



Consulting Engineers Environmental Scientists Construction Materials Testing

August 3, 2023

GNN Project No. 222-1615

Upper Peoh Point Rock Quarry  
2906 Upper Peoh Point Road  
Cle Elum, Washington 98922

**RECEIVED**

**August 3, 2023**

**Washington Geological Survey**

Attn: Robert W. Dressel Jr., Owner

CC: Skylar Brower, PE, AHBL, Inc.

**Subject: Report of Geotechnical Evaluation and Slope Stability Analyses  
Peoh Point Rock Quarry Mine Reclamation  
2906 Upper Peoh Point Road, Cle Elum, Kittitas County, Washington**

Dear Mr. Dressel,

As requested, GN Northern (GNN) has completed a geotechnical evaluation and slope stability analyses for the Peoh Point Rock Quarry proposed mining area near Cle Elum in Kittitas County, Washington.


Based on the findings of our reconnaissance of the proposed mining area subsurface study, we conclude that the proposed mine reclamation project is generally considered feasible provided the recommendations presented in this report are followed during the production phases of the planned quarry operations.

This report describes in detail the results of our investigation, summarizes our findings, and presents our recommendations concerning earthwork and mining processes for the proposed quarry.

If you have any questions regarding this report, please contact us at 509-893-9400.

Respectfully submitted,

**GN Northern, Inc.**

  
Karl A. Harmon, LEG, PE  
Senior Geologist/Engineer



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## **1.0 EXECUTIVE SUMMARY**

GN Northern (GNN) has prepared this executive summary to provide a general overview of the finding and conclusions of our geotechnical evaluation and slope stability analyses as required for submittal with your Washington State Department of Natural Resources application for Reclamation Permit and Plan for the proposed rock quarry near Cle Elum, Washington. The report itself should be relied upon for information about the findings, conclusions, recommendations, and other concerns. The intent of this study is to assess potential slope stability hazards that may impact the proposed mine/quarry activities at the site of the proposed mining and provide our recommendations for mitigation as needed.

We understand the client intends to utilize the subject property for quarrying of talus materials for distribution and resale of the processed aggregate materials. The subject site of the proposed mining area currently consists of relatively steep, undeveloped hillside terrain with a moderate growth of native grasses and brush in the northern gentler slopes and thickly wooded terrain in the steeper slopes in the southern portion of the project site of the proposed mining area. In preparing this report, we reviewed existing topography, proposed final grades, and cross-sections provided by Skylar Brower, PE, with AHBL, Inc.

Our site assessment of the proposed mining area was performed to identify common geologic conditions in the project region, including soil and bedrock conditions, groundwater, slopes, drainage, erosion, and geologic hazards. A review of selected information pertaining to the subject property and surrounding region was performed that included published technical literature, published geologic maps, available aerial photographs, and previous geotechnical/geologic studies prepared for other sites in the vicinity. Geologic and geotechnical data was obtained from our detailed field reconnaissance to observe site conditions at the proposed mining area and subsurface soil/rock conditions within existing cuts.

Based on our site evaluation and analyses of the proposed mining area, our findings indicate that the proposed mine/quarry project may be proceed as planned, given that the recommendations for mitigation of steep slopes and proposed cuts are followed. The proposed mine/quarry project will require appropriate design and construction for proposed reconfigured slopes as well as drainage/erosion control measures to mitigate the potential geologic constraints at the proposed mining area.

*In our professional opinion, the proposed mining/quarry project may be developed as planned, provided that the recommendations in this report are incorporated in the final civil design and earthwork construction. Based on our valuation and analysis of the proposed mining area, the existing native slope conditions are generally considered stable. Proposed cut slopes for the planned mine/quarry project will require appropriate grading measures as recommended within this report to minimize the risk of slope instability and increase safety factors of the reconfigured slopes.*

## **2.0 INTRODUCTION**

### **2.1 Project Description**

This report of geotechnical evaluation and slope stability analyses has been prepared for the proposed mining area of the proposed Peoh Point Rock Quarry located south of Cle Elum in Kittitas County, Washington (see Figure 1 attached to this report). The subject site of the proposed mining area is located along and to the south of the existing BPA transmission line alignment extending east-west across the region south of Cle Elum. The proposed mining area is mapped to lie within Kittitas County Geologically Hazardous Areas, with areas at risk from steep slopes (>35%) and erosion hazards.

### **2.2 Purpose and Scope of Services**

The purpose of our services was to assess the surface and subsurface soil and bedrock conditions and potential slope stability hazards as they relate to the proposed mine/quarry operations, and provide professional opinions regarding the general feasibility of the proposed mine/quarry project and provide recommendation for mitigation of any identified slope stability hazards and constraints.

Our study was conducted in general accordance with our *Proposal for Geotechnical and Geologic Engineering Services* dated November 30, 2022; notice to proceed was provided in the form of a signed copy of our proposal dated December 4, 2022.

The scope of work included the following:

- A detailed reconnaissance of the site of the proposed mining area on November 18, 2022.
- A review of selected published technical literature pertaining to the site of the proposed mining area and previous geologic reports prepared for similar projects in the vicinity.



- Review of selected available historic aerial photos and USGS topographic maps of the project site and vicinity.
- A geologic/engineering analysis and evaluation of the acquired data from the site reconnaissance.
- Stability analyses of existing and proposed mining area slopes.
- A summary of our findings, conclusions and recommendations in this written report.

### **3.0 METHODS OF EVALUATION OF THE PROPOSED MINING AREA**

#### ***3.1 Reconnaissance of the Proposed Mining Area***

A detained field reconnaissance of the proposed mining area site was performed on November 18th, 2022 to observe the on-site surficial geologic and geotechnical conditions. The purpose of the field reconnaissance was to observe the proposed mining area slope conditions along with readily viewable exposed surficial geologic conditions to compare with the data obtained from our technical literature review. During our reconnaissance we looked for common geomorphic features of landslides as well as characteristic indications of possible recent activity and instability of slide masses.

#### ***3.2 Technical Literature and Aerial Photo Review***

A review of selected information pertaining to the proposed mining area and surrounding area was performed that included published technical literature, published geologic maps, aerial photographs and previous geotechnical and geologic reports prepared for other sites in the vicinity. The review was performed to identify typical geotechnical and geologic constraints that may affect the proposed mine/quarry project, including soil and bedrock conditions, groundwater, slopes, drainage, erosion, and geologic hazards.

GNN also reviewed the Washington State Department of Natural Resources website pertaining to *Surface Mining and Regulations* as well as the Instruction for Form SM-8A Application for Reclamation Permit. Our review of the regulations indicate that the primary geotechnical-related concern focuses on the need to address safe stability of planned slopes associated with the planned quarry/mining operations.

We reviewed Permit Set dated 1-24-2023 prepared by AHBL, Inc. and the Washington State Department of Natural Resources Application for Reclamation Permit and Plan (Form SM-8A). Based

on the permit application we understand that the total acreage to be permitted would be 100 acres and the total area to be disturbed during the life of the mine would be 45 acres. The permit application indicate that the maximum vertical depth (thickness) mined below pre-mining topographic grade will be 23 feet and the lowest elevation of excavated mine will be 2250 feet relative to MSL and the highest elevation of excavated mine will be 2770 feet relative to MSL. The reclamation setback for this proposed mining area will be 30 feet wide.

## **4.0 DISCUSSION OF PROPOSED MINING AREA AND GEOLOGIC CONDITIONS**

### ***4.1 Conditions at the Proposed Mining Area***

A detained field reconnaissance of the proposed mining area was performed on November 18<sup>th</sup>, 2022 to observe the on-site surficial geologic and geotechnical conditions. The norther portion of the proposed mining area identified as Zone 5 is located along the BPA power transmission line alignment that extend east-west across the region. The southern portions of the quarry, identified as Zones 1 through 4, are situated upslope and to the south on the norther flanks of Peoh Point Mountain. The assigned address of the proposed mining area is identified as 2906 Upper Peoh Point Road south of Cle Elum in Kittitas County, Washington (see Figure 1 attached to this report). The proposed mining area is located in the NW  $\frac{1}{4}$  and NE  $\frac{1}{4}$  of Section 10, Township 19 North and Range 15 East, Willamette Meridian.

The lower portion of the proposed mining area along the BPA alignment has been historically deforested and generally covered with a sparse to moderate growth of grasses and brush, while the southern zones 1-4 located on the lower flanks of Peoh Point are generally moderately to densely wooded with mature evergreen trees. Existing native slopes at the proposed mining area typically exhibit approximate gradients ranging from ~15% to greater than 60%.

### ***4.2 Proposed Mining Area Slopes***

Existing native slopes at the proposed mining area site typically range from approximately 15% to 60%. Portions of the subject property lie within the Kittitas County designated Geologically Hazardous Areas Map, with selected areas mapped for steep slopes and erosion hazards. A field reconnaissance of the subject property was performed to observe conditions at the proposed mining area and correlate the information gathered from our preliminary research. During our reconnaissance we looked for common geomorphic features of landslides as well as indications of possible signs demonstrating recent activity

and instability of slide masses. Aside from some observed areas of surface raveling along overstepped trail cuts, no notable indications of recent failures or significant slope instability were observed on or near the proposed mining area.

#### **4.3 Subsurface Soil Conditions**

Based on our observations at the proposed mining area of exposed soils revealed within various access trail roadway cuts across the planned quarry zones, the typical subsurface soil profile encountered generally consist of apparent colluvium consisting of sandy gravels with silt, cobbles, and boulders. The soils within the exiting onsite cut slopes generally consist of a heterogeneous blend of grain sizes ranging from cobbles/boulders to silts that appeared to be medium dense and damp. Although assumed to be present in the uppermost portions of the proposed mining area, bedrock outcrops of the underlying Peoh Point volcanics were not observed.

The soil survey map of the proposed mining area prepared by the Natural Resources Conservation Service (NRCS) generally identifies the proposed mining area soils along the BPA alignment as *Kladnick very stony ashy loam, 5% to 15% slopes* (Landform: Terraces; Parent Material: Glacial outwash with mantle of volcanic ash), with soils along the lower flanks of Peoh Point consisting of *Jumpe stony ashy loam, 45% to 65% slopes* (Landform: Mountain Slopes; Parent Material: Residuum and colluvium from basalt, with loess and minor amounts of volcanic ash).

#### **4.4 Groundwater**

We reviewed the Washington State Department of Ecology database of nearby well logs to estimate groundwater levels in the vicinity. Based on our review of available data, we believe groundwater levels are anticipated to be greater than 100 feet BGS at the proposed mining area.

#### **4.5 Geologic Setting**

The project site of the proposed mining area is located south Yakima River within the Kittitas Valley situated on the eastern flanks of the Cascade Mountains. Localized geologic conditions at the proposed mining area are generally characterized by recent alluvial deposits and glacial sediments deposited during the Pleistocene epoch. According to *Washington State Department of Natural Resources Washington Geologic Information Portal*, the surficial geology of the proposed mining area is mapped as Quaternary alluvium (Qa) described as unconsolidated or semi-consolidated alluvial clay, silt, sand, gravel, and cobble deposits. These surficial deposits also include colluvium, talus, and mass-wasting

deposits. One small portion on the southwest corner of Zone 5 is mapped as Quaternary mass wasting deposits (Qls) composed primarily of landslide deposits which include talus, colluvium, and avalanche debris. These surficial deposits overlie Tertiary volcanic rocks and in the eastern portion, basalts from the most western extent of the late to middle Miocene-age Columbia River Basalt Group. To the south of the proposed mining area, Peoh Point, and the surrounding cliffs are mapped as Tertiary intrusive rocks (Pliocene), described as andesite, dacite porphyry, dacite, quartz diorite and diorite stocks, plugs domes, and dikes.

## 5.0 SLOPE STABILITY ANALYSIS

Slope stability analyses were conducted for the existing native slopes as well as various planned reconfigured gradients and slope heights that are anticipated within each of quarry operational zones. The analyses were conducted using generalized geologic cross-section models and data obtained from our subsurface exploration. ***The output sheets of our slope stability analyses are attached to this report.***

The static slope stability analysis was conducted by a two-dimensional limit equilibrium stability analysis of selected trial failure surfaces using the computer program *SLIDE (Version 7)*. Potential circular-arc failure surfaces were evaluated using the Spencer method. The computer program searched for critical potential failure surfaces with low computed factors of safety. The computed factor of safety (FS) against slope failure is simply the ratio of total resisting forces or moments (strength of the slope) to the total driving forces or moments for planar or circular failure surfaces respectively. A slope with a factor of safety of 1.0 is in equilibrium, indicating that the disturbing forces driving the slope down are equal to its strength to resist failure. Simply put, slope-failure results when the strength of the slope is overcome by gravity.

The stability of the slopes have been analyzed under both static and seismic conditions. Our analysis used the pseudostatic method which modifies the limit equilibrium method by incorporating a horizontal static seismic force to simulate the potential inertial forces generated from earthquake ground accelerations. For slope stability analyses under seismic loading, a pseudostatic seismic coefficient,  $k_h$  (horizontal component), expressed in terms of acceleration (units of g), is typically estimated as a percentage of the horizontal peak ground acceleration (PGA). PGA for the proposed mining area was calculated with a 2,475-year return interval (RI) assuming Site Class D using the online USGS PSHA

Deaggregation tool for a 2% probability of exceedance in 50 years. For our analyses, we have selected a value of  $k_h = 0.135g$ , approximately half of the design PGA of  $0.27g$ .

The selection of unit weight and shear strength parameters for the various earth materials were based on judgment and data obtained during our field reconnaissance, review of previous studies, research and previous experience with similar materials in similar geotechnical and geologic settings. Engineering and geologic judgment must be applied to the estimated shear strength parameters in order to consider lateral and vertical variations in the subsurface conditions, such as degree of cementation, fracturing, planes of weakness, and gradational characteristics. The geotechnical strength parameters used in our stability calculations are presented on the stability output sheets attached to this report.

The results of our analyses and reconnaissance of the proposed mining area indicate that the existing native (undisturbed) slopes at the proposed mining area generally appear to be grossly stable. The analyses of proposed cut slopes indicate relatively deep failure planes with safety factors well below 1.3 that will require remedial grading. Shallow failures through the near-surface soils represent relatively insignificant displacement of the surficial veneer of residual soils that should be readily mitigated with appropriate erosion control measures (BMPs). GN Northern recommends that any reconfigured quarry related cut slopes should be limited to a gradient that will meet a minimum factor of safety of 1.3 for the static condition. Our analyses further indicate that, considering the strength properties of the onsite earth materials that will be exposed, in order to maintain a minimum safety factor of 1.3, quarry slopes gradients must not be cut steeper than 1.85H:1V ( $\sim 28.5^\circ$ ).

## ***6.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS***

The following is a summary of our findings, conclusions and professional opinions based on the data obtained from a review of selected technical literature and the proposed mining area evaluation:

- The near-surface soils at the proposed mining area are susceptible to wind and water erosion when exposed during grading operations. Preventative measures and appropriate BMPs to control runoff and reduce erosion should be incorporated into grading plans for the proposed mining area. All slope faces shall be protected with appropriate erosion control measures (BMPs) to insure long-term surficial stability.

- Our review and analyses indicate that the existing undisturbed native slopes of the proposed mining area are generally considered grossly stable.
- **Proposed cut slopes for quarry operations in each of the zones must be constructed to a maximum gradient of 1.85H:1V.**
- ***In our professional opinion, the proposed mine/quarry project at the site of the proposed mining area will not pose a threat to the health or safety of the public, or increase hazards to surrounding properties, provided the recommendations in this report are followed in the design and construction of this project.***

#### Temporary Excavations

Unsupported vertical cuts deeper than 4 feet are not recommended if worker access is necessary. The cuts shall be adequately sloped, shored or supported to prevent injury to personnel from caving and sloughing. No heavy equipment shall be allowed near the top of temporary cut slopes unless the cut slopes are adequately braced. The contractor shall be aware of and familiar with applicable local, state and federal safety regulations including the current OSHA Excavation and Trench Safety Standards, and OSHA Health and Safety Standards for Excavations, 29 CFR Part 1929, or successor regulations. The following table summarizes the soil classification type according to chapter 296-155 of the Washington Administrative Code (WAC), and provides slope gradients for temporary and permanent slopes for excavation planning purposes for this project:

**Table 2: Recommended Excavation Parameters**

Parameter	Value
Soil Classification Type*	Type 'C'
Temporary slope gradient	1.5H:1V (max.)
Permanent slope gradient	2H:1V (max.)

\*actual classification shall be performed by a competent person based on real-time exposed soil conditions.

#### Slope Erosion Protection

Proper slope protection will help minimize slope erosion and improve the stability of the cut slopes. The project soils are prone to erosion and will require appropriate BMP protection and maintenance. Positive drainage should be provided at the tops of all slopes to divert runoff away from the face. Erosion protection should be provided, especially where concentrated runoff is anticipated. Erosion control

measures should take into consideration the engineering characteristics of the slopes, especially with regards to the surficial stability.

The need for and design of flood control and erosion protection measures is within the purview of the design civil engineer and/or landscape architect. In general, erosion should be mitigated with best management practices (BMPs) consisting of proper drainage design including collecting and disposal (conveyance) of water to approved points of discharge in a non-erosive manner.

## **7.0 LIMITATIONS OF THE GEOTECHNICAL EVALUATION REPORT**

This GEOTECHNICAL EVALUATION AND SLOPE STABILITY ANALYSES REPORT (“Report”) was prepared for the exclusive use of the Client. GN Northern, Inc.’s (GNN) findings, conclusions and recommendations in this Report are based on selected points of field exploration, laboratory testing, and GNN’s understanding of the proposed project at the time the Report is prepared. Furthermore, GNN’s findings and recommendations are based on the assumption that soil, rock and/or groundwater conditions do not vary significantly from those found at specific exploratory locations at the proposed mining area. Variations in soil, bedrock and/or groundwater conditions could exist between and beyond the exploration points. The nature and extent of these variations may not become evident until during or after construction. Variations in soil, bedrock and groundwater may require additional studies, consultation, and revisions to GNN’s recommendations in the Report.

GNN has provided geotechnical services in accordance with generally accepted geotechnical engineering practices in this locality at this time. GNN expressly disclaims all warranties and guarantees, express or implied.

Although GNN can provide environmental assessment and investigation services for an additional cost, the current scope of GNN’s services does not include an environmental assessment or an investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.



## ***ATTACHMENTS***

**Vicinity Map (Figure 1)**  
**Geologic Map Map (Figure 2)**  
**Lidar Maps (Figure 3)**  
**AHBL - Overall Site Plan**

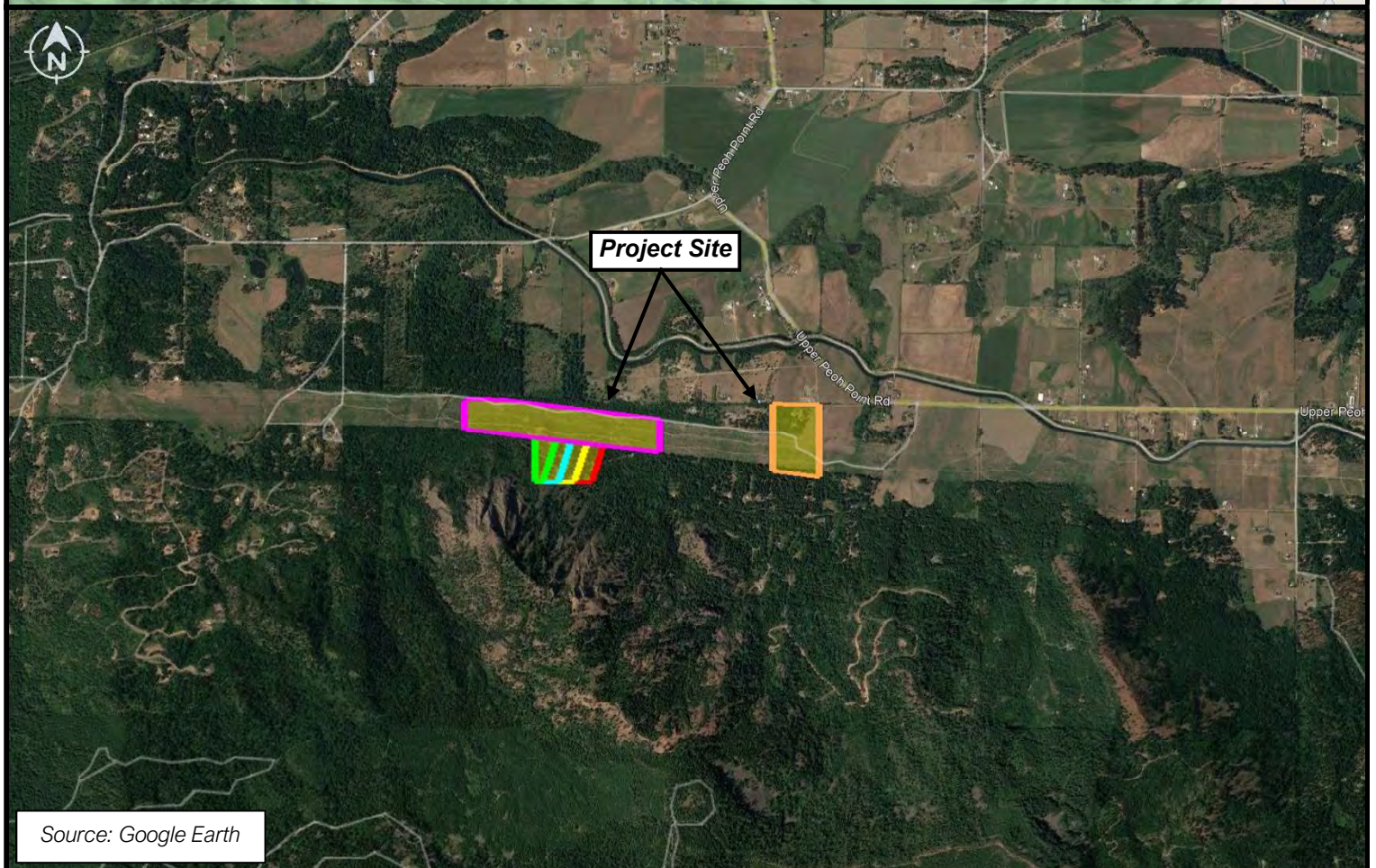
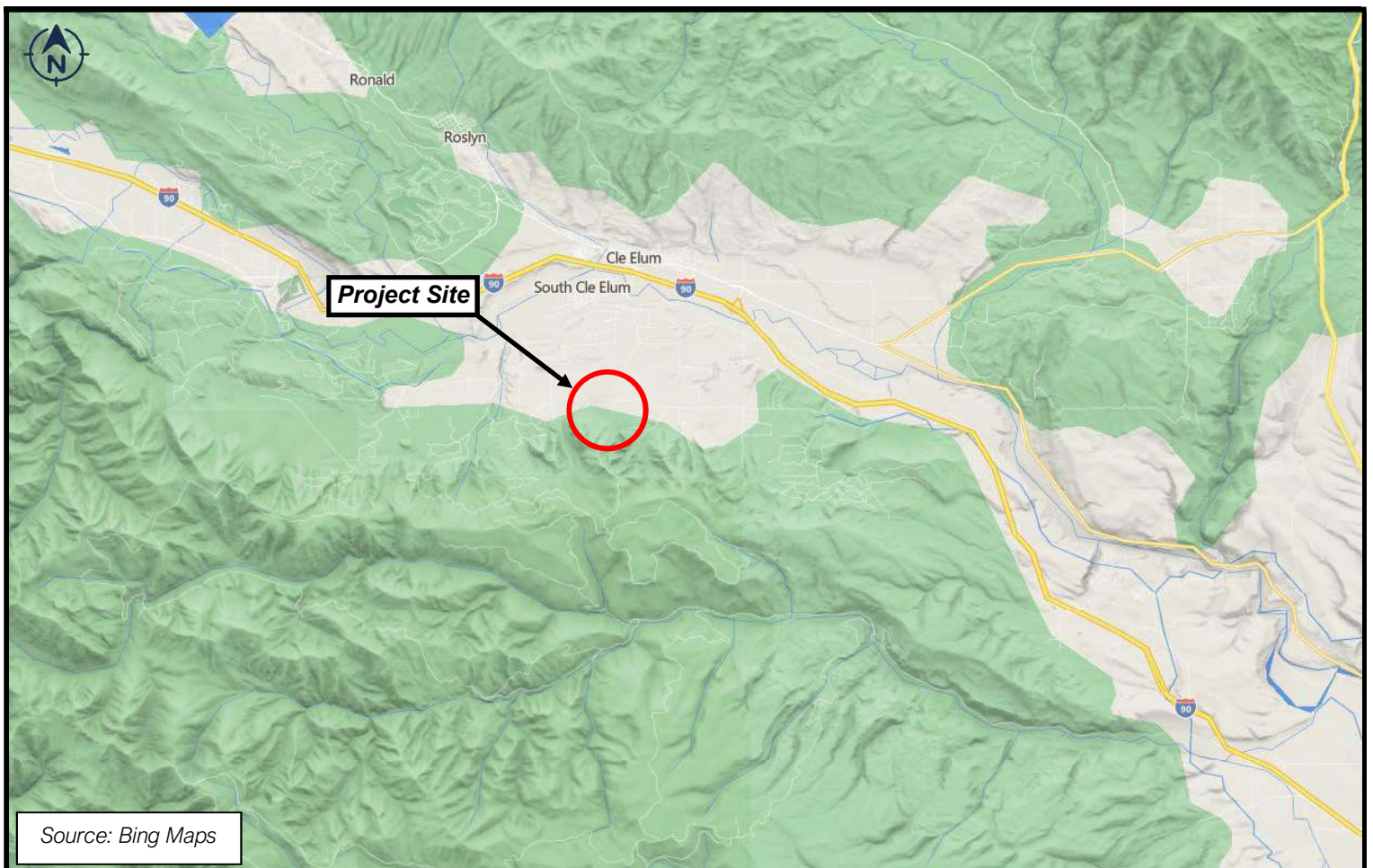
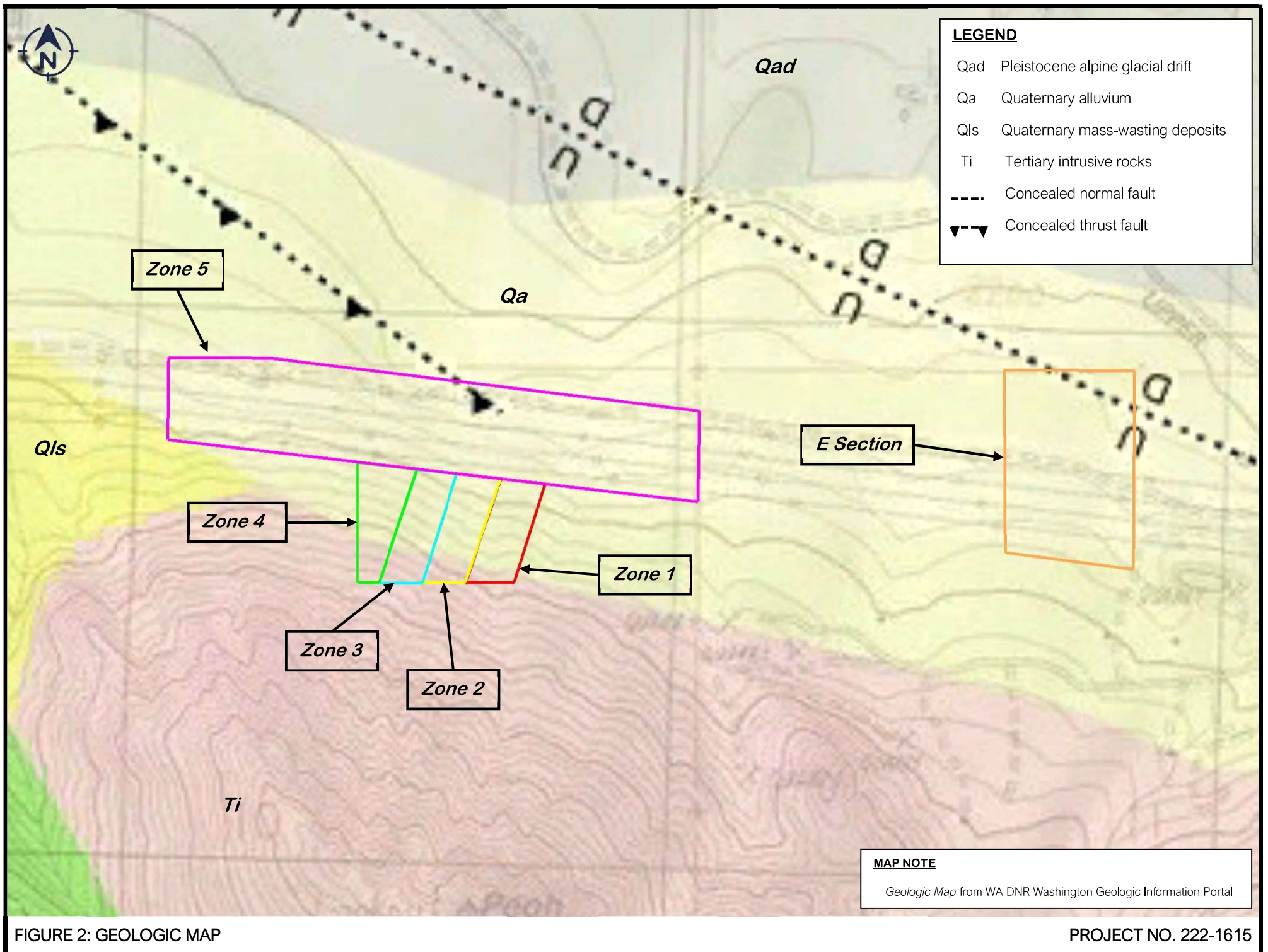


FIGURE 1: VICINITY MAP







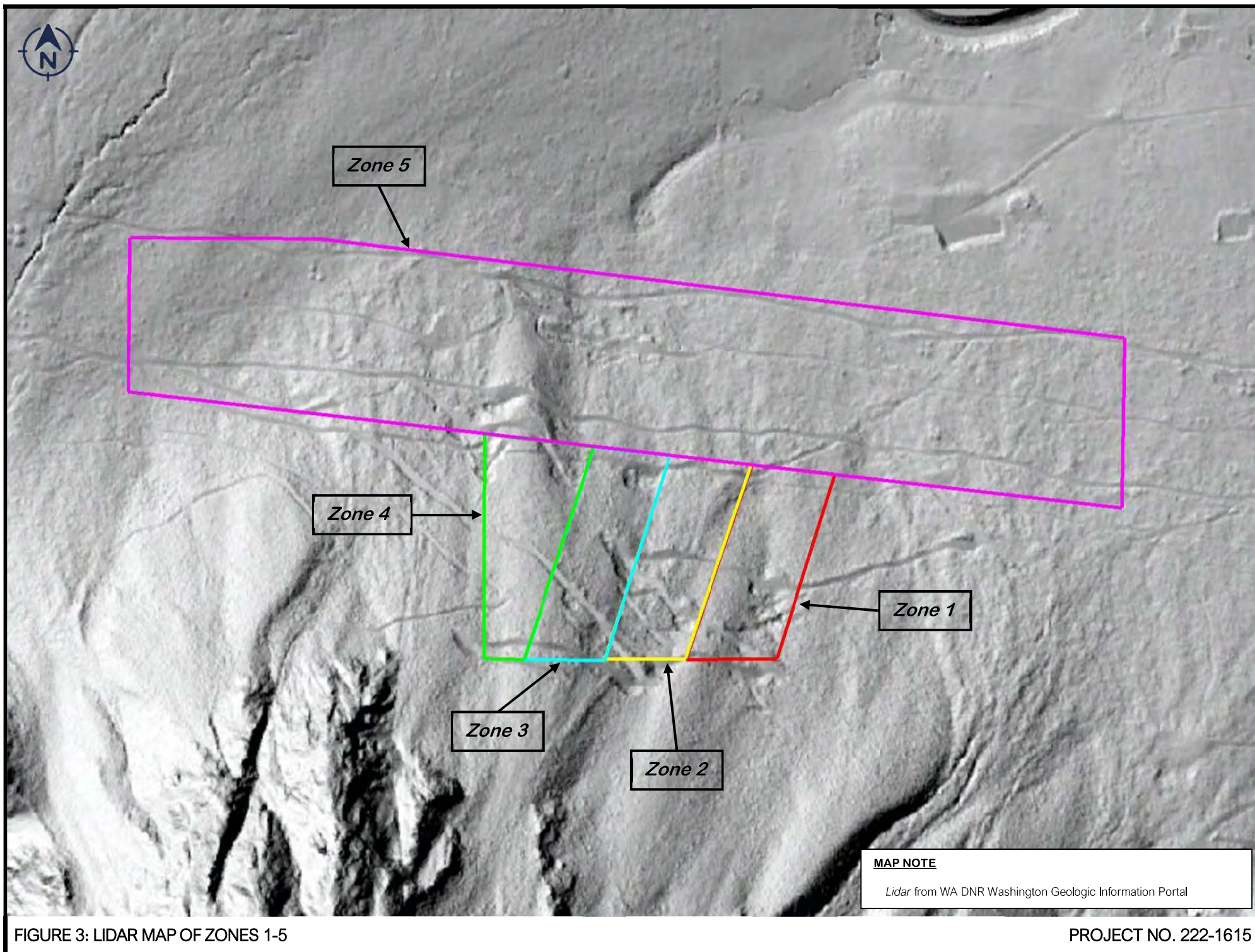


FIGURE 3: LIDAR MAP OF ZONES 1-5





**Project Title:**  
**PEOH POINT ROCK  
QUARRY - CLE ELUM**

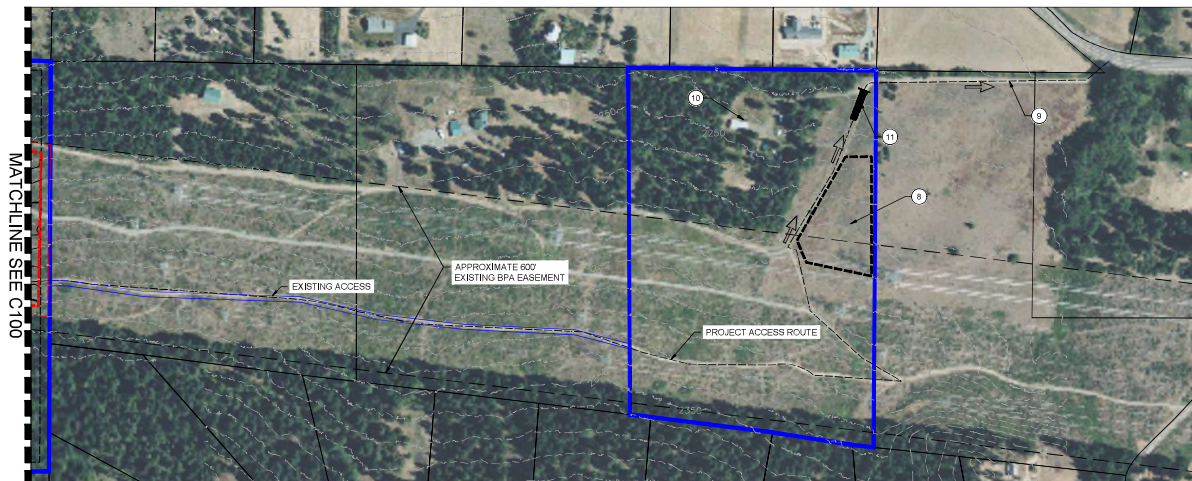
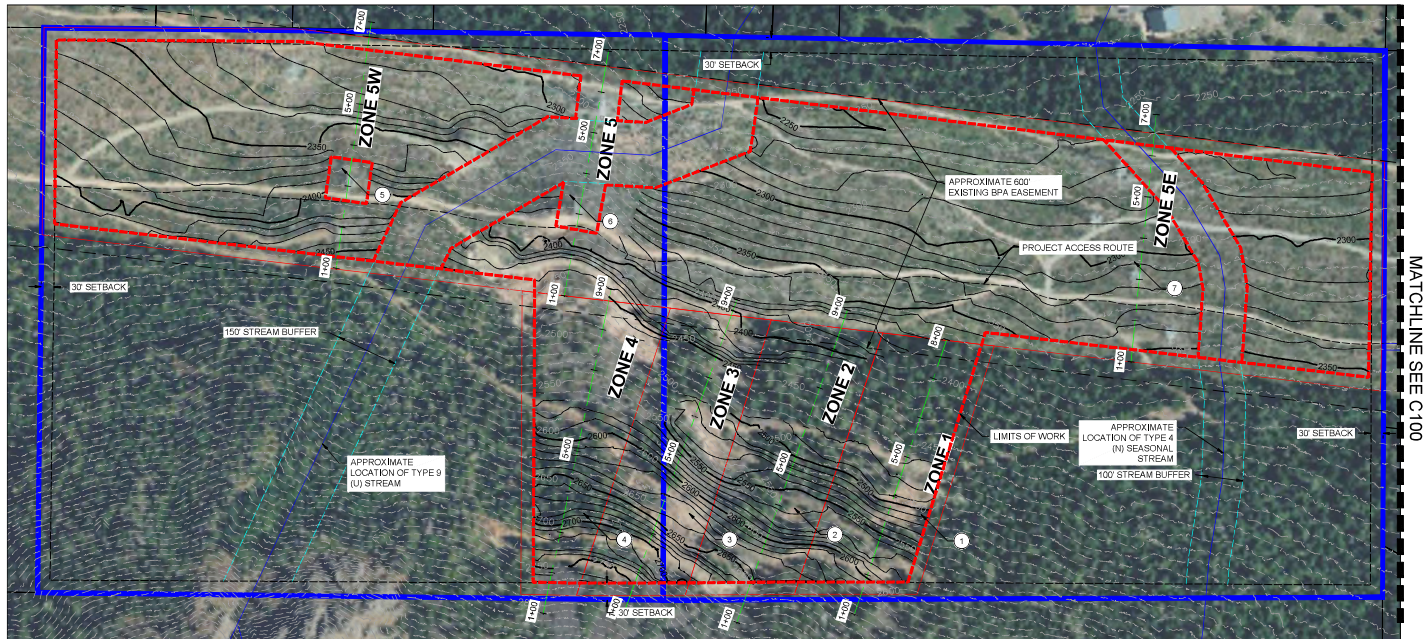
Client:  
**ROBERT DRESSEL**

2906 UPPER PECH POINT ROAD  
CLE ELUM, WA 98922

Job No. 2220480.10

Issue Set & Date:  
**PERMIT SET**

01.24.2023




## KEY NOTES

- |    |  |
|----|--|
| 1  | SEE SHEET C201 FOR LIMITS OF DISTURBANCE AND PROPOSED GRADING OF ZONE 1  |
| 2  | SEE SHEET C202 FOR LIMITS OF DISTURBANCE AND PROPOSED GRADING OF ZONE 2  |
| 3  | SEE SHEET C203 FOR LIMITS OF DISTURBANCE AND PROPOSED GRADING OF ZONE 3  |
| 4  | SEE SHEET C204 FOR LIMITS OF DISTURBANCE AND PROPOSED GRADING OF ZONE 4  |
| 5  | SEE SHEET C205 FOR LIMITS OF DISTURBANCE AND PROPOSED GRADING OF ZONE 5W |
| 6  | SEE SHEET C206 FOR LIMITS OF DISTURBANCE AND PROPOSED GRADING OF ZONE 5  |
| 7  | SEE SHEET C207 FOR LIMITS OF DISTURBANCE AND PROPOSED GRADING OF ZONE 5E |
| 8  | STAGING AREA   |
| 9  | ACCESS TO PUBLIC ROADWAY THROUGH ACCESS EASEMENT                         |
| 10 | PROJECT OFFICE   |
| 11 | CONSTRUCTION ENTRANCE  |



HORIZONTAL SCALE



0 75 150 300

1" = 150 FEET

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3

2



Revisions:

Sheet Title:

Sheet Title:  
**OVERALL SITE PLAN**

Designed by: SBP      Drawn by: SBP      Checked by: SMB

Sheet No.

# C100

3 of 12 Sheets



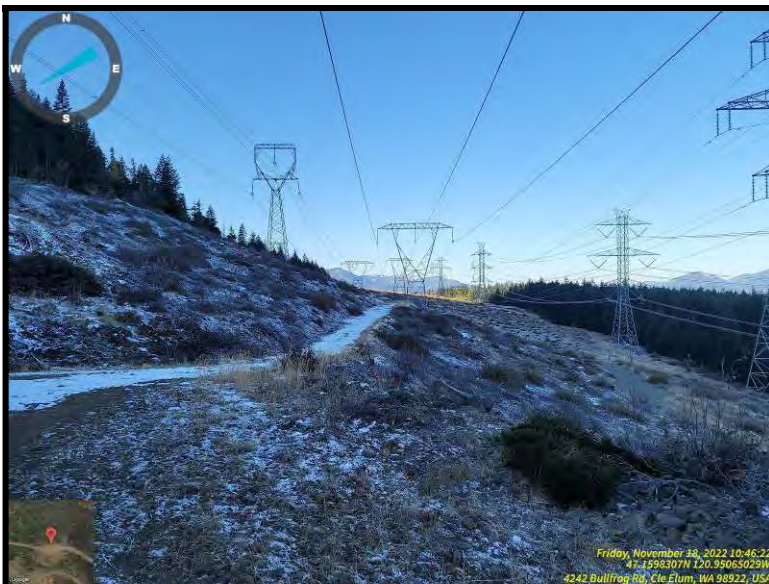
Know what's below.  
Call before you dig.

DATE: January 24, 2023 FILENAME: Q:\2022\2220480\10 CIVICAD\2220480-SH-SITE.dwg

2220480-SH-SITE.DWG EXIST SITE

## **Site Reconnaissance Photographs**





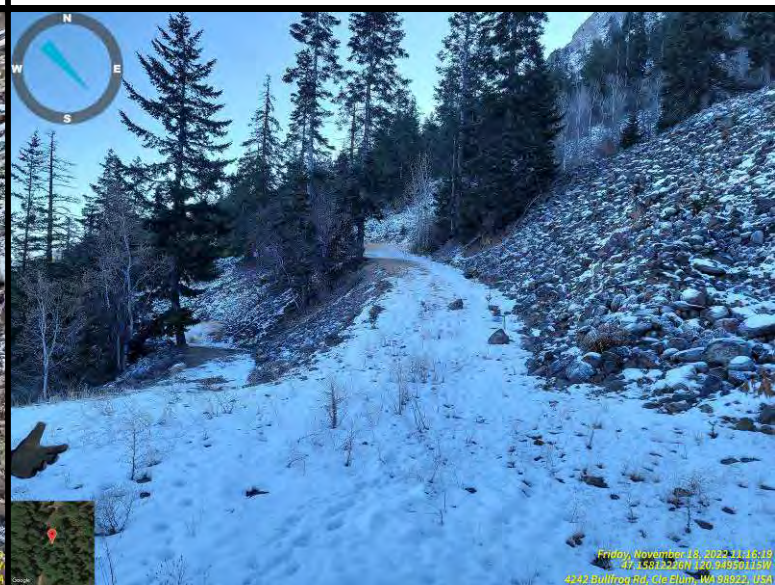
*Access road in southern portion of site*



*Road cut and small quarry*



*Access road in southern portion of site*



*Road cut on southern hillside*



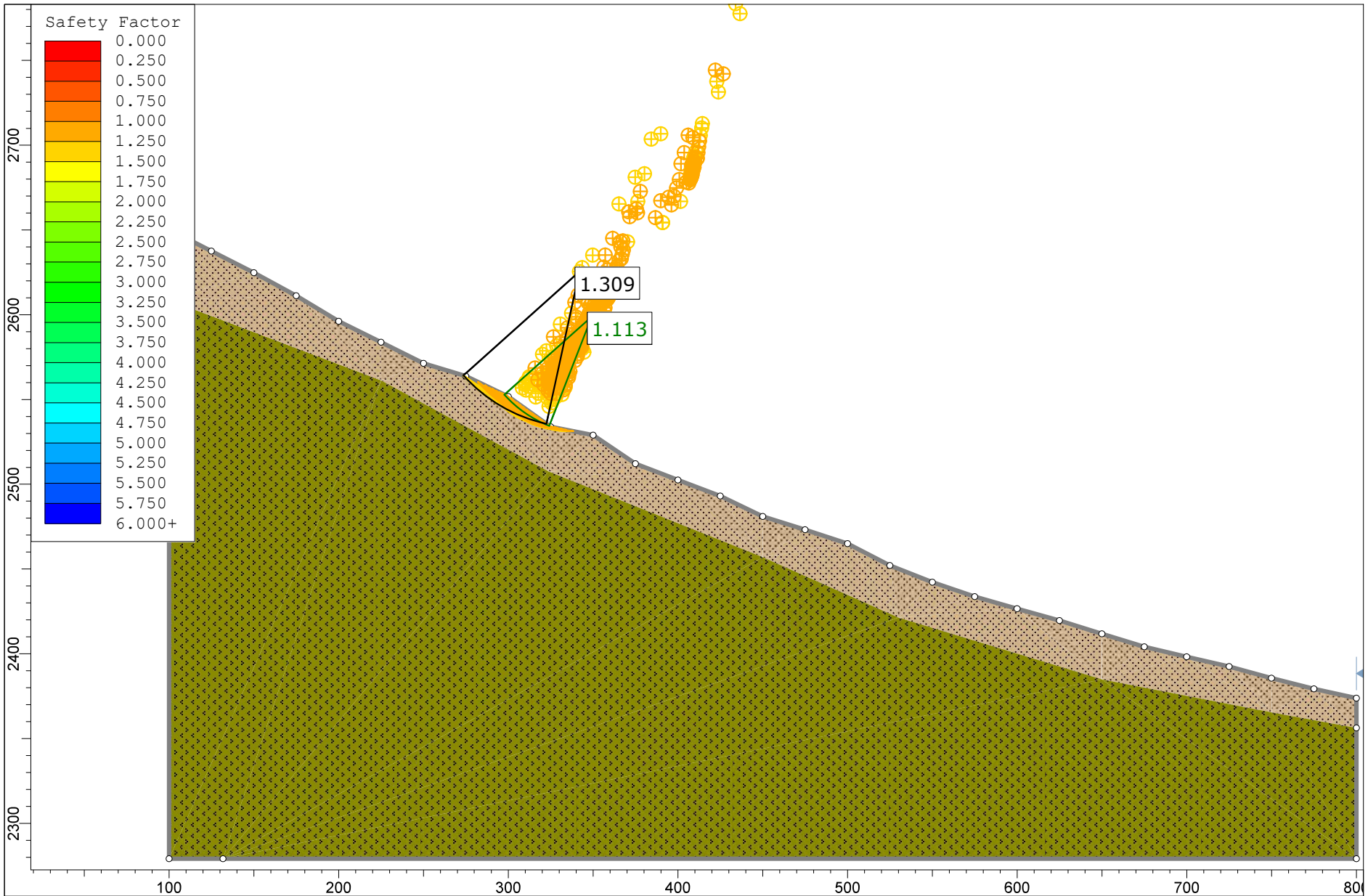
*Road cut in southern portion of site*



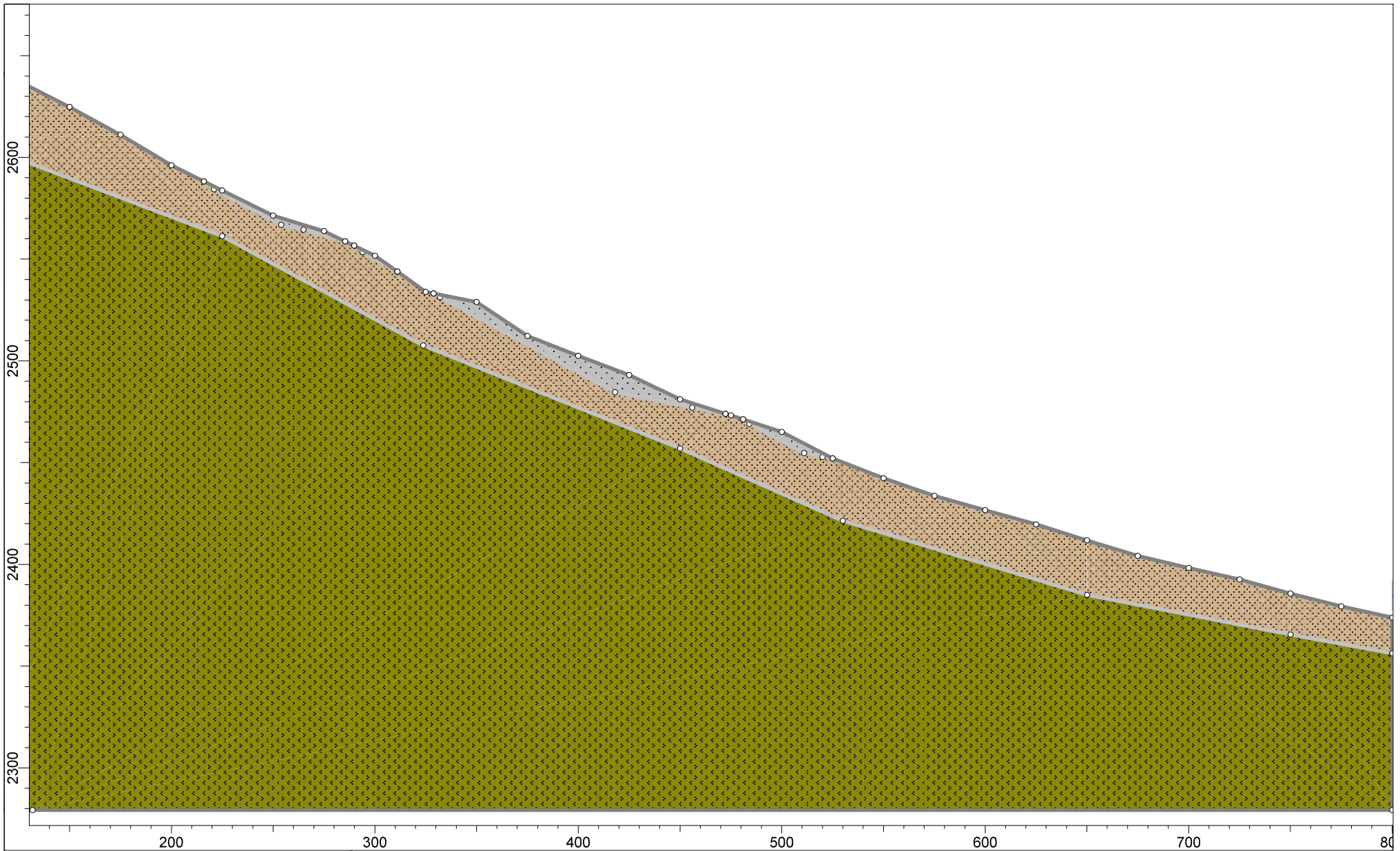
*Colluvium downhill of access road*




## **Slope Stability Analyses**



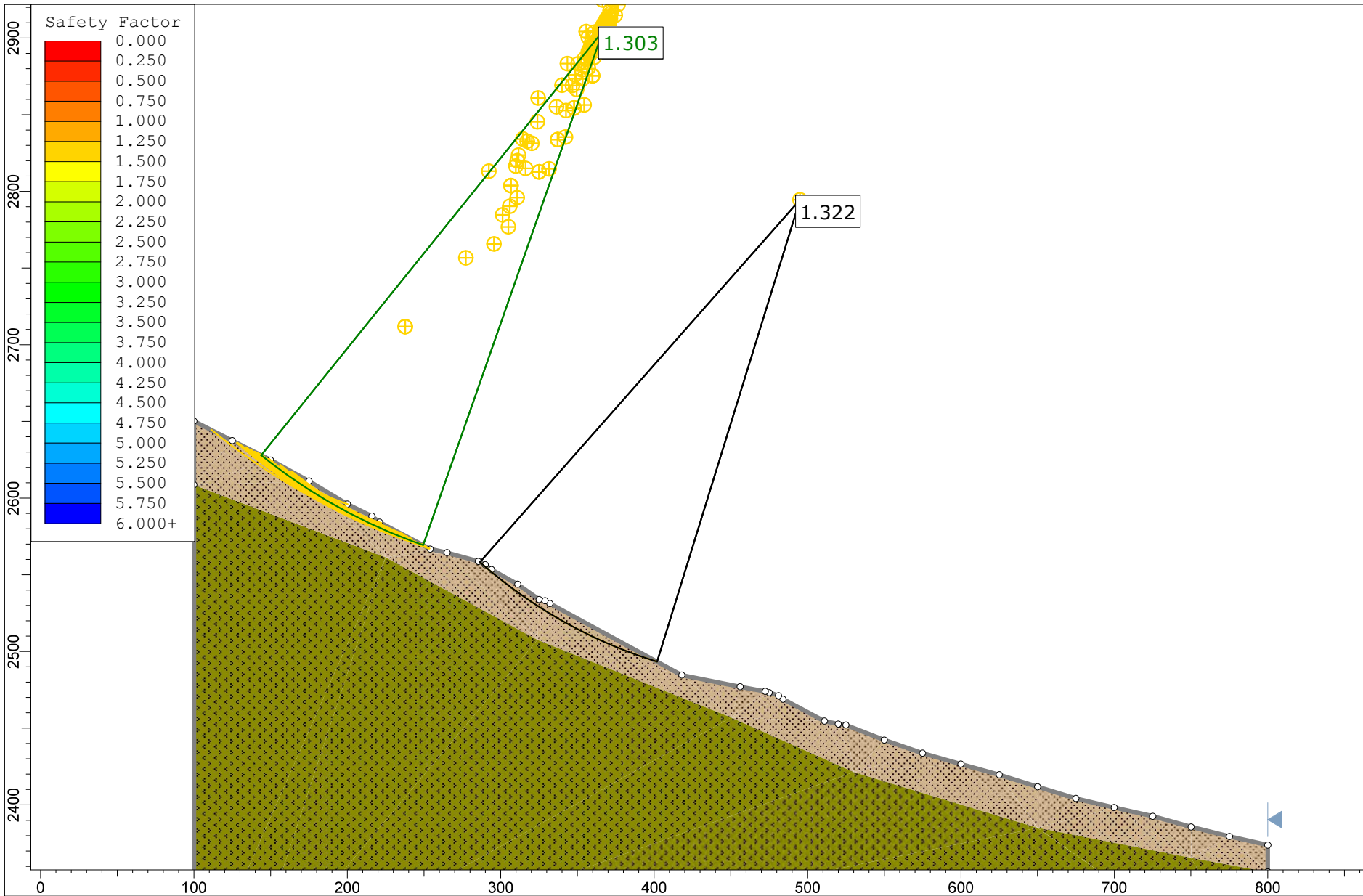
Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 1 - Existing Slope - Static			
Drawn By	KAH	Scale	1:986
		Company	GNN
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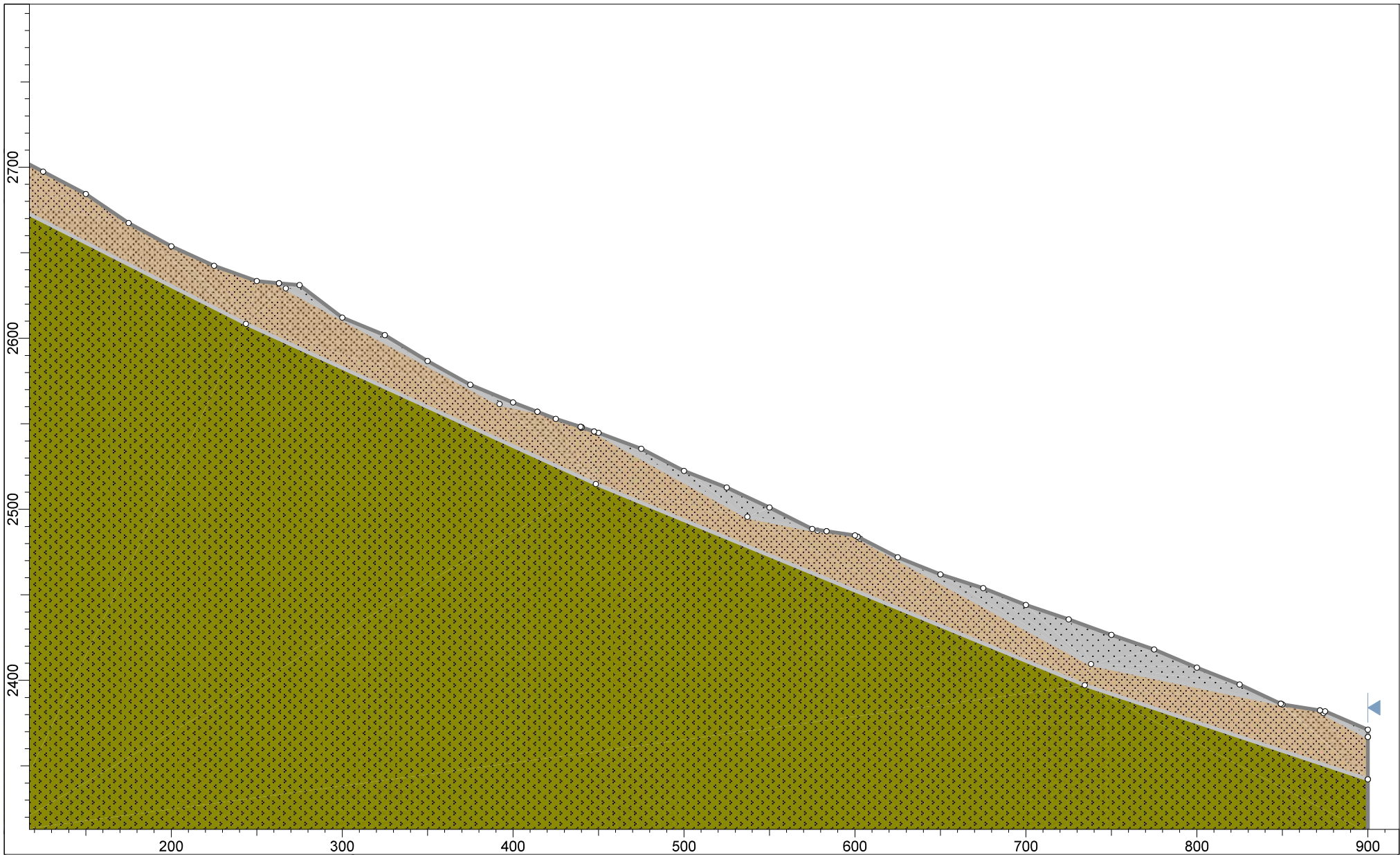
 <div><b>Northern, Inc.</b> Consulting Engineers   Environmental Scientists   Geologists Construction Materials Testing   Geophysical Services</div>	<i>Project</i>				Peoh Point Rock Quarry		
	<i>Analysis Description</i>				Zone 1 - Proposed Slope - Static		
	<i>Drawn By</i>		KAH	<i>Scale</i>	1:780	<i>Company</i>	GNN
	<i>Date</i>		1/30/2023, 4:01:50 PM		<i>File Name</i>	Zone 1 Proposed REV.slim	


SLIDE 7.036



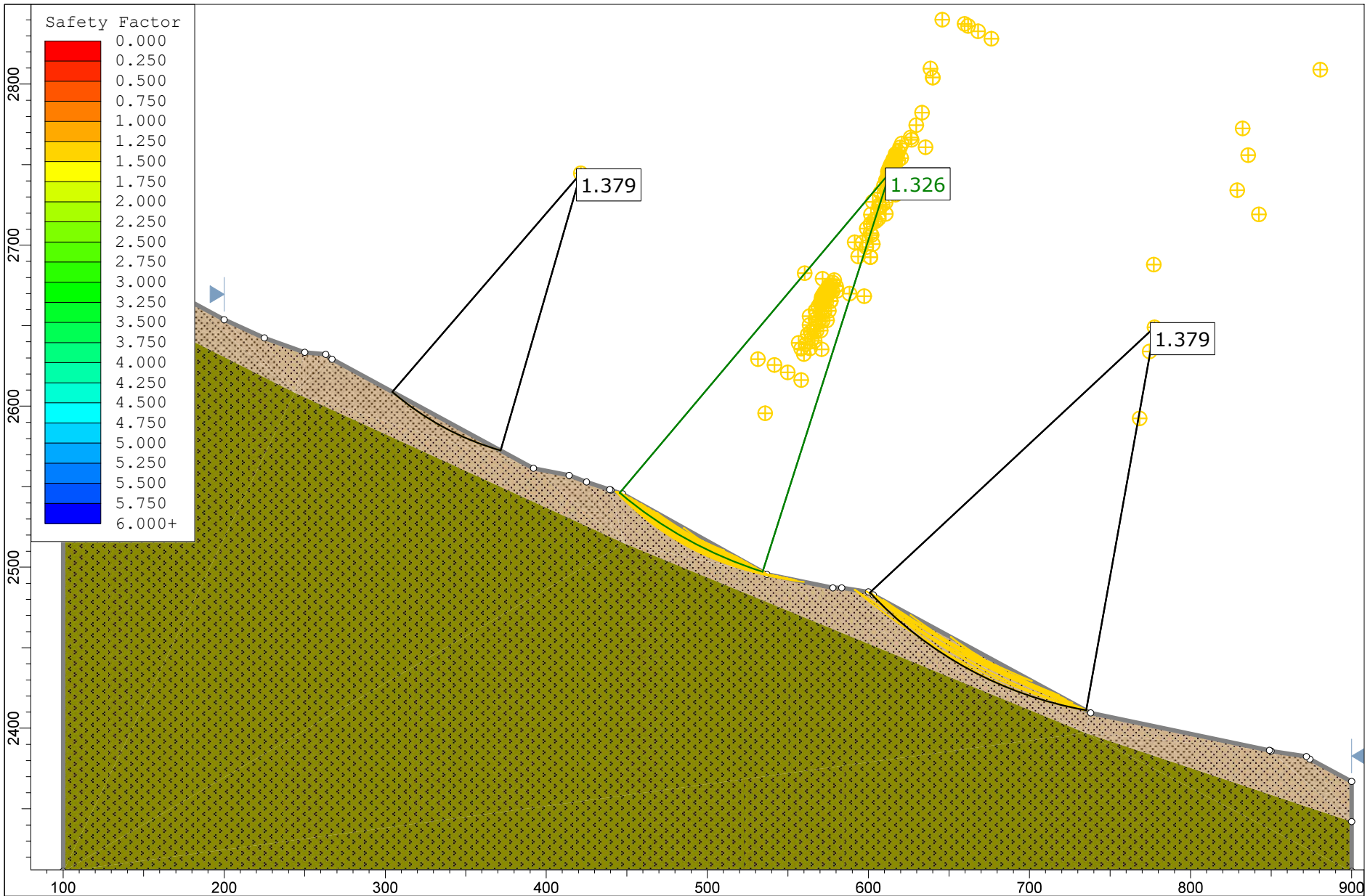


 <b>Northern, Inc.</b> <small>Consulting Engineers   Environmental Scientists   Geologists Construction Materials Testing   Geophysical Services</small>	Project				
	Peoh Point Rock Quarry				
	Analysis Description				
	Zone 1 - Proposed Slope - Static				
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SLIDEINTERPRET 7.036					



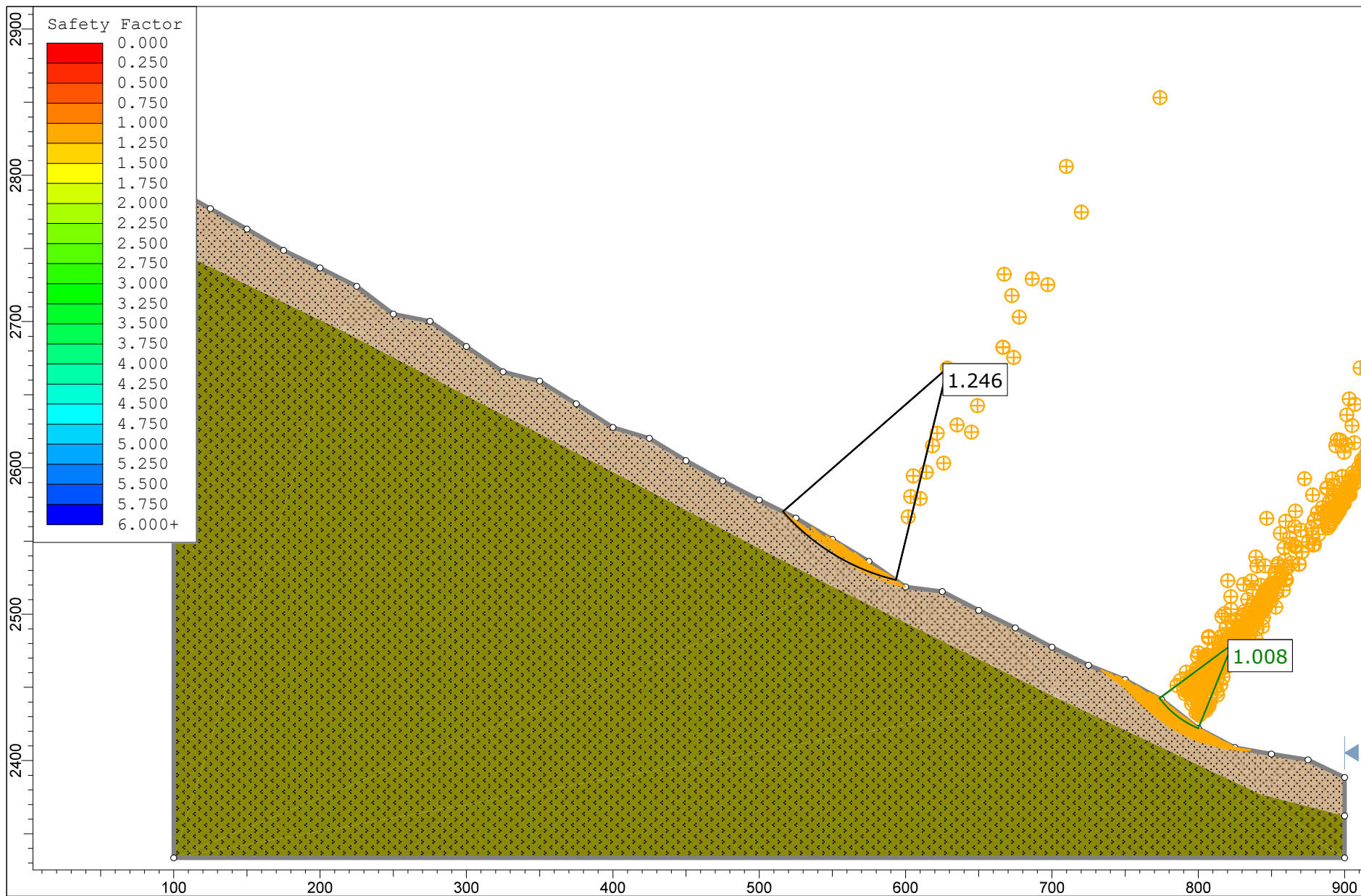
 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Peoh Point Rock Quarry	
	Analysis Description			Zone 2 - Exisitng Slope - Static	
	Drawn By	KAH	Scale	1:933	Company GNN
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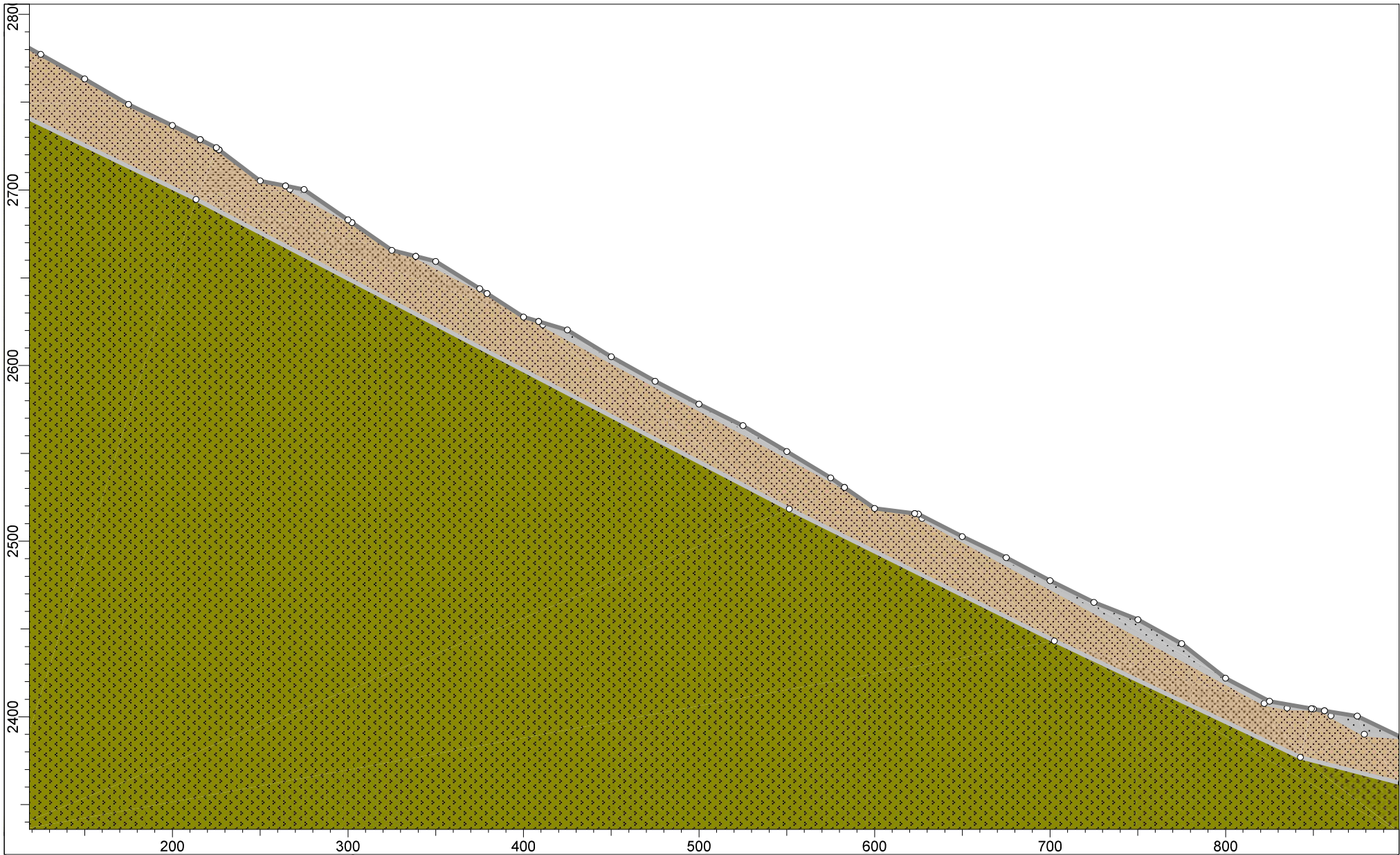


Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 2 - Proposed Cut Slopes - Static			
Drawn By	KAH	Scale	1:1039
Date		Company	GNN
1/30/2023, 4:01:50 PM		File Name	Zone 2 Proposed Cut Slopes.slim



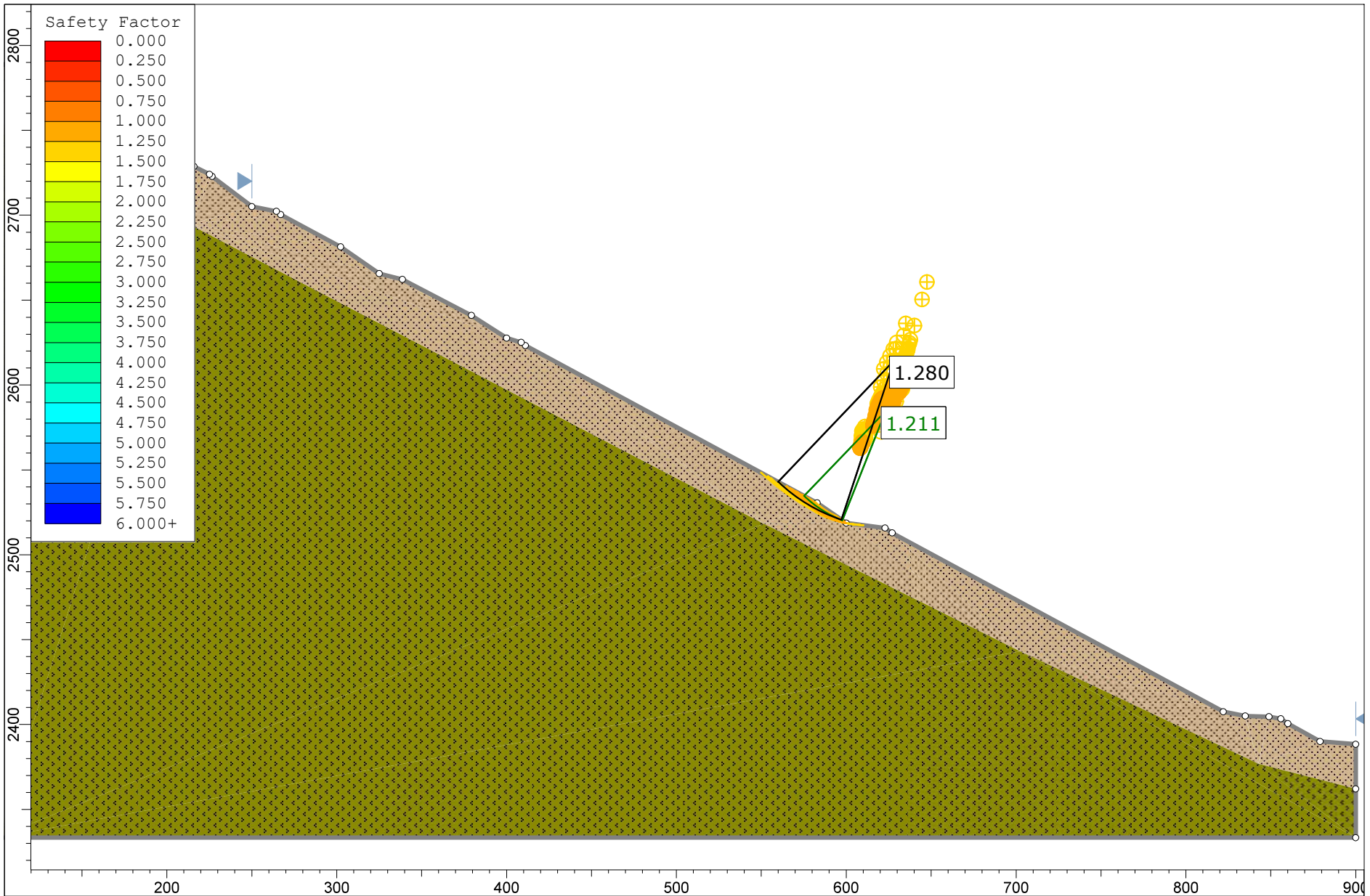


Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 3 - Existing Slope - Static			
Drawn By	KAH	Scale	1:1141
Date		Company	GNN
1/30/2023, 4:01:50 PM		File Name	Zone 3 Existing slope.slim

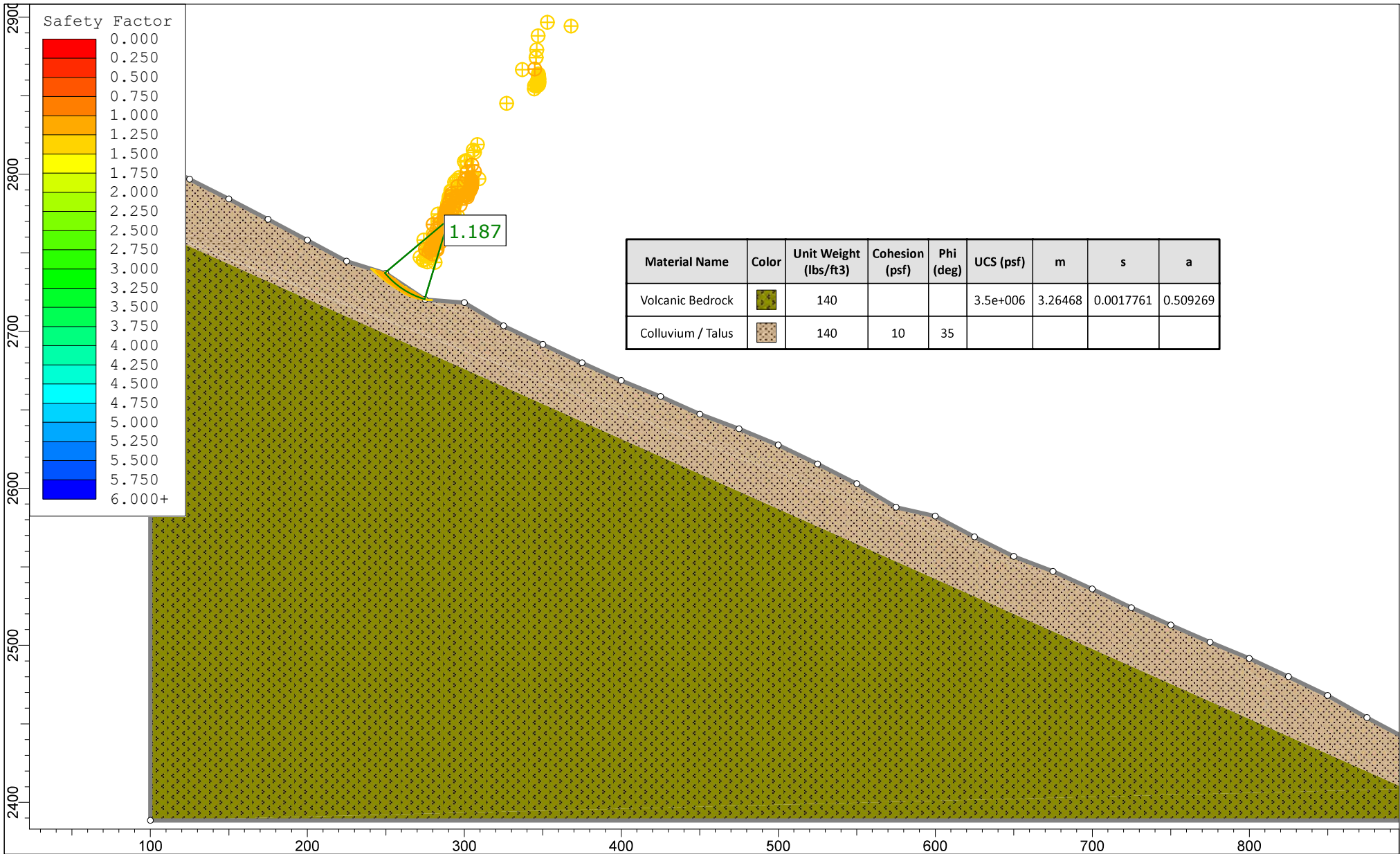


Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 3 - Exisitng Slope - Static			
Drawn By	KAH	Scale	1:908
		Company	GNN
Date	1/30/2023, 4:01:50 PM		File Name
		Zone 3 Proposed Cut Slopes.slim	



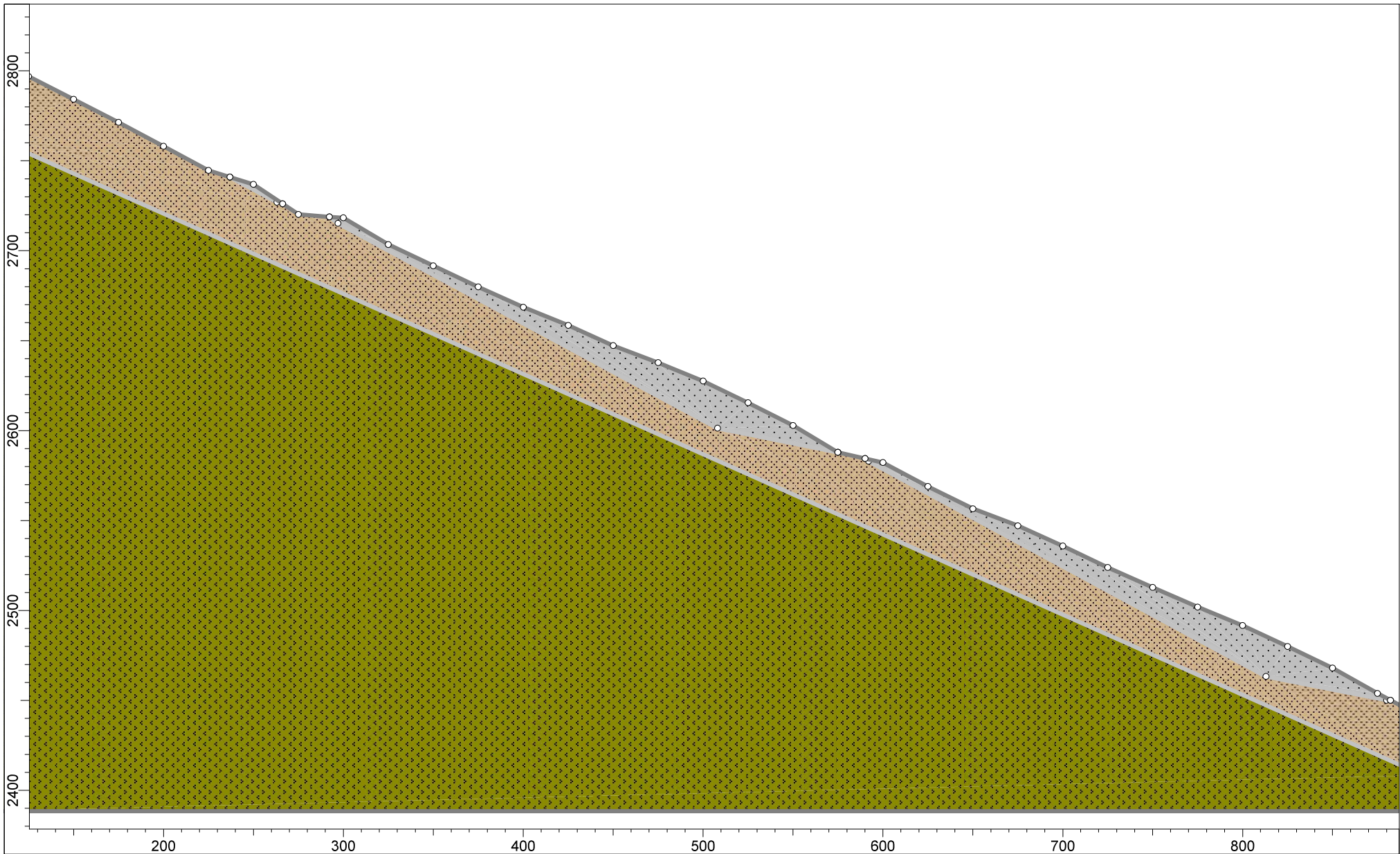


Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 3 - Proposed Cut Slope - Static			
Drawn By	KAH	Scale	1:985
		Company	GNN
Date	1/30/2023, 4:01:50 PM		File Name
		Zone 3 Proposed Cut Slopes.slim	

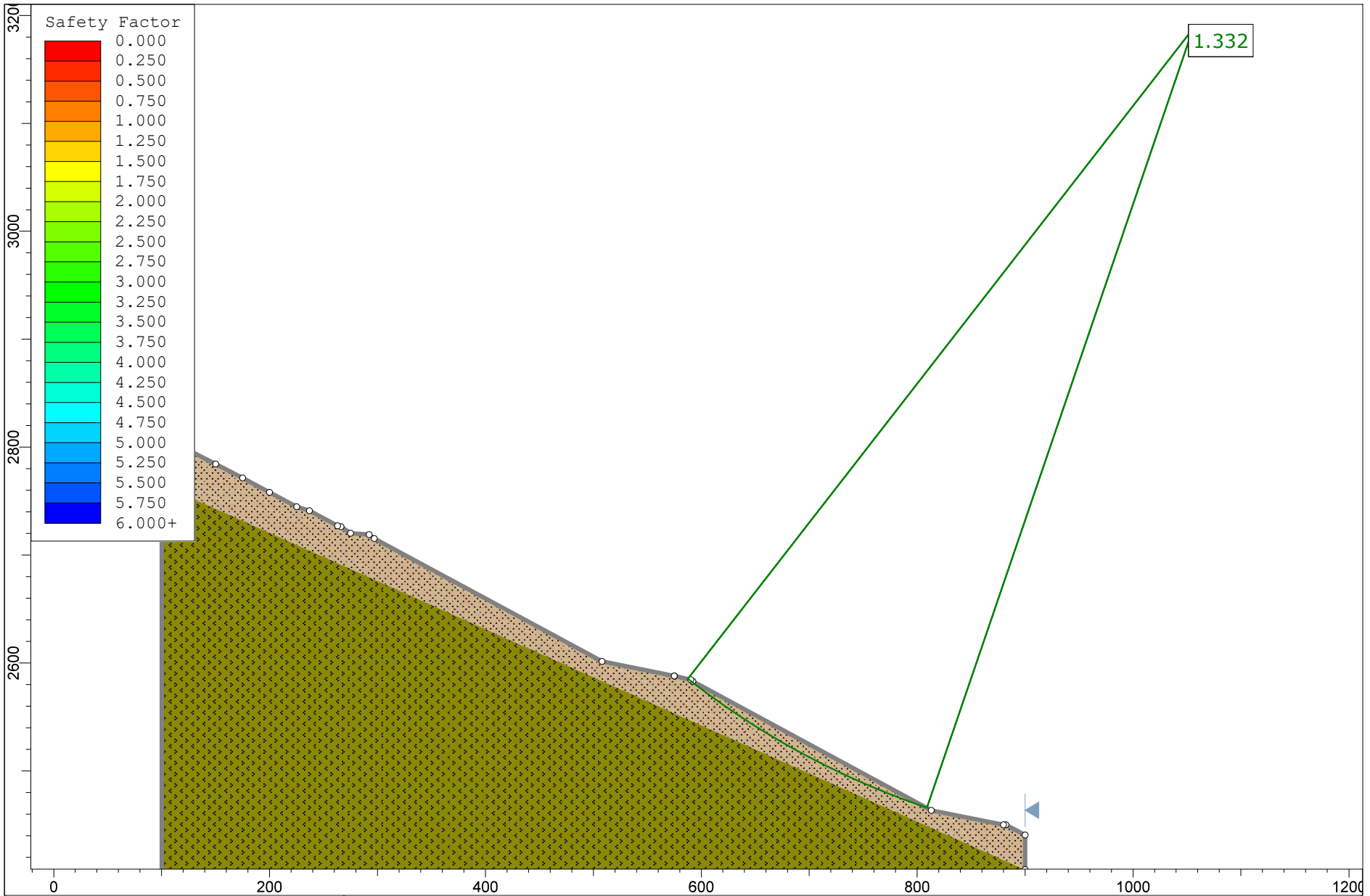


Project		Peoh Point Rock Quarry	
Analysis Description		Zone 4 - Exisitng Slope - Static	
Drawn By	KAH	Scale	1:1016
Date		Company	GNN
		File Name	Zone 4 existing slope.slim
12/27/2022, 4:01:50 PM			



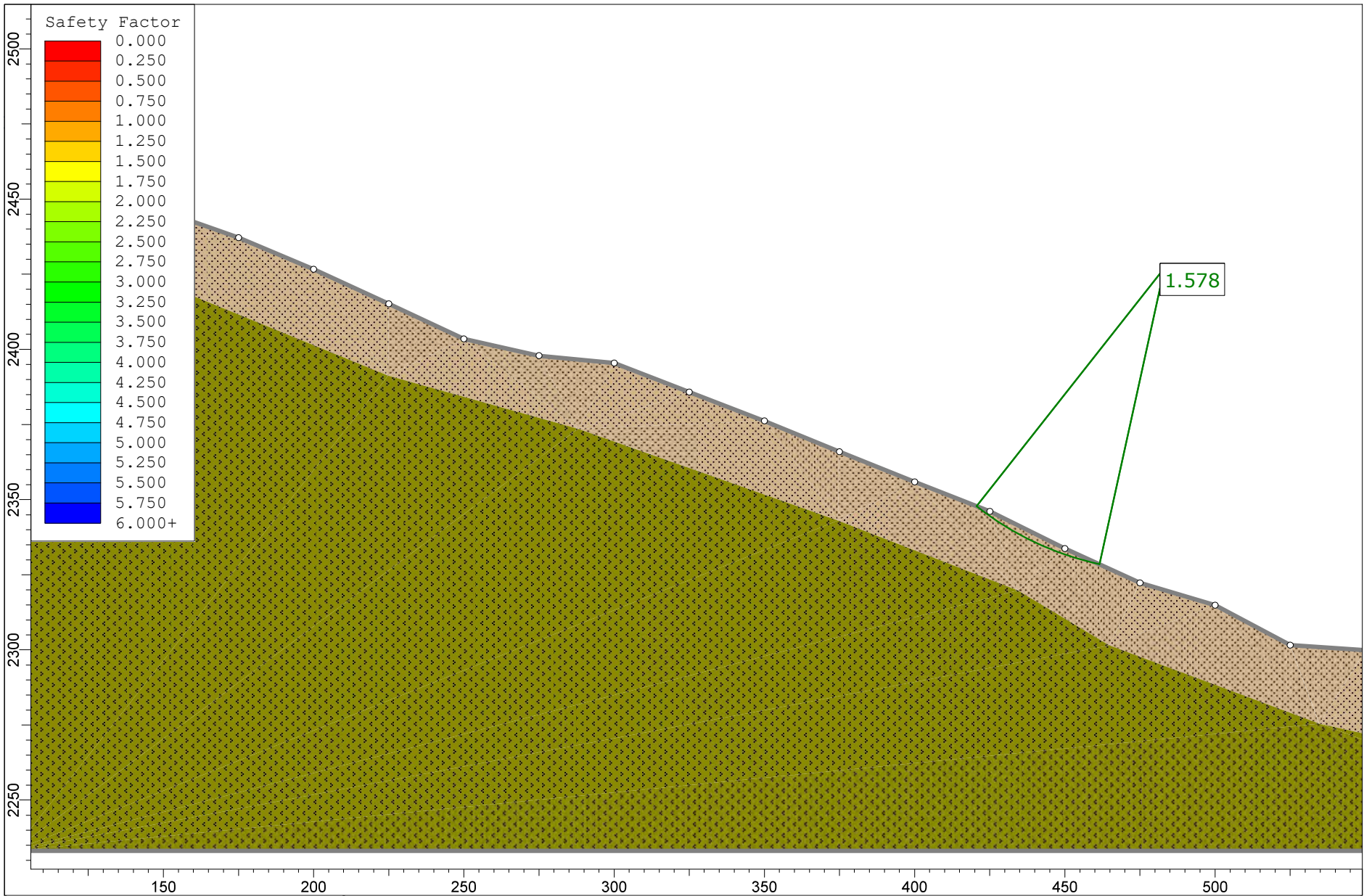


<i>Project</i>		Peoh Point Rock Quarry	
<i>Analysis Description</i>		Zone 4 - Exisitng Slope - Static	
<i>Drawn By</i>	KAH	<i>Scale</i>	1:886
<i>Date</i>	1/30/2023, 4:01:50 PM	<i>Company</i>	GNN
		<i>File Name</i>	Zone 4 existing slope.slim



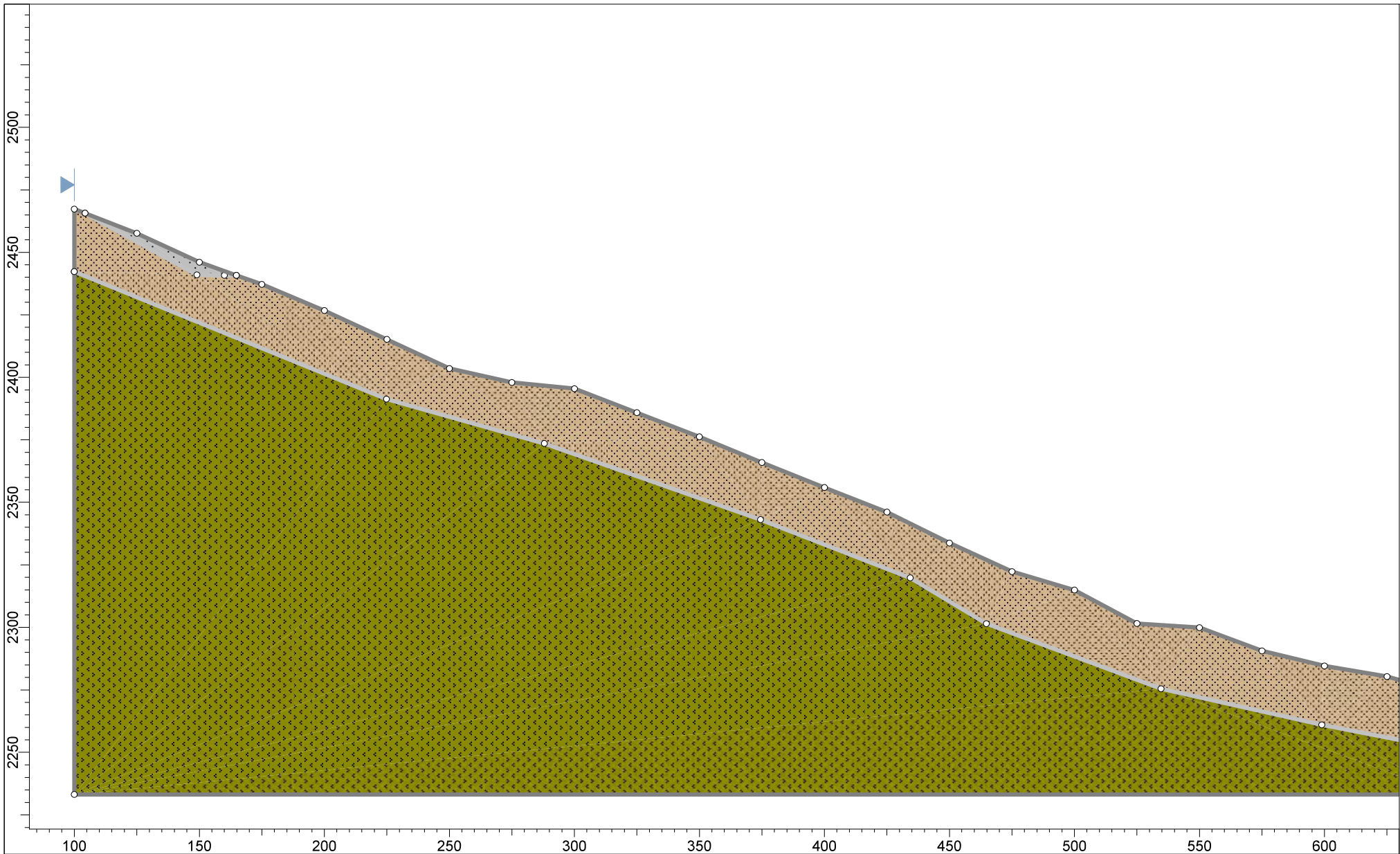
Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 4 - Proposed Cut Slope - Static			
Drawn By	KAH	Scale	1:1549
		Company	GNN
Date	1/30/2023, 4:01:50 PM		File Name
		Zone 4 with proposed cut slopes.slim	



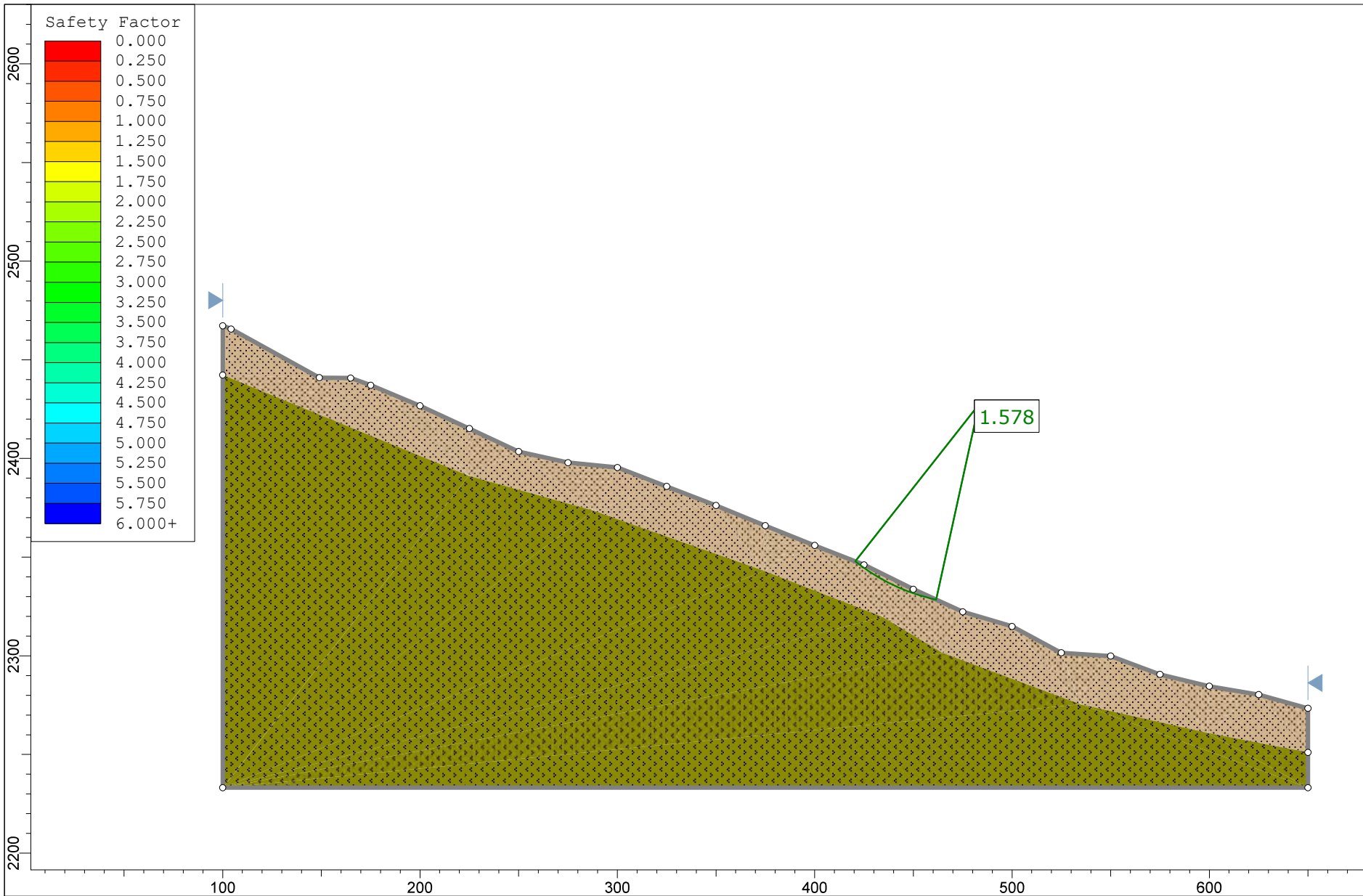


Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 5 - Existing Slope - Static			
Drawn By	KAH	Scale	1:556
		Company	GNN
Date	1/30/2023, 4:01:50 PM		File Name
		Zone 5 Existing slope.slim	

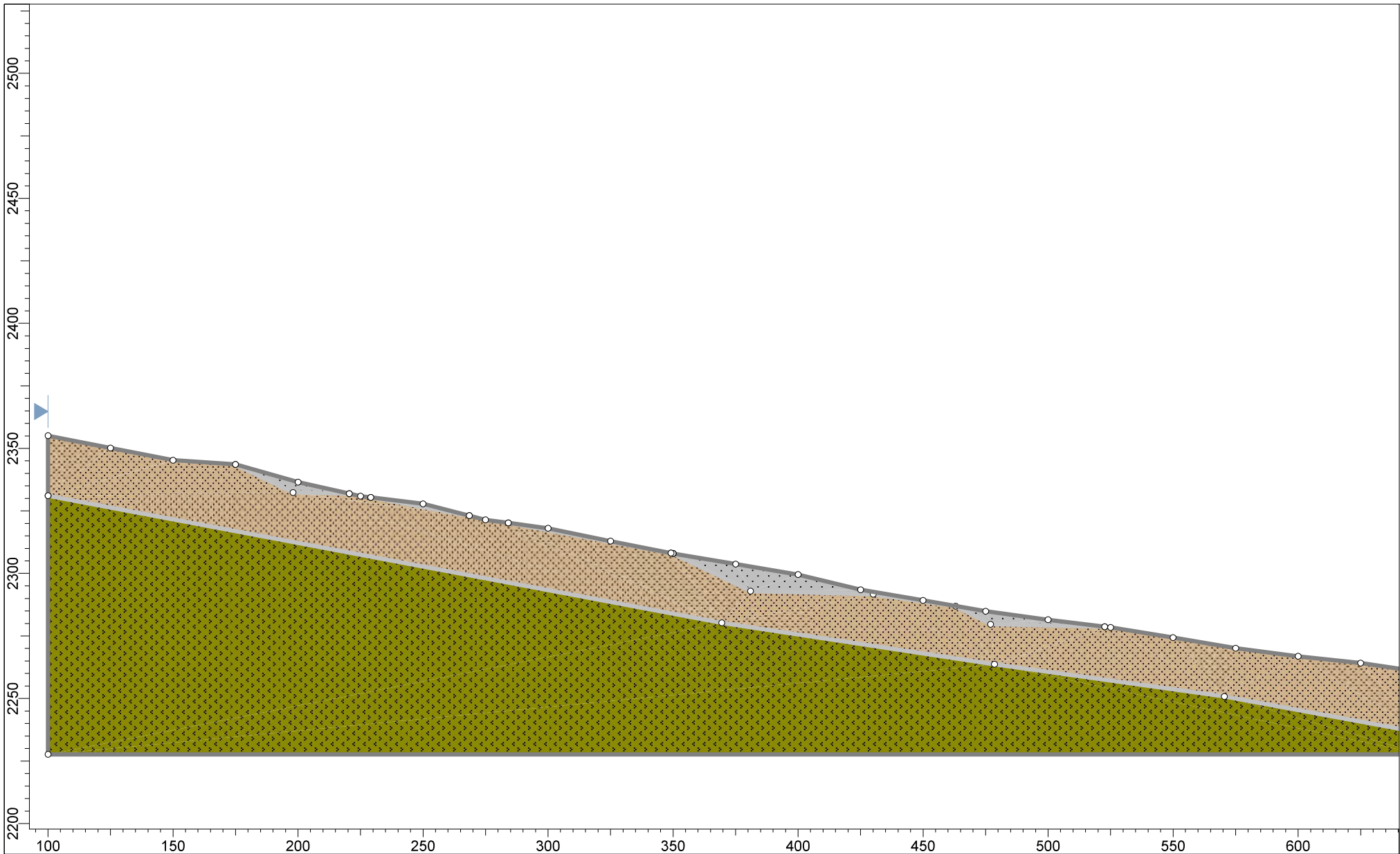





Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 5 - Exisitng Slope - Static			
Drawn By	KAH	Scale	1:638
		Company	GNN
Date	1/30/2023, 4:01:50 PM		File Name
		Zone 5 Proposed Cut Slopes.slim	

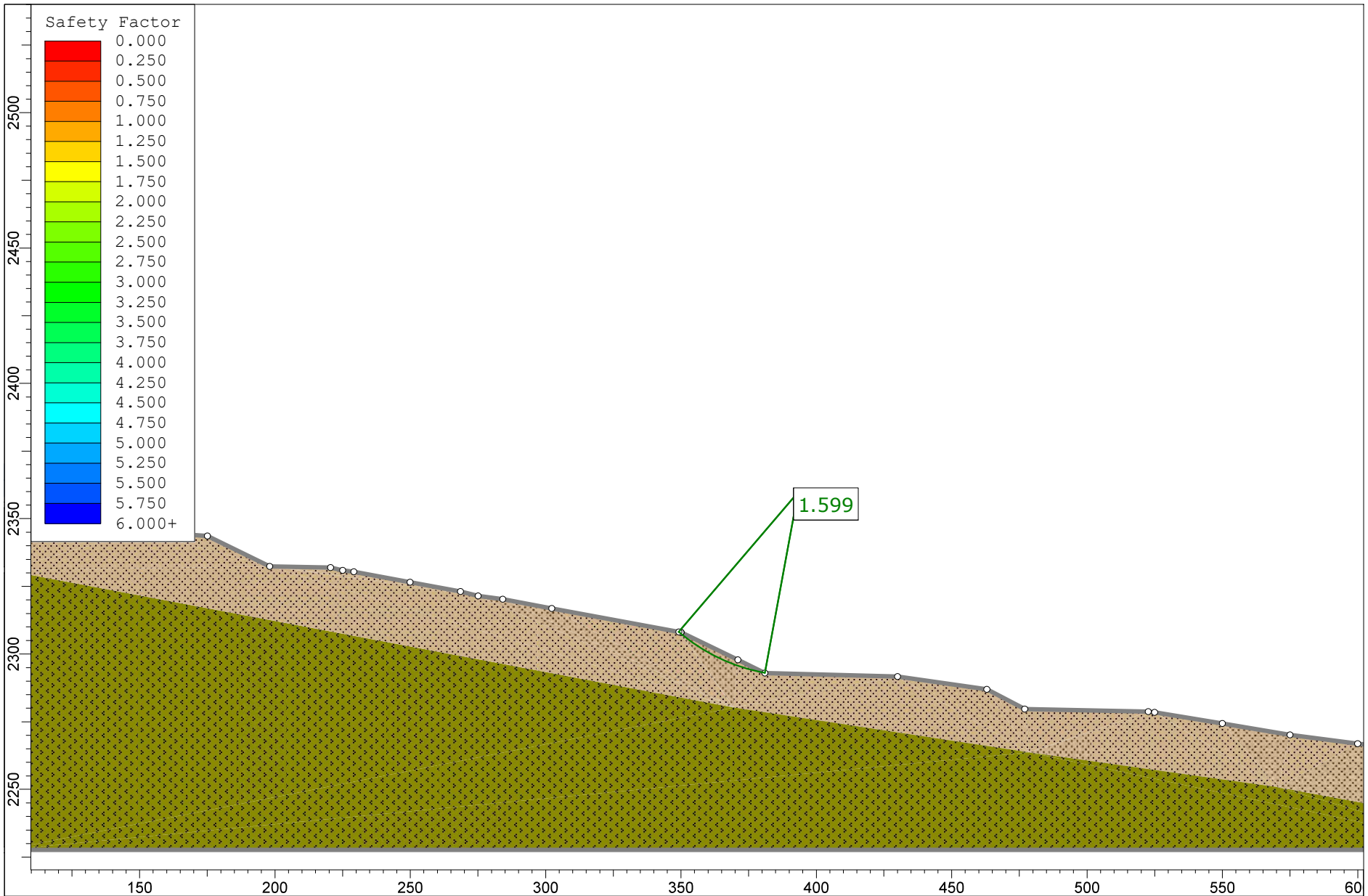



Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 5 - Existing Slope - Static			
Drawn By	KAH	Scale	1:848
Date		Company	GNN
1/30/2023, 4:01:50 PM		File Name	Zone 5 Proposed Cut Slopes.slim

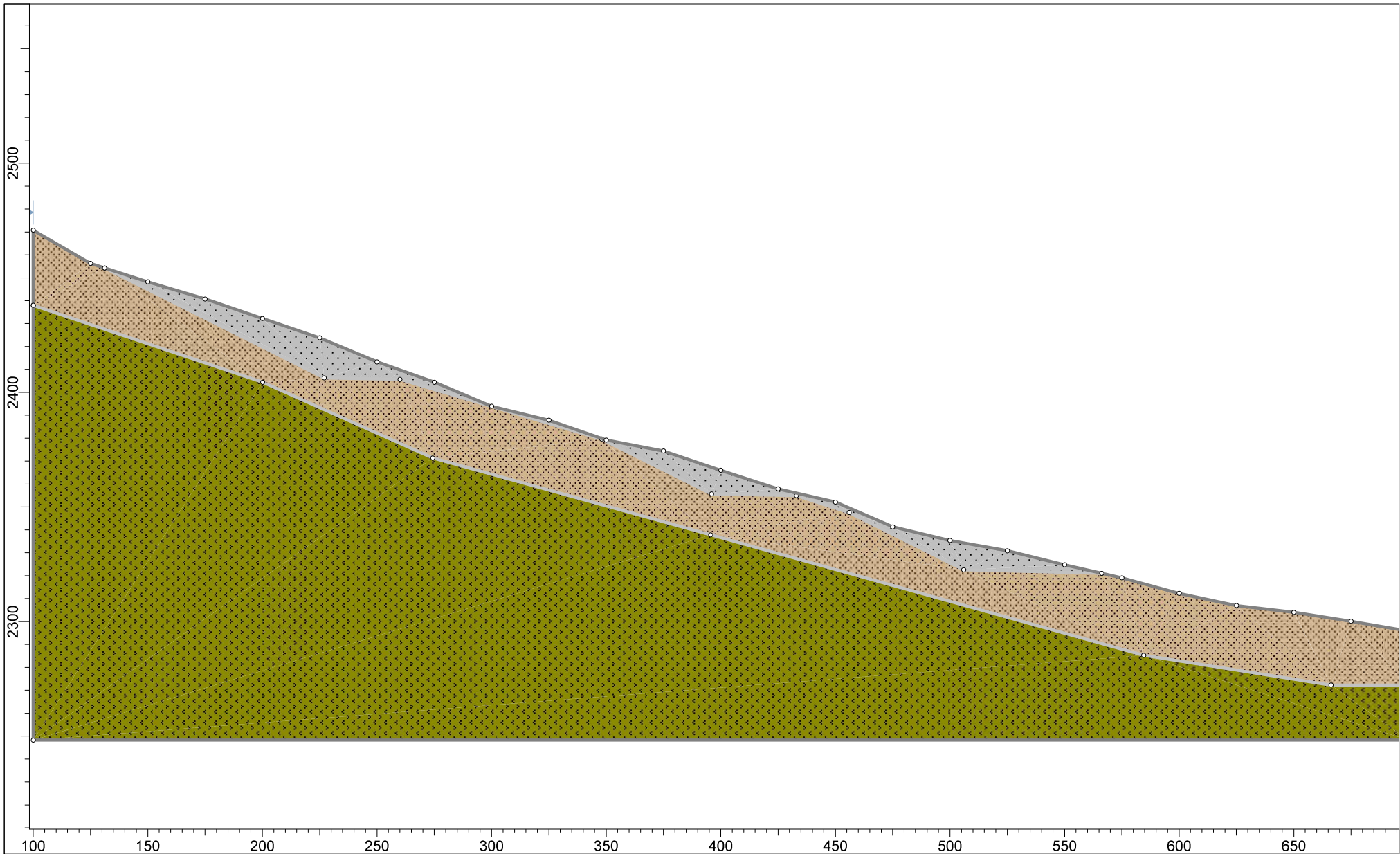



 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	<i>Project</i>		
	Peoh Point Rock Quarry		
	<i>Analysis Description</i>		
	Zone 5 E - Existing Slope - Static		
	<i>Drawn By</i>	KAH	<i>Scale</i> 1:638
<i>Date</i>		1/30/2023, 4:01:50 PM	<i>Company</i> GNN
<i>File Name</i>			Zone 5E Proposed Slope Cuts.slim

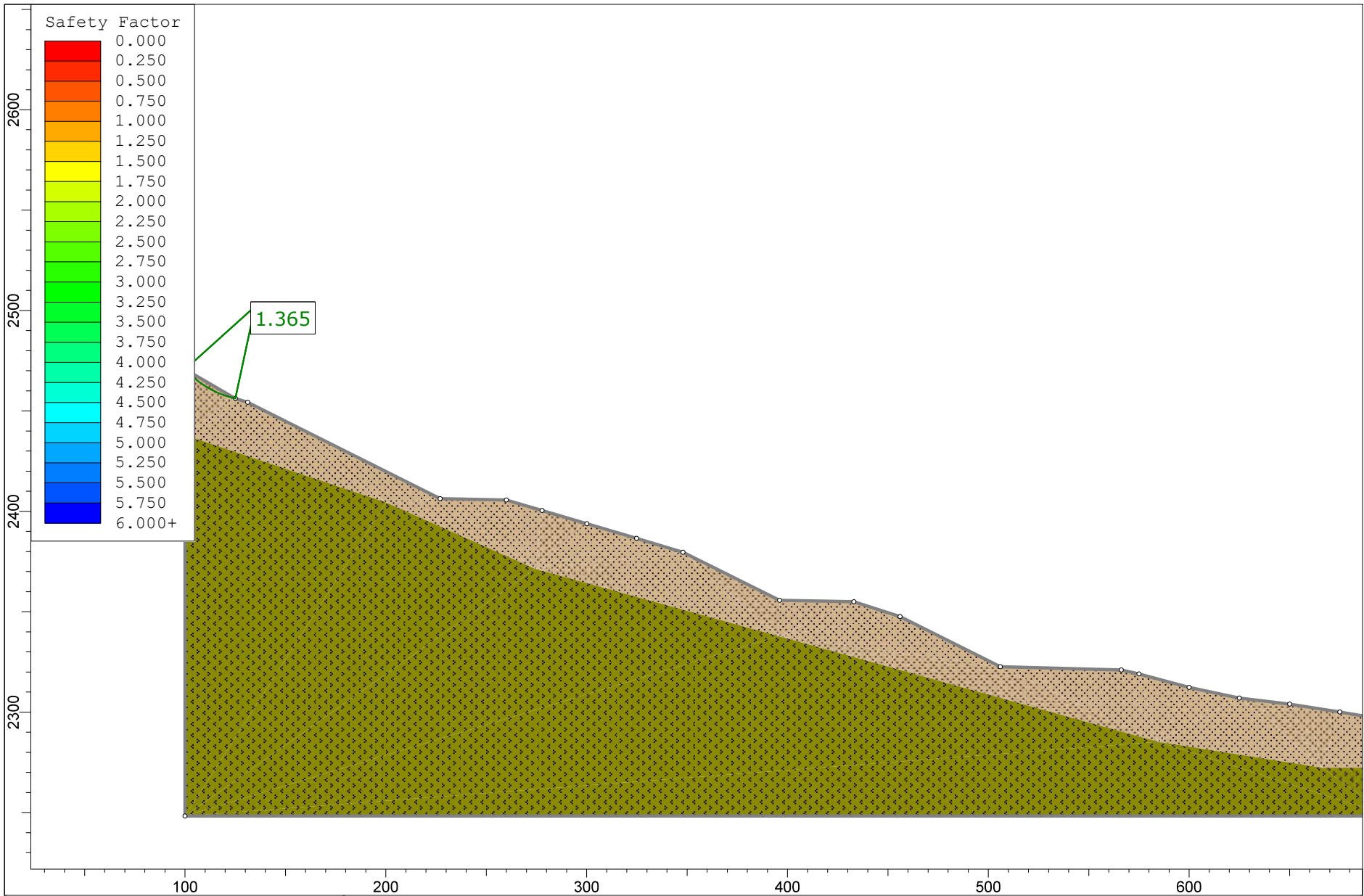




 <div><b>Northern, Inc.</b> Consulting Engineers   Environmental Scientists   Geologists Construction Materials Testing   Geophysical Services</div>	Project				
	Peoh Point Rock Quarry				
	Analysis Description				
	Zone 5 E - Existing Slope - Static				
	Drawn By	KAH	Scale	1:618	Company
Date	1/30/2023, 4:01:50 PM			File Name	Zone 5E Proposed Slope Cuts.slim
SLIDEINTERPRET 7.036					

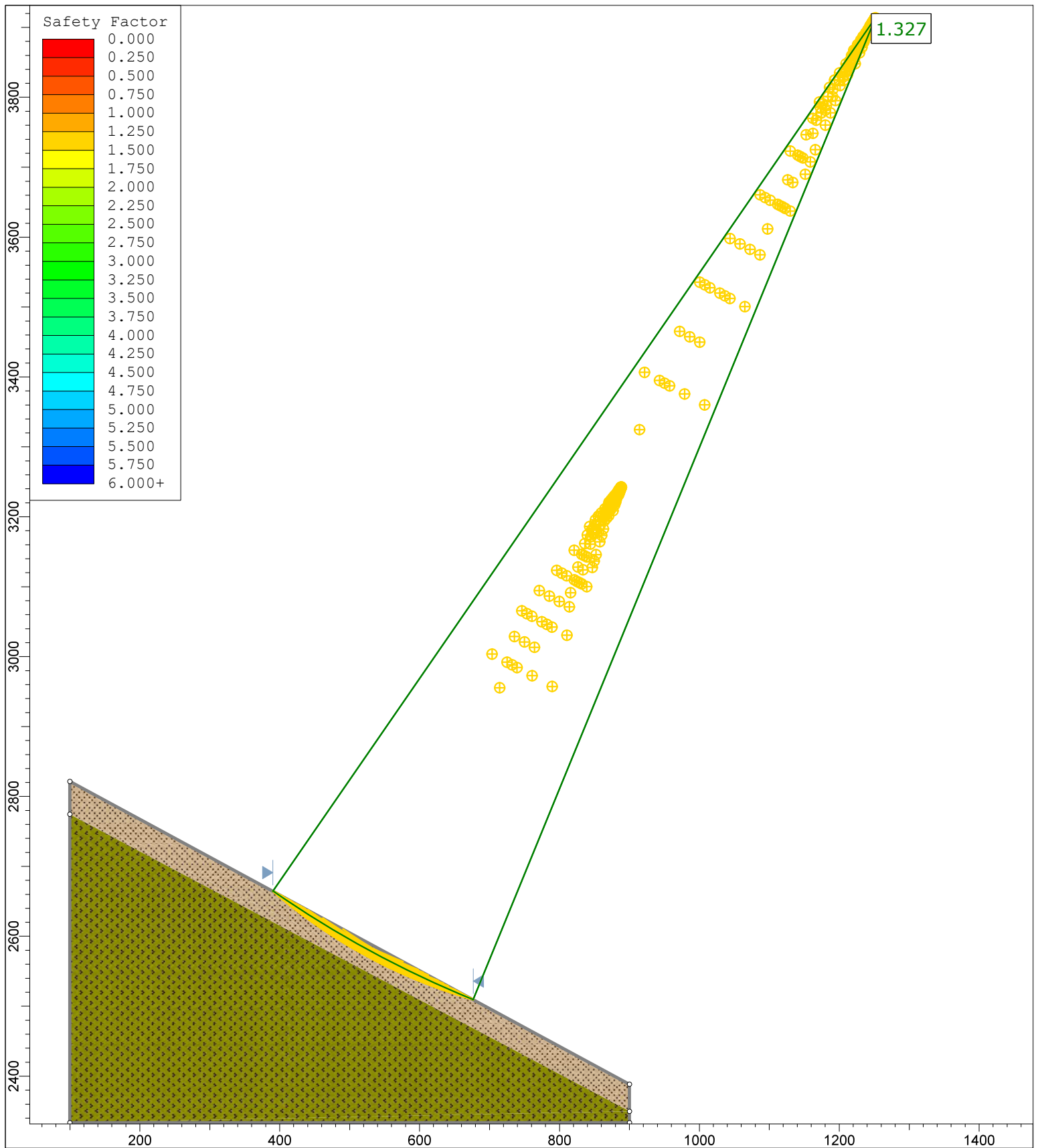


 <b>Northern, Inc.</b> <small>Consulting Engineers   Environmental Scientists   Geologists Construction Materials Testing   Geophysical Services</small>	<i>Project</i>		
	Peoh Point Rock Quarry		
	<i>Analysis Description</i>		
	Zone 5 W - Exisitng Slope - Static		
<i>Drawn By</i>	KAH	<i>Scale</i>	1:696
<i>Company</i>	GNN		
<i>Date</i>	1/30/2023, 4:01:50 PM		<i>File Name</i>
			Zone 5W With Proposed Cut Areas.slim



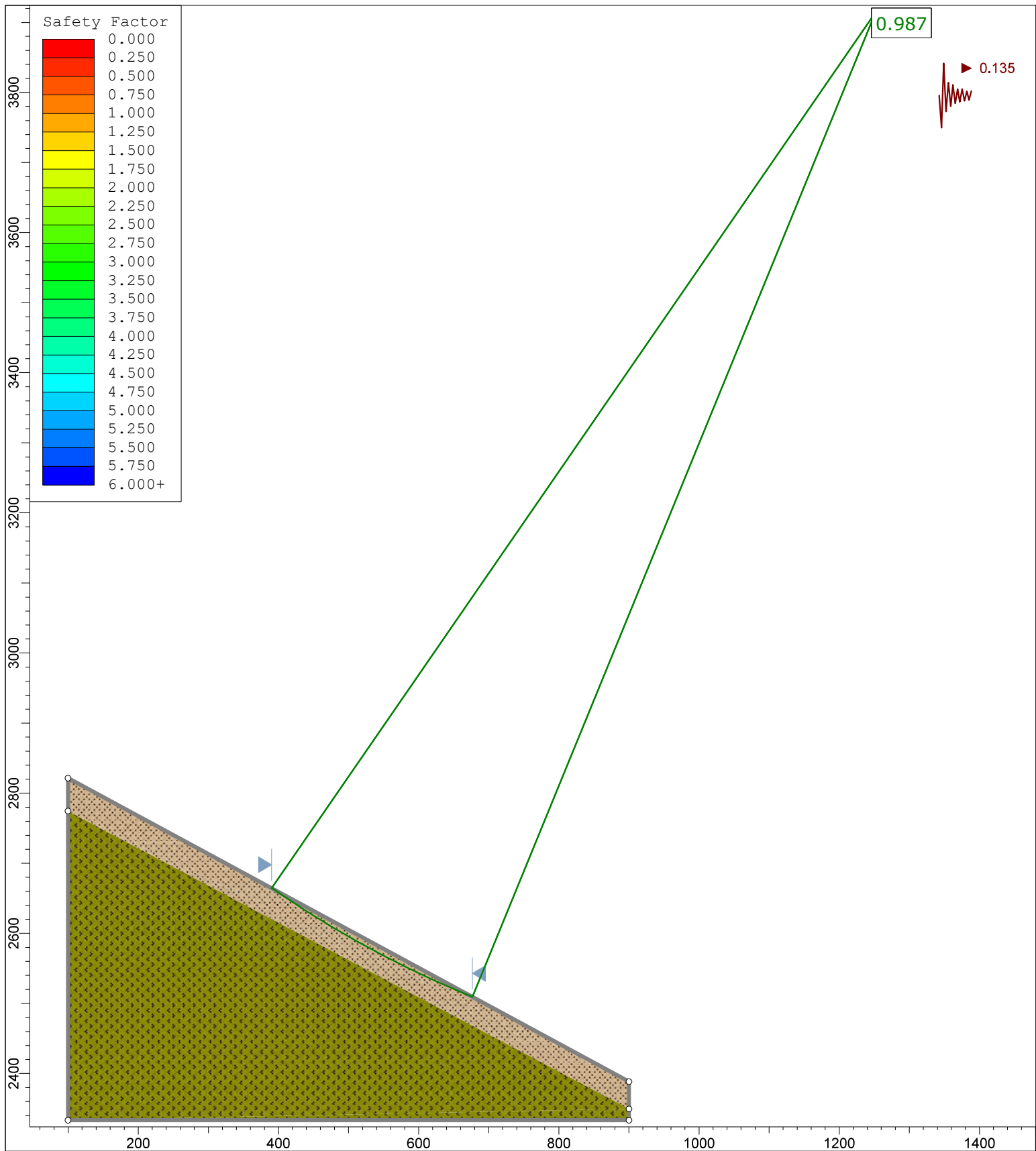
Project			
Peoh Point Rock Quarry			
Analysis Description			
Zone 5 W - Proposed Cut Slope - Static			
Drawn By	KAH	Scale	1:832
		Company	GNN
Date	1/30/2023, 4:01:50 PM		File Name
		Zone 5W Proposed Cut Slope.slim	






Project			
Peoh Point Rock Quarry			
Analysis Description			
Simplified Generic 1.85H:1V Slope - Static			
Drawn By	KAH	Scale	1:2205
		Company	GNN
Date	12/27/2022, 4:01:50 PM		File Name
		Simplified 1.85 to 1.slim	





 <b>Northern, Inc.</b> <small>Consulting Engineers   Environmental Scientists   Geologists Construction Materials Testing   Geophysical Services</small>	Project				
	Peoh Point Rock Quarry				
	Analysis Description				
	Simplified Generic 1.85H:1V Slope - Seismic				
	Drawn By	KAH	Scale	1:2205	Company
Date	12/27/2022, 4:01:50 PM			File Name	Simplified 1.85 to 1.slim

SLIDEINTERPRET 7.036