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TETRA TECH LIMITED

DORKET HEAD QUARRY INERT LANDFILL

ENVIRONMENTAL PERMIT APPLICATION

Stability Risk Assessment Report

GEC JOB NO: GE220041201

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1.0 INTRODUCTION

Report Context

1.1 The operator of the installation is Mick George Ltd. (MGL).

1.2 Tetra Tech Ltd. have instructed Geotechnical & Environmental Consulting Ltd. (GEC) to undertake a Stability Risk Assessment (SRA) to form part of an Environmental Permit Application for Dorket Head Quarry Inert Landfill.

1.3 This environmental permit application is for the permanent placement of inert material within the void formed by the former mineral extraction works.

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

- Dorket Head Environmental Permit Application Environmental Setting and Site Design. Tetra Tech Report No. B027237 – January 2022;
- Dorket Head Environmental Permit Application Hydrogeological Risk Assessment. Tetra Tech Report No. 784- B027237 - January 2022;
- Dorket Head Environmental Permit Application Operating Techniques. Tetra Tech Report No. B027237 – January 2022; and
- Dorket Head Southern Extension – Restoration Masterplan, Drawing No. DHS3/10 September 2018.

1.5 This Report has been completed in conjunction with the Environmental Setting and Site Design Report (ESSD) (January 2022). It is not a standalone document and factual data related to the site, its setting and receiving environment are located in the ESSD and referred to in this document. All drawings referred to in this SRA are to be found in the ESSD unless otherwise stated.

1.6 This document has been prepared in accordance with the Stability Risk Assessment Report Template (Version 1 – March 2010).

Conceptual Stability Site Model

<u>Location</u>

1.7 This Stability Risk Assessment refers to the area that is included within the Environmental Permit Application boundary shown on Drawing No. MGL/B027237/PER/01 and covers the area known as Dorket Head Quarry.

1.8 Dorket Head Quarry is located on the northern edge of Arnold and the B684 Woodborough Lane. Arnold forms the northern district of the Nottingham urban area, with the city centre lying approximately 7.5km to the southwest. Woodborough is located 2.9km southwest of the site; whilst the village of Calverton is located 2.6km to the south. The centre of the site is centred at approximate National Grid Reference (NGR) 459887, 346752.

1.9 The site is bordered by agricultural land to the north, east and west. To the south of the site is Hobbucks Nature Reserve and a housing estate with the closest residential roads being Surgeys Lane, Homefield Avenue, Strathmore Road and Shandwick Close. The Ibstock-owned Dorket Head Brickworks is situated to the west of the site and utilises clays that are extracted from the quarry for the manufacture of bricks.

1.10 The proposed facility will cover an area of approximately 5.7ha and is on steeply south easterly sloping terrain (134mAOD to 115mAOD).

Regional Geology

Solid Geology

1.11 With reference to British Geological Survey Sheet 126 Nottingham 1:50000 Sold & Drift, the site is located on the Gunthorpe Member of the Mercia Mudstone Group.

1.12 The BGS Lexicon of Named Rock Units describes the Gunthorpe Member as red-brown mudstone with subordinate dolomitic siltstone and fine-grained sandstone, gypsum veins and nodules are common.

Superficial Geology

1.13 The geological map does not record any superficial deposits at the site.

Structural Geology

1.14 There are no structural features that are likely to affect the stability of the site within 500m.

Local Geology

1.15 A large number of investigative boreholes have been installed within the wider quarry area. Three ‘skerry bands’ are located within the Gunthorpe Member at various depths and these comprise siltstone and fine sandstone which are strongly cemented and lithified. The uppermost unit is known as the ‘Top Skerry’ and has an average thickness of approximately 0.80m. The lowermost unit is known as the ‘Bottom Skerry’ with an average thickness of approximately 2.70m. The intermediate ‘Plains Skerry’ has an average thickness of approximately 10m.

1.16 The Bottom Skerry is recognised as being at the base of the currently useable ‘brick clay’ materials at the site and so forms the base of the currently permitted working scheme for the Dorket Head Quarry, in addition to the base of the proposed southern extension.

1.17 Superficial deposits are shown to be largely absent across the site. As the site is a quarry, any overburden has subsequently been removed and re-deposited in the excavation void space.

1.18 A round of drilling was undertaken to establish a network of monitoring boreholes surrounding the site's boundary and dedicated to measuring groundwater levels and quality (See Drawing DK/H/MPP01).

1.19 4no. boreholes were installed around the site's perimeter. In addition to providing basic geological and hydrogeological information these boreholes indicated the depths of exploitable minerals.

1.20 Ground conditions beneath the site comprises units representing the Gunthorpe Member. There is also a small parcel of land located in the northwest and northeast corners of the site which have a bedrock of Siltstone and Dolomitic Limestone which also belong to the Gunthorpe Member.

1.21 The encountered stratigraphy comprises red/brown mudstones, siltstones, and occasional relatively thin pale green fine grained sandstones (Skerry Bands). Although the level of description makes accurate identification of any Skerry Bands difficult.

1.22 There is no evidence of any shallow mine activities beneath the site, expect where the Coal Measures Group would be intersected, this is likely to occur at a depth of >60m.

Hydrology

1.23 Within the wider site area, the following surface water features are located: a pond approximately 430m northwest of the site, the Day (Dumble) Brook approximately 800m east, the Lambley Dumble located approximately 1.2km southeast and the Day Brook approximately 2.7km southwest.

1.24 According to the Flood Map for Planning Service (FMPS), the application site is not situated in an area at risk of flooding.

Hydrogeology

1.25 In terms of aquifer designation, the MAGIC website shows that the application site overlies a Secondary B aquifer.

1.26 According to the Multi Agency Geographic Information for the Countryside (MAGIC) website, the proposed site is not situated within a GSPZ.

1.27 Based on the groundwater contours presented in Drawing. No MGL/B27237/HYD/05 the shallowest groundwater level is 101.0mAOD., whilst the ground level at the base of the extraction void is shown at 115.0mAOD (Figure SRA1). Therefore, groundwater levels will be a minimum of 14.00m beneath the base of the void.

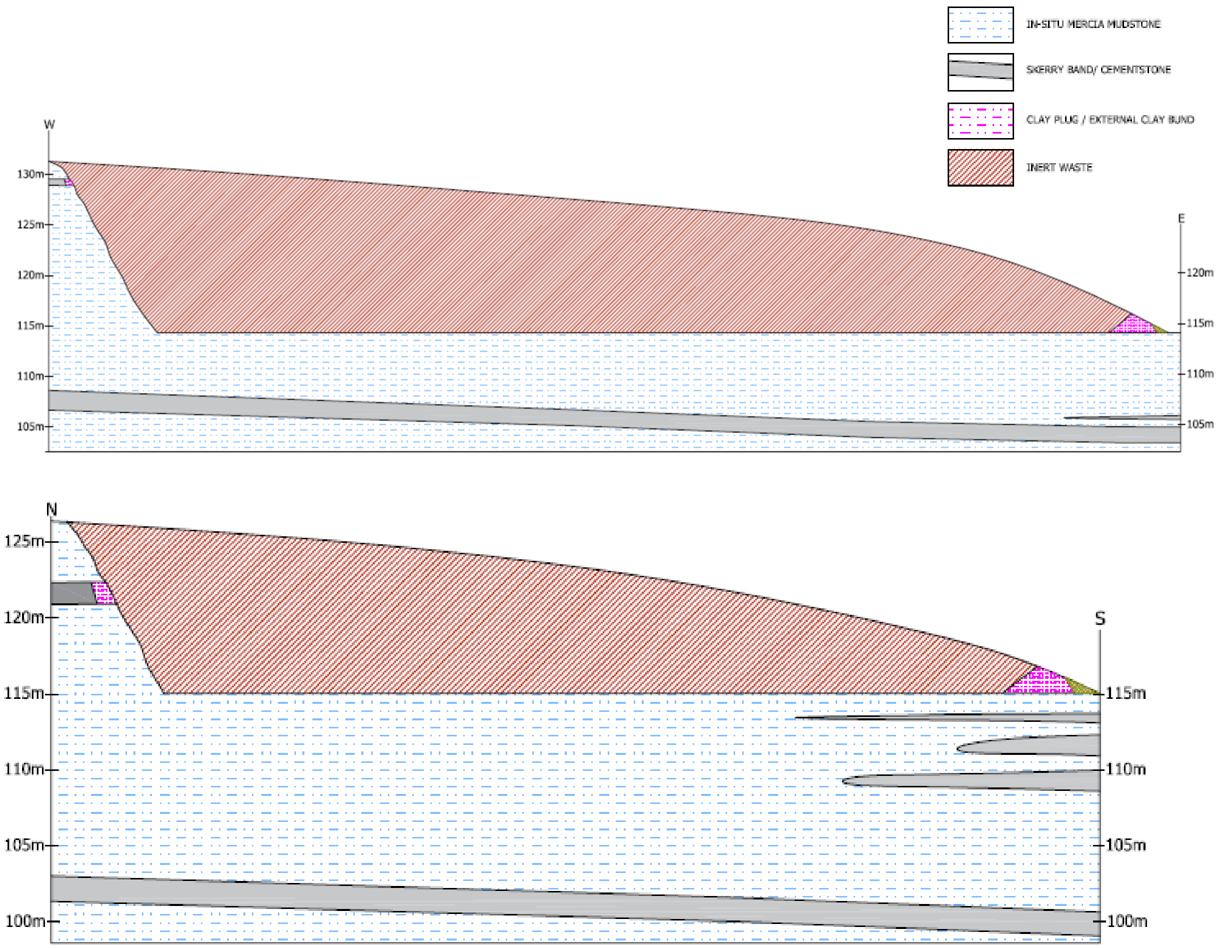


Figure SRA1 – Geological Cross Sections showing proposed finished elevations (Drawing No. MGL/B027237/HYD/03)

Basal Subgrade Model

1.28 The existing void and any further extension to the void will be created by the extraction of the Mudstones and weathered Mudstones of the Mercia Mudstone Group. It is unclear from the borehole logs if any Skerry Bands will be exposed during the extraction works.

1.29 The Radcliffe and the Gunthorpe Members of the Mercia Mudstone Group are described locally as interbedded blue grey and red brown Mudstones and Siltstones. Whilst the Skerry Bands are described as light bluish grey Sandstone interbedded with Siltstone.

1.30 All the individual lithologies making up the Mercia Mudstone Group within the site area are considered to be of extremely low compressibility.

Basal Lining System

1.31 No mineral liner is required due to the presence of a natural geological barrier comprising units of the Mercia Mudstone Group. Therefore, the geological barrier will be formed by leaving the existing mudstones in place.

1.32 Suitable site derived materials imported clays or suitable inert waste materials will however be used to line the base of the void if Skerry Bands are exposed following extraction of the overlying mudstone. The proposed basal liner is to be 0.5m thick and will have a permeability of 5×10^{-8}m/s which is equivalent to a 1m liner with a permeability of 1×10^{-7}m/s.

Side Slope Subgrade Model

1.33 There are three sandstone interbedded with siltstone bands termed the “Skerry Beds” whose higher permeability means they contain groundwater under artesian pressure.

1.34 The side slopes of the existing void appear to be stable at there current configuration i.e. at angles up to 80° due to the lithification of the mudstones and siltstones.

Side Slope Lining Model

1.35 Given the low permeability of the Mercia Mudstone between the skerry bands an engineered geological barrier will not be used. However engineered clay will be used to plug any seepage from any skerry bands in the side walls of the landfill. If required, it is proposed to excavate into the seeping band to a point where a minimum 1m with a maximum permeability of 1×10^{-7}m/s (or equivalent) of engineered clay will fill the gap to prevent any groundwater ingress into the site. By doing this it will remove any pathways for potential contaminates out of the landfill. The clay plug will tie in above and below with the Mercia Mudstone to form a low permeability seal.

1.36 The clay plugs (if required) will be constructed just ahead of the waste placement such that hydrostatic forces from the dammed groundwater will not develop prior to buttressing by inert waste.

1.37 No side slope liner will be placed against side slopes comprising the Mercia Mudstone due to its low in-situ permeability.

Inert Waste Mass Model

1.38 It is proposed that Dorket Head Quarry will be used for the placement of inert materials only.

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

1.40 The geology of the local area is variable and comprises both coarse- and fine-grained materials. As most of the inert materials is 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 SRA1: 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.*

1.41 The maximum temporary waste slope during placement operations will be restricted to 1(v):3(h).

1.42 The waste will be compacted in horizontal layers across the base of the cell to the pre-settlement restoration level.

Capping System Model

1.43 On completion of filling to final levels, the site will be capped with 1.2m of restoration soils comprising not less than 0.3m of topsoil. 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 or redeposited mudstones of the Mercia Mudstone Group or locally by the exposed sandstone and siltstone of the lower Skerry Band. As the void has been and will continue to be formed by the excavation of material there will be a net unloading of the ground. The replacement of the excavated material with unwanted clays and inert waste will not fully reload the soil as there is a difference in the unit weight of the excavated material and the replaced inert waste.

2.2 It is understood that pumping is to be undertaken to control the water level in the base of the void. Therefore, basal heave is unlikely to occur to such an extent as to affect the stability of the basal subgrade.

2.3 No stability analysis of this component is considered necessary.

Basal Lining System Screening

2.4 The basal liner is to comprise the in-situ Mercia Mudstone Group. In areas where the mineral extraction works have exposed the lower Skerry Band locally sourced fine-grained material will be placed as either 1.00m of clay with a hydraulic conductivity of 1.0×10^{-7}m/s or 0.5m of clay with a hydraulic conductivity of 5×10^{-8}m/s. The dewatering of the void will prevent softening of this material until the inert waste is placed.

Side Slope Subgrade Screening

2.5 The side slopes will be formed as part of the extraction process which is being carried out by Ibstock Plc. These works and the redeposition of the unwanted clays are subject to geotechnical appraisal under Regulation 33 of the Quarries Regulations, part of which is to assess the stability of the side slope subgrade. Therefore, the side slope subgrade will be in a stable configuration at the onset of inert waste placement and there is no reason for this situation not to persist throughout waste placement operations.

2.6 As the side-slope subgrade would have undergone geotechnical appraisal during the mineral extraction works, no further stability analysis of the side-slope subgrade is considered necessary.

Side Slope Lining System Screening

2.7 Based on the level of confidence in the low permeability of the side-slope subgrade no artificial liner is to be constructed. If any Skerry Bands are encountered an engineered clay will be used to plug any seepage in the side walls of the landfill. The construction of the clay plug would be to the specification detailed in the Construction Quality Assurance (CQA) Plan that will be produced for the site.

2.8 No further analysis of this component of the landfill is considered necessary.

Waste Mass Screening

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

Capping System Screening

2.10 Based on the finished proposed finished contours a maximum gradient of 1(v):30 (h) will be created which will remain stable under all foreseeable ground conditions. Therefore, no stability analysis of the restoration soils is considered necessary.

Justification of Modelling Approach and Software

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

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

2.13 The Morgenstern and Price Method was used in the analyses to determine the factor of safety against instability for both total stress and effective stress conditions.

Justification of Geotechnical Parameters Selected for Analyses

Parameters Selected for Waste Analyses

2.14 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 SRA1. 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.

Table SRA2: Waste Mass Stability - Summary of Characteristic Geotechnical Data

Material	Unit Weight	Total Stress		Effective Stress	
	γ_k (kN/m^3)	c_u (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

2.15 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 is required.

Table SRA3: 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	$\gamma_{G;dst}$	1.35
				Favourable	$\gamma_{G;stb}$	1.00
			Variable (Q)	Unfavourable	$\gamma_{Q;dst}$	1.50
				Favourable	$\gamma_{G;dst}$	0
			Materials M1			
			Coefficient of shearing resistance (*tanφ*)		$\gamma_{\phi'}$	1.00
			Effective cohesion (*c'*)		$\gamma_{c'}$	1.00
			Undrained shear strength (c_u)		γ_{cu}	1.00
			Resistance R1			
			Resistance		$\gamma_{R;e}$	1.00
	2	A2 + M2 + R1	Actions A2			
			Permanent (G)	Unfavourable	$\gamma_{G;dst}$	1.00
				Favourable	$\gamma_{G;stb}$	1.00
			Variable (Q)	Unfavourable	$\gamma_{Q;dst}$	1.30
				Favourable	$\gamma_{G;dst}$	0
			Materials M2			
			Coefficient of shearing resistance (*tanφ*)		$\gamma_{\phi'}$	1.25
			Effective cohesion (*c'*)		$\gamma_{c'}$	1.25
			Undrained shear strength (c_u)		γ_{cu}	1.40
			Resistance R1			
			Resistance		$\gamma_{R;e}$	1.00

2.16 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.

2.17 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

Waste Mass Analyses

2.18 The post extraction void may be up to 12m deep. However, although it is unlikely that a 12m high waste face would be created given the phasing and placement of the inert waste in layers. However, for risk assessment purposes a 12m high slope will be considered and the waste during placement operations will be restricted to 1(v) : 3(h).

2.19 Leachate pore fluid pressures may develop in the 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.

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

2.21 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.

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

2.23 The effects of variations in leachate pressure were modelled by investigating the effects of increased leachate levels on the factor of safety against instability within the waste body.

2.24 Results of the analyses are presented in Appendix 1 and can be summarised as follows:

Table SRA4: Waste Mass Stability – Summary of Results

Run	File Name	Waste Strength	Leachate Level	Degree of Utilisation		Notes
				C1	C2	
1	WMass1	Total	Dry	0.59		Short term waste mass parameters
2	WMass2				0.54	
3	WMass3	Effective	1.00m	0.63		Increasing leachate level measured from base of waste mass
4	WMass4				0.72	
5	WMass5		4.00	0.71		
6	WMass6				0.80	
07	WMass7		8.00	0.70		
08	WMass8				0.76	
09	WMass9		Not Present	1.39 (FoS)		Cohesion = 0kN/m^2

Assessment

Basal Subgrade

2.25 The basal subgrade will comprise competent in-situ Mercia Mudstone Group materials (Gunthorpe or Radcliffe Member). If a Skerry Band is exposed during mineral extraction works. Both of these materials are considered competent and with no net increase in stress at basal subgrade level predicted, no settlement other than short term elastic recompression is expected. Therefore, the basal subgrade is considered appropriate without any significant re-engineering.

Basal Liner

2.26 The basal liner will comprise the in-situ Gunthorpe Member. In some areas of the void it is possible that a Skerry Band may be exposed and, in these areas, locally derived clay will be placed.to form a geological barrier.

2.27 Therefore, provided the in-situ mudstone meets the requirements of the engineering specification it is considered appropriate without significant re-engineering.

Side Slope Sub-Grade

2.28 All the side slope subgrades will have undergone geotechnical appraisal under Regulation 33 of the Quarries Regulations. Therefore, the side – slopes will have been constructed at a stable configuration. There is no reason why these side slopes should degrade during the period of waste placement operations.

Side Slope Liner

2.29 It is not proposed to construct a side slope liner against the low permeability Gunthorpe Member of the Mercia Mudstone Group.

Waste Mass

2.30 The stability of the temporary waste face was analysed using the computer programme SLOPE/W to calculate the factor of safety against failure through the waste body for a range of circular failure surfaces using Morgenstern and Price's method.

2.31 The importance of different leachate levels within the waste and their effect on overall stability were assessed. The effect of reduction of shear strength from peak to residual values has also been investigated.

2.32 The waste slope has a degree of utilisation < 1 for all leachate levels up to 8.00m from the base of the waste body. As the thickness of the unbuttressed inert waste is 12.00m a leachate level of 8.00m is extremely unlikely to occur under normal operating conditions.

2.33 The waste slope has a factor of safety of 1.39 even if the value of the cohesion intercept of the waste reduces from 5kN/m^2 to 0kN/m^2.

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

Capping System

2.35 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.

Basal Subgrade Monitoring

3.2 It is recommended that continuous monitoring of the subgrade is carried out to identify any soft spots. If soft spots are identified appropriate treatments may include excavation and replacement with granular material and proof-rolling.

Side Slope Subgrade + Lining Monitoring

3.3 The side slopes should be visually monitored for instability both during the mineral extraction works and waste placement operations. In the event of any instances of instability appropriate action should be taken which may include buttressing the toe of the slope using inert waste material or reducing the side slope angle.

3.4 Special attention should be paid if any areas of groundwater outflows within the side slope subgrade are identified as these may require “plugging” prior to the placement of the inert waste.

Basal Lining System Monitoring

3.5 Although no basal liner is to be placed, the in-situ Gunthorpe Member will undergo continuous monitoring in respect of suitability to meet the engineering specification. In addition, areas where a Skerry Band has been exposed and a geological barrier placed will be visually monitored for signs of heave. if any movement is suspected a local surcharge of at least 1.00m of inert waste should be placed across the area of concern.

Waste Mass Monitoring

3.6 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.

Capping System Monitoring

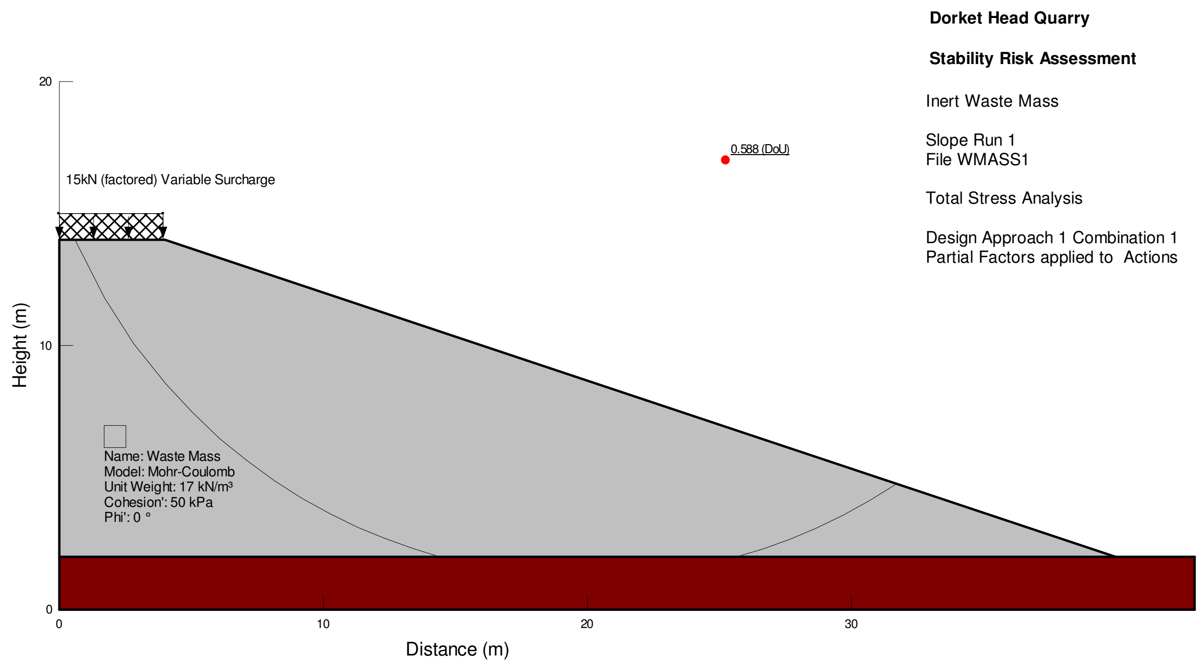
3.7 The condition of the surface of all restored areas will be monitored on a regular basis as part of the site inspection regimen.

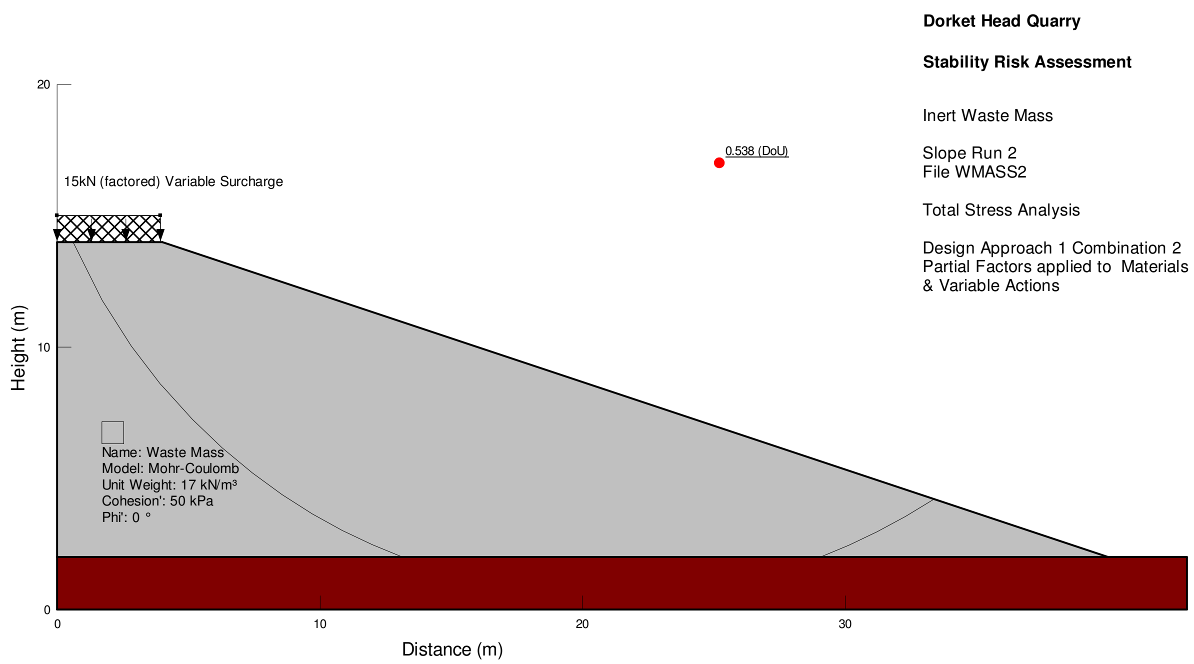
3.8 The surface will be checked for incipient signs of failure that might result from the occurrence of differential settlement within these deposits. These would include cracking, development of depressions or ponding and seepage of water. In the event that any symptom of incipient failure is detected the Environment Agency will be informed and a site action plan for remediation agreed.

3.9 The Surface of the restored areas will be monitored by land survey techniques on a regular basis. These checks will be on a biannual basis for the first two years and then on an annual basis to the fifth year after restoration, when the periodicity reviewed with the Environment Agency.

Appendix 1

SlopeW Worksheets – Waste Mass


Dorket Head Quarry
Stability Risk Assessment
Inert Waste Mass
Slope Run 1
File WMASS1
Total Stress Analysis
Design Approach 1 Combination 1
Partial Factors applied to Actions
0.588 (DoU)
15kN (factored) Variable Surcharge
Name: Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 50 kPa
Phi': 0 °
Height (m)
Distance (m)
0
10
20
30


Dorket Head Quarry
Stability Risk Assessment
Inert Waste Mass
Slope Run 2
File WMASS2
Total Stress Analysis
Design Approach 1 Combination 2
Partial Factors applied to Materials
& Variable Actions
0.538 (DoU)
15kN (factored) Variable Surcharge
Name: Waste Mass
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Cohesion': 50 kPa
Phi': 0 °
Height (m)
Distance (m)
0
10
20
30

Dorket Head Quarry

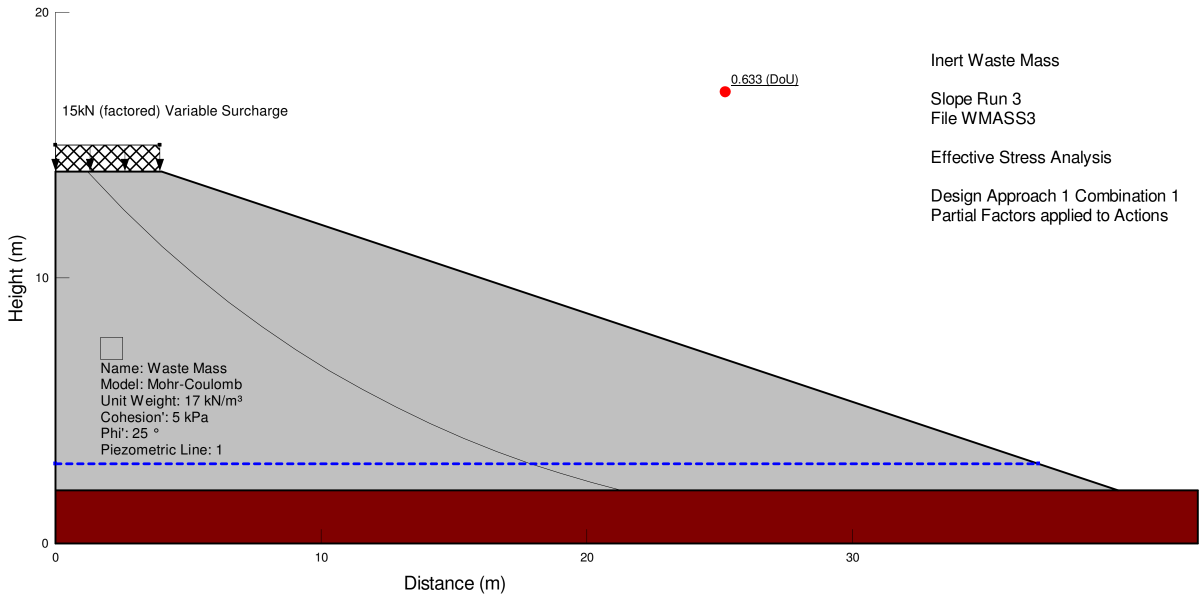
Stability Risk Assessment

Inert Waste Mass

Slope Run 3
File WMASS3

Effective Stress Analysis

Design Approach 1 Combination 1
Partial Factors applied to Actions



Dorket Head Quarry

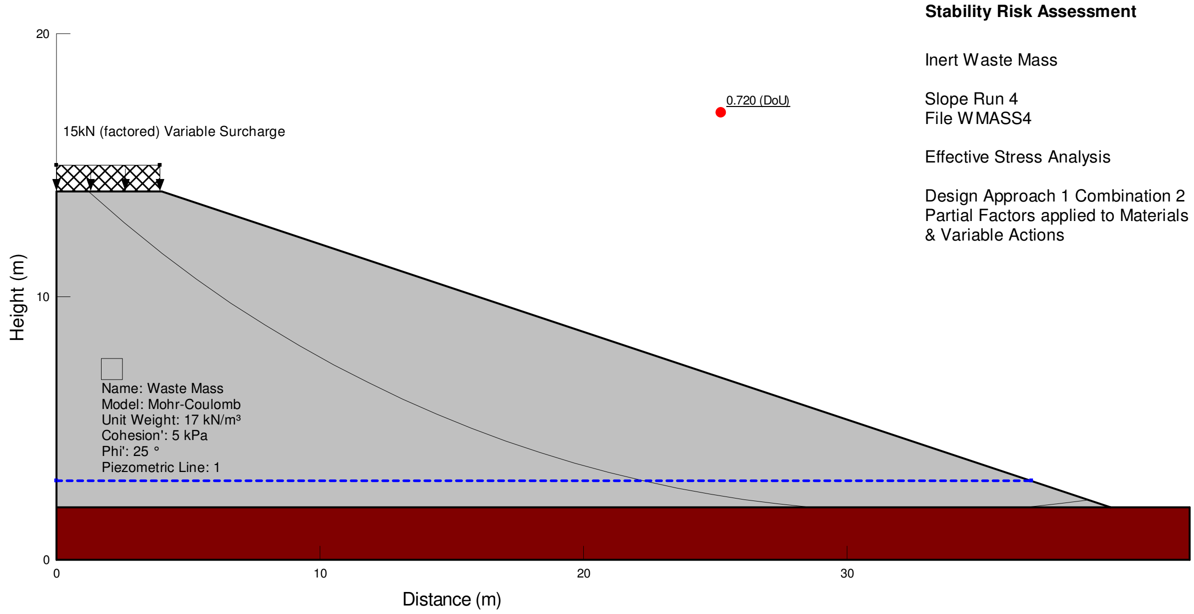
Stability Risk Assessment

Inert Waste Mass

Slope Run 4
File WMASS4

Effective Stress Analysis

Design Approach 1 Combination 2
Partial Factors applied to Materials
& Variable Actions



Dorket Head Quarry

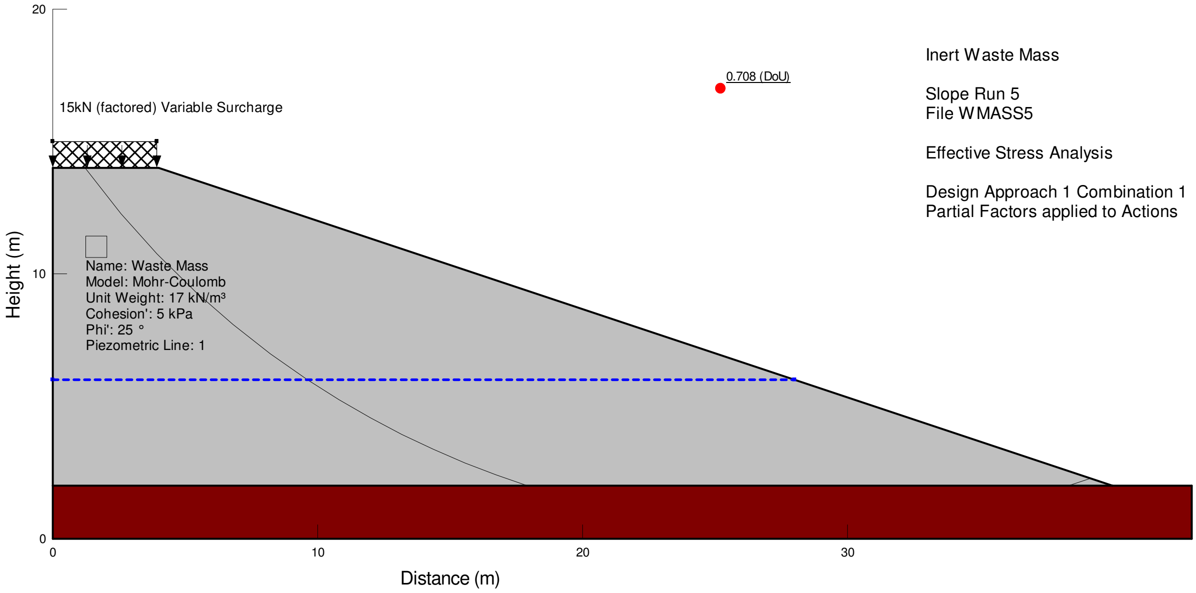
Stability Risk Assessment

Inert Waste Mass

Slope Run 5
File WMASS5

Effective Stress Analysis

Design Approach 1 Combination 1
Partial Factors applied to Actions



Dorket Head Quarry

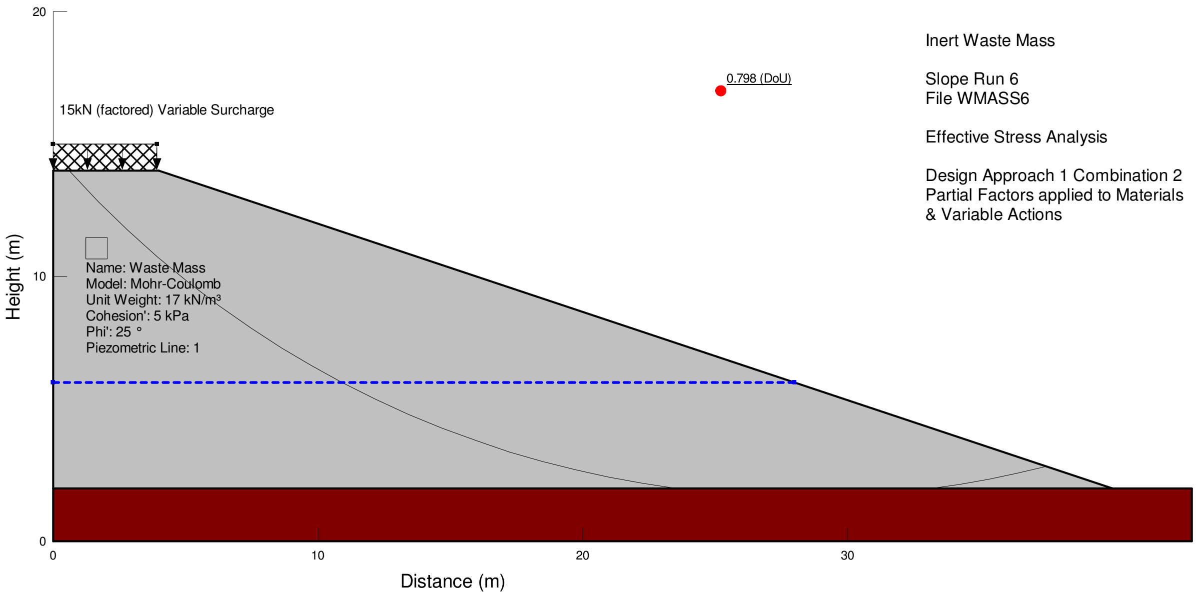
Stability Risk Assessment

Inert Waste Mass

Slope Run 6
File WMASS6

Effective Stress Analysis

Design Approach 1 Combination 2
Partial Factors applied to Materials
& Variable Actions



Dorket Head Quarry

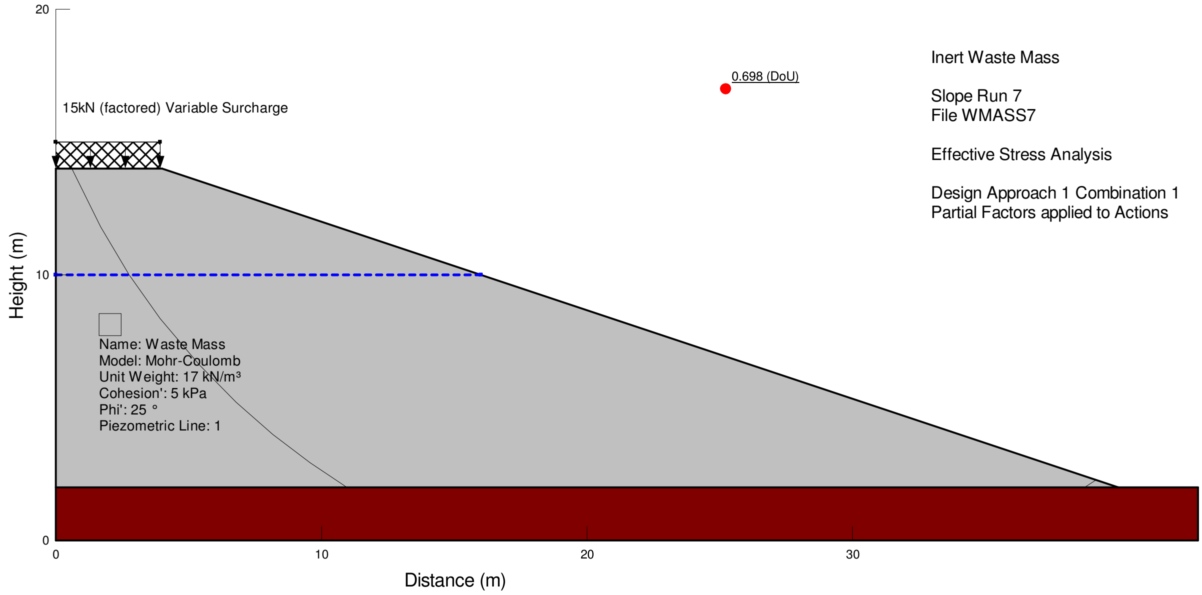
Stability Risk Assessment

Inert Waste Mass

Slope Run 7
File WMASS7

Effective Stress Analysis

Design Approach 1 Combination 1
Partial Factors applied to Actions



Dorket Head Quarry

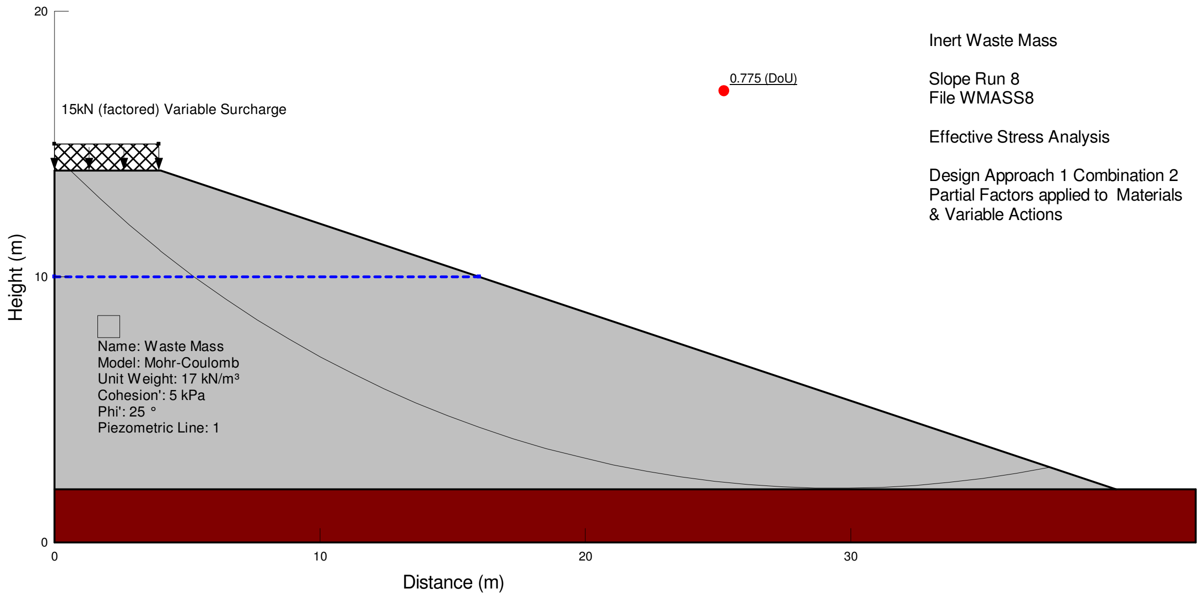
Stability Risk Assessment

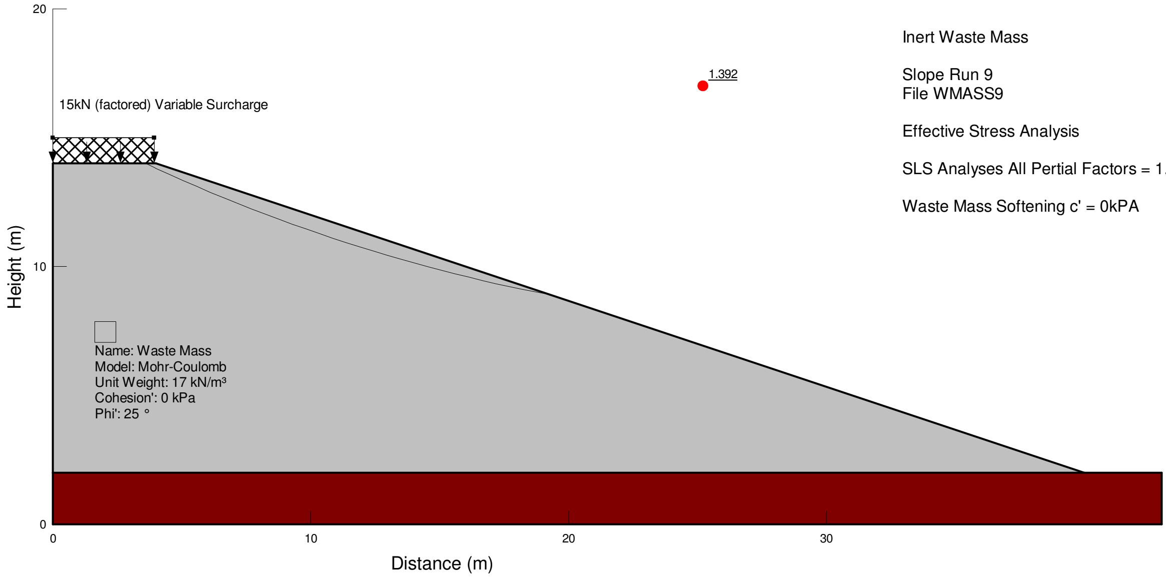
Inert Waste Mass

Slope Run 8
File WMASS8

Effective Stress Analysis

Design Approach 1 Combination 2
Partial Factors applied to Materials
& Variable Actions





Dorket Head Quarry

Stability Risk Assessment

Inert Waste Mass

Slope Run 9
File WMASS9

Effective Stress Analysis

SLS Analyses All Pertial Factors = 1.00

Waste Mass Softening c' = 0kPA