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WHETSTONE BRIDGE FARM STABILITY RISK ASSESSMENT TO SUPPORT ENVIRONMENTAL PERMIT APPLICATION EPR/GB3002MQ/A001

For

MORETON C CULLIMORE (GRAVELS) LIMITED

July 2021

GWP Consultants LLP
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Report Title: **Whetstone Bridge Farm Stability Risk Assessment to Support Environmental Permit Application EPR/GB3002MQ/A001**

Client: **Moreton C Cullimore (Gravels) Limited**

Job: WHETEPR
Report Number: 210702
Version: v.01
Issue Status: Final
Prepared by: Edward Betteridge
Issue Date: 9th July 2021

Issue History:

Issue No	Date	Description	Admin Review	Technical Review	Approver
v.01	09/07/21	Final	GM	MP	MP

Approver Signature:

This document is based on GWP report template v.1.09 and Normal template v3.10 17/04/19

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WHETSTONE BRIDGE FARM STABILITY RISK ASSESSMENT TO SUPPORT ENVIRONMENTAL PERMIT APPLICATION EPR/GB3002MQ/A001

1. Introduction

1.1 Report Context

The works approved by Planning Permission 16/0083/CWMAJM provide for, inter alia, site restoration using imported inert fill material at Whetstone Bridge Farm, Sheepenbridge Lane, Down Ampney, Gloucestershire (the Whetstone site).

Completion of the approved site restoration scheme, involving the restoration of the mineral extraction area requires 416,520m^3 (approximately 728,910t using a standard conversion factor of 1.75t/m^3) of imported inert fill material.

An application is being submitted for a Bespoke Environmental Permit (use of waste in a deposit for recovery activity). The applicant is Moreton C Cullimore (Gravels) Limited.

The EPR Permit application is submitted on the basis that the permanent deposit of imported inert fill material at the site to achieve the approved restoration scheme is a deposit for recovery activity and not a waste disposal activity.

This report presents a Stability Risk Assessment (SRA) and has been prepared to support an EPR Permit application to provide for the permanent deposit of imported inert fill material at the site as a deposit for recovery activity to achieve the restoration landform.

A side slopes Artificial Geological Barrier (AGB) will be constructed on a phased basis in order to provide protection to soil, groundwater and surface water at least equivalent to that resulting from an attenuation barrier/liner with a minimum thickness of 1.0m and a maximum permeability of 1 x 10^{-7} m/s.

1.2 Operator of the proposed installation

Moreton C Cullimore (Gravels) Limited, Netherhills, Whitminster, Gloucestershire, GL2 7PD.

1.3 Agent who completed this report

GWP Consultants LLP, Upton House, Market Street, Charlbury, Oxfordshire, OX7 3PJ.

1.4 Outline of the proposed installation

The EPR Permit application is to provide for site restoration using imported inert fill material as a deposit for recovery operation at the Whetstone site.

The inert fill capacity to be provided for by the EPR Permit is *c.* 416,520m^3.

Details of the site setting and installation design are presented in the Environmental Setting and Site Design (ESSD) report prepared by GWP Consultants LLP (GWP Report No. 210508) which accompanies the EPR Permit application (Appendix Hii of the Permit application documentation) and which should be read in conjunction with this report.

2. SITE SETTING

2.1 Physical Setting

The application site is located at Whetstone Bridge Farm, Sheepenbridge Lane, Down Ampney, Gloucestershire, SN6 6LL (National Grid Reference SU 12500 96125).

Drawing No. WHETEPR2107-1 shows the site location and Drawing No. WHETEPR2107-2 shows the EPR Permit application area.

Whetstone Bridge Farm is located *c.* 0.5km south of the village of Marston Meysey and *c.* 1.5km north-northwest of the village of Castle Eaton. The town of Cricklade is located *c.* 2.9km to the southwest of the site.

Original ground levels along the excavation perimeter range from *c.* 77mAOD in the northwest of the site to *c.* 76mAOD in the southeast of the site, near to the Marston Meysey Brook.

The current mineral extraction area is excavated in the Northmoor Sand and Gravel Member down to the underlying Oxford Clay Formation. The site is excavated to levels ranging from *c.* 73mAOD in the northwest to *c.* 74mAOD in the southeast.

The site is accessed from an unnamed road between the A419 (west) and the village of Kempsford (east).

2.2 Geological Setting

The geological setting of the site has been determined based on a review of published information, site investigation information and observations made in the existing excavation.

The general geological setting of the site is shown in Sections 14.3 (Superficial geology) and 14.5 (Bedrock geology) of the Enviro Insight report presented in Appendix 1 of the ESSD report which accompanies the EPR Permit application (Appendix Hii of the Permit application documentation).

The mineral extraction site is excavated in the Northmoor Sand and Gravel Member, overlying the Oxford Clay Formation.

More specifically, within the vicinity of the site the strata comprise:

- Alluvium (Fluvial Deposits) – clay, silt, sand and gravel (only present at the eastern edge of the site in the vicinity of the Marston Meysey Brook);
- Northmoor Sand and Gravel Member (River Terrace Deposits) – sandy limestone gravel (*c.* 1.0m to *c.* 3.65m thick locally); overlying
- Oxford Clay Formation (Ancholme Group) – clay (estimated to be 5-15m thick at the site – not worked).

3. CONCEPTUAL STABILITY SITE MODEL

The EPR Permit application provides for the permanent deposit of *c.* 416,520m^3 of imported inert fill as a deposit for recovery activity and not a waste disposal activity. Notwithstanding, a side slope AGB will be constructed on a phased basis in order to provide sufficient attenuation between the source and the receptor (the underlying Oxford Clay formation provides an adequate natural base AGB) as would be required in order to ensure compliance with the Landfill Directive in circumstances where an inert landfill waste disposal activity was being applied for.

A side slope AGB will be constructed on a phased basis in order to provide protection to soil, groundwater and surface water at least equivalent to that resulting from an attenuation barrier/liner with a minimum thickness of 1.0m and a maximum permeability of 1 x 10^{-7} m/s.

The Oxford Clay Formation underlying the site forms an adequate natural basal geological barrier.

Details of the components of the conceptual stability site model are presented in the following sub-sections, are summarised on Table 1 and are illustrated on Drawing No. WHETEPR2107-5.

3.1 Basal Sub-Grade Model

The basal sub-grade will comprise the *in situ* underlying Oxford Clay Formation.

3.2 Side slope Sub-Grade Model

The side slope sub-grade will comprise the perimeter slopes of the mineral excavation formed in the Northmoor Sand and Gravel Member.

3.3 Basal Artificial Geological Barrier Model

The Oxford Clay Formation underlying the site forms an adequate natural basal geological barrier. An engineered basal AGB will therefore not be constructed at the site.

3.4 Side slope Artificial Geological Barrier Model

A side slope AGB will be constructed on a phased basis against the excavation perimeter slopes using suitable indigenous Oxford Clay dug from the floor of the excavation and will have a minimum thickness of 1.0m and a permeability no greater than 1 x 10^{-7} m/s.

The suitable material will be compacted in layers as a single lift up to *c.* 4m high against the side slope sub-grade formed in sand and gravel. The maximum side slope height formed in sand and gravel and the maximum unsupported height of the side slope AGB will be *c.* 4m. Following

completion of AGB construction, imported inert waste will be placed against the AGB to provide buttress support.

The side slope AGB will be constructed in accordance with a Construction Quality Assurance Plan approved by the Environment Agency. The Construction Quality Assurance Plan (GWP Report No. 210712) is provided as Appendix N of the EPR Permit application.

Details of the components of the AGB are illustrated on Drawing No. WHETEPR2107-5.

3.5 Inert Fill Mass Model

The site will receive imported inert fill material.

The fill material will be placed in layers *c.* 1m thick in 1 No. lift *c.* 4m thick. The maximum total thickness of inert fill material will be *c.* 4m. Active advancing slopes in fill material will be formed no steeper than 1v : 2h.

No daily cover material will be placed.

3.6 Capping System Model

There will be no engineered capping system constructed as there will be no generation of gas or leachate. The inert fill material will be capped in a progressive manner with restoration soils following deposit for recovery.

Site restoration will be in accordance with the requirements of extant Planning Permission 16/0083/CWMAJM.

Approved restoration surface contours are shown in Figure 8 in Appendix 3 of the ESSD report which accompanies the EPR Permit application (Appendix Hii of the Permit application documentation).

4. STABILITY RISK ASSESSMENT

4.1 Risk Screening

A risk screening of the geotechnical issues relating to the stability and integrity of the components of the conceptual stability site model is presented in Table 1.

4.2 Modelling Approach and Software

Assessment of the geotechnical stability and integrity of the components of the conceptual stability site model has included the completion of 2D limit equilibrium slope stability analysis of the side slope AGB. This modelling and analytical approach is considered appropriate given the simplicity of the geotechnical setting of the development.

Industry standard computer software (SLIDE – supplied by Rocscience Inc.) has been used to complete the slope stability analyses.

4.3 Geotechnical Parameters Selected for Analyses

Geotechnical parameters selected for analysis purposes are presented in the following sub-sections:

4.3.1 Sand and Gravel Side Slope Sub-Grade

Drained shear strength: c′ = 0kPa ø′ = 35°

(conservative estimate)

Bulk density: 1.8Mg/m^3

4.3.1 Oxford Clay Basal Sub-Grade

Drained shear strength: c′ = 10kPa ø′ = 30°

(conservative estimate)

Bulk density: 2.0Mg/^{m3}

4.3.2 Artificial Geological Barrier (engineered Oxford Clay)

Drained shear strength: c′ = 4kPa ø′ = 23°

(conservative estimate)

Bulk density: 1.8Mg/m^3

4.4 Selection of Appropriate Factor of Safety

A benchmark minimum Factor of Safety (FoS) value of 1.30 has been adopted for the purpose of assessing the stability of the deposit for recovery development. It is considered that this benchmark value is appropriate given that:

- the geotechnical setting of the site is simple and is adequately defined;
- the geotechnical input parameters selected for analysis are known or have been conservatively estimated with reasonable confidence;
- the geotechnical stability and safety risks associated with the deposit for recovery development at the site are considered to be very low.

4.5 Stability Analyses

4.5.1 Basal Sub-Grade

No specific stability analyses have been deemed necessary. Relevant geotechnical issues are discussed below in Section 4.6.1.

4.5.2 Side Slope Sub-Grade

No specific stability analyses have been deemed necessary. Relevant geotechnical issues are discussed below in Section 4.6.2.

4.5.3 Basal Artificial Geological Barrier

Not applicable. The Oxford Clay Formation underlying the site forms an adequate natural basal geological barrier. An engineered basal AGB will therefore not be constructed at the site.

4.5.4 Side Slope Artificial Geological Barrier

See Appendix 1 and Section 4.6.3 below.

4.5.5 Inert Fill Mass

See Section 4.6.4 below.

4.5.6 Capping

No specific stability analyses have been deemed necessary. Relevant geotechnical issues are discussed below in Section 4.6.5.

4.6 Stability Analyses Results

The following sub-sections summarise the results of the stability analyses performed and discuss relevant geotechnical issues associated with the various deposit for recovery components. Reference should be made as appropriate to the relevant Appendices for full details of the analyses performed and the associated results.

4.6.1 Basal Sub-Grade

- Basal Sub-Grade Stability

  Based on evidence from geotechnical site inspection, site investigation borehole logs and published information relating to the lithological character of the Oxford Clay Formation, it is considered that no compressible material or cavities will be present beneath the site.

  Accordingly, it is considered that the stability and integrity of the basal sub-grade will not be compromised by compressibility or the presence of cavities.

- Basal Heave

  The Oxford Clay Formation is classified as an aquiclude, has low permeability and does not transmit groundwater flow.

There will be no groundwater pressures acting which have the potential to promote basal heave. Accordingly, it is considered that the stability and integrity of the basal sub-grade will not be compromised by basal heave.

4.6.2 Side Slope Sub-Grade

- Compressibility

  Based on evidence from geotechnical site inspection, site investigation borehole logs and published information relating to the lithological character of the Northmoor Sand and Gravel Member, it is considered that no compressible material or cavities will be present in the excavated perimeter slopes. Accordingly, it is considered that the stability and integrity of the excavated perimeter side slope sub-grade will not be compromised by compressibility or the presence of cavities.

- Slope Stability

  Excavated perimeter slopes in the Northmoor Sand and Gravel Member will generally be formed at an overall design gradient of *c.* 1v : 1h. The maximum height of the excavated perimeter slopes will be *c.* 4m.

  Based on evidence from geotechnical site inspection, it is considered that the excavated slopes will remain adequately stable at the design gradient. Any minor face dressing or re-grading of the side slope sub-grade will be undertaken on a phased basis in advance of the construction of the side slope 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 slope sub-grade will not be compromised by slope instability.

4.6.3 Side Slope Artificial Geological Barrier (see Appendix 1)

- Side Slope Sub-Grade Stability

  See Section 4.6.2

- Side slope Artificial Geological Barrier Slope Stability

  Using the input parameters detailed in Appendix 1, a satisfactory minimum FoS value of 1.45 is indicated by the analysis results for slope failure involving the side slope AGB. Accordingly, it is considered that the stability and integrity of the side slope AGB will not be compromised by slope instability.

4.6.4 Inert Fill Mass

The fill material will be placed in layers *c.* 1m thick in 1 No. lift *c.* 4m thick. The maximum total thickness of inert fill material will be *c.* 4m. Active advancing slopes in fill material will be formed no steeper than 1v : 2h.

It is considered that the stability and integrity of the inert fill mass will not be compromised by slope instability.

4.6.5 Capping

- Slope Stability

  Site restoration will be in accordance with the requirements of extant Planning Permission 16/0083/CWMAJM.

  Approved restoration surface contours are shown in Figure 8 in Appendix 2 of the ESSD report which accompanies the EPR Permit application (Appendix Hii of the Permit application documentation).

  Given the shallow restoration gradients, it is considered that the stability of the final restoration surface will not be compromised by slope instability.

- Deformation Due to Inert Fill Settlement

  No engineered low permeability capping system will be placed and therefore the potential for the integrity of such a system to be compromised by settlement of the inert fill mass does not exist.

  Given:

  - the character of the inert fill material which will be placed at the site (mainly clayey soil and stone);
  - that site operational procedures, consistent with principles of best practice, will be employed to ensure that the inert fill material is placed in layers *c.* 1m thick and is adequately compacted

  it is considered that the potential for settlement will be low (less than *c.* 2% of fill thickness). Re-grading of the restored surface will be undertaken if settlement results in the formation of localised shallow depressions. Whilst it is considered that such depressions would not adversely affect fill stability, they may cause localised ponding and therefore affect the afteruse of the site.

5. MONITORING

5.1 Basal Sub-Grade

The basal sub-grade will be inspected prior to the placement of imported inert fill material, in order to ensure that no compressible or unsuitable material is present, and that no ponded surface water is present.

5.2 Side Slope Sub-Grade

The side slope sub-grade will be inspected prior to the construction of the side slope AGB in order to ensure that no compressible or unsuitable material is present and that the sub-grade slopes exhibit adequate stability.

5.3 Side Slope Artificial Geological Barrier

Construction Quality Assurance procedures, consistent with a Construction Quality Assurance Plan approved by the Environment Agency and involving construction supervision and testing, will be adopted in order to ensure that the side slope AGB meets required specifications.

The Construction Quality Assurance Plan (GWP Report No. 210712) is provided as Appendix N of the EPR Permit application.

5.4 Inert Fill Mass

Placement of the inert fill material will be routinely monitored in order to ensure that the material is placed in layers *c.* 1m thick and is adequately compacted and that inert fill slopes are formed at appropriate gradients and remain stable.

5.5 Capping

A topographic survey of the restored surface will be undertaken at intervals in accordance with the requirements of the EPR Permit in order to monitor inert fill settlement.

6. SUMMARY AND CONCLUSIONS

This report presents a Stability Risk Assessment (SRA) and has been prepared to support an EPR Permit application to provide for the permanent deposit of imported inert fill material at the site as a deposit for recovery activity to achieve the restoration landform.

The EPR Permit application provides for the permanent deposit of *c.* 416,520m^3 of imported inert fill as a deposit for recovery activity and not a waste disposal activity. Notwithstanding, a side slope AGB will be constructed on a phased basis in order to provide sufficient attenuation between the source and the receptor (the underlying Oxford Clay formation provides an adequate natural basal AGB) as would be required in order to ensure compliance with the Landfill Directive in circumstances where an inert landfill waste disposal activity was being applied for.

A side slope AGB will be constructed on a phased basis in order to provide protection to soil, groundwater and surface water at least equivalent to that resulting from an attenuation barrier/liner with a minimum thickness of 1.0m and a maximum permeability of 1×10^{-7} m/s.

The Oxford Clay Formation underlying the site forms an adequate natural basal geological barrier.

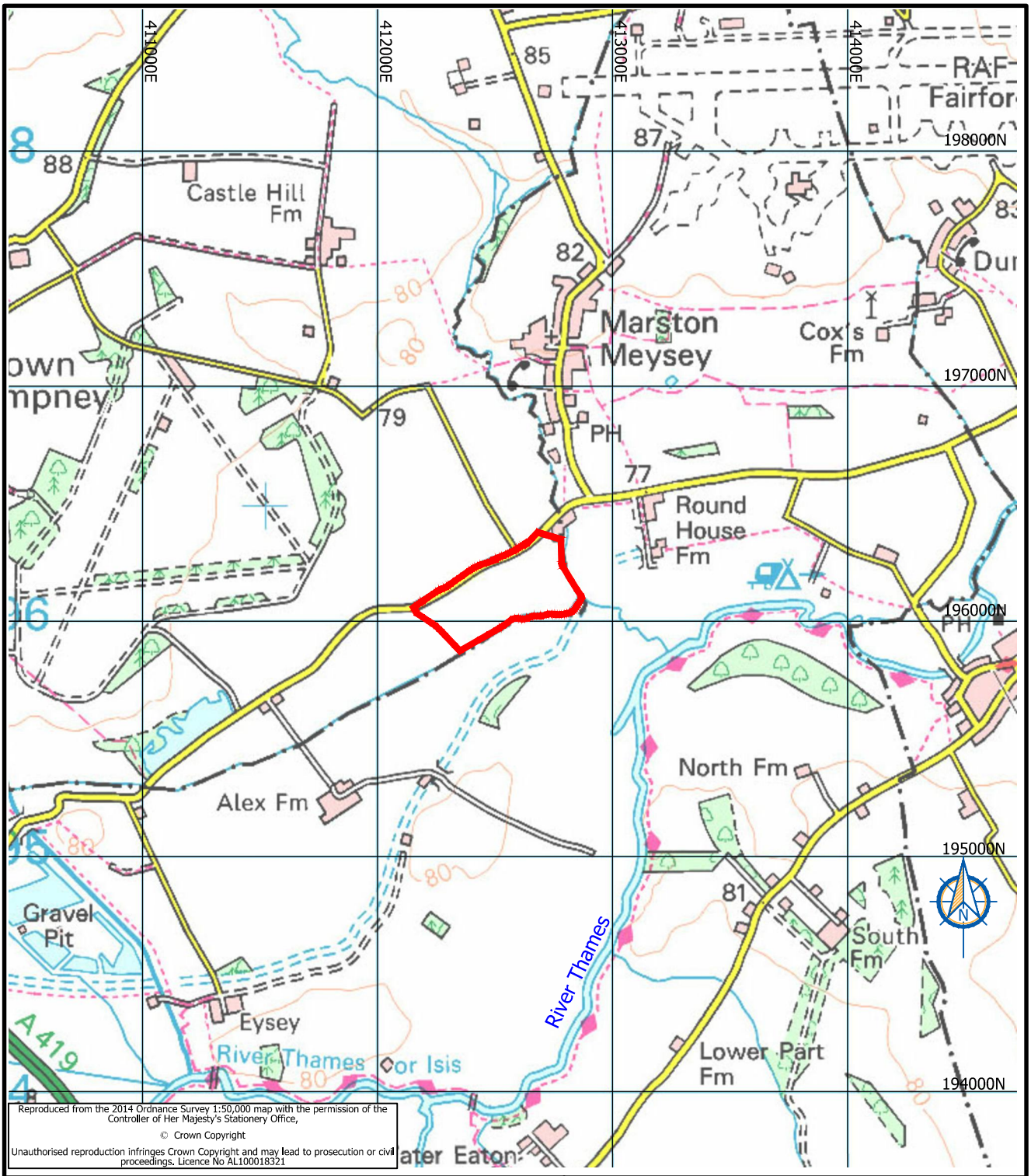
It is considered that the geotechnical setting of the site is adequately defined and that the geotechnical stability and safety risks associated with the development are very low.

The geotechnical stability and integrity of the components of the conceptual stability site model have been assessed and it is considered that adequate factor of safety values will be obtained during site development and following completion.

GWP CONSULTANTS
JULY 2021

Table 1 – Risk screening of the components of the conceptual stability site model

Deposit for recovery component	Geotechnical issue	Classification of geotechnical issue	Justification		
			Is stability/integrity of component at significant risk?	Principal reason(s)	Supporting analyses
Basal sub-grade	Compressibility of sub-grade	Simple	No	No compressible material in basal sub-grade	See Section 4.6.1
	Cavities in sub-grade	Simple	No	No cavities in basal sub-grade	See Section 4.6.1
	Basal heave	Simple	No	No groundwater pressures acting to promote basal heave	See Section 4.6.1
Side slope sub-grade	Compressibility of sub-grade	Simple	No	No compressible material in side slope sub-grade	See Section 4.6.2
	Cavities in sub-grade	Simple	No	No cavities in side slope sub-grade	See Section 4.6.2
	Slope stability	Simple	No	Adequate stability of side slope sub-grade	See Section 4.6.2
Side slope artificial geological barrier	Compressibility and slope stability of side slope sub-grade	Simple	No	No compressible material in side slope sub-grade and adequate stability of side slope sub-grade	See Section 4.6.3
	Cavities in sub-grade	Simple	No	No cavities in side slope sub-grade	See Section 4.6.3
	Slope stability	Simple	No	Shallow gradient slope in adequately strong side slope artificial geological barrier material	See Section 4.6.3
Inert fill mass	Stability of inert fill mass	Simple	No	Shallow gradient slope in adequately strong imported inert fill material	See Section 4.6.4
Capping system	Slope stability	Simple	No	Shallow gradient restored surface	See Section 4.6.5
	Deformation due to inert fill settlement	Simple	No	No engineered capping system - limited inert fill settlement	See Section 4.6.5



LEGEND

Site boundary

Version	Revision and compilation notes	Date
a	Final	09.07.2021

Client: Moreton C Cullimore (Gravels) Limited

Project: Whetstone Bridge Farm Permit EPR/GB3002MQ

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earth & water resources

Site location plan

Date	Drawn	Checked	Scale
09.07.2021	EMB	*MP*	1:25,000 at A4

Drawing Ref	Drawing No	Version
WHETEPR2107	1	a

412000E
412250E
412500E
412750E
413000E
196500N
196250N
196000N
195750N
Marston Meysey Brook
Disused Thames and Severn canal
Elsey Field Copse
Drain
Canal (disused)
Ca. Canal. Bdy
Well
Pond

LEGEND

Environmental Permit application area (EPR/GB3002MQ)

Version	Revision and compilation notes	Date
a	Final	09.07.2021

Client
Moreton C Cullimore (Gravels) Limited

Project
Whetstone Bridge Farm Permit EPR/GB3002MQ

Environmental Permit application area

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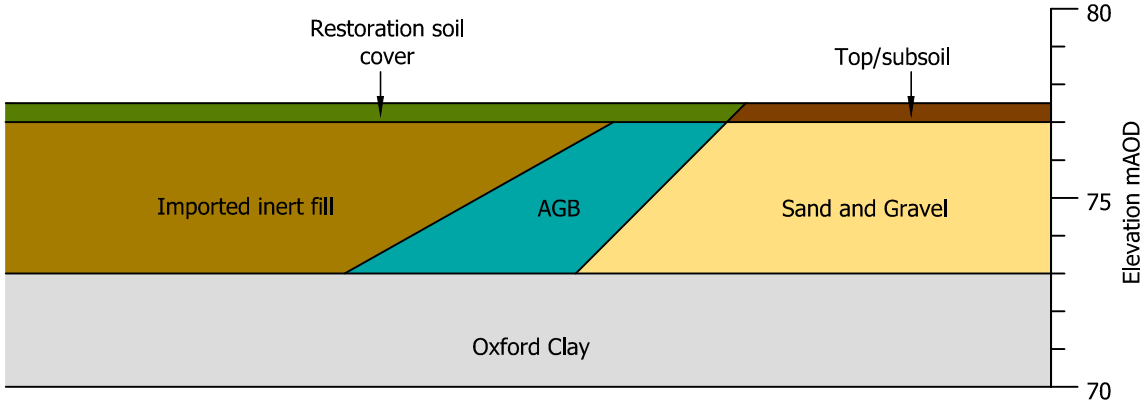
Date	Drawn	Checked	Scale
09.07.2021	EMB	*MP*	1:4000 at A3

Drawing Ref	Drawing No	Version
WHETEPR2107	2	a



Version	Revision and compilation notes	Date
a	Final	09.07.2021

Client
Moreton C Cullimore (Gravels) Limited

Project
Whetstone Bridge Farm Permit EPR/GB3002MQ

NOTE: AGB - Artificial Geological Barrier (engineered indigenous Oxford Clay)

Components of the site model

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Date	Drawn	Checked	Scale
09.07.2021	EMB	*MP*	1:250 at A4

Drawing Ref	Drawing No	Version
WHETEPR2107	5	a

APPENDIX 1

Stability analyses – side slope artificial geological barrier

APPENDIX 1

STABILITY ANALYSES – SIDE SLOPE ARTIFICIAL GEOLOGICAL BARRIER

1. Side Slopes Artificial Geological Barrier Model

A side slope Artificial Geological Barrier (AGB) will be constructed on a phased basis against the excavation perimeter slopes using suitable indigenous Oxford Clay dug from the floor of the excavation and will have a minimum thickness of 1.0m and a permeability no greater than 1×10^{-7} m/s.

The suitable material will be compacted in layers as a single lift up to *c.* 4m high against the side slope sub-grade formed in sand and gravel. The maximum side slope height formed in sand and gravel and the maximum unsupported height of the side slope AGB will be *c.* 4m. Following completion of AGB construction, imported inert waste will be placed against the AGB to provide buttress support.

The side slope AGB will be constructed in accordance with a Construction Quality Assurance Plan approved by the Environment Agency. The Construction Quality Assurance Plan (GWP Report No. 210712) is provided as Appendix N of the EPR Permit application.

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 Northmoor Sand and Gravel Member, it is considered that no compressible material or cavities will be present in the excavated perimeter slopes. Accordingly, it is considered that the stability and integrity of the excavated perimeter side slope sub-grade will not be compromised by compressibility or the presence of cavities.

- **Slope Stability of Side Slope Sub-Grade**

  Excavated perimeter slopes in the Northmoor Sand and Gravel Member will generally be formed at an overall design gradient of *c.* 1v : 1h. The maximum height of the excavated perimeter slopes will be *c.* 4m.

  Based on evidence from geotechnical site inspection, it is considered that the excavated slopes will remain adequately stable at the design gradient. Any minor face dressing or re-grading of the side slope sub-grade will be undertaken on a phased basis in advance of the construction of the side slope 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 slope sub-grade will not be compromised by slope instability.

3. Slope Stability – Side Slope Artificial Geological Barrier

- **Aim:** To assess the potential for instability involving the side slope AGB.
- **Analytical approach:** Use of SLIDE computer software to investigate the potential for slope failure.
- **Slope geometry:** See Figure Appendix 1.slmd.
- **Analysis input parameters:**
- Shear strength and bulk density parameters:

  Sand and Gravel Side Slope Sub-Grade

  Drained shear strength: c′ = 0kPa ø′ = 35°

  (conservative estimate)

  Bulk density: 1.8Mg/m^3

  Oxford Clay Basal Sub-Grade

  Drained shear strength: c′ = 10kPa ø′ = 30°

(conservative estimate)

Bulk density: 2.0Mg/m^3

Oxford Clay Basal Sub-Grade

Artificial Geological Barrier (engineered Oxford Clay)

Drained shear strength: c′ = 4kPa ø′ = 23°

(conservative estimate)

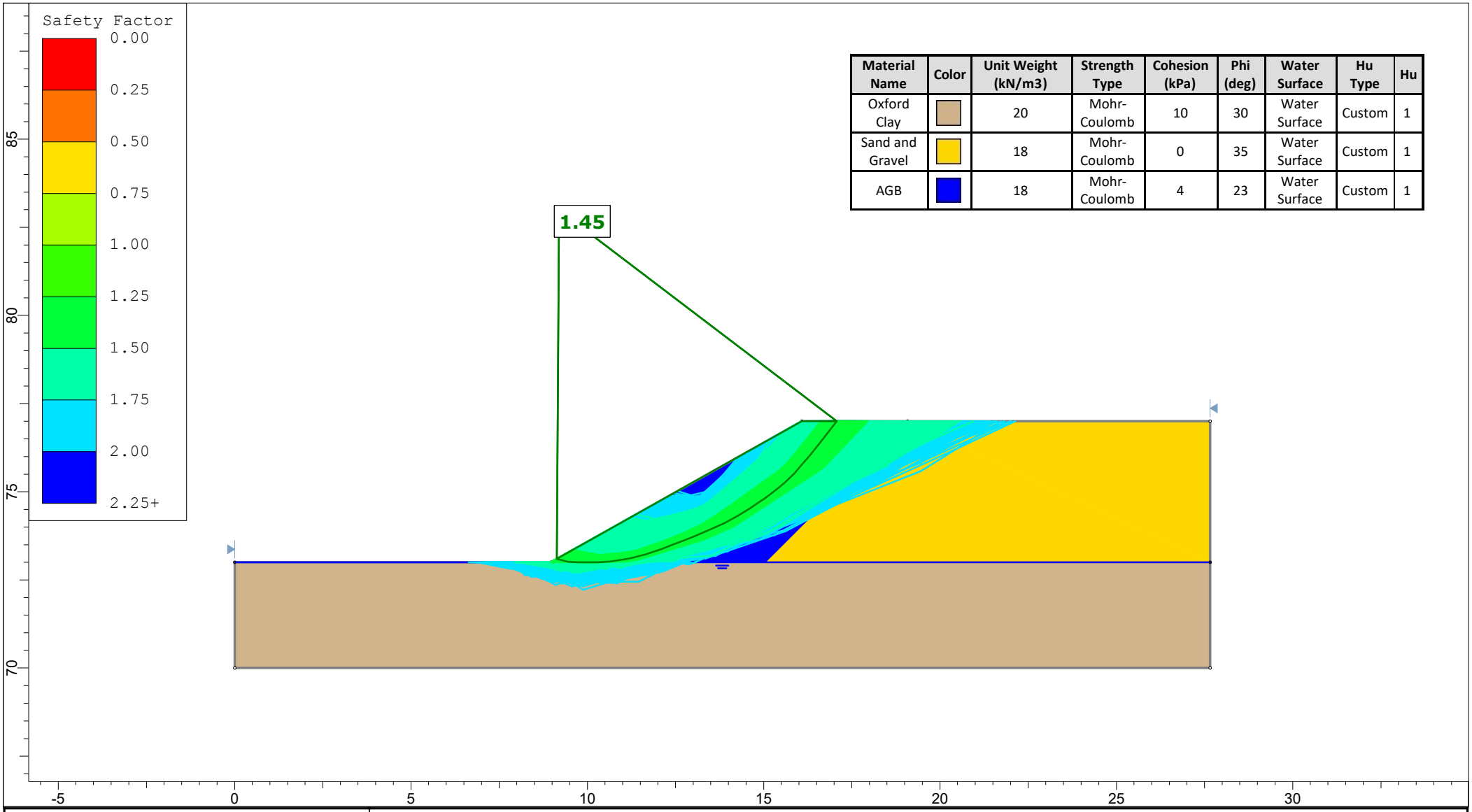
Bulk density: 1.8Mg/m^3

- Groundwater: Quarry floor level (dewatered excavation).
- Leachate: None.
- **Results:** See Figure Appendix 1.slmd.

  Using the input parameters detailed in Appendix 1, a satisfactory minimum FoS value of 1.45 is indicated by the analysis results for slope failure involving the side slope AGB.

- **Conclusions**

  The calculated FoS value of 1.45 calculated is considered satisfactory. Accordingly, it is considered that the stability and integrity of the side slope AGB will not be compromised by slope instability.



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type	Hu
Oxford Clay		20	Mohr-Coulomb	10	30	Water Surface	Custom	1
Sand and Gravel		18	Mohr-Coulomb	0	35	Water Surface	Custom	1
AGB		18	Mohr-Coulomb	4	23	Water Surface	Custom	1

GWP consultants
earth & water resources

SLIDEINTERPRET 9.010

Project	Whetstone Bridge Farm - Stability Risk Assessment		
Analysis description	Side Slope AGB Analysis (Appendix 1)		
Drawn By	GWP Consultants LLP	*Scale* 1:150	*Company* Moreton C Cullimore (Gravels) Ltd
Date	09/07/2021	*File Name*	Appendix 1.slmd