Basement Impact Assessment
33 ½ Mill Lane, London NW6 1NZ

Geotechnical Interpretative Report and Ground Movement Assessment

June 2022

MAUND GEO-CONSULTING

Produced for:
Croft Structural Engineers Ltd

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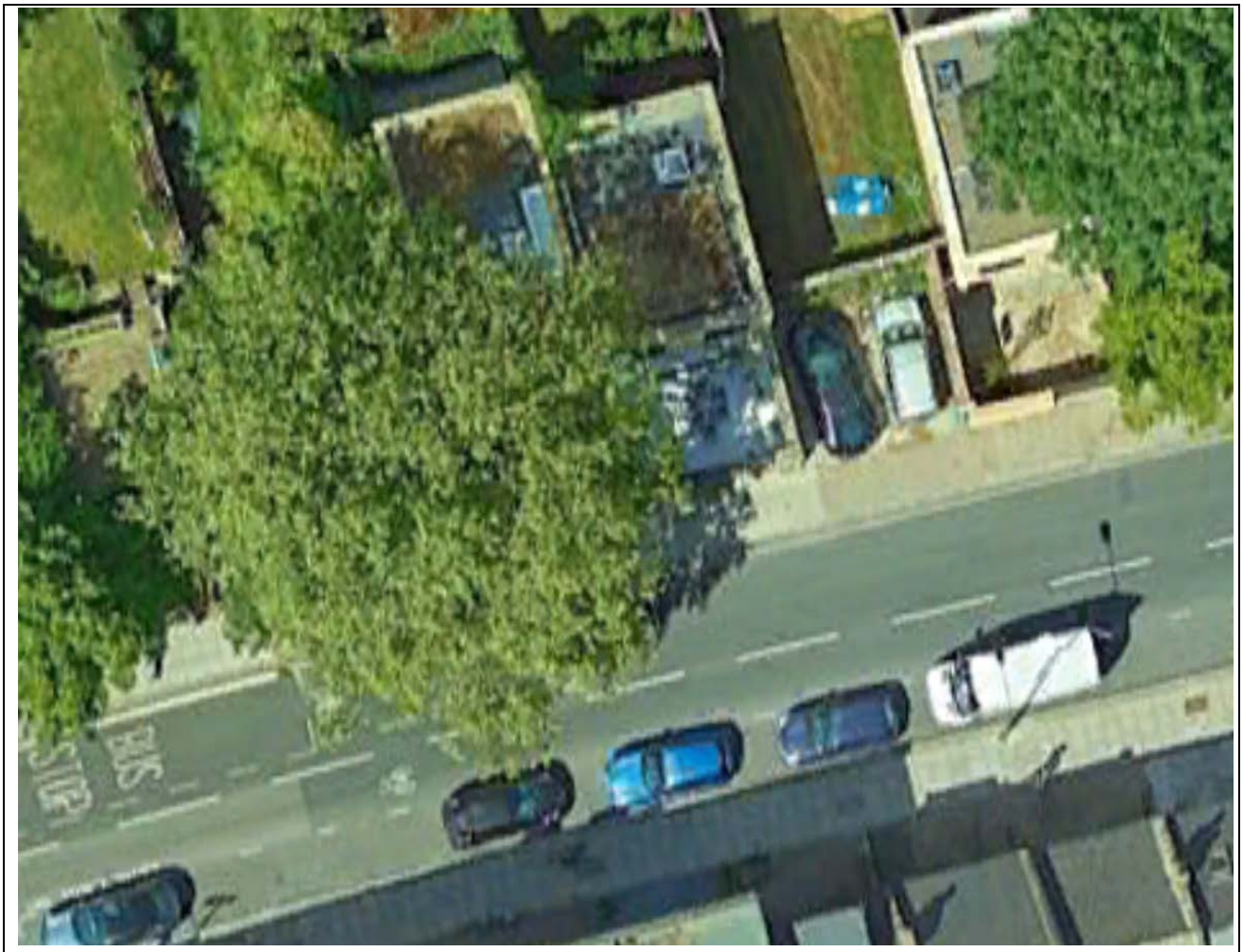

Report Title	Basement Impact Assessment	Site Address	33 ½ Mill Lane, London NW6 1NZ
Work Stage	Geotechnical Interpretative Report and Ground Movement Assessment	Report Date	June 2022
Brief Description of the Report Contents	Geotechnical interpretation of the ground and groundwater conditions, to provide a ground movement assessment, as part of a Basement Impact Assessment for 33 ½ Mill Lane.		

Document Control Sheet

Project Title	33 ½ Mill Lane, London NW6 1NZ
Report Title	Basement Impact Assessment - Geotechnical Interpretative Report and Ground Movement Assessment
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Record of Issue

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V4	Reviewed by Campbell Reith	14/06/22	Julian Maund BSc PhD CEng MIMMM CGeol FGS Registered Ground Engineering Adviser	

Distribution

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The Basement Design Studio	M. Wiseman

Contents

1 Non-Technical Summary

A basement impact assessment (BIA) has been undertaken for hydrogeology and land stability in general accordance with CPG Basement 2021, for the site at 33 ½ Mill Lane, London NW6 1NZ, in the London Borough of Camden.

The proposed basement is located at a detached house but situated in very close proximity 33 G Mill Lane. The proposed basement will occupy an area of approximately 45 m^2.

The BIA report considered relevant information from existing sources included in the 'Guidance for subterranean development' produced by Arup for the London Borough of Camden' (November 2010), historical maps and BGS records.

A ground investigation at the site was undertaken by Maund Geo-Consulting Ltd in November 2021 which comprised one borehole. The borehole (BH01) was drilled to 5.45 m below ground level (bgl).

The ground investigation confirmed the ground conditions as a reinforced concrete foundation or slab to a depth of approximately 0.65m which overlies firm to stiff silty clay of the London Clay Formation to a depth of at least 5.45 m bgl. Groundwater was encountered during the ground investigation to a depth of 2.75 m bgl. Subsequent monitoring after the investigation indicated groundwater in an installation to 0.75m bgl (approx. 62.25 m AOD). However, it is considered this may represent trapped water below the concrete slab and London Clay, rather than genuine groundwater

An assessment of hydrogeology has shown that the strata underlying site is considered non-productive strata of very low permeability and is not designated as an aquifer within Environment Agency (EA) guidelines. The proposed basement will have a negligible impact on groundwater flow.

An assessment of land stability has been made from the excavation and construction of the basement. It has been calculated that heave in the centre of the basement is not expected to exceed 8 mm resulting from the excavation and construction. The foundation formation will be able to accommodate a maximum load from the walls of 65 kPa, acting from a thickened perimeter slab, with net settlement of < 25 mm. The proposed basement will have a negligible impact on land stability.

The maximum damage category for the adjacent properties has been calculated to be within Category 1 (very slight damage) for the adjacent 33G Mill Lane.

An appropriate monitoring regime should be adopted and maintained throughout construction to manage risk and potential damage to the neighbouring structures as construction progresses onsite.

2 Introduction

2.1 Terms of Reference

Maund Geo-Consulting Ltd (MGC) was instructed on 01/10/21 by Croft Structural Engineers Ltd (Croft) to undertake a Basement Impact Assessment (BIA) for the site at 33 ½ Mill Lane, London NW6 1NZ, following on from a ground investigation, which was also undertaken by MGC, on 13/10/21 and 01/11/21, and reported in a factual report referenced MGC-FR-21-51 issued on 12/11/2021.

2.2 Terms and Conditions

This report has been prepared for Croft in consideration of the proposed further development of the site. The geotechnical information relates to the site only and should not be used in a different context without reference to MGC.

MGC has used reasonable skill, care and diligence in the investigation, calculations and design recommendations for the project. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths at the time of the investigation. At intermediate locations, conditions can only be inferred. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

2.3 Scope and Objective

The scope and objective of the report is as follows:

- An assessment of land stability and hydrogeological risks associated with the proposed development,
- An assessment of the ground conditions at the site and derivation of geotechnical parameters to be used in a ground movement assessment (GMA),
- Modelling of the ground movement in relation to the additional imposed loads from the proposed basement in general accordance with CIRIA C760,
- Determination of the Burland Damage Assessment Category.

2.4 Author

This report has been prepared by Dr Julian Maund, director of Maund Geo Consulting Ltd, who is a chartered engineer and chartered geologist with over 35 years' experience. Dr Maund has undertaken BIAs for LB Camden since 2012. Dr Maund is a UK and Ireland Registered Ground Engineering Adviser (RoGEP) and a member of the Association of Geotechnical and Geoenvironmental Specialists.

2.5 Sources of Information

Background information has been derived from the ground investigation report by MGC and sources of published information.

The list of information sources is shown below in Table 1.1:

Table 1.1 Information type and sources

Information Type	Source
Geological mapping	GHHS / BGS /Groundsure
Hydrogeological data	GHHS / BGS / EA /Groundsure
Surface water	GHHS / EA
Ground and groundwater conditions	Geotechnical Factual Report 33 ½ Mill Lane, MGC-FR-21-51, 12/11/2021
Historical Mapping	Groundsure
Environmental designations	Groundsure / EA
Structural Drawings	Croft Structural Engineers
Pre app Scheme Drawings	Basement Design Studio

GHHS - Camden geological hydrogeological and hydrological study- Arup 2010
BSG - British Geological Survey
EA - Environment Agency

Relevant scheme drawings are included in Appendix A. Historical maps are included in Appendix C.

3 Information on the Site

3.1 Location

33 ½ Mill Lane is located in West Hampstead, within the London Borough of Camden. The ground level is approximately 63.50 m AOD at the front of the property.

3.2 Description

The current building is a residential dwelling of two storeys above ground level. The front elevation is indicated in Figure 2.1. There is a small gap between 33 ½ and the neigbour No. 33G. No. 33 ½ is understood to have been constucted in 2014 after the construction of 33G.

Figure 3.1 Front Elevation from Street View (2019).

3.3 Present use

A residential dwelling.

3.4 Proposed development

The proposed development is understood to provide a full basement to the property. Drawings to show the house and proposed basement are included in Appendix A.

3.5 Geology

Geological information obtained from http://mapapps.bgs.ac.uk/geologyofbritain3d/ British Geological Survey (BGS) mapping at 1 50 000 scale shows the site to be directly underlain by the London Clay Formation (LFC), which comprises a predominantly silty clay formed during the Tertiary period.

3.6 Natural Hazards

The assessment of natural hazards is summarised in Table 3.1.

Table 3.1 Natural Hazards

Natural Hazard	Risk (Stated by BGS)	Comment
Natural ground subsidence	Low	Not applicable to the geology of the site.
Shrink-Swell	Moderate	The site is underlain by the London Clay Formation (LFC) which comprises plasticity clays. This material has potential shrink swell properties.
Landslide	Very Low	Not applicable to the site geology/topography
Soluble Rock	Negligible	Not applicable to the site geology
Compressible Ground	Negligible	Clay soil of the LCF is subject to consolidation from additional imposed loads, which are limited by appropriate foundation design
Collapsible deposits	Very Low	Not applicable to the site geology
Running Sand	Very Low	Not applicable to the site geology
Radon	<1%	No Radon protection measures are necessary

3.7 Hydrogeology/groundwater

The property is located on the bedrock geology of the LCF which is classified as an 'unproductive stratum' which is effectively impermeable. The site does not lie within a ground water protection zone.

3.8 Surface Water and Flood risk

The site is located in Flood Zone 1, an area with a low probability of flooding from rivers. The Environment Agency indicate there is a very low risk of surface water flooding at the subject property as indicated in Figure 3.2.

Figure 3.2 Extent of flooding from surface water

Figure 15 of the GHHS indicates Mill Lane experienced flooding in 2002 as indicated in Figure 3.3 below, with the site location added. However, it is noted that 33 ½ is located on the north side of Mill Lane, and the ground slopes to the south from 63.1 m AOD in centre of Mill Lane, to 58.2m AOD in Dornfell Street about 50m to the south, as shown in Figure 3.4 with a slope

of about 1 in 13 (5^0) therefore the flooding is unlikely to have impacted properties on the north side of Mill Lane.

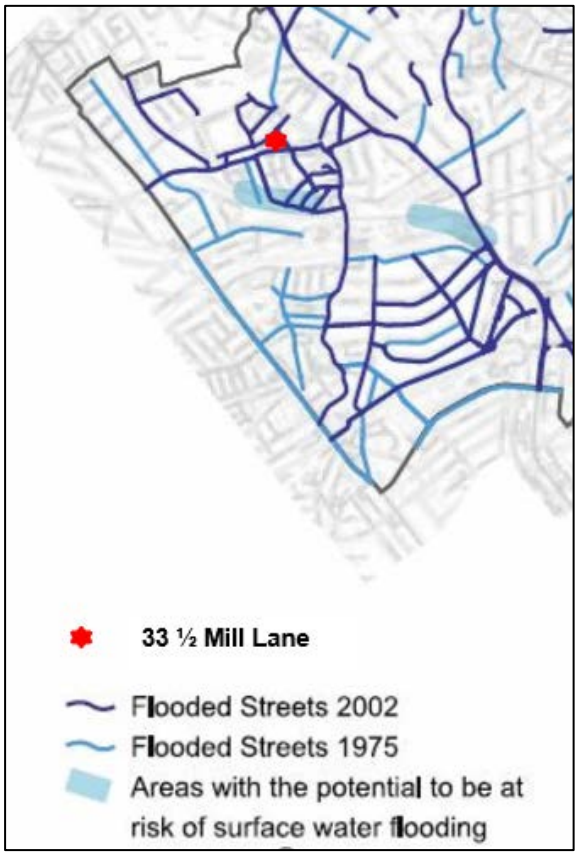


Figure 3.3 GHHS Fig. 15 annotated with site location

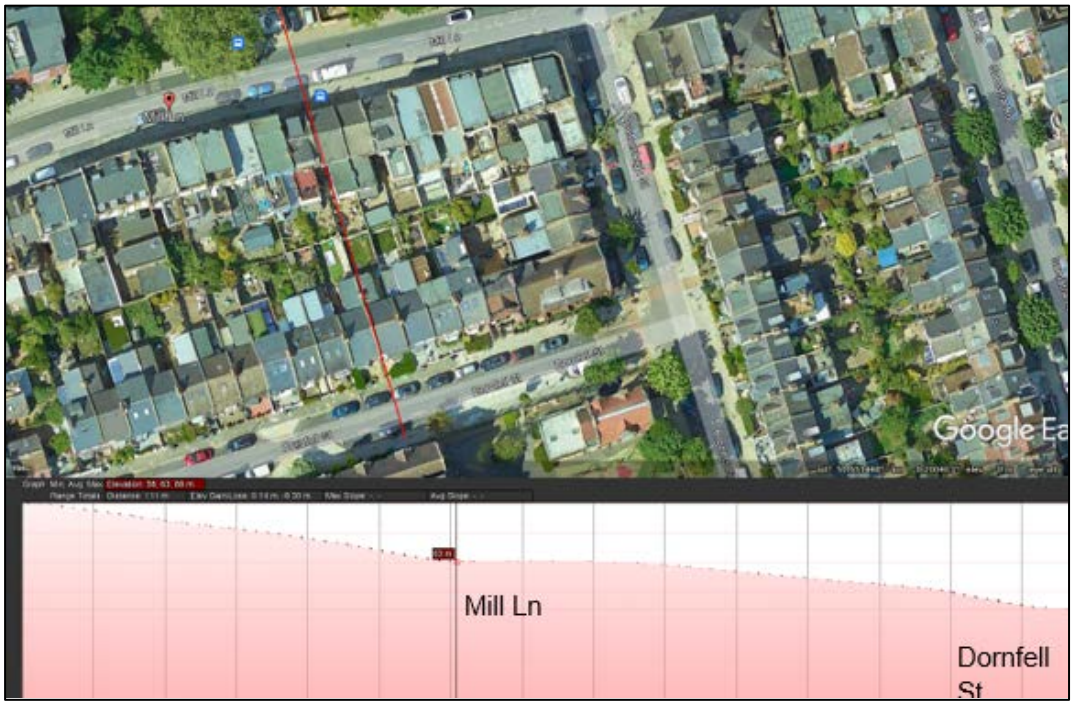


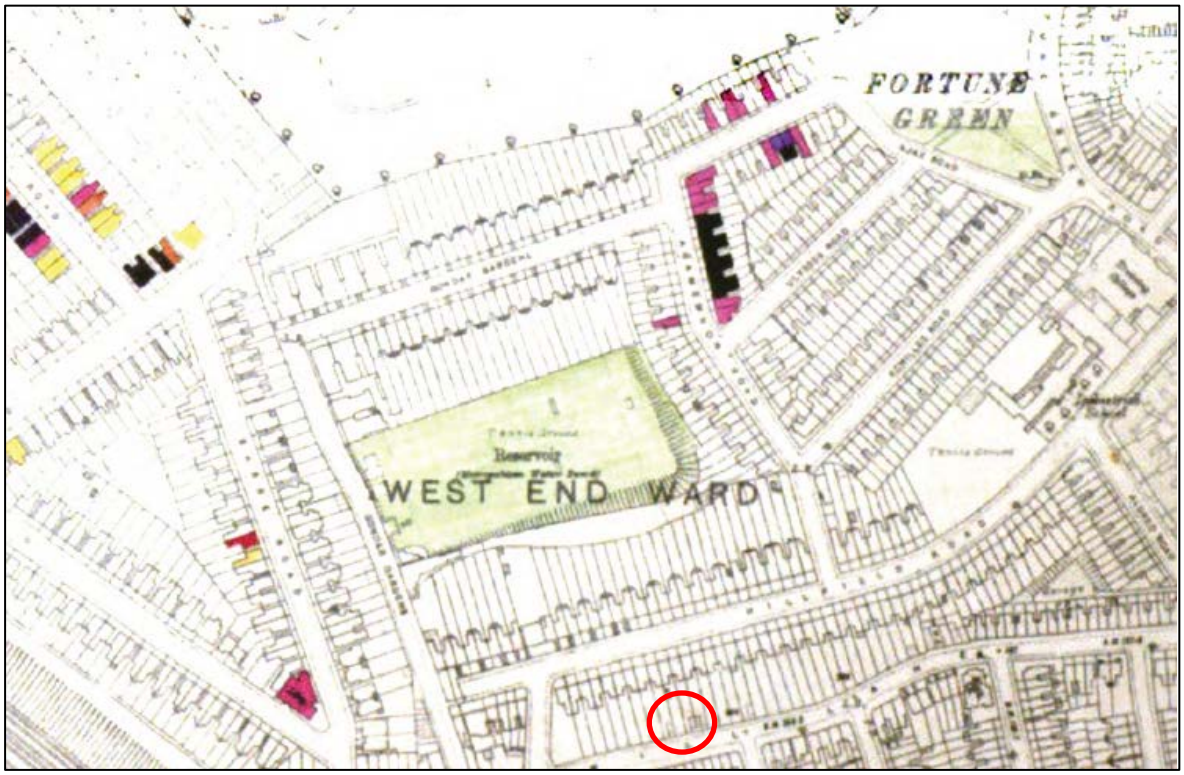
Figure 3.4 Ground profile at 33 ½ Mill Lane (Google Earth)

3.9 Site History

The property and the surrounding area are shown as fully developed with residential properties since the earliest available mapping of 1865. Selected maps at mostly 1:1,250 scale are included in Appendix C. The site is agricultural land on the 1873 1:10,560 survey. Mill Lane and Hillfield Rd are shown as first developed with housing on the 1896 1:1056 survey. The site of 33 ½ is within the rear garden of a property fronting Hillfield Rd. The site is occupied by an irregular shaped building on the 1953 1:1250 survey, which is no longer shown on the 1970-74 1:1,250 to 2003 surveys. It is understood the current building was constructed in the mid 2000's. Relevant historical surveys are included in Appendix C.

The historical development of the site is significant as the ground investigation encountered a substantial concrete slab which may have been part of the building shown on the 1953 survey.

A review of LCC Bomb damage maps 1939 to 1945 show the property or the immediate neighbourhood was not affected by bombing.



Key:
Black Total Destruction
Purple: Damage beyond repair
Dark red: Seriously damaged – repair doubtful
Light red: Seriously damaged – repairable at cost
Orange: General blast damage – not structural
Yellow: Blast damage – minor in nature

Figure 3.3 Bomb locations from WWII

4 Ground Investigation

A ground investigation was undertaken by PM Sampling Ltd on behalf of MGC on 13/10/21 and 01/11/21. The factual information of the exploratory hole record and laboratory testing results are included in a factual report in Appendix B.

The site investigation comprised:

- 1 No. cored hole through concrete to 0.65m
- 1 No cored hole through concrete to 0.25m
- 1 No. Window sampler borehole to 5.45 m bgl.
- The in-situ strengths determined by standard penetration testing
- Disturbed soil samples were obtained from the exploratory holes for laboratory geotechnical testing and further examination.
- A 19 mm diameter groundwater monitoring well was installed to 5.0 m The location of the exploratory hole is shown in Figure 4.1.

During the ground investigation concrete was encountered below a surface pavement of ceramic tiles. An attempt was initially made to progress through the concrete using a hydraulic breaker. When it was clear the concrete was potentially extensive, of an unknown depth a diamond bit 200mm diameter concrete corer was utilised. The corer has a maximum depth of 400mm. On reaching the extent of the corer the concrete depth had not been obtained. The corer was extracted, and the drilling was halted. The drillers returned to the site on 01/11/21 to break out the core stub and continue coring from a depth of 400mm bgl. At a depth of approximately 600mm steel reinforcement bars were encountered preventing further coring as the corer jammed on the rebar.

Due to concern about completing the borehole a second borehole (BH02) was attempted where it was hoped concrete was less thick. The concrete corer was used from ground level through the ceramic tiles to a depth of 250mm. However, progress was very slow below 200mm depth as the concrete was disintegrating during the coring clogging the bit. As the core hole was only 150mm diameter using a breaker was very restrictive. It was decided to have a further attempt at BH01.

Utilising the breaker at BH01 it was possible to prove the base of the concrete at 650mm depth. It was then possible to use dynamic sampler tubes to complete the borehole to a depth of 5.45m. Photographs of the borehole are included in Appendix A

Insitu SPT’s were undertaken at 0.65m, 1.50, 2.50, 3.50, 4.50 and 5.00m. The factual information of the exploratory holes records is included in Appendix A and laboratory testing results are included in Appendix B.

Figure 4.1 Exploratory Hole Locations

4.1 Laboratory Testing

Laboratory tests to determine the geotechnical and contaminative properties of the soil were scheduled by MGC and carried out by i2 Laboratories Ltd, generally in accordance with BS1377:1990 and UKAS. The tests are indicated in Table 4.1.

Table 4.1 Laboratory Testing

Test type	No. of tests	Test Method
Moisture Content	5	BS1377:1990
Plasticity Index - 1 point Liquid Limit	5	BS1377:1990
pH, and water-soluble sulphate,	2	BRE SD1
WAC Full Solid Suite	1	ISO 17025

The laboratory test reports are included in Appendix B.

4.2 Groundwater Monitoring

The groundwater level was monitored in the borehole installation on completion of drilling where groundwater was encountered at approximately 2.5m bgl. A groundwater monitoring installation was installed to 5.00m. The installation comprised a gravel pack from 5.00 to 1.00m depth with a slotted pipe from 5.00 to 1.00m and solid pipe in bentonite to ground level -0.1m. The pipe had a rubber bung sealing the top and was protected by a stock cock cover.

A ceramic tile was placed over the installation. The results of the monitoring shown in Table 4.1.

Table 4.1 Groundwater Monitoring

Date of Monitoring	Groundwater (depth metres below ground level)
01/11/21	groundwater encountered during drilling at approximately 2.50 m bgl
01/11/21	2.50 m bgl
09/11/21	0.75 m bgl

5 Ground Conditions

5.1 Stratigraphy

The ground conditions encountered are summarised in Table 5.1 below. For a full description refer to the exploratory record in Appendix B.

Table 5.1 Summary of ground conditions

Stratum	Description	Depth at top of Strata (mbgl)	Approx. level (m AOD)	Thickness of Stratum (m)	N100 Values
Made Ground	Ceramic tile over concrete. The concrete had reinforcement bars from 0.60 to 0.63m depth	0	63.5	0.65	n/a
London Clay Formation	Firm to stiff brown to grey silty CLAY with fine sand partings and occasional selenite crystals	0.65	62.85	4.80 (proven)	9-25

5.2 Groundwater

Groundwater was encountered during drilling at approximately 2.50m bgl on 01/11/2021. Subsequent monitoring on 09/11/21 indicated groundwater at a depth of 0.75m bgl (approx. 62.75m). It is considered that the groundwater represents perched water trapped between the concrete slab/foundation and the London Clay Formation, as the London Clay generally has low permeability.

5.3 Consideration of the individual stratum, with reference to the basement.

The anticipated level of the basement excavation will be approximately 3.35m below existing ground level at the subject property at circa 60.15 m AOD at the front of the property. The excavation will be in the London Clay Formation.

An overall ground model is illustrated in the conceptual model in Section 8.2 below.

5.3.1 Made Ground

Made ground comprised concrete which had reinforcement at its base between 0.60 and 0.63m bgl. The concrete may represent a foundation and appeared to be laid directly on the London Clay Formation.

5.3.2 London Clay Formation (LCF))

The LCF is firm becoming stiff brown to mottled grey, silty clay. The SPT N values show a gradual increase from 9 at 1.00 m depth to 25 at 5.00m. The LCF is likely to extend to a greater depth as a very stiff over consolidated clay. The SPT N plot is shown n Figure 5.1.

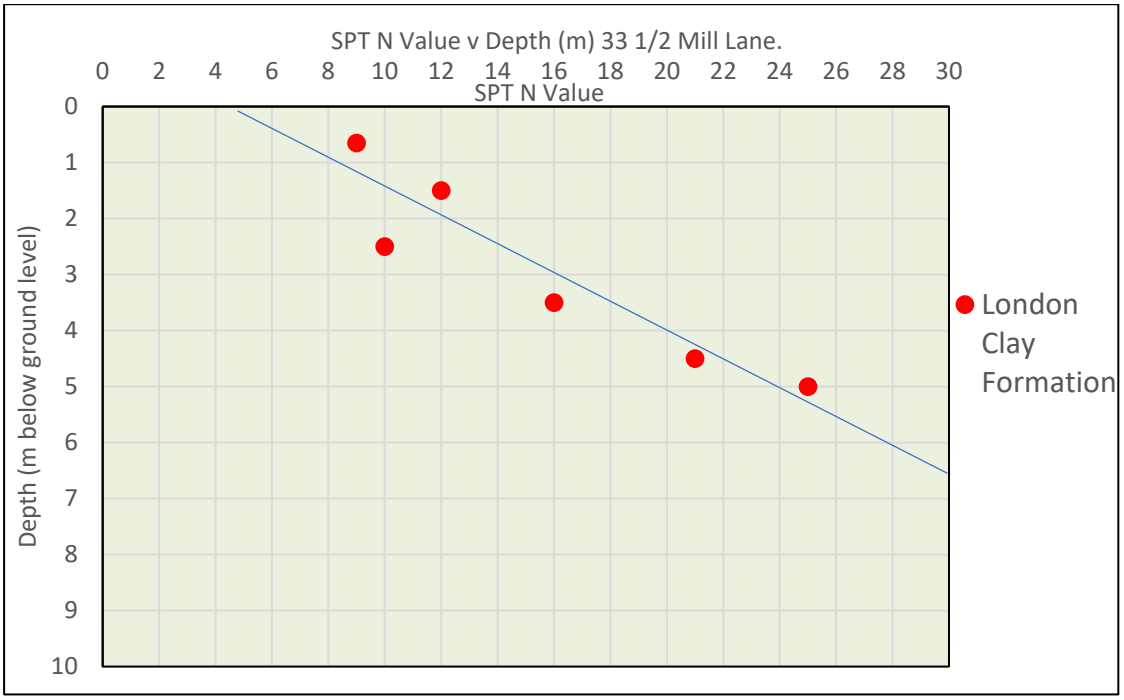


Figure 5.1 SPT N value against depth

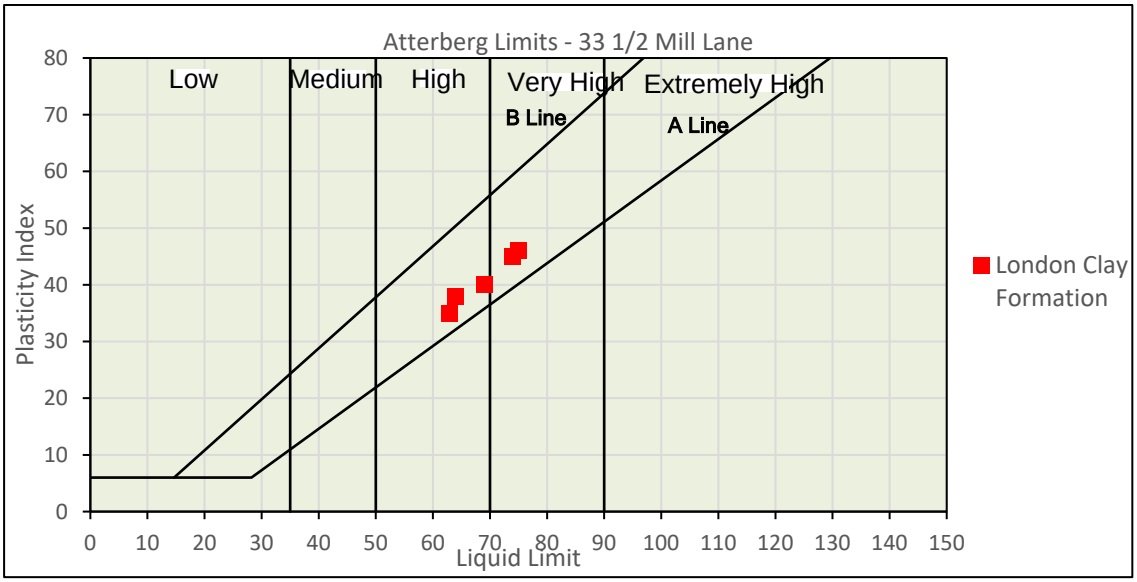


Figure 5.2 Atterberg Chart

Five Atterberg Limit tests showed a mean plasticity index of 40% and a mean liquid limit of 68%, indicating a clay of high plasticity, characteristic of the LCF as shown in Figure 5.2. Using the relationship between SPT N value and plasticity (Stroud and Butler 1975), with an f1 of 4.5 an equivalent undrained shear strength (c_u) is extrapolated to range from 41 kPa at 1.00m to 113.0 kPa at 5.00m. C_u = 15z+25, where z is depth in metres.

The deformation moduli (E_u and E') of the LCF has been cautiously estimated from the relationship between undrained cohesion for an axial strain of 0.1% and plasticity of the LCF where E_u is based on a PI of 40% and an OCR >4 giving an E_u/C_u ~ 400 (after Jamiolkowski et al. 1979). and E' is 0.75 Eu after Burland, Standing J.R., and Jardine F.M. (eds.) (2001). Poisson Ratio is taken as v_u = 0.5 undrained and v' = 0.2 drained.

As there is a clear linear relationship of SPT and C_u with depth, the corresponding E_u / E' is assessed to increase linearly with depth from ~16.4/ 12.3 MPa at 0.65m bgl to 45/34 MPa at 5.00 m AOD. These parameters have been used for purposes of settlement / heave modelling in Section 6.

The characteristic values of geotechnical parameters are a cautious estimate based on the data obtained from the ground investigation (Appendix B) have been summarised in Table 5.2 as follows:

Table 5.2 Geotechnical Design Parameters

	Design Level	plasticity Index	Undrained Cohesion	Effective angle of shearing resistance	Bulk unit weight	Deformation Modulus E_u (E')	K_a	K_p
Strata	**m bgl**		**Cu (kPa)**	**MPa**	**kN/m^3**	**MPa**		
London Clay Formation	0.8	42	(15z+25)	22*	20*	7z +10** (5.25z+7.5)	0.46	2.3

Notes:
*BS8004 2015
**E_u is based on 400 C_u. (Jamiolkowski et al. 1979). E' based on 0.75E_u. (Burland, Standing J.R., and Jardine F.M. (eds.) 2001).
Active and Passive pressure coefficients k_a and k_p from BS EN 1997-1 Annex C
The parameters in Table 4.2 are unfactored (Serviceability Limit State) and considered to be 'a cautious estimate.'
Groundwater is assumed to be at circa 0.75m bgl or ~62.75 m AOD but see comment in Section 8.1.

6 Geotechnical Assessment of Ground Conditions

6.1 Introduction

The information obtained from the ground investigation on the soil conditions in relation to the proposed basement construction has been assessed for impacts on existing building structures. The principal impacts are ground movements from the installation and excavation for the basement. These movements are vertical and horizontal movements of the foundation formation level from isostatic readjustment from the excavation and possible vertical and horizontal impacts of existing structures from the basement wall construction.

6.2 Presumed Bearing Resistance

The foundation formation level of the basement will be at approximately 60.15 m AOD or 3.35 m below ground level at the front of the house. At the formation level an undrained shear strength of the soil (Assumed LCF) has been evaluated as 70 kPa.

Wall loads have been calculated by Croft Structural Engineers to be approximately a maximum 65 kPa below the wall adjacent to No. 33G Mill Lane.

In consideration of net loading allowing for the removal of 3.35 m of soil of 67 kPa (based on a unit weight of 20 kN/m^3) below the ground floor. This gives a net loading of up to -2 kPa below the existing building.

A net foundation load of -2 kPa can be accommodated by the indicated shear strength of 70 kPa without significant (<25 mm) settlement or heave. The actual ground movement will however be determined from the net effect from the removal of soil during the basement excavation causing heave and the subsequent effect of construction which is considered in Section 10.

6.3 Effect of Heave from soil excavation

The proposed basement will require the excavation from the exiting basement level of approximately 63.5 m AOD to approximately 60.15 m AOD (3.35 m depth). For purposes of this assessment, it is assumed the unit weight of the soil (γ_k) to be removed is 20 kN/m^3 giving an overall negative load of 67 kPa.

Dimensions of the excavation is based on the drawings included Appendix A.

The ground model is based on the ground conditions assessment in Section 5. The effects of short term un-drained and long term drained conditions have been considered cumulatively, which is a conservative assessment as a worst case. The long and cross sections in Figures 6.1 and 6.2 have been drawing to intersect the greatest movement contours from the PDisp plot.

The heave has been evaluated using PDisp version 20.0.23, which shows a maximum heave of up to – 4.6 mm[1] under short term undrained conditions as shown in Figures 6.1, 6.3 and 6.4 below in which location of adjacent property 33G is diagrammatically indicated. Long term drained conditions are shown in Figure 6.2, 6.5 & 6.6 where up to 3.3 mm settlement was determined, where foundation loads are more significant than heave. As can be seen from Figures 6.3 and 6.4 the short term displacement becomes less than -2.4 mm at the boundary with 33 G Mill Lane, reducing to less than 1 mm within this property. Similarly, long term movements reduce range from 0.25mm settlement at the boundary of 33G . The combined movements are discussed further in Section 10 and 11.

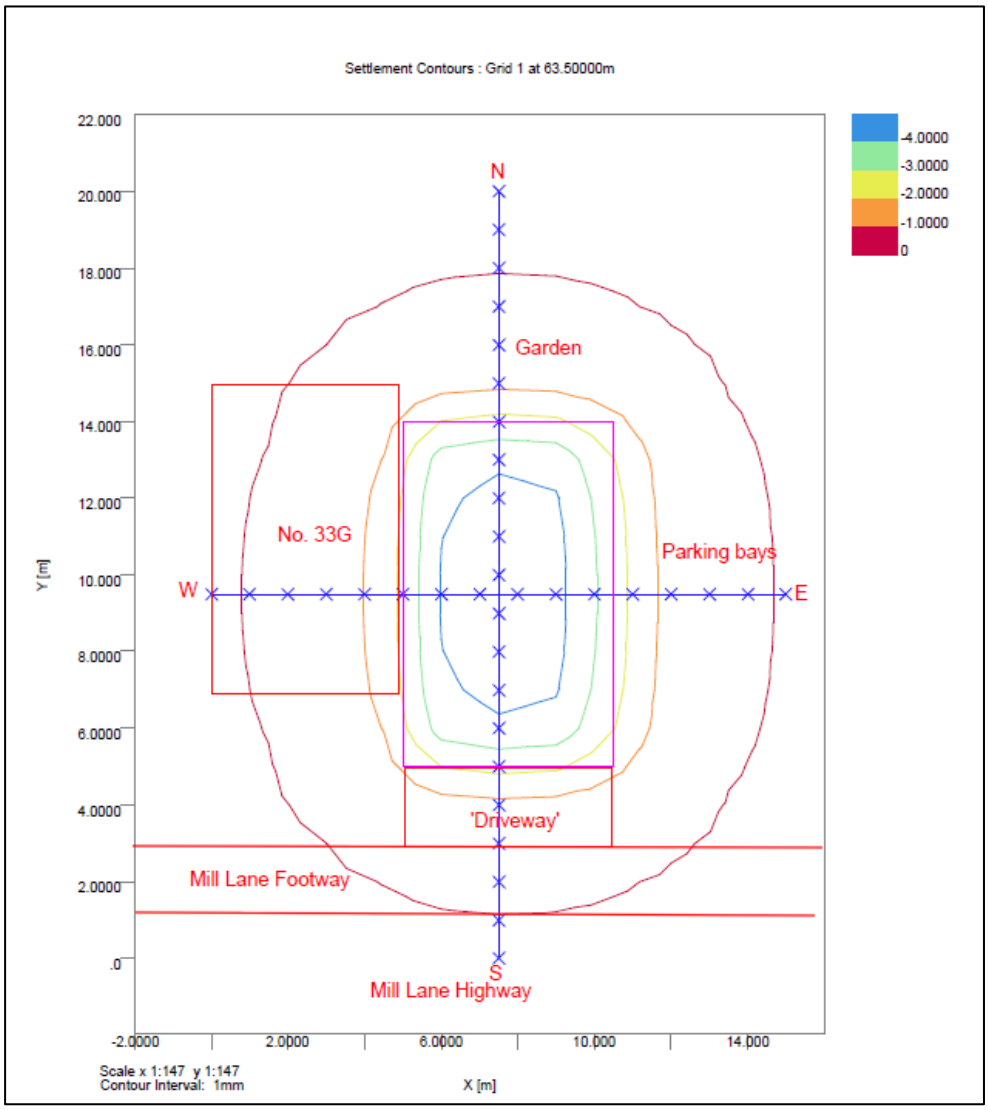


Figure 6.1 Heave- short term undrained condition

[1] Note that heave is stated as a negative number in PDisp, but is a positive number in the Ground Movement Assessment in Section 9

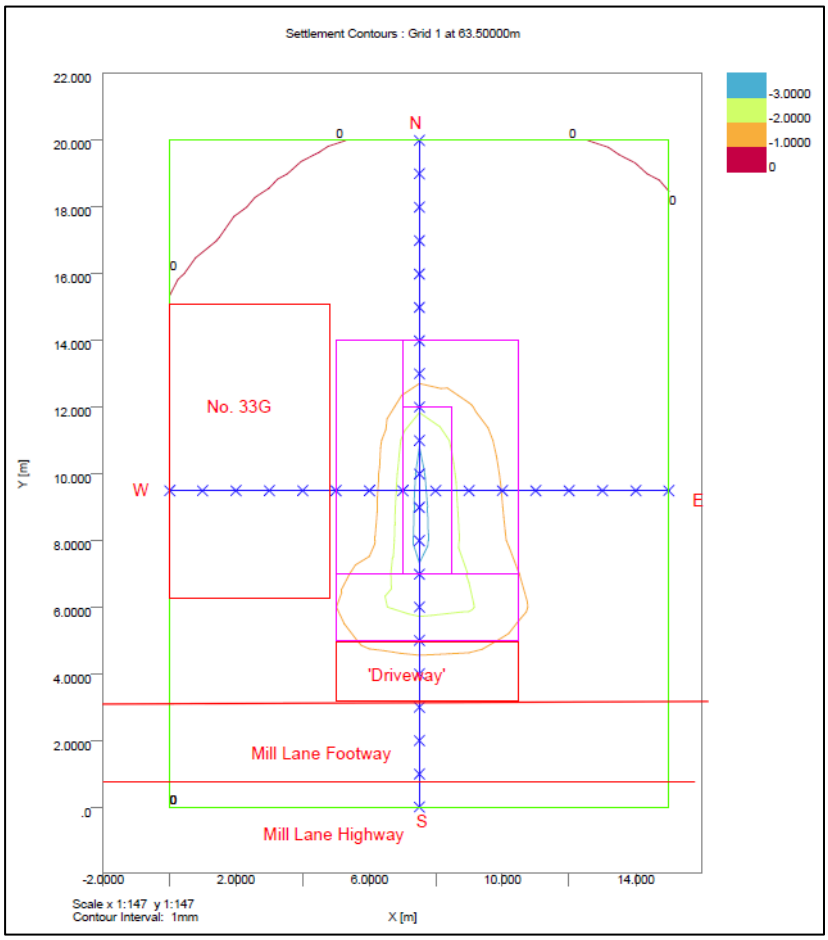


Figure 6.2 Heave- long term drained condition

Cross sections of the effects of the basement excavation and construction are shown in Figures 6.3 to 6.6, in which the boundary with 33G Mill Lane is diagrammatically indicated. These models have been used as a basis for the ground movement assessment and damage assessment in Section 9 and 10 respectively.

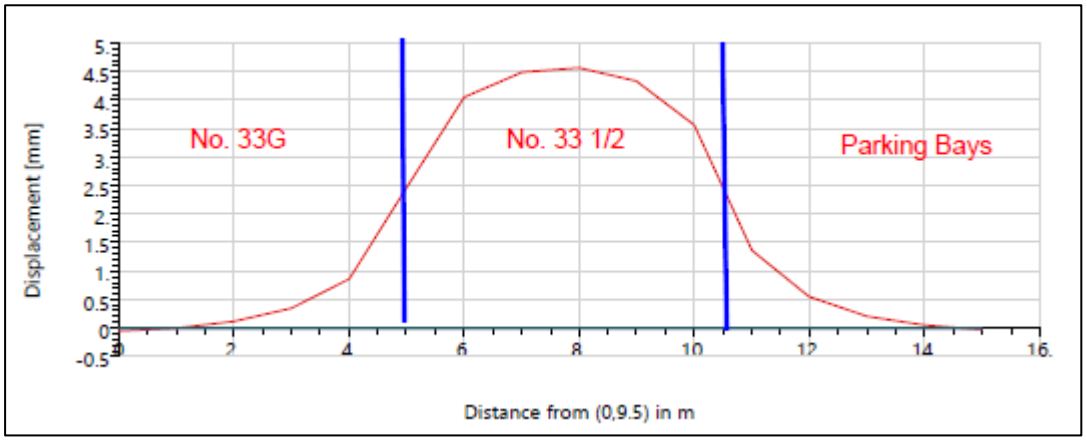


Figure 6.3 Heave- short term undrained condition in excavation- Section W - E

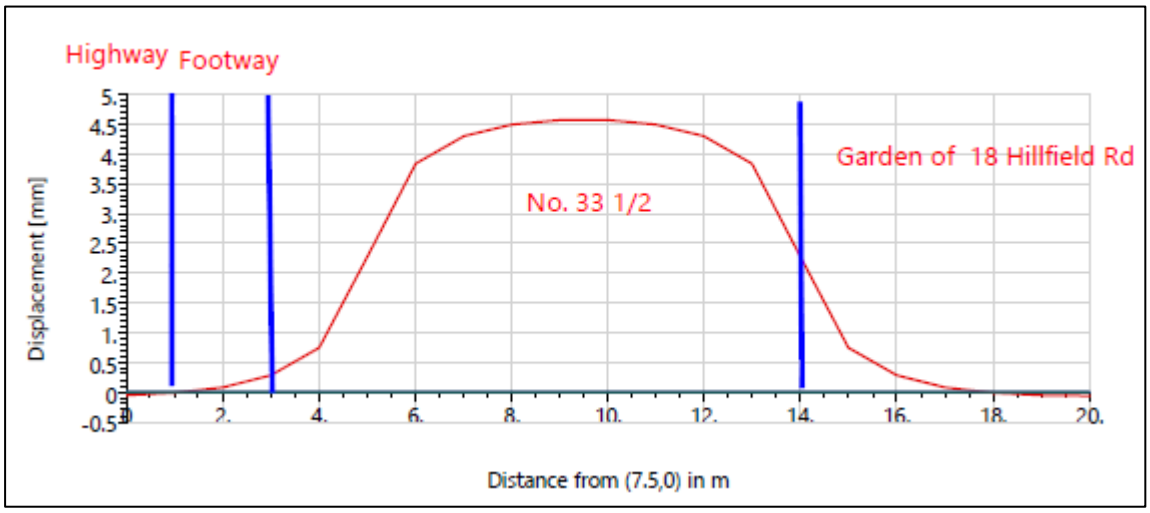


Figure 6.4 Heave- short term undrained condition in excavation- Section S - N

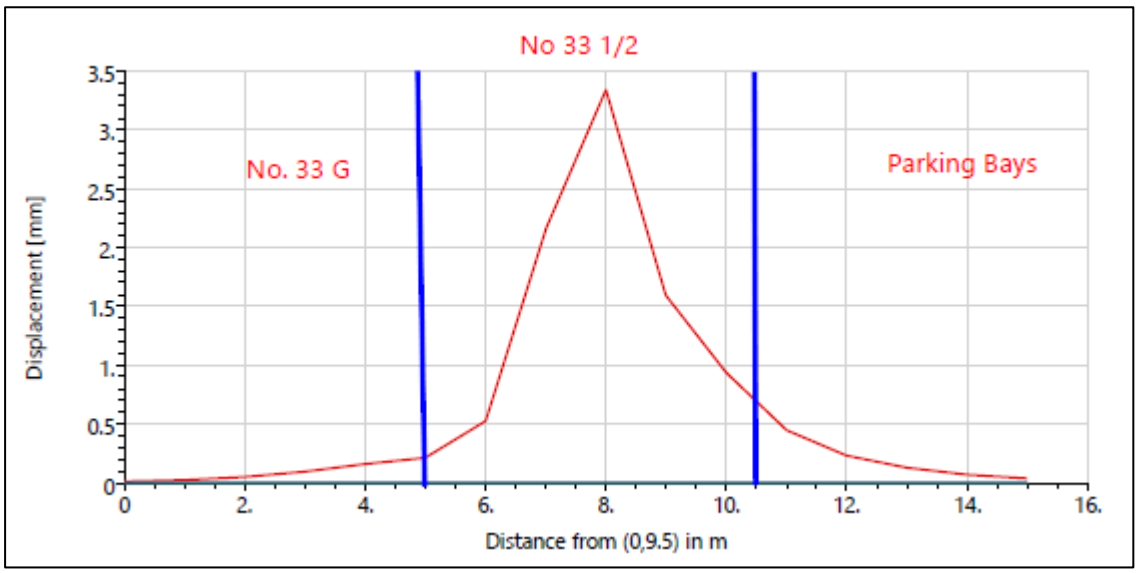


Figure 6.5 Heave- long term drained condition- Section 1-1'

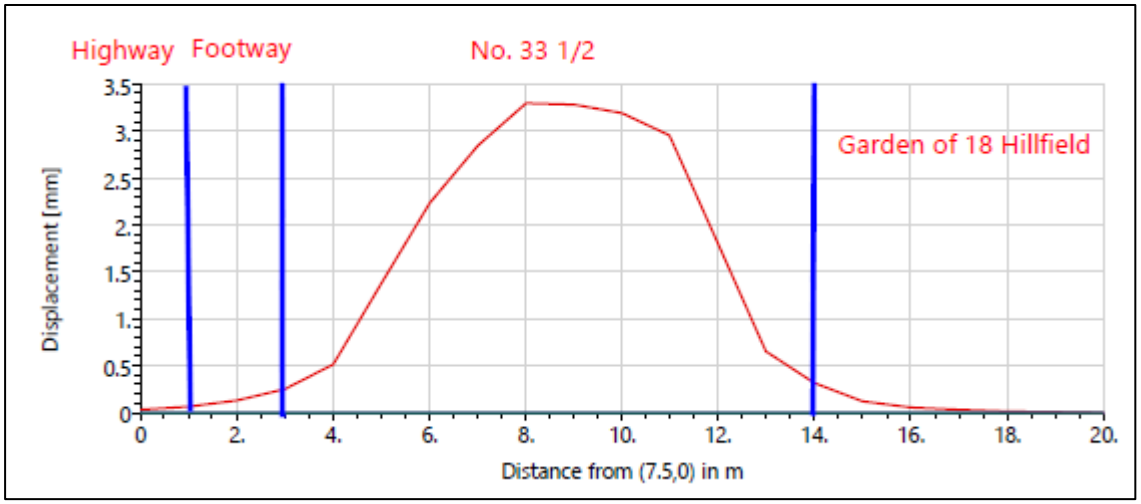


Figure 6.6 Heave- long term drained condition- Section 2-2'

6.4 Sub –surface Concrete

The results of lab testing for sulphate and pH are summarised below in Table 6.1. The full analysis is included in Appendix B.

Table 6.1 Sulphate and pH categories

Sample depth	Soil Type	Total Sulphate as S04	Sulphate S04 2:1 extract	pH	Sulphate Class (DS)	ACEC Class
0.65	London Clay	380 mg/kg	0.052 g/l	7.2	DS-2	AC1s
1.50	London Clay Formation	188 mg/kg	0.058 g/l	7.6	DS-2	AC1s

It is recommended that an overall design sulphate class of DS-2 and an Aggressive Chemical Environment for Concrete (ACEC) class of AC1s is adopted for the basement slab and underpinning.

7 Screening

7.1 Introduction

Screening is undertaken as outlined in Section 6.2 of the GHHS recommendations. It identifies if there are hydrogeological and land stability issues associated with the proposed development that requires detailed analysis and investigation. If there are no significant issues identified in the screening stage, then further stages are not required. The report follows the flow charts set out in CPG Basements (2021) and makes reference to the GHHS.

7.2 Subterranean (Groundwater) flow

This section answers questions in Figure 12 of CPG Basements (2021):

The source of information for the assessment of subterranean flow is from the GHHS and along with the ground investigation undertaken at 33 ½ Mill Lane on 01 November 2021 (Appendix B).

Table 7.1: Responses to Figure 12, CPG Basements (2021)

Question	Response	Action required
1a. Is the site located directly above an aquifer?	No. The site is underlain by the London Clay Formation. This is considered an unproductive stratum.	None
1b. Will the proposed basement extend beneath the water table surface?	Groundwater was struck during investigation at 2.75m bgl. Post investigation monitoring indicated groundwater was encountered at a depth of at 0.75m (approximately 62.75m). However, it is possible this was water trapped between the concrete slab and the London Clay	Allow for groundwater in the basement design and /or bailed out the installation and undertake further monitoring.
2. Is the site within 100m of a watercourse, well, or potential spring line?	No. There are no known wells or spring-lines within 100 m of the site[b,c].	None

Question	Response	Action required
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No. The site is not within the catchment of the ponds [b]	None
4. Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	No The basement is entirely below the existing building and concrete forecourt	None
5. As part of site drainage, will more surface water than at present be discharged to ground (e.g., via soakaways and/or SUDS)?	No, the basement is entirely below the existing building and concrete forecourt.	None. Due to the geology of the London Clay Formation close to ground level, soakaway drainage will not be suitable
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond or spring lines?	No. There are no recorded local ponds or spring lines within 250 m of the site	None

a. Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 8).
b. Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 11).
c. Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 14).

In summary, the site is located on the London Clay Formation. Post investigation monitoring of 1 No. boreholes drilled at the site to a depth of 5.45 m bgl indicated that groundwater was not encountered to a depth of at least 2.000 m (~ 69.00 m AOD) below the basement excavation level of 71 m AOD .

7.3 Slope / Land Stability

This section answers questions posed by Figure 13 in CPG Basements (2021).

Table 7.2: Responses to Figure 13, CPG Basements (2021)

Question	Response	Action required
1. Does the site include slopes, natural or man-made, greater than about 1 in 8 (~7^0)?	No. The site slopes gently to the south at a gradient of about 1 in 13 (~4.5^0)	None
2. Will the proposed re-profiling of the landscaping at site change slopes at the property boundary to greater than about 1 in 8?	No.	None
3. Does the development neighbour's land including railway cuttings and the like with a slope greater than about 1 in 8?	No No railway is present with 500m of the site	None.
4. Is the site within a wider hillside setting in which the general slope is greater than about 1 in 8?	With reference to Fig 16 of GHHS the site is in an area of slope angle of 0 to 7^0 or less than 1 in 8.	None
5. Is the London Clay the shallowest stratum on site?	Yes.	Determine heave and ground movement from the excavation of the clay and construction of basement walls.
6. Will any trees be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?	No trees will be felled.	None

Question	Response	Action required
7. Is there a history of shrink/swell subsidence in the local area and/or evidence of such at the site.	No records.	None
8. Is the site within 100 m of a watercourse or a potential spring line?	No [a,b].	None
9. Is the site within an area of previously worked ground?	No.	None
10. Is the site within an aquifer?	No. The site is underlain by the London Clay. This is considered unproductive strata.	None
11. Is the site within 50m of the Hampstead Heath Ponds?	No.	None
12. Is the site within 5 m of a highway or pedestrian right of way?	Yes The basement lightwell will be 2.0 m from the footway and 4.25 m from the highway.	Assess the ground movement from the basement construction on the footway and highway.

Question	Response	Action required
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes No. 33G does not have a basement to the west of No. 33 ½ . to the north is a garden, the east concrete parking bays and the south Mill Lane	A ground movement assessment will be undertaken to assess impact (Burland Damage Assessment) as a precaution
14. Is the site over (or within the exclusion zone of) any tunnels?	No.	None.

a. Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 8).
b. Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 11).
c. Camden Geological, Hydrogeological, and Hydrological Study, Arup, 2010. (Fig. 14).
d. Groundsure Report (Appendix C) September 2016

In summary, the proposed basement is located on very gently sloping ground (about 1 in 13) and will be founded within the London Clay Formation, which is present below the site.

8 Scoping

8.1 Introduction

This section considers the output from the screening survey where further actions are required. It considers the scope of information required in addressing these actions and what the potential impacts are of the basement construction. The existing ground conditions and the location of the basement can be summarised in a conceptual site model as indicated in Figure 8.1, based on Drawing 21-021-02 included in Appendix A.

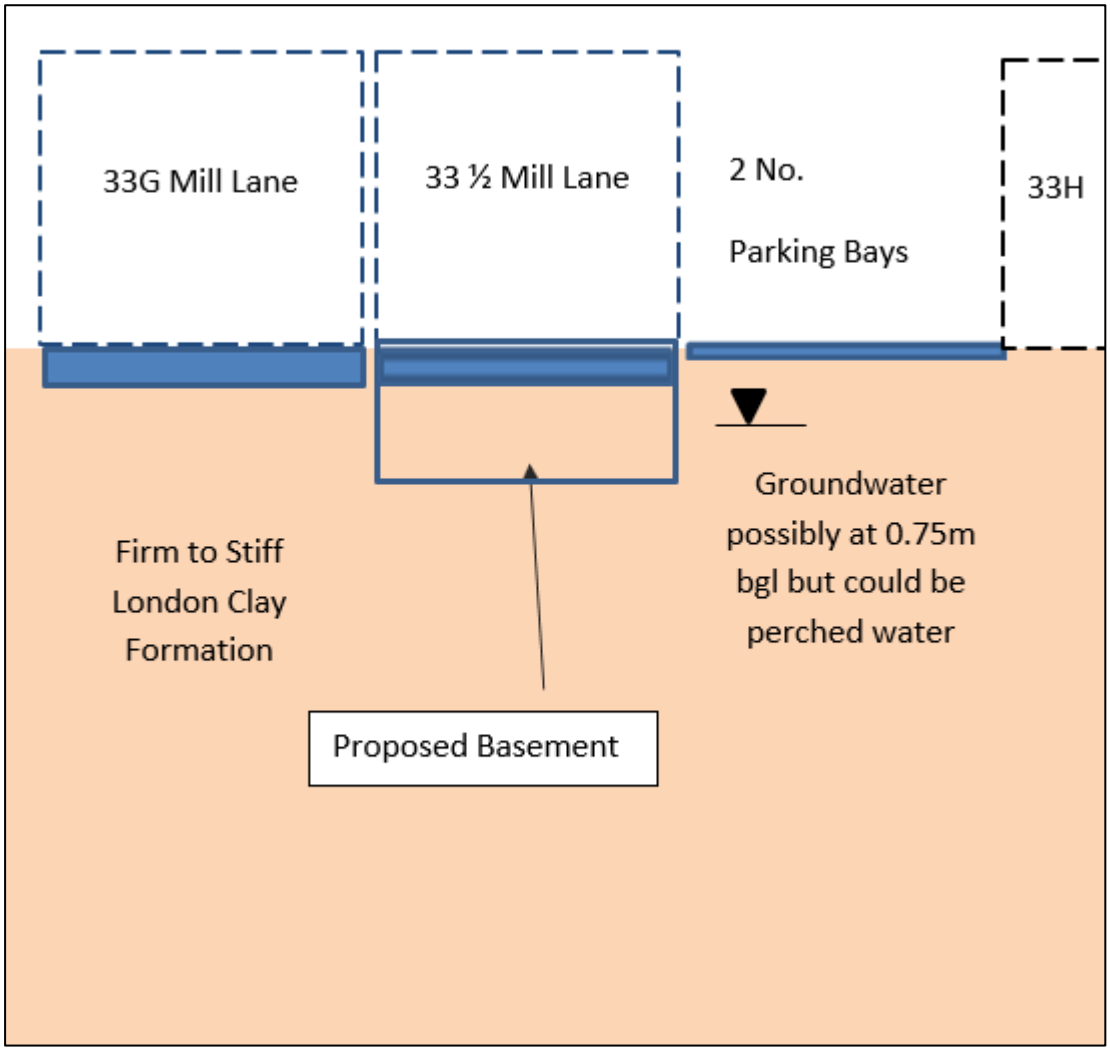


Figure 8.1 Conceptual Site Model (Not to scale)

There is some uncertainty on the requirements for groundwater mitigation, as the geology is entirely London Clay, but groundwater was measured at 0.75m bgl on monitoring. It is considered highly probable that the groundwater is perched trapped between the concrete slab/old foundation and the top of the London Clay. It is recommended that groundwater is allowed for in the basement design. Alternatively, or in addition the installation could be bailed out and remeasured as summarised in Table 8.1

Table 8.1 Summary of Scoping Requirements - Hydrogeology

Screening questions of concern - Hydrogeology	Potential Impact	Mitigation
1b. Will the proposed basement extend beneath the water table surface?	Groundwater was struck during investigation at 2.75m bgl. Post investigation monitoring indicated groundwater was encountered at a depth of at 0.75m (approximately 62.75m). However, it is possible this was water trapped between the concrete slab and the London Clay	Allow for groundwater in the basement design and /or bailed out the installation and undertake further monitoring.

The land stability issue relates to the ground movements resulting from the excavation within the London Clay Formation which will be addressed by a ground movement analysis as summarised in Table 8.2 taken from Table 7.2

Table 8.2 Summary of Scoping Requirements – Land Stability

Screening questions of concern – Land Stability	Potential Impact	Mitigation
5. Is the London Clay the shallowest stratum on site?	Yes.	Determine heave and ground movement from the excavation of the clay and construction of basement walls.

Screening questions of concern – Land Stability	Potential Impact	Mitigation
12. Is the site within 5 m of a highway or pedestrian right of way?	Yes The basement lightwell will be 2.0 m from the pedestrian walkway and ~4.0 m from the highway.	Assess the ground movement from the basement construction on the pedestrian walkway and highway.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes 33G does not have a basement to the west of No. 33 ½ . to the north is a garden, the east concrete parking bays and the south Mill Lane	A ground movement assessment will be undertaken to assess impact (Burland Damage Assessment) as a precaution

9 Impact Assessment

9.1 Groundwater

9.1.1 Groundwater level

The screening process has shown from borehole information that groundwater was encountered at a depth of 0.75m bgl at approximately 62.75m AOD[2].

It is considered highly probable that the groundwater is perched trapped between the concrete slab/old foundation and the top of the London Clay. It is recommended that groundwater is allowed for in the basement design. Alternatively, or in addition the installation could be bailed out and remeasured

While the investigation indicates that groundwater is present, during excavation and construction it is considered that any localised seepages can be dealt with sump pumps in the low permeability London Clay Formation.

9.2 Land Stability

The screening process has identified three issues which require an impact assessment listed below from Table 8.2

- Presence of London Clay as the shallowest stratum;
- Proximity to the highway and
- Proximity of an adjacent structure with differential depth of foundations.

9.2.1 Presence of the London Clay Formation at the surface

The ground investigation indicates that the soil can be readily excavated using conventional plant appropriate for the access constraints imposed by the location of the property.

The impact of the excavation on ground heave has been assessed in Section 6 of this report, which concludes that total heave will be less than **8 mm**, which is considered within normal construction tolerance. For evaluation of all ground movements both short term during excavation and long term after construction it was considered necessary to undertake a Ground Movement Assessment, which is included in Section 10 of this report.

The ground movement assessment evaluates ground movement in relation to neighbouring property of No. 33G and the footway/highway.

9.2.2 Stability of Temporary Excavations

It is proposed that the basement retaining walls will be constructed using hit and miss underpinning at the front followed by progressive underpinning below the main building, with temporary propping supporting the excavation, which is set out in the Drawings included in Appendix A.

[2] Levels are approximate and subject to a site topographical survey.

9.2.3 Groundwater Control

As discussed in Section 9.1.1 groundwater may affect the construction works. If localised seepages are encountered of groundwater that is likely to impact the works, groundwater could be controlled by pumping. Alternatively discharge of the groundwater could be made to the sewer subject to an agreement at detailed design stage from the local water company in terms of water quality, flow rate and quantity.

9.2.4 Monitoring of groundwater and ground movements

Groundwater levels if present should be monitored before the works as a precaution. Monitoring of adjacent structures should be carried out before, during and after construction.

10 Ground Movement Assessment

10.1 Introduction

This section provides an assessment of ground movement that may result from the construction of the basement and to determine how these may affect the adjacent building structures and the highway/footway.

The assessment of ground movements is based on guidance provided by CIRIA C760. The ground conditions of the site are wholly the London Clay Formation. A conceptual model of the proposed basement is shown in Figure 8.1.

The proposed construction sequence comprises 3 phases indicated by Croft in their CMS and summarised as:

10.1.1 PHASE 1

10.1.1.1 Excavate and form front stairwell and RC Retaining walls to in the front garden area
10.1.1.2 De-water ground if required
10.1.1.3 Prop initial excavations: install lintels with props where soil is loose
10.1.1.4 Remove existing slab where required
10.1.1.5 Place reinforcement and cast retaining wall
10.1.1.6 Excavate and form underpins under the main house
10.1.1.7 Outline of pin segments are shown on drawing SL-10; underpin sequence TBA at detailed design stage, suggested sequence shown.
10.1.1.8 Excavation below existing walls to be carried out in segments not exceeding 1m width
10.1.1.9 Prop pits as excavation progresses
10.1.1.10 Prop existing footing, where required before installation of the steelwork supporting existing slab
10.1.1.11 Underpinning to the footing of the adjacent property, where required to be installed as per suggested detail on drawing SL-10

10.1.2 PHASE 2

10.1.2.1 Continue with excavation and casting pins following numbering
10.1.2.2 Keep installing temporary propping, while excavation progresses
10.1.2.3 Place reinforcement and cast retaining wall
10.1.2.4 Continue for remaining underpins
10.1.2.5 Do not commence excavation for pin until at least 48 hours after dry-packing for adjacent pin is complete
10.1.2.6 Needle and prop walls above as necessary.
10.1.2.7 Install steelwork supporting existing beam and block floor and new RC slab to the front garden.

10.1.3 PHASE 3

10.1.3.1 Excavate remaining soil mass below building
10.1.3.2 Initial horizontal props may be removed as excavation progresses
10.1.3.3 Install full width cross prop
10.1.3.4 Install below slab drainage
10.1.3.5 Cast concrete floor slab on Clayboard
10.1.3.6 After basement slab has gained sufficient strength, full width horizontal props may be removed after Basement structure is complete
10.1.3.7 Proceed with construction of internal walls, columns, and Ground floor support

10.2 Ground Movements Assessed

Ground movements resulting from underpinning are not well documented and there is no specific method for assessing their magnitude. It should be noted that CIRIA C760 (2017), which is often used as a reference for ground movement assessments, is for embedded retaining walls and not concrete underpins.

When underpinning is carried out in a well-controlled manner, movements are typically small. A widely accepted movement from the installation of underpins is for 5mm of horizontal and vertical movement for a single stage underpinning, in addition to the global movements from excavation and subsequent settlement from the imposed loads acting on the underpins.

The ground conditions at 33 ½ Mill Lane are predominantly London Clay, which will display heave from excavation and long term movement from the imposed loads, although CIRIA C760 indicate long term movement are limited beyond the excavation as indicated in Figure 10.1.

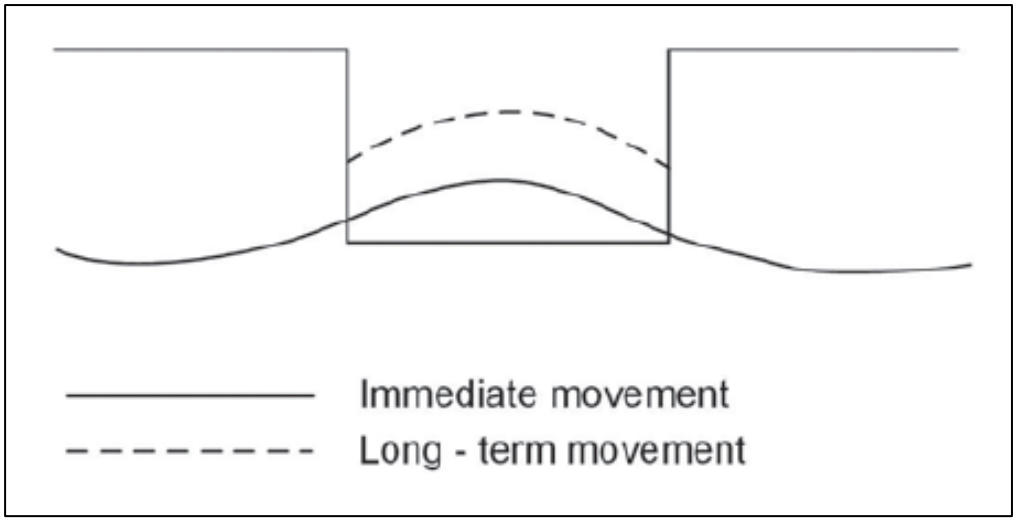


Figure 10.1 Impact of short term immediate undrained and long term movement (From CIRIA C760 Fig 6.10)

The following ground movements have been assessed:

- **Short term vertical heave / settlement movements**: London Clay and is susceptible to short term heave and time dependent swelling on unloading, which will occur

because of basement excavation, generating upward ground movements. Short term heave has been analysed by PDisp in the undrained condition.

- **Long term vertical ground movement in the drained condition:** The net loading / unloading on formation soils will generate ground movement, which could affect adjacent foundations which will happen over a period after construction. This has been modelled with PDisp. This considers existing stress conditions, and the weight of soil removed and the load from the new basement.
- **Vertical and horizontal movement from underpin installation:** Underpins act as stiff concrete retaining walls, which limits the potential for wall deflection. However, deflections that do occur may generate surface settlements, which could impact adjacent properties.
  From experience within the industry, at least 5mm of additional ground movement (both vertical and horizontal) is typically anticipated for the proposed single stage underpinning.

10.3 Modelling of movements due to vertical and horizontal stress changes

The predicted ground response due to vertical unloading of the ground through excavation for the proposed basement has been modelled using the OASYS program PDisp version 20.0.23.

PDisp assumes a linear elastic behaviour of the soil and a flexible structure. The finite stiffness of the structures will tend to redistribute or smooth out the movements, when compared to those predicted by PDisp. The settlement calculations therefore represent free field movements unaffected by the stiffness of the structures and are likely to be conservative (i.e., the distortions of the structure would be less than those obtained from the predicted movements).

The analysis was undertaken for the combination of short-term undrained movements and long term drained movements. The 'hard layer' base to the analysis was taken as 10 m below ground level. In addition, it has been assumed for ground modelling that the soil mass is removed in its entirety before the underpins and are placed, when in reality this is an incremental process. When the overall mass of the soil removed relative to the load of the re-imposed structure is considered onto a cohesive soil this presents a reasonable scenario

10.3.1 Vertical Movements due to excavation (Undrained/short term)

The excavation level is assumed at 3.35 m below ground level. Demolition and excavation of up to 3.35m of soil will therefore produce an unload at new formation level of - 67 kPa. Poisson's Ratio for London Clay as v_u = 0.5.

A short term (undrained) analysis was undertaken using parameters in Table 5.2 above to determine the heave movements likely to arise as a result of the excavation (i.e., the movements likely to occur prior to the construction of the new structural elements and the consequential vertical loading of the soil). The analysis indicated a maximum heave of 4.6 mm occurring centrally within the excavation (Figures 6.1, 6.3 & 6.4), with 2.3 mm at the boundary with 33G Mill Lane.

10.3.2 Vertical movements following construction of the new basement (drained/long-term)
The movements of the ground following construction are assessed for the long term (drained) case using parameters in Table 5.2 above.

The PDisp assessment indicates that peak heave movements in the long term again occur under the centre of the basement, with a magnitude of 3.3 mm occurring centrally (Figure 6.2, 6.5 & 6.6), with 0.25 mm at the boundary with 33G Mill Lane.

10.3.3 Vertical deflection from underpin installation
As indicated above in Section 9.1, 5mm of vertical movement is assumed for installation. The distance behind the wall to which negligible movement occurs has been assumed at 3.5 times the excavation depth.

10.3.4 Horizontal deflection from underpin installation
As indicated above in Section 10.1, 5mm of horizontal movement (δ_{max}) at the basement wall is assumed for installation. The distance behind the wall to which negligible movement occurs is assumed to be 4 times the height of the underpin of 3.35m. δ_h is the difference between δ_{max} and the movement of the far wall of the neighbouring property.

It should be reiterated that the movements due to vertical and horizontal stress changes do not occur in isolation to the other movements resulting from the basement construction process and the actual ground movements, particularly around and beyond the perimeter of the proposed basement, will be from the quality of workmanship during excavation and installation.

11 Damage Category Assessment

11.1 Introduction

The calculated ground movements have been used to assess potential 'damage categories' that may apply to neighbouring properties due to the proposed basement construction. The methodology proposed by Burland and Wroth and later supplemented by the work of Boscardin and Cording has been used, as described in *CIRIA Special Publication 200* and *CIRIA C760*. General damage categories are summarised in Table 11.1 below:

Table 11.1: Classification of damage visible to walls (reproduction of Table 6.4, CIRIA C760)

Category	Description	Approx. Crack Width (mm)	Limiting tensile Strain
0 (Negligible)	Negligible – hairline cracks	<0.1	0.0 – 0.05
1 (Very slight)	Fine cracks that can easily be treated during normal decoration	<1	0.05 – 0.075
2 (Slight)	Cracks easily filled; redecoration probably required. Some repointing may be required externally.	<5	0.075 – 0.15
3 (Moderate)	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced.	5 -15 or a number of cracks > 3	0.15 – 0.3
4 (Severe)	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows.	15-25 but also depends on number of cracks	> 0.3
5 (Very Severe)	This requires a major repair involving partial or complete re-building.	> 25 but also depends on number of cracks	

11.2 Damage Assessment Category for neighbouring property 33G Mill Lane

Vertical and horizontal ground movement for a section through 33G Mill Lane. is shown in Figure 11.1. For this underpin wall, the combined impact of short-term heave and long-term settlement/ heave and installation has been shown. The location of the section is shown diagrammatically in Figures 6.1/6.2. The horizontal strain in relation to the damage

assessment category is shown in Figure 11.2 and the damage category for 33G Mill Lane is shown in Figure 11.3.

Table 11.2 and Figure11.3 incorporates superimposed horizontal and vertical movements derived from the wall deflection and heave/settlement due to excavation as outlined in Section 10. The assessment is based on the assumption of firm to stiff clays. The assessment has been based on the limiting tensile strain for Category 1 of a strain of 0.075 %.

Table 11.2: Summary of ground movements and corresponding damage category 33G Mill Lane

Adjacent Property	33G Mill Lane
Building width - L (m)	5.5
Building height - H (m)	6.0
L/H = 0.48 (approximated for plotting)	1.0
max deflection (Δ) in metres (from Fig 11.1)	0.0018
Δ/L (%)	0.0327
εlim	0.075
Δ/L/εlim	0.44
length to negligible horizontal movement - 4x wall height (m)	4
δh_{max} (m)	0.005
δh (m)	0.0025
δh/L (%) = εh	0.045
Damage Category	**1**

It is further noted that 33G and 33 ½ were constructed at different times, 33G in 2011 and 33 ½ in 2014 approximately. There is a gap between the walls at the boundary between the two properties. It is thought likely that the foundations are also independent, although this has not been proven in this report, as drawings have not been identified to show the construction details. Isolated construction could potentially reduce the damage assessment further than Category 1.

11.3 Impact on Highway/Footway

The main impact on the highway and footway is the potential damage to service pipes, particularly for ceramic sewer pipes and old cast iron water pipes.

A utilities search was undertaken by Croft. The utilities drawings are included in Appendix D. A summary for the utilities and the distance depth to the basement is shown in Table 11.3.

Table 11.3, together with Figures 6.1, 6.2, 6.4 and 6.6, show that ground movement will have an insignificant impact on utilities in the street to the both the distance and level of the utility in relation to the proposed basement

Table 11.3 Summary of Ground Movement Impact on Utilities

Utility	Distance from Basement (m)	Depth (m bgl)	Approx. invert level (m AOD)	Ground movement at utility (mm)	Impact
Water (Thames Water)	8.40	0.9 or greater	<62.00	< 1mm	none
Combined Sewer (Thames Water)	10.65	approx. 3m	60.00	< 1mm	none
Gas (Cadent)	14.0	0.9	62.00	< 1mm	none
Electricity (National Grid)	n/a	n/a	n/a	n/a	none

12 Monitoring Strategy

The results of the ground movement analysis show that with good construction control, damage to adjacent structures generated by the assumed construction methods and sequence can be controlled to be within Category 1 'very slight' damage. A formal monitoring strategy should be implemented on site in order to observe and control ground movements during construction.

The system should operate broadly in accordance with the 'Observational Method' as defined in CIRIA Report 185. Monitoring can be undertaken by installing survey targets to the top of the wall and face of the adjacent building. Baseline values should be established prior to commencement of works. Monitoring of these targets should be carried out at regular time intervals and the results should be analysed to determine if any horizontal translation of the wall or tilt/settlement of the neighbouring structure is occurring. Regular monitoring of these targets will allow ground movement trends to be detected early and a mitigation strategy can be implemented to control further movement. Monitoring data should be checked against predefined trigger limits and can also be further analysed to assess and manage the damage category of the adjacent buildings as construction progresses.

It is recommended that a condition survey is undertaken on all adjacent property facades prior to the works commencing and ideally when monitoring baseline values are established. Existing cracks or structural defects should be carefully recorded, documented and regularly inspected as construction progresses.

13 Conclusions

The results of this Basement Impact Assessment are supported by site investigation data and outline construction methods and sequence provided by the structural engineer.

The maximum damage category for the adjacent properties has been calculated to be within Category 1 (very slight damage). The assessment has also indicated underground services identified within Mill Lane are sufficiently distant from the basement, that ground movement will have reduced to <1mm at the utility.

An appropriate monitoring regime should be adopted and maintained throughout construction to manage risk and potential damage to the neighbouring structures as construction progresses onsite.

14 References

Boscardin, M.D., and Cording, E.G., (1989). *Building response to excavation induced settlement*. J Geotech Eng, ASCE, 115 (1); pp 1-21

Burland, J.B., and Wroth, C.P. (1974). *Settlement of buildings and associated damage*, State of the art review. Conf on Settlement of Structures, Cambridge, Pentech Press, London, pp611-654

Burland, J. B. (2008) The assessment of the risk of damage to buildings due to tunnelling and excavations. Jornada Tecnica de Movimientos de Edificios Inducidos por Excavaciones, Barcelona 16/12/2008.

BS 1377:1990. British Standard Methods of test for soils for Civil engineering purposes. British Standards Institution.

BS 5930: 2015. *Code of practice for Ground Investigation.* British Standards Institution.

BS EN 1997-1 Eurocode 7 Geotech Design Part1 General Rules- inc. corrigendum Feb 2009

BS EN 1997-2 Eurocode 7 Geotechnical Design Part 2 Ground Investigation and Testing – inc. corrigendum 2010

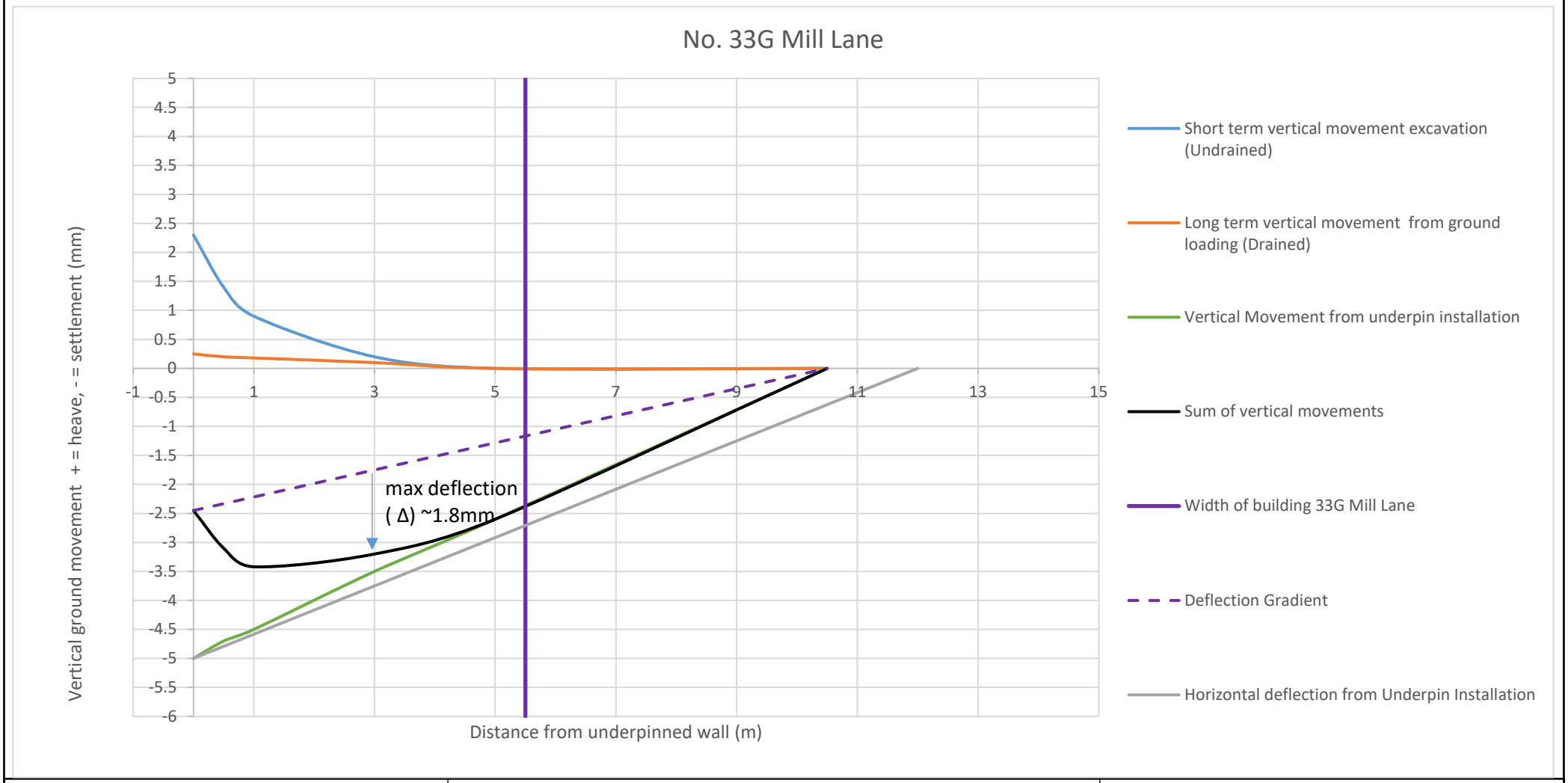
BS 8002: 2015 Earth Retaining Structures

BS 8004: 2015 Code of practice for Foundations

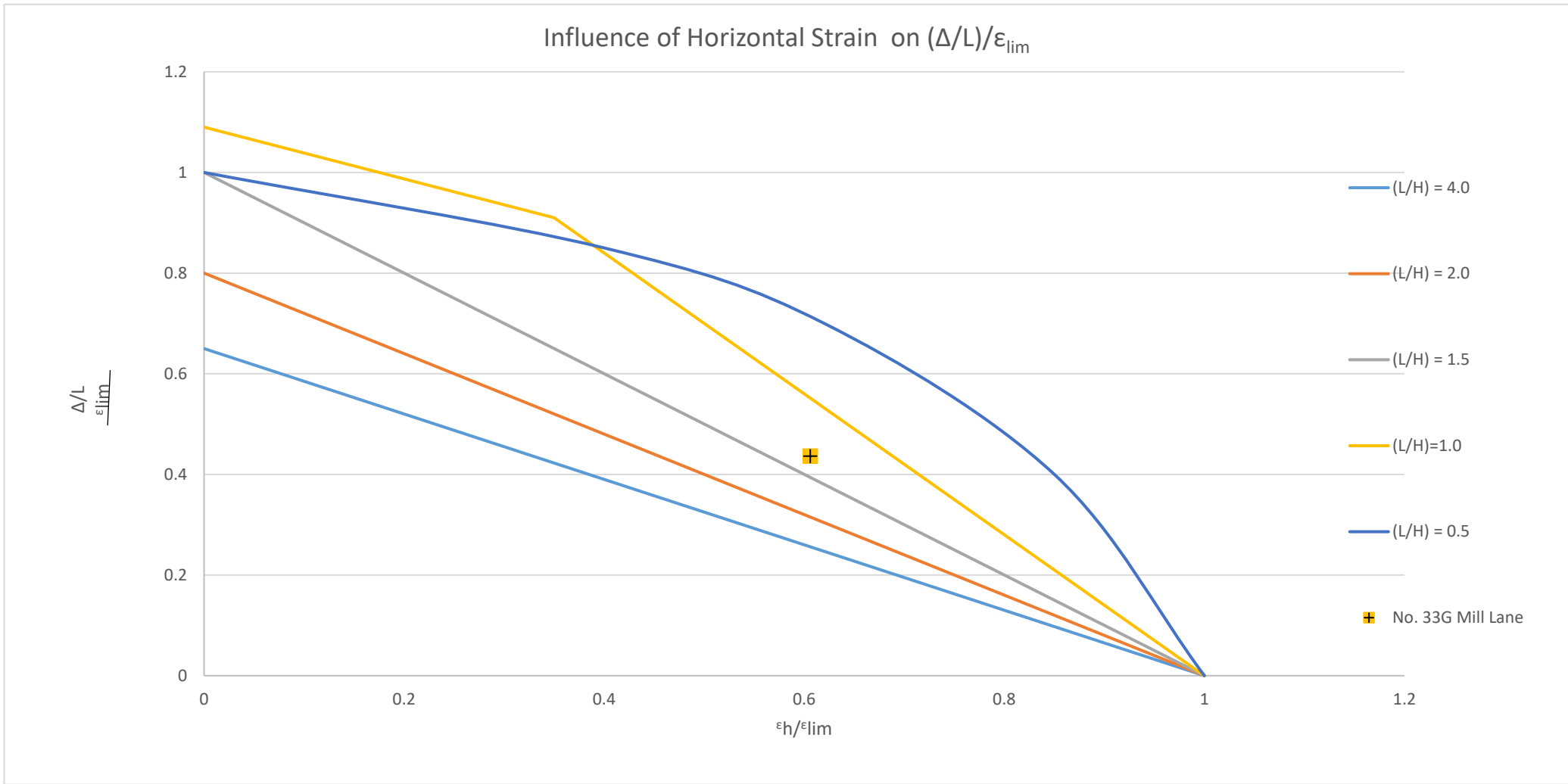
BGS Geology of Britain Viewer (*http://mapapps.bgs.ac.uk/geologyofbritain/home.html)*

CIRIA C760 Guidance on Embedded retaining wall design 2017.

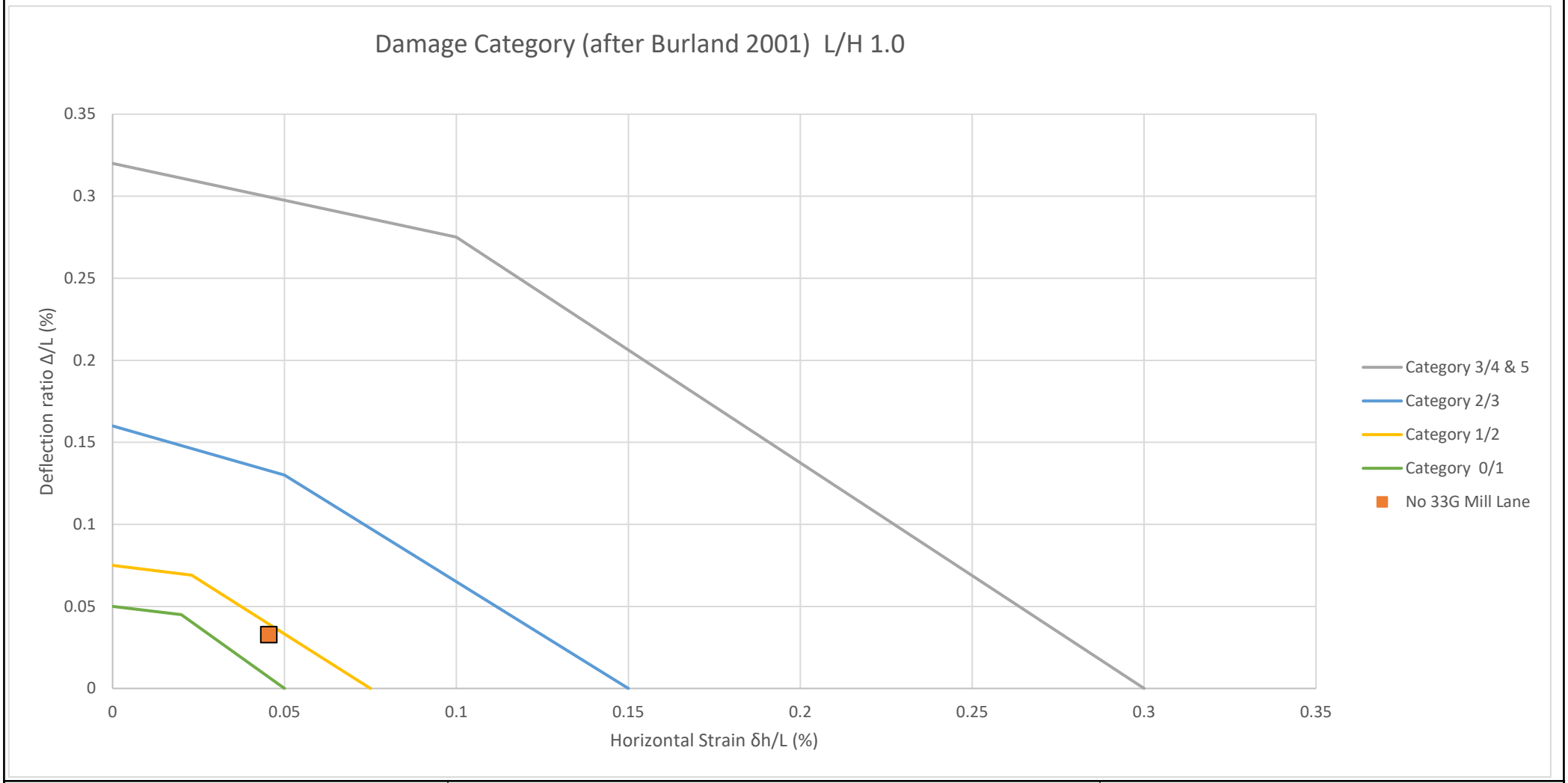
Figures 11.1 to 11.3



Client Croft Structural Engineers Ltd.	MAUND GEO-CONSULTING	Project 33 ½ Mill Lane NW6 1NZ
Job No. MGC/21/51	Title Combined Movements 33G Mill Lane	Figure 11.1



Client Croft Structural Engineers Ltd.	MAUND GEO-CONSULTING	Project 33 ½ Mill Lane
Job No. MGC/21/51	Title Influence of Horizontal Strain	Figure 11.2

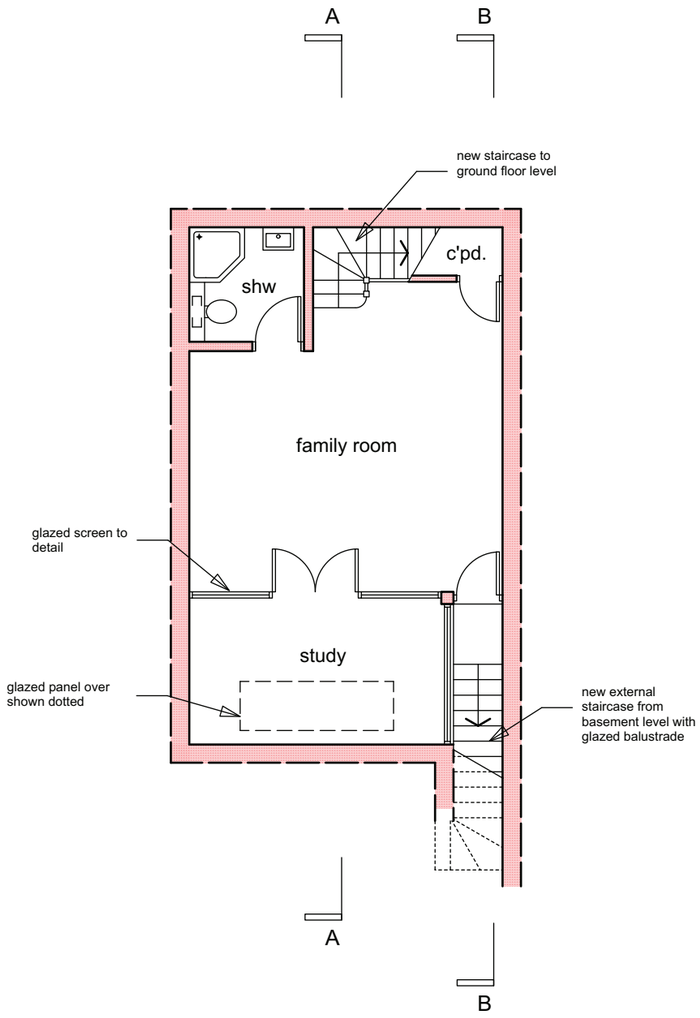


Client Croft Structural Engineers Ltd.	MAUND GEO-CONSULTING	Project 33 ½ Mill Lane NW6 1NZ
Job No. MGC/21/51	Title Damage Category 33G Mill Lane	Figure 11.3

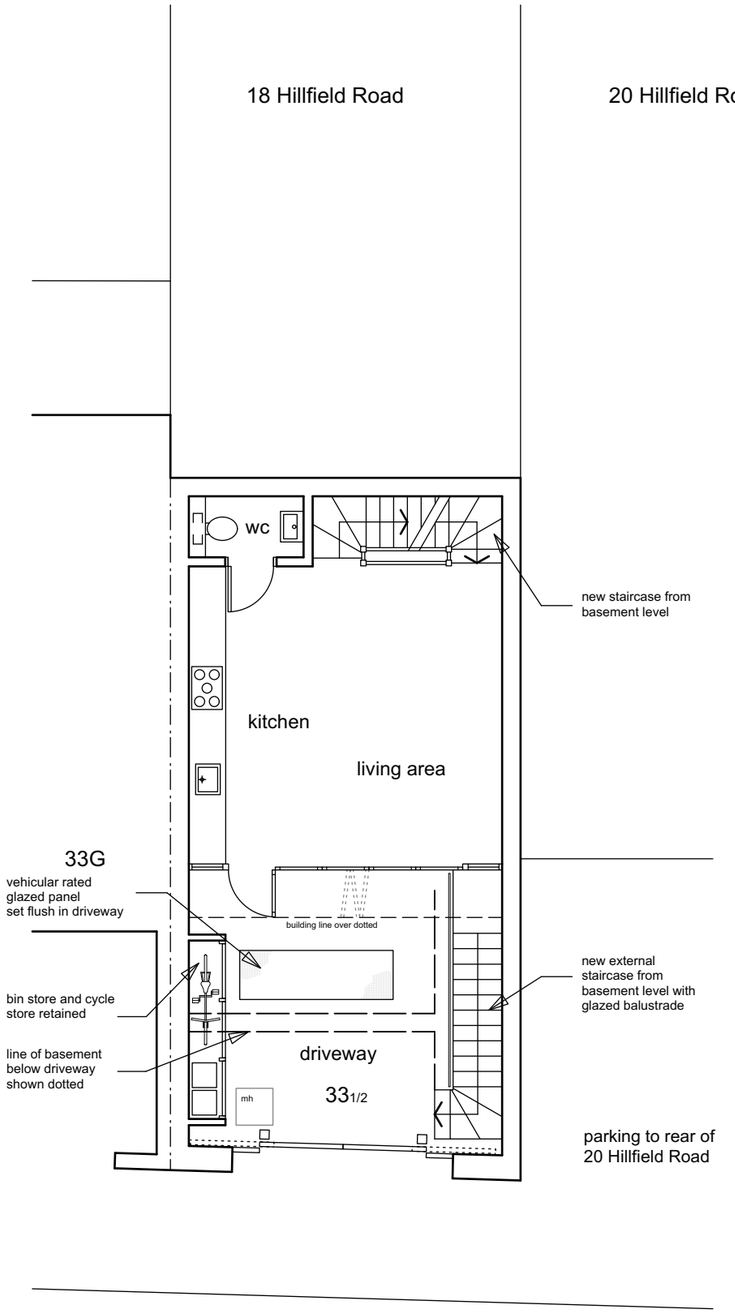
Appendix A Drawings

schedule of areas:
(approx gross internal)

proposed basement as drawn: 40.6 m2 (440 sq ft)



BASEMENT PLAN
as proposed



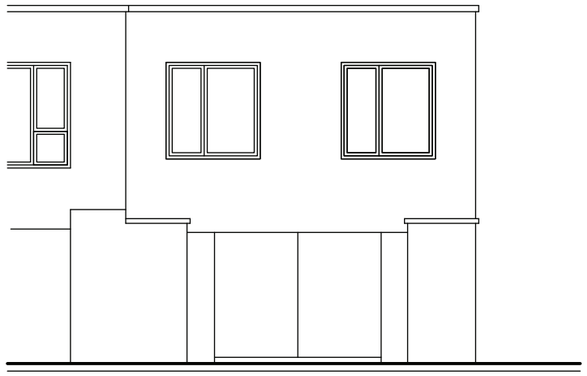
GROUND FLOOR PLAN
as proposed

N

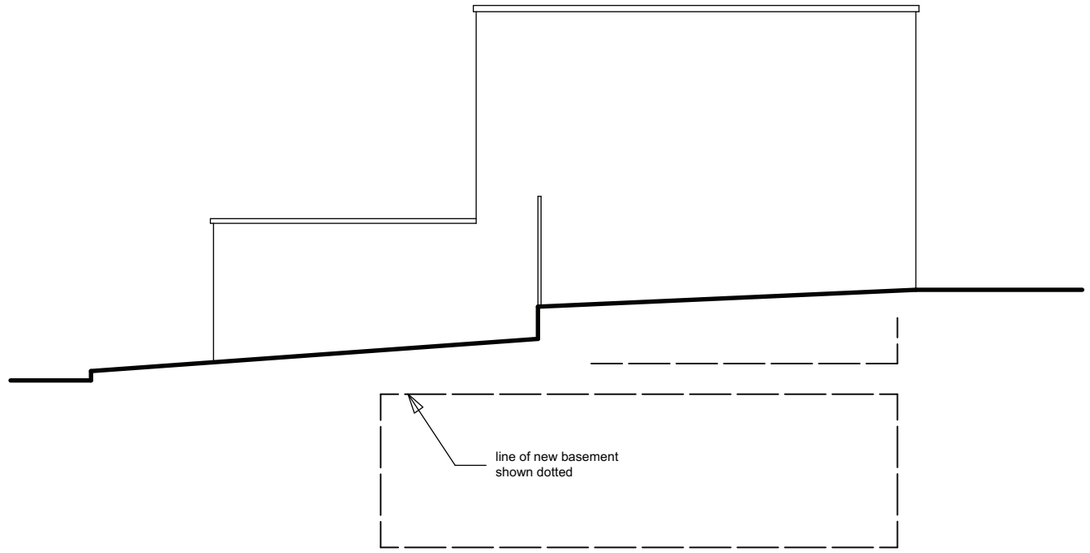
0 1 2 3 4 5
scale bar (m)

Rev B: excavation depths clarified on sections 13.6.22
Rev A: cycle store clarified. glazed panel noted added. 19.5.22

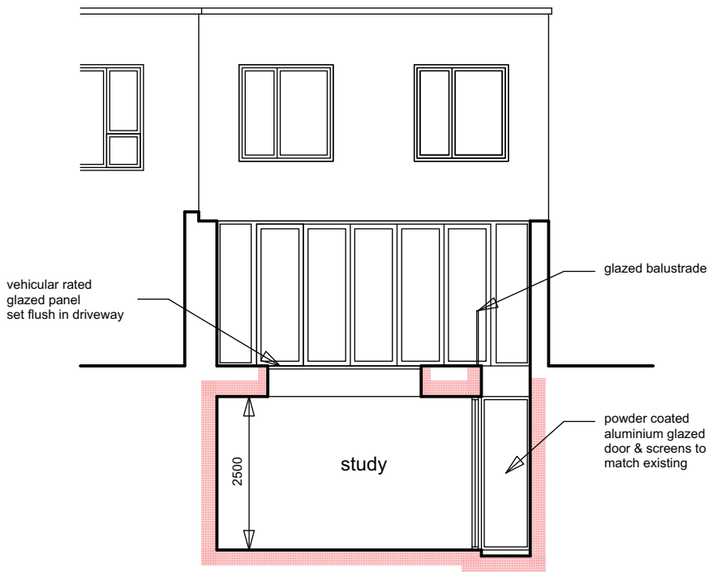
client: Moyo Osanyintuyi	project: 33(1/2) Mill Lane London NW6 1NZ	scale: 1:100 @ A3 date: Sept 2021 drawn: MW	drawing title: Scheme Proposals drawing no: 21-021-02B (sheet 1 of 3)	the basement design studio Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW tel: 01628 826066 www.basementdesignstudio.co.uk



STREET ELEVATION (from mill lane)



SIDE ELEVATION

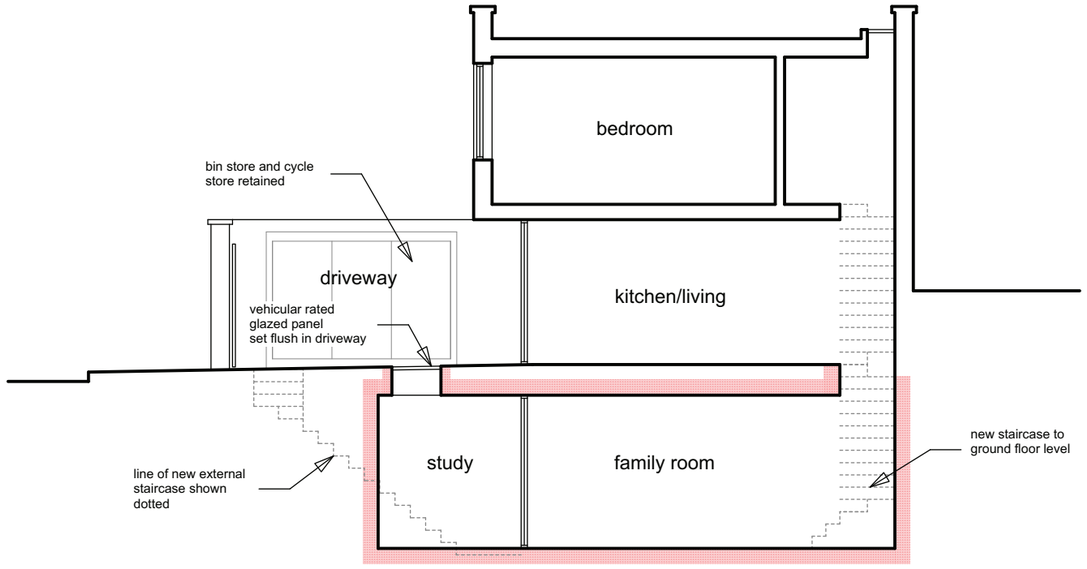


FRONT ELEVATION

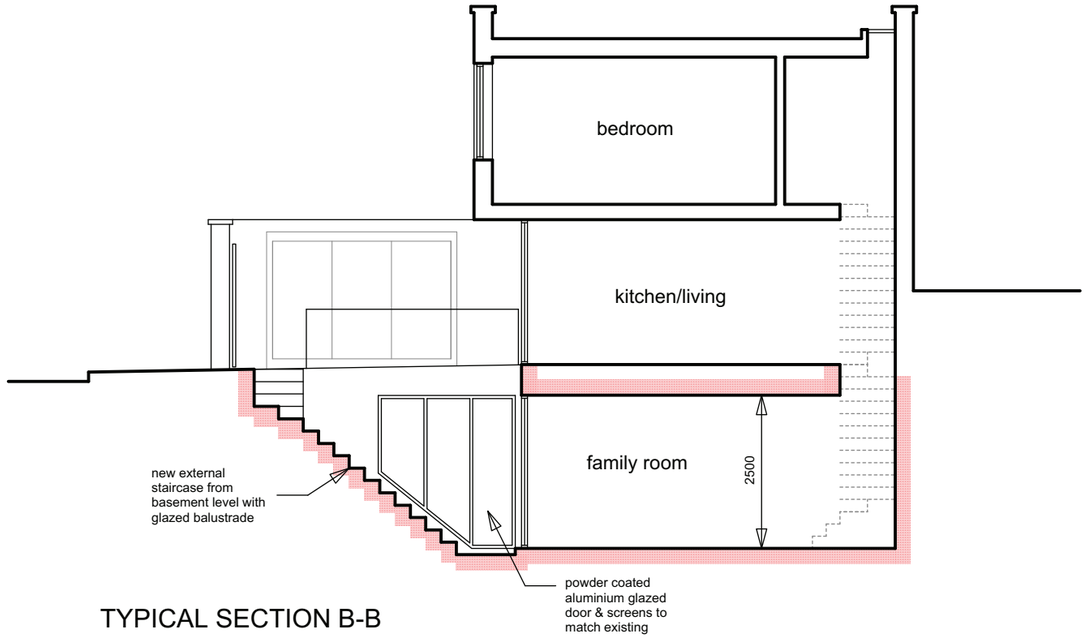
Rev B: excavation depths clarified on sections 13.6.22

Rev A: cycle store clarified. glazed panel noted added. 19.5.22

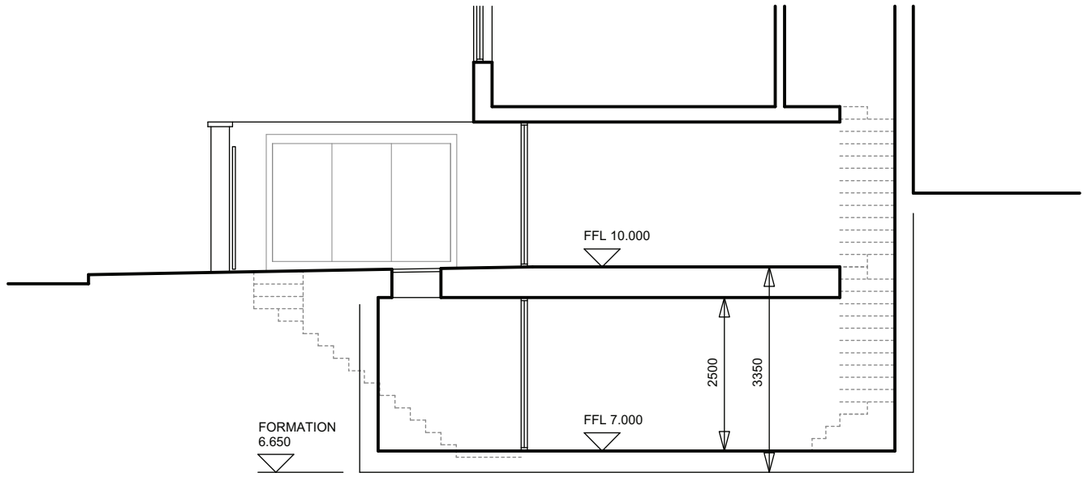
client: Moyo Osanyintuyi	project: 33(1/2) Mill Lane London NW6 1NZ	scale: 1:100 @ A3 date: Sept 2021 drawn: MW	drawing title: Scheme Proposals drawing no: 21-021-02B (sheet 2 of 3)	the basement design studio Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW tel: 01628 826066 www.basementdesignstudio.co.uk



TYPICAL SECTION A-A



TYPICAL SECTION B-B



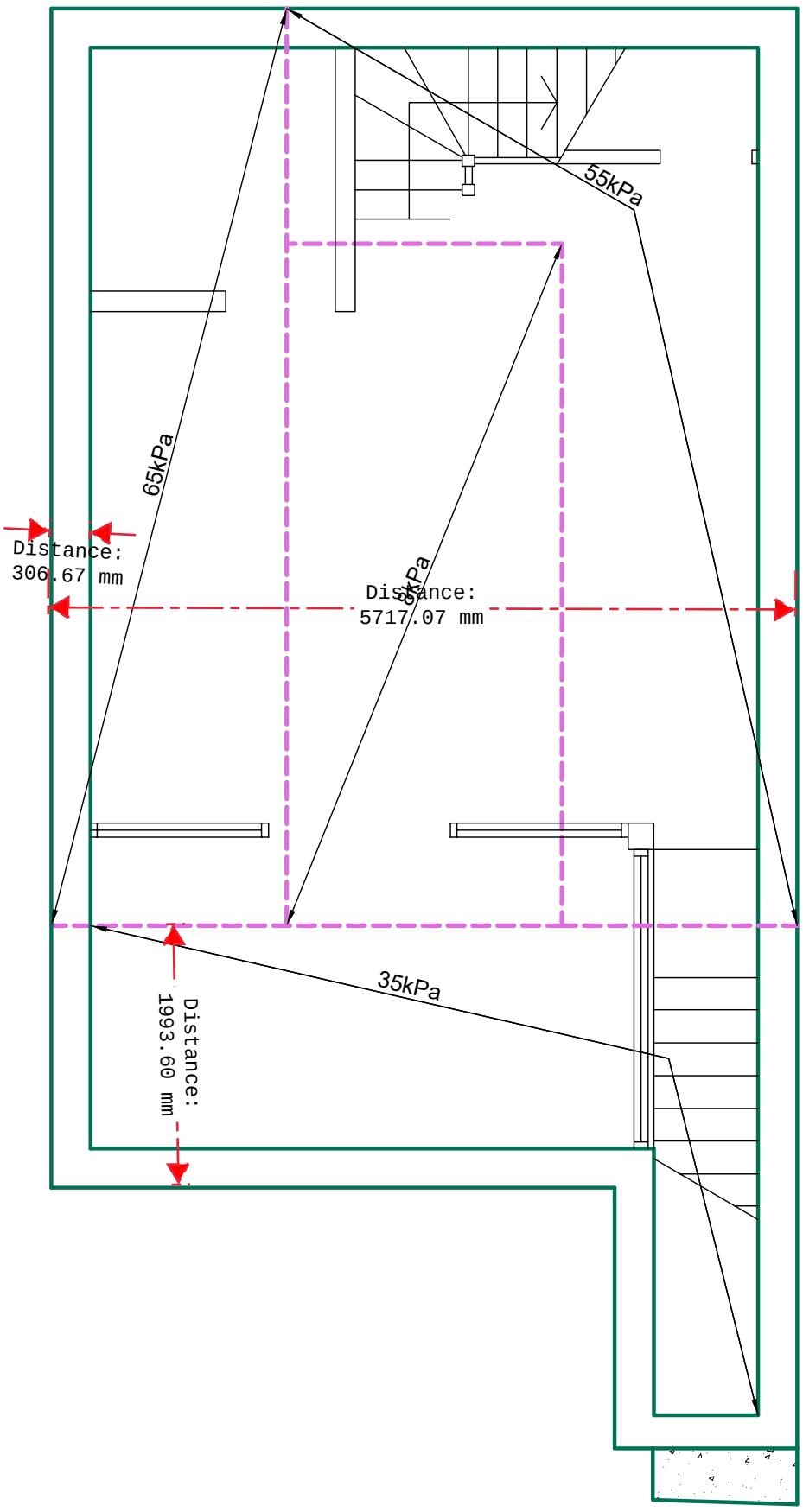
TYPICAL DIG DEPTHS

0 1 2 3 4 5
scale bar (m)

Rev B: excavation depths clarified on sections 13.6.22

Rev A: cycle store clarified. glazed panel noted added. 19.5.22

client: Moyo Osanyintuyi	project: 33(1/2) Mill Lane London NW6 1NZ	scale: 1:100 @ A3 date: Sept 2021 drawn: MW	drawing title: Scheme Proposals drawing no: 21-021-02B (sheet 3 of 3)	the basement design studio Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW tel: 01628 826066 www.basementdesignstudio.co.uk



Rev	Date	Amendments
-	12/11/21	First issue

Client: Mr Moyo Anyintuyi

Project: 33.5 Mill Lane

Title : Basement box kPa Values for Planning

Job nos	Drawn	Date
210935	pr	11/10/21
Dwg Nos	Rev	Scale
SL-06	-	1:50

Croft Structural Engineers
Clockshop Mews,
Rear 60 Saxon Rd
London, SE25 5EH
0208 684 4744 www.croftse.co.uk

Appendix B Ground Investigation Factual Report

33 ½ Mill Lane, London NW6 1NZ

Geotechnical Factual Report

November 2021

MAUND GEO-CONSULTING

Produced for: Mr M. Osanyintuyi/
The Basement Design Studio

Prepared by:

Julian Maund BSc PhD CEng MIMMM CGeol FGS
UK and Ireland Registered Ground Engineering Adviser

Maund Geo-Consulting Ltd
3 Coopers Square
Chipping Norton

OX7 5DG

T 07817018716
E julian.maund@gmail.com
MGC-FR-21-51-V1

Report Title	Geotechnical Factual Report	Site Address	33 ½ Mill Lane, London NW6 1NZ
Work Stage	Investigation	Report Date	November 2021
Brief Description of the Report Contents	Report on a ground investigation comprising one borehole to a depth of 5.45m, which was undertaken at the site on 13/10/21 and 01/11/21, to provide factual information on the ground conditions.		

Document Control Sheet

Project Title	33 ½ Mill Lane NW6 1NZ
Report Title	Geotechnical Factual report
Reference	MGC-FR-21-51-V1
Revision	1
Status	Final

Record of Issue

Issue	Status	Date	Author	
A	Final	12/11/21	Julian Maund BSc PhD CEng MIMMM CGeol FGS Registered Ground Engineering Adviser	

Distribution

Organisation	Contact
Client	M. Osanyintuyi
The Basement Design Studio	M. Wiseman
Croft Structural Engineers	P. Rogalewicz

Contents

1 Introduction

1.1 Terms of Reference

Maund Geo-Consulting Ltd (MGC) was instructed on 01/10/21 by The Basement Design Studio Ltd (BDS) on behalf of Mr M. Osanyintuyi the owner of 33 ½ Mill Lane, to undertake a ground investigation at the property. The objective of the ground investigation was to determine the ground conditions at the site for support of a Basement Impact Assessment (BIA) for the London Borough of Camden.

1.2 Terms and Conditions

This report has been prepared for The Basement Design Studio in consideration of the proposed further development of the site. The geotechnical information relates to the site only and should not be used in a different context without reference to MGC.

The report has been prepared for the exclusive benefit of The Basement Design Studio. The report contents should only be used in that context. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

MGC has used reasonable skill, care and diligence in the design of the investigation of the site. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths at the time of the investigation. At intermediate locations, conditions can only be inferred.

2 Information on the Site

2.1 Location

33 ½ Mill Lane is located within the West Hampstead, within the London Borough of Camden. The ground level is approximately 64.00 m AOD at the front of the property.

2.2 Description

The current building is a residential dwelling and forms a semi detached house of two storeys above ground level. The front elevation is indicated in Figure 2.1.

Figure 2.1 33 ½ Mill Lane (Streetview March 2019)

2.3 Present use

A residential dwelling.

2.4 Proposed development

The proposed development is understood to provide a full basement to the property.

2.5 Geology

Geological information obtained from http://mapapps.bgs.ac.uk/geologyofbritain3d/ British Geological Survey (BGS) mapping at 1 50 000 scale shows the site to be directly underlain by the London Clay Formation (LFC), which comprises a predominantly silty clay formed during the Tertiary period.

2.6 Hydrogeology/groundwater

The property is located on the bedrock geology of the LCF which is classified as an 'unproductive stratum' which is effectively impermeable. The site does not lie within a ground water protection zone.

3 Ground Investigation

A ground investigation was undertaken by PM Sampling Ltd on behalf of MGC on 13/10/21. The exploratory holes are indicated in Figure 3.1. The boreholes were located within the courtyard in front of the house.

The site investigation comprised:

- 1 No. cored hole through concrete to 0.65m
- 1 No cored hole through concrete to 0.25m
- 1 No. Window sampler borehole to 5.45 m bgl.
- The in-situ strengths determined by standard penetration testing
- Disturbed soil samples were obtained from the exploratory holes for laboratory geotechnical testing and further examination.
- A 19 mm diameter groundwater monitoring well was installed to 5.0 m

During the ground investigation concrete was encountered below a surface pavement of ceramic tiles. An attempt was initially made to progress through the concrete using a hydraulic breaker. When it was clear the concrete was potentially extensive, of an unknow depth a diamond bit 200mm diameter concrete corer was utilised. The corer has a maximum depth of 400mm. On reaching the extent of the corer the concrete depth had not been obtained. The corer was extracted, and the drilling was halted. Further to consultation with BDS it was agreed to have a further attempt to determine the concrete depth by breaking out the concrete core stub and continue coring with a 150mm diameter diamond concrete corer. The drillers returned to the site on 01/11/21 to break out the core stub and continue coring from a depth of 400mm bgl. At a depth of approximately 600mm steel reinforcement bars were encountered preventing further coring as the corer jammed on the rebar.

Due to concern about completing the borehole a second borehole (BH02) was attempted where it was hoped concrete was less thick. The concrete corer was used from ground level through the ceramic tiles to a depth of 250mm. However, progress was very slow below 200mm depth as the concrete was disintegrating during the coring clogging the bit. As the core hole was only 150mm diameter using a breaker was very restrictive. It was decided to have a further attempt at BH01.

Utilising the breaker at BH01 it was possible to prove the base of the concrete at 650mm depth. It was then possible to use dynamic sampler tubes to complete the borehole to a depth of 5.45m. Photographs of the borehole are included in Appendix A

Insitu SPT's were undertaken at 0.65m, 1.50, 2.50, 3.50, 4.50 and 5.00m. The factual information of the exploratory holes records is included in Appendix A and laboratory testing results are included in Appendix B.

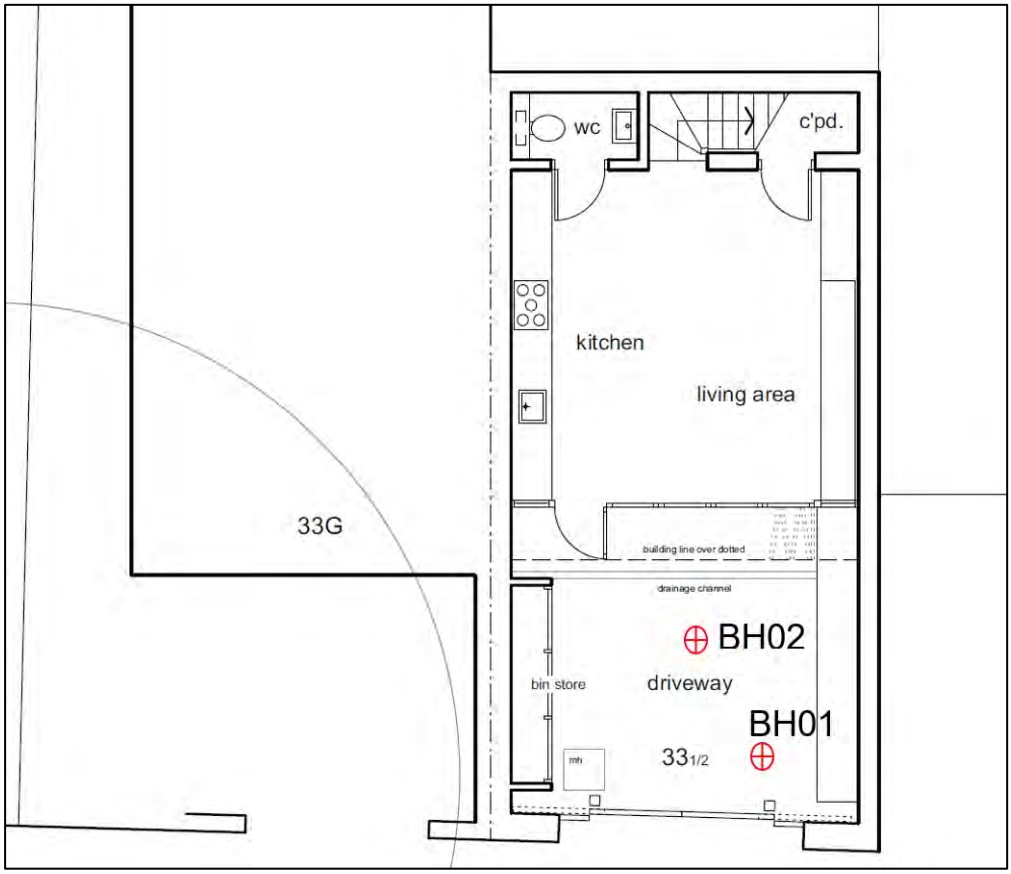


Figure 3.1 Exploratory Hole Locations

4 Laboratory Testing

Laboratory tests to determine the geotechnical properties of the soil were scheduled by MGC and carried out by i2 Laboratories Ltd generally in accordance with BS1377:1990 and UKAS. The tests included:

Test type	No. of tests	Test Method
Moisture Content	5	BS1377:1990
Plasticity Index - 1 point Liquid Limit	5	BS1377:1990
pH, and water-soluble sulphate,	2	BRE SD1
WAC Full Solid Contamination Suite	1	ISO 17025

The laboratory test reports are included in Appendix B.

5 Groundwater Monitoring

The groundwater level was monitored in the borehole installation on completion of drilling. On completion of drilling the borehole was dry to 5.45m. A groundwater monitoring installation was installed to 5.00m. The installation comprised a gravel pack from 5.00 to 1.00m depth with a slotted pipe from 5.00 to 1.00m and solid pipe in bentonite to ground level -0.1m. The pipe had a rubber bung sealing the top and was protected by a stock cock cover. A ceramic tile was placed over the installation. The results of the monitoring shown in Table 5.1.

Table 5.1 Groundwater Monitoring

Date of Monitoring	Groundwater (depth metres below ground level)
01/11/21	groundwater encountered drilling as approximately 2.75 m bgl
01/11/21	2.75 m bgl
09/11/21	0.75 m bgl

6 References

BS 1377:1990. British Standard Methods of test for soils for Civil engineering purposes. British Standards Institution.

BS 5930: 2015. *Code of practice for Ground Investigation.* British Standards Institution.

BS EN 1997-2 Eurocode 7 Geotechnical Design Part 2 Ground Investigation and Testing – inc. corrigendum 2010

BGS Geology of Britain Viewer (*http://mapapps.bgs.ac.uk/geologyofbritain/home.html)*

BRE SD1: 2005. Concrete in Aggressive Ground

Appendix A Exploratory Hole Records

MAUND GEO-CONSULTING

Julian Maund BSc PhD MIMMM CEng FGS CGeol
Registered Ground Engineering Adviser

Maund Geo-Consulting Ltd
3 Coopers Square
Chipping Norton
OX7 5DG
julian.maund@gmail.com

Borehole No.

BH01

Sheet 1 of 1

Project Name:	33 1/2 Mill Lane NW6 1NZ	Project No: 21-51	Co -ords 524908 , 185163
Location:	Front patio area		Level: (m AOD) 64.00 (Approx.)
Client:	Mr M. Osanyintuyi		Date Drilled: 12/10/21

Hole Type: PM Trent lined

Hole Diameter: 200 to 51 mm

Logged By: JGM

Well	Water Strikes	Sampling and Insitu Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.50	D1		0.65	63.35		Made Ground: Ceramic tile (10mm thick) over concrete. Concrete has steel 10 and 8mm diameter reinforcement bars in three layers from 0.60 to 0.63m depth
		0.65	D2	N=9 (10,7/ 4, 2, 1, 2)				Firm to stiff brown to grey silty CLAY with fine sandy partings and occasional selenite crystals (London Clay Formation)
		1.50	D3	N=12 (4,3/ 3, 3, 3, 3)				
	▼	2.50	D4	N= 10 (3,1/ 3, 2, 2, 3)				
		3.50	D5	N=16 (3,4/ 4, 4, 4, 4)				
		4.50	D6	N= 21 (4,4/ 5, 5, 5, 6)				
		5.00	D7	N= 25 (4,5)/ 5, 6, 6, 8	5.45	58.55		Borehole complete at 5.45 m

Remarks

Borehole cored through concrete with 200mm diameter corer to 0.6m. Breaker used to get through reinforcement. Possible groundwater at 2.50m.
Standpipe Peizometer installed to depth of 5.0m. Bentonite seal from 0.65 to 0.1 m. Gas bung and flat cover

MAUND GEO-CONSULTING

Julian Maund BSc PhD MIMMM CEng FGS CGeol
Registered Ground Engineering Adviser

Maund Geo-Consulting Ltd
3 Coopers Square
Chipping Norton
OX7 5DG
julian.maund@gmail.com

Borehole No.

BH02

Sheet 1 of 1

Project Name:	33 1/2 Mill Lane NW6 1NZ	Project No: 21-51	Co -ords 524908 , 185159
Location:	Front patio area		Level: (m AOD) 64.00 (Approx.)
Client:	Mr M. Osanyintuyi		Date Drilled: 01/11/21

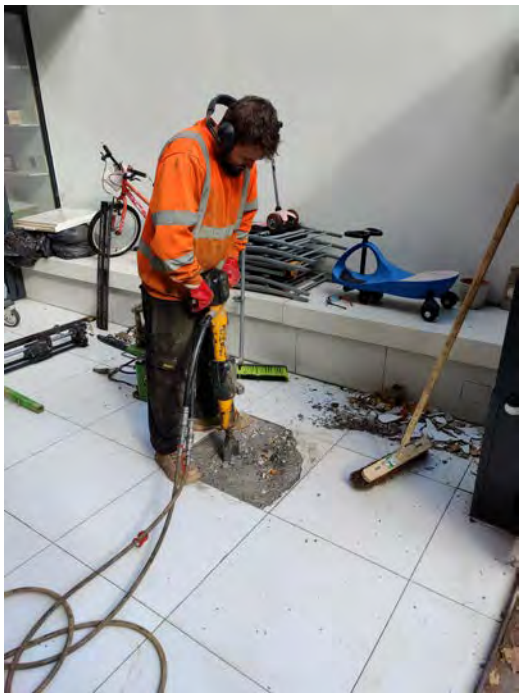
Hole Type: PM Trent lined

Hole Diameter: 150mm

Logged By: JGM

Well	Water Strikes	Sampling and Insitu Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.25	63.75		Made Ground: Ceramic tile (10mm thick) over concrete. Concrete
								Borehole abandoned at 0.25 m

Remarks: Borehole cored through concrete with 150mm diameter corer to 0.25m. Borehole abandoned due to lack of progress with corer.

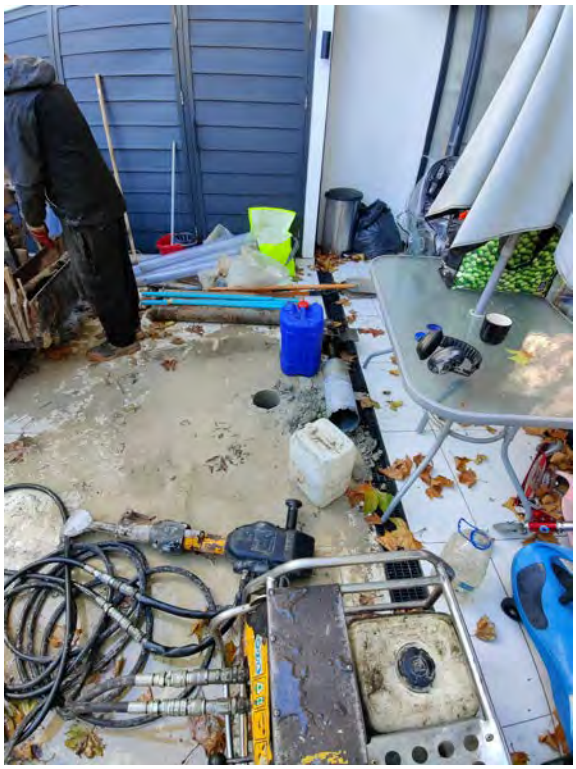


BH01 Location Breaking out concrete 13/10/21

BH01 Concrete Coring 13/10/21

BH01 core broken out 01/11/21 with rebar at 600mm bgl

BH01 rebar from base of concrete 01/11/21



BH02 Attempt 01/11/21

BH01 conventional drilling with Trent tracked rig.01/11/21

Appendix B Laboratory Test Reports

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Maund GeoConsulting Ltd
Client Address: 3 Coopers Square, Chipping Norton OX7 5DG

Contact: Julian Maund
Site Address: 33.5 Mill Lane

Client Reference: MGC-21-51
Job Number: 21-82192
Date Sampled: 01/11/2021
Date Received: 03/11/2021
Date Tested: 11/11/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

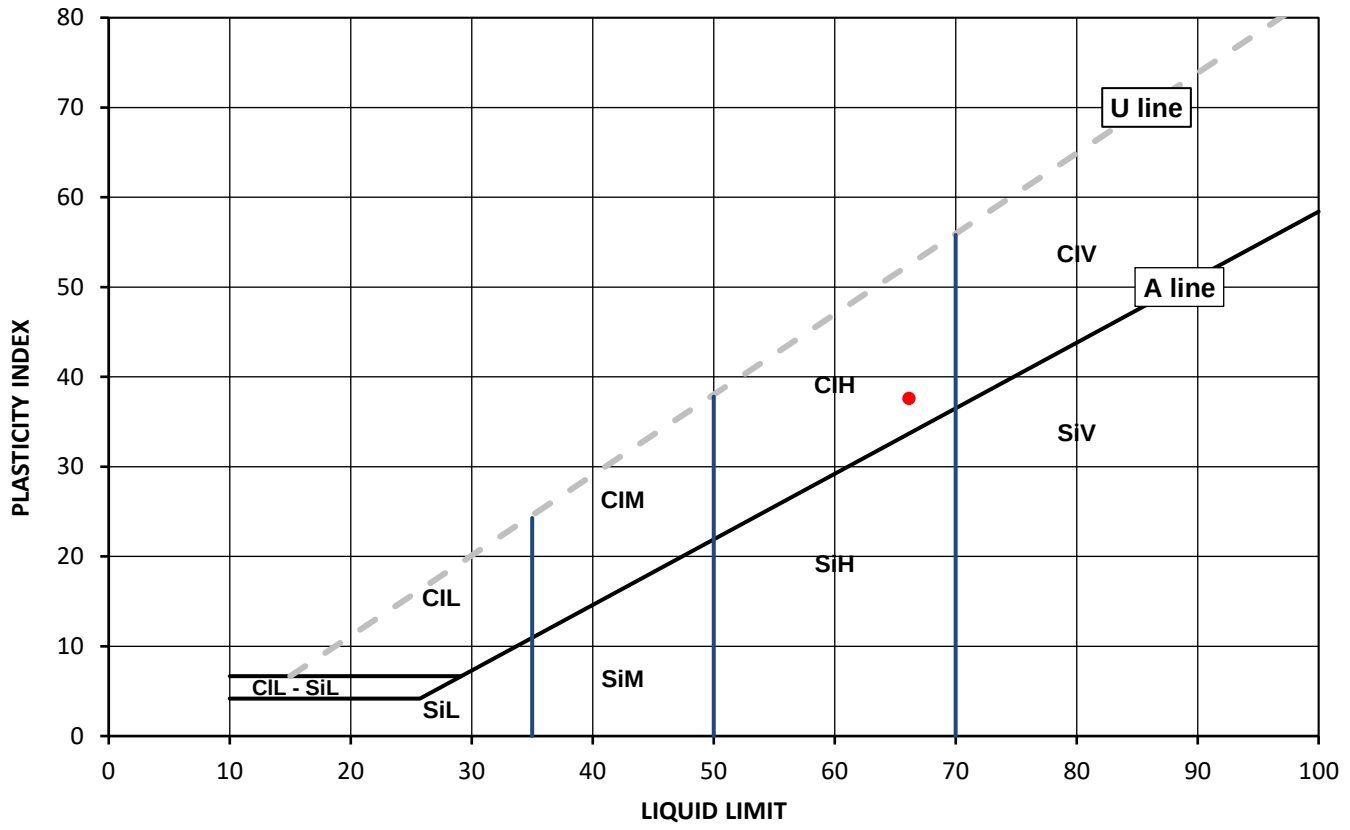
Test Results:

Laboratory Reference: 1910526
Hole No.: BH01
Sample Reference: Not Given
Soil Description: Brown slightly sandy CLAY

Depth Top [m]: 0.65
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
28	67	28	37	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 11/11/2021

GF 232.10

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

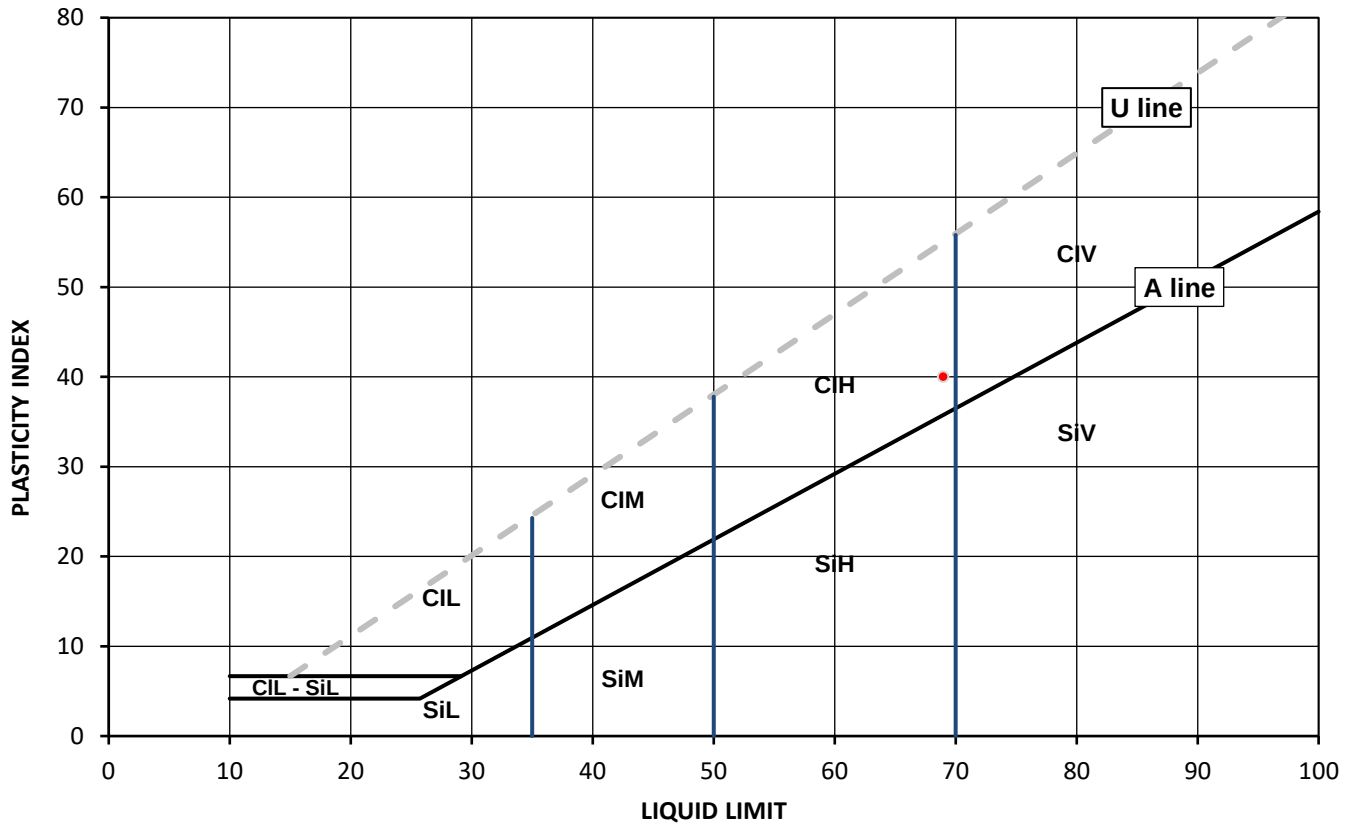
Client:	Maund GeoConsulting Ltd	Client Reference:	MGC-21-51
Client Address:	3 Coopers Square, Chipping Norton OX7 5DG	Job Number:	21-82192
		Date Sampled:	01/11/2021
	Julian Maund	Date Received:	03/11/2021
Contact:	33.5 Mill Lane	Date Tested:	11/11/2021
Site Address:		Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1910527	Depth Top [m]:	1.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Brown slightly sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22	69	29	40	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 11/11/2021

GF 232.10

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

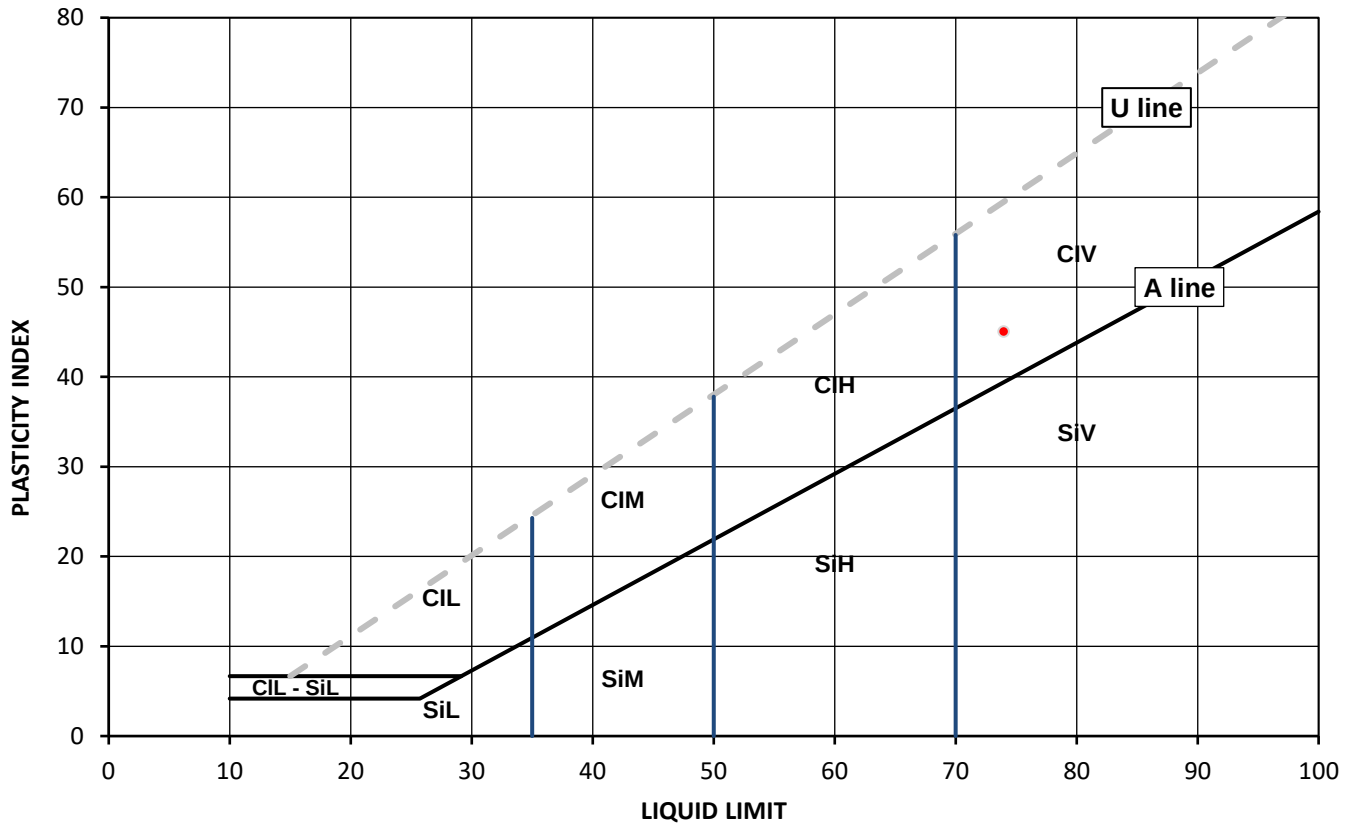
Client:	Maund GeoConsulting Ltd	Client Reference:	MGC-21-51
Client Address:	3 Coopers Square, Chipping Norton OX7 5DG	Job Number:	21-82192
		Date Sampled:	01/11/2021
	Julian Maund	Date Received:	03/11/2021
Contact:	33.5 Mill Lane	Date Tested:	11/11/2021
Site Address:		Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1910528	Depth Top [m]:	3.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Brown slightly sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
24	74	29	45	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 11/11/2021

GF 232.10

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

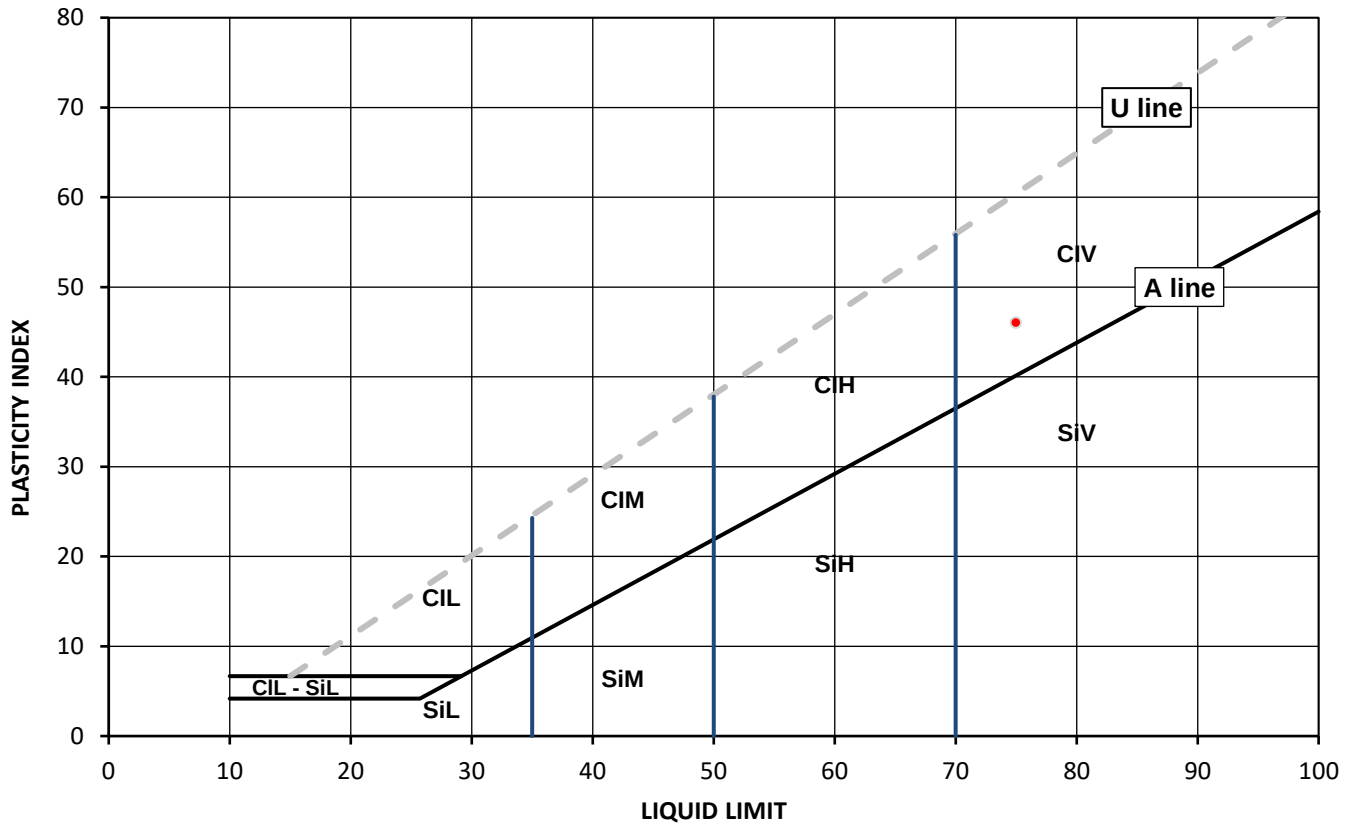
Client:	Maund GeoConsulting Ltd	Client Reference:	MGC-21-51
Client Address:	3 Coopers Square, Chipping Norton OX7 5DG	Job Number:	21-82192
		Date Sampled:	01/11//2021
	Julian Maund	Date Received:	03/11/2021
Contact:	33.5 Mill Lane	Date Tested:	11/11/2021
Site Address:		Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1910529	Depth Top [m]:	4.50
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Brown slightly sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23	75	29	46	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 11/11/2021

GF 232.10

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	Maund GeoConsulting Ltd	Client Reference:	MGC-21-51
Client Address:	3 Coopers Square, Chipping Norton OX7 5DG	Job Number:	21-82192
		Date Sampled:	01/11/2021
	Julian Maund	Date Received:	03/11/2021
Contact:	33.5 Mill Lane	Date Tested:	11/11/2021
Site Address:		Sampled By:	Client

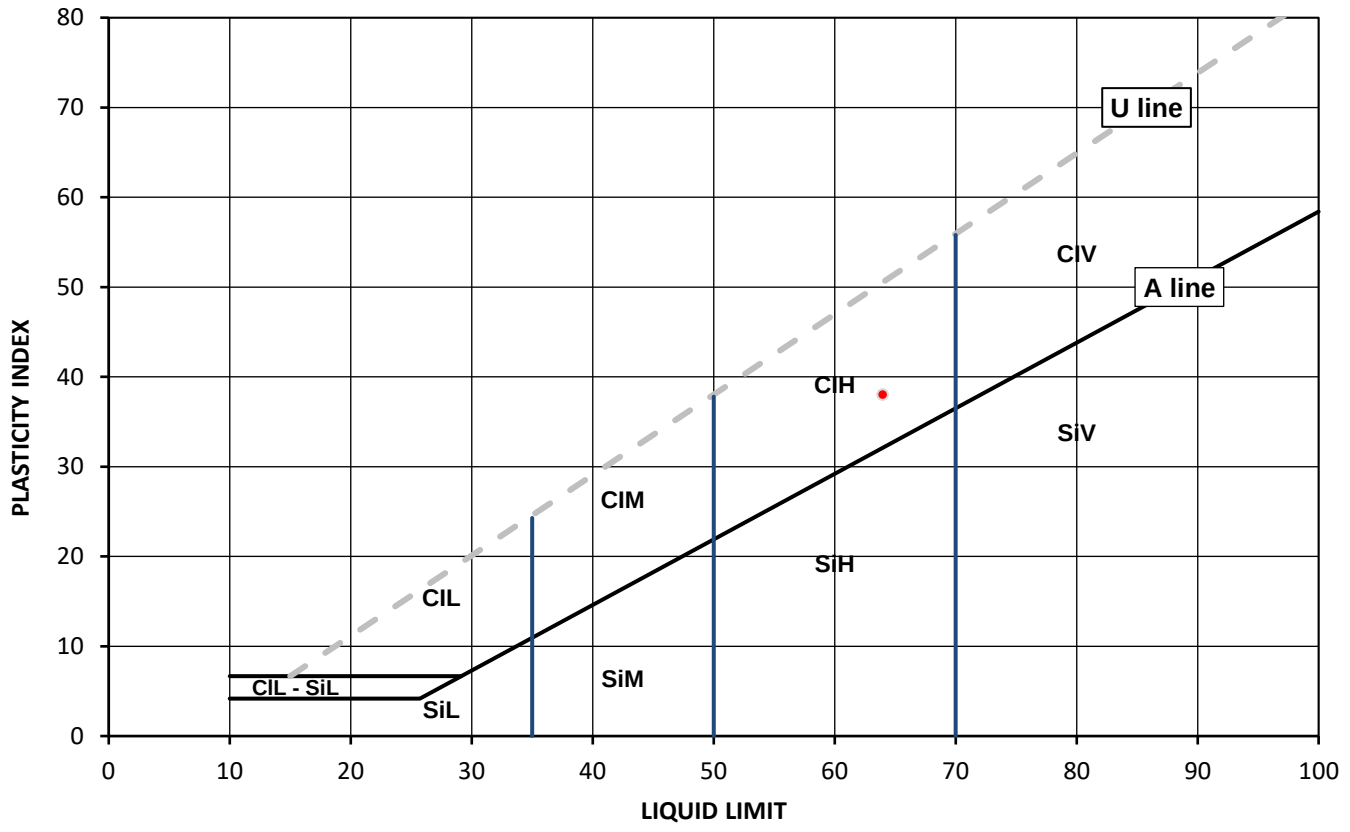
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1910530	Depth Top [m]:	5.00
Hole No.:	BH01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Brown sandy CLAY		

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	64	26	38	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 11/11/2021

GF 232.10

SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client: Maund GeoConsulting Ltd

Client Address: 3 Coopers Square, Chipping Norton OX7 5DG

Contact: Julian Maund

Site Address: 33.5 Mill Lane

Client Reference: MGC-21-51
Job Number: 21-82192
Date Sampled: 01/11/2021
Date Received: 03/11/2021
Date Tested: 11/11/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top m	Depth Base m	Type			%	%	% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3	%		
1910526	BH01	Not Given	0.65	Not Given	D	Brown slightly sandy CLAY	Atterberg 1 Point	27		100	63	28	35						
1910527	BH01	Not Given	1.50	Not Given	D	Brown slightly sandy CLAY	Atterberg 1 Point	22		100	69	29	40						
1910528	BH01	Not Given	3.50	Not Given	D	Brown slightly sandy CLAY	Atterberg 1 Point	24		100	74	29	45						
1910529	BH01	Not Given	4.50	Not Given	D	Brown slightly sandy CLAY	Atterberg 1 Point	23		100	75	29	46						
1910530	BH01	Not Given	5.00	Not Given	D	Brown sandy CLAY	Atterberg 1 Point	18		100	64	26	38						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 11/11/2021

GF 234.12

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Analytical Report Number 21-82205

Project / Site name:	33.5 Mill Lane	**Samples received on:**	03/11/ 2021
Your job number:	MGC-21-51	**Samples instructed on/ Analysis started on:**	11/11/ 2021
Your order number:		**Analysis completed by:**	11/11/ 2021
Report Issue Number:	1	**Report issued on:**	12/11/ 2021
Samples Analysed:	2 soil samples		

Signed: A. Czerwinska

Agnieszka Czerwinska Technical Reviewer (Reporting Team) **For & on behalf of i2 Analytical Ltd.**

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionier6w 39, 41 -711 Ruda Slijska, Poland.

Accredited tests are defined within the report , opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-82204
Project / Site name: 29 Gondar Gardens

Lab Sample Number				1910590	1910591
Sample Reference				BH01	BH01
Sample Number				None Supplied	None Supplied
Depth (m)				0.65	1.50
Date Sampled				101/11/2021	01/11/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	22	16
Total mass of sample received	kg	0.001	NONE	0.20	0.20
General Inorganics					
pH - Automated	pH Units	N/A	MCERTS	7.2	7.6
Total Sulphate as SO4	%	0.005	MCERTS	0.038	0.018
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.052	0.058
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	4.3	2.6
Total Sulphur	%	0.005	MCERTS	0.014	0.067
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	3.3	< 2.0
Heavy Metals / Metalloids					
Magnesium (water soluble)	mg/kg	5	NONE	21	99
Magnesium (leachate equivalent)	mg/l	2.5	NONE	10	49

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-82204

Project / Site name: 29 Gondar Gardens

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1910590	BH01	None Supplied	1.2	Light brown clay and sand.
1910591	BH01	None Supplied	2	Brown clay.

Analytical Report Number: 21-82204
Project / Site name: 29 Gondar Gardens

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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Analytical Report Number : 21-16739

Project / Site name:	33.5 Mill Lane NW6 1NZ	**Samples received on:**	02/11/2021
Your job number:	MGC-21-51	**Samples instructed on/ Analysis started on:**	03/11/2021
Your order number:		**Analysis completed by:**	11/11/2021
Report Issue Number:	1	**Report issued on:**	12/11/2021
Samples Analysed:	1 10:1 WAC sample		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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Waste Acceptance Criteria Analytical Results

Report No:	**21-16738**						
					Client:	**MAUNDGEO**	
Location	**221-16739-1 33.5 Mill Lane NW6 1NZ**						
Lab Reference (Sample Number)	2049235 / 2049236				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	01/11/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BH01						
Depth (m)	0.65						
Solid Waste Analysis							
TOC (%)**	1.7				3%	5%	6%
Loss on Ignition (%) **	6.4				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	3.15				100	--	--
pH (units)**	8.2				--	>6	--
Acid Neutralisation Capacity (mol / kg)	23				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.0010			< 0.0100	0.5	2	25
Barium *	0.0125			0.111	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0009			0.0083	0.5	10	70
Copper *	0.0068			0.060	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	< 0.0004			< 0.0040	0.5	10	30
Nickel *	0.0032			0.029	0.4	10	40
Lead *	0.0071			0.063	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0082			0.072	4	50	200
Chloride *	2.1			18	800	15000	25000
Fluoride	0.20			1.8	10	150	500
Sulphate *	4.5			40	1000	20000	50000
TDS*	51			450	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	8.90			78.5	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.80						
Dry Matter (%)	79						
Moisture (%)	21						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.
*= UKAS accredited (liquid eluate analysis only)
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation
** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 21-16739
Project / Site name: 33.5 Mill Lane NW6 1NZ

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2049235	BH01	None Supplied	0.5	Brown clay and loam with gravel and brick.

Analytical Report Number : 21-16739
Project / Site name: 33.5 Mill Lane NW6 1NZ

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 21-16739
Project / Site name: 33.5 Mill Lane NW6 1NZ

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

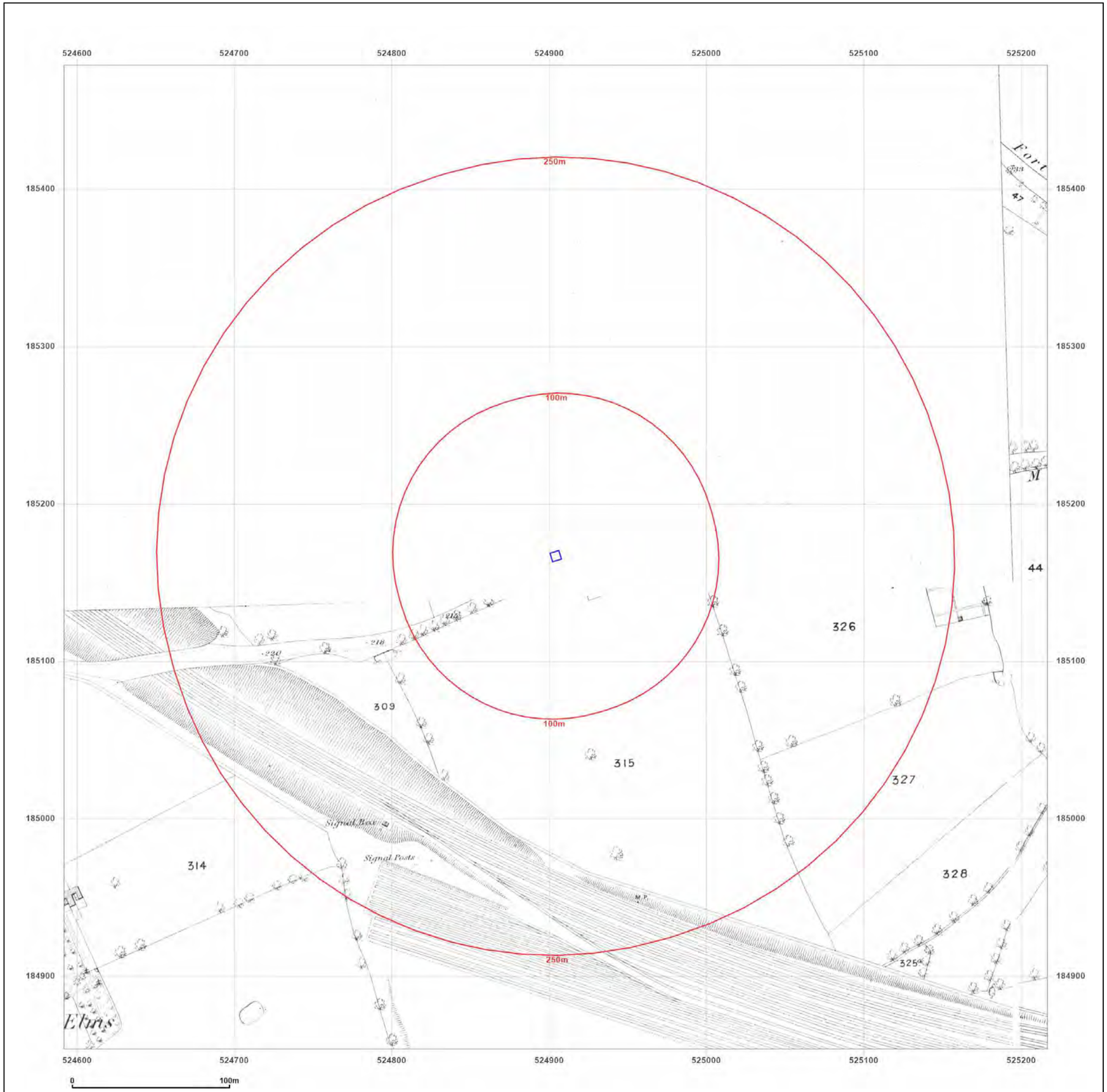
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report

Analytical Report Number : 21-16739
Project / Site name: 33.5 Mill Lane NW6 1NZ

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH01	None Supplied	S	2049235	b	BTEX in soil (Monoaromatics)	L073B-PL	b
BH01	None Supplied	S	2049235	b	Mineral Oil (Soil) C10 - C40	L076-PL	b
BH01	None Supplied	S	2049235	b	PCB's By GC-MS in soil	L027-PL	b
BH01	None Supplied	S	2049235	b	Speciated WAC-17 PAHs in soil	L064-PL	b
BH01	None Supplied	S	2049235	b	Total BTEX in soil (Poland)	L073-PL	b

Appendix C Historical Maps



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Site Details:

33E, MILL LANE, LONDON,
NW6 1NZ

Client Ref: MGG-21-44
Report Ref: HMD-8326552
Grid Ref: 524904, 185166

Map Name: County Series

Map date: **1865-1871**

Scale: 1:2,500

Printed at: 1:2,500

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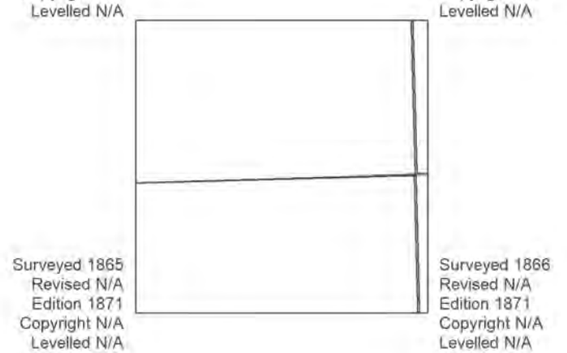

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Client Ref: MGG-21-44
Report Ref: HMD-8326552
Grid Ref: 524904, 185166

Map Name: 1056 Scale Town Plan

Map date: **1896**

Scale: 1:1,056

Printed at: 1:1,056

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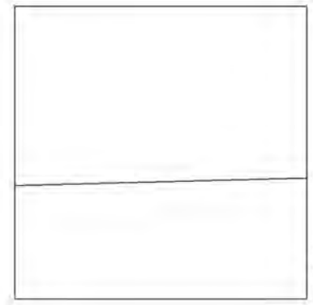

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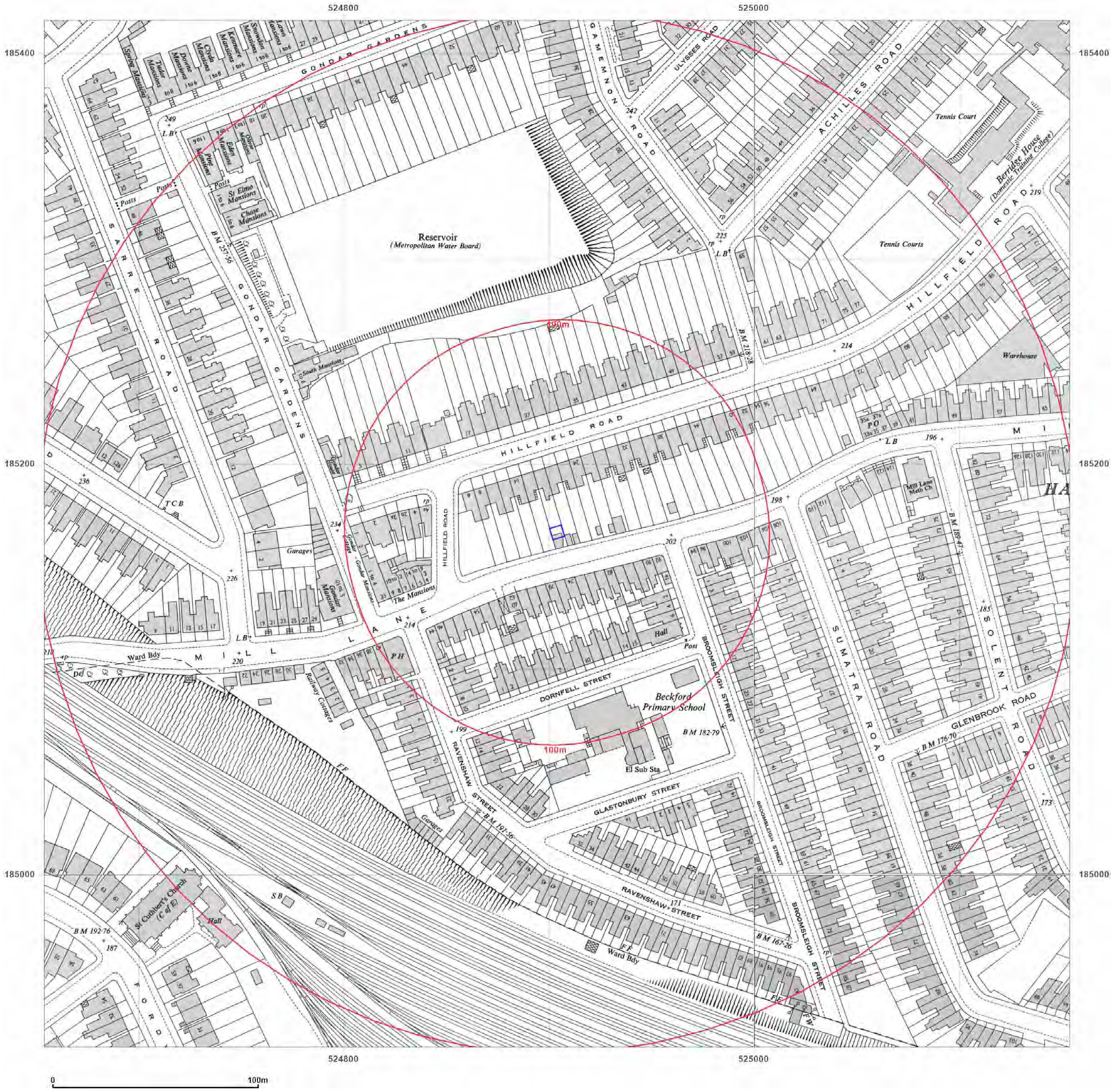

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Site Details:

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NW6 1NZ

Client Ref: MGG-21-44
Report Ref: HMD-8326552
Grid Ref: 524904, 185166

Map Name: National Grid

Map date: **1953**

Scale: 1:1,250

Printed at: 1:2,000

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~~Surveyed 1953~~ Revised 1953 Edition N/A Copyright N/A Levelled 1953	Surveyed 1953 Revised 1953 Edition N/A Copyright N/A Levelled 1933

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Groundsure INSIGHTS

Site Details:

33E, MILL LANE, LONDON,
NW6 1NZ

Client Ref: MGG-21-44
Report Ref: HMD-8326552
Grid Ref: 524904, 185166

Map Name: National Grid

Map date: **1953-1955**

Scale: 1:2,500

Printed at: 1:2,500

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Revised 1953
Edition 1955
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Surveyed 1953
Revised 1953
Edition 1955
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Levelled 1933

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Revised 1953
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Revised 1953
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Groundsure INSIGHTS

Site Details:

33E, MILL LANE, LONDON,
NW6 1NZ

Client Ref: MGG-21-44
Report Ref: HMD-8326552
Grid Ref: 524904, 185166

Map Name: National Grid

Map date: **1970-1974**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

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~~Surveyed 1953~~ Revised 1969 Edition N/A Copyright 1970 Levelled 1953	Surveyed N/A Revised N/A Edition N/A Copyright N/A Levelled N/A

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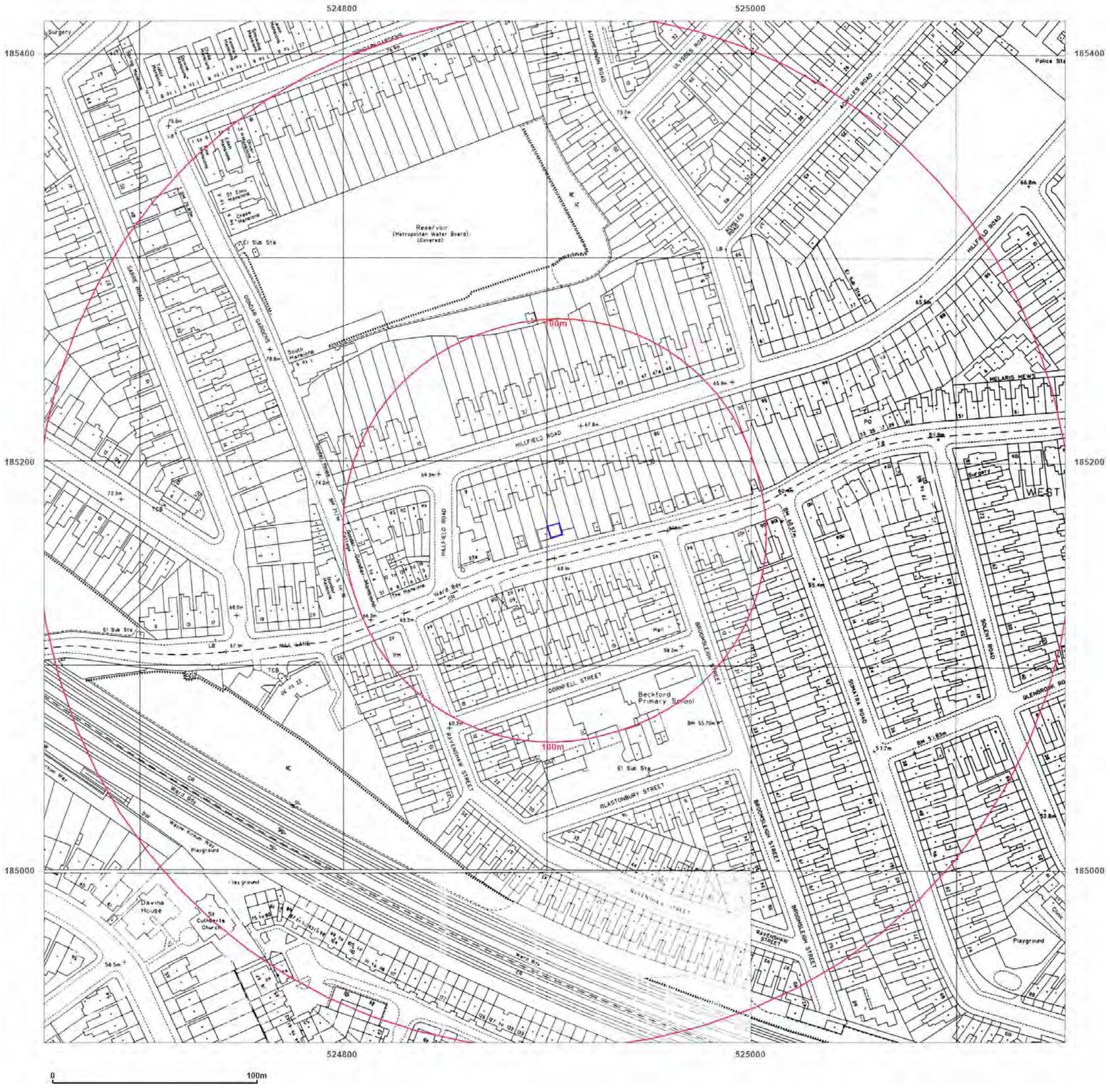

Groundsure INSIGHTS

Site Details:

33E, MILL LANE, LONDON,
NW6 1NZ

Client Ref: MGG-21-44
Report Ref: HMD-8326552
Grid Ref: 524904, 185166

Map Name: National Grid

Map date: **1991-1992**

Scale: 1:1,250

Printed at: 1:2,000

N
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S

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Groundsure INSIGHTS

Site Details:

33E, MILL LANE, LONDON,
NW6 1NZ

Client Ref: MGG-21-44
Report Ref: HMD-8326552
Grid Ref: 524904, 185166

Map Name: LandLine

Map date: **2003**

Scale: 1:1,250

Printed at: 1:1,250

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Production date: 10 November 2021

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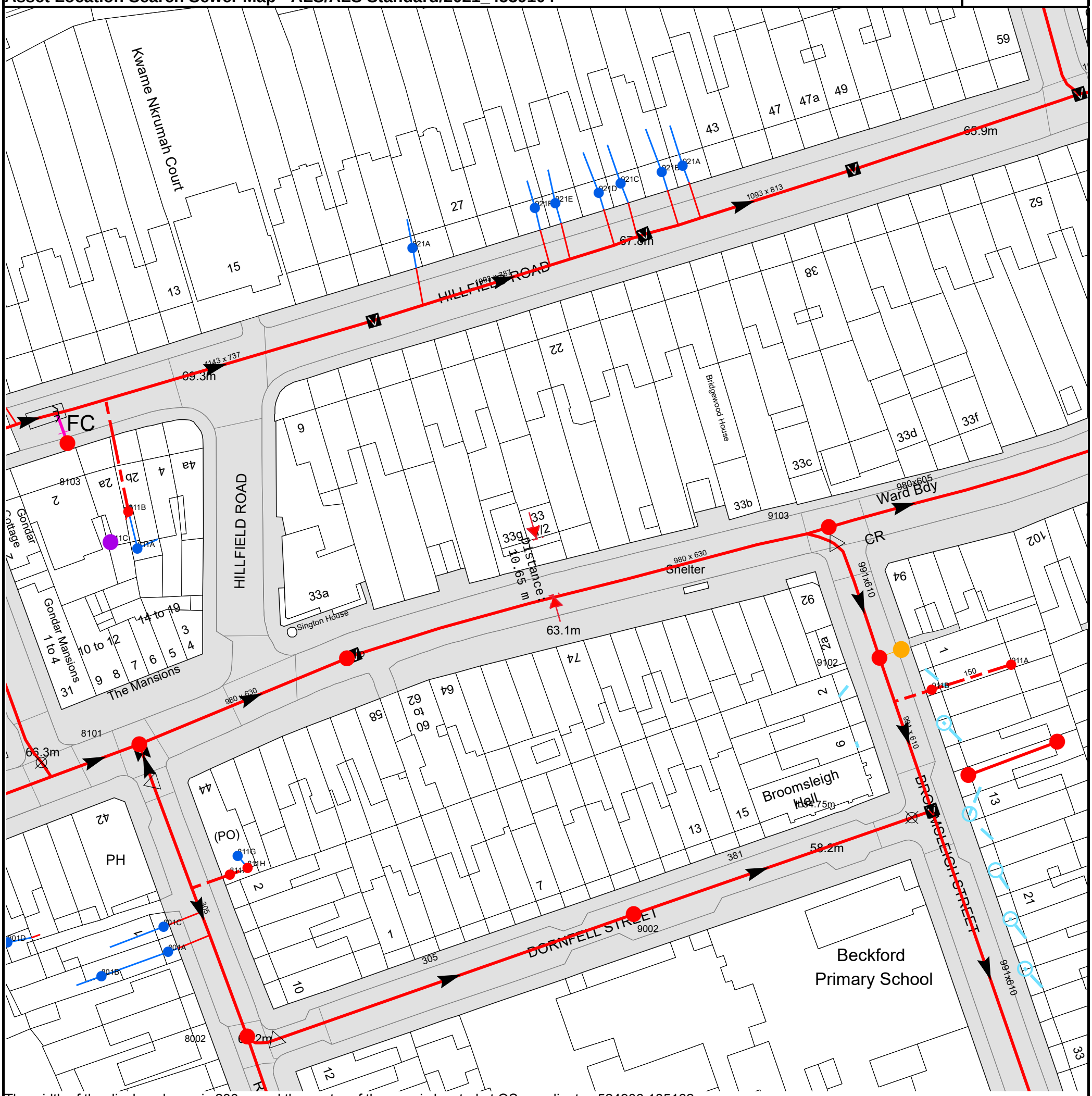
Appendix D Underground Services Drawings

Asset Location Search Sewer Map - ALS/ALS Standard/2021_4539104



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 524906,185162

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
91DH	n/a	n/a
91BJ	n/a	n/a
91BH	n/a	n/a
91DB	n/a	n/a
911B	n/a	n/a
911A	n/a	n/a
9102	60.11	56.57
9103	61.76	57.04
921A	n/a	n/a
90EE	n/a	n/a
90ED	n/a	n/a
91EC	n/a	n/a
8002	60.96	57.63
801B	n/a	n/a
801A	n/a	n/a
801D	n/a	n/a
801C	n/a	n/a
9002	59.05	56.17
811I	n/a	n/a
811H	n/a	n/a
811G	n/a	n/a
8101	65.68	61.03
811D	n/a	n/a
811A	n/a	n/a
811C	n/a	n/a
811B	n/a	n/a
8103	n/a	n/a
821A	n/a	n/a
921F	n/a	n/a
921E	n/a	n/a
921D	n/a	n/a
921C	n/a	n/a
921B	n/a	n/a

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

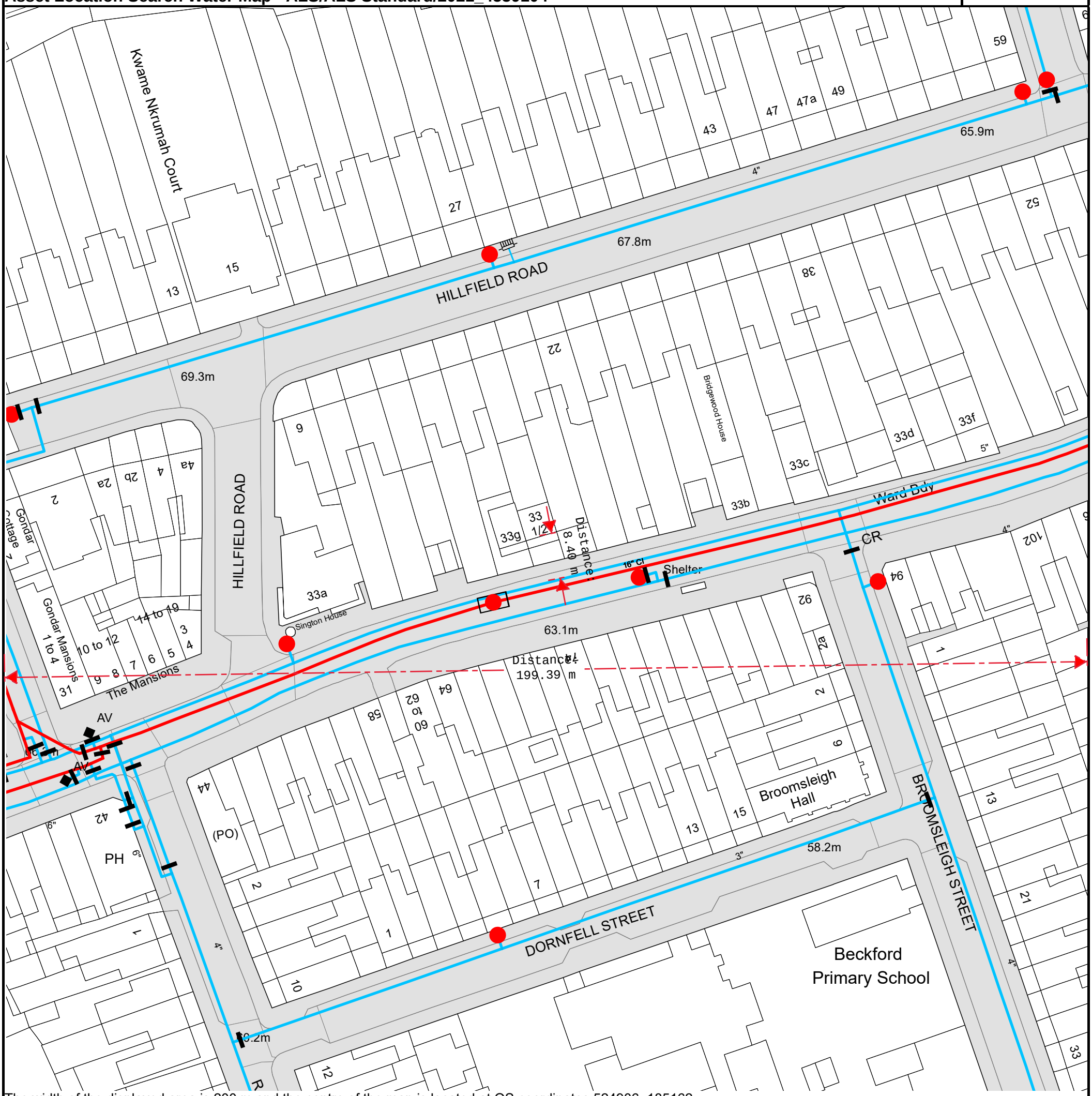
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2021_4539104



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 524906, 185162.

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

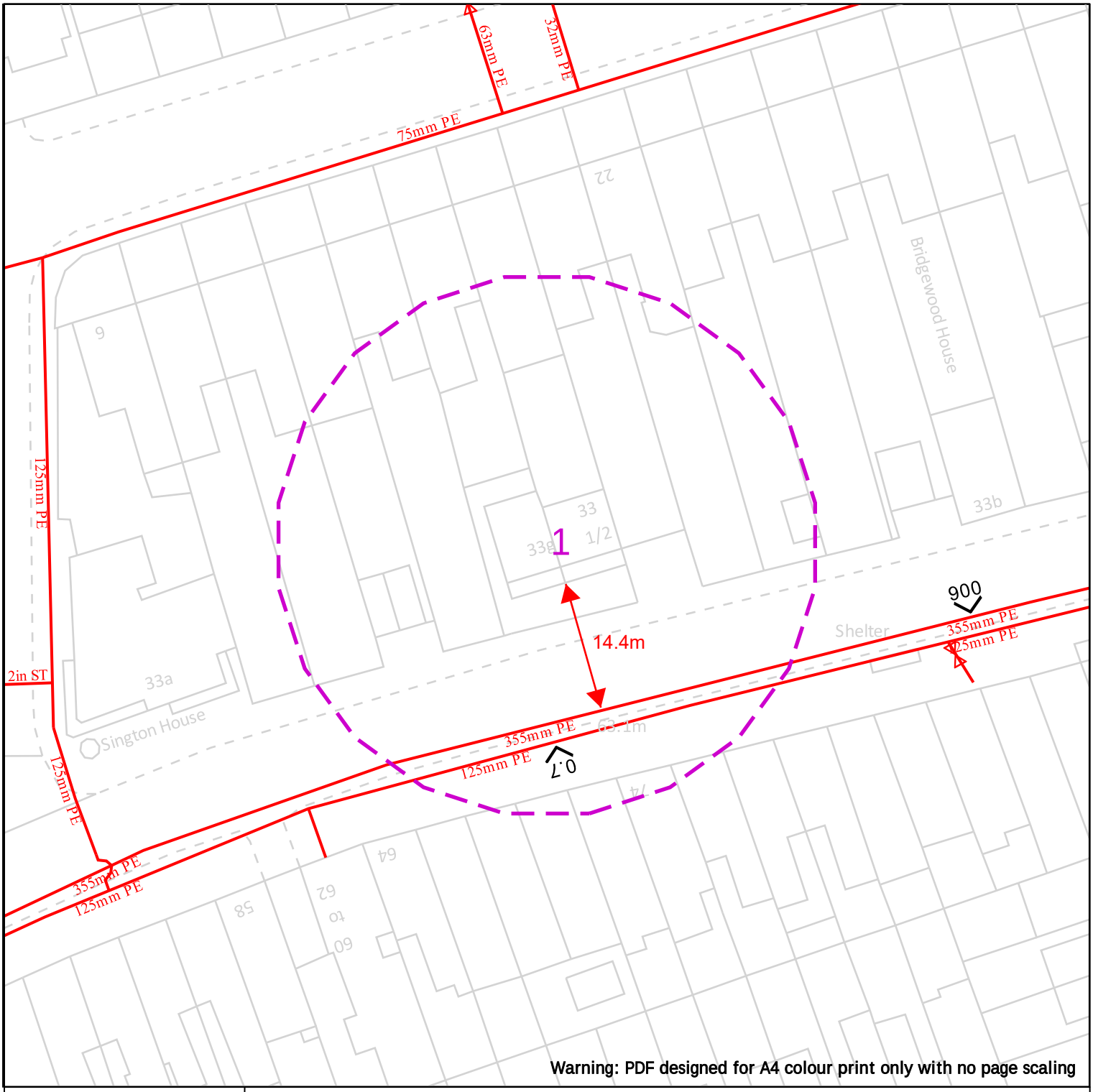
If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0800 009 4540** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.



25m

Dig Sites Area: Line:

LP Mains
MP Mains
IP Mains
LHP Mains

Valve
Depth of cover
Syphon
Diameter Change
Material Change
Out of Standard Service

Cadent
Your Gas Network

Date Requested: 10/11/2021
Job Reference: 23841120
Site Location: 524901 185165
Requested by: Mr Pawel Rogalewicz

Your Scheme/Reference: 210935-33.5 Mill Lane

View extent: 100m, 100m

Scale: 1:500 (When plotted at A4)

IMPORTANT NOTICES

This plan shows these pipes owned by Cadent Gas Limited in its role as a Licensed Gas Transporter (GT). Gas pipes owned by other GT's or otherwise privately owned may be present in this area. Information with regards to such pipes should be obtained from the relevant owners. The information shown on this plan is given without warranty, the accuracy thereof cannot be guaranteed. Service pipes, valves, syphons, stub connections etc. are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Cadent Gas Limited or their agents, servants or contractors for any errors or omission. Safe digging practices, in accordance with HS(G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near gas apparatus. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

In case of emergency call - 0800 111 999

National Grid House
Warwick Technology Park
Gallows Hill, Warwick
CV34 6DA

Electricity Emergency Number:
0800 40 40 90*
*Available 24 hours, 7 days/week.
Calls may be recorded and monitored.
www.nationalgrid.com

Asset Protection
Gas Transmission
National Grid
Warwick
Email: assetprotection@nationalgrid.com

Our Ref: 23841120 210935-33.5 Mill Lane

Wednesday, 10 November 2021

Pawel Rogalewicz
Clockshop Mews Clockshop Mews rear of 60 Saxon road

London
E255EH

National Grid Electricity – No Assets Affected

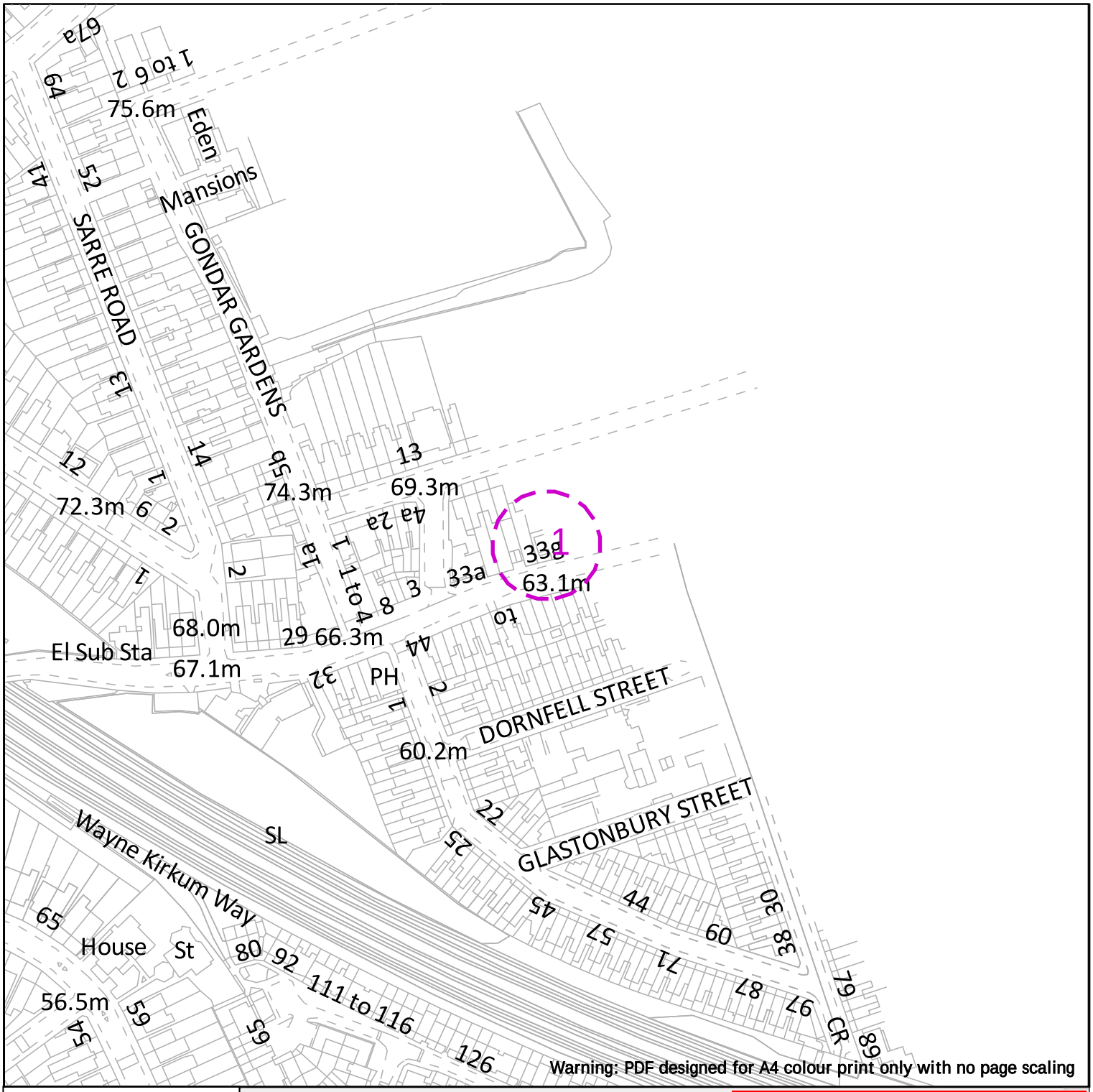
Dear Sir/ Madam,

An assessment has been carried out with respect to National Grid Electricity Transmission plc's apparatus and the proposed work location. Based on the location entered into the system for assessment the area has been found to not affect any National Grid Electricity Transmission plc's apparatus.

Please note this response and any attached map(s) are valid for 28 days

Yours sincerely

Asset Protection Team



nationalgrid

NationalGrid House
Warwick Technology Park
Gallows Hill
Warwick
CV34 6DA

AssetProtection@NationalGrid.com

100m

EXTREME CAUTION - HIGH VOLTAGE
RISK OF DEATH OR SERIOUS INJURY

Dig Sites Area: Line:

Underground Cables

Overhead Lines

Fibre Cables

Date Requested: 10/11/2021
Job Reference: 23841120
Site Location: 524901 185165
Requested by: Mr Pawel Rogalewicz

Your Scheme/Reference: 210935-33.5 Mill Lane

Scale: 1:2500 (When plotted at A4)

IMPORTANT NOTICES

This plan shows those pipes owned by National Grid Electricity Transmission plc in its role as a Licensed Electricity Transporter (ET). Electricity cables owned by other ETs, or otherwise privately owned, may be present in this area. Information with regards to such cables should be obtained from the relevant owners. The information shown on this plan is given without warranty, the accuracy thereof cannot be guaranteed. Ancillary equipment such as cooling systems and communication cables are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by National Grid Electricity Transmission plc or their agents, servants or contractors for any error or omission. Safe digging practices, in accordance with HS(G)47, must be used to verify and establish the actual position of cables and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you on or near electricity apparatus. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

National Grid Electricity Emergency Number: 0800 40 40 90

Available 24 hours, 7 days/week. Calls may be recorded and monitored

ENQUIRY SUMMARY

Received Date
10/11/2021 15:04

Work Start Date
01/04/2022

Your Reference
210935-33.5 Mill Lane

Location
Centre Point: 524901 185165
X Extent:
Y Extent:
Postcode: NW6 1NZ

Map Options
Paper Size: A4
Orientation: PORTRAIT
Scale: 1:2500
Real World Extents: 49m x 49m

Enquirer Details
Organisation Name: Croft SE
Contact Name: Pawel Rogalewicz
Email Address: pawel@croftse.co.uk
Telephone: 02086844744
Address: Clockshop Mews Clockshop Mews rear of 60 Saxon road, , London, E255EH

Enquiry Type
Planned Works

Activity Type
Domestic Works (General public)

Work Types
Domestic building project

Notes/Works Description (if supplied)

Appendix E PDISP Input and output

Titles

Job No.: MGC-21-51
Job Title: 33.5 Mill Lane
Sub-title: Basement Impact Assessment
Calculation Heading: undrained
Initials: JGM
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 33.5 Mill Lane Undrained.pdd
File Path: F:\OneDrive\Documents\Croft Structural Engineers\33 Mill Lane NW6 1NZ\07-GIR Mill Lane\PDisp

History

Date	Time	By	Notes
18-Nov-2021	12:37	Maund Geo Consulting	New
18-Nov-2021	13:56	Maund Geo Consulting	
18-Nov-2021	14:24	Maund Geo Consulting	
18-Nov-2021	15:32	Maund Geo Consulting	
13-Jun-2022	14:24	Maund Geo Consulting	

Analysis Options

General

Global Poisson's ratio: 0.20
Maximum allowable ratio between values of E: 1.5
Horizontal rigid boundary level: 53.50 [m OD]
Displacements at load centroids: Yes
GSA piled raft data : No

Elastic

Elastic : Yes

Soil ProfilesSoil Profile 1

Layer ref.	Name	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	London Clay Formation	63.500	20	17000.	71000.	0.50000	None

Soil Zones

Zone	Name	X min [m]	X max [m]	Y min [m]	Y max [m]	Profile
1	zone 1	0.0	15.000	0.0	20.000	Soil Profile 1

Polygonal Load Data

Load ref.	Name	Position : Level [m]	Position : Polygon : Coords. [m]	Position : Polygon : Rect. tolerance [%]	No. of Rectangles	Value : Normal (local z) [kN/m²]
1	Basement Excavation	60.15000	(5,5) (10.5,5) (10.5,14) (5,14) (5,5)	10.000	1	-67.000

Polygonal Loads' Rectangles

No.	Centre : x [m]	Centre : y [m]	Angle of local x from global X [Degrees]	Width x [m]	Depth y [m]
Load 1 : Basement Excavation					
(Edge 1 optimal)					
1	7.75000	9.50000	0.0	5.5000	9.0000

Displacement Lines

Name	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals [No.]	Calculate	Detailed Results
Section 1 West- East	0.00000	9.50000	63.50000	15.00000	9.50000	63.50000	15	Yes	Yes
Section 2 South - North	7.50000	0.00000	63.50000	7.50000	20.00000	63.50000	20	Yes	Yes

Displacement Grids

Name	Extrusion: Direction	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals Along Line [No.]	Extrusion: Distance [m]	Extrusion: Calculate	Intervals Along [No.]	Detailed Results
Displacemetn Grid	Global X	0.00000	0.00000	63.50000	-	20.00000	63.50000	20	15.00000	Yes	10	Yes

Results : Immediate : Load Centres : Polygonal

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Basement Excavation	7.75000	9.50000	60.50000	-5.17134	60.405	-66.999	-156.67	-657.43E-6

Results : Total : Load Centres : Polygonal

None

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]

Results : Immediate : Displacement Data : Lines

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Section 1 West- East	0.00000	9.50000	63.50000	0.05560	63.326	0.0	0.0	0.0
1	Section 1 West- East	1.00000	9.50000	63.50000	0.00033	63.326	0.0	0.0	0.0
1	Section 1 West- East	2.00000	9.50000	63.50000	-0.12343	63.326	0.0	0.0	0.0
1	Section 1 West- East	3.00000	9.50000	63.50000	-0.38715	63.326	0.0	0.0	0.0
1	Section 1 West- East	4.00000	9.50000	63.50000	-0.96371	63.326	0.0	0.0	0.0
1	Section 1 West- East	5.00000	9.50000	63.50000	-2.75404	63.326	0.0	0.0	0.0
1	Section 1 West- East	6.00000	9.50000	63.50000	-4.52194	63.326	0.0	0.0	0.0
1	Section 1 West- East	7.00000	9.50000	63.50000	-5.01896	63.326	0.0	0.0	0.0
1	Section 1 West- East	8.00000	9.50000	63.50000	-5.10223	63.326	0.0	0.0	0.0
1	Section 1 West- East	9.00000	9.50000	63.50000	-4.83787	63.326	0.0	0.0	0.0
1	Section 1 West- East	10.00000	9.50000	63.50000	-3.97892	63.326	0.0	0.0	0.0
1	Section 1 West- East	11.00000	9.50000	63.50000	-1.52373	63.326	0.0	0.0	0.0
1	Section 1 West- East	12.00000	9.50000	63.50000	-0.61695	63.326	0.0	0.0	0.0
1	Section 1 West- East	13.00000	9.50000	63.50000	-0.23079	63.326	0.0	0.0	0.0
1	Section 1 West- East	14.00000	9.50000	63.50000	-0.04977	63.326	0.0	0.0	0.0
1	Section 1 West- East	15.00000	9.50000	63.50000	0.03382	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	0.00000	63.50000	0.05472	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	1.00000	63.50000	0.01345	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	2.00000	63.50000	-0.08496	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	3.00000	63.50000	-0.30731	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	4.00000	63.50000	-0.82535	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	5.00000	63.50000	-2.55081	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	6.00000	63.50000	-4.27623	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	7.00000	63.50000	-4.79326	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	8.00000	63.50000	-5.01055	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	9.00000	63.50000	-5.09297	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	10.00000	63.50000	-5.09297	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	11.00000	63.50000	-5.01055	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	12.00000	63.50000	-4.79326	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	13.00000	63.50000	-4.27623	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	14.00000	63.50000	-2.55081	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	15.00000	63.50000	-0.82535	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	16.00000	63.50000	-0.30731	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	17.00000	63.50000	-0.08496	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	18.00000	63.50000	0.01345	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	19.00000	63.50000	0.05472	63.326	0.0	0.0	0.0
2	Section 2 South - North	7.50000	20.00000	63.50000	0.06900	63.326	0.0	0.0	0.0

Results : Total : Displacement Data : Lines

None

Results : Immediate : Displacement Data : Grids

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Displacemetn Grid	0.00000	0.00000	63.50000	0.06785	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	0.00000	63.50000	0.07152	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	0.00000	63.50000	0.07071	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	0.00000	63.50000	0.06536	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	0.00000	63.50000	0.05849	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	0.00000	63.50000	0.05472	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	0.00000	63.50000	0.05669	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	0.00000	63.50000	0.06301	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	0.00000	63.50000	0.06935	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	0.00000	63.50000	0.07180	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	0.00000	63.50000	0.06948	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	1.00000	63.50000	0.07169	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	1.00000	63.50000	0.07195	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	1.00000	63.50000	0.06311	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	1.00000	63.50000	0.04471	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	1.00000	63.50000	0.02418	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	1.00000	63.50000	0.01345	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	1.00000	63.50000	0.01900	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	1.00000	63.50000	0.03751	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	1.00000	63.50000	0.05786	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	1.00000	63.50000	0.07016	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	1.00000	63.50000	0.07257	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	2.00000	63.50000	0.07392	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	2.00000	63.50000	0.06752	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	2.00000	63.50000	0.04233	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	2.00000	63.50000	-0.00524	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	2.00000	63.50000	-0.05800	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	2.00000	63.50000	-0.08496	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	2.00000	63.50000	-0.07109	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	2.00000	63.50000	-0.02382	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	2.00000	63.50000	0.02867	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	2.00000	63.50000	0.06163	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	2.00000	63.50000	0.07332	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	3.00000	63.50000	0.07408	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	3.00000	63.50000	0.05651	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	3.00000	63.50000	0.00081	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	3.00000	63.50000	-0.11154	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	3.00000	63.50000	-0.24304	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	3.00000	63.50000	-0.30731	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	3.00000	63.50000	-0.27471	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	3.00000	63.50000	-0.15787	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	3.00000	63.50000	-0.03025	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	3.00000	63.50000	0.04339	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	3.00000	63.50000	0.07104	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	4.00000	63.50000	0.07209	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	4.00000	63.50000	0.03835	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	4.00000	63.50000	-0.06803	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	4.00000	63.50000	-0.32741	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	4.00000	63.50000	-0.67855	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	4.00000	63.50000	-0.82535	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	4.00000	63.50000	-0.75369	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	4.00000	63.50000	-0.45262	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	4.00000	63.50000	-0.13292	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	4.00000	63.50000	0.01415	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	4.00000	63.50000	0.06560	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	5.00000	63.50000	0.06844	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	5.00000	63.50000	0.01504	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	5.00000	63.50000	-0.16028	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	5.00000	63.50000	-0.74107	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	5.00000	63.50000	-2.25366	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	5.00000	63.50000	-2.55081	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	5.00000	63.50000	-2.41500	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	5.00000	63.50000	-1.36098	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	5.00000	63.50000	-0.27883	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	5.00000	63.50000	-0.02327	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	5.00000	63.50000	0.05784	63.326	0.0	0.0	0.0

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Displacemetn Grid	0.00000	6.00000	63.50000	0.06410	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	6.00000	63.50000	-0.00894	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	6.00000	63.50000	-0.25306	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	6.00000	63.50000	-1.15503	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	6.00000	63.50000	-3.82884	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	6.00000	63.50000	-4.27623	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	6.00000	63.50000	-4.07634	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	6.00000	63.50000	-2.26956	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	6.00000	63.50000	-0.42521	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	6.00000	63.50000	-0.06131	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	6.00000	63.50000	0.04940	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	7.00000	63.50000	0.06013	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	7.00000	63.50000	-0.02891	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	7.00000	63.50000	-0.32316	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	7.00000	63.50000	-1.37126	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	7.00000	63.50000	-4.26381	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	7.00000	63.50000	-4.79326	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	7.00000	63.50000	-4.55455	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	7.00000	63.50000	-2.56435	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	7.00000	63.50000	-0.52885	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	7.00000	63.50000	-0.09223	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	7.00000	63.50000	0.04200	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	8.00000	63.50000	0.05726	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	8.00000	63.50000	-0.04238	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	8.00000	63.50000	-0.36559	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	8.00000	63.50000	-1.47609	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	8.00000	63.50000	-4.44500	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	8.00000	63.50000	-5.01055	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	8.00000	63.50000	-4.75374	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	8.00000	63.50000	-2.69608	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	8.00000	63.50000	-0.58797	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	8.00000	63.50000	-0.11253	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	8.00000	63.50000	0.03678	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	9.00000	63.50000	0.05579	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	9.00000	63.50000	-0.04896	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	9.00000	63.50000	-0.38484	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	9.00000	63.50000	-1.51880	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	9.00000	63.50000	-4.51414	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	9.00000	63.50000	-5.09297	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	9.00000	63.50000	-4.82936	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	9.00000	63.50000	-2.74810	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	9.00000	63.50000	-0.61389	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	9.00000	63.50000	-0.12224	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	9.00000	63.50000	0.03415	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	10.00000	63.50000	0.05579	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	10.00000	63.50000	-0.04896	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	10.00000	63.50000	-0.38484	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	10.00000	63.50000	-1.51880	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	10.00000	63.50000	-4.51414	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	10.00000	63.50000	-5.09297	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	10.00000	63.50000	-4.82936	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	10.00000	63.50000	-2.74810	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	10.00000	63.50000	-0.61389	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	10.00000	63.50000	-0.12224	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	10.00000	63.50000	0.03415	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	11.00000	63.50000	0.05726	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	11.00000	63.50000	-0.04238	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	11.00000	63.50000	-0.36559	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	11.00000	63.50000	-1.47609	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	11.00000	63.50000	-4.44500	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	11.00000	63.50000	-5.01055	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	11.00000	63.50000	-4.75374	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	11.00000	63.50000	-2.69608	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	11.00000	63.50000	-0.58797	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	11.00000	63.50000	-0.11253	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	11.00000	63.50000	0.03678	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	12.00000	63.50000	0.06013	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	12.00000	63.50000	-0.02891	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	12.00000	63.50000	-0.32316	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	12.00000	63.50000	-1.37126	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	12.00000	63.50000	-4.26381	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	12.00000	63.50000	-4.79326	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	12.00000	63.50000	-4.55455	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	12.00000	63.50000	-2.56435	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	12.00000	63.50000	-0.52885	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	12.00000	63.50000	-0.09223	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	12.00000	63.50000	0.04200	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	13.00000	63.50000	0.06410	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	13.00000	63.50000	-0.00894	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	13.00000	63.50000	-0.25306	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	13.00000	63.50000	-1.15503	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	13.00000	63.50000	-3.82884	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	13.00000	63.50000	-4.27623	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	13.00000	63.50000	-4.07634	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	13.00000	63.50000	-2.26956	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	13.00000	63.50000	-0.42521	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	13.00000	63.50000	-0.06131	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	13.00000	63.50000	0.04940	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	14.00000	63.50000	0.06844	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	14.00000	63.50000	0.01504	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	14.00000	63.50000	-0.16028	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	14.00000	63.50000	-0.74107	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	14.00000	63.50000	-2.25366	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	14.00000	63.50000	-2.55081	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	14.00000	63.50000	-2.41500	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	14.00000	63.50000	-1.36098	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	14.00000	63.50000	-0.27883	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	14.00000	63.50000	-0.02327	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	14.00000	63.50000	0.05784	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	15.00000	63.50000	0.07209	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	15.00000	63.50000	0.03835	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	15.00000	63.50000	-0.06803	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	15.00000	63.50000	-0.32741	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	15.00000	63.50000	-0.67855	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	15.00000	63.50000	-0.82535	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	15.00000	63.50000	-0.75369	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	15.00000	63.50000	-0.45262	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	15.00000	63.50000	-0.13292	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	15.00000	63.50000	0.01415	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	15.00000	63.50000	0.06560	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	16.00000	63.50000	0.07408	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	16.00000	63.50000	0.05651	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	16.00000	63.50000	0.00081	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	16.00000	63.50000	-0.11154	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	16.00000	63.50000	-0.24304	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	16.00000	63.50000	-0.30731	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	16.00000	63.50000	-0.27471	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	16.00000	63.50000	-0.15787	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	16.00000	63.50000	-0.03025	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	16.00000	63.50000	0.04339	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	16.00000	63.50000	0.07104	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	17.00000	63.50000	0.07392	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	17.00000	63.50000	0.06752	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	17.00000	63.50000	0.04233	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	17.00000	63.50000	-0.00524	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	17.00000	63.50000	-0.05800	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	17.00000	63.50000	-0.08496	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	17.00000	63.50000	-0.07109	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	17.00000	63.50000	-0.02382	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	17.00000	63.50000	0.02867	63.326	0.0	0.0	0.0

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Displacemetn Grid	13.50000	17.00000	63.50000	0.06163	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	17.00000	63.50000	0.07332	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	18.00000	63.50000	0.07169	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	18.00000	63.50000	0.07195	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	18.00000	63.50000	0.06311	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	18.00000	63.50000	0.04471	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	18.00000	63.50000	0.02418	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	18.00000	63.50000	0.01345	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	18.00000	63.50000	0.01900	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	18.00000	63.50000	0.03751	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	18.00000	63.50000	0.05786	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	18.00000	63.50000	0.07016	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	18.00000	63.50000	0.07257	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	19.00000	63.50000	0.06785	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	19.00000	63.50000	0.07152	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	19.00000	63.50000	0.07071	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	19.00000	63.50000	0.06536	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	19.00000	63.50000	0.05849	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	19.00000	63.50000	0.05472	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	19.00000	63.50000	0.05669	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	19.00000	63.50000	0.06301	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	19.00000	63.50000	0.06935	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	19.00000	63.50000	0.07180	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	19.00000	63.50000	0.06948	63.326	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	20.00000	63.50000	0.06298	63.326	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	20.00000	63.50000	0.06803	63.326	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	20.00000	63.50000	0.07076	63.326	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	20.00000	63.50000	0.07101	63.326	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	20.00000	63.50000	0.06985	63.326	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	20.00000	63.50000	0.06900	63.326	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	20.00000	63.50000	0.06946	63.326	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	20.00000	63.50000	0.07069	63.326	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	20.00000	63.50000	0.07109	63.326	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	20.00000	63.50000	0.06923	63.326	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	20.00000	63.50000	0.06488	63.326	0.0	0.0	0.0

Results : Total : Displacement Data : Grids

None

Titles

Job No.: MGC-21-51
Job Title: 33.5 Mill Lane
Sub-title: Basement Impact Assessment
Calculation Heading: Drained
Initials: JGM
Checker:
Date Saved:
Date Checked:
Notes:
File Name: 33.5 Mill Lane Drained.pdd
File Path: F:\OneDrive\Documents\Croft Structural Engineers\33 Mill Lane NW6 1NZ\07-GIR Mill Lane\PDisp

History

Date	Time	By	Notes
18-Nov-2021	12:37	Maund Geo Consulting	New
18-Nov-2021	14:29	Maund Geo Consulting	
18-Nov-2021	15:20	Maund Geo Consulting	
13-Jun-2022	14:26	Maund Geo Consulting	

Analysis Options

General

Global Poisson's ratio: 0.20
Maximum allowable ratio between values of E: 1.5
Horizontal rigid boundary level: 53.50 [m OD]
Displacements at load centroids: Yes
GSA piled raft data : No

Elastic

Elastic : Yes

Soil ProfilesSoil Profile 1

Layer ref.	Name	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	London Clay Formation	63.500	20	12300.	59000.	0.20000	None

Soil Zones

Zone	Name	X min [m]	X max [m]	Y min [m]	Y max [m]	Profile
1	zone 1	0.0	15.000	0.0	20.000	Soil Profile 1

Polygonal Load Data

Load ref.	Name	Position : Level [m]	Position : Polygon : Coords. [m]	Position : Polygon : Rect. tolerance [%]	No. of Rectangles	Value : Normal (local z) [kN/m²]
1	Basement Excavation	60.15000	(5,5) (10.5,5) (10.5,14) (5,14) (5,5)	10.000	1	-67.000
2	Underpins west	60.15000	(5,7) (7,7) (7,14) (5,14) (5,7)	10.000	1	65.000
3	Underpins south	60.15000	(5,5) (10.5,5) (10.5,7) (5,7) (5,5)	10.000	1	35.000
4	Underpins east /north	60.15000	(8.5,7) (10.5,7) (10.5,14) (7,14) (7,12) (8.5,12) (8.5,7)	10.000	2	55.000
5	central slab	60.15000	(7,7) (8.5,7) (8.5,12) (7,12) (7,7)	10.000	1	8.0000

Polygonal Loads' Rectangles

No.	Centre : x [m]	Centre : y [m]	Angle of local x from global X [Degrees]	Width x [m]	Depth y [m]
Load 1 : Basement Excavation					
(Edge 1 optimal)					
1	7.75000	9.50000	0.0	5.5000	9.0000
Load 2 : Underpins west					
(Edge 1 optimal)					
1	6.00000	10.50000	0.0	2.0000	7.0000
Load 3 : Underpins south					
(Edge 1 optimal)					
1	7.75000	6.00000	0.0	5.5000	2.0000
Load 4 : Underpins east /north					
(Edge 1 optimal)					
1	9.50000	10.50000	0.0	2.0000	7.0000
2	7.75000	13.00000	0.0	1.5000	2.0000
Load 5 : central slab					
(Edge 1 optimal)					
1	7.75000	9.50000	0.0	1.5000	5.0000

Displacement Lines

Name	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals [No.]	Calculate Detailed Results
Section 1 West- East	0.00000	9.50000	63.50000	15.00000	9.50000	63.50000	15	Yes Yes
Section 2 North - South	7.50000	0.00000	63.50000	7.50000	20.00000	63.50000	20	Yes Yes

Displacement Grids

Name	Extrusion: Direction	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals Along Line [No.]	Extrusion: Distance [m]	Extrusion: Intervals Along [No.]	Calculate Detailed Results
Displacemetn Grid	Global X	0.00000	0.00000	63.50000	-	20.00000	63.50000	20	15.00000	10	Yes Yes

Results : Immediate : Load Centres : Polygonal

Name	Extrusion: Direction	X1 [m]	Y1 [m]	Z1 [m]	X2 [m]	Y2 [m]	Z2 [m]	Intervals Along Line [No.]	Extrusion: Distance [m]	Extrusion: Intervals Along [No.]	Calculate Detailed Results

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Basement Excavation	7.75000	9.50000	60.50000	-4.21192	60.410	-58.962	-131.47	-0.0016634
2	Underpins west	6.00000	10.50000	60.50000	-1.13279	60.410	-2.0077	-6.7489	-39.636E-6
3	Underpins south	7.75000	6.00000	60.50000	-2.94702	60.410	-31.996	-73.598	-885.77E-6
4	Underpins east /north	9.19118	10.94118	60.50000	-1.97846	60.410	-12.019	-30.395	-312.16E-6
5	central slab	7.75000	9.50000	60.50000	-4.21192	60.410	-58.962	-131.47	-0.0016634

Results : Total : Load Centres : Polygonal

None

Results : Immediate : Displacement Data : Lines Ref.

Name	x	y	z

		x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Section 1 West- East	0.00000	9.50000	63.50000	-0.02884	63.331	0.0	0.0	0.0
1	Section 1 West- East	1.00000	9.50000	63.50000	-0.05586	63.331	0.0	0.0	0.0
1	Section 1 West- East	2.00000	9.50000	63.50000	-0.10397	63.331	0.0	0.0	0.0
1	Section 1 West- East	3.00000	9.50000	63.50000	-0.19005	63.331	0.0	0.0	0.0
1	Section 1 West- East	4.00000	9.50000	63.50000	-0.34674	63.331	0.0	0.0	0.0
1	Section 1 West- East	5.00000	9.50000	63.50000	-0.66332	63.331	0.0	0.0	0.0
1	Section 1 West- East	6.00000	9.50000	63.50000	-1.23369	63.331	0.0	0.0	0.0
1	Section 1 West- East	7.00000	9.50000	63.50000	-2.94937	63.331	0.0	0.0	0.0
1	Section 1 West- East	8.00000	9.50000	63.50000	-4.12994	63.331	0.0	0.0	0.0
1	Section 1 West- East	9.00000	9.50000	63.50000	-2.34655	63.331	0.0	0.0	0.0
1	Section 1 West- East	10.00000	9.50000	63.50000	-1.56264	63.331	0.0	0.0	0.0
1	Section 1 West- East	11.00000	9.50000	63.50000	-0.71940	63.331	0.0	0.0	0.0
1	Section 1 West- East	12.00000	9.50000	63.50000	-0.36825	63.331	0.0	0.0	0.0
1	Section 1 West- East	13.00000	9.50000	63.50000	-0.19749	63.331	0.0	0.0	0.0
1	Section 1 West- East	14.00000	9.50000	63.50000	-0.10654	63.331	0.0	0.0	0.0
1	Section 1 West- East	15.00000	9.50000	63.50000	-0.05672	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	0.00000	63.50000	-0.04348	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	1.00000	63.50000	-0.08523	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	2.00000	63.50000	-0.16520	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	3.00000	63.50000	-0.32466	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	4.00000	63.50000	-0.67071	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	5.00000	63.50000	-1.78947	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	6.00000	63.50000	-2.90135	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	7.00000	63.50000	-3.59219	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	8.00000	63.50000	-4.07429	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	9.00000	63.50000	-4.07325	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	10.00000	63.50000	-3.97997	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	11.00000	63.50000	-3.72951	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	12.00000	63.50000	-2.55043	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	13.00000	63.50000	-1.31634	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	14.00000	63.50000	-0.72795	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	15.00000	63.50000	-0.27831	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	16.00000	63.50000	-0.13533	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	17.00000	63.50000	-0.06802	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	18.00000	63.50000	-0.03382	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	19.00000	63.50000	-0.01585	63.331	0.0	0.0	0.0
2	Section 2 North - South	7.50000	20.00000	63.50000	-0.00628	63.331	0.0	0.0	0.0

Results : Total : Displacement Data : Lines

None

Results : Immediate : Displacement Data : Grids

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Displacemetn Grid	0.00000	0.00000	63.50000	-0.00146	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	0.00000	63.50000	-0.00723	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	0.00000	63.50000	-0.01620	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	0.00000	63.50000	-0.02756	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	0.00000	63.50000	-0.03810	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	0.00000	63.50000	-0.04348	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	0.00000	63.50000	-0.04116	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	0.00000	63.50000	-0.03226	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	0.00000	63.50000	-0.02076	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	0.00000	63.50000	-0.01061	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	0.00000	63.50000	-0.00354	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	1.00000	63.50000	-0.00468	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	1.00000	63.50000	-0.01437	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	1.00000	63.50000	-0.03056	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	1.00000	63.50000	-0.05258	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	1.00000	63.50000	-0.07406	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	1.00000	63.50000	-0.08523	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	1.00000	63.50000	-0.08039	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	1.00000	63.50000	-0.06204	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	1.00000	63.50000	-0.03922	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	1.00000	63.50000	-0.02038	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	1.00000	63.50000	-0.00818	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	2.00000	63.50000	-0.00900	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	2.00000	63.50000	-0.02465	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	2.00000	63.50000	-0.05332	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	2.00000	63.50000	-0.09652	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	2.00000	63.50000	-0.14152	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	2.00000	63.50000	-0.16520	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	2.00000	63.50000	-0.15493	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	2.00000	63.50000	-0.11601	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	2.00000	63.50000	-0.06976	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	2.00000	63.50000	-0.03502	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	2.00000	63.50000	-0.01462	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	3.00000	63.50000	-0.01431	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	3.00000	63.50000	-0.03834	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	3.00000	63.50000	-0.08769	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	3.00000	63.50000	-0.17418	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	3.00000	63.50000	-0.27329	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	3.00000	63.50000	-0.32466	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	3.00000	63.50000	-0.30256	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	3.00000	63.50000	-0.21618	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	3.00000	63.50000	-0.11879	63.331	0.0	0.0	0.0

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Displacemetn Grid	13.50000	3.00000	63.50000	-0.05558	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	3.00000	63.50000	-0.02290	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	4.00000	63.50000	-0.02013	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	4.00000	63.50000	-0.05454	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	4.00000	63.50000	-0.13485	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	4.00000	63.50000	-0.31400	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	4.00000	63.50000	-0.55811	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	4.00000	63.50000	-0.67071	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	4.00000	63.50000	-0.62405	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	4.00000	63.50000	-0.41509	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	4.00000	63.50000	-0.19258	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	4.00000	63.50000	-0.08162	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	4.00000	63.50000	-0.03251	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	5.00000	63.50000	-0.02562	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	5.00000	63.50000	-0.07054	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	5.00000	63.50000	-0.18754	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	5.00000	63.50000	-0.55879	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	5.00000	63.50000	-1.55566	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	5.00000	63.50000	-1.78947	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	5.00000	63.50000	-1.69969	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	5.00000	63.50000	-0.99581	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	5.00000	63.50000	-0.28583	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	5.00000	63.50000	-0.10966	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	5.00000	63.50000	-0.04228	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	6.00000	63.50000	-0.02979	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	6.00000	63.50000	-0.08243	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	6.00000	63.50000	-0.22577	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	6.00000	63.50000	-0.74915	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	6.00000	63.50000	-2.46097	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	6.00000	63.50000	-2.90135	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	6.00000	63.50000	-2.73390	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	6.00000	63.50000	-1.52633	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	6.00000	63.50000	-0.36380	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	6.00000	63.50000	-0.13335	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	6.00000	63.50000	-0.05062	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	7.00000	63.50000	-0.03195	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	7.00000	63.50000	-0.08754	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	7.00000	63.50000	-0.23450	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	7.00000	63.50000	-0.69858	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	7.00000	63.50000	-2.00935	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	7.00000	63.50000	-3.59219	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	7.00000	63.50000	-2.67121	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	7.00000	63.50000	-1.41859	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	7.00000	63.50000	-0.39569	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	7.00000	63.50000	-0.14762	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	7.00000	63.50000	-0.05625	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	8.00000	63.50000	-0.03197	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	8.00000	63.50000	-0.08615	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	8.00000	63.50000	-0.22137	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	8.00000	63.50000	-0.56868	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	8.00000	63.50000	-1.38169	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	8.00000	63.50000	-4.07429	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	8.00000	63.50000	-2.41451	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	8.00000	63.50000	-1.19616	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	8.00000	63.50000	-0.39351	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	8.00000	63.50000	-0.15201	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	8.00000	63.50000	-0.05865	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	9.00000	63.50000	-0.03022	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	9.00000	63.50000	-0.08038	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	9.00000	63.50000	-0.20100	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	9.00000	63.50000	-0.49865	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	9.00000	63.50000	-1.27376	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	9.00000	63.50000	-4.07325	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	9.00000	63.50000	-2.37800	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	9.00000	63.50000	-1.14408	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	9.00000	63.50000	-0.37864	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	9.00000	63.50000	-0.14887	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	9.00000	63.50000	-0.05802	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	10.00000	63.50000	-0.02719	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	10.00000	63.50000	-0.07206	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	10.00000	63.50000	-0.17865	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	10.00000	63.50000	-0.44613	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	10.00000	63.50000	-1.18780	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	10.00000	63.50000	-3.97997	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	10.00000	63.50000	-2.29897	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	10.00000	63.50000	-1.09336	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	10.00000	63.50000	-0.35564	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	10.00000	63.50000	-0.14013	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	10.00000	63.50000	-0.05483	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	11.00000	63.50000	-0.02332	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	11.00000	63.50000	-0.06214	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	11.00000	63.50000	-0.15398	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	11.00000	63.50000	-0.38775	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	11.00000	63.50000	-1.05333	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	11.00000	63.50000	-3.72951	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	11.00000	63.50000	-2.12307	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	11.00000	63.50000	-1.01627	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	11.00000	63.50000	-0.32256	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	11.00000	63.50000	-0.12664	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	11.00000	63.50000	-0.04953	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	12.00000	63.50000	-0.01898	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	12.00000	63.50000	-0.05124	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	12.00000	63.50000	-0.12668	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	12.00000	63.50000	-0.31746	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	12.00000	63.50000	-0.83723	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	12.00000	63.50000	-2.55043	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	12.00000	63.50000	-1.75225	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	12.00000	63.50000	-0.90318	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	12.00000	63.50000	-0.27793	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	12.00000	63.50000	-0.10894	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	12.00000	63.50000	-0.04256	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	13.00000	63.50000	-0.01451	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	13.00000	63.50000	-0.04001	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	13.00000	63.50000	-0.09811	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	13.00000	63.50000	-0.24049	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	13.00000	63.50000	-0.59736	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	13.00000	63.50000	-1.31634	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	13.00000	63.50000	-1.31671	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	13.00000	63.50000	-0.75070	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	13.00000	63.50000	-0.22215	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	13.00000	63.50000	-0.08808	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	13.00000	63.50000	-0.03452	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	14.00000	63.50000	-0.01021	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	14.00000	63.50000	-0.02929	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	14.00000	63.50000	-0.07077	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	14.00000	63.50000	-0.16370	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	14.00000	63.50000	-0.36528	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	14.00000	63.50000	-0.72795	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	14.00000	63.50000	-0.76287	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	14.00000	63.50000	-0.46682	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	14.00000	63.50000	-0.15931	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	14.00000	63.50000	-0.06606	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	14.00000	63.50000	-0.02613	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	15.00000	63.50000	-0.00636	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	15.00000	63.50000	-0.01985	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	15.00000	63.50000	-0.04734	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	15.00000	63.50000	-0.10034	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	15.00000	63.50000	-0.18592	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	15.00000	63.50000	-0.27831	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	15.00000	63.50000	-0.28998	63.331	0.0	0.0	0.0

Ref.	Name	x [m]	y [m]	z [mOD]	δz [mm]	Stress: Calc. Level [mOD]	Stress: Vertical [kN/m²]	Stress: Sum Princ. [kN/m²]	Vert. Strain [μ]
1	Displacemetn Grid	10.50000	15.00000	63.50000	-0.20349	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	15.00000	63.50000	-0.10186	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	15.00000	63.50000	-0.04560	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	15.00000	63.50000	-0.01823	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	16.00000	63.50000	-0.00316	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	16.00000	63.50000	-0.01220	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	16.00000	63.50000	-0.02938	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	16.00000	63.50000	-0.05869	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	16.00000	63.50000	-0.09926	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	16.00000	63.50000	-0.13533	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	16.00000	63.50000	-0.13883	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	16.00000	63.50000	-0.10468	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	16.00000	63.50000	-0.06023	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	16.00000	63.50000	-0.02892	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	16.00000	63.50000	-0.01146	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	17.00000	63.50000	-0.00067	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	17.00000	63.50000	-0.00644	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	17.00000	63.50000	-0.01673	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	17.00000	63.50000	-0.03268	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	17.00000	63.50000	-0.05240	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	17.00000	63.50000	-0.06802	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	17.00000	63.50000	-0.06919	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	17.00000	63.50000	-0.05438	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	17.00000	63.50000	-0.03358	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	17.00000	63.50000	-0.01671	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	17.00000	63.50000	-0.00616	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	18.00000	63.50000	0.00114	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	18.00000	63.50000	-0.00239	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	18.00000	63.50000	-0.00834	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	18.00000	63.50000	-0.01692	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	18.00000	63.50000	-0.02666	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	18.00000	63.50000	-0.03382	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	18.00000	63.50000	-0.03424	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	18.00000	63.50000	-0.02746	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	18.00000	63.50000	-0.01740	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	18.00000	63.50000	-0.00844	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	18.00000	63.50000	-0.00232	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	19.00000	63.50000	0.00237	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	19.00000	63.50000	0.00031	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	19.00000	63.50000	-0.00304	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	19.00000	63.50000	-0.00759	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	19.00000	63.50000	-0.01246	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	19.00000	63.50000	-0.01585	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	19.00000	63.50000	-0.01602	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	19.00000	63.50000	-0.01281	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	19.00000	63.50000	-0.00786	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	19.00000	63.50000	-0.00315	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	19.00000	63.50000	0.00028	63.331	0.0	0.0	0.0
1	Displacemetn Grid	0.00000	20.00000	63.50000	0.00312	63.331	0.0	0.0	0.0
1	Displacemetn Grid	1.50000	20.00000	63.50000	0.00200	63.331	0.0	0.0	0.0
1	Displacemetn Grid	3.00000	20.00000	63.50000	0.00018	63.331	0.0	0.0	0.0
1	Displacemetn Grid	4.50000	20.00000	63.50000	-0.00220	63.331	0.0	0.0	0.0
1	Displacemetn Grid	6.00000	20.00000	63.50000	-0.00464	63.331	0.0	0.0	0.0
1	Displacemetn Grid	7.50000	20.00000	63.50000	-0.00628	63.331	0.0	0.0	0.0
1	Displacemetn Grid	9.00000	20.00000	63.50000	-0.00635	63.331	0.0	0.0	0.0
1	Displacemetn Grid	10.50000	20.00000	63.50000	-0.00481	63.331	0.0	0.0	0.0
1	Displacemetn Grid	12.00000	20.00000	63.50000	-0.00236	63.331	0.0	0.0	0.0
1	Displacemetn Grid	13.50000	20.00000	63.50000	0.00008	63.331	0.0	0.0	0.0
1	Displacemetn Grid	15.00000	20.00000	63.50000	0.00193	63.331	0.0	0.0	0.0

Results : Total : Displacement Data : Grids

None