Former Hamble Airfield, Hamble-le-Rice, Hampshire

Ground Movement Assessment for Network Rail Assets

Project reference: 331201108

On behalf of: **CEMEX UK Operations Ltd**

Project Ref: 331201108 | Document: RP-3501-V02 | June 2023

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Document Control Sheet

Project: **Former Hamble Airfield, Hamble-le-Rice, Hampshire**
Document: **Ground Movement Assessment for Network Rail Assets**
Project Ref: **331201108**
Document: **331201108-RP-3501-V02**
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	Name	Position	Signature	Date
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For and on behalf of Stantec UK Limited				

Issue	Date	Description	Prepared	Reviewed	Approved
v01a	May 2023	Issued for information	mdh	rf	mdh
v02	Jun 2023	Issued final	mdh	-	-

Contents

1.0 Introduction

1.1 Preamble

1.1.1 Stantec UK Limited (Stantec) has been commissioned by Cemex UK Operations Ltd (the Client) to prepare an engineering appraisal of the geotechnical conditions together with an assessment of the effects of sand and gravel extraction on the existing Network Rail (NR) assets in the vicinity of the proposed works at the former Hamble Airfield, Hamble-le-Rice (the Site).

1.2 Background

1.2.1 It is proposed to extract sand and gravel from a site at Hamble Airfield, Hamble-le-Rice. The proposed extraction of sand and gravel is intended to be carried out in dry or wet conditions depending on the groundwater level however any areas that need to be restored using imported materials may require an attenuation layer to be installed prior to placement of the imported material. In these areas the groundwater level may have to be artificially lowered through pumping of groundwater in order to install the attenuation layer and place the imported material.

1.2.2 Details of the proposed development have been submitted to Hampshire County Council as part of the planning application for the scheme (Application CS/22/92277, dated 29 December 2021).

1.2.3 Network Rail has been given the opportunity to comment on the proposed development by the local planning authority. In their response, Network Rail stated that the applicant must demonstrate what implications localised dewatering will have on the railway line/cutting which runs parallel to the northern boundary of the site.

1.3 Scope of Work

1.3.1 The scope of work performed by Stantec comprises:

i) A review and critical appraisal of the ground investigations and other available information to determine the ground conditions in the vicinity of the Site and Network Rail assets.

ii) An assessment of potential ground movements associated with any localised dewatering and consequent effects on Network Rail assets in the vicinity of the Site.

1.3.2 This report presents an assessment of the ground conditions on the Site together with recommended values of geotechnical parameters for use in the assessment of ground movements. The report also presents details of the Network Rail assets in the vicinity of the Site and a detailed technical assessment of the effects of potential ground movements associated with any localised dewatering on those assets.

1.4 Limitations

1.4.1 Unless stated otherwise, information from previous studies and investigations has not been included in this report and, where referenced, the reports presenting this information should be read in conjunction with this report.

1.4.2 Guidance on the context of this report and any general limitations or constraints on its content and usage are given in a separate guidance note included after the text of this report.

2.0 The Site

2.1 Site Location

2.1.1 The Site is centred at National Grid Reference SU 477 076 about 0.3 km north of Hamble-le-Rice The location of the Site is shown on a Site Location Plan presented as **Figure 1**.

2.1.2 The Site is an irregular polygon in plan with overall plan dimensions of about 750 by 1150 m. The Site is bound to the west by the B3397 Hamble Lane with undeveloped sports pitches beyond; to the southwest and south by residential development; to the southeast by residential development along Satchell Lane; to the east by Satchell Lane with undeveloped agricultural and woodland beyond; and to the north by the Southampton to Fareham railway line. The layout of the Site is shown on a Site Layout Plan presented as **Figure 2**.

2.1.3 The Site is situated on a ridge between the valley of the River Hamble to the east and Southampton Water to the West and comprises undeveloped rough grassland partly colonised by dense scrub of the landing areas of the former Hamble North Airfield. Natural ground levels across the Site around generally between about 20.0 and 21.0 m relative to Ordnance Datum (OD) rising to about 23.0 m OD on the northern part of the Site and locally falling to about 15.0 m OD along the eastern boundary of the Site.

2.2 Network Rail Assets

2.2.1 The Network Rail (NR) asset in the vicinity of the Site comprises a section of the Southampton to Fareham railway line (ELR: SDP1, Mileage: 7m19ch to 7m40ch) between Hamble Station to the west and Burlesdon Station to the east. This section of the railway is aligned approximately northeast-southwest and comprises two tracks running in cutting down to about 5.0 m below the adjacent ground level. The base of the cutting is about 8 m wide, and the side slopes are formed at gradients up to about 1 vertical in 2 horizontal.

2.2.2 The alignment of the railway is shown on the Site Layout Plan presented as **Figure 2**. The elevation of the railway and natural ground level adjacent to the railway are illustrated on a Schematic Geological Sections included as **Figure 3**.

2.3 Ground Conditions

Geology

2.3.1 The 1:50,000 scale geological sheet of the area (BGS, 1987a) indicates that the solid geology in the vicinity of the Site comprises a sequence of the Selsey Sand Formation, the Marsh Farm Formation and the Earnley Sand Formation of the Bracklesahm Group. These formations dip to the southwest with the Selsey Sand Formation sub-cropping on the southwest part of the Site, the Marsh Farm Formation sub-cropping on the central part of the Site and the Earnley Sand Formation sub-cropping along the northeast boundary of the Site.

2.3.2 The geological memoir for the area (BGS, 1987b) indicates the Marsh Farm Formation comprises laminated clays with thin beds of sand and silt, and sand with clay beds with rapid lateral and vertical variations in the proportions of sand and clay present.

2.3.3 The solid geology is shown to be overlain by River Terrace Deposits. In addition, Head deposits formed by natural geomorphological processes are expected to be present overlying the River Terrace Deposits.

Ground Investigations

2.3.4 The ground conditions in the area of the Site were investigated by RMC Aggregates Ltd in June 1995 and by Apex Drilling Services Ltd in May 2011. In addition, water observation boreholes have been installed over the Site by D K Sykes Associates in February 2008 and by Southeastern Drilling Services Ltd in November 2018.

2.3.5 The 1995 ground investigation included 28 boreholes (denoted BH 01/95 to 28/95) to a maximum depth of 7.5 m, and the 2011 ground investigation 10 boreholes (denoted BH01 to 06 and BH09 to 12) to a maximum depth of 9.0 m to provide information on the available mineral resources. The 2008 ground investigation included 12 boreholes (denoted BH A/08 to L/08) to a maximum depth of 8.3 m, and the 2018 ground investigation 9 boreholes (denoted BH W01 to W06, W08 and W10 to W12) to a maximum depth of 12.5 m to allow the installation of groundwater monitoring wells.

2.3.6 In addition, the British Geological Survey archives contain the record of an exploratory hole (denoted BH HC in this report) about 0.35 km northwest of the Site.

2.3.7 The locations of the boreholes the Site are shown on the Site Layout Plan presented as **Figure 2**.

Stratigraphy

2.3.8 The information presented on the borehole records is consistent with the stratigraphy presented on the published geological map. From consideration of the information given on the records the expected ground conditions in the vicinity of the Site are summarised in the following table.

Summary of Existing Ground Conditions

Formation	Base of Stratum, m bgl [m OD](1)	Description
Head	0.2 to 4.0 [15.0 to 22.0]	Soft to firm orange brown slightly sandy CLAY with a little subangular to subrounded fine to coarse medium gravel of flint.
River Terrace Deposits	1.5 to 8.3 [10.8 to 20.2]	Orange brown sandy subangular to subrounded fine to coarse GRAVEL of flint.
Selsey Sand Formation(2)	2.5 to >12.0 [<10.4 to 17.6]	Yellow/orange clayey fine to coarse SAND with occasional lenses of sandy clay.
Marsh Farm Formation	3.8 to >12.5 [<8.5 to 18.0]	Firm to stiff thinly laminated dark grey CLAY

Note 1) Denotes metres below ground level {meters relative to Ordnance Datum]
2) The Selsey Sand Formation is locally absent on the northwest part of the Site where the River Terrace Deposits are directly underlain by the Marsh Farm Formation.

2.3.9 Details of the strata encountered are illustrated on the Schematic Geological Sections included as **Figure 3** and a contour plot[1] of the base elevation of the River Terrace Deposits is included on **Figure 4**. The lines of the geological sections are shown on the Site Layout Plan, **Figure 2**.

2.3.10 As illustrated on the Schematic Geological Sections included as **Figure 3** the railway cutting cuts through the River Terrace Deposits.

[1] Contours of the base elevation of the River Terrace Deposits have been determined from the base elevation of the River Terrace Deposits at the individual borehole locations by the Kriging geostatistical gridding method using the computer program Surfer© version 20.1.195.

Groundwater Conditions

2.3.11 Recorded groundwater levels in the standpipes installed in boreholes around the perimeter of the Site indicate groundwater levels in the River Terrace Deposits typically vary between about 2.5 and 3.0 m below ground level with the higher levels being recorded after prolonged periods of heavy rainfall. From a review of the available data the groundwater levels for February 2023 represent a complete data set of moderately conservative groundwater levels and have been selected as the base groundwater data set for use in this assessment[2].

2.3.12 The base groundwater data set indicates maximum groundwater levels of about 21.0 m OD (0.9 m depth) are present on the higher ground of the northern part of the Site. Groundwater levels fall to the southwest to about 16.5 m OD (4.5 m depth) on the central part of the Site and then to the southeast to about 13.0 m OD (3.0 m depth) on the southeast part of the Site.

2.3.13 Further details of the groundwater monitoring are given in a technical note on groundwater flow (Stantec, 2023). The base groundwater profile is illustrated on Schematic Geological Sections included as **Figure 3** and a contour plot[3] of the base groundwater levels is included on **Figure 4**.

2.4 Proposed Development

2.4.1 The proposed plan is to extract about 1.7 Mt of sand and gravel deposits in seven phases during a period up to 7 years. The mineral may be extracted to the base of the deposits with a maximum depth of extraction of about 7 m bgl. This corresponds to a base of working generally at 20 m OD on the higher ground of the northern part of the Site, reducing to about 15.0 OD in the in the central part of the Site and locally about 14.0 m OD along the southern and western edges of the Site.

2.4.2 No dewatering is planned during the extraction period and the proposed extraction is to be carried out in dry or wet conditions depending on the groundwater level at the time of excavation.

2.4.3 The excavated material is to be taken to a processing plant located on the northeast part of the Site. Once completed the first phase would be used for freshwater and silt lagoons to facilitate the processing of the excavated material.

2.4.4 The excavated void is to be infilled using in-situ soils and overburden from the Site together with imported inert materials to restore the Site to parkland and grazing land. The proposed infilling is to be carried out in dry conditions requiring the groundwater level to be artificially lowered through pumping of groundwater from the area of each phase of infilling. The infilling of each phase is to take place on a progressive basis and concurrently with the ongoing excavation of the following operational phase.

2.4.5 The proposed extraction phases are shown on the Site Layout Plan presented as **Figure 2**.

[2] Given that the assessment in this report considers long term drained loading conditions the use of moderately conservative groundwater levels is deemed appropriate in preference to peak groundwater levels which would be appropriate for short term loading conditons.
[3] Contours of the base groundwater levels have been determined from the elevations measured in February 2023 at the individual monitoring well locations by the Kriging geostatistical gridding method using the computer program Surfer© version 20.1.195.

3.0 Ground Movement Assessment

3.1 Preamble

3.1.1 Any dewatering required to facilitate the infilling of the excavated voids in dry conditions may result in reduction of the groundwater levels in the surrounding aquifer unit and there is a potential for lower groundwater levels below the railway to the north of the Site to be observed during the proposed extraction works. Any reduction in groundwater level could increase the effective stresses in the ground and thereby could induce settlement of the ground and any supported development. The degree of settlement that could occur is dependent on the magnitude of groundwater drawdown and the geological units affected. The risk of settlement is increased for greater drawdowns and where more compressible sediments are present.

3.1.2 This section of the report presents (i) an assessment of the potential drawdown below the line of the railway, (ii) an assessment of the associated ground settlements, and (iii) a discussion of any potential adverse effects on the railway.

3.2 Groundwater Drawdown

3.2.1 To facilitate the infilling of the excavated void in dry conditions, it is expected that groundwater levels within the area of each phase of excavation may be lowered to the base of the River Terrace Deposits. On this basis the groundwater would be reduced below the base groundwater level by between about 0.5 and 3.0 m adjacent to the northern site boundary with the greater reduction along the western part of the boundary. It is understood that any dewatering may be carried out for a period of about three months during the installation of the basal and sidewall attenuation layers with groundwater being allowed to recover as the imported inert materials are placed. Elsewhere on the Site the depth of groundwater present in the River Terrace Deposits is limited and, consequently, there will be limited requirements for dewatering across the larger part of the Site.

3.2.2 The reduction of the groundwater levels in the surrounding aquifer unit depends on the hydraulic conductivity of the aquifer. Information on the hydraulic properties is given in a factual report on infiltration testing (Stantec 2022) and indicates the infiltration rate in the River Terrace Deposits is in the range 1 x 10^{-6} to 5 x 10^{-4} m/s.

3.2.3 The rate of infiltration into unsaturated soils can differ from the rate of permeation into saturated soils owing to various factors including the available non-capillary pore space, and the effects of capillary action. However, the infiltration test results indicate little change between the first test into unsaturated soil and the later tests into partially saturated soil, as such, the determined values of infiltration rate are considered representative of the expected permeability of the River Terrace Deposits.

3.2.4 With regard to potential effects on the railway, the most onerous conditions depend on the interrelationship of the radius of influence of the dewatering and the gradient of the drawdown curve under the railway. For the conditions on the Site, the most onerous conditions are expected to relate to the upper bound value of hydraulic conductivity and on this basis the corresponding radii of influence of the dewatering range from about 35 to 200 m for the proposed drawdown of 0.5 to 3.0 m[4]. On this basis the potential drawdown below the railway is estimated to be down to about 3.0 m.

3.2.5 As discussed in **Section 2.4**, it is expected that infilling of the excavated void will be carried out in phases. As such, the most onerous conditions relate to the dewatering of the western part of

[4] The radius of influence has been determined using the methodology presented in Section 10 of CIRIA (1986).

Phase 1 and this assessment is limited to considering the potential effects relating to the dewatering of this cell.

3.2.6 The associated drawdown profile is shown on the Schematic Geological Sections included as **Figure 3** and a contour plot of the reduced groundwater level associated with the dewatering of Phase 1W is included on **Figure 4**.

3.3 Effects on Network Rail Assets

Potential Effects

3.3.1 The reduction in groundwater level below the railway increases the effective stresses in the ground and thereby induce settlement of the railway line. Potential effects on the railway have been considered by modelling the effect of the increased effective stresses in the ground to determine the expected effects on the railway line.

3.3.2 The following sections of this report present the method of assessment and associated design parameters used to model the changes in effective stresses and to determine any potential ground movements, together with an assessment of any consequential effects on the railway.

Method of Assessment

3.3.3 Given the nature of the proposed changes in effective stress and the ground conditions the potential ground movements have been assessed using a simplified elastic half-space analysis (Oasys Pdisp) to determine the displacements and strains in the soil mass along and perpendicular to the line of the railway line resulting from the changes in effective stress.

3.3.4 The changes in effective stress have been modelled as an equivalent uniform load over the area of potential dewatering around and beneath the railway line. To allow for the curvature of the drawdown profile separate uniform loads have been applied for each 0.5 m increment of drawdown acting at the drawdown level. This load scenario has been used to determine the displacements along and perpendicular to the line of the railway.

Characteristic Values

3.3.5 It is noted that the ground investigations carried out in the area of the Site were to provide information on the available mineral resources. Consequently, information on the geotechnical properties of the ground on and in the vicinity of the Site is limited.

3.3.6 In the absence of site specific information, recommended characteristic values of parameters have been determined from consideration of published data based on the typical descriptions of the various strata. Given the potential duration of the proposed infilling works it is proposed to determine the effect on the railway for long-term drained loading conditions only as appropriate for assessing long-term ground movements.

3.3.7 The selected characteristic values are presented in the following table.

Summary of Selected Characteristic Values

Formation	Bulk Unit Weight[1], kN/m³	Elastic Modulus[2], MPa	Poisson's Ratio[3]
Head	20.0	8[2b]	0.3
River Terrace Deposits	20.0	30[2a]	0.2
Selsey Sand formation[4]	n/a	n/a	n/a
Marsh Farm Formation	20.0	15[2b]	0.3

Notes:
1) Values of bulk unit weight determined from consideration of the measured values and suggested values given in Figures 1 and 2 of BS 8002 (2015)
2) Values of elastic modulus are appropriate for long-term drained vertical loading conditions as determined from (a) the empirical correlation with expected SPT N values given by Stroud and Butler (1975); (b) the empirical correlation with expected undrained shear strength given by CIRIA (1983 and 2001)
3) Values of Poisson's ratio selected from parameters presented by Jurečič et al (2016)
4) The Selsey Sand Formation is absent under the northwest part of the Site and this formation has been neglected in the design analysis.

3.3.8 The selected values of elastic modulus represent lower bound values for an axial strain of 0.01 per cent. As such the determined deflections and distortions of the railway are deemed to be conservative.

Assessed Effects on Network ff Assets

3.3.9 The determined displacements along and perpendicular to the line of the railway resulting from the changes in effective stress associated with the proposed dewatering of the works are given in the design calculations presented in **Appendix A** of this report and are summarised in the following table.

Summary of Assessed Ground Movements

Load Scenario	Maximum Settlement, mm	Differential Settlement, 1:n	
		Centre Alignment	Perpendicular
LS01- Dewatering	12.5	15600	12700

3.3.10 Long term differential settlements during the proposed dewatering are determined to be less than 1 vertical in 10000 horizontal. For comparison the normal limiting design values for track gradient is 1 vertical in 80 horizontal and for cross fall (cant) is 150 mm (1 vertical in 9.5 horizontal) (NR, 2021). Given that the long term differential settlements are significantly less than the normal limiting design values of the railway they are not deemed to be of concern.

3.3.11 On this basis it is concluded that the proposed development will not result in significant additional deflections to the Network Rail assets adjacent to the Site and the consequent risk of damage to those assets is assessed to be very low.

References

BGS (1987a) Southampton, England and Wales Sheet 315, Solid and Drift 1 to 50 000 scale. British Geological Survey, Keyworth, Notts.

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Stroud M A and Butler F G (1975) The Standard Penetration Test and the Engineering Properties of Glacial Materials. Proc. Symposium on the Engineering Behaviour of Glacial Materials, University of Birmingham.

Stantec (2022) Hamble Quarry: Infiltration testing. Report 331201108R6, Stantec UK Ltd, Reading, Berkshire.

Stantec (2023) Hamble Quarry: Groundwater Flow. Technical Note 331201108TN201, Stantec UK Ltd, Shrewsbury, Shropshire.

Guidance Notes

Essential Guidance on the Context of the Report

This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations or constraints, they are described in the report text.

1) The opinions and recommendations expressed in this report are based on statute, guidance, and appropriate practice current at the date of its preparation. Stantec UK Ltd (Stantec) does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and we will be pleased to advise if any report requires revision due to changing circumstances. Following delivery of the report Stantec has no obligation to advise the Client or any other party of such changes or their repercussions.

2) Some of the conclusions in this report may be based on third party data. No guarantee can be given for the accuracy or completeness of any third party data used.

3) The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be taken into account in the reporting.

4) It should be noted that groundwater levels, groundwater chemistry, surface water levels, surface water chemistry, soil gas concentrations and soil gas flow rates can vary due to seasonal, climatic, tidal and man made effects.

5) Unless specifically stated to the contrary, this report does not purport to be a “Geotechnical Design Report” as defined in Clause 2.8 of Eurocode 7 (Geotechnical Design BS EN 1997-1:2004).

6) This report has been written for the sole use of the Client stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the express written authorisation of Stantec. Any such party relies upon the report at its own risk.

7) The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not taken into account the perceptions of, for example, banks, insurers, other funders, lay people, etc, unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.

8) Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Environment Agency, Natural England or Local Authority) have taken place only as part of this work where specifically stated.

Figures

National Grid Reference	SU 477 076
Coordinates	N50:52:00 W1:19:21
Nearest Post Code	SO31 4HU

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Client/Project

CEMEX UK OPERATIONS LTD

FORMER HAMBLE AIRFIELD, HAMBLE-LE-RICE

Title

SITE LAYOUT PLAN

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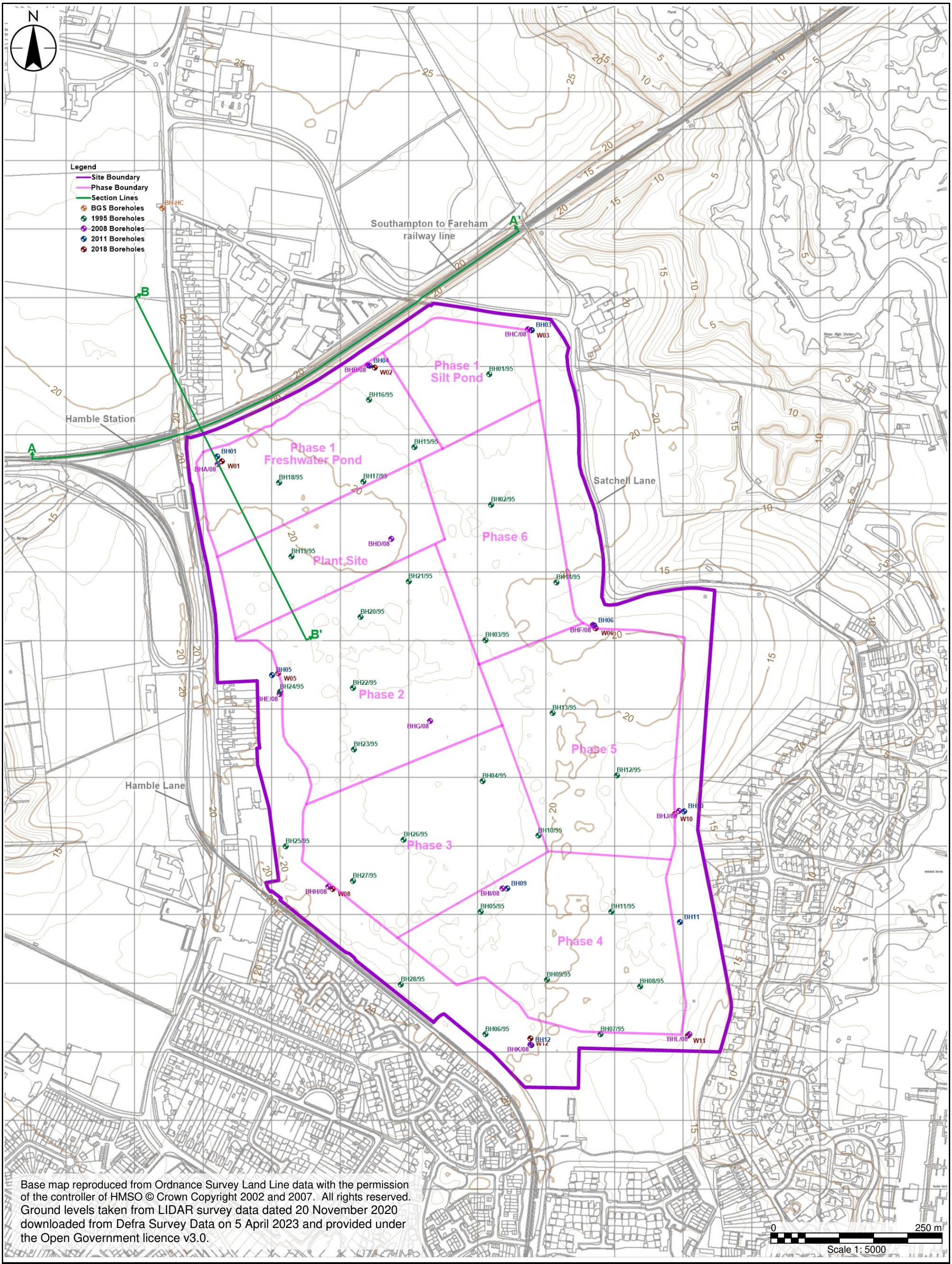

Base map reproduced from Ordnance Survey Land Line data with the permission of the controller of HMSO © Crown Copyright 2002 and 2007. All rights reserved.
Ground levels taken from LIDAR survey data dated 20 November 2020 downloaded from Defra Survey Data on 5 April 2023 and provided under the Open Government licence v3.0.

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FORMER HAMBLE AIRFIELD, HAMBLE-LE-RICE

Title/Project

SITE LAYOUT PLAN

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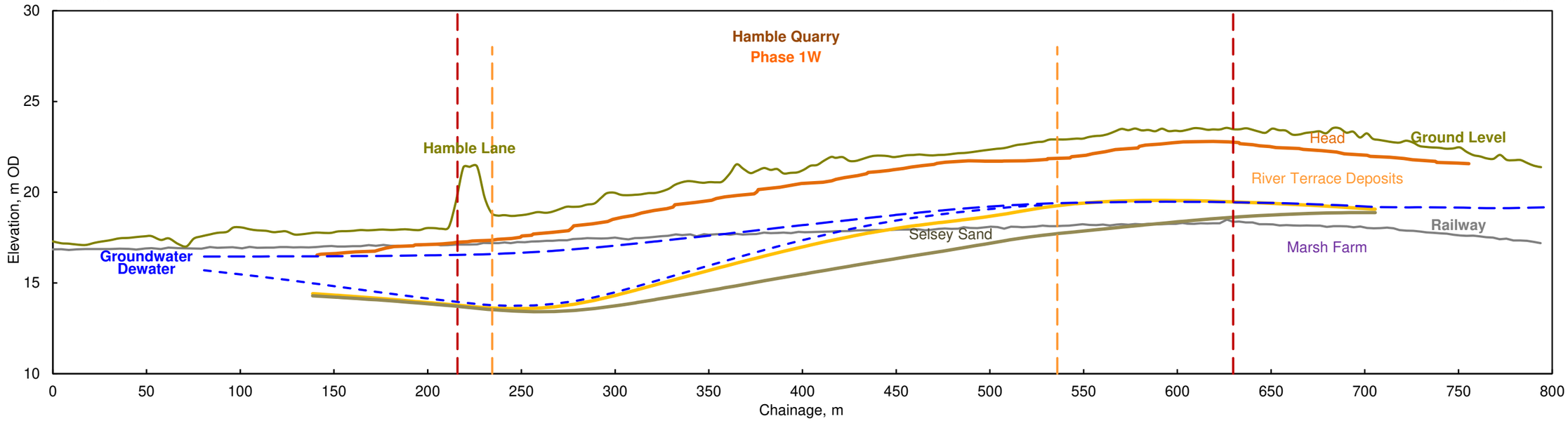
SECTION A-A'

SOUTHWEST
447150 mE
108164 mN

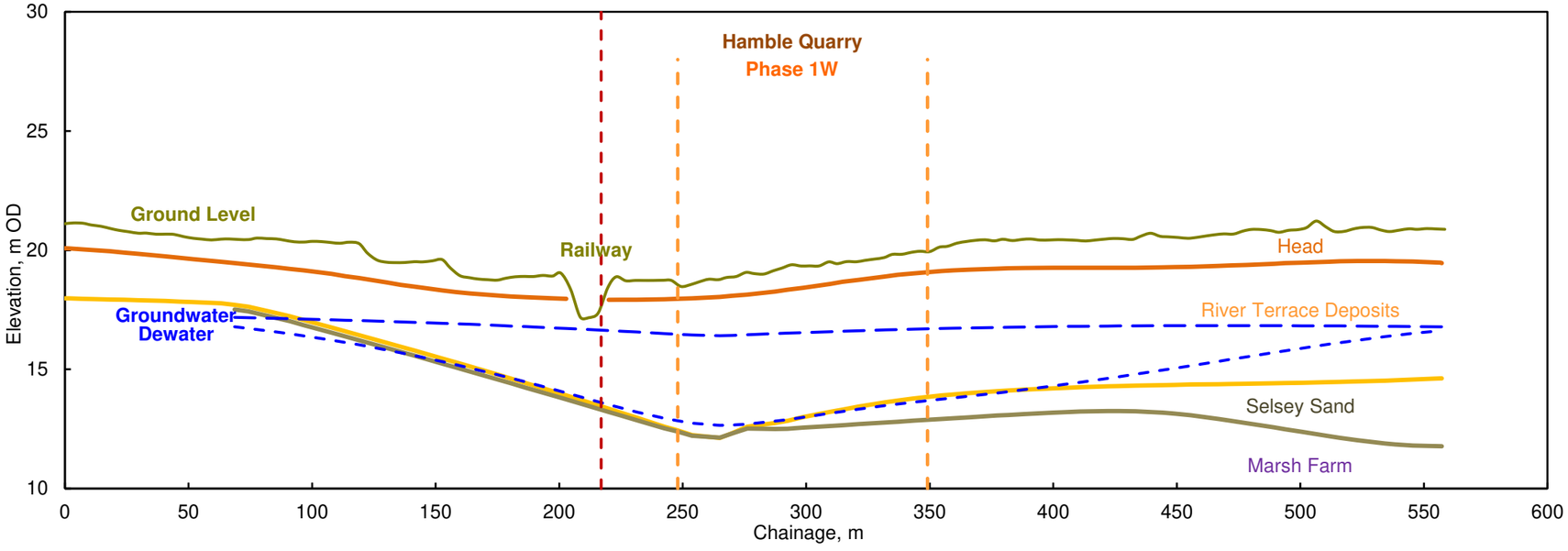
NORTHEAST
447860 mE
108496 mN



SECTION B-B'

NORTHWEST
447300 mE
108400 mN

SOUTHEAST
447550 mE
107900 mN



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Note: 1) Vertical scale approx 10 times horizontal scale
2) Elevation of railway line and ground level taken from LIDAR survey data dated 20 Novemebr 2020 downloaded from Defra Survey Data on 5 April 2023 and provided under the Open Government licence v3.0.

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FORMER HAMBLE AIRFIELD, HAMBLE-LE-RICE

Prepared: mdh | Checked: | Date: May 2023

Title

SCHEMATIC GEOLOGICAL SECTIONS

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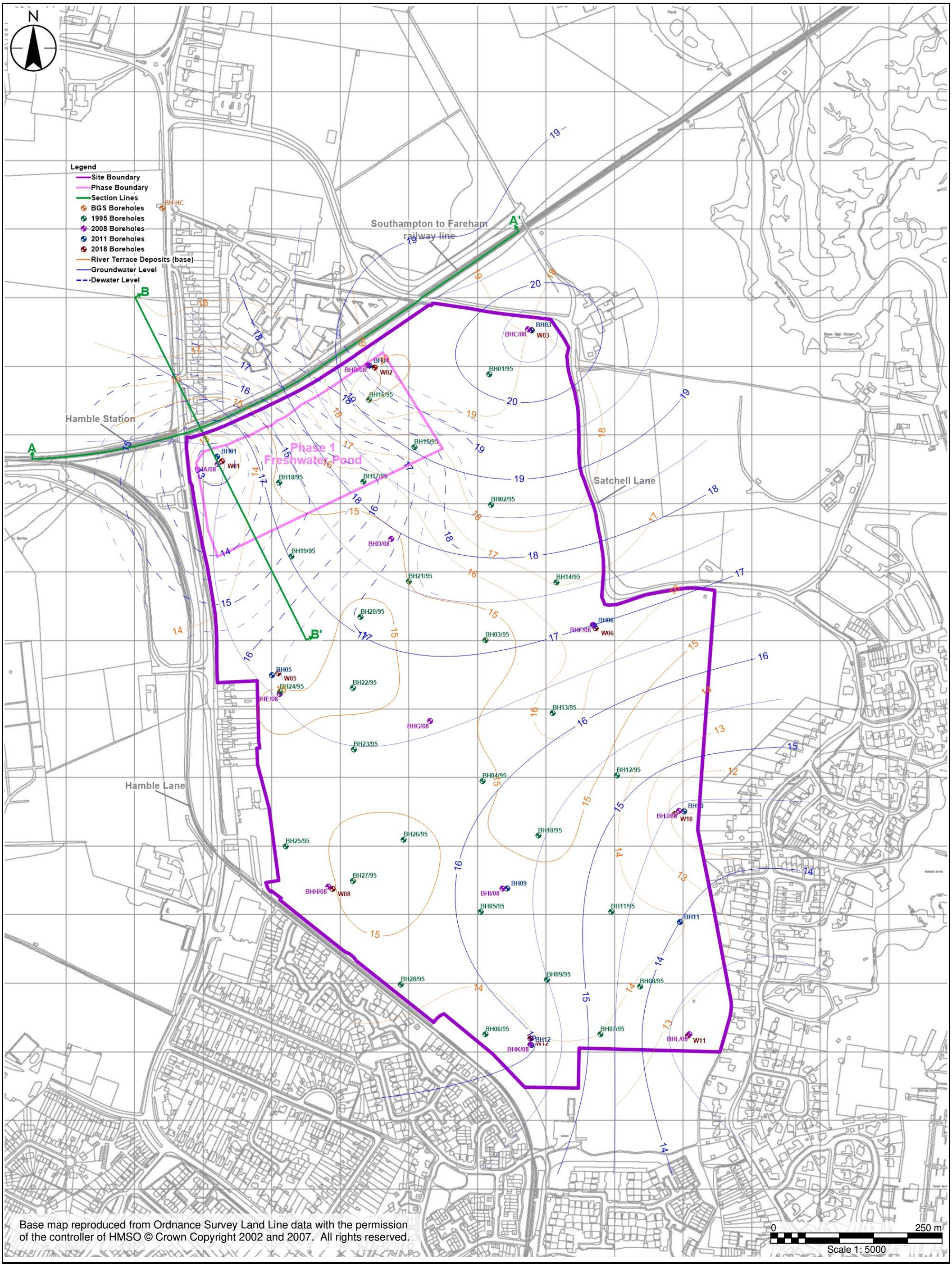

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CONTOUR PLOTS

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Appendix A: Ground Movement Calculations

Calculations

GROUND MOVEMENT ASSESSMENT - NETWORK RAIL ASSETS

Project Title	FORMER HAMBLE AIRFIELD, HAMBLE-LE-RICE							
Project No	331201108	3500	By	mdh	Chkd	rf	Date	18/05/2023

Existing Conditions

The Site is situated on a ridge between the valley of the River Hamble to the east and Southampton Water to the West and comprises undeveloped rough grassland partly colonised by dense scrub of the landing areas of the former Hamble North Airfield. Natural ground levels across the Site are generally between about 20.0 and 21.0 m relative to Ordnance Datum (OD) rising to about 23.0 m OD on the northern part of the Site and locally falling to about 15.0 m OD along the eastern boundary of the Site.

Proposed Works

The proposed works comprise the extraction of sand and gravel. No dewatering is planned and the extraction is to be carried out in dry or wet conditions depending on the groundwater level at the time of excavation.

The excavated void is to be infilled using in-situ soils and overburden from the Site together with imported inert materials to restore the Site to parkland and grazing land. The proposed infilling is to be carried out in dry conditions requiring the groundwater level to be artificially lowered through off-site pumping of groundwater from the area of each phase of infilling.

The proposed dewatering will result in reduction of the groundwater levels in the surrounding aquifer including below the Network Rail asset to the north of the Site Any reduction in groundwater level will increase the effective stresses in the ground and can thereby induce settlement of the ground and any supported development.

The Network Rail asset comprises the Hamble to Burlesdon section of the Southampton to Fareham railway which is aligned approximately southwest-northeast parallel with the northern site boundary. The railway comprises two tracks running in cutting down to about 3.0 m below the adjacent ground level. The base of the cutting is about 7 m wide, and the side slopes are formed at gradients of about 1 vertical in 6 horizontal.

Ground Conditions

Strata	Base Level m bgl	Description
Head	0.2 to 4.0	Soft to firm slightly sandy CLAY with a little gravel.
River Terrace Deposits	1.5 to 8.3	Sandy fine to coarse GRAVEL of flint
Selsey Sand Formation	1.8 to 9.5	Clayey fine to coarse SAND
Marsh Farm Formation	>20.0	Firm to stiff thinly laminated CLAY

The Selsey Sand Formation typically sub-crops on the southwest part of the Site and locally on the higher ground on the northern part of the Site. Across a central band from the northwest to southeast of the Site the Selsey Sand Formation is generally absent.

Groundwater Conditions

Groundwater levels of about 21.0 m OD (0.9 m depth) are present on the higher ground of the northern part of the Site falling to the southwest to about 16.5 m OD (4.5 m depth) on the central part of the Site and then to the southeast to about 13.0 m OD (3.0 m depth) on the southeast part of the Site.

Assumptions

1) The most onerous conditions relate to the dewatering of the western part of Phase 1.

2) Groundwater levels in the area of the dewaterng will be lowered by 0.5 to 3.0 m to the base of the River Terrace Deposits and the associated radius of influence of the dewatering works will extend between 35 and 200 m from the edge of the workings.

3) The changes in effective stress owing to the reduction in groundwater levels can be modelled as an equivalent uniform load over the plan area of the dewatering with separate uniform unloads each 0.5 m of drawdown acting at the drawdown level to allow for the curvature of the drawdown profile.

4) The existing ground conditions can be modelled as a linear elastic soil mass.

Assumptions - Cont'd

5) The stresses in the soil mass can be calculated assuming values of elastic modulus and Poisson's ratio are constant throughout the soil mass.

6) The vertical strains, and thereby displacements, can be calculated using selected values of drained vertical elastic modulus and Poisson's ratio for each soil layer.

7) The railway track experiences the same movements as the supporting soils.

Ground Properties

Strata	Base of Stratum m bgl [m OD}	Bulk Unit Wt, γ kN/m^3	Elastic Modulus MPa [@m OD]	Poisson's Ratio
Head	1.1 [17.7]	20.0	8.0	0.3
River Terrace Deposits	5.6 [13.2]	20.0	30.0	0.2
Selsey Sand Formation(1)	n/a	n/a	n/a	n/a
Marsh Farm Formation	>20.0 [<-1.2]	20.0	15.0	0.3

(1) The Selsey Sand Formation is absent under the northwest part of the Site and this formation has been neglected in the design analysis.

Load Scenarios

Consider a single load scenario

1) Changes in effective stress associated with the reduction in groundwater level resulting from the dewatering of the proposed works.

Method of Analysis

1) Consider settlement of soil mass associated with the proposed dewatering using Oasys Pdisp v19.2.

2) Model reduction in groundwater as equivalent uniform loads over the plan area of the dewatering in accordance with Assumption (3).

3) Determine the ground movements on a line along (i) the centre alignment of the railway, and (ii) perpendicular to the railway through the area of the proposed dewatering.

Design Loads

Load Case	Description	Load level m OD	Loaded Area m	m	Pressure kPa
LC01	Dewatering				
	3.5	13.2	50.0	50.0	5.0
	3.0 to 3.5	13.7	100.0	120.0	5.0
	2.5 to 3.0	14.2	190.0	180.0	5.0
	2.0 to 2.5	14.7	280.0	240.0	5.0
	1.5 to 2.0	15.2	350.0	300.0	5.0
	1.0 to 1.5	15.7	420.0	360.0	5.0
	0.5 to 1.0	16.2	490.0	420.0	5.0

Design Note

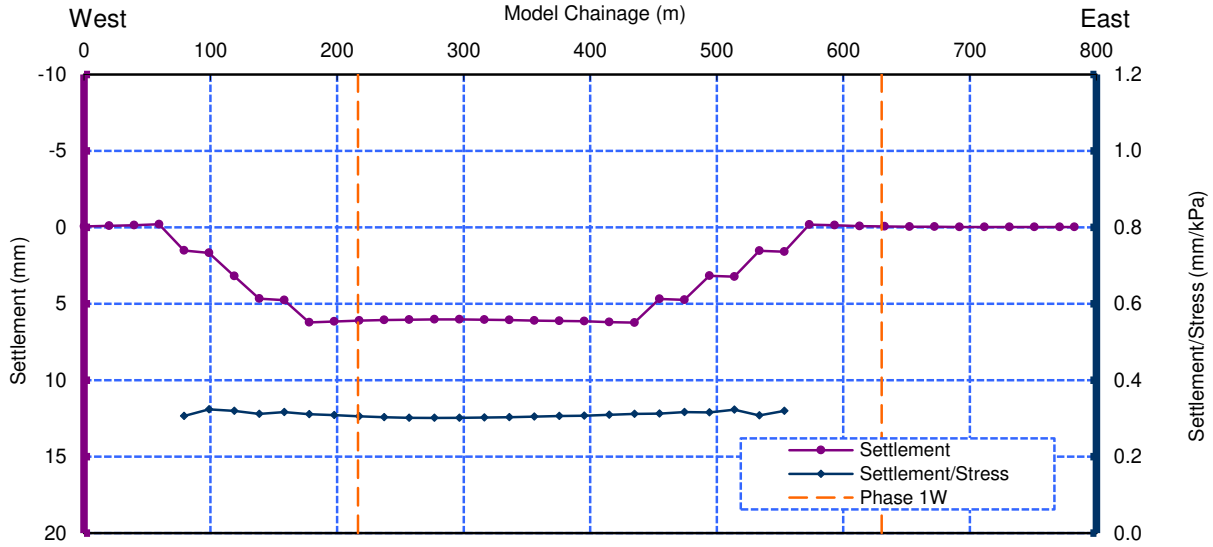
In Pdisp the dewatering profile is modelled with step-changes between the differing stresses changes. The use of step-changes results in unrealistic settlement profiles and consequently determined differential settlements at the location of the step-changes. To mitigate this effect of the modelling, the results of the Pdisp analysis have been used to determine the ratio of settlement to applied vertical stress with the settlement profile and corresponding differential settlements then determined from the profile of ground water reduction determined from the ground model. Given the large plan area of the loaded areas this assumption is deemed accepatble as the settlements will be predominantly one-dimensional with limited lateral dispersion of the applied vertical stresses.

Results of Analysis

Results of the Pdisp analysis are presented graphically below.

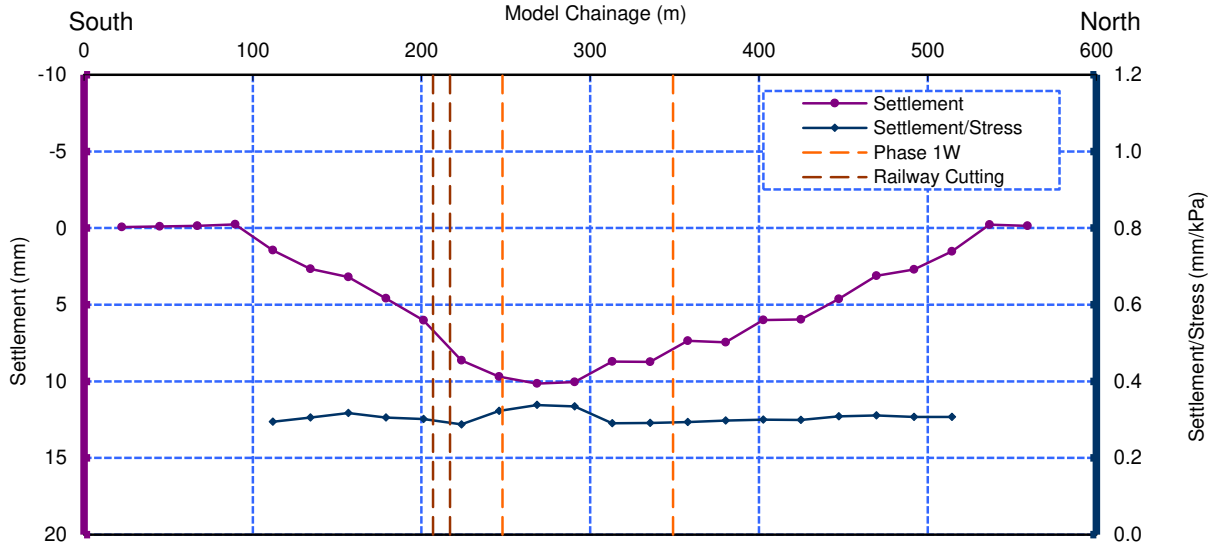
Load Scenario 01 - Dewatering

Centreline of Railway



Note 1) Negative values of settlement correspond to heave.

Perpendicular to the Centreline of Railway

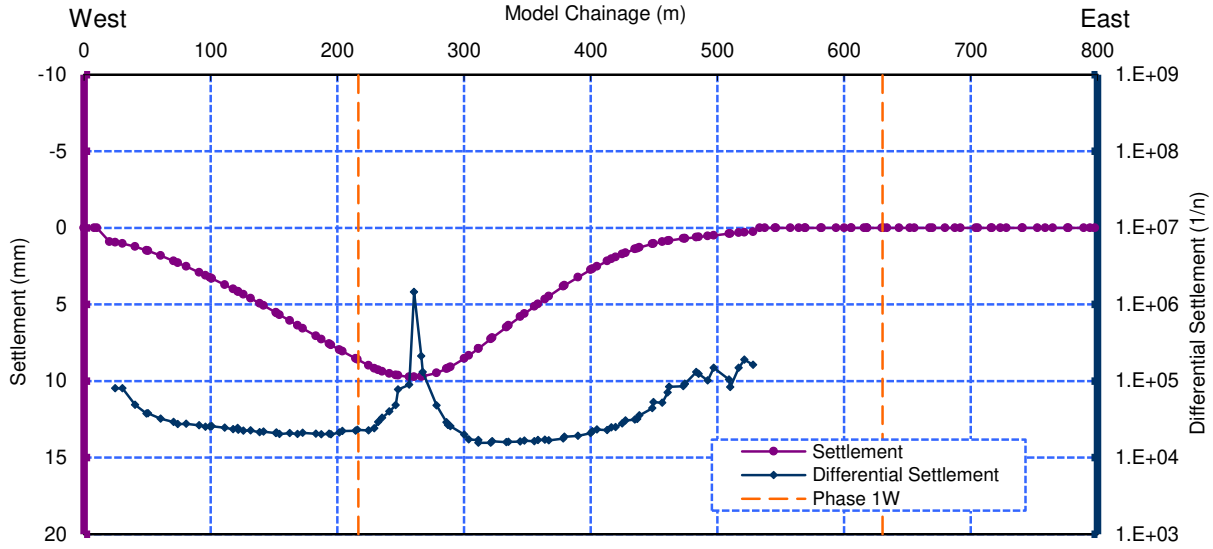


Results of Analysis

Settlement profile and corresponding differential settlements determined from the profile of ground water reduction determined from the ground model.

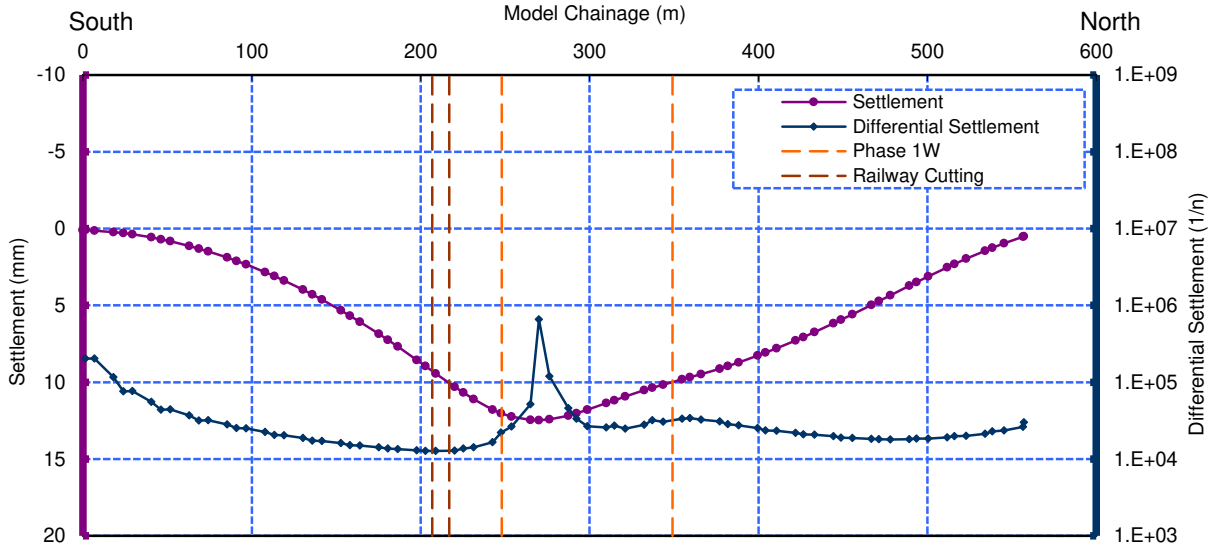
Load Scenario 01 - Dewatering

Centreline of Railway



Note 1) Negative values of settlement correspond to heave.

Perpendicular to the Centreline of Railway



Calculations

GROUND MOVEMENT ASSESSMENT - NETWORK RAIL ASSETS

Project Title	FORMER HAMBLE AIRFIELD, HAMBLE-LE-RICE							
Project No	331201108	3500	By	mdh	Chkd	rf	Date	18/05/2023

Summary

Determined ground movements under the NR assets are summarised in the following table.

Load Scenario	Max Settlement, $\Delta\delta$ (mm)	Maximum Differential, $\Delta L/\Delta\delta$	
		Centre Alignment	Perpendicular
LS01	12.5	15600	12700

Results of analysis indicate

Differential settlements associated with the dewatering of the proposed works are determined to be less than 1 vertical in 10000 horizontal and are therefore deemed to be negligible .

On this basis it is concluded that the proposed development will not result in significant displacements that cannot be accommodated by the Network Rail assets in the vicinity of the Site.

Analysis Options

Analysis: Boussinesq
Global Poisson's ratio: 0.20
Maximum allowable ratio between values of E: 2.0
Horizontal rigid boundary level: -1.20 [m OD]
Displacements at area centroids calculated.

Soil ProfilesSoil Profile 1

Layer	Level at top [mOD]	Number of intermediate displacement levels	Youngs Modulus Top [kN/m²]	Youngs Modulus Btm [kN/m²]	Poissons ratio	Non-linear curve
1	18.800	2	8000.0	8000.0	0.30000	None
2	17.700	9	30000.	30000.	0.20000	None
3	13.200	29	15000.	70000.	0.30000	None

Soil Zones

Zone	Name	X coordinates min [m]	X coordinates max [m]	Y coordinates min [m]	Y coordinates max [m]	Profile
1	Site	0.0	800.00	0.0	800.00	Soil Profile 1

Non-linear Curve Coordinates - Non-linear Curve 1

Point	Strain [%]	Factor

Load Data

Load ref.	Name	Orientation	Loaded plane Centre of load (Global) X [m]	Y [m]	Z(level) [m]	Angle of local x w.r.t. global X [Degrees]	Shape	Dimension Width x/ Radius [m]	Depth y [m]	Loads Normal z [kN/m²]	Load value Tangential x [kN/m²]	y [kN/m²]	Number of rectangles
1	DW3.5	Horizontal	325.00	360.00	13.200	26.600	Rectangular	50.000	50.000	5.0000	0.0	0.0	N/A
2	DW3.0	Horizontal	330.00	350.00	13.700	26.600	Rectangular	100.00	120.00	5.0000	0.0	0.0	N/A
3	DW2.5	Horizontal	350.00	340.00	14.200	26.600	Rectangular	190.00	180.00	5.0000	0.0	0.0	N/A
4	DW2.0	Horizontal	370.00	340.00	14.700	26.600	Rectangular	280.00	240.00	5.0000	0.0	0.0	N/A
5	DW1.5	Horizontal	375.00	340.00	15.200	26.600	Rectangular	350.00	300.00	5.0000	0.0	0.0	N/A
6	DW1.0	Horizontal	380.00	340.00	15.700	26.600	Rectangular	420.00	360.00	5.0000	0.0	0.0	N/A
7	DW0.5	Horizontal	385.00	340.00	16.200	26.600	Rectangular	490.00	420.00	5.0000	0.0	0.0	N/A

Displacement Data

Ref.	Type	Name	Direction of Extrusion	Line/Line for extrusion First point X [m]	First point Y [m]	First point Z(level) [m]	Second point X [m]	Second point Y [m]	Second point Z(level) [m]	No. of intrvls across extrusion/line	Extrusion Depth [m]	No. of intrvls along extrusion	Calculate	Show Detailed results
1	Line	NR Railway	N/A	50.00000	300.00000	18.80000	750.00000	650.00000	18.80000	198	N/A	N/A	Yes	No
2	Line	NR Railway2	N/A	50.00000	300.00000	13.20000	750.00000	650.00000	13.20000	198	N/A	N/A	Yes	No
3	Line	X-Section	N/A	200.00000	600.00000	18.80000	450.00000	100.00000	18.80000	125	N/A	N/A	Yes	No
4	Line	X-Section2	N/A	200.00000	600.00000	13.20000	450.00000	100.00000	13.20000	125	N/A	N/A	Yes	No

RESULTS FOR GRIDS

Analysis: Boussinesq
Global Poisson's ratio: 0.20
Horizontal rigid boundary level: -1.20 [m OD]

The maximum displacement difference between
Boussinesq method = 1.5417mm and Mindlin method = -8.7114mm
occurs at point X = 527.27m Y = 538.64mLevel = 18.800mOD and is: 10.253mm

Name	Location X [m]	Y [m]	Z[Level] [mOD]	Z [mm]	Stresses Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [%]
	325.00000	360.00000	13.20000	8.8907	13.030	35.000	83.011	0.13167
	330.00000	350.00000	13.70000	9.2427	13.450	30.000	71.356	0.072429
	350.00000	340.00000	14.20000	8.2240	13.950	25.000	59.614	0.060257
	370.00000	340.00000	14.70000	8.3974	14.450	20.000	47.775	0.048150
	375.00000	340.00000	15.20000	8.5910	14.950	15.000	35.881	0.036079
	380.00000	340.00000	15.70000	8.7124	15.450	10.000	23.950	0.024033
	385.00000	340.00000	16.20000	8.6941	15.986	5.0000	11.990	0.012007
NR Railway	50.00000	300.00000	18.80000	-0.065705	18.617	0.0	0.0	0.0
	53.53535	301.76768	18.80000	-0.069976	18.617	0.0	0.0	0.0
	57.07071	303.53535	18.80000	-0.074690	18.617	0.0	0.0	0.0
	60.60606	305.30303	18.80000	-0.079912	18.617	0.0	0.0	0.0
	64.14141	307.07071	18.80000	-0.085721	18.617	0.0	0.0	0.0
	67.67677	308.83838	18.80000	-0.092209	18.617	0.0	0.0	0.0
	71.21212	310.60606	18.80000	-0.099486	18.617	0.0	0.0	0.0
	74.74747	312.37374	18.80000	-0.10768	18.617	0.0	0.0	0.0
	78.28283	314.14141	18.80000	-0.11694	18.617	0.0	0.0	0.0
	81.81818	315.90909	18.80000	-0.12743	18.617	0.0	0.0	0.0
	85.35354	317.67677	18.80000	-0.13932	18.617	0.0	0.0	0.0
	88.88889	319.44444	18.80000	-0.15270	18.617	0.0	0.0	0.0
	92.42424	321.21212	18.80000	-0.16751	18.617	0.0	0.0	0.0
	95.95960	322.97980	18.80000	-0.18318	18.617	0.0	0.0	0.0
	99.49495	324.74747	18.80000	-0.19776	18.617	0.0	0.0	0.0
	103.03030	326.51515	18.80000	-0.20568	18.617	0.0	0.0	0.0
	106.56566	328.28283	18.80000	-0.19095	18.617	0.0	0.0	0.0
	110.10101	330.05051	18.80000	-0.10268	18.617	0.0	0.0	0.0
	113.63636	331.81818	18.80000	0.27979	18.617	0.0	0.0	0.0
	117.17172	333.58586	18.80000	1.2805	18.617	0.0	0.0	0.0
	120.70707	335.35354	18.80000	1.5061	18.617	0.0	0.0	0.0
	124.24242	337.12121	18.80000	1.5537	18.617	0.0	0.0	0.0
	127.77778	338.88889	18.80000	1.5531	18.617	0.0	0.0	0.0
	131.31313	340.65657	18.80000	1.5445	18.617	0.0	0.0	0.0
	134.84848	342.42424	18.80000	1.5593	18.617	0.0	0.0	0.0
	138.38384	344.19192	18.80000	1.6699	18.617	0.0	0.0	0.0
	141.91919	345.95960	18.80000	2.2622	18.617	0.0	0.0	0.0
	145.45455	347.72727	18.80000	3.0585	18.617	0.0	0.0	0.0
	148.98990	349.49495	18.80000	3.1887	18.617	0.0	0.0	0.0
	152.52525	351.26263	18.80000	3.2068	18.617	0.0	0.0	0.0
	156.06061	353.03030	18.80000	3.1952	18.617	0.0	0.0	0.0
	159.59596	354.79798	18.80000	3.1845	18.617	0.0	0.0	0.0
	163.13131	356.56566	18.80000	3.2075	18.617	0.0	0.0	0.0
	166.66667	358.33333	18.80000	3.3624	18.617	0.0	0.0	0.0
	170.20202	360.10101	18.80000	4.2483	18.617	0.0	0.0	0.0
	173.73737	361.86869	18.80000	4.6560	18.617	0.0	0.0	0.0
	177.27273	363.63636	18.80000	4.7308	18.617	0.0	0.0	0.0
	180.80808	365.40404	18.80000	4.7349	18.617	0.0	0.0	0.0
	184.34343	367.17172	18.80000	4.7219	18.617	0.0	0.0	0.0
	187.87879	368.93939	18.80000	4.7166	18.617	0.0	0.0	0.0
	191.41414	370.70707	18.80000	4.7561	18.617	0.0	0.0	0.0
	194.94949	372.47475	18.80000	4.9836	18.617	0.0	0.0	0.0
	198.48485	374.24242	18.80000	5.9506	18.617	0.0	0.0	0.0
	202.02020	376.01010	18.80000	6.1811	18.617	0.0	0.0	0.0
	205.55556	377.77778	18.80000	6.2243	18.617	0.0	0.0	0.0
	209.09091	379.54545	18.80000	6.2229	18.617	0.0	0.0	0.0
	212.62626	381.31313	18.80000	6.2097	18.617	0.0	0.0	0.0
	216.16162	383.08081	18.80000	6.1959	18.617	0.0	0.0	0.0
	219.69697	384.84848	18.80000	6.1857	18.617	0.0	0.0	0.0
	223.23232	386.61616	18.80000	6.1779	18.617	0.0	0.0	0.0
	226.76768	388.38384	18.80000	6.1687	18.617	0.0	0.0	0.0
	230.30303	390.15152	18.80000	6.1571	18.617	0.0	0.0	0.0
	233.83838	391.91919	18.80000	6.1442	18.617	0.0	0.0	0.0
	237.37374	393.68687	18.80000	6.1313	18.617	0.0	0.0	0.0
	240.90909	395.45455	18.80000	6.1190	18.617	0.0	0.0	0.0
	244.44444	397.22222	18.80000	6.1075	18.617	0.0	0.0	0.0
	247.97980	398.98990	18.80000	6.0970	18.617	0.0	0.0	0.0

Former Hamble Airfield, Hamble-le-Rice

Ground Movement Assessment - Network Rail Assets

Estimated Ground Movements - Load Scenario 01

Name	Location				Stresses			
	X	Y	Z[Level]	Z	Calc Level	Vert Stress	Sum Princ	Vert Strain
	[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[%]
	251.51515	400.75758	18.80000	6.0873	18.617	0.0	0.0	0.0
	255.05051	402.52525	18.80000	6.0784	18.617	0.0	0.0	0.0
	258.58586	404.29293	18.80000	6.0703	18.617	0.0	0.0	0.0
	262.12121	406.06061	18.80000	6.0630	18.617	0.0	0.0	0.0
	265.65657	407.82828	18.80000	6.0564	18.617	0.0	0.0	0.0
	269.19192	409.59596	18.80000	6.0505	18.617	0.0	0.0	0.0
	272.72727	411.36364	18.80000	6.0454	18.617	0.0	0.0	0.0
	276.26263	413.13131	18.80000	6.0409	18.617	0.0	0.0	0.0
	279.79798	414.89899	18.80000	6.0371	18.617	0.0	0.0	0.0
	283.33333	416.66667	18.80000	6.0339	18.617	0.0	0.0	0.0
	286.86869	418.43434	18.80000	6.0312	18.617	0.0	0.0	0.0
	290.40404	420.20202	18.80000	6.0292	18.617	0.0	0.0	0.0
	293.93939	421.96970	18.80000	6.0277	18.617	0.0	0.0	0.0
	297.47475	423.73737	18.80000	6.0268	18.617	0.0	0.0	0.0
	301.01010	425.50505	18.80000	6.0263	18.617	0.0	0.0	0.0
	304.54545	427.27273	18.80000	6.0264	18.617	0.0	0.0	0.0
	308.08081	429.04040	18.80000	6.0271	18.617	0.0	0.0	0.0
	311.61616	430.80808	18.80000	6.0282	18.617	0.0	0.0	0.0
	315.15152	432.57576	18.80000	6.0298	18.617	0.0	0.0	0.0
	318.68687	434.34343	18.80000	6.0320	18.617	0.0	0.0	0.0
	322.22222	436.11111	18.80000	6.0346	18.617	0.0	0.0	0.0
	325.75758	437.87879	18.80000	6.0377	18.617	0.0	0.0	0.0
	329.29293	439.64646	18.80000	6.0413	18.617	0.0	0.0	0.0
	332.82828	441.41414	18.80000	6.0452	18.617	0.0	0.0	0.0
	336.36364	443.18182	18.80000	6.0494	18.617	0.0	0.0	0.0
	339.89899	444.94949	18.80000	6.0539	18.617	0.0	0.0	0.0
	343.43434	446.71717	18.80000	6.0586	18.617	0.0	0.0	0.0
	346.96970	448.48485	18.80000	6.0636	18.617	0.0	0.0	0.0
	350.50505	450.25253	18.80000	6.0688	18.617	0.0	0.0	0.0
	354.04040	452.02020	18.80000	6.0742	18.617	0.0	0.0	0.0
	357.57576	453.78788	18.80000	6.0798	18.617	0.0	0.0	0.0
	361.11111	455.55556	18.80000	6.0857	18.617	0.0	0.0	0.0
	364.64646	457.32323	18.80000	6.0918	18.617	0.0	0.0	0.0
	368.18182	459.09091	18.80000	6.0983	18.617	0.0	0.0	0.0
	371.71717	460.85859	18.80000	6.1052	18.617	0.0	0.0	0.0
	375.25253	462.62626	18.80000	6.1123	18.617	0.0	0.0	0.0
	378.78788	464.39394	18.80000	6.1193	18.617	0.0	0.0	0.0
	382.32323	466.16162	18.80000	6.1255	18.617	0.0	0.0	0.0
	385.85859	467.92929	18.80000	6.1293	18.617	0.0	0.0	0.0
	389.39394	469.69697	18.80000	6.1297	18.617	0.0	0.0	0.0
	392.92929	471.46465	18.80000	6.1284	18.617	0.0	0.0	0.0
	396.46465	473.23232	18.80000	6.1298	18.617	0.0	0.0	0.0
	400.00000	475.00000	18.80000	6.1350	18.617	0.0	0.0	0.0
	403.53535	476.76768	18.80000	6.1429	18.617	0.0	0.0	0.0
	407.07071	478.53535	18.80000	6.1522	18.617	0.0	0.0	0.0
	410.60606	480.30303	18.80000	6.1621	18.617	0.0	0.0	0.0
	414.14141	482.07071	18.80000	6.1724	18.617	0.0	0.0	0.0
	417.67677	483.83838	18.80000	6.1833	18.617	0.0	0.0	0.0
	421.21212	485.60606	18.80000	6.1947	18.617	0.0	0.0	0.0
	424.74747	487.37374	18.80000	6.2068	18.617	0.0	0.0	0.0
	428.28283	489.14141	18.80000	6.2194	18.617	0.0	0.0	0.0
	431.81818	490.90909	18.80000	6.2313	18.617	0.0	0.0	0.0
	435.35354	492.67677	18.80000	6.2389	18.617	0.0	0.0	0.0
	438.88889	494.44444	18.80000	6.2304	18.617	0.0	0.0	0.0
	442.42424	496.21212	18.80000	6.1664	18.617	0.0	0.0	0.0
	445.95960	497.97980	18.80000	5.8521	18.617	0.0	0.0	0.0
	449.49495	499.74747	18.80000	4.9044	18.617	0.0	0.0	0.0
	453.03030	501.51515	18.80000	4.7246	18.617	0.0	0.0	0.0
	456.56566	503.28283	18.80000	4.6905	18.617	0.0	0.0	0.0
	460.10101	505.05051	18.80000	4.6951	18.617	0.0	0.0	0.0
	463.63636	506.81818	18.80000	4.7118	18.617	0.0	0.0	0.0
	467.17172	508.58586	18.80000	4.7309	18.617	0.0	0.0	0.0
	470.70707	510.35354	18.80000	4.7451	18.617	0.0	0.0	0.0
	474.24242	512.12121	18.80000	4.7402	18.617	0.0	0.0	0.0
	477.77778	513.88889	18.80000	4.6722	18.617	0.0	0.0	0.0
	481.31313	515.65657	18.80000	4.3293	18.617	0.0	0.0	0.0
	484.84848	517.42424	18.80000	3.3873	18.617	0.0	0.0	0.0
	488.38384	519.19192	18.80000	3.1975	18.617	0.0	0.0	0.0
	491.91919	520.95960	18.80000	3.1627	18.617	0.0	0.0	0.0
	495.45455	522.72727	18.80000	3.1699	18.617	0.0	0.0	0.0
	498.98990	524.49495	18.80000	3.1902	18.617	0.0	0.0	0.0
	502.52525	526.26263	18.80000	3.2127	18.617	0.0	0.0	0.0
	506.06061	528.03030	18.80000	3.2290	18.617	0.0	0.0	0.0
	509.59596	529.79798	18.80000	3.2233	18.617	0.0	0.0	0.0
	513.13131	531.56566	18.80000	3.1468	18.617	0.0	0.0	0.0
	516.66667	533.33333	18.80000	2.7751	18.617	0.0	0.0	0.0
	520.20202	535.10101	18.80000	1.7837	18.617	0.0	0.0	0.0
	523.73737	536.86869	18.80000	1.5814	18.617	0.0	0.0	0.0
	527.27273	538.63636	18.80000	1.5417	18.617	0.0	0.0	0.0
	530.80808	540.40404	18.80000	1.5469	18.617	0.0	0.0	0.0
	534.34343	542.17172	18.80000	1.5658	18.617	0.0	0.0	0.0
	537.87879	543.93939	18.80000	1.5864	18.617	0.0	0.0	0.0
	541.41414	545.70707	18.80000	1.5992	18.617	0.0	0.0	0.0
	544.94949	547.47475	18.80000	1.5865	18.617	0.0	0.0	0.0
	548.48485	549.24242	18.80000	1.4948	18.617	0.0	0.0	0.0
	552.02020	551.01010	18.80000	1.0905	18.617	0.0	0.0	0.0
	555.55556	552.77778	18.80000	0.097136	18.617	0.0	0.0	0.0
	559.09091	554.54545	18.80000	-0.12442	18.617	0.0	0.0	0.0
	562.62626	556.31313	18.80000	-0.17747	18.617	0.0	0.0	0.0
	566.16162	558.08081	18.80000	-0.18313	18.617	0.0	0.0	0.0
	569.69697	559.84848	18.80000	-0.17381	18.617	0.0	0.0	0.0
	573.23232	561.61616	18.80000	-0.16030	18.617	0.0	0.0	0.0
	576.76768	563.38384	18.80000	-0.14644	18.617	0.0	0.0	0.0
	580.30303	565.15152	18.80000	-0.13353	18.617	0.0	0.0	0.0
	583.83838	566.91919	18.80000	-0.12194	18.617	0.0	0.0	0.0
	587.37374	568.68687	18.80000	-0.11168	18.617	0.0	0.0	0.0
	590.90909	570.45455	18.80000	-0.10262	18.617	0.0	0.0	0.0
	594.44444	572.22222	18.80000	-0.094623	18.617	0.0	0.0	0.0
	597.97980	573.98990	18.80000	-0.087543	18.617	0.0	0.0	0.0
	601.51515	575.75758	18.80000	-0.081252	18.617	0.0	0.0	0.0
	605.05051	577.52525	18.80000	-0.075637	18.617	0.0	0.0	0.0
	608.58586	579.29293	18.80000	-0.070605	18.617	0.0	0.0	0.0
	612.12121	581.06061	18.80000	-0.066077	18.617	0.0	0.0	0.0
	615.65657	582.82828	18.80000	-0.061986	18.617	0.0	0.0	0.0
	619.19192	584.59596	18.80000	-0.058275	18.617	0.0	0.0	0.0
	622.72727	586.36364	18.80000	-0.054898	18.617	0.0	0.0	0.0
	626.26263	588.13131	18.80000	-0.051814	18.617	0.0	0.0	0.0
	629.79798	589.89899	18.80000	-0.048989	18.617	0.0	0.0	0.0
	633.33333	591.66667	18.80000	-0.046394	18.617	0.0	0.0	0.0
	636.86869	593.43434	18.80000	-0.044003	18.617	0.0	0.0	0.0
	640.40404	595.20202	18.80000	-0.041794	18.617	0.0	0.0	0.0
	643.93939	596.96970	18.80000	-0.039750	18.617	0.0	0.0	0.0
	647.47475	598.73737	18.80000	-0.037853	18.617	0.0	0.0	0.0
	651.01010	600.50505	18.80000	-0.036089	18.617	0.0	0.0	0.0
	654.54545	602.27273	18.80000	-0.034445	18.617	0.0	0.0	0.0
	658.08081	604.04040	18.80000	-0.032911	18.617	0.0	0.0	0.0
	661.61616	605.80808	18.80000	-0.031477	18.617	0.0	0.0	0.0
	665.15152	607.57576	18.80000	-0.030133	18.617	0.0	0.0	0.0
	668.68687	609.34343	18.80000	-0.028873	18.617	0.0	0.0	0.0
	672.22222	611.11111	18.80000	-0.027689	18.617	0.0	0.0	0.0
	675.75758	612.87879	18.80000	-0.026575	18.617	0.0	0.0	0.0
	679.29293	614.64646	18.80000	-0.025525	18.617	0.0	0.0	0.0
	682.82828	616.41414	18.80000	-0.024535	18.617	0.0	0.0	0.0
	686.36364	618.18182	18.80000	-0.023600	18.617	0.0	0.0	0.0
	689.89899	619.94949	18.80000	-0.022715	18.617	0.0	0.0	0.0
	693.43434	621.71717	18.80000	-0.021878	18.617	0.0	0.0	0.0
	696.96970	623.48485	18.80000	-0.021085	18.617	0.0	0.0	0.0
	700.50505	625.25253	18.80000	-0.020333	18.617	0.0	0.0	0.0
	704.04040	627.02020	18.80000	-0.019618	18.617	0.0	0.0	0.0
	707.57576	628.78788	18.80000	-0.018940	18.617	0.0	0.0	0.0
	711.11111	630.55556	18.80000	-0.018294	18.617	0.0	0.0	0.0
	714.64646	632.32323	18.80000	-0.017679	18.617	0.0	0.0	0.0
	718.18182	634.09091	18.80000	-0.017093	18.617	0.0	0.0	0.0
	721.71717	635.85859	18.80000	-0.016535	18.617	0.0	0.0	0.0
	725.25253	637.62626	18.80000	-0.016002	18.617	0.0	0.0	0.0
	728.78788	639.39394	18.80000	-0.015493	18.617	0.0	0.0	0.0
	732.32323	641.16162	18.80000	-0.015007	18.617	0.0	0.0	0.0
	735.85859	642.92929	18.80000	-0.014542	18.617	0.0	0.0	0.0
	739.39394	644.69697	18.80000	-0.014097	18.617	0.0	0.0	0.0
	742.92929	646.46465	18.80000	-0.013671	18.617	0.0	0.0	0.0
	746.46465	648.23232	18.80000	-0.013263	18.617	0.0	0.0	0.0

Name	Location X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Stresses Sum Princ [kN/m²]	Vert Strain [%]
	750.00000	650.00000	18.80000	-0.012872	18.617	0.0	0.0	0.0
NR Railway2	50.00000	300.00000	13.20000	-0.064180	13.200	84.043E-6	0.17338	-239.85E-6
	53.53535	301.76768	13.20000	-0.068339	13.200	99.465E-6	0.18568	-256.81E-6
	57.07071	303.53535	13.20000	-0.072928	13.200	118.39E-6	0.19944	-275.78E-6
	60.60606	305.30303	13.20000	-0.078009	13.200	142.90E-6	0.21493	-297.10E-6
	64.14141	307.07071	13.20000	-0.083657	13.200	174.27E-6	0.23249	-321.25E-6
	67.67677	308.83838	13.20000	-0.089961	13.200	215.47E-6	0.25253	-348.79E-6
	71.21212	310.60606	13.20000	-0.097025	13.200	270.75E-6	0.27563	-380.47E-6
	74.74747	312.37374	13.20000	-0.10497	13.200	347.12E-6	0.30251	-417.28E-6
	78.28283	314.14141	13.20000	-0.11394	13.200	454.41E-6	0.33420	-460.56E-6
	81.81818	315.90909	13.20000	-0.12408	13.200	611.62E-6	0.37210	-512.17E-6
	85.35354	317.67677	13.20000	-0.13553	13.200	849.81E-6	0.41829	-574.76E-6
	88.88889	319.44444	13.20000	-0.14838	13.200	0.0012317	0.47585	-652.27E-6
	92.42424	321.21212	13.20000	-0.16250	13.200	0.0018845	0.54976	-750.81E-6
	95.95960	322.97980	13.20000	-0.17725	13.200	0.0031018	0.64847	-880.34E-6
	99.49495	324.74747	13.20000	-0.19054	13.200	0.0056541	0.78776	-0.0010581
	103.03030	326.51515	13.20000	-0.19654	13.200	0.012011	1.0009	-0.0013154
	106.56566	328.28283	13.20000	-0.17868	13.200	0.032739	1.3718	-0.0017051
	110.10101	330.05051	13.20000	-0.085327	13.200	0.14056	2.1792	-0.0021767
	113.63636	331.81818	13.20000	0.27056	13.200	1.2657	4.6686	0.0011317
	117.17172	333.58586	13.20000	0.89023	13.200	4.4414	9.0446	0.014142
	120.70707	335.35354	13.20000	1.1163	13.200	4.9218	10.715	0.014713
	124.24242	337.12121	13.20000	1.1688	13.200	4.9799	11.372	0.014151
	127.77778	338.88889	13.20000	1.1716	13.200	4.9950	11.776	0.013682
	131.31313	340.65657	13.20000	1.1661	13.200	5.0046	12.140	0.013235
	134.84848	342.42424	13.20000	1.1846	13.200	5.0254	12.623	0.012690
	138.38384	344.19192	13.20000	1.3007	13.200	5.1567	13.642	0.012066
	141.91919	345.95960	13.20000	1.7910	13.200	7.2299	17.334	0.019402
	145.45455	347.72727	13.20000	2.3390	13.200	9.7972	21.485	0.029070
	148.98990	349.49495	13.20000	2.4746	13.200	9.9679	22.617	0.028526
	152.52525	351.26263	13.20000	2.4962	13.200	9.9909	23.105	0.027987
	156.06061	353.03030	13.20000	2.4870	13.200	9.9979	23.434	0.027574
	159.59596	354.79798	13.20000	2.4786	13.200	10.004	23.756	0.027163
	163.13131	356.56566	13.20000	2.5046	13.200	10.021	24.227	0.026612
	166.66667	358.33333	13.20000	2.6645	13.200	10.190	25.449	0.025932
	170.20202	360.10101	13.20000	3.3309	13.200	13.745	30.893	0.039743
	173.73737	361.86869	13.20000	3.7232	13.200	14.937	33.872	0.042776
	177.27273	363.63636	13.20000	3.8017	13.200	14.988	34.577	0.042103
	180.80808	365.40404	13.20000	3.8079	13.200	14.996	34.908	0.041693
	184.34343	367.17172	13.20000	3.7964	13.200	14.999	35.144	0.041383
	187.87879	368.93939	13.20000	3.7924	13.200	15.002	35.391	0.041059
	191.41414	370.70707	13.20000	3.8340	13.200	15.015	35.811	0.040552
	194.94949	372.47475	13.20000	4.0658	13.200	15.264	37.368	0.039893
	198.48485	374.24242	13.20000	4.8538	13.200	19.730	44.422	0.056943
	202.02020	376.01010	13.20000	5.0885	13.200	19.982	45.970	0.056312
	205.55556	377.77778	13.20000	5.1335	13.200	19.995	46.354	0.055853
	209.09091	379.54545	13.20000	5.1330	13.200	19.997	46.535	0.055615
	212.62626	381.31313	13.20000	5.1204	13.200	19.998	46.653	0.055455
	216.16162	383.08081	13.20000	5.1071	13.200	19.998	46.750	0.055324
	219.69697	384.84848	13.20000	5.0973	13.200	19.998	46.842	0.055200
	223.23232	386.61616	13.20000	5.0898	13.200	19.999	46.928	0.055083
	226.76768	388.38384	13.20000	5.0809	13.200	19.999	47.000	0.054986
	230.30303	390.15152	13.20000	5.0696	13.200	20.000	47.054	0.054911
	233.83838	391.91919	13.20000	5.0569	13.200	20.000	47.096	0.054854
	237.37374	393.68687	13.20000	5.0441	13.200	20.000	47.130	0.054807
	240.90909	395.45455	13.20000	5.0319	13.200	20.000	47.158	0.054769
	244.44444	397.22222	13.20000	5.0206	13.200	20.000	47.182	0.054736
	247.97980	398.98990	13.20000	5.0101	13.200	20.000	47.202	0.054707
	251.51515	400.75758	13.20000	5.0005	13.200	20.000	47.221	0.054682
	255.05051	402.52525	13.20000	4.9917	13.200	20.000	47.237	0.054660
	258.58586	404.29293	13.20000	4.9837	13.200	20.000	47.251	0.054640
	262.12121	406.06061	13.20000	4.9764	13.200	20.000	47.264	0.054623
	265.65657	407.82828	13.20000	4.9699	13.200	20.000	47.274	0.054608
	269.19192	409.59596	13.20000	4.9640	13.200	20.000	47.284	0.054595
	272.72727	411.36364	13.20000	4.9589	13.200	20.000	47.292	0.054584
	276.26263	413.13131	13.20000	4.9545	13.200	20.000	47.299	0.054574
	279.79798	414.89899	13.20000	4.9507	13.200	20.000	47.305	0.054565
	283.33333	416.66667	13.20000	4.9475	13.200	20.000	47.311	0.054558
	286.86869	418.43434	13.20000	4.9449	13.200	20.000	47.315	0.054552
	290.40404	420.20202	13.20000	4.9429	13.200	20.000	47.319	0.054546
	293.93939	421.96970	13.20000	4.9415	13.200	20.000	47.322	0.054542
	297.47475	423.73737	13.20000	4.9405	13.200	20.000	47.324	0.054539
	301.01010	425.50505	13.20000	4.9401	13.200	20.000	47.326	0.054536
	304.54545	427.27273	13.20000	4.9402	13.200	20.000	47.328	0.054534
	308.08081	429.04040	13.20000	4.9408	13.200	20.000	47.328	0.054533
	311.61616	430.80808	13.20000	4.9420	13.200	20.000	47.328	0.054533
	315.15152	432.57576	13.20000	4.9436	13.200	20.000	47.328	0.054534
	318.68687	434.34343	13.20000	4.9458	13.200	20.000	47.326	0.054536
	322.22222	436.11111	13.20000	4.9484	13.200	20.000	47.324	0.054539
	325.75758	437.87879	13.20000	4.9515	13.200	20.000	47.322	0.054543
	329.29293	439.64646	13.20000	4.9550	13.200	20.000	47.318	0.054548
	332.82828	441.41414	13.20000	4.9589	13.200	20.000	47.313	0.054555
	336.36364	443.18182	13.20000	4.9631	13.200	20.000	47.308	0.054562
	339.89899	444.94949	13.20000	4.9676	13.200	20.000	47.302	0.054570
	343.43434	446.71717	13.20000	4.9724	13.200	20.000	47.295	0.054579
	346.96970	448.48485	13.20000	4.9773	13.200	20.000	47.288	0.054589
	350.50505	450.25253	13.20000	4.9825	13.200	20.000	47.281	0.054599
	354.04040	452.02020	13.20000	4.9879	13.200	20.000	47.274	0.054609
	357.57576	453.78788	13.20000	4.9935	13.200	20.000	47.266	0.054619
	361.11111	455.55556	13.20000	4.9993	13.200	20.000	47.258	0.054631
	364.64646	457.32323	13.20000	5.0054	13.200	20.000	47.248	0.054644
	368.18182	459.09091	13.20000	5.0118	13.200	20.000	47.237	0.054660
	371.71717	460.85859	13.20000	5.0186	13.200	20.000	47.224	0.054678
	375.25253	462.62626	13.20000	5.0257	13.200	20.000	47.208	0.054700
	378.78788	464.39394	13.20000	5.0327	13.200	20.000	47.187	0.054729
	382.32323	466.16162	13.20000	5.0387	13.200	20.000	47.158	0.054768
	385.85859	467.92929	13.20000	5.0424	13.200	20.000	47.119	0.054822
	389.39394	469.69697	13.20000	5.0426	13.200	19.999	47.066	0.054893
	392.92929	471.46465	13.20000	5.0411	13.200	19.999	47.006	0.054973
	396.46465	473.23232	13.20000	5.0423	13.200	19.998	46.954	0.055044
	400.00000	475.00000	13.20000	5.0474	13.200	19.998	46.913	0.055100
	403.53535	476.76768	13.20000	5.0551	13.200	19.998	46.881	0.055144
	407.07071	478.53535	13.20000	5.0643	13.200	19.998	46.853	0.055181
	410.60606	480.30303	13.20000	5.0740	13.200	19.998	46.829	0.055216
	414.14141	482.07071	13.20000	5.0843	13.200	19.998	46.804	0.055249
	417.67677	483.83838	13.20000	5.0950	13.200	19.998	46.778	0.055285
	421.21212	485.60606	13.20000	5.1062	13.200	19.998	46.749	0.055326
	424.74747	487.37374	13.20000	5.1181	13.200	19.998	46.714	0.055374
	428.28283	489.14141	13.20000	5.1305	13.200	19.998	46.669	0.055435
	431.81818	490.90909	13.20000	5.1421	13.200	19.997	46.607	0.055520
	435.35354	492.67677	13.20000	5.1492	13.200	19.997	46.510	0.055649
	438.88889	494.44444	13.20000	5.1398	13.200	19.994	46.334	0.055877
	442.42424	496.21212	13.20000	5.0738	13.200	19.976	45.903	0.056370
	445.95960	497.97980	13.20000	4.7572	13.200	19.452	43.758	0.056193
	449.49495	499.74747	13.20000	3.9868	13.200	15.142	36.969	0.039710
	453.03030	501.51515	13.20000	3.8031	13.200	15.011	35.835	0.040497
	456.56566	503.28283	13.20000	3.7673	13.200	15.002	35.506	0.040900
	460.10101	505.05051	13.20000	3.7710	13.200	15.000	35.331	0.041131
	463.63636	506.81818	13.20000	3.7869	13.200	14.999	35.197	0.041311
	467.17172	508.58586	13.20000	3.8052	13.200	14.998	35.063	0.041491
	470.70707	510.35354	13.20000	3.8183	13.200	14.996	34.891	0.041717
	474.24242	512.12121	13.20000	3.8117	13.200	14.989	34.616	0.042057
	477.77778	513.88889	13.20000	3.7403	13.200	14.950	34.010	0.042658
	481.31313	515.65657	13.20000	3.4015	13.200	14.135	31.557	0.041164
	484.84848	517.42424	13.20000	2.6907	13.200	10.260	25.796	0.025874
	488.38384	519.19192	13.20000	2.4962	13.200	10.026	24.419	0.026376
	491.91919	520.95960	13.20000	2.4586	13.200	10.006	23.965	0.026887
	495.45455	522.72727	13.20000	2.4641	13.200	10.001	23.713	0.027208
	498.98990	524.49495	13.20000	2.4831	13.200	9.9994	23.522	0.027460
	502.52525	526.26263	13.20000	2.5041	13.200	9.9972	23.336	0.027705
	506.06061	528.03030	13.20000	2.5187	13.200	9.9931	23.110	0.027995
	509.59596	529.79798	13.20000	2.5104	13.200	9.9801	22.759	0.028402
	513.13131	531.56566	13.20000	2.4294	13.200	9.9074	22.017	0.028994
	516.66667	533.33333	13.20000	2.0735	13.200	8.8596	19.439	0.026274
	520.20202	535.10101	13.20000	1.4156	13.200	5.3894	14.484	0.012296
	523.73737	536.86869	13.20000	1.2094	13.200	5.0469	12.966	0.012343
	527.27273	538.63636	13.20000	1.1659	13.200	5.0118	12.423	0.012885
	530.80808	540.40404	13.20000	1.1687	13.200	5.0033	12.120	0.013255
	534.34343	542.17172	13.20000	1.1857	13.200	4.9995	11.893	0.013547
	537.87879	543.93939	13.20000	1.2043	13.200	4.9958	11.675	0.013826
	541.41414	545.70707	13.20000	1.2148	13.200	4.9887	11.412	0.014148

Name	Location X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ Stress [kN/m²]	Vert Strain [%]
	544.94949	547.47475	13.20000	1.1987	13.200	4.9668	11.009	0.014576
	548.48485	549.24242	13.20000	1.1018	13.200	4.8517	10.168	0.015050
	552.02020	551.01010	13.20000	0.72991	13.200	3.6361	7.5869	0.011325
	555.55556	552.77778	13.20000	0.11297	13.200	0.51847	3.2831	-0.0014367
	559.09091	554.54545	13.20000	-0.10968	13.200	0.075715	1.7171	-0.0019256
	562.62626	556.31313	13.20000	-0.16700	13.200	0.021572	1.1444	-0.0014569
	566.16162	558.08081	13.20000	-0.17518	13.200	0.0087900	0.85687	-0.0011351
	569.69697	559.84848	13.20000	-0.16745	13.200	0.0043963	0.68385	-921.61E-6
	573.23232	561.61616	13.20000	-0.15503	13.200	0.0025056	0.56780	-772.08E-6
	576.76768	563.38384	13.20000	-0.14196	13.200	0.0015622	0.48423	-661.90E-6
	580.30303	565.15152	13.20000	-0.12965	13.200	0.0010394	0.42100	-577.39E-6
	583.83838	566.91919	13.20000	-0.11853	13.200	726.80E-6	0.37139	-510.49E-6
	587.37374	568.68687	13.20000	-0.10864	13.200	528.17E-6	0.33138	-456.21E-6
	590.90909	570.45455	13.20000	-0.099892	13.200	395.70E-6	0.29839	-411.28E-6
	594.44444	572.22222	13.20000	-0.092156	13.200	304.28E-6	0.27073	-373.48E-6
	597.97980	573.98990	13.20000	-0.085297	13.200	239.09E-6	0.24719	-341.24E-6
	601.51515	575.75758	13.20000	-0.079195	13.200	190.73E-6	0.22691	-313.42E-6
	605.05051	577.52525	13.20000	-0.073745	13.200	154.97E-6	0.20928	-289.20E-6
	608.58586	579.29293	13.20000	-0.068857	13.200	127.40E-6	0.19381	-267.91E-6
	612.12121	581.06061	13.20000	-0.064456	13.200	105.87E-6	0.18013	-249.08E-6
	615.65657	582.82828	13.20000	-0.060478	13.200	89.034E-6	0.16795	-232.30E-6
	619.19192	584.59596	13.20000	-0.056868	13.200	75.623E-6	0.15705	-217.27E-6
	622.72727	586.36364	13.20000	-0.053581	13.200	64.075E-6	0.14724	-203.74E-6
	626.26263	588.13131	13.20000	-0.050579	13.200	55.432E-6	0.13837	-191.49E-6
	629.79798	589.89899	13.20000	-0.047828	13.200	48.131E-6	0.13032	-180.37E-6
	633.33333	591.66667	13.20000	-0.045299	13.200	41.872E-6	0.12297	-170.23E-6
	636.86869	593.43434	13.20000	-0.042970	13.200	36.806E-6	0.11626	-160.95E-6
	640.40404	595.20202	13.20000	-0.040818	13.200	32.187E-6	0.11009	-152.43E-6
	643.93939	596.96970	13.20000	-0.038825	13.200	28.759E-6	0.10442	-144.58E-6
	647.47475	598.73737	13.20000	-0.036975	13.200	25.481E-6	0.099180	-137.34E-6
	651.01010	600.50505	13.20000	-0.035256	13.200	22.724E-6	0.094334	-130.64E-6
	654.54545	602.27273	13.20000	-0.033653	13.200	20.042E-6	0.089838	-124.42E-6
	658.08081	604.04040	13.20000	-0.032157	13.200	18.254E-6	0.085659	-118.64E-6
	661.61616	605.80808	13.20000	-0.030757	13.200	16.615E-6	0.081767	-113.25E-6
	665.15152	607.57576	13.20000	-0.029446	13.200	15.125E-6	0.078133	-108.22E-6
	668.68687	609.34343	13.20000	-0.028216	13.200	13.411E-6	0.074735	-103.52E-6
	672.22222	611.11111	13.20000	-0.027061	13.200	11.921E-6	0.071554	-99.123E-6
	675.75758	612.87879	13.20000	-0.025973	13.200	11.101E-6	0.068568	-94.989E-6
	679.29293	614.64646	13.20000	-0.024949	13.200	10.431E-6	0.065764	-91.106E-6
	682.82828	616.41414	13.20000	-0.023982	13.200	9.3877E-6	0.063125	-87.453E-6
	686.36364	618.18182	13.20000	-0.023069	13.200	8.4192E-6	0.060639	-84.013E-6
	689.89899	619.94949	13.20000	-0.022206	13.200	7.7486E-6	0.058294	-80.766E-6
	693.43434	621.71717	13.20000	-0.021389	13.200	7.2271E-6	0.056078	-77.698E-6
	696.96970	623.48485	13.20000	-0.020614	13.200	6.8545E-6	0.053983	-74.796E-6
	700.50505	625.25253	13.20000	-0.019880	13.200	6.0350E-6	0.052000	-72.051E-6
	704.04040	627.02020	13.20000	-0.019182	13.200	5.9605E-6	0.050121	-69.447E-6
	707.57576	628.78788	13.20000	-0.018519	13.200	4.9919E-6	0.048338	-66.981E-6
	711.11111	630.55556	13.20000	-0.017888	13.200	4.6939E-6	0.046646	-64.637E-6
	714.64646	632.32323	13.20000	-0.017288	13.200	5.0664E-6	0.045038	-62.406E-6
	718.18182	634.09091	13.20000	-0.016715	13.200	4.4703E-6	0.043507	-60.286E-6
	721.71717	635.85859	13.20000	-0.016170	13.200	3.8743E-6	0.042049	-58.269E-6
	725.25253	637.62626	13.20000	-0.015649	13.200	3.6508E-6	0.040660	-56.345E-6
	728.78788	639.39394	13.20000	-0.015152	13.200	3.7998E-6	0.039337	-54.510E-6
	732.32323	641.16162	13.20000	-0.014677	13.200	3.5018E-6	0.038073	-52.760E-6
	735.85859	642.92929	13.20000	-0.014223	13.200	3.3528E-6	0.036866	-51.087E-6
	739.39394	644.69697	13.20000	-0.013788	13.200	3.1292E-6	0.035713	-49.490E-6
	742.92929	646.46465	13.20000	-0.013371	13.200	2.6822E-6	0.034610	-47.963E-6
	746.46465	648.23232	13.20000	-0.012973	13.200	2.3097E-6	0.033554	-46.502E-6
	750.00000	650.00000	13.20000	-0.012590	13.200	2.5332E-6	0.032544	-45.100E-6
X-Section	200.00000	600.00000	18.80000	-0.051227	18.617	0.0	0.0	0.0
	202.00000	596.00000	18.80000	-0.054201	18.617	0.0	0.0	0.0
	204.00000	592.00000	18.80000	-0.057432	18.617	0.0	0.0	0.0
	206.00000	588.00000	18.80000	-0.060950	18.617	0.0	0.0	0.0
	208.00000	584.00000	18.80000	-0.064791	18.617	0.0	0.0	0.0
	210.00000	580.00000	18.80000	-0.068998	18.617	0.0	0.0	0.0
	212.00000	576.00000	18.80000	-0.073619	18.617	0.0	0.0	0.0
	214.00000	572.00000	18.80000	-0.078714	18.617	0.0	0.0	0.0
	216.00000	568.00000	18.80000	-0.084352	18.617	0.0	0.0	0.0
	218.00000	564.00000	18.80000	-0.090617	18.617	0.0	0.0	0.0
	220.00000	560.00000	18.80000	-0.097608	18.617	0.0	0.0	0.0
	222.00000	556.00000	18.80000	-0.10545	18.617	0.0	0.0	0.0
	224.00000	552.00000	18.80000	-0.11428	18.617	0.0	0.0	0.0
	226.00000	548.00000	18.80000	-0.12429	18.617	0.0	0.0	0.0
	228.00000	544.00000	18.80000	-0.13567	18.617	0.0	0.0	0.0
	230.00000	540.00000	18.80000	-0.14869	18.617	0.0	0.0	0.0
	232.00000	536.00000	18.80000	-0.16358	18.617	0.0	0.0	0.0
	234.00000	532.00000	18.80000	-0.18058	18.617	0.0	0.0	0.0
	236.00000	528.00000	18.80000	-0.19963	18.617	0.0	0.0	0.0
	238.00000	524.00000	18.80000	-0.21993	18.617	0.0	0.0	0.0
	240.00000	520.00000	18.80000	-0.23820	18.617	0.0	0.0	0.0
	242.00000	516.00000	18.80000	-0.24361	18.617	0.0	0.0	0.0
	244.00000	512.00000	18.80000	-0.19923	18.617	0.0	0.0	0.0
	246.00000	508.00000	18.80000	0.055764	18.617	0.0	0.0	0.0
	248.00000	504.00000	18.80000	1.1491	18.617	0.0	0.0	0.0
	250.00000	500.00000	18.80000	1.4471	18.617	0.0	0.0	0.0
	252.00000	496.00000	18.80000	1.4959	18.617	0.0	0.0	0.0
	254.00000	492.00000	18.80000	1.4940	18.617	0.0	0.0	0.0
	256.00000	488.00000	18.80000	1.5099	18.617	0.0	0.0	0.0
	258.00000	484.00000	18.80000	1.6631	18.617	0.0	0.0	0.0
	260.00000	480.00000	18.80000	2.6709	18.617	0.0	0.0	0.0
	262.00000	476.00000	18.80000	3.0721	18.617	0.0	0.0	0.0
	264.00000	472.00000	18.80000	3.1276	18.617	0.0	0.0	0.0
	266.00000	468.00000	18.80000	3.1181	18.617	0.0	0.0	0.0
	268.00000	464.00000	18.80000	3.1136	18.617	0.0	0.0	0.0
	270.00000	460.00000	18.80000	3.1997	18.617	0.0	0.0	0.0
	272.00000	456.00000	18.80000	3.9312	18.617	0.0	0.0	0.0
	274.00000	452.00000	18.80000	4.5388	18.617	0.0	0.0	0.0
	276.00000	448.00000	18.80000	4.6106	18.617	0.0	0.0	0.0
	278.00000	444.00000	18.80000	4.5992	18.617	0.0	0.0	0.0
	280.00000	440.00000	18.80000	4.5815	18.617	0.0	0.0	0.0
	282.00000	436.00000	18.80000	4.6226	18.617	0.0	0.0	0.0
	284.00000	432.00000	18.80000	5.0296	18.617	0.0	0.0	0.0
	286.00000	428.00000	18.80000	5.9113	18.617	0.0	0.0	0.0
	288.00000	424.00000	18.80000	6.0133	18.617	0.0	0.0	0.0
	290.00000	420.00000	18.80000	6.0294	18.617	0.0	0.0	0.0
	292.00000	416.00000	18.80000	6.1129	18.617	0.0	0.0	0.0
	294.00000	412.00000	18.80000	6.9471	18.617	0.0	0.0	0.0
	296.00000	408.00000	18.80000	7.4179	18.617	0.0	0.0	0.0
	298.00000	404.00000	18.80000	7.6341	18.617	0.0	0.0	0.0
	300.00000	400.00000	18.80000	8.6295	18.617	0.0	0.0	0.0
	302.00000	396.00000	18.80000	8.8294	18.617	0.0	0.0	0.0
	304.00000	392.00000	18.80000	8.8468	18.617	0.0	0.0	0.0
	306.00000	388.00000	18.80000	8.8453	18.617	0.0	0.0	0.0
	308.00000	384.00000	18.80000	8.9130	18.617	0.0	0.0	0.0
	310.00000	380.00000	18.80000	9.6951	18.617	0.0	0.0	0.0
	312.00000	376.00000	18.80000	10.112	18.617	0.0	0.0	0.0
	314.00000	372.00000	18.80000	10.166	18.617	0.0	0.0	0.0
	316.00000	368.00000	18.80000	10.165	18.617	0.0	0.0	0.0
	318.00000	364.00000	18.80000	10.155	18.617	0.0	0.0	0.0
	320.00000	360.00000	18.80000	10.145	18.617	0.0	0.0	0.0
	322.00000	356.00000	18.80000	10.138	18.617	0.0	0.0	0.0
	324.00000	352.00000	18.80000	10.135	18.617	0.0	0.0	0.0
	326.00000	348.00000	18.80000	10.131	18.617	0.0	0.0	0.0
	328.00000	344.00000	18.80000	10.116	18.617	0.0	0.0	0.0
	330.00000	340.00000	18.80000	10.046	18.617	0.0	0.0	0.0
	332.00000	336.00000	18.80000	9.6120	18.617	0.0	0.0	0.0
	334.00000	332.00000	18.80000	8.8080	18.617	0.0	0.0	0.0
	336.00000	328.00000	18.80000	8.7198	18.617	0.0	0.0	0.0
	338.00000	324.00000	18.80000	8.7086	18.617	0.0	0.0	0.0
	340.00000	320.00000	18.80000	8.7168	18.617	0.0	0.0	0.0
	342.00000	316.00000	18.80000	8.7304	18.617	0.0	0.0	0.0
	344.00000	312.00000	18.80000	8.7457	18.617	0.0	0.0	0.0
	346.00000	308.00000	18.80000	8.7598	18.617	0.0	0.0	0.0
	348.00000	304.00000	18.80000	8.7650	18.617	0.0	0.0	0.0
	350.00000	300.00000	18.80000	8.7321	18.617	0.0	0.0	0.0
	352.00000	296.00000	18.80000	8.5150	18.617	0.0	0.0	0.0
	354.00000	292.00000	18.80000	7.5159	18.617	0.0	0.0	0.0
	356.00000	288.00000	18.80000	7.3590	18.617	0.0	0.0	0.0
	358.00000	284.00000	18.80000	7.3399	18.617	0.0	0.0	0.0
	360.00000	280.00000	18.80000	7.3525	18.617	0.0	0.0	0.0
	362.00000	276.00000	18.80000	7.3736	18.617	0.0	0.0	0.0

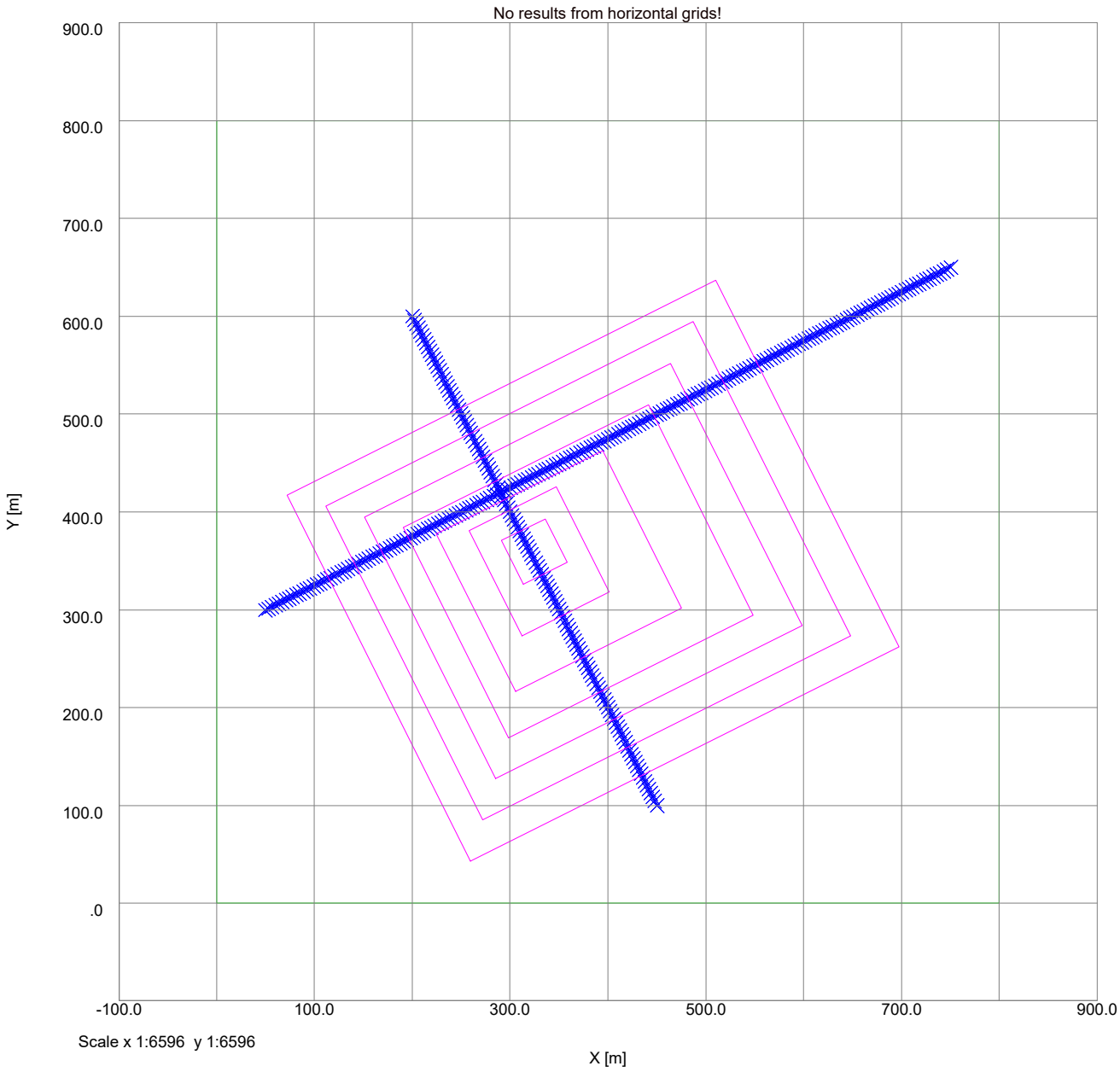
Former Hamble Airfield, Hamble-le-Rice

Ground Movement Assessment - Network Rail Assets

Estimated Ground Movements - Load Scenario 01

Name	Location X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Stresses Sum Princ [kN/m²]	Stresses Vert Strain [%]
	364.00000	272.00000	18.80000	7.3970	18.617	0.0	0.0	0.0
	366.00000	268.00000	18.80000	7.4205	18.617	0.0	0.0	0.0
	368.00000	264.00000	18.80000	7.4406	18.617	0.0	0.0	0.0
	370.00000	260.00000	18.80000	7.4452	18.617	0.0	0.0	0.0
	372.00000	256.00000	18.80000	7.3866	18.617	0.0	0.0	0.0
	374.00000	252.00000	18.80000	6.9415	18.617	0.0	0.0	0.0
	376.00000	248.00000	18.80000	6.0927	18.617	0.0	0.0	0.0
	378.00000	244.00000	18.80000	5.9991	18.617	0.0	0.0	0.0
	380.00000	240.00000	18.80000	5.9996	18.617	0.0	0.0	0.0
	382.00000	236.00000	18.80000	6.0239	18.617	0.0	0.0	0.0
	384.00000	232.00000	18.80000	6.0532	18.617	0.0	0.0	0.0
	386.00000	228.00000	18.80000	6.0773	18.617	0.0	0.0	0.0
	388.00000	224.00000	18.80000	6.0755	18.617	0.0	0.0	0.0
	390.00000	220.00000	18.80000	5.9672	18.617	0.0	0.0	0.0
	392.00000	216.00000	18.80000	5.0807	18.617	0.0	0.0	0.0
	394.00000	212.00000	18.80000	4.6509	18.617	0.0	0.0	0.0
	396.00000	208.00000	18.80000	4.5980	18.617	0.0	0.0	0.0
	398.00000	204.00000	18.80000	4.6109	18.617	0.0	0.0	0.0
	400.00000	200.00000	18.80000	4.6355	18.617	0.0	0.0	0.0
	402.00000	196.00000	18.80000	4.6425	18.617	0.0	0.0	0.0
	404.00000	192.00000	18.80000	4.5648	18.617	0.0	0.0	0.0
	406.00000	188.00000	18.80000	3.9670	18.617	0.0	0.0	0.0
	408.00000	184.00000	18.80000	3.2109	18.617	0.0	0.0	0.0
	410.00000	180.00000	18.80000	3.1173	18.617	0.0	0.0	0.0
	412.00000	176.00000	18.80000	3.1207	18.617	0.0	0.0	0.0
	414.00000	172.00000	18.80000	3.1441	18.617	0.0	0.0	0.0
	416.00000	168.00000	18.80000	3.1550	18.617	0.0	0.0	0.0
	418.00000	164.00000	18.80000	3.0972	18.617	0.0	0.0	0.0
	420.00000	160.00000	18.80000	2.7005	18.617	0.0	0.0	0.0
	422.00000	156.00000	18.80000	1.6808	18.617	0.0	0.0	0.0
	424.00000	152.00000	18.80000	1.5209	18.617	0.0	0.0	0.0
	426.00000	148.00000	18.80000	1.5055	18.617	0.0	0.0	0.0
	428.00000	144.00000	18.80000	1.5212	18.617	0.0	0.0	0.0
	430.00000	140.00000	18.80000	1.5295	18.617	0.0	0.0	0.0
	432.00000	136.00000	18.80000	1.4809	18.617	0.0	0.0	0.0
	434.00000	132.00000	18.80000	1.1867	18.617	0.0	0.0	0.0
	436.00000	128.00000	18.80000	0.088812	18.617	0.0	0.0	0.0
	438.00000	124.00000	18.80000	-0.17513	18.617	0.0	0.0	0.0
	440.00000	120.00000	18.80000	-0.22343	18.617	0.0	0.0	0.0
	442.00000	116.00000	18.80000	-0.22065	18.617	0.0	0.0	0.0
	444.00000	112.00000	18.80000	-0.20443	18.617	0.0	0.0	0.0
	446.00000	108.00000	18.80000	-0.18582	18.617	0.0	0.0	0.0
	448.00000	104.00000	18.80000	-0.16819	18.617	0.0	0.0	0.0
	450.00000	100.00000	18.80000	-0.15243	18.617	0.0	0.0	0.0
X-Section2	200.00000	600.00000	13.20000	-0.050116	13.200	31.367E-6	0.12955	-179.40E-6
	202.00000	596.00000	13.20000	-0.053022	13.200	35.465E-6	0.13738	-190.24E-6
	204.00000	592.00000	13.20000	-0.056178	13.200	40.978E-6	0.14593	-202.06E-6
	206.00000	588.00000	13.20000	-0.059613	13.200	47.088E-6	0.15530	-215.01E-6
	208.00000	584.00000	13.20000	-0.063364	13.200	53.942E-6	0.16560	-229.24E-6
	210.00000	580.00000	13.20000	-0.067471	13.200	63.106E-6	0.17696	-244.93E-6
	212.00000	576.00000	13.20000	-0.071981	13.200	73.612E-6	0.18954	-262.32E-6
	214.00000	572.00000	13.20000	-0.076952	13.200	87.470E-6	0.20356	-281.67E-6
	216.00000	568.00000	13.20000	-0.082451	13.200	104.46E-6	0.21925	-303.32E-6
	218.00000	564.00000	13.20000	-0.088559	13.200	126.96E-6	0.23692	-327.68E-6
	220.00000	560.00000	13.20000	-0.095371	13.200	155.05E-6	0.25696	-355.29E-6
	222.00000	556.00000	13.20000	-0.10300	13.200	192.82E-6	0.27988	-386.84E-6
	224.00000	552.00000	13.20000	-0.11160	13.200	244.30E-6	0.30633	-423.20E-6
	226.00000	548.00000	13.20000	-0.12133	13.200	316.05E-6	0.33720	-465.56E-6
	228.00000	544.00000	13.20000	-0.13238	13.200	418.95E-6	0.37374	-515.59E-6
	230.00000	540.00000	13.20000	-0.14499	13.200	573.92E-6	0.41769	-575.59E-6
	232.00000	536.00000	13.20000	-0.15940	13.200	817.55E-6	0.47168	-648.98E-6
	234.00000	532.00000	13.20000	-0.17576	13.200	0.0012267	0.53983	-741.00E-6
	236.00000	528.00000	13.20000	-0.19400	13.200	0.0019696	0.62900	-860.14E-6
	238.00000	524.00000	13.20000	-0.21316	13.200	0.0034808	0.75165	-0.0010211
	240.00000	520.00000	13.20000	-0.22977	13.200	0.0070880	0.93330	-0.0012512
	242.00000	516.00000	13.20000	-0.23253	13.200	0.018139	1.2357	-0.0016041
	244.00000	512.00000	13.20000	-0.18341	13.200	0.070440	1.8545	-0.0021477
	246.00000	508.00000	13.20000	0.071055	13.200	0.62854	3.7246	-0.0013876
	248.00000	504.00000	13.20000	0.76630	13.200	4.1794	8.6727	0.013084
	250.00000	500.00000	13.20000	1.0584	13.200	4.9187	10.851	0.014505
	252.00000	496.00000	13.20000	1.1129	13.200	4.9836	11.621	0.013827
	254.00000	492.00000	13.20000	1.1153	13.200	5.0011	12.132	0.013225
	256.00000	488.00000	13.20000	1.1358	13.200	5.0271	12.735	0.012544
	258.00000	484.00000	13.20000	1.2954	13.200	5.2502	14.129	0.011953
	260.00000	480.00000	13.20000	1.9751	13.200	8.7343	19.386	0.025594
	262.00000	476.00000	13.20000	2.3563	13.200	9.9228	22.325	0.028660
	264.00000	472.00000	13.20000	2.4171	13.200	9.9857	23.144	0.027903
	266.00000	468.00000	13.20000	2.4110	13.200	9.9980	23.614	0.027324
	268.00000	464.00000	13.20000	2.4097	13.200	10.009	24.094	0.026727
	270.00000	460.00000	13.20000	2.5010	13.200	10.082	25.037	0.025858
	272.00000	456.00000	13.20000	3.0827	13.200	12.751	29.797	0.035292
	274.00000	452.00000	13.20000	3.6070	13.200	14.930	34.044	0.042494
	276.00000	448.00000	13.20000	3.6834	13.200	14.989	34.891	0.041677
	278.00000	444.00000	13.20000	3.6744	13.200	14.998	35.304	0.041154
	280.00000	440.00000	13.20000	3.6588	13.200	15.002	35.670	0.040672
	282.00000	436.00000	13.20000	3.7029	13.200	15.022	36.281	0.039944
	284.00000	432.00000	13.20000	4.1042	13.200	16.099	39.516	0.041930
	286.00000	428.00000	13.20000	4.8193	13.200	19.941	45.964	0.056072
	288.00000	424.00000	13.20000	4.9250	13.200	19.994	46.870	0.055133
	290.00000	420.00000	13.20000	4.9431	13.200	20.000	47.318	0.054547
	292.00000	416.00000	13.20000	5.0290	13.200	20.015	47.988	0.053713
	294.00000	412.00000	13.20000	5.7524	13.200	23.965	55.081	0.067606
	296.00000	408.00000	13.20000	6.2217	13.200	24.992	58.587	0.068916
	298.00000	404.00000	13.20000	6.4400	13.200	25.006	59.437	0.067819
	300.00000	400.00000	13.20000	7.3792	13.200	29.980	69.874	0.083234
	302.00000	396.00000	13.20000	7.5807	13.200	29.999	70.671	0.082242
	304.00000	392.00000	13.20000	7.5985	13.200	30.000	70.858	0.081986
	306.00000	388.00000	13.20000	7.5973	13.200	30.000	70.956	0.081852
	308.00000	384.00000	13.20000	7.6653	13.200	30.000	71.019	0.081765
	310.00000	380.00000	13.20000	8.4476	13.200	30.000	71.064	0.081702
	312.00000	376.00000	13.20000	8.8646	13.200	30.000	71.098	0.081655
	314.00000	372.00000	13.20000	8.9183	13.200	30.000	71.125	0.081618
	316.00000	368.00000	13.20000	8.9181	13.200	30.000	71.146	0.081589
	318.00000	364.00000	13.20000	8.9078	13.200	30.000	71.163	0.081565
	320.00000	360.00000	13.20000	8.8981	13.200	30.000	71.177	0.081546
	322.00000	356.00000	13.20000	8.8915	13.200	30.000	71.188	0.081530
	324.00000	352.00000	13.20000	8.8878	13.200	30.000	71.197	0.081517
	326.00000	348.00000	13.20000	8.8842	13.200	30.000	71.204	0.081508
	328.00000	344.00000	13.20000	8.8693	13.200	30.000	71.209	0.081501
	330.00000	340.00000	13.20000	8.7992	13.200	30.000	71.213	0.081496
	332.00000	336.00000	13.20000	8.3652	13.200	30.000	71.214	0.081494
	334.00000	332.00000	13.20000	7.5612	13.200	30.000	71.214	0.081495
	336.00000	328.00000	13.20000	7.4730	13.200	30.000	71.211	0.081498
	338.00000	324.00000	13.20000	7.4618	13.200	30.000	71.207	0.081505
	340.00000	320.00000	13.20000	7.4700	13.200	30.000	71.199	0.081516
	342.00000	316.00000	13.20000	7.4836	13.200	30.000	71.186	0.081533
	344.00000	312.00000	13.20000	7.4988	13.200	30.000	71.167	0.081559
	346.00000	308.00000	13.20000	7.5129	13.200	30.000	71.137	0.081602
	348.00000	304.00000	13.20000	7.5180	13.200	30.000	71.081	0.081678
	350.00000	300.00000	13.20000	7.4848	13.200	29.999	70.952	0.081855
	352.00000	296.00000	13.20000	7.2666	13.200	29.981	70.245	0.082724
	354.00000	292.00000	13.20000	6.3242	13.200	25.007	59.961	0.067101
	356.00000	288.00000	13.20000	6.1665	13.200	25.000	59.495	0.067707
	358.00000	284.00000	13.20000	6.1472	13.200	25.000	59.376	0.067870
	360.00000	280.00000	13.20000	6.1596	13.200	25.000	59.310	0.067960
	362.00000	276.00000	13.20000	6.1805	13.200	25.000	59.259	0.068031
	364.00000	272.00000	13.20000	6.2038	13.200	25.000	59.208	0.068102
	366.00000	268.00000	13.20000	6.2271	13.200	25.000	59.146	0.068186
	368.00000	264.00000	13.20000	6.2469	13.200	25.000	59.060	0.068304
	370.00000	260.00000	13.20000	6.2509	13.200	24.999	58.912	0.068504
	372.00000	256.00000	13.20000	6.1911	13.200	24.992	58.542	0.068977
	374.00000	252.00000	13.20000	5.7473	13.200	24.006	55.238	0.067633
	376.00000	248.00000	13.20000	5.0103	13.200	20.016	48.193	0.053435
	378.00000	244.00000	13.20000	4.9149	13.200	20.002	47.652	0.054095
	380.00000	240.00000	13.20000	4.9147	13.200	20.000	47.449	0.054369
	382.00000	236.00000	13.20000	4.9384	13.200	20.000	47.311	0.054557
	384.00000	232.00000	13.20000	4.9670	13.200	19.999	47.178	0.054739
	386.00000	228.00000	13.20000	4.9903	13.200	19.998	47.009	0.054966
	388.00000	224.00000	13.20000	4.9871	13.200	19.994	46.721	0.055338
	390.00000	220.00000	13.20000	4.8753	13.200	19.943	45.907	0.056161
	392.00000	216.00000	13.20000	4.1543	13.200	16.158	39.587	0.042188

Name	Location				Stresses			
	X	Y	Z[Level]	Z	Calc Level	Vert Stress	Sum Princ	Vert Strain
	[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[%]
	394.00000	212.00000	13.20000	3.7318	13.200	15.023	36.319	0.039896
	396.00000	208.00000	13.20000	3.6762	13.200	15.003	35.754	0.040561
	398.00000	204.00000	13.20000	3.6875	13.200	15.000	35.462	0.040946
	400.00000	200.00000	13.20000	3.7106	13.200	14.997	35.201	0.041292
	402.00000	196.00000	13.20000	3.7153	13.200	14.990	34.845	0.041741
	404.00000	192.00000	13.20000	3.6334	13.200	14.932	34.046	0.042504
	406.00000	188.00000	13.20000	3.1101	13.200	12.828	29.908	0.035601
	408.00000	184.00000	13.20000	2.5130	13.200	10.085	25.106	0.025780
	410.00000	180.00000	13.20000	2.4145	13.200	10.011	24.195	0.026595
	412.00000	176.00000	13.20000	2.4151	13.200	10.001	23.785	0.027106
	414.00000	172.00000	13.20000	2.4362	13.200	9.9961	23.459	0.027528
	416.00000	168.00000	13.20000	2.4442	13.200	9.9854	23.061	0.028016
	418.00000	164.00000	13.20000	2.3813	13.200	9.9246	22.293	0.028715
	420.00000	160.00000	13.20000	2.0028	13.200	8.7829	19.443	0.025807
	422.00000	156.00000	13.20000	1.3135	13.200	5.2597	14.179	0.011941
	424.00000	152.00000	13.20000	1.1476	13.200	5.0292	12.805	0.012461
	426.00000	148.00000	13.20000	1.1281	13.200	5.0051	12.263	0.013067
	428.00000	144.00000	13.20000	1.1407	13.200	4.9961	11.883	0.013540
	430.00000	140.00000	13.20000	1.1454	13.200	4.9821	11.465	0.014034
	432.00000	136.00000	13.20000	1.0915	13.200	4.9199	10.750	0.014653
	434.00000	132.00000	13.20000	0.80237	13.200	4.2087	8.6379	0.013308
	436.00000	128.00000	13.20000	0.10310	13.200	0.65159	3.7019	-0.0012177
	438.00000	124.00000	13.20000	-0.15962	13.200	0.071919	1.8105	-0.0020778
	440.00000	120.00000	13.20000	-0.21262	13.200	0.018323	1.1938	-0.0015449
	442.00000	116.00000	13.20000	-0.21247	13.200	0.0071061	0.89621	-0.0011997
	444.00000	112.00000	13.20000	-0.19788	13.200	0.0034689	0.71911	-976.06E-6
	446.00000	108.00000	13.20000	-0.18037	13.200	0.0019532	0.60038	-820.56E-6
	448.00000	104.00000	13.20000	-0.16354	13.200	0.0012115	0.51454	-706.02E-6
	450.00000	100.00000	13.20000	-0.14839	13.200	804.89E-6	0.44921	-617.90E-6


No results from horizontal grids!
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
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Y [m]
-100.0
100.0
300.0
500.0
700.0
900.0
X [m]
Scale x 1:6596 y 1:6596