

## APPENDIX 3

### STABILITY ANALYSES – SIDE SLOPES ARTIFICIAL GEOLOGICAL BARRIER

#### 1. SIDE SLOPES ARTIFICIAL GEOLOGICAL BARRIER MODEL

A side slopes AGB will be formed on a phased basis within the western excavation area using suitable indigenous quarry material (overburden material and processing fines) and/or suitable selected imported inert waste, as has been constructed within the currently permitted existing inert landfill area.

The suitable material will be compacted in layers and brought up in lifts up to *c.* 5m high against the side slopes sub-grade formed in the Kingston Formation and the overlying Stanford Formation as the general placement of waste progresses.

Following the completion of each side slopes AGB lift, imported inert waste material will be graded against the compacted material in order to provide buttress support and to establish a stable platform for the placement and compaction of the next side slopes AGB lift. Excavated perimeter slopes in the Kingston Formation and the overlying Stanford Formation will have a maximum height *c.* 15m and the maximum unsupported height of the side slopes AGB will be *c.* 5m. The side slopes AGB will have a minimum thickness of 1m and a permeability no greater than  $1 \times 10^{-7}$ m/s.

The side slope AGB will be constructed in accordance with the approved original Construction Quality Assurance (CQA) Plan (PGW&A Report reference SQL/CQA Plan/1) and the Addendum CQA Plan (GWP Report No. 190508) approved by the Environment Agency.

#### 2. SIDE SLOPES SUB-GRADE

- Compressibility of Side Slopes Sub-Grade

Based on evidence from geotechnical site inspection, site investigation borehole logs and published information relating to the lithological character of the strata sequence it is considered that no compressible material or cavities will be present beneath the western extension area. Accordingly, it is considered that the stability and integrity of the side slopes AGB will not be compromised by compressibility or the presence of cavities associated with the excavated perimeter side slopes sub-grade.

- Slope Stability of Side Slopes Sub-Grade

Excavated perimeter slopes in the Kingston Formation and the overlying Stanford Formation will generally be formed at overall design gradients of *c.* 1v : 0.5h (vertical : horizontal) in limestone and *c.* 1v : 1h in sand. The maximum height of the excavated perimeter slopes will be *c.* 15m.

Based on the findings of geotechnical inspections undertaken by GWP, it is considered that the excavated slopes will remain adequately stable at the design gradients. Any minor face dressing or re-grading of the side slopes sub-grade will be undertaken on a phased basis in advance of the construction of the side slopes AGB.

In accordance with the requirements of the Quarries Regulations 1999, the quarry operator is responsible for ensuring that the excavated faces are designed, constructed, operated and maintained so as to ensure that instability or movement which is likely to give rise to a risk to the health and safety of any person is avoided. Accordingly, it is considered that the stability and integrity of the side slopes sub-grade will not be compromised by slope instability.

#### 3. SLOPE STABILITY

- **Aim**

To assess the potential for instability of the basal AGB involving instability of the side slopes AGB or the waste mass.

- **Analytical approach**

Use of SLIDE computer software to investigate the potential for slope failure.

- **Slope geometry**

See Analysis B.

- **Analysis input parameters**

- o Shear strength and bulk density parameters

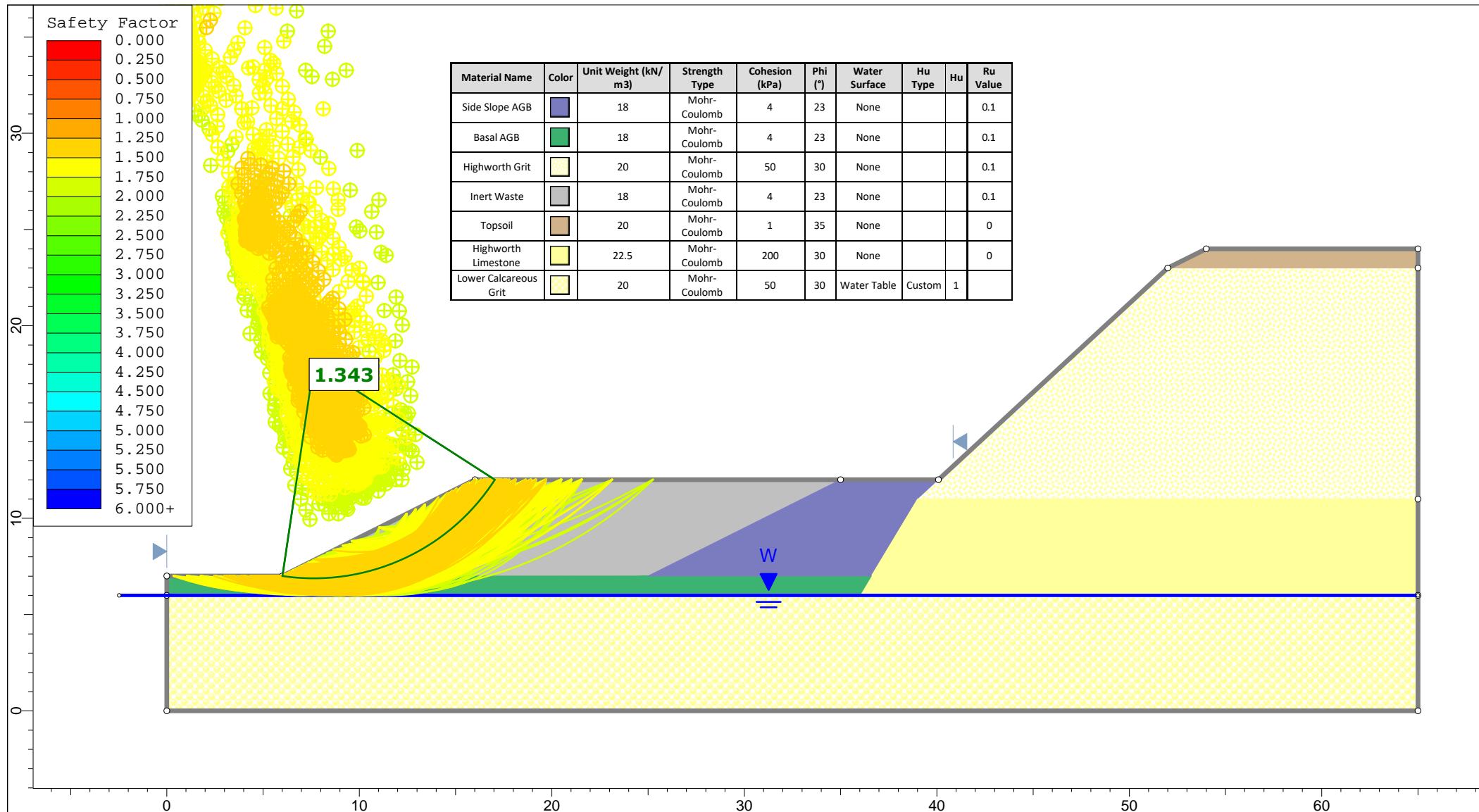
Material Type	Drained Shear Strength [c' (kPa)]	Angle of Shearing Resistance (°)	Bulk Density (Mg/m <sup>3</sup> )
Artificial Geological Barrier (AGB)	4	23	1.8
Waste Mass	4	23	1.8
Groundwater	Quarry Floor Level		
Leachate	None		

- **Results (Analysis B)**

Using the input parameters detailed above, a minimum FoS value of 1.34 is indicated by the analysis results for a circular slope failure involving the side slopes AGB.

#### 4. **CONCLUSIONS**

The calculated FoS value of 1.34 is considered satisfactory. Accordingly, it is considered that the stability and integrity of the side slopes AGB will not be compromised by slope instability.



**Project**

Shellingford Quarry - Stability Risk Assessment

**Group**

Side Slopes AGB - Analysis B

**Drawn By**

GWP Consultants LLP

**Date**

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**Scenario**

Master Scenario

**Company**

Multi-Agg Limited

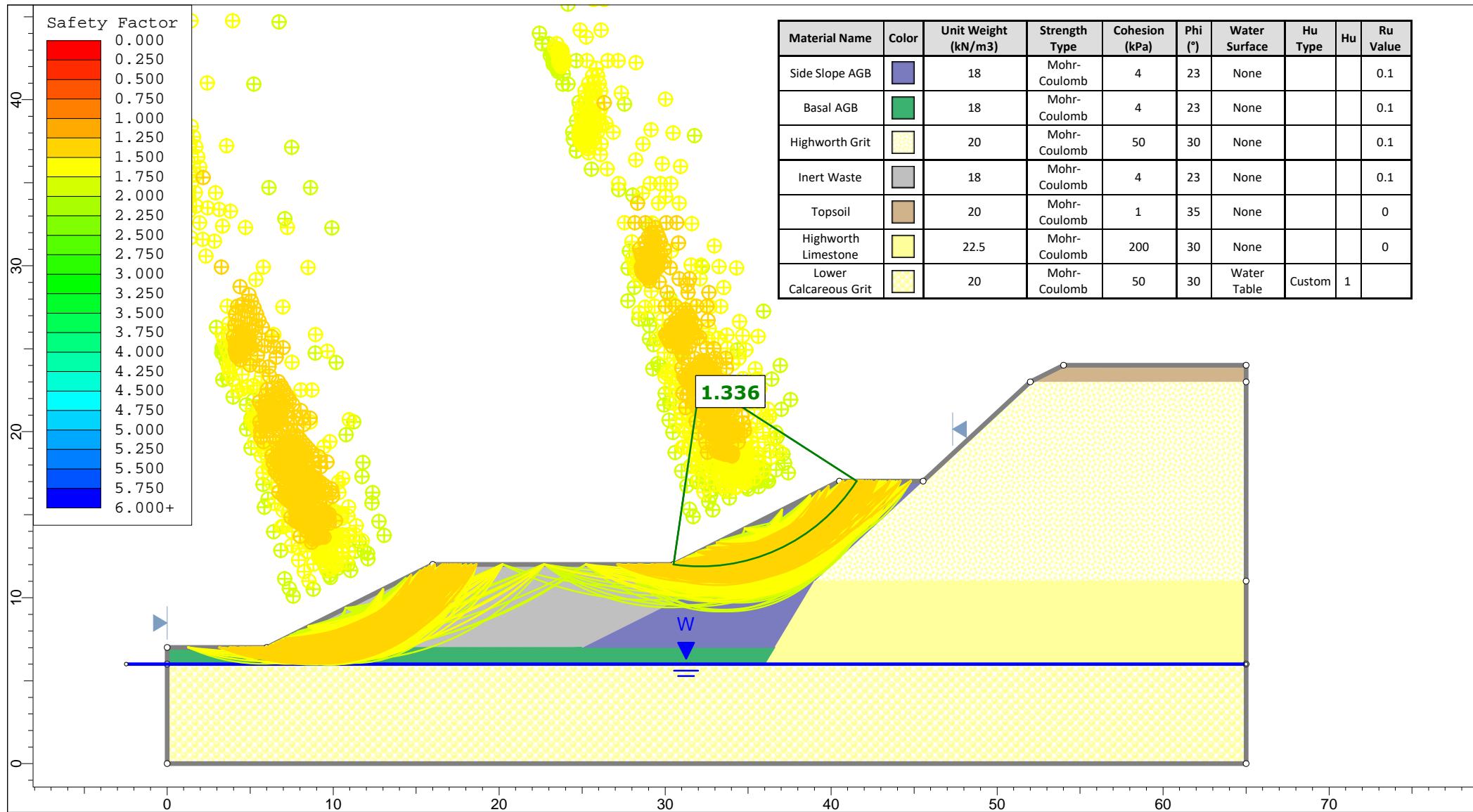
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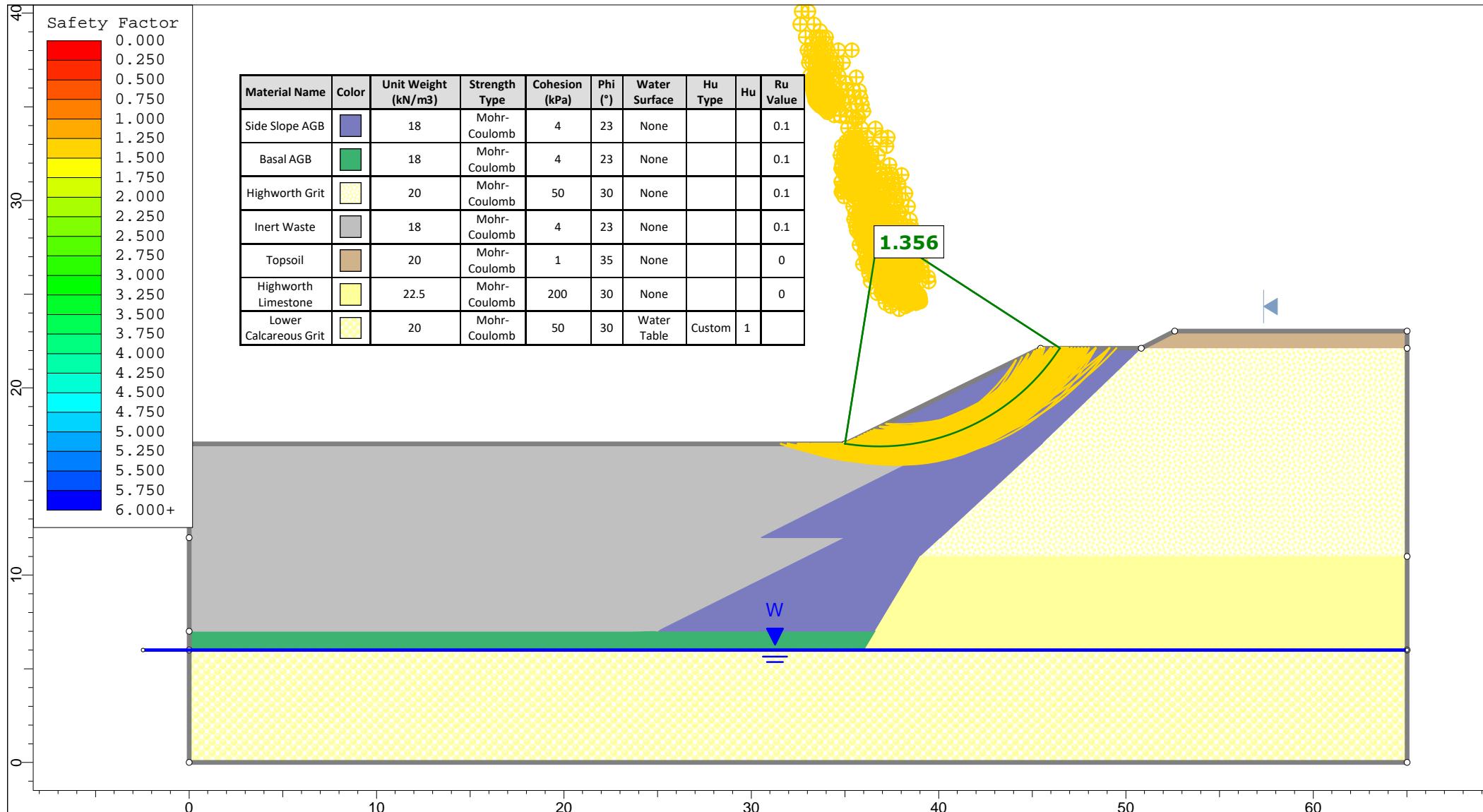


Project		Shellingford Quarry - Stability Risk Assessment		
Group	Side Slope Stability AGB Layer 2 - Analysis B		Scenario	Master Scenario
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Project		Shellingford Quarry - Stability Risk Assessment	
Group	Side Slope Stability AGB Layer 3 - Analysis B	Scenario	Master Scenario
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