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Thorpe Marsh Green Energy Hub Limited

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June 2024

Thorpe Marsh Landfill (EPR/CP3091SC/V002)

Stability Risk Assessment

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Thorpe Marsh Landfill (EPR/CP3091SC/V002)
Stability Risk Assessment

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Contents

1. Introduction

As part of our ongoing support to Thorpe Marsh Green Energy Hub Limited ("TMGEHL" or herein "the "Client"), Ramboll UK Limited ("Ramboll") have produced this Stability Risk Assessment (SRA) report for Thorpe Marsh Landfill (the "site"). The landfill is to be redeveloped into a Battery Energy Storage System (BESS), and the design works are ongoing.

The current permit holder is HJ Banks and Company Ltd. A permit transfer application has been submitted (ref. EPR/CP3091SC/T002) to transfer the permit to Thorpe Marsh Green Energy Hub Limited. This transfer application is to be decided alongside the proposed permit variation application.

Thorpe Marsh Landfill is a regulated waste disposal site covered by an Environmental Permit (WML number WD20D53, originally granted in 1977, now EPR/CP3091SC/V002). The permit allowed the disposal of PFA as well as domestic, commercial, and industrial wastes from the adjacent Thorpe Marsh Power Station. The landfill was operated prior to the implementation of the 2001 Landfill Directive (LfD) and was designed as a 'dilute and disperse' land-raise landfill. The waste disposal cell was formed by the construction of a three sided, 'U' shaped ("horseshoe") bund using PFA. Within the cell, limited or no PFA deposition took place, due to the closure of the Power Station in 1994 when the landfill was also put into closure. In a discrete area at the southern end of the site PFA waste was co-disposed with other permitted waste types. These discrete waste areas are will not be disturbed by the proposed development work. Pulverised fuel ash (PFA) was originally deposited at the site from the generation activities of Thorpe Marsh Power Station, a 1GWatt coal-fired station, commissioned in 1963 and closed in 1994. It is understood that some of the PFA generated from commissioning in 1963 to 1977 was removed from site and used for construction foundation and fill material during the construction of the local motorway network in the region, prior to waste licensing in the UK. The residual PFA generated to 1977 that was not taken off site was stockpiled on-site up to a height of approximately 10m AOD in the 'ash fields' (i.e., the development area). Then from 1977 licensed PFA disposal took place on top of the unlicensed PFA. Despite closure of the Power Station in 1994 the landfill's environmental permit was not surrendered. The proposed redevelopment of the landfill into a BESS will involve submission of a permit variation application for re-opening of the landfill to facilitate the creation of a development platform by re-profiling PFA from both the eastern and western arms of the 'U' shaped bund.

It is understood that PFA is not considered to be inert (as stated in an email from Helen Culshaw of the Environment Agency (EA) dated 9th October 2023) and therefore the LfD standards for hazardous or non-hazardous wastes[1] would apply.

The SRA report follows the format outlined on the Gov.uk website - How to do a stability risk assessment: landfill sites for hazardous and non-hazardous waste[2].

As the works are limited to reprofiling of the existing landfill to form the new PFA landfill cell, a number of the report sections do not require input.

[1] Landfill operators: environmental permits - Design and build your landfill site - Guidance - GOV.UK (www.gov.uk). Accessed May 2024

[2] https://www.gov.uk/guidance/landfill-operators-environmental-permits/how-to-do-a-stability-risk-assessment-landfill-sites-for-hazardous-and-non-hazardous-waste access May-June 2024.

2. Contact Details and Report Context

Current Site operator – HJ Banks and Company Ltd.

Agent completing risk assessment – Ramboll UK Ltd

Report context – The overall site was formerly associated with the Thorpe Marsh Power Station. The area covered by this stability risk assessment comprises the former PFA disposal area which operated as a waste disposal site, covered by an Environmental Permit, until its closure in 1994.

The intention is to remodel the area to provide a new level landfill cell. This will then form the development platform for construction of a Battery Energy Storage System (BESS). Drawings showing the layout, cut and fill zones, and site cross-sections are included in Appendix 1.

In order to allow the movement and redeposition of PFA contained in the current landfill, a permit variation application is required. As part of the permit application process, an Environmental Setting and Installation Design Report (ESID)[3] is required to demonstrate the 'in principle' engineering design based on risk assessments[4][5].

This stability risk assessment is intended to accompany the ESID and to provide verification that the proposed works will not result in environmental risks due to slope failure. Global settlement of the waste mass has also been considered to allow assessment of likely surface deformation magnitudes and timescales.

Characteristic geotechnical parameters have been based on ground investigation information from a number of studies at the site. Information sources are listed in Table 1.

Table 1: Geotechnical data sources

Title	Date	Ground investigation contractor
Ground investigation at Thorpe Marsh, South Yorkshire	2002	HB Boring and Company Ltd
Report on a ground investigation for PFA reuse form Thorpe Marsh Power Station	2010	Soil Engineering
Thorpe Marsh former waste disposal site – drilling and ground investigation factual report	2021	Egniol Consulting Ltd
Thorpe Marsh green energy hub: Battery Energy Storage System (BESS) – Factual ground investigation report	2024	Geotechnical Engineering Ltd

[3] Ramboll UK Ltd. Thorpe Marsh Landfill (EPR/CP3091SC/V002) environmental Setting and Installation Design. Dated June 2024. Ref. 1620013237-012-RAM-RP-SS-00004.

[4] Ramboll UK Ltd. Thorpe Marsh Landfill (EPR/CP3091SC/V002) Conceptual Site Model Report. Dated May 2024. Ref. 1620016237-012-RAM-RP-SS-00001.

[5] Ramboll UK Ltd. Thorpe Marsh Landfill (EPR/CP/3091SC/V002) Hydrogeological Risk Assessment Report. Dated May 2024. Ref. 1620016237-012-RAM-RP-SS-00003.

3. Conceptual Site Model

3.1 Primary components

3.1.1 Basal subgrade

Reference to the British Geological Survey online Geoindex service[6] and Mapping portal[7]indicates that the natural stratum beneath the PFA deposits is the Hemingbrough Glaciolacustrine Formation, comprising of '*laminated clays, silts and sands with rare dropstones*'.

This is verified by the project-specific ground investigation results as well as historical ground investigation information which describe deposits of clays, silts and sands of varying proportions. Clays and silts are described as being of soft to stiff consistency, while sands are generally medium-dense.

3.1.2 Side slope subgrade

It is understood that the original landfilling activities were carried out within a borrow pit, where natural soils were excavated to provide fill for the railway. Side slope subgrade for the original landfilling operations is therefore considered to be the same as the basal subgrade described in 3.1.1.

For the proposed redistribution of PFA, some areas of filling will be placed against the existing PFA bunds which surround the area. The slope gradients in the locations of fill are generally 1V:2.5H and are observed to be stable with no evidence of ground movements.

3.1.3 Basal lining system

There is no evidence that a basal lining system was installed prior to PFA deposition.

3.1.4 Side slope lining system

There is no evidence that a side slope lining system was installed prior to PFA deposition.

The PFA bund that surrounds the site does not incorporate any form of lining system.

3.1.5 Waste mass

The existing waste mass generally comprises ash from the power station, predominantly PFA but with some coarser bottom ash.

All earthworks carried out as part of the landfill reprofiling will be placed and compacted to an engineering specification to provide a homogeneous and lower permeability mass.

In areas of cut, the PFA will be over-excavated and replaced to ensure that a minimum of 1.0m of engineered, low permeability material is present at the surface.

The engineered development platform will overlie the insitu PFA waste mass.

Further technical information will be produced during the detailed design/CQA stage.

[6] https://mapapps2.bgs.ac.uk/geoindex/home.html accessed [May 2024]

[7] https://webapps.bgs.ac.uk/data/MapsPortal/?_ga=2.142585010.1642759561.1715768761-169449358.1715768761 [accessed May 2024]

3.1.6 Capping system

The Conceptual Site Model and Hydrogeological Risk Assessment have determined that a formal capping system is not required. However, in engineering the PFA to form the new cell the entire thickness of new PFA will result in a low permeability material covering the surface of the remaining PFA waste mass.

3.2 Pore fluid pressures

Regional groundwater level is anticipated to be similar to the standing water level seen in the various drainage channels in the area with historical monitoring suggesting a groundwater level between approximately 1.0mAOD and 3.0mAOD.

Historical monitoring of borehole wells suggests an elevated groundwater level within the landfill mass between approximately 6.0mAOD and 11.0mAOD. The elevated water levels within the landfill are considered to be due to percolation of water through the PFA with potentially an element of capillary rise within the PFA. The maximum development platform level is approximately 12.4mAOD and falls to a minimum of 11.3mAOD.

As the landfill is unlined there are not likely to be groundwater pressures acting on the base or sides of the landfill.

3.3 Settlement and strains

As there are no formal lining or capping systems proposed, the effect of settlement or strains within the landfill are not considered to present a risk to the environment.

3.4 Waste mass

The reprofiling work will require excavation of existing PFA from the eastern and western U-shaped bund which will subsequently be placed and compacted as fill within the central area, forming the new landfill cell.

The PFA will be placed in layers nominally 225mm thick and will be compacted to 90% to 95% of its maximum dry density, resulting in a compacted thickness of approximately 150mm per layer.

Compaction trials will be undertaken prior to commencement of the main earthworks.

Geotechnical parameters for assessment of the stability of the reprofiled PFA have been derived from historical and project specific ground investigations.

3.5 Capping system

Not applicable.

4. Stability Risk Assessment

4.1 Slope stability

The stability of side slopes has been assessed using GeoStudio Slope/W software (version 2023.1.0) using Eurocode 7 partial factors for Design Approach 1, combination 2. The stability analyses provide an overdesign factor where values greater than 1.0 indicate that the GEO limit state will not be exceeded, i.e., that failure or excessive deformation of the ground will not occur.

The design geometry of the reprofiled waste mass includes cut slopes in the existing material, and new embankment slopes, both proposed at gradients of 1V:3H. It should be noted, however that existing slopes within the site are observed to be stable at 1V:2.5H.

Geotechnical parameters used for the analysis are summarised in section 6 of this report, and have been derived based on:

- Published information.
- In-situ, Standard Penetration Testing (SPT).
- Undrained unconsolidated triaxial shear strength tests on undisturbed samples.
- Consolidated undrained triaxial shear strength tests on undisturbed samples.

For all analyses a nominal uniformly distributed surcharge load of 10kPa has been applied at the crest of the slope. N.B. vehicles and BESS units would not be expected to sit at, or particularly close to the crest of the slopes.

Groundwater conditions have been modelled as a piezometric line at 11.0mAOD which is considered to be worst case based on groundwater monitoring data.

Output from the analyses for PFA slope stability are included as Figure 1 and Figure 2.

Figure 1 shows stability output where effective cohesion is 0kPa. Figure 2 includes an effective cohesion of 1kPa and was carried out to assess the effect of minimal cohesion within the PFA due to the pozzolanic effects of the material.

It should be noted that the colour shading of the slip surfaces is graded from lowest (red) to highest (blue), but that red does not denote a failure. All over design factors are above 1.0 and as such, provide suitable factored resistance to slope failure.

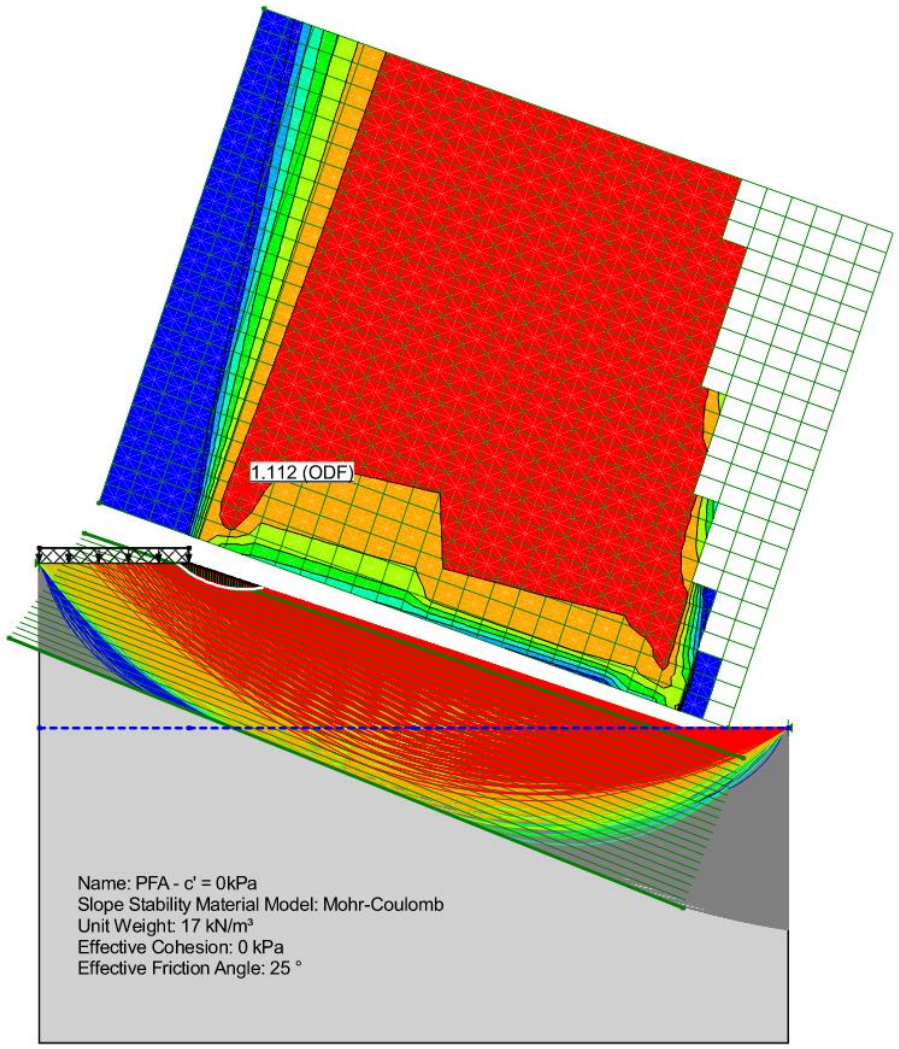

Figure 1 - Slope stability output, effective cohesion = 0kPa

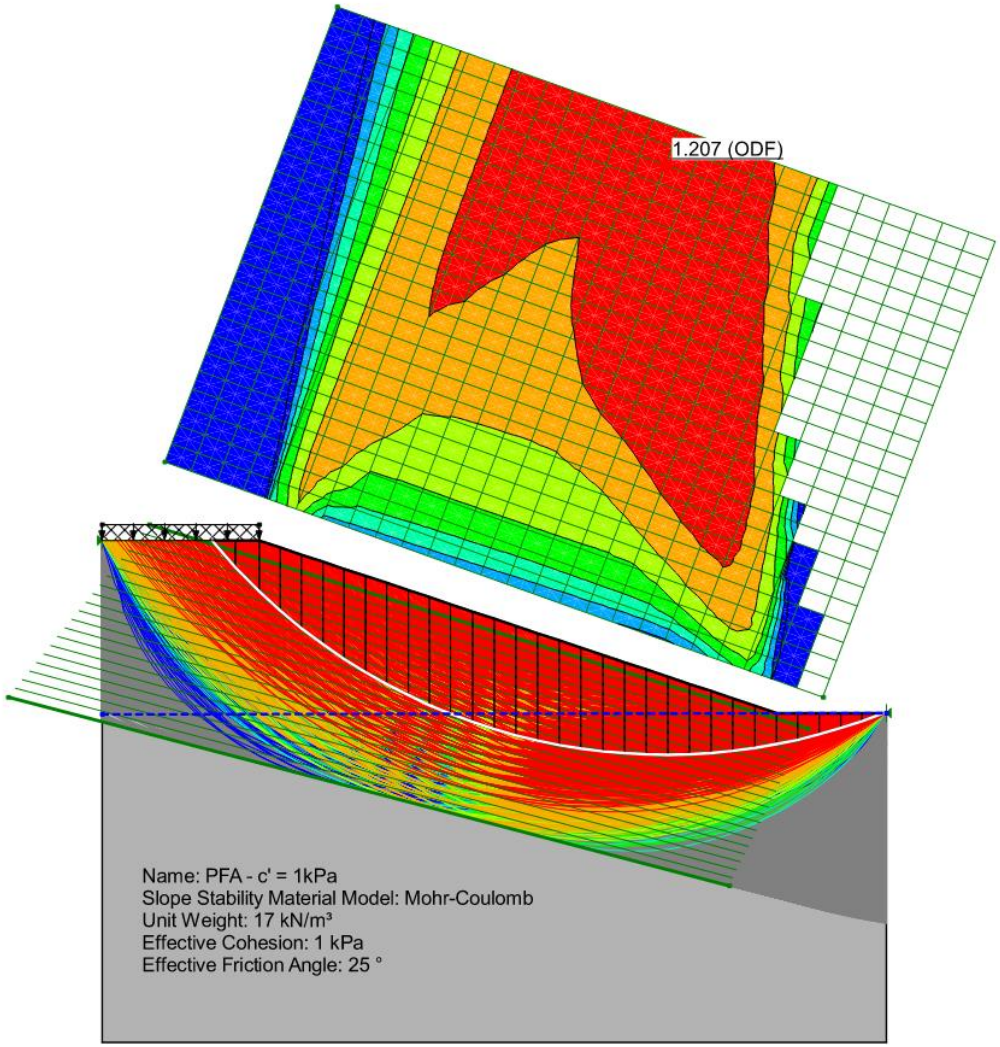

Figure 2 - Slope stability output, effective cohesion = 1kPa

4.2 Settlement analysis

Settlement analysis has been carried out using Oasys Pdisp software (version 20) to model deformation following placement of the fill materials.

Settlement analysis has assumed a consistent earthworks build-up of 3m across the majority of the development area. Where the infill is thicker towards the south of the site, a consistent fill thickness of 7m has been assumed.

Geotechnical parameters used for the analysis are summarised in section 6 and have been derived based on:

- In-situ SPT results
- Bulk density tests
- Stress/strain plots from triaxial strength testing
- Oedometer testing

Analysis has been carried out using the drained elastic modulus for all materials to provide total settlement magnitudes.

Where ground levels are to be raised by approximately 3.0m total settlements in the order of 130mm are anticipated, with approximately 65mm being immediate/during construction and 50% of the remaining 65mm anticipated to be complete within 5 years.

Where the southern part of the site is to be filled in, to achieve similar levels to the rest of the site, total settlements in the order of 230mm are anticipated with approximately 115mm being immediate/during construction and 50% of the remaining 115mm anticipated to be complete within 5 years.

5. Lifecycle Phases

Following construction of the cut slopes and embankment faces, it is assumed at this point that a layer of topsoil will be placed, seeded and allowed to vegetate. The soil and vegetation cover will provide protection from wind/rain erosion, reduce infiltration of precipitation, and will serve to bind the soils in the slope thus providing additional resistance to slope instability. A further minor variation will be submitted in future to provide the landfill restoration plan.

The proposed BESS facility will not be situated close enough to slopes to cause destabilising loads. Offset distances are anticipated to be in excess of 20m.

6. Data Summary

Geotechnical material parameters used in the slope stability and settlement analyses have been derived from published values, historical and project specific ground investigations and are summarised in Table 2.

Table 2: Characteristic geotechnical parameters

Material	Parameter		No. of tests	Max.	Min.	Average	10th Percentile [90th Percentile]	Characteristic value	Basis of characteristic value
PFA	Bulk density (Mg/m^3)		32	1.90	1.32	1.61	1.48 [1.74]	1.74	90th percentile
	Angle of shearing resistance (deg)	Laboratory testing	8	27	20	24	22	25	Average of 10th percentile values *Note that not all shearbox test results have been received to date.
		From SPT	102	42	27.1	31	27		
		Published data	N/A	26	35	N/A	26 (assumed)		
	Undrained shear strength (kPa)		7	254	75	170	97	100	10th percentile rounded up
	Undrained modulus (MPa) from triaxial tests		5	25	10	21	14	14	10th percentile
	Elastic modulus (MPa) from triaxial tests		3	12	20	17	13.6	13.6	10th percentile

Material	Parameter	No. of tests	Max.	Min.	Average	10th Percentile [90th Percentile]	Characteristic value	Basis of characteristic value
River Terrace Deposits: 0mOD to -7mOD	Coefficient of volume compressibility, m_v (m^2/MN)	8	0.27	0.04	0.17	[0.25]	0.25	90th percentile
	Elastic modulus (MPa) (reciprocal of m_v)	8	25.0	3.7	8.6	4	4	10th percentile
River Terrace Deposits: -7mOD to -25mOD	Coefficient of volume compressibility, m_v (m^2/MN)	7	0.13	0.021	0.066	[0.11]	0.11	90th percentile
	Drained elastic modulus (MPa) (reciprocal of m_v)	7	47.6	7.7	24.05	9.1	Increasing with depth from 9MPa to 40Mpa at -25mOD	10th percentile to 90th percentile over range

7. Justification for Modelling Approach and Software

The scheme consists of removing waste PFA from the eastern and western U-shaped bund and placing/compacting it within the area enclosed by the bund to provide a level platform for subsequent development. Drawings showing the layout, cut and fill zones, and site cross-sections are included in Appendix 1.

The long-term stability of the new earthwork/waste mass will be the only aspect of the development that requires stability analysis and will be addressed during the detailed design stage.

Limit state slope stability software has been used to verify that the design slope angles will be safe, based on conservative assumptions regarding geotechnical parameters of the PFA.

The software used is Slope/W, part of the Geostudio suite of analysis software developed by Bentley Systems

Settlement of the earthworks has been modelled using Pdisp software to model soils displacements due to an applied load. Drained modulus has been used as the primary deformation parameter to model total settlements. The relative proportions of immediate and consolidation settlement have been taken to be 50% immediate and 50% consolidation due to the predominantly firm to stiff consistency of the River Terrace Deposit clays as well as the presence of granular layers within the River Terrace Deposits stratum.

8. Justification of Geotechnical Parameters Selected for Analysis

Geotechnical parameters have been selected following the recommendations of Eurocode 7 and based on log descriptions, in-situ testing, and laboratory test results.

Generally, parameters have been selected as the 10^{th} or 90^{th} percentile of all available results, whichever is the most onerous for the situation in which it is being used.

Parameters have been taken from direct measurements where possible. However, these values have also been compared to correlated values from field tests and index testing. It is considered that the parameters selected for analysis are suitably conservative. It is worth noting that existing slopes within the site have remained stable at gradients of 1V:2.5H for some considerable time.

Additionally, parameters have been compared to published values or ranges provided by scientific or industry bodies such as the UK Quality Ash Association (UKQAA), the Transport Research Laboratory (TRL), the Building Research Establishment (BRE) and the Construction Industry Research and Information Association (CIRIA).

Suggested low-bound parameter ranges given by the UKQAA are as follows:

- Peak cohesion, c’: 0kPa to 20kPa
- Peak friction angle, φ’: 26° to 35°
- Critical state cohesion, c'_{crit}: 0kPa
- Critical state friction angle, φ'_{crit}: 26° to 30°

9. Select Appropriate Factors of Safety

Slope stability analysis has been undertaken in accordance with Eurocode 7 and its UK National Annex using Design Approach 1, and taking the partial factors associated with Design Combination 2 whereby the geotechnical material properties are factored along with variable actions. Design Combination 2 governs the design therefore calculations following Design Combination 1 have not been carried out.

Surcharge loading has been taken as a variable action and as such has been factored during analysis.

10. Sensitivity Analyses

10.1 Geotechnical parameters

The effective angle of shearing resistance has been reduced from its characteristic value of 25° to identify the value which results in an overdesign factor of 1.0. For the analysis geometry this equates to a value of φ′ = 22.5°. During detailed design further consideration will be made of the characteristic shear strength parameters, including the complete set of shear box testing for which the results have not yet been provided.

Increasing effective cohesion from 0kPa to 1kPa is seen to make a significant, positive difference to the overdesign factor.

Unit weight has been varied and is seen to make very little difference to the analysis result.

Analysis using undrained parameters to reflect the short-term stability of the slopes results in an overdesign factor considerably in excess of 1.0.

10.2 Groundwater level

Groundwater monitoring data indicates that groundwater level is typically below the level of cutting and embankment slopes, at 11mAOD or lower. This is above the regional groundwater level and is likely attributable to a combination of percolation of surface water, and capillary rise in the PFA.

Stability analyses have conservatively assumed a piezometric level at 11.0mAOD based on the highest level recorded within historical monitoring data. This is considered conservative therefore additional sensitivity analysis is not required.

10.3 Surcharge loading

Surcharge loads at the crest of cutting and embankment slopes has been increased and has negligible effects on the stability of the slopes.

11. Assessment

The results of the slope stability analyses indicate that the proposed geometry of the landfill satisfies the requirements given in Eurocode 7 with a suitable overdesign factor for Design Approach 1 using the partial factors for Design Combination 2.

The characteristic geotechnical parameters have been selected based on a conservative analysis of available data to minimise the likelihood of more unfavourable conditions occurring within the works.

Stability analyses have been undertaken using drained parameters, reflecting the long-term, worst-case situation.

Settlement magnitudes are not considered excessive given the scale of the works. Given the generally uniform increase in stress across the site, differential settlements should not significantly affect the falls or drainage.

Where fill depth is maximum to the south of the site, it may be necessary to over-fill to ensure long-term settlements do not cause failure of the drainage system, however this will be addressed during detailed design.

Monitoring/inspection of the drainage should be carried out regularly. Any problems identified may then be addressed/remediated.

12. Monitoring

The Site will be monitored for evidence of instability when topographical surveys are carried out to assess the settlement of the waste mass. The landfill surface and waste slopes will be assessed during each monitoring round.

Monitoring of the post closure surface will be carried out on regular occasions (at least quarterly). On these occasions observations will be made and the results will be recorded on a Site check sheet. Should it be identified that settlement of the waste has occurred to affect the surface, the details of any rectification works necessary will be passed to the Site operator.

13. Interface Testing

Not applicable.

14. Conclusion

Based on the results of slope stability analysis it is concluded that the proposed geometry of cut slopes and embankment faces will remain stable in the long term.

Establishment of vegetation will serve to improve stability by binding the soils together and reducing the effects of erosion.

At detailed design stage a Ground Investigation Report and a Geotechnical Design Report will be produced in accordance with Eurocode 7 to include derivation of a ground model for the site, characteristic geotechnical material parameters, and formal design calculations and modelling for geotechnical aspects of the development.

An earthworks specification will be developed to establish a construction methodology for placing and compacting the PFA to ensure stability of slopes and adequate permeability of the engineered layers. This will include site compaction trials in advance of the main works, and validation testing during earthworks operations.

Appendix 1
Drawings

REV	DATE	DESCRIPTION	DRW	CHK
P01	10.05.24	ISSUED FOR INFORMATION	NTW	ATE
P02	17.05.24	ISSUED FOR INFORMATION. FILL ZONE MATERIAL CATEGORY UPDATED. LEGEND UPDATED TO SUIT. LEGEND UPDATED.	NTW	AND
P03	24.05.24	ISSUED FOR INFORMATION. TITLE BLOCK UPDATED. LAND FILL CELL BOUNDARY UPDATED TO NORTH EAST SITE CORNER. ATTENUATION BASIN PROFILES UPDATED.	NTW	AND

LEGEND

- LAND OWNERSHIP BOUNDARY
- PLANNING RED LINE BOUNDARY
- ENVIRONMENTAL PERMIT BOUNDARY (AS DENOTED ON H.J. BANKS CONDITIONING PLAN 60837) (Drg.No. HJB/408/18) RECEIVED 18.04.24.
- BOUNDARY OF NEW LANDFILL CELL
- SITE CUT ZONE
- SITE FILL ZONE
- ENGINEERED EMBANKMENT

N

MAIN DEVELOPMENT AREA ACCESS RAMP LOCATIONS TBC PENDING RECEIPT OF FINAL LAYOUT

ACCESS RAMPS TO COMPOUND (FINAL POSITION TBC)

AMENITY / COMPOUND AREA

BESS UNIT AREA

TRANSFORMER COMPOUND

11.300 (VALLEY)

ACCESS RAMP TO UPPER TERRACE (FINAL POSITION TBC)

UPPER TERRACING

BESS UNIT AREA

ATTENUATION BASIN 'A'

ATTENUATION BASIN 'B'

ATTENUATION BASIN 'C'

A 0105 · B 0105 · C 0105 · D 0105 · E 0106 · F 0106 · G 0106 · H 0106

NOTES

1. ALL PROPOSED SITE CUT AND FILL BANKSLOPES ARE GRADED AT 1 in 3 UNLESS NOTED OTHERWISE.
2. FOR SECTIONS REFER TO DRG. No.'s P23165-SMCE ZZ-XX-DR-C-0105 & 0106.
3. FOR DRAINAGE SCHEME DETAILS REFER TO DRG. No. P23165-SMCE-ZZ-XX-DR-D-0310.

Client

THORPE MARSH GREEN ENERGY HUB LIMITED

Project Title

THORPE MARSH LANDFILL (EPR/CP3091SC/V002)

Drawing Title

PROPOSED LANDFILL CELL LAYOUT

Job No.	Originator	Zone	Level	Type	Role	Drawing No.	Revision
P23165	SMCE	ZZ	XX	DR	C	0103	P03

Drawn	Checked	Date	Scale	Size
NTW	ATE	10.05.24	As Shown	A1

Purpose Of Issue: FOR COMMENT

Status: S3

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REV	DATE	DESCRIPTION	DRW	CHK
P01	10.05.24	ISSUED FOR INFORMATION	NTW	ATE
P02	17.05.24	ISSUED FOR INFORMATION. ATTENUATION POND LINK CHANNELS ADDED. LEGEND UPDATED.	NTW	AND
P03	24.05.24	ISSUED FOR INFORMATION. TITLE BLOCK UPDATED. LAND FILL CELL BOUNDARY UPDATED TO NORTH EAST SITE CORNER. ATTENUATION BASIN PROFILES UPDATED.	NTW	AND

LEGEND

- LAND OWNERSHIP BOUNDARY
- PLANNING RED LINE BOUNDARY
- ENVIRONMENTAL PERMIT BOUNDARY (AS DENOTED ON H.J. BANKS CONDITIONING PLAN 60837) (Drg.No. HJB/408/18) RECEIVED 18.04.24.
- BOUNDARY OF NEW LANDFILL CELL

N

A 0005 · B 0005 · C 0005 · D 0005 · E 0006 · F 0006 · G 0006 · H 0006

12.740 · 12.179 · 12.179 · 12.500 · 12.000 · 11.500 · 11.300 (VALLEY) · 11.740 · 11.740 · 11.739 · 12.739 · 11.447 · 10.651 · 11.535 · 11.449 · 11.300 · 11.472 · 7.250 · 11.600 · 11.436 · 11.485 · 11.452 · 11.599 · 15.100 · 11.612 · 11.712 · 11.943 · 12.056 · 11.408 · 11.300 · 11.409 · 11.601 · 22.000 · 11.881 · 12.100 · 12.274 · 6.500 · 10.000 · 6.000 · 6.500 · 10.000 · 7.250

Fall 1 in 200

BASE LEVEL OF ALL TRANSFORMER PITS TO BE 9.000m

ATTENUATION BASIN 'A' · ATTENUATION BASIN 'B' · ATTENUATION BASIN 'C'

NOTES

1. ALL LEVELS ARE IN METRES TO ORDNANCE DATUM.
2. ALL PROPOSED SITE CUT AND FILL BANKSLOPES ARE GRADED AT 1 in 3 UNLESS NOTED OTHERWISE.
3. FOR SECTIONS REFER TO DRG. No.'s P23165-SMCE ZZ-XX-DR-C-0105 & 0106.
4. FOR DRAINAGE SCHEME DETAILS REFER TO DRG. No. P23165-SMCE-ZZ-XX-DR-D-0310.

Client

THORPE MARSH GREEN ENERGY HUB LIMITED

Project Title

THORPE MARSH LANDFILL (EPR/CP3091SC/V002)

Drawing Title

PROPOSED LANDFILL CELL CONTOURS AND FINISHED CELL LEVELS

Job No.	Originator	Zone	Level	Type	Role	Drawing No.	Revision
P23165	SMCE	ZZ	XX	DR	C	0104	P03

Drawn	Checked	Date	Scale	Size
NTW	ATE	10.05.24	As Shown	A1

Purpose Of Issue: FOR COMMENT

Status: S3

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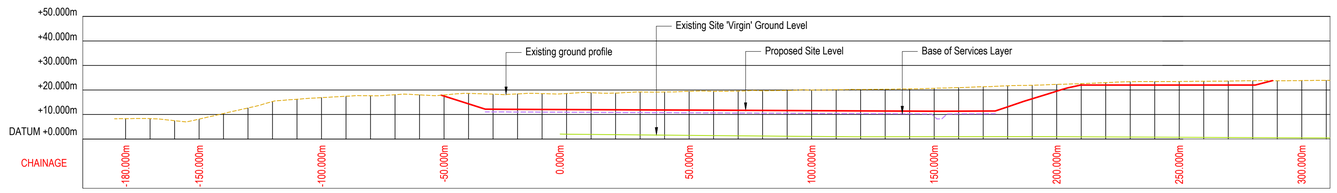
REV	DATE	DESCRIPTION	DRW	CHK
P01	10.05.24	ISSUED FOR INFORMATION	NTW	ATE
P02	17.05.24	ISSUED FOR INFORMATION. SECTIONS UPDATED.	NTW	AND
P03	24.05.24	ISSUED FOR INFORMATION. TITLE BLOCK UPDATED.	NTW	ATE

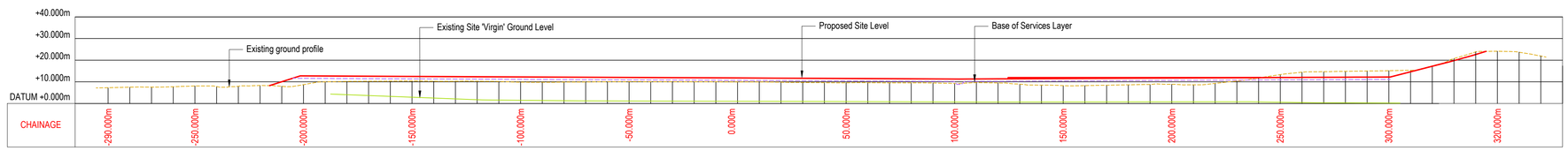
NOTES

1. FOR SECTION LOCATIONS REFER TO DRG. No. P23165-ZZ-XX-DR-C-0103 & 0104



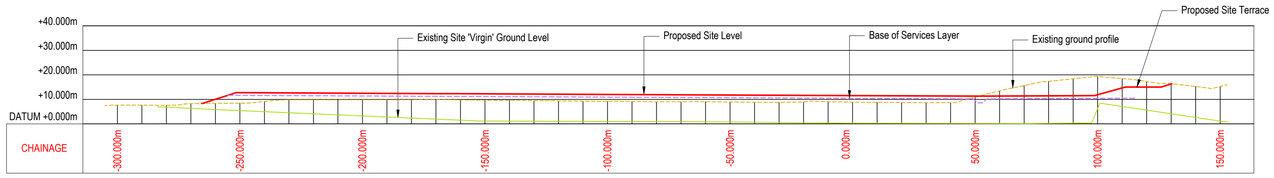
SECTION A-A

1:1250



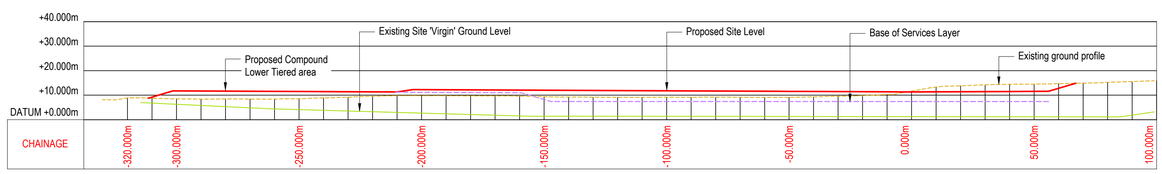
SECTION B-B

1:1250



SECTION C-C

1:1250



SECTION D-D

1:1250

Client

THORPE MARSH GREEN ENERGY HUB LIMITED

Project Title

THORPE MARSH LANDFILL (EPR/CP3091SC/V002)

Drawing Title

PROPOSED LANDFILL CELL INDICATIVE SECTIONS
SHEET 1

Job No.	Originator	Zone	Level	Type	Role	Drawing No.	Revision
P23165	SMCE	ZZ	XX	DR	C	0105	P03

Drawn	Checked	Date	Scale	Size
NTW	ATE	01.02.24	As Shown	A1

Purpose Of Issue: FOR COMMENT

Status: S3

STIRLINGMAYNARD
CONSULTING ENGINEERS
Stirling House Rightwell Bretton Peterborough PE3 8DJ
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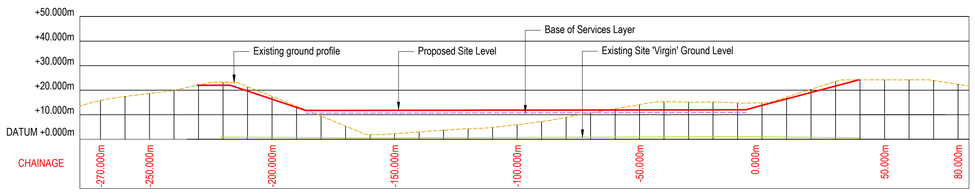
email enquiries@stirlingmaynard.com www.stirlingmaynard.com

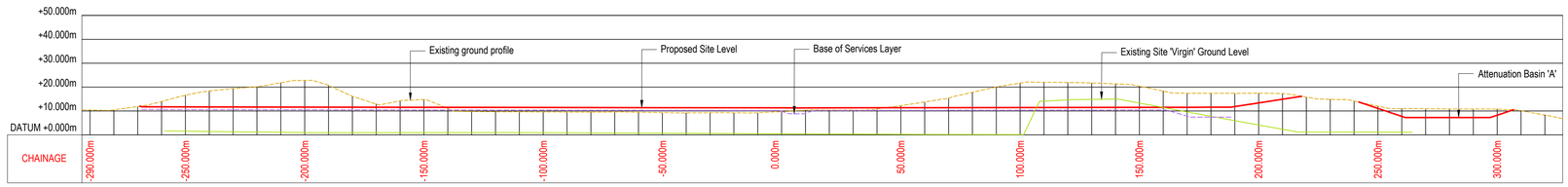
REV	DATE	DESCRIPTION	DRW	CHK
P01	10.05.24	ISSUED FOR INFORMATION	NTW	ATE
P02	17.05.24	ISSUED FOR INFORMATION. SECTIONS UPDATED.	NTW	AND
P03	24.05.24	ISSUED FOR INFORMATION. TITLE BLOCK UPDATED. SECTION F-F UPDATED.	NTW	AND

NOTES

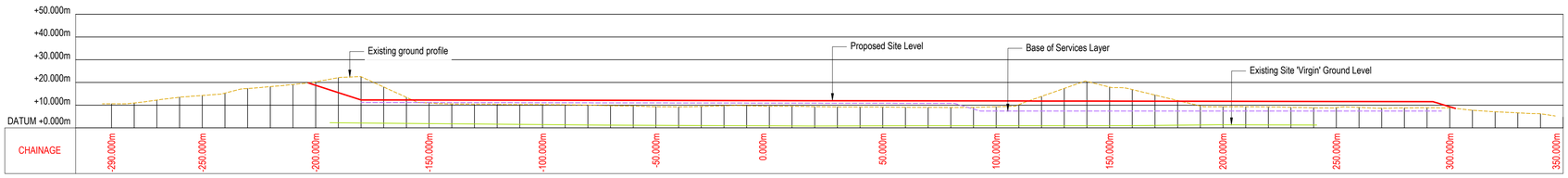
1. FOR SECTION LOCATIONS REFER TO DRG. No. P23165-ZZ-XX-DR-C-????.



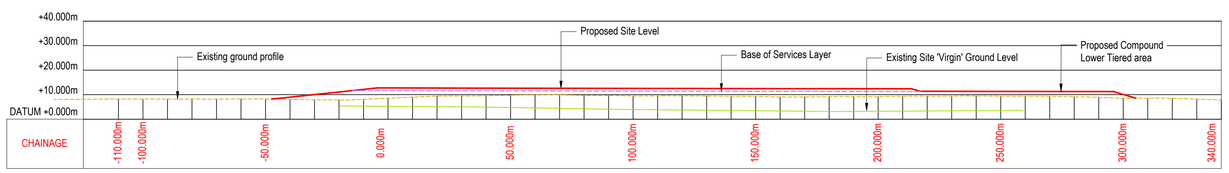
SECTION E-E
1:1250



SECTION F-F
1:1250



SECTION G-G
1:1250



SECTION H-H
1:1250

Client
THORPE MARSH GREEN ENERGY HUB LIMITED

Project Title
THORPE MARSH LANDFILL (EPR/CP3091SC/V002)

Drawing Title
PROPOSED LANDFILL CELL INDICATIVE SECTIONS
SHEET 2

Job No.	Originator	Zone	Level	Type	Role	Drawing No.	Revision
P23165	SMCE	ZZ	XX	DR	C	0106	P03

Drawn	Checked	Date	Scale	Size
NTW	ATE	01.02.24	As Shown	A1

Purpose Of Issue: FOR COMMENT
Status: S3

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REV	DATE	DESCRIPTION	DRW	CHK
P01	17.05.24	ISSUED FOR INFORMATION	NTW	AND
P02	24.05.24	ISSUED FOR INFORMATION. TITLE BLOCK UPDATED. LAND FILL CELL BOUNDARY UPDATED TO NORTH EAST SITE CORNER. ATTENUATION BASIN PROFILES UPDATED.	NTW	AND

LEGEND

- LAND OWNERSHIP BOUNDARY
- PLANNING RED LINE BOUNDARY
- ENVIRONMENTAL PERMIT BOUNDARY (AS DENOTED ON H.J. BANKS CONDITIONING PLAN 60837) (Drg.No. HJB/408/18) RECEIVED 18.04.24.
- BOUNDARY OF NEW LANDFILL CELL

N

A 0005 · B 0005 · C 0005 · D 0005 · E 0006 · F 0006 · G 0006 · H 0006

ATTENUATION BASIN 'A' OVERCUT

ATTENUATION BASIN 'B' OVERCUT

ATTENUATION BASIN 'C' OVERCUT

NOTES

1. ALL LEVELS ARE IN METRES TO ORDNANCE DATUM.
2. ALL PROPOSED SITE CUT AND FILL BANKSLOPES ARE GRADED AT 1 in 3 UNLESS NOTED OTHERWISE.
3. FOR SECTIONS REFER TO DRG. No.'s P23165-SMCE ZZ-XX-DR-C-0105 & 0106.
4. FOR DRAINAGE SCHEME DETAILS REFER TO DRG. No. P23165-SMCE-ZZ-XX-DR-D-0310.

CUT DEPTHS BANDS (m) FROM EXISTING GROUND LEVEL

Minimum Depth (m)	Maximum Depth (m)	Color
0.000	1.000	
1.000	2.000	
2.000	3.000	
3.000	4.000	
4.000	5.000	
5.000	6.000	
6.000	7.000	
7.000	8.000	
8.000	9.000	
9.000	10.000	
10.000	11.000	
11.000	12.000	
12.000	13.000	
13.000	14.000	
14.000	14.636	

Client

THORPE MARSH GREEN ENERGY HUB LIMITED

Project Title

THORPE MARSH LANDFILL (EPR/CP3091SC/V002)

Drawing Title

PROPOSED CUT TO BASE OF NEW LANDFILL CELL FROM EXISTING GROUND LEVEL

Job No.	Originator	Zone	Level	Type	Role	Drawing No.	Revision
P23165	SMCE	ZZ	XX	DR	C	0107	P02

Drawn	Checked	Date	Scale	Size
NTW	NTW	10.05.24	1:1250	A1

Purpose Of Issue: FOR COMMENT — Status: S3

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REV	DATE	DESCRIPTION	DRW	CHK
P01	17.05.24	ISSUED FOR INFORMATION	NTW	AND
P02	24.05.24	ISSUED FOR INFORMATION. TITLE BLOCK UPDATED. LAND FILL CELL BOUNDARY UPDATED TO NORTH EAST SITE CORNER. ATTENUATION BASIN PROFILES UPDATED.	NTW	AND

LEGEND

- LAND OWNERSHIP BOUNDARY
- PLANNING RED LINE BOUNDARY
- ENVIRONMENTAL PERMIT BOUNDARY (AS DENOTED ON H.J. BANKS CONDITIONING PLAN 60837) (Drg.No. HJB/408/18) RECEIVED 18.04.24.
- BOUNDARY OF NEW LANDFILL CELL

N

ACCESS RAMP TO COMPOUND (FINAL POSITION TBC)

ACCESS RAMP TO UPPER TERRACE (FINAL POSITION TBC)

ATTENUATION BASIN 'A'

ATTENUATION BASIN 'B'

ATTENUATION BASIN 'C'

NOTES

1. ALL PROPOSED SITE CUT AND FILL BANKSLOPES ARE GRADED AT 1 in 3 UNLESS NOTED OTHERWISE.
2. FOR SECTIONS REFER TO DRG. No.'s P23165-SMCE ZZ-XX-DR-C-0105 & 0106.
3. FOR DRAINAGE SCHEME DETAILS REFER TO DRG. No. P23165-SMCE-ZZ-XX-DR-D-0310.

FILL DEPTH BANDS (m) ABOVE SERVICES PLANE AND EXISTING GROUND		
Minimum Depth (m)	Maximum Depth (m)	Color
0.000	1.000	
1.000	2.000	
2.000	3.000	
3.000	4.000	
4.000	5.000	
5.000	6.000	
6.000	7.000	
7.000	8.000	
8.000	9.000	
9.000	9.881	

Client

THORPE MARSH GREEN ENERGY HUB LIMITED

Project Title

THORPE MARSH LANDFILL (EPR/CP3091SC/V002)

Drawing Title

PROPOSED FILL TO FINISHED LANDFILL CELL LEVELS

Job No.	Originator	Zone	Level	Type	Role	Drawing No.	Revision
P23165	SMCE	ZZ	XX	DR	C	0108	P02

Drawn	Checked	Date	Scale	Size
NTW	ATE	10.05.24	As Shown	A1

Purpose Of Issue: FOR COMMENT — Status: S3

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