GEOTECHNICAL

ENVIRONMENTAL

A & J.WASTE SERVICES LTD.

WHEALDREAM HOLIDAYS & LEISURE
WENDRON, HELSTON, CORNWALL

APPLICATION FOR WASTE RECOVERY PERMIT

Stability Risk Assessment Report

GEC JOB NO: GE250412209

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Document History:

Reference: **GE25041/DRA/DF**		
Date of Issue	Document Description	Prepared
26/09/2025	Stability Risk Assessment	Dr David Fall CGEOL FGS

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1.0 INTRODUCTION

Report Context

1.1 The operator responsible for the placement of the inert waste is A & J Waste Services Ltd.

1.2 Land and Mineral Management have instructed Geotechnical & Environmental Consulting Ltd. (GEC) on behalf of their Client A & J Waste Services Ltd. to undertake a Stability Risk Assessment (SRA) in respect to the permanent placement of inert waste at the Whealdream Holiday & Leisure. Helston, Cornwall. TR13 0LR.

1.3 This Stability Risk Assessment deals with the permanent deposit of inert waste to land to raise ground levels across areas of the existing golf complex (Weller Designs Ltd. Drawing No. 901.03 Rev. A dated 03/07/2024).

1.4 The following documents have been supplied by the Client and referred to in the compilation of this Report: -

- Deposit For Recovery Permit Application - Whealdream Holidays & Leisure Wendron, Helston, Cornwall – Hydrological Risk Assessment. Nicola Sugg Consultant Hydrogeologist & Hydrologist dated September 2025.

- Weller Designs Ltd. Whealdream Holiday and Leisure – Cross Sections Plan. Drawing No. 901.03 Rev A dated 03/07/2024.

1.5 This document has been prepared in accordance with the Stability Risk Assessment Report Template (Version 1 – March 2010) which addresses the guidance presented at: https://www.gov.uk/guidance/landfill-operators-environmental-permits/how-to-do-a-stability risk-assessment-landfill-sites-for-inert-waste-or-deposit-for-recovery-activities.

Conceptual Stability Site Model

Location

1.6 The placement areas are situated within the wider Whealdream Holiday and Leisure Centre which is located approximately 1.50km north northeast (NNE) of the centre of Helston at NGR 166849 029923.

1.7 This Stability Risk Assessment refers to area within the existing golf course where reprofiling of the ground is to take place by the placement of inert waste material ((Figure SRA2).

Figure SRA1 Site location plan

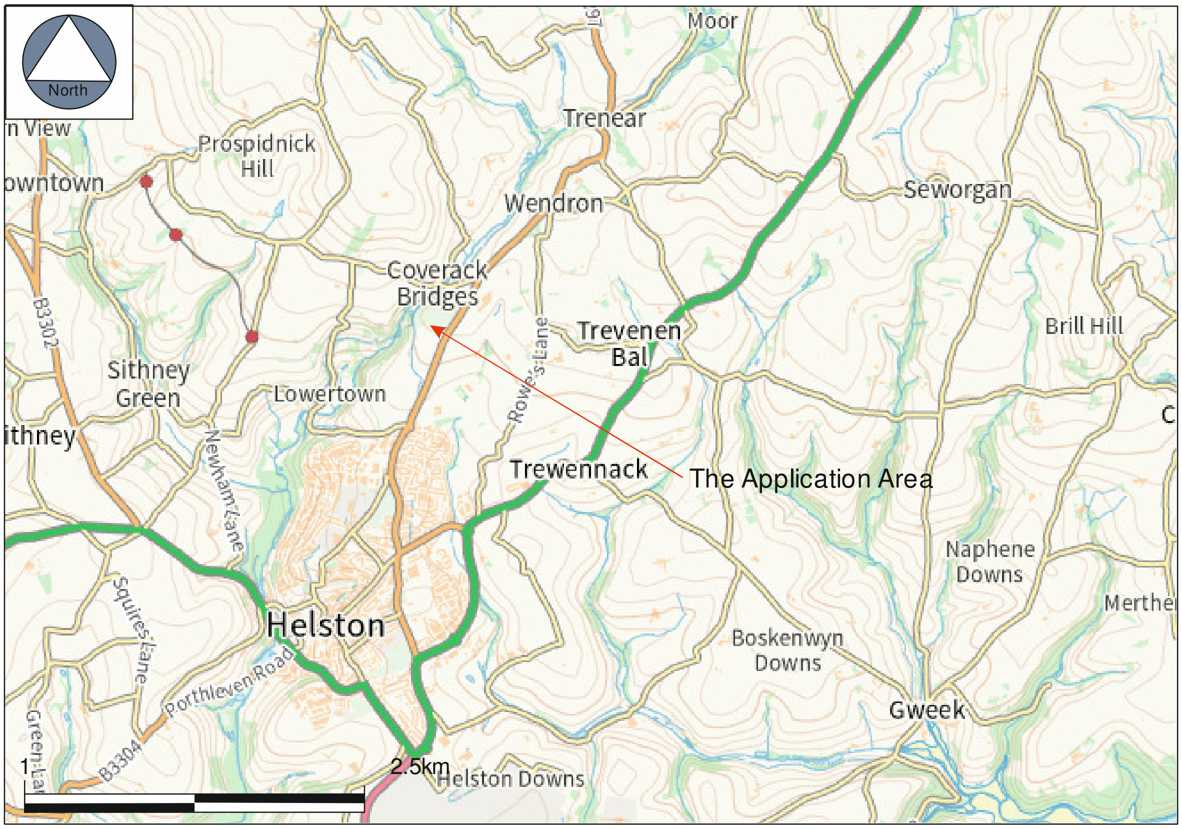


Figure SRA2 Site layout plan

For Cross Sections see Figure SRA4

1.8 There is a long history of mining in the region, primarily for tin, but also tungsten, arsenic, copper and zinc, with Ordnance Survey mapping confirming the presence of historic mine shafts within 0.5km to the east of the site.

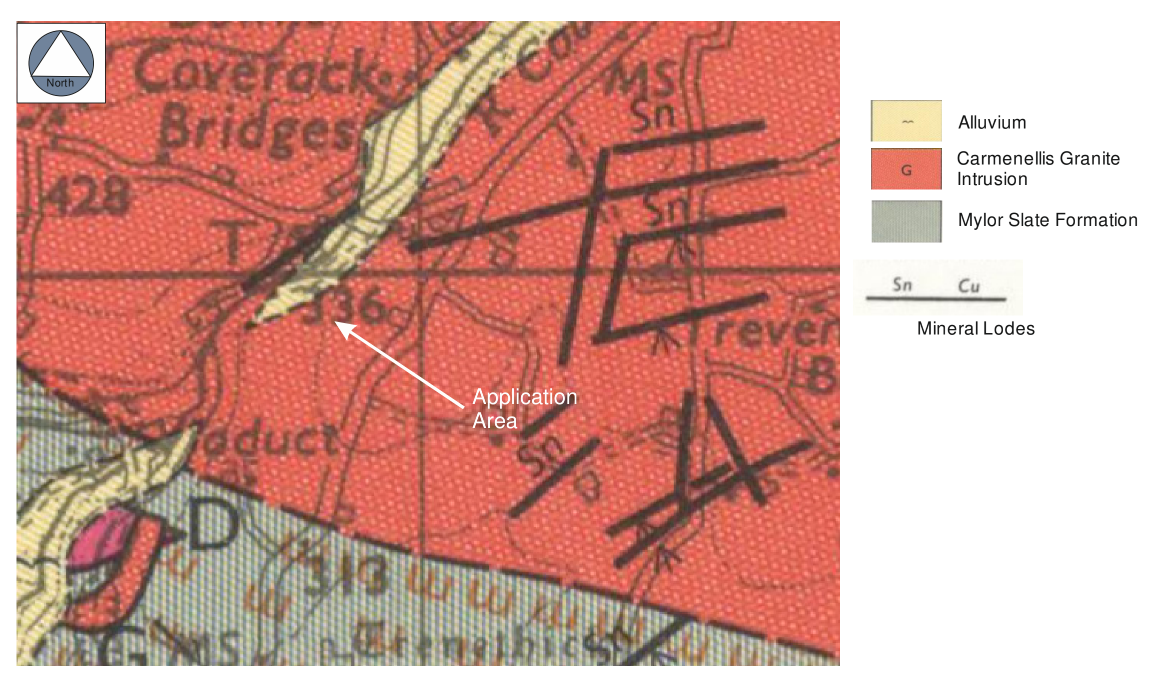
1.9 The site is outside the Wendron Mining District, but the above evidence suggests significant historic local mine workings, with potential workings extending beneath the site at depth.

Regional Geology

Bedrock Geology

1.10 With reference to British Geological Survey Sheet 352 Falmouth 1::50,000 Bedrock and Superficial Deposits, the site is located on bedrock geology comprising Carmenellis Granite Intrusion (CAIN) with Mylor Slate Formation outcropping approximately 500m south of the application area.

Figure SRA3 Geology of the site area – after NERC 2006



1.11 The BGS Lexicon of Named Rock Units describes the Carmenellis Granite Intrusion (CAIN) as coarse-grained granite with varying amounts feldspar crystals of varying size. Whilst the Mylor Slate Formation (MRSL) comprises dark grey, locally green-grey slates, interbedded with thin bands and laminae of sandstone and graded and locally cross-bedded siltstone.

1.12 There is evidence of local, small-scale granite quarrying within 0.5km to the west of the site, including Trannack Quarry which has been restored via landfilling. There is a long history of mining in the region, with the mineral lodes within and close to the granite carrying tin, tungsten and arsenic.

Superficial Geology

1.13 The BGS mapping shows superficial deposits identified as Alluvium described as a mixture of sand, silt and clay present in the west of the site and associated with the River Cober.

Structural Geology

1.14 There are no structural features with the application area that will deleteriously affect the stability of the site.

Local Geology

1.15 The nearest boreholes held by the National Geoscience Database which contain stratigraphical information are located approximately 750m east of the site along the route of the A394. The stratigraphy recorded in the five (5no.) closest boreholes is presented in Table SRA1.

Table SRA1 Local stratigraphy of Carnmenellis Granite

BGS Borehole	Topsoil		Carnmenellis Granite Stratigraphy			
			Highly Weathered		Moderately Weathered	
			Very silty SAND with gravel and small cobbles		White GRANITE with iron stained discontinuities	
	From (mbgl)	To (mbgl)	From (mbgl)	To (mbgl)	From (mbgl)	To (mbgl)
SW62NE/67	GL	0.40	0.40	2.60	2.60	>2.30
SW62NE/68	GL	0.40	0.40	1.00	1.00	>3.10
SW62NE/69	GL	0.50	0.50	1.00	1.00	>3.20
SW62NE/70	Not Recorded		GL	>2.00	Not Encountered	
SW62NE/71	GL	0.30	0.30	1.30	1.30	>3.80

1.16 With reference to Table SRA1 the stratigraphy at the site is likely to comprise 0.30 to 0.50m of Topsoil over 0.50 to >2.00m very silty gravelly SAND (highly weathered Granite) becoming moderately weathered Granite at 1.00 to 2.60mbgl.

Hydrology

1.17 The Environment Agency's Catchment Data Explorer confirms that the site lies within the surface water catchment of the River Cober, which flows in a south-westerly direction, passing within 30m of the application area's western boundary. Locally, flow was diverted from the River Cober via weirs and sluices into leats used historically to power mills (agricultural corn mills and stamp mills for processing metalliferous ore.

1.18 The site-specific Flood Risk Assessment (FRA) for the proposed development confirms the Helston Leats are fed from an intake off the River Cober, near Wendron (approximately 1.25km-east northeast of the site) via a 3km supply channel which flows along the western site boundary.

1.19 The site-specific FRA confirms the site lies entirely within low probability Flood Zone 1, defined as land with less than 0.1% annual probability of flooding, and assessed as being at low or very low risk of flooding from all sources.

Hydrogeology

1.20 According to the Multi-Agency Geographic Information for the Countryside's (MAGIC) website, the Carnmenellis Granite intrusion is classified as a Secondary A Aquifer; these comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.

1.21 The superficial Alluvium associated with the River Cober to the north-west of the site is also classified as a Secondary A Aquifer.

1.22 The site is not located within or in the vicinity of a Groundwater Source Protection Zone or Drinking Water Safeguard Zone for groundwater.

1.23 The Environment Agency's Groundwater Vulnerability Maps (MAGIC) mapping system11) show the vulnerability of groundwater to a pollutant discharged at ground level, based on the hydrological, geological, hydrogeological and soil properties. The groundwater vulnerability beneath the site is classified as High, reducing to Medium-High immediately to the northwest, where Alluvium overlies the bedrock. Areas with high groundwater vulnerability are defined as: areas able to easily transmit pollution to groundwater.

1.24 Prior to the preparation of this SRA no groundwater monitoring data has been supplied. However, shallow groundwater has been to discharge to the adjacent River Cober, with a general westerly or south-westerly flow direction. Groundwater levels of approximately 100mOD to 105mOD can be inferred beneath the site, based on the regional hydrogeological map, site levels and local topography.

Deposition Models

1.25 The inert waste placement will comprise the importation of approximately 102,000 m^3 of inert waste for remodelling and reprofiling the site to achieve the landform laid out in Section 10 of the Design and Access Statement prepared in support of the planning application documentation.

1.26 A Construction Quality Assurance document has been produced demonstrating the method of placement and working practices.

Models of the Different Components of the Inert Waste Placement

1.27 The main purpose of this stability risk assessment is to meet the requirements presented Table S1.3 Pre- 0perational measures, Reference PO1; which states:

> *"The operator shall submit a Stability Risk Assessment (SRA) in writing to the Environment Agency for approval. The SRA must contain an assessment of the proposed engineered attenuation layer and its short and long-term stability and integrity in view of the drainage of infiltration from above it that will occur to non-aquifer areas. The operator shall implement the mitigation measures included within the SRA as agreed with the Environment Agency's written approval of the SRA, subject to such amendments or additions as notified by the Environment Agency.".*

Basal Subgrade Model

1.28 The inert waste placement is being undertaken to raise the existing ground level in areas of the Whealdream Golf Course (Table SRA3). Apart form the removal of Topsoil and local benching of the natural stratigraphy prior to placement of any material, no widespread excavation across the area is proposed.

1.29 The basal subgrade will comprise the weathered Carnmenellis Granite, comprising silty gravelly SAND over intact coarse grained GRANITE. The weathered Granite is considered competent and not prone to the formation voids or karstic weathering.

1.30 Groundwater levels are not reported in the HRA or in the local boreholes. No groundwater outflows have been identified in the HRA so it is considered unlikely that groundwater will adversely affect the proses works

Basal Lining System

1.31 The risk assessment undertaken as part of the Hydrological Risk Assessment has demonstrated that no geological attenuation layer is necessary.

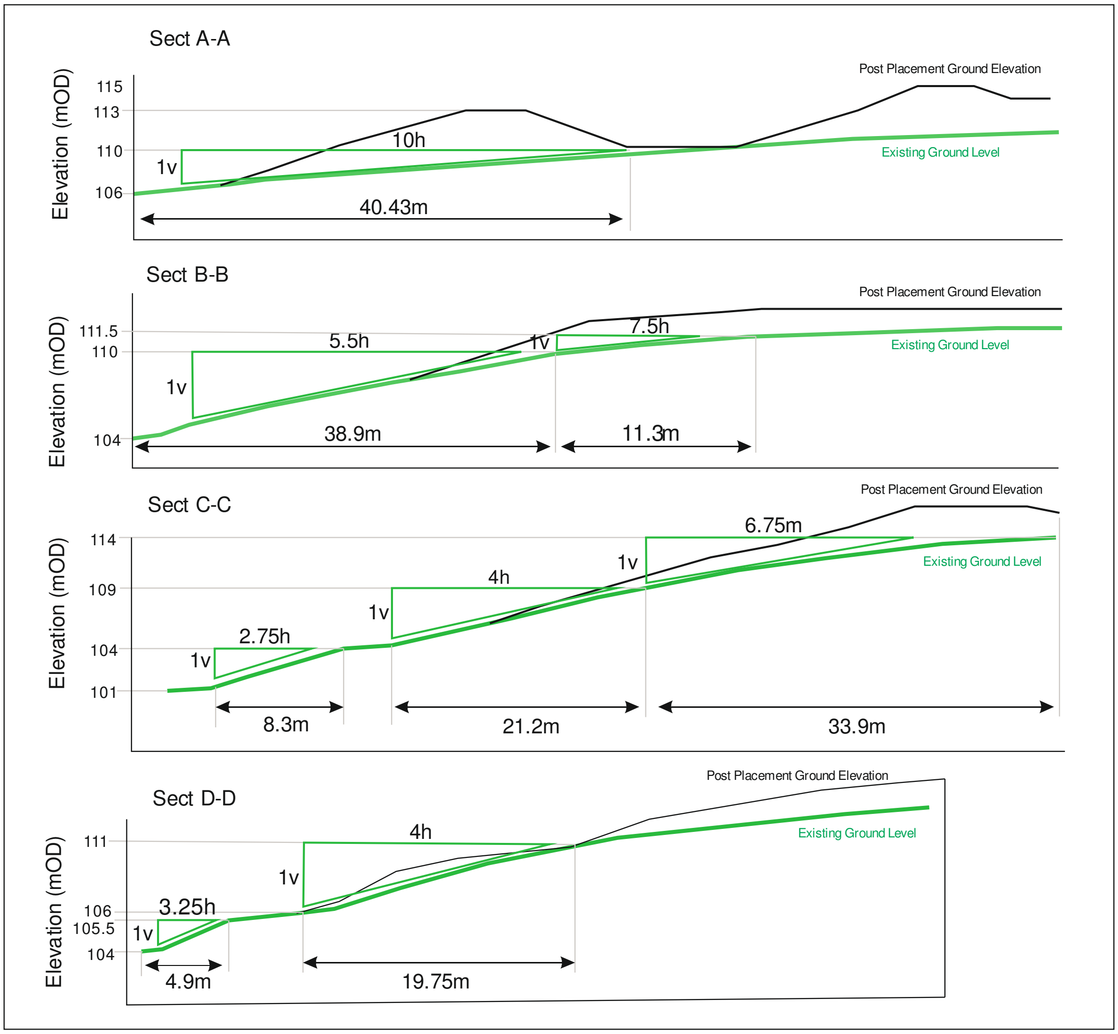
Side Slope Subgrade Model

1.32 Apart from the Topsoil strip no additional excavations into the natural strata will be undertaken as part of these works. Therefore, the gradient of the side slopes will be the same as the existing topography in each of the uplift areas of the site.

1.33 After removal of the Topsoil, the side slope subgrade model will consist of the in-situ weathered Carnmenellis Granite.

1.34 Cross-sections supplied by the Client have been examined and the steepest slopes of the side slope subgrade extracted and presented as Figure SRA4.

Figure SRA4 Cross sections through side slope subgrade



1.35 Based on the cross sections presented in Figure SRA 4 the steepest side slope subgrade is located at the northern end of Section C-C where it achieves a gradient 1(v) : 2.75(h) or 20°.

<u>Side Lining Model</u>

Not a consideration at this site.

<u>Inert Waste Mass Model</u>

1.36 It is proposed that the Whealdream land uplift will be undertaken by the placement of inert materials only.

1.37 The inert material is liable to comprise locally derived arisings from earthworks, foundation construction works and demolition debris.

1.38 The geology of the local area is variable and comprises both coarse- and fine-grained materials. Most of the inert materials are likely to comprise locally derived materials. With respect to stability the worst case would be a waste mass comprised entirely of fine-grained materials. Therefore, the inert material model will comprise a generic fine-grained material and the characteristic geotechnical parameters attributed to this material will be based on a number of sources.

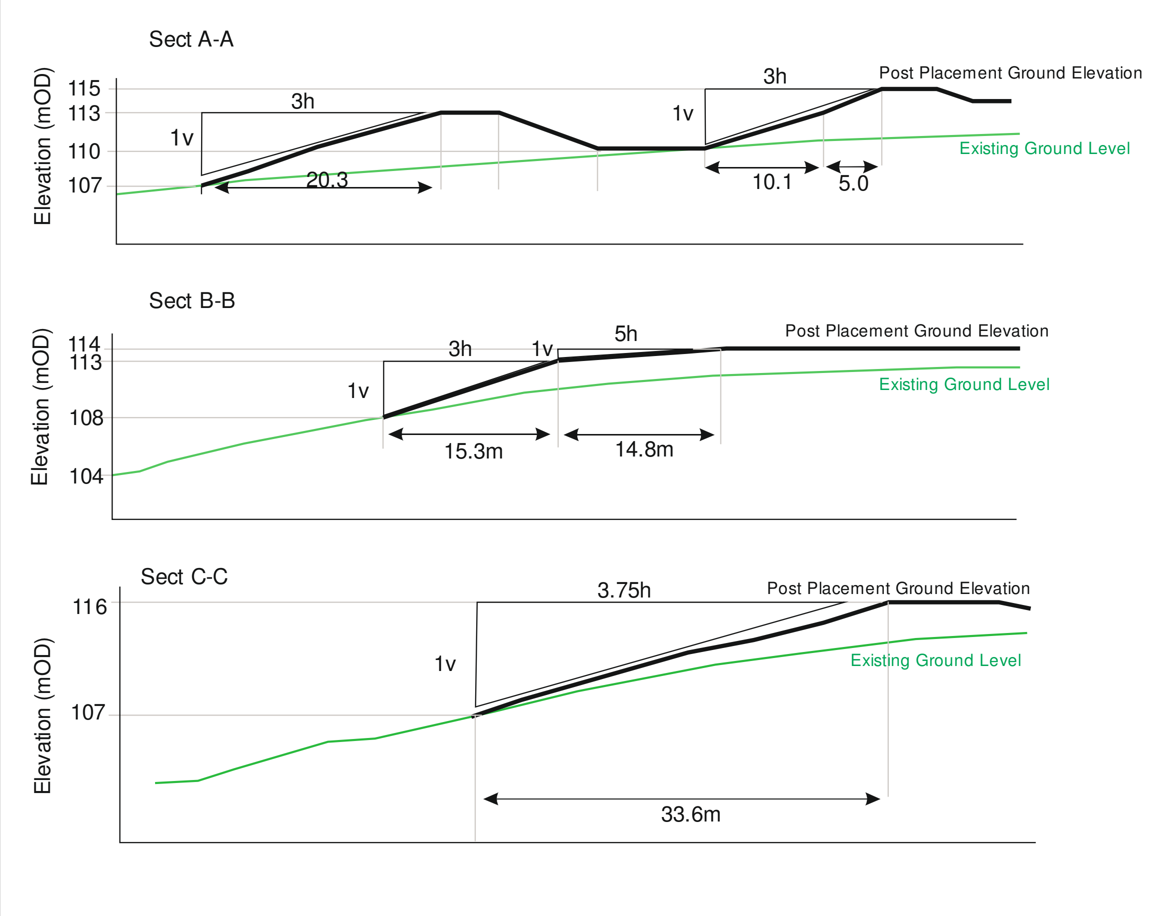
Table SRA2 Bibliography of Published sources used in the determination of the characteristic geotechnical parameters of the inert waste

Author	*Date*	*Title*
Carter M., & Bentley S.P.	2016	Soil Properties and Correlations 2nd. Ed.
Look B.	2007	Handbook of Geotechnical Investigation and Design Tables
Duncan J.M., & Wright, S.G.	2005	Soil Strength & Slope Stability
CIRIA C583	2004	Engineering in the Lambeth Group[1]
Hight D.W., McMillan, F, Powell, J.J.M., Jardine, R.J., & Allenou, C.P.	2003	Some Characteristics of the London Clay: In Tan et al. (Eds.) Characterisation and Engineering Properties of Natural Soils.[1]

[1] the inclusion of these two strata specific references should not be taken as a suggestion of the Inert Waste content

1.39 The maximum permanent inert waste slope is 1(v):3(h) (Figure SRA5).

Figure SRA5 Cross sections through inert waste placement areas



1.40 The waste will be compacted in horizontal layers across the area to be reprofiled to the approved pre-settlement topography.

Capping System Model

1.41 On completion of filling to final levels, the site will be capped with soils suitable for its end leisure uses. In accordance with the requirements of the Landfill Directive, an engineered cap (clay or plastic) is not required.

2.0 STABILITY RISK ASSESSMENT

Risk Screening

Basal Subgrade Screening

2.1 The basal subgrade will be formed of the in-situ weathered Carnmenellis Granite. Boreholes completed along the A394 approximately 750m east of the application area show the upper 0.50 to 2.00m of the Granite to weather to light brown silty gravelly SAND with little or no kaolinization. The highly weathered Granite and the underlying intact Graite are considered to be competent strata easily capable of supporting the additional loading generated by the inert waste placement.

2.2 Provided careful inspection of the basal subgrade is carried, with particular attention to any soft areas (if Present) prior to the placement and compaction of the basal liner, further consideration of this component is not considered necessary.

Side Slope Subgrade Screening

2.3 The side slope subgrade will follow the existing topography which has been shown to exhibit gradients of up to 1(v) : 2.75(h). The areas where the inert waste placement is to be carried out are currently stable and given the gradients under consideration will remain stable under all foreseeable conditions. Placement of the attenuation barrier and inert waste is likely to increase the already stable side slope subgrade. Therefore, no further consideration of the side slope subgrade is required.

Waste Mass Screening

2.4 This component is considered to be an issue that will require a detailed geotechnical analysis in order to assess the stability of the inert waste mass.

Capping System Screening

2.5 The proposed finished contours indicate a maximum slope at 1(V) : 3(H) will be achieved within the inert waste. Provided this maximum gradient of 1(V) : 3(H) (17°) is not exceeded the finished restoration profile will remain stable under all foreseeable conditions and requires no specific stability analysis.

Justification of Modelling Approach and Software

2.6 Two-dimensional limiting equilibrium stability analyses will be used in the assessment of the stability of the various components of the proposed landfill at the ESNG. The method of analysis used in each particular case was determined from an examination of the form of failure being considered.

2.7 The stability analyses were carried out using the Slope/W computer programme.

2.8 The Morgenstern and Price Method (MP) was used in the analyses to determine the Degree of Utilisation against instability for both total stress and effective stress conditions. The MP method is a general method of slices developed on the basis of limit equilibrium, it is a numerical technique for calculating the factor of safety (FOS) or Degree of Utilisation (DOU) of a slope against sliding. This method is based on the idea that the forces and moments acting on individual blocks must be in equilibrium. The calculation method satisfies all equilibrium equations and is applicable to surfaces of any shape.

Justification of Geotechnical Parameters Selected for Analyses

Parameters Selected for Waste Analyses

2.9 The Parameters of the inert waste appropriate for this site were selected on the basis of the information presented in the various publications listed in Table SRA2. As stated previously the inclusion of stratum-specific references should not be taken as guidance to what may be included within the Inert Waste but purely as another source to help define a generic fine grained material. In reality, it is likely to comprise a mixture of fine-and coarse-grained materials and demolition materials. Therefore, the treatment of the inert waste as fine-grained will be the worst-case as the inclusion of any coarse-grained material will increase its characteristic angle of shearing resistance. For the operation of earth moving and compacting material an undrained shear strength of between 40 and 60kN/m^2 is required (Handbook of Geotechnical Investigation and Design Tables). Therefore, a mean characteristic value of 50kN/m^2 has been adopted for the Inert Waste.

Table SRA3 Waste Mass Stability - Summary of Characteristic Geotechnical Data

Material	Unit Weight	Total Stress		Effective Stress	
	γ_k (kN/m^3)	c_{uk} (kN/m^2)	ϕ_{uk} (°)	c'_k (kN/m^2)	ϕ'_k (°)
Waste Mass	17	50	0	5	25

Selection of Appropriate Factors of Safety

2.10 The stability analyses have been carried out in accordance with EC7. The United Kingdom have adopted Design Approach 1 (DA1) Combination 1 & 2 (C 1 & 2) whereby partial factors are applied to either the actions or the material properties and a resultant factor of safety of 1.00 or Degree of Utilisation of less than 1.00 is required.

Table SRA4 Partial Factors used in Design in Accordance with the UK National Annex to EC7

Design Approach	Combination	Partial Factor Sets	Partial Factor Value			
1	1	A1 + M1 + R1	Actions A1			
			Permanent (G)	Unfavourable	$\square_{G;dst}$	1.35
				Favourable	$\square_{G;stb}$	1.00
			Variable (Q)	Unfavourable	$\square_{Q;dst}$	1.50
				Favourable	$\square_{G;dst}$	0
			Materials M1			
			Coefficient of shearing resistance (*tan*□)		$\square_{\square'}$	1.00
			Effective cohesion (*c'*)		$\square_{c'}$	1.00
			Undrained shear strength (c_u)		$\square_{cu}$	1.00
			Resistance R1			
			Resistance		$\square_{R;e}$	1.00
	2	A2 + M2 + R1	Actions A2			
			Permanent (G)	Unfavourable	$\square_{G;dst}$	1.00
				Favourable	$\square_{G;stb}$	1.00
			Variable (Q)	Unfavourable	$\square_{Q;dst}$	1.30
				Favourable	$\square_{G;dst}$	0
			Materials M2			
			Coefficient of shearing resistance (*tan*□)		$\square_{\square'}$	1.25
			Effective cohesion (*c'*)		$\square_{c'}$	1.25
			Undrained shear strength (c_u)		$\square_{cu}$	1.40
			Resistance R1			
			Resistance		$\square_{R;e}$	1.00

2.11 The values of the partial factors used are termed "nationally determined parameters" and EC7 (as published by CEN) allows these to be specified in National Annexes which recognise regional variations in design philosophy.

2.12 LFE4 – Earthworks in Landfill Engineering – Chapter 2 confirms the adoption of Design Approach 1 Combinations 1 and 2, and the nationally adopted partial factors.

Analyses

Inert Waste Mass Analyses

2.13 The topographic survey shows that the maximum gradient of the post placement inert waste is 1(v) : 3 (h) (18.2°). The horizontal length of this slope is 20.3m whilst the thickness of the inert waste is ca 7.5m allowing for topsoil strip and localised benching (Figure SRA5). This configuration will be used in the inert waste stability assessment.

2.14 Leachate pore fluid pressures may develop in the inert waste mass during filling due to infiltration. It is noteworthy that the term leachate as applied refers to direct precipitation or groundwater present within the inert waste at time of placement.

2.15 Given the composition (inert materials), landfill gas pressures are unlikely to develop within the waste mass.

2.16 Waste stability must be assessed as part of the design process for the temporary waste slope configuration. A Stability assessment is required for failure modes wholly within the waste body. The analyses of the failures wholly within the waste were based on Table 3.43 “Failure Wholly within the Waste” of the Environmental Agency R&D Technical Report P1-385/TR2.

2.17 Slope/W has been used to undertake the investigation into failures wholly within the waste mass for both total and effective stress conditions and under different leachate conditions.

2.18 The effects of saturation of the waste mass have been modelled by reducing the cohesion to 0kN/m^2 and representing the waste mass as fully softened.

2.19 Results of the analyses are presented in Appendix 2 and are summarised in Table SRA5.

Table SRA5 Waste Mass Stability – Summary of Results

Run	File Name	Stress Condition	Leachate Condition	Degree of Utilization		Notes
				C1	C2	
1	WM1	Total	Dry	0.32		20.3m Waste Slope at 1(v) : 3(h)
2	WM2				0.29	
3	WM3	Effective	Dry	0.52		Waste Mass Dry
4	WM4				0.60	
5	WM5	Effective	Leachate at 3.00m	0.70		Leachate level 3.00m above basal liner
6	WM6				0.88	
7	WM7	Effective	Saturated	0..69		Saturated inert waste modelled by loss of all apparent cohesion
8	WM8				0.87	

Stability Assessment

Basal and Side Slope Subgrade

2.20 Not a consideration at this site

Basal and Side Slope Liner

2.20 Not a consideration at this site

Inert Waste Mass

2.21 The stability of the inert waste face has been analysed using the computer programme SLOPE/W to calculate the Degree of Utilisation of the restoring forces to prevent failure through the waste body for a range of circular failure surfaces using the Morgenstern and Price's method.

2.22 The waste slope has a Degree of Utilisation of <1.00 (<100%) under both short term total stress conditions and long term effective stress conditions.

2.23 The waste slope continues to have a Degree of Utilisation of < 1.00 even when the material becomes fully softened and the value of the cohesion intercept reduces from 5kN/m^2 to 0kN/m^2.

2.24 It is concluded that a 1(v) : 3(h) waste slope will be stable for the range of conditions anticipated.

Capping System

2.25 Not a consideration at this site.

3.0 MONITORING

The Risk-Based Monitoring Scheme

3.1 Monitoring of the stability of the site is proposed in the form set out below. The objectives are to identify any instances of overall settlement of the structure, identify instability of the waste mass itself and instability of the side slope subgrade and lining system at the earliest possible juncture.

Subgrade Monitoring

3.2 Prior to the placement any inert waste, it is recommended that the basal subgrade is carefully inspected with special attention being paid to the presence of any soft spots. It is recommended that in order to prevent the deterioration of the subgrade that it is left exposed for the minimum time possible prior to the placement of the side slope / basal liner.

Waste Mass Monitoring

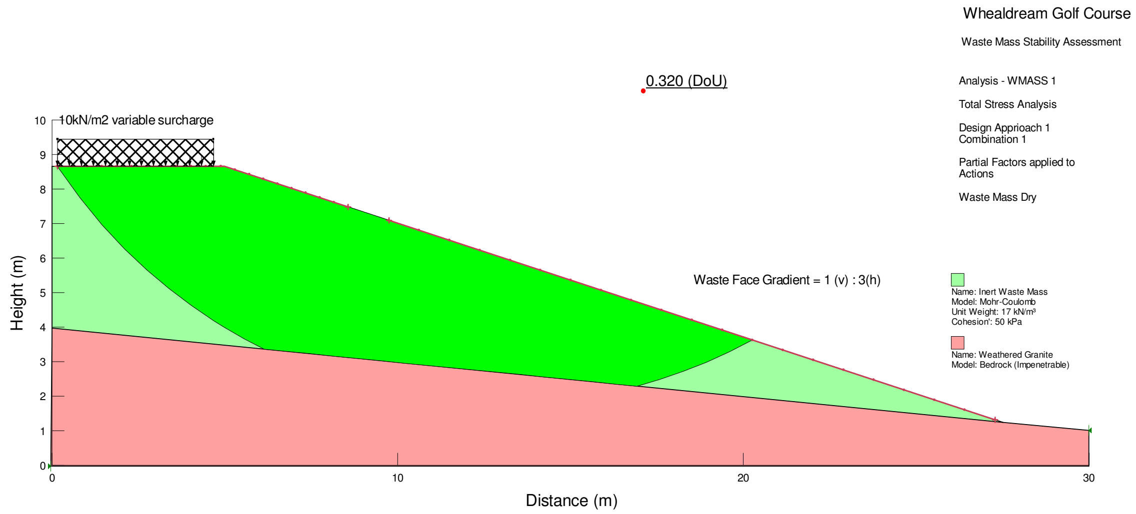
3.3 The temporary slopes in the waste should be visually monitored and appropriate actions taken on any sign of instability. This would typically include a reduction in slope angle of the temporary waste slopes.

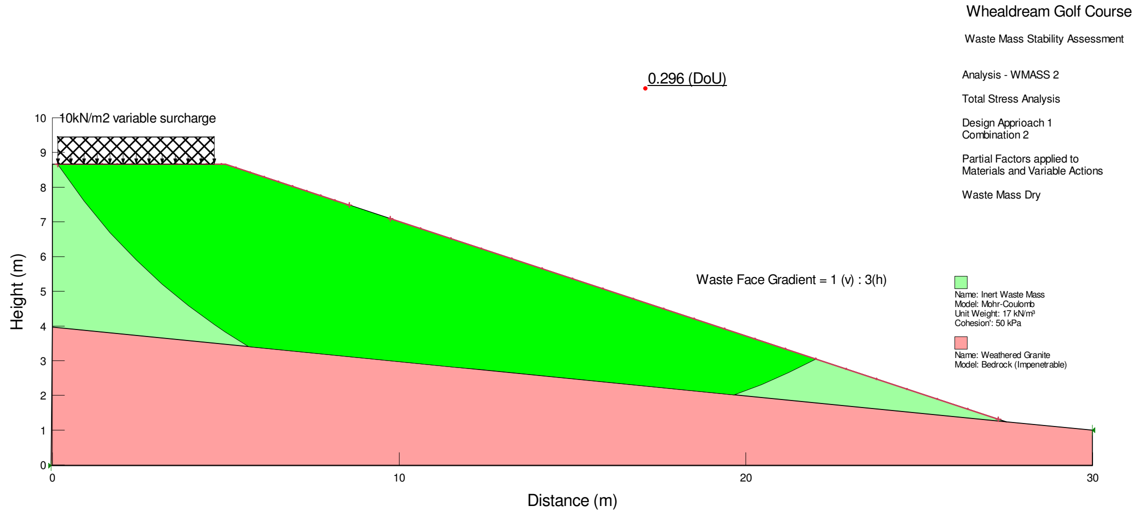
Restoration Soils and Finished Surface Monitoring

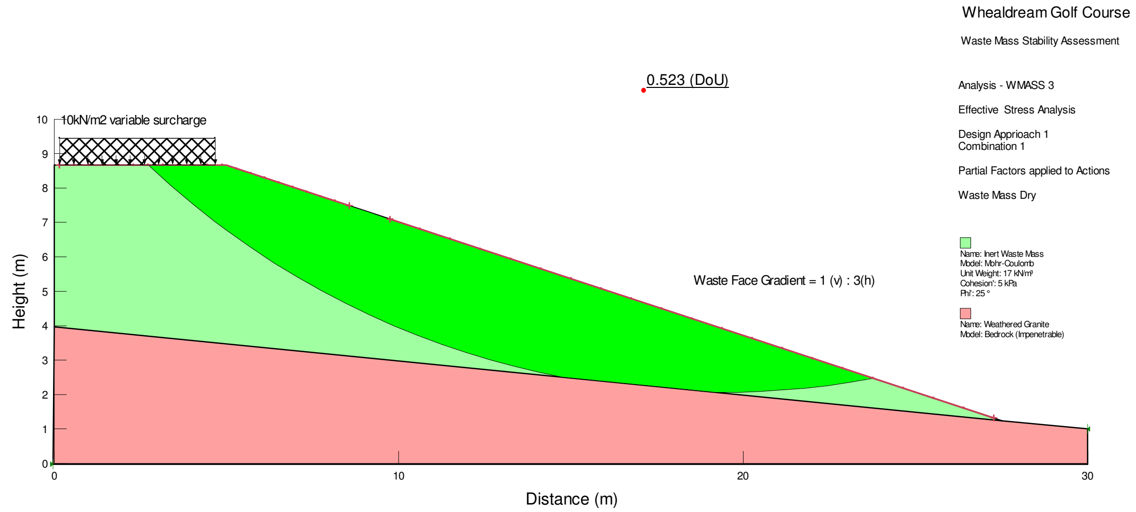
3.4 EA Guidance ‘Landfill and deposit for recovery: aftercare and permit surrender’ indicates that where records demonstrate that a recovery site has accepted only inert wastes during its lifetime, the site is applicable for a low risk surrender based on records alone. As such no further monitoring or post closure monitoring is deemed necessary. However, a site specific closure and aftercare plan has been complied and has been issued under separate cover.

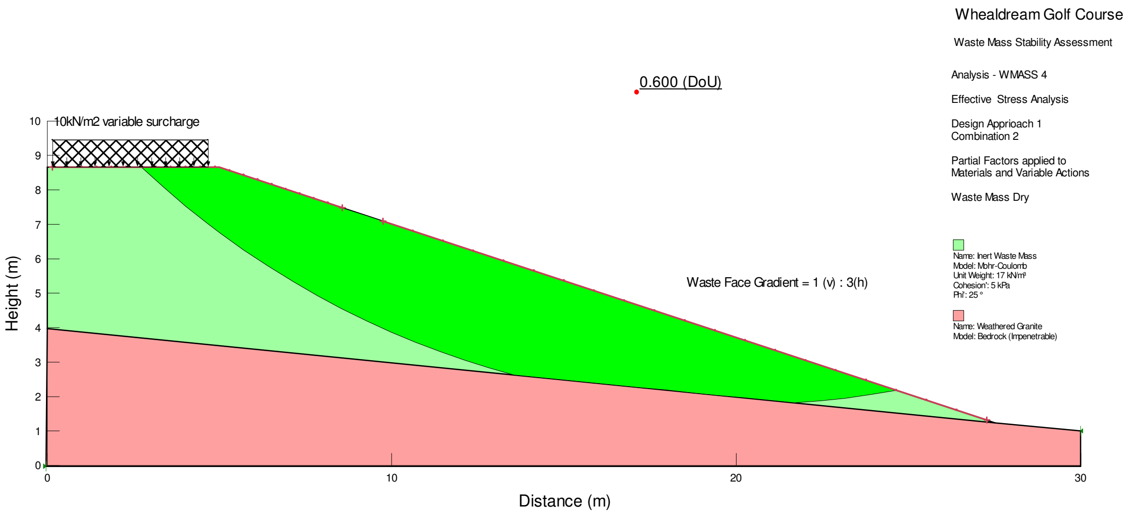
Appendix 1

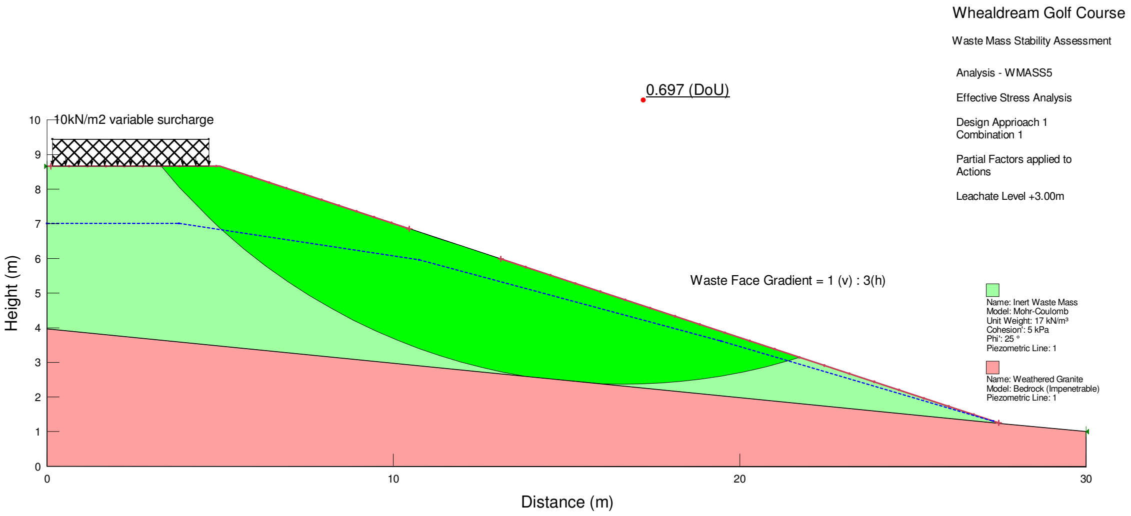
SlopeW Worksheets – Inert Waste

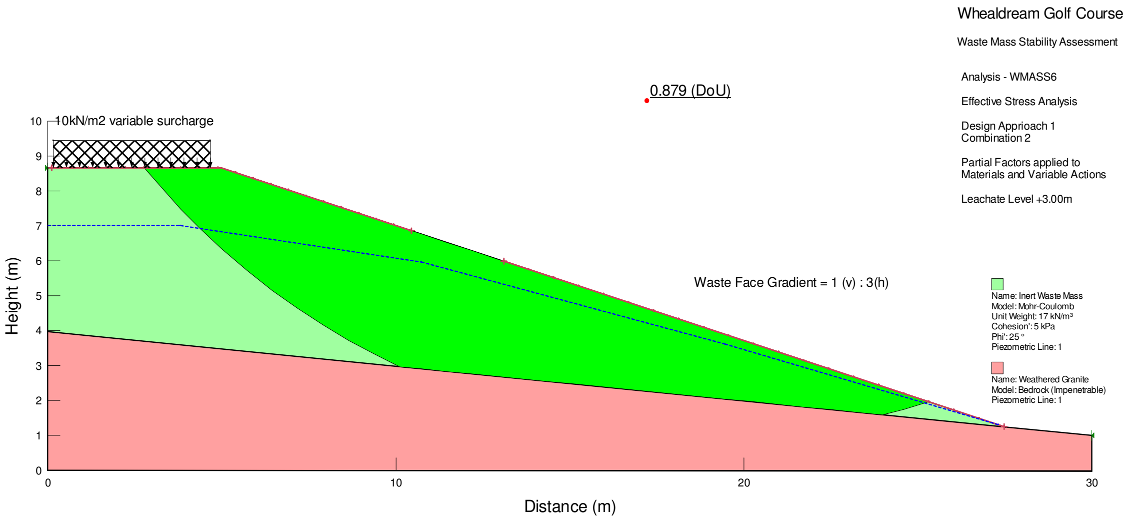

Whealdream Golf Course
Waste Mass Stability Assessment
0.320 (DoU)
Analysis - WMASS 1
Total Stress Analysis
Design Apprioach 1
Combination 1
Partial Factors applied to
Actions
Waste Mass Dry
10kN/m2 variable surcharge
Waste Face Gradient = 1 (v) : 3(h)
Name: Inert Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 50 kPa
Name: Weathered Granite
Model: Bedrock (Impenetrable)
Height (m)
0
1
2
3
4
5
6
7
8
9
10
Distance (m)
0
10
20
30

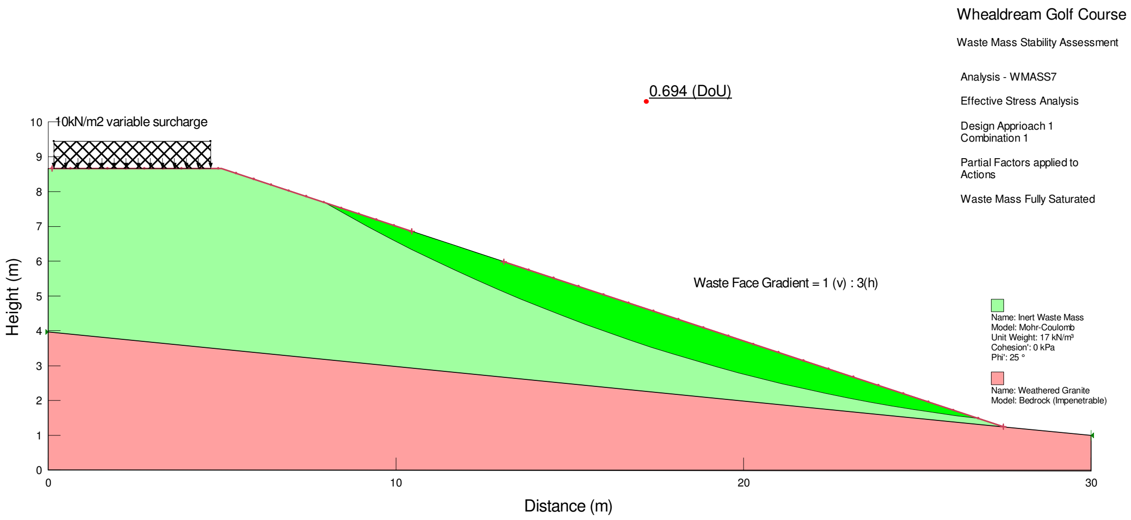

Whealdream Golf Course
Waste Mass Stability Assessment
0.296 (DoU)
Analysis - WMASS 2
Total Stress Analysis
Design Apprioach 1
Combination 2
Partial Factors applied to
Materials and Variable Actions
Waste Mass Dry
10kN/m2 variable surcharge
Waste Face Gradient = 1 (v) : 3(h)
Name: Inert Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 50 kPa
Name: Weathered Granite
Model: Bedrock (Impenetrable)
Height (m)
0
1
2
3
4
5
6
7
8
9
10
Distance (m)
0
10
20
30

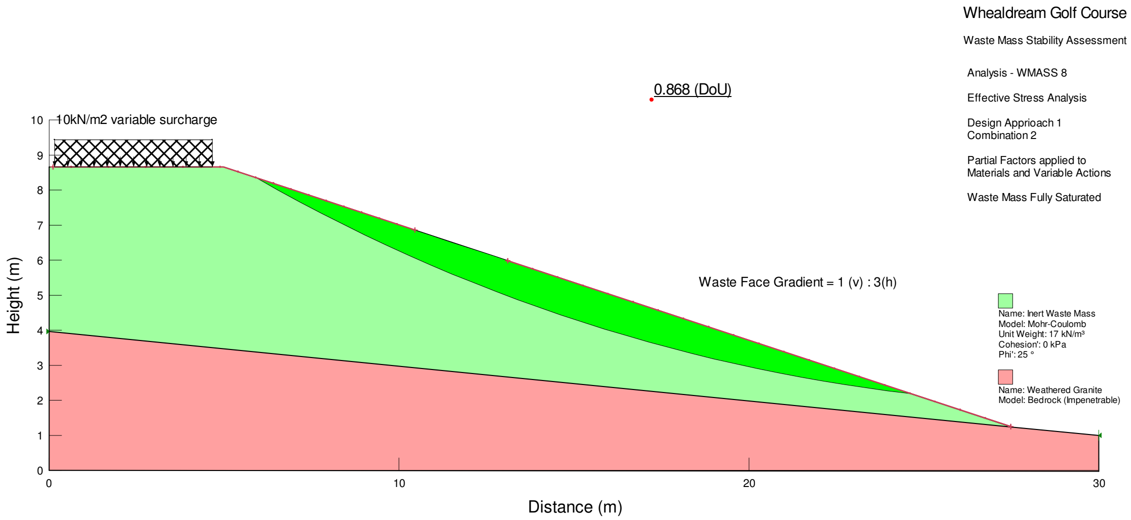

Whealdream Golf Course
Waste Mass Stability Assessment
0.523 (DoU)
Analysis - WMASS 3
Effective Stress Analysis
Design Apprioach 1
Combination 1
Partial Factors applied to Actions
Waste Mass Dry
10kN/m2 variable surcharge
Waste Face Gradient = 1 (v) : 3(h)
Name: Inert Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 5 kPa
Phi': 25 °
Name: Weathered Granite
Model: Bedrock (Impenetrable)
Height (m)
0
1
2
3
4
5
6
7
8
9
10
Distance (m)
0
10
20
30


Whealdream Golf Course
Waste Mass Stability Assessment
Analysis - WMASS 4
Effective Stress Analysis
Design Apprioach 1
Combination 2
Partial Factors applied to
Materials and Variable Actions
Waste Mass Dry
🟩
Name: Inert Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 5 kPa
Phi': 25 °
🟥
Name: Weathered Granite
Model: Bedrock (Impenetrable)
0.600 (DoU)
10kN/m2 variable surcharge
Waste Face Gradient = 1 (v) : 3(h)
Height (m)
Distance (m)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30


Whealdream Golf Course
Waste Mass Stability Assessment
Analysis - WMASS5
Effective Stress Analysis
Design Apprioach 1
Combination 1
Partial Factors applied to
Actions
Leachate Level +3.00m
🟩
Name: Inert Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 5 kPa
Phi': 25 °
Piezometric Line: 1
🟥
Name: Weathered Granite
Model: Bedrock (Impenetrable)
Piezometric Line: 1
0.697 (DoU)
10kN/m2 variable surcharge
Waste Face Gradient = 1 (v) : 3(h)
Height (m)
Distance (m)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30


Whealdream Golf Course
Waste Mass Stability Assessment
Analysis - WMASS6
Effective Stress Analysis
Design Apprioach 1
Combination 2
Partial Factors applied to
Materials and Variable Actions
Leachate Level +3.00m
🟩
Name: Inert Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 5 kPa
Phi': 25 °
Piezometric Line: 1
🟥
Name: Weathered Granite
Model: Bedrock (Impenetrable)
Piezometric Line: 1
0.879 (DoU)
10kN/m2 variable surcharge
Waste Face Gradient = 1 (v) : 3(h)
Height (m)
Distance (m)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30


Whealdream Golf Course
Waste Mass Stability Assessment
Analysis - WMASS7
Effective Stress Analysis
Design Apprioach 1 Combination 1
Partial Factors applied to Actions
Waste Mass Fully Saturated
0.694 (DoU)
10kN/m2 variable surcharge
Waste Face Gradient = 1 (v) : 3(h)
Name: Inert Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 0 kPa
Phi': 25 °
Name: Weathered Granite
Model: Bedrock (Impenetrable)
Height (m)
Distance (m)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30


Whealdream Golf Course
Waste Mass Stability Assessment
Analysis - WMASS 8
Effective Stress Analysis
Design Apprioach 1 Combination 2
Partial Factors applied to Materials and Variable Actions
Waste Mass Fully Saturated
0.868 (DoU)
10kN/m2 variable surcharge
Waste Face Gradient = 1 (v) : 3(h)
Name: Inert Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 0 kPa
Phi': 25 °
Name: Weathered Granite
Model: Bedrock (Impenetrable)
Height (m)
Distance (m)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30