GROUND INVESTIGATION & BASEMENT IMPACT ASSESSMENT REPORT

39 Rosslyn Hill
London NW3 5UJ

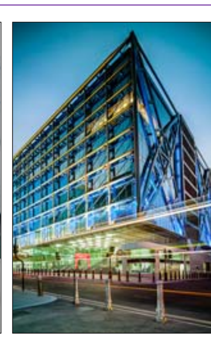
Client: Mr J Cohen & Ms A Lindsay

Engineer: Conisbee

J15236

November 2015



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EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

BRIEF

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Conisbee, on behalf of Mr J Cohen and Ms A Lindsay, with respect to the extension of the existing lower ground floor below part of the rear garden. The purpose of the investigation has been to review previous desk study, ground investigation and Basement Impact Assessment (BIA) reports, to further establish the ground conditions and to provide an assessment of any possible effects of the proposed development on the local hydrogeological and hydrological setting and the stability of the natural and built environment, and to provide an updated BIA in accordance with the guidelines from the London Borough of Camden. Contamination testing did not form part of the project brief.

SUMMARY OF BIA SCREENING STAGE

The previous BIA identified the following questions to be carried forward to the scoping stage, which have been verified by the review carried out as part of this report.

- The site is underlain by a Secondary 'A' Aquifer.
- The basement may extend below the water table.
- There will be an increase in the proportion of hard-surfacing.
- Slopes of greater than 7° are present on the site and on neighbouring sites
- The development will result in differential founding depths with respect to adjacent foundations

GROUND CONDITIONS.

The additional investigation has encountered the expected ground conditions in that, below a nominal thickness of made ground, the Claygate Member was encountered over the London Clay Formation. Below either a layer of concrete or a surface covering of topsoil or artificial grass, made ground was encountered to depths of between 0.40 m and 0.85 m, corresponding to levels of between 80.45 m OD and 84.74 m OD. It generally comprised a matrix of brown silty clay with gravel and fine brick and coal fragments. The Claygate Member was encountered in Borehole No 2 only, which was advanced from the highest level at the southwestern end of the site. It comprised firm pale brown mottled orange-brown silty slightly sandy clay with decayed rootlets, traces of selenite, partings of pale grey silt and fibrous rootlets to a depth of 2.00 m, a level of 82.74 m OD. The underlying London Clay was found to comprise an initial weathered horizon of firm becoming stiff fissured locally thinly laminated high strength brown silty clay with bluish grey veins, partings of pale grey silt, occasional pockets of orange-brown fine sand and selenite crystals, which extended to levels of between 78.76 m OD and 77.85 m OD. The weathered horizon was underlain by typical unweathered London Clay, which comprised stiff becoming very stiff fissured high strength to very high strength dark grey silty clay with occasional partings of pale grey and brownish grey silt and fine sand and traces selenite and was proved to the maximum depth investigated, of 20.45 m (60.85 m OD).

Seepage of groundwater was encountered in Borehole No 1 at a depth of 6.00 m (75.30 m OD) associated with a silt parting, although the borehole was noted to be dry on completion, and in Borehole No 3 at a depth of 2.00 m (80.46 m OD) associated with the presence of a claystone. Subsequent groundwater monitoring recorded variable water levels within the standpipes, which do not represent a continuous groundwater table, but rather perched water trapped within the standpipes.

BIA CONCLUSIONS

Through the results of the additional investigation and on the basis of the proposed development, it has been concluded that the lower ground floor extension will not have an impact on the hydrological or hydrogeological setting. The ground movement analysis has indicated that the predicted damage to the neighbouring properties will be Category 0 'Negligible' and is therefore within acceptable limits, whilst the slope stability analysis has indicated that the existing slope is in a stable condition, with the proposed development likely to provide an increased stability to the slope. There is therefore not considered to be a risk of slope instability and / or structural damage to neighbouring properties up slope from the proposed development.

Part 1: INVESTIGATION REPORT

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 INTRODUCTION

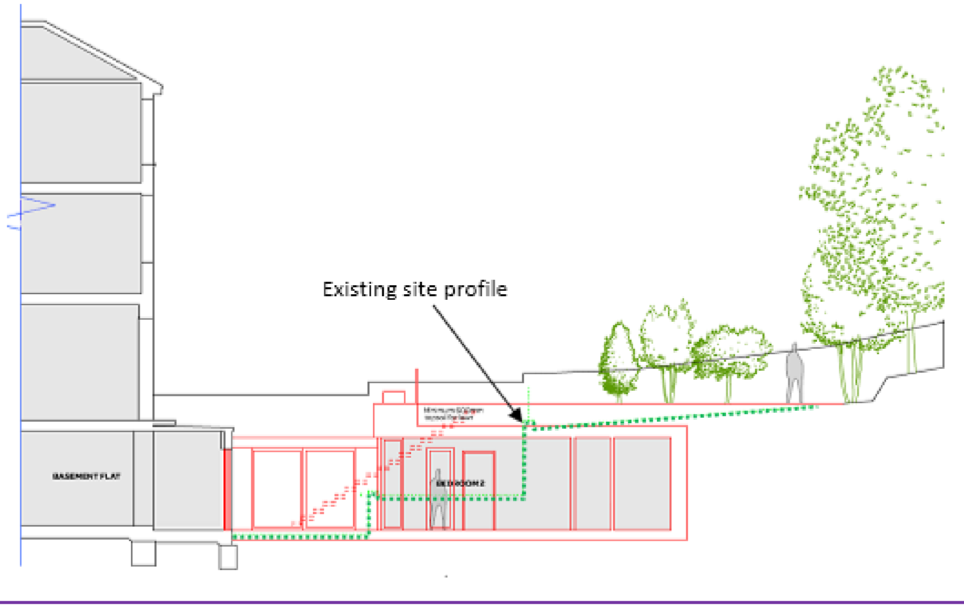
Geotechnical and Environmental Associates (GEA) has been commissioned by Conisbee, the consulting engineers, on behalf of Mr J Cohen and Ms A Lindsay, to carry out a ground investigation at 39 Rosslyn Hill, London NW3 5UJ. This site has previously been the subject of a desk study, ground investigation and Basement Impact Assessment (BIA), with the following reports being produced, which have been provided by Conisbee:

- Baseline Desk Study by Environmental Scientifics Group (ESG), Report ref: G4099, dated October 2014;
- Site Investigation Report by ESG, Report ref: G4099-14, Dated January 2015;
- Basement Impact Assessment – Screening and Scoping Report by Conisbee, Report ref: 140321/HH, dated May 2015;

In addition to the above documents, an independent review of the BIA has been carried out by LBH Wembley (Ref: 4315, dated May 2015) on behalf of the London Borough of Camden. GEA has also been commissioned to carry out a review of all of the above documents and produce a revised BIA, in accordance with guidelines from the London Borough of Camden. Contamination testing did not form part of the project brief.

1.1 Proposed Development

It is understood that it is proposed to construct a single storey extension to the lower ground floor, which involves excavating further into the slope of the rear garden, beyond the existing concrete retaining walls, as shown by the cross-section of the proposed development below.



This report is specific to the proposed development and the advice herein should be reviewed once the development proposals have been finalised.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows:

- to review the previous reports and BIA documents;
- to confirm the ground conditions and their engineering properties;
- to identify the configuration and bearing stratum of existing foundations;
- to assess the possible impact of the proposed development on the local hydrogeology, hydrology and stability of surrounding structures; and
- to provide additional advice with respect to the design of suitable foundations and retaining walls for the proposed development.

1.3 Scope of Work

In order to meet the above objectives, following a review of the previous reports and documents, an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- a single borehole advanced to a depth of 20.45 m by means of a dismantlable cable percussion drilling rig;
- standard penetration tests (SPTs), carried out at regular intervals in the borehole, to provide quantitative data on the strength of the soils;
- a series of three window sample boreholes advanced to a depth of 4.00 m and 5.00 m;
- the installation of two groundwater monitoring standpipes, to depths of 5.00 m and 7.00 m, and two subsequent monitoring visits over a four week period;
- three manually excavated trial pits to depths of between 0.40 m and 1.30 m;
- laboratory testing of selected soil samples for geotechnical purposes; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

1.3.1 Basement Impact Assessment

The work carried out also includes a Hydrological and Hydrogeological Assessment and Land Stability Assessment (also referred to as Slope Stability Assessment), all of which form part of the BIA procedure specified in the London Borough of Camden (LBC) Planning Guidance CPG4[1] and their Guidance for Subterranean Development[2] prepared by Arup (the "Arup report"). The aim of the work is to provide information on surface water, groundwater and land stability and in particular to assess whether the development will affect neighbouring properties or groundwater movements and whether any identified impacts can be

1 London Borough of Camden Planning Guidance CPG4 *Basements and lightwells*
2 Ove Arup & Partners (2010) *Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development.* For London Borough of Camden November 2010

appropriately mitigated by the design of the development.

1.3.2 Qualifications

The land stability element of the Basement Impact Assessment (BIA) has been carried out by Martin Cooper, a BEng in Civil Engineering, a chartered engineer (CEng), member of the Institution of Civil Engineers (MICE), and Fellow of the Geological Society of London (FGS) who has over 20 years' specialist experience in ground engineering. The subterranean (groundwater) flow assessment has been carried out by John Evans, MSc in Hydrogeology, Chartered Geologist (CGeol) and Fellow of the Geological Society of London (FGS). The surface water and flooding assessment has been carried out by Rupert Evans, a hydrologist with more than ten years consultancy experience in flood risk assessment, surface water drainage schemes and hydrology / hydraulic modelling. Rupert Evans is a Chartered Environmentalist, Chartered Water and Environmental Manager and a Member of CIWEM.

The assessments have been made in conjunction with Steve Branch, a BSc in Engineering Geology and Geotechnics, MSc in Geotechnical Engineering, a chartered geologist (CGeol) and Fellow of the Geological Society (FGS) with over 25 years' experience in geotechnical engineering and engineering geology.

All assessors meet the qualification requirements of the Council guidance.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

2.0 THE SITE

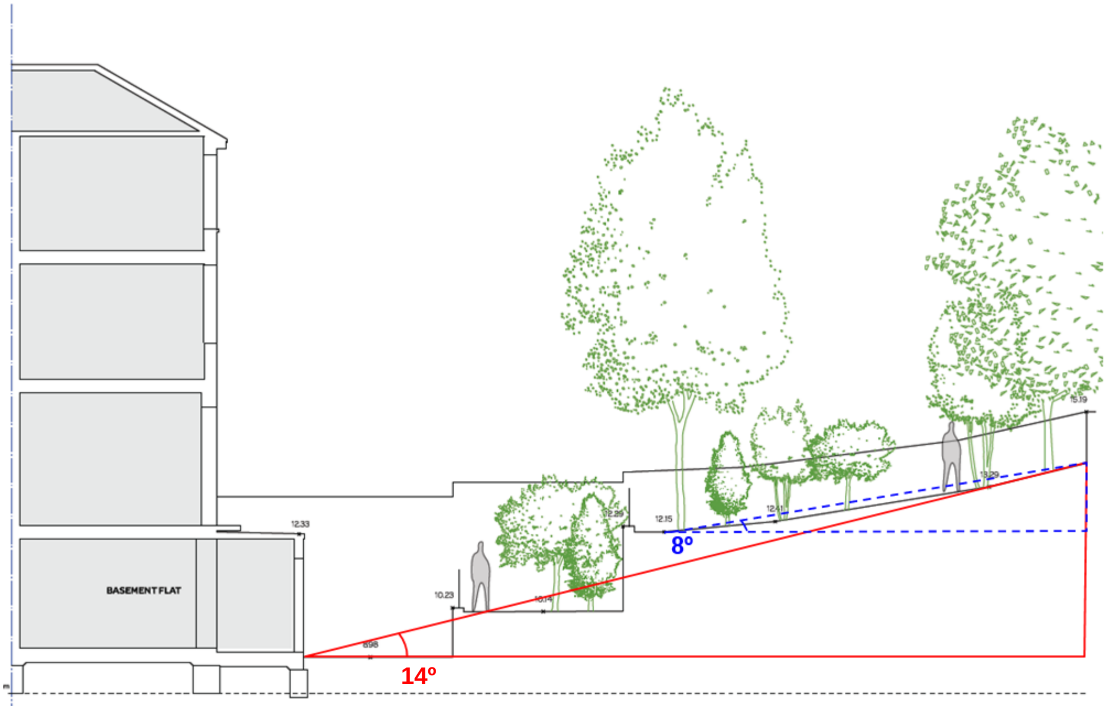
2.1 Site Description

The site is located in Hampstead, northwest London, approximately 425 m to the southwest of Hampstead Heath Railway Station and approximately 530 m southeast of Hampstead London Underground station. It may be additionally located by National Grid Reference 526864,185485 as shown on the map below.

The site covers a rectangular area with maximum dimensions of approximately 32 m northeast-southwest by 13 m northwest-southeast and fronts onto Rosslyn Hill to the northeast. It is bordered to the northwest by No 41 Rosslyn Hill, a three-storey detached property with a lower ground floor, to the southwest by No 30A Thurlow Road, a single storey property, and No 30 Thurlow Road, a four-storey semi-detached property with loft space and a lower ground, to the southeast by No 37 Rosslyn Hill, an adjoining three-storey property with a lower ground floor and to the south by Nos 10b, 10c and 10d Eldon Grove, a terrace of three houses.

The site is currently occupied by No 39 Rosslyn Hill, a three-storey semi-detached property with a lower ground floor that is divided into self-contained apartments. The property that forms the subject of the current investigation comprises the lower ground floor flat, which is at a level of approximately 1.0 m below ground level and includes the rear garden to the property. The front of the building is occupied by a shared accessed communal garden, which is covered in rough grass with planted borders and a concrete paved path that leads down the side of the property for access to the lower ground flat and the associated rear garden. A mature evergreen tree is present in the front garden, which stands at a height of approximately 18 m.

The rear garden, in keeping with the surrounding topography, slopes up to the southwest, with the southwestern boundary elevated above lower ground floor by approximately 4.0 m to 5.0 m. The garden has however been terraced to form three tiers. The lower level is covered in decking at the same level as the lower ground floor, whilst the middle tier is between 1.2 m and 1.5 m higher and covered in artificial grass. The upper tier is approximately 3.5 m above the lower round floor level, but slopes up to the southwestern boundary at an angle of approximately 7º to 9º, as indicated by the existing cross-section and site photographs below. If the terraces had not been formed, the rear garden would form a slope angle of approximately 14º.



The terraces are supported by reinforced concrete retaining walls, with no evidence of slope instability or movement having taken place, although it is clear that soil placed behind the top retaining wall was not backfilled properly as some settlement has taken place. The upper tier is covered in grass with planted borders and includes a number of mature pear trees that stand at heights of up to approximately 12 m, a 12 m high ash tree and a holly tree about 8 m in height.

View down from top terrace.

View of the area behind the top retaining wall.

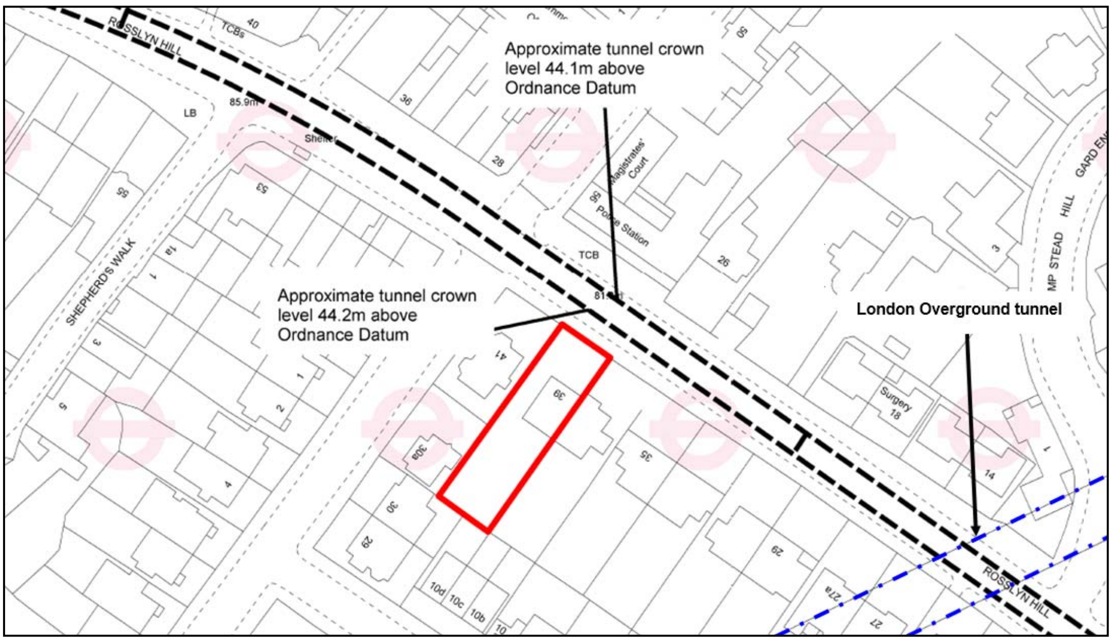
2.2 Summary of Previous Desk Study Findings

The ESG desk study indicates that the existing house had been constructed by the time of the earliest historical Ordnance Survey (OS) map studied, dated 1871. The surrounding area had also mostly been developed in its existing layout at that time, with only minor layout changes occurring throughout the recorded history.

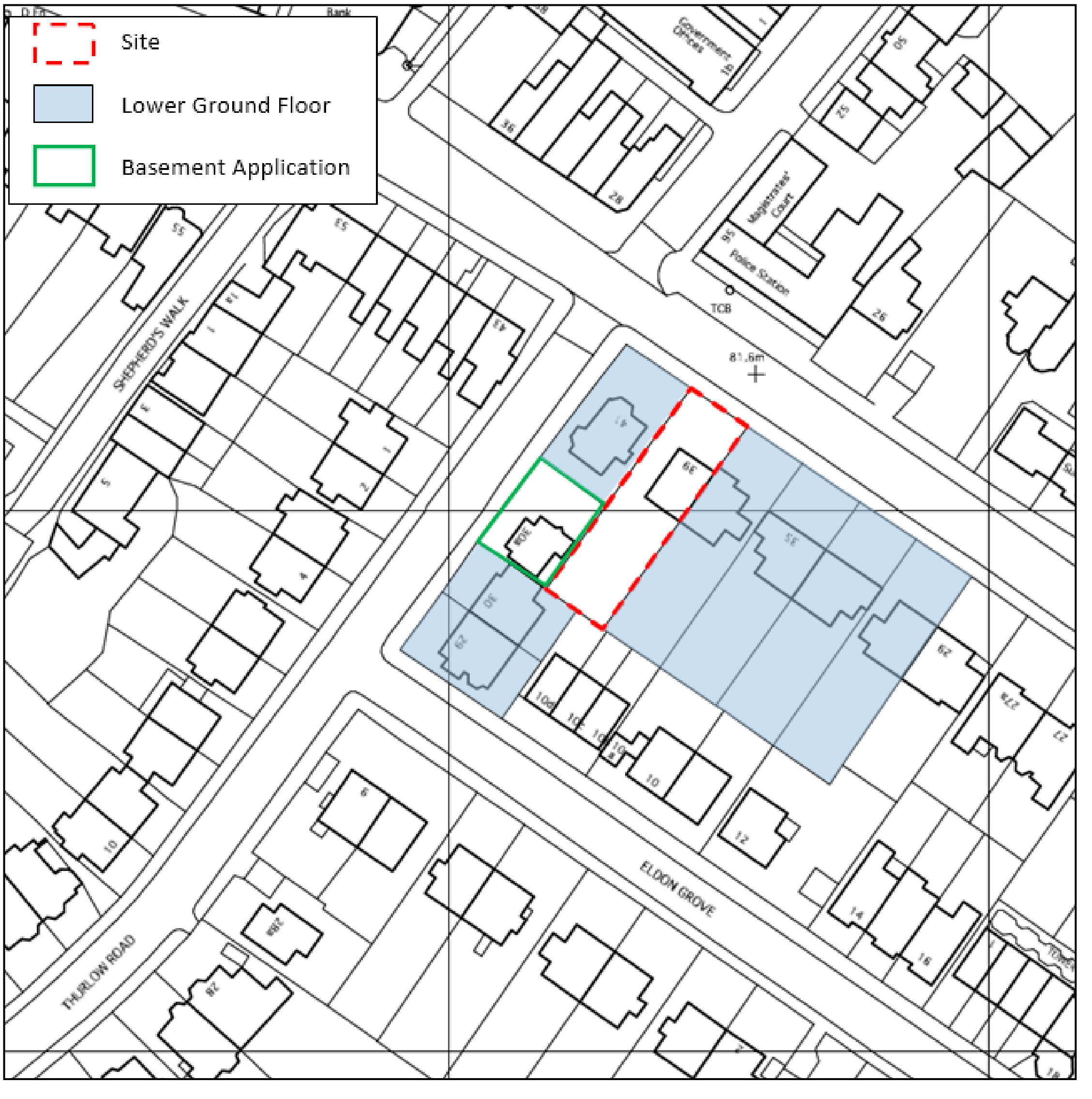
The desk study indicates that there are no historical or existing landfill sites within 1 km of the site and that no substantiated pollution incidents or recorded pollution incidents to controlled waters have occurred within 250 m of the site.

2.3 Other Information

The Northern Line London Underground tunnels run below Rosslyn Hill, beyond the northeastern boundary of the site, with a tunnel crown at a level of 44 m OD, approximately 40 m below ground level. A London Overground tunnel is also present approximately 60 m to the southeast of the site, as can be seen by the tunnel location plan below, provided by Transport for London (TfL). The depth of the Overground tunnel is unknown, although is thought to be approximately 20 m below ground level.

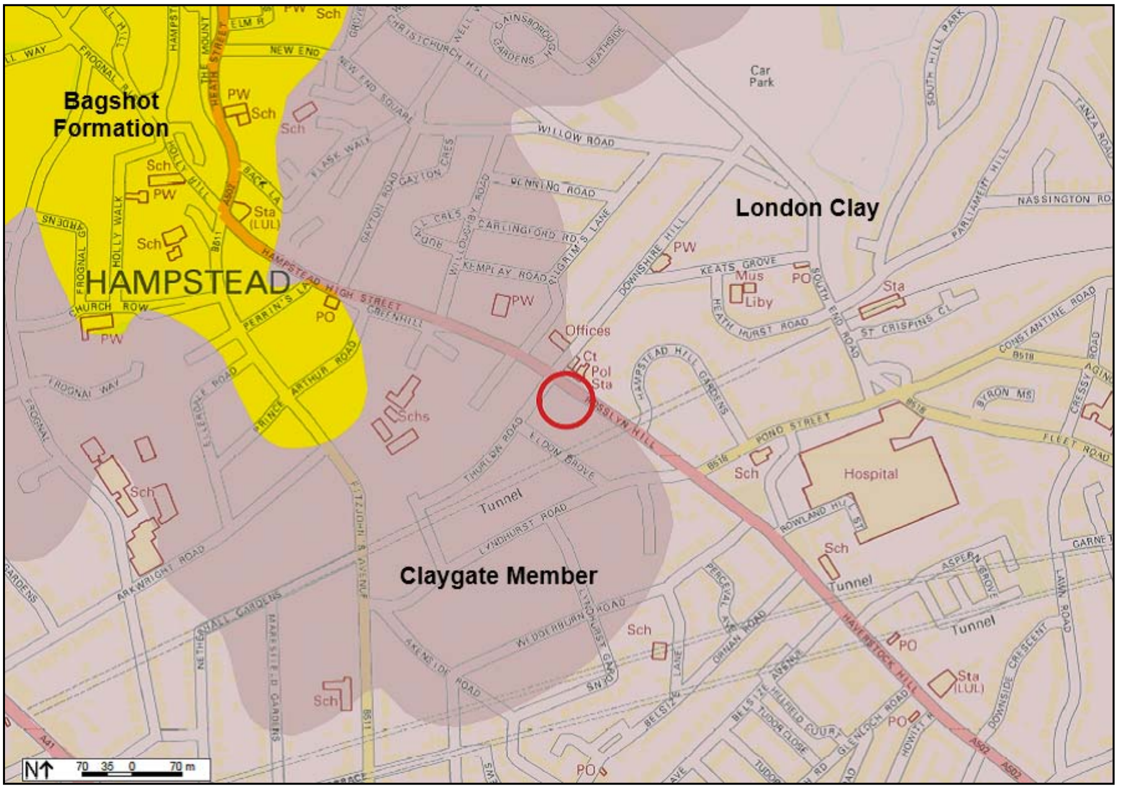


Information on the properties surrounding the site has been gathered by the project architects from the Local Authority planning portal and other sources, the results of which have been supplied to GEA by Conisbee. The results are summarised on the map below with the neighbouring properties along Rosslyn Hill including similar lower ground floor levels to the site, in addition to Nos 29 and 30 Thurlow Road, which also include a lower ground floor level. No 30a Thurlow Road currently has planning permission for a single level basement, although this work has not yet commenced. This property is understood to be currently supported on piled foundations.



2.4 Geology

The British Geological Survey (BGS) map of the area (sheet 256) indicates that the site is underlain by the Claygate Member, as shown by the digital geological map extract overleaf, which also indicates the site to be located close to the boundary with the underlying London Clay.



The geology in this area is generally horizontally bedded such that the boundary between the geological formations roughly follows the ground surface contour lines. The boundary between the Claygate Member and the upper unit of the London Clay is at a level of approximately 80 m OD. The Claygate Member is described in the geological memoir as typically comprising interbedded fine grained sand, silt and clay.

According to the BGS Sheet 256, dated 2006, the site is within an area also shown as having a "Head Propensity". Head propensity is shown on the BGS map as areas denoted as most likely to be covered by Quaternary Head Deposits as interpreted from digital slope analysis and confirmed by borehole data. These deposits are not mapped and have not been verified by fieldwork, but are noted as having properties similar to that of the London Clay and are shown to occur close to the boundary with the overlying Claygate Member.

The previous ESG ground investigation comprised two window sampler boreholes advanced to 6.00 m from the middle and top terraces in the area of the proposed extension. These were supplemented by the manual excavation of three trial pits in order to expose a number of existing foundations. The boreholes encountered a moderate thickness of made ground to depths of 0.70 m (81.73 m OD) and 0.80 m (84.28 m OD), whereupon, what is 'tentatively' interpreted as the Claygate Member was encountered and was proved to the maximum depth investigated (76.43 m OD). The Claygate Member was described as comprising firm to stiff light brown becoming grey slightly fine sandy clay.

2.5 Hydrology and Hydrogeology

The ESG desk study indicates that the Claygate Member is classified on aquifer designation maps as a Secondary 'A' Aquifer, which refers to strata that contain permeable layers capable of supporting water supply at a local level and in some cases may form an important source of base flow for local rivers, as defined by the Environment Agency (EA). The underlying London Clay is classified as a Non-Aquifer and Unproductive Stratum, which refers to a soil or rock with low permeability that has a negligible effect on local water supply or river base flow.

The previous desk study indicates that the nearest surface water feature is a culvert over 300 m from the site, with the Hampstead Ponds almost 500 m to the northeast. At this distance, the site is not within the catchment of the ponds, as indicated by Figure 14 of the Arup report. The site is not within an area at risk from flooding, as defined by the EA and Rosslyn Hill is not listed within a London Borough of Camden report[3] as having suffered from surface water flooding in the past, with Figure 5 of the Arup report indicating that the site is not in an area with the potential to be at risk from surface water flooding.

The Claygate Member is predominantly cohesive in nature and therefore groundwater flow is likely to be relatively slow, although horizons of sandier soils do occur in this stratum, resulting in the permeability ranging from "very low" to "high". The Claygate Member is only designated as a Secondary Aquifer because it contains such sand horizons, which provide more permeable layers for the storage of groundwater. Where such sand beds are not present, the Claygate Member behaves more hydraulically like the underlying London Clay, which accounts for the variable permeability described above.

Existing and historical spring lines are present at the boundary between the Claygate Member and the underlying London Clay, although such springs occur more commonly at the boundary with the Claygate Member and the overlying Bagshot Formation. These springs have been the source of a number of London's "lost" rivers, notably the Fleet, Westbourne and Tyburn. Reference to Figure 11 of the Arup report indicates that the site is not located within 250 m of any springs or former rivers.

Groundwater was not encountered during the drilling of the boreholes or the excavation of the trial pits that were carried as part of the ESG investigation. A groundwater monitoring standpipe was installed in one of the boreholes and two monitoring visits recorded groundwater at depths of 0.60 m (84.48 m OD) and 0.97 m (84.11 m OD).

3.0 SCREENING

The previous answers to the screening questions included in the Conisbee BIA have been reviewed and updated, where necessary, using the results of the previous ESG investigation.

3.1 Screening Assessment

A number of screening tools are included in the Arup document and for the purposes of this report reference has been made to Appendices E1, E2 and E3 which include a series of questions within screening flowcharts for surface flow and flooding, subterranean (groundwater) flow and land stability. The flowchart questions and responses to these questions are tabulated below.

3 London Borough of Camden (2003) *Floods in Camden, Report of the Floods Scrutiny Panel*

3.1.1 Subterranean (groundwater) Screening Assessment

Question	Response for 39 Rosslyn Hill
1a. Is the site located directly above an aquifer?	*Yes. The Claygate Member is a designated Secondary 'A' Aquifer.*
1b. Will the proposed basement extend beneath the water table surface?	Unlikely as the ESG investigation indicated the Claygate Member at the site to comprise a sandy clay, which cannot store or transmit groundwater under normal hydraulic conditions and therefore cannot not support a water table. The ESG monitoring recorded groundwater but further monitoring will be carried out during additional investigation.
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	No.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No.
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	*Yes. There will be an increase in area covered by decking and the underlying concrete slab.*
5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No.
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 line?	No.

The above assessment has identified the following potential issues that need to be assessed:

Q1a The site is located directly above the Claygate Member, which is a Secondary 'A' Aquifer.
Q1b There is a possibility that the proposed basement will encounter groundwater.
Q4 There will be a slight increase in the proportion of hard-surfacing.

3.1.2 Stability Screening Assessment

Question	Response for 39 Rosslyn Hill
1. Does the existing site include slopes, natural or manmade, greater than 7°?	*Yes. The overall slope would be about 14˚, however the slope is terraced and currently retained by mass concrete retaining walls. The remaining slope at the rear of the site, above the retaining walls is approximately 8˚.*
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	No.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	*Yes. The neighbouring properties of Nos 37 and 41 Rosslyn Hill have similar profiles within the rear gardens and therefore the overall slopes would be about 14˚.*
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	No. Reference to Figure 16 of the Arup report indicates that the site is not in an area where slopes are generally greater than 7˚.
5. Is the London Clay the shallowest strata at the site?	No.
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.

Question	Response for 39 Rosslyn Hill
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	No.
8. Is the site within 100 m of a watercourse or potential spring line?	No.
9. Is the site within an area of previously worked ground?	No.
10. Is the site within an aquifer?	*Yes a Secondary 'A' Aquifer.*
11. Is the site within 50 m of Hampstead Heath ponds?	No.
12. Is the site within 5 m of a highway or pedestrian right of way?	No.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	*Yes. The extension will be constructed below the founding depths of the western and eastern boundary walls. The proposed founding depth will be lower than the foundations to 30 Thurlow Road, although this building is up slope from the development and includes a lower ground floor level, such that a 45˚ angle will not intercept the proposed extension. No 30A Thurlow Road is supported on piled foundations such that it will not be affected by the proposed development. No 10d Eldon Grove is at a sufficient distance not to be effected by the proposed development.*
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No. A Northern Line underground tunnel is present below Rosslyn Hill and a London Overground tunnel is present 60 m to the southeast, but the area of the proposed development is not located in an exclusion zone.

The above assessment has identified the following potential issues that need to be assessed:

Q1 Although terraced, the rear garden forms a slope of approximately 14º.
Q3 Neighbouring properties include a similar slope angle and profile within the rear gardens.
Q10 The Claygate Member is a Secondary 'A' Aquifer.
Q13 The founding depth of the proposed extension will be at a lower depth than two of the garden boundary walls.

3.1.3 Surface Flow and Flooding Screening Assessment

Question	Response for 39 Rosslyn Hill
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No. Figure 14 of the Arup report confirms that the site is not located within this catchment area.
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No. The lower ground floor extension will largely be beneath the footprint of the existing decking and artificial grass which are positively drained to the sewer system. Therefore, the existing drainage regime will remain the same. Whilst the extension will also extend into the permeable garden area, there will be 600 mm of topsoil between the roof of the extension and the ground surface thus maintaining the infiltration capacity of the soil.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	*Yes. There will be an increase in area covered by decking and the underlying concrete slab.*

Question	Response for 39 Rosslyn Hill
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	No. The lower ground floor extension will largely be beneath the footprint of the existing decking and artificial grass which are positively drained to the sewer system. Therefore, the existing drainage regime will remain the same. Whilst the extension will also extend into the permeable garden area, there will be 0.6m of topsoil between the roof of the extension and the ground surface thus maintaining the infiltration capacity of the soil.
5. Will the proposed basement result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	The proposals are very unlikely to result in any changes to the quality of surface water being received by adjacent properties or downstream watercourses as the surface water drainage regime will be unchanged.
6. Is the site in an area known to be at risk from surface water flooding such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk of flooding because the proposed basement is below the static water level of a nearby surface water feature?	No. The Camden Flood Risk Management Strategy dated 2013, together with Figures 3iii, 4e, 5a and 5b of the SFRA dated 2014, and Environment Agency online flood maps show that the site has a very low flooding risk from surface water, sewers, reservoirs (and other artificial sources), groundwater and fluvial/tidal watercourses. In accordance with paragraph 5.11 of the CPG a positive pumped device will be installed across the lower ground floor in order to further protect the site from sewer flooding. The site is not located within a Critical Drainage Area or a Local Flood Risk Zone, as identified in the Camden SWMP and Updated SFRA Figure 6/Rev 2.

The above assessment has identified the following potential issues that need to be assessed:

Q3 There will be a slight increase in the proportion of hard-surfacing.

4.0 SCOPING AND SITE INVESTIGATION

The purpose of scoping is to assess in more detail the factors to be investigated in the impact assessment. Potential impacts are assessed for each of the identified potential impact factors.

4.1 Potential Impacts

The following potential impacts have been identified by the BIA screening process.

Potential Impact	Consequence
The site is located directly above an aquifer	The site is underlain by the Claygate Member, which is classified as a Secondary ‘A’ Aquifer. This has the potential of being able to support local water supplies as well as forming an important source of base flow for local rivers. There is the potential for the hydrogeological setting to be affected by a basement development.
The proposed basement extends beneath the water table surface	The previous ESG investigation measured groundwater at depths of 0.60 m and 0.97 m within what was described as the Claygate Member and therefore it is possible that the basement excavation will extend below the water table. Should this happen, the basement structure is capable of diverting groundwater flow such that groundwater level is affected on both the up slope and down slope side of the basement structure. This in turn has the potential to affect the local hydrogeology and any adjacent structures.

There will be an increase in the proportion of hard-surfacing	An increase in hardstanding across a site, particularly as a result of covering highly permeable areas, can reduce the rate of infiltration of rainwater and increase surface run-off. If adequate drainage is therefore not installed to intercept and dispose of the increased run-off, it can lead to surface water ponding on the site, with the possibility of surface water flow being diverted into neighbouring sites.
The site contains slopes of greater than 7˚.	Previous case studies of slopes within the Claygate Member and London Clay have generally been found to be stable in the long-term at angles of between 8° and 10°. Slopes greater than this therefore may be prone to slope failure unless adequately retained. Should slope failure occur, it may give rise to the damage of nearby property and infrastructure. It should be noted that, whilst the site is indicated on Figure 17 to be located in an area of landslide potential, there is no evidence of slope movement within the general area or within the site itself, with slope currently retained by a series of retaining walls.
The site neighbours land that include slopes of greater than 7˚.	
The development will increase the differential founding depth	Should the design of retaining walls and foundations not take into account the configuration and bearing stratum of adjacent foundations, it may lead to the structural damage of associated structures.

An independent review of the BIA previously carried out by Conisbee has been undertaken by LBH Wembley, and concluded that further information and investigation was required on the groundwater regime and on potential ground movements, including slope stability, that may arise from the proposed development. Further investigation, as detailed below, has therefore been carried out in order to address these outstanding requirements and the above highlighted potential impacts.

4.2 Exploratory Work

In order to meet the objectives described in Section 1.2, to investigate the potential impacts identified by the BIA screening and to address the outstanding elements raised by the independent BIA review, a single borehole was drilled to a depth of 20.45 m using a dismantlable cable percussion drilling rig. Standard penetration tests (SPTs) were carried out at regular intervals in the boreholes and disturbed and undisturbed samples were recovered for subsequent laboratory examination and testing. The deep borehole was supplemented with a series of three window sampler boreholes advanced to depths of 4.00 m and 5.00 m, in order to provide further coverage of the area of the proposed lower ground floor extension and to confirm the shallow ground conditions.

Groundwater monitoring standpipes were installed in two of the boreholes, to depths of 5.00 m and 7.00 m and have subsequently been monitored, in addition to the standpipe installed as part of the previous ESG investigation, on a two occasions over a one-month period. During the second monitoring visit, a rising head test was carried in the standpipe installed as part of the previous ESG investigation

In addition to the boreholes, a series of three trial pits was manually excavated in order to determine the configuration of the foundations to a number of the existing boundary walls between neighbouring properties.

The borehole and trial pit records and results of the rising head test and laboratory analyses are appended, together with a site plan indicating the exploratory positions. The Ordnance Datum (OD) levels shown on the borehole records have been interpolated from spot heights shown on a site plan (reference 1411_1-011, dated August 2014), which was provided by

Conisbee. The spot heights shown on the site survey drawing are relative to an arbitrary datum, where 0 m OAD related to 72.33 m OD.

4.3 Sampling Strategy

The deep borehole was positioned at lower ground floor level on the decking area directly to the rear of the existing building and in the area of the proposed extension. The window sample boreholes were located to provide additional coverage of the development and were constructed through the existing terraces, one on the highest tier of the site and the other two on the middle tier. As the standpipe installed within the ESG investigation was found to be intact at the top of the site, groundwater monitoring standpipes were installed in one of the boreholes from the middle tier and within the cable percussion borehole at lower ground floor level.

Two of the trial pits were positioned adjacent to the rear boundary wall of the site, between No 10d Eldon Grove and No 30 Thurlow Road, which was not previously investigated. A third trial pit was excavated adjacent to the boundary wall with No 30A Thurlow Road to confirm the foundation configuration identified in the ESG investigation. All of the exploratory locations were positioned on site by an engineer from GEA as to avoid known buried services.

A number of disturbed samples recovered from the boreholes were submitted to a geotechnical laboratory for a programme of testing that included moisture content and Atterberg limit tests, undrained triaxial compression tests and soluble sulphate and pH level analysis.

5.0 GROUND CONDITIONS

The investigation has encountered the expected ground conditions in that, below a nominal thickness of made ground, the Claygate Member was encountered over the London Clay Formation.

5.1 Made Ground

Borehole No 1 was advanced through the existing decked area, with the decking found to be laid over a 200 mm void, below which a 350 mm concrete slab was present and was reinforced with 6 mm reinforcement. Below the concrete and below either a surface covering of topsoil or artificial grass in the other boreholes, made ground was encountered to depths of between 0.40 m and 0.85 m, corresponding to levels of between 80.45 m OD and 84.74 m OD. It generally comprised a matrix of brown silty clay with gravel and fine brick and coal fragments.

With the exception of notable fragments of extraneous material, no visual or olfactory evidence of significant contamination was observed within these soils. Contamination testing however did not form part of the project.

5.2 Claygate Member

Soils interpreted as comprising the Claygate Member were encountered in Borehole No 2 only, which was advanced from the highest tier at the southwestern end of the site. This stratum comprised firm pale brown mottled orange-brown silty slightly sandy clay with decayed rootlets, traces of selenite, partings of pale grey silt and fibrous rootlets to a depth of

2.00 m, a level of 82.74 m OD. The location of the boundary between the Claygate Member and underlying upper facies of the London Clay Formation can be difficult to identify as the lithologies have very similar compositions and material properties. It is therefore possible that these soils may form part of the London Clay, but as the geological map indicates the site to be on the boundary between the Claygate Member and the London Clay, and as from nearby borehole data the boundary is expected to be between 85 m OD and 80 m OD, it is thought that these soils form the base of the Claygate Member.

These soils were found to be free from the evidence of contamination and the results of Atterberg Limit tests indicate the clay to be of moderate shrinkability, with a plasticity index of 32%.

5.3 London Clay Formation

This formation was found to comprise an initial weathered horizon of firm becoming stiff fissured locally thinly laminated high strength brown silty clay with bluish grey veins, partings of pale grey silt, occasional pockets of orange-brown fine sand and selenite crystals, which extended to the maximum depth investigated in Borehole No 2, of 5.00 m (79.74 m OD) and to depths of between 3.45 m and 3.80 m, levels of between 78.76 m OD and 77.85 m OD, in the other boreholes

The weathered horizon was underlain by typical unweathered London Clay, which comprised stiff becoming very stiff fissured high strength to very high strength dark grey silty clay with occasional partings of pale grey and brownish grey silt and fine sand and traces of selenite and was proved to the maximum depth investigated, of 20.45 m (60.85 m OD).

These soils were found to be free from the evidence of contamination and of high shrinkability, with plasticity indices of between 41% and 45%. The results of quick undrained triaxial compression tests indicate the clay to increase in strength with depth from high strength and an undrained shear strength of 80 kPa to very high strength and an undrained shear strength of 153 kPa. A number of the triaxial tests yielded lower results than would be expected and it would appear that this was due to failure occurring along pre-existing fissures or being induced by the presence of silt and sand partings.

5.4 Groundwater

Seepage of groundwater was encountered in Borehole No 1 at a depth of 6.00 m (75.30 m OD) associated with a silt parting, although the borehole was noted to be dry on completion, and in Borehole No 3 at a depth of 2.00 m (80.46 m OD) associated with the presence of a claystone. Monitoring of the standpipes installed in Borehole Nos 1 and 3, in addition to the previous WS1 ESG borehole, has been carried out on two occasions over a one month period and the results are shown in the table below.

Date	Borehole No	Depth to water (m) [Level (m OD)]
14/09/2015	1	Not Monitored
	3	0.60 [81.86]
	ESG-WS1	2.23 [82.85]
5/10/2015	1	2.16 [79.14]
	3	0.60 [81.86]
	ESG-WS1	2.23 [82.85]

The measured groundwater levels vary considerably and therefore the water levels recorded are not considered to represent a continuous groundwater level. In order to provide an indication of the rate of any groundwater inflows, a rising head test was carried out in the ESG borehole WS1. The head of water was reduced by 1.50 m using a water bailer and over a period of two hours, the groundwater level did not rise. The result of the rising head test is included in the appendix.

5.5 Existing Foundations

The findings of the trial pits are summarised in the table below and sketches and photographs of each pit are included in the Appendix.

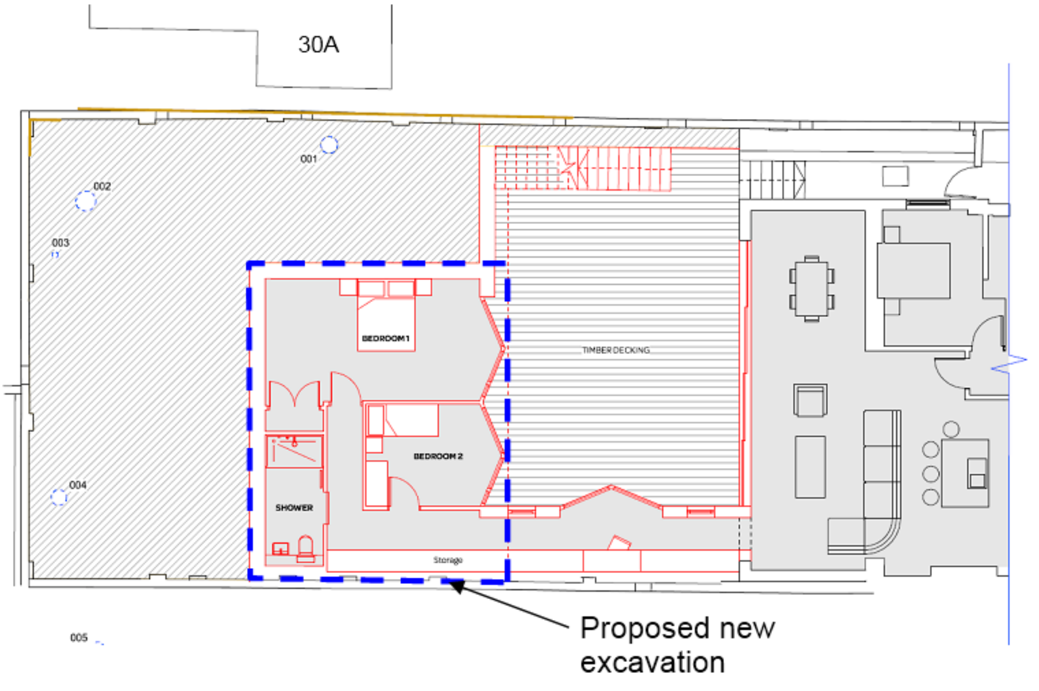
Trial Pit No	Structure	Foundation detail	Bearing Stratum
1	Rear boundary wall between No 10d Eldon Grove	Concrete strip Top 200 mm below ground level (bgl) Base 0.60 m bgl (85.60 m OD) Lateral projection 100 mm	MADE GROUND
2	Northern boundary wall between 30A Thurlow Road	Concrete strip Top 1.10 m bgl (84.02 m OD) Base 1.30 m bgl (83.82 m OD) Lateral projection 180 mm	Firm brown silty slightly sandy clay CLAYGATE MEMBER
3	Rear boundary wall with No 30 Thurlow Road	Concrete strip Top 150 mm bgl Base 0.25 m bgl (85.74 m OD) Lateral projection 300 mm	MADE GROUND

Part 2: DESIGN BASIS REPORT

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations with respect to foundation options and contamination issues.

6.0 INTRODUCTION

It is understood that it is proposed to construct a single storey extension to the lower ground floor, which involves excavating further into the slope of the rear garden, beyond the existing concrete retaining walls. New wall loads along the proposed retaining walls are understood to be in the order of between 77 kN/m and 158 kN/m, whilst the proposed raft foundation will apply a pressure of 20.5 kN/m^2. A plan of the proposed development is shown below.



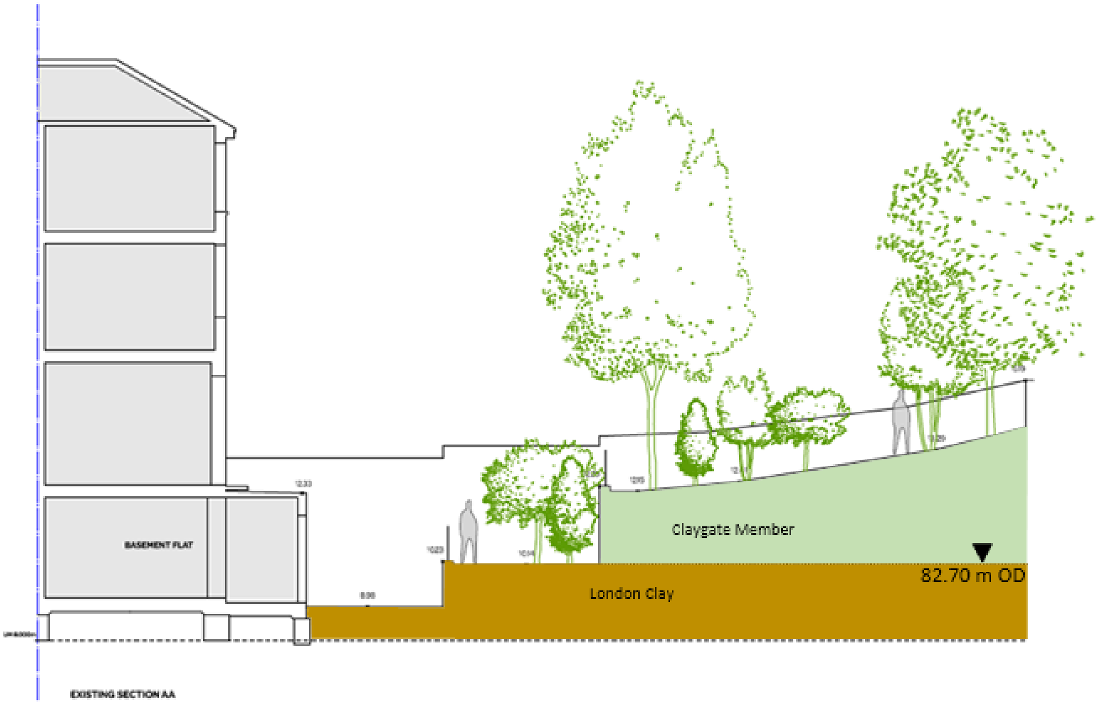
7.0 GROUND MODEL

On the basis of the intrusive investigations, the ground conditions at this site can be characterised as follows and are shown in the cross-section overleaf:

- below a generally nominal thickness of made ground, the Claygate Member overlies the London Clay;
- made ground extends to depths of between 0.40 m and 0.85 m, levels of between 80.45 m OD and 84.74 m OD;
- the Claygate Member is only present below the southwestern portion of the garden to a level of 82.74 m OD and comprises firm pale brown mottled orange-brown silty

slightly sandy clay;

- the London Clay is present below the Claygate Member to the maximum depth investigated, of 20.45 m (60.85 m OD);
- groundwater monitoring indicated groundwater at levels of 79.14 m OD and 82.85 m OD, although rather than indicating a continuous groundwater table, the water levels are considered to represent perched groundwater within the standpipes; and
- groundwater seepages do occur within the London Clay associated with claystones and silt partings.



8.0 ADVICE AND RECOMMENDATIONS

It is understood that the proposed lower ground floor extension will require a 6.00 m lateral excavation into the existing slope at the same level as the existing lower ground floor and associated decking (81.30 m OD). This will also include the excavation of a 1.00 m thickness of soil that currently forms the middle terrace. It is also understood that it is proposed that the new structure will be supported on a raft foundation

8.1 Excavation

The formation level for the extension will be within the London Clay at a level of approximately 81.30 m OD. On the basis of the groundwater observations to date, perched groundwater inflows, as indicated by the monitoring to date are likely to be encountered in the excavation. As indicated by the rising head test carried out during the investigation, such inflows are considered to be relatively slow and not prolonged, such that they should be adequately dealt with using conventional methods.

There are a number of methods by which the sides of the excavation could be supported in the temporary and permanent conditions. The choice of wall may be governed to a large extent by whether it is to be incorporated into the permanent works and have a load bearing function. The final choice will depend to a large extent on the need to protect nearby structures from movements, the required overall stiffness of the support system, and the need to control groundwater movement through the wall in the temporary condition. In this respect the stability of the neighbouring properties and the existing slope will be paramount.

It is likely that most appropriate method of constructing the retaining walls will be the combination of localised conventional concrete underpinning of the existing garden boundary walls and a bored pile wall. As discussed above, perched groundwater may be encountered although these inflows should be adequately dealt with using sump pumping. It would however be prudent for the chosen contractor to have a contingency plan in place to deal with more significant inflows as a precautionary measure. The use of underpinning will require the soils being underpinned to stand unsupported and difficulties may be encountered with unsupported excavations in the made ground, particularly where groundwater is encountered. However the trial pits excavated during the investigation did not encountered groundwater and did not indicate major instabilities in the made ground.

On the basis of the monitoring results to date, the use of a contiguous bored pile wall should be suitable, with localised grouting between piles to prevent any minor inflows. The noise and vibrations associated with the installation of sheet piles is likely to render their use as a temporary retaining wall unacceptable.

The ground movements associated with the excavation will depend on the method of excavation and support and the overall stiffness of the basement structure in the temporary condition. Thus, a suitable amount of propping will be required to provide the necessary rigidity and the timing of the provision of support to the wall will have an important effect on movements. The stability of the existing foundations will need to be ensured at all times and the retaining walls will need to be designed to support the loads from these foundations unless they are underpinned. Careful workmanship will be required in the construction of the underpins and it is recommended that a suitable specialist contractor is consulted in this respect. It is also paramount that the retaining wall along the rear elevation of the proposed excavation is designed to maintain the stability of the existing slope. In this respect, the wall will need to be installed prior to any excavation or modification to the slope profile taking place. The stability of the slope is however considered further in Part 3 of this report.

8.1.1 Retaining Walls

The following parameters are suggested for the design of the permanent basement retaining walls.

Stratum	Bulk Density (kg/m^3)	Effective Cohesion (c′ – kN/m^2)	Effective Friction Angle (Φ′ – degrees)
Made ground	1700	Zero	27
Claygate Member	1900	Zero	25
London Clay	2000	Zero	25

Significant groundwater inflows are unlikely to be encountered within the excavation, although monitoring of the standpipe should be continued in order to establish equilibrium levels. At this stage, it is recommended that for the design of the retaining walls, that groundwater level should be assumed to be ¾ of the retained height, unless the risk of groundwater and surface water collecting behind the retaining walls can be suitably mitigated through the use of the use of a fully effective drainage system. The advice in BS8102:2009[4] should be followed in the design of the basement retaining walls and with regard to waterproofing requirements.

8.1.2 Heave

The proposed development will require a maximum excavation depth of approximately 3.00 m, which will result in a net unloading of around 60 kN/m^2. The excavation of an approximately 1.0 m thickness of soil from the lowering of the existing middle terrace will result in unloading of approximately 20 kN/m^2. The unloading will result in heave of the underlying clay soils, although these movements will to certain extent be counteracted by the applied loads from the new structures. Further consideration is given to heave movements in Part 3 of this report.

8.2 Piled Foundations

For the ground conditions at this site some form of bored pile is likely to be the most appropriate type. A conventional rotary augered pile may be appropriate, with temporary casing installed to maintain stability and prevent groundwater inflows, or alternatively the use of bored piles installed using continuous flight auger (cfa) techniques, which would not require the provision of casing, would also be an appropriate choice of pile.

The following table of ultimate coefficients may be used for the preliminary design of bored piles, based on the SPT & Cohesion / level graph in the appendix.

Stratum	Level m OD	kN / m^2
Ultimate Skin Friction		
Made Ground and Claygate Member	All soil above 81.00	Ignore (Basement excavation)
London Clay (clay - α = 0.5)	81.00 to 61.00	Increasing linearly from 35 to 75
Ultimate End Bearing		
Claygate Member	69.00 to 61.00	Increasing linearly from 963 to 1350

In the absence of pile tests, guidance from the London District Surveyors Association (LDSA)[5] suggests that a factor of safety of 2.6 should be applied to the above coefficients in the computation of safe theoretical working loads. On the basis of the above coefficients it has been estimated that a 300 mm diameter pile extending to 69.00 m OD, approximately 12.00 m below lower ground level, should provide a safe working load of about 215 kN, whereas the same diameter pile extending to 72.00 m OD, approximately 15.00 m below lower ground level should provide a safe working load of approximately 300 kN. Alternatively a 450 mm diameter pile founding at 20.00 m, a toe level of 61 m OD, should provide about 670 kN.

4 BS8102 (2009) *Code of practice for protection of below ground structures against water from the ground*

5 LDSA (2009) *Foundations No 1 – Guidance notes for the design of straight shafted bored piles in London Clay*. LDSA Publications

The above examples are not intended to constitute any form of recommendation with regard to pile size or type, but merely serve to illustrate the use of the above coefficients. Specialist piling contractors should be consulted with regard to the design of an appropriate piling scheme and their attention should be drawn to potential groundwater inflows within the made ground and silt and sand partings within the London Clay.

8.3 Effect of Sulphates

Generally moderate concentrations of total sulphate have been measured in samples of the made ground and therefore indicate that buried concrete should be designed in accordance with Class DS-2 conditions of Table C2 of BRE Special Digest 1: SD1 Third Edition (2005). The measured pH conditions are mildly alkaline and therefore on the basis of static groundwater conditions being assumed for buried concrete an ACEC classification of AC-1s may be adopted. The guidelines contained in the above digest should be followed in the design of foundation concrete.

These recommendations will also be reviewed upon completion of sulphate and pH level testing on samples of natural soil.

Part 3: GROUND MOVEMENT ANALYSIS

This section of the report comprises an analysis of the ground movements arising from the proposed basement and foundation scheme discussed in Part 2 and the information obtained from the investigation, presented in Part 1 of the report.

9.0 INTRODUCTION

The sides of an excavation will move to some extent regardless of how they are supported. The movement will typically be both horizontal and vertical and will be influenced by the engineering properties of the ground, groundwater level and flow, the efficiency of the various support systems employed during underpinning and the efficiency or stiffness of any support structures used.

An analysis has been carried out of the likely movements arising from the proposed excavation and the results of this analysis have been used to predict the effect of these movements on surrounding structures.

9.1 Construction Sequence

The following sequence of operations has been taken from drawings SSK003, SSK004 and SSK005, all dated October 2015, issued by Conisbee. It has been used to enable analysis of the ground movements around the excavation both during and after construction.

In general, the sequence of works for excavation and construction will comprise the following stages.

1. Construct retaining wall along the boundary with No 37 Rosslyn Hill through underpinning garden boundary wall with maximum 1.0 m wide underpins in a 'hit and miss' construction sequence. The 'hit and miss' sequence is typically formed by using a trench box excavation, commonly sheet lined, shored and strutted; all temporary shoring and propping to be inspected by a suitably qualified person.

2. Installation of contiguous bored piled wall to form temporary retaining walls running parallel to the boundary wall with No 30A Thurlow Road and the rear of the excavation, parallel to rear boundary wall.

3. Reduced dig and install blocks and props.

4. Second underpins formed along the boundary with No 37 with maximum 1.0 m wide underpins, followed by further reduced dig and additional props formed.

5. Ground slab cast with starter bars for permanent retaining walls.

6. Permanent concrete retaining walls formed and cast, top slab formed and cast and props removed once the concrete is at a sufficient strength.

The underpins should be adequately laterally propped and sufficiently dowelled together, with the concrete cast and adequately cured prior to excavation of the basement and removal of the formwork and supports.

The detail of the support provided to adjacent walls is beyond the scope of this report at this stage and the structural engineer will be best placed to agree a methodology with the underpinning contractors once appointed.

10.0 GROUND MOVEMENTS

An assessment of ground movements within and surrounding the excavation has been undertaken using the X-Disp and P-Disp computer programs licensed from the OASYS suite of geotechnical modelling software from Arup. These programs are commonly used within the ground engineering industry and are considered to be appropriate tools for this analysis.

The X-Disp program has been used to predict ground movements likely to arise from the construction of the proposed basement. This includes the settlement of the ground (vertical movement) and the lateral movement of soil behind the proposed retaining walls (horizontal movement).

The analysis of potential ground movements within the excavation, as a result of unloading of the underlying soils, has been carried out using the Oasys P-Disp Version 19.3 – Build 12 software package and is based on the assumption that the soils behave elastically, which provides a reasonable approximation to soil behaviour at small strains.

For the purpose of these analyses, the corners have been defined by x and y coordinates, with the x-direction parallel with the orientation northeast-southwest, whilst the y-direction is parallel with the orientation of northwest-southeast. Vertical movement is in the z-direction.

The full outputs of all the analyses can be provided on request but samples of the output movement contour plots are included within the appendix.

10.1 Ground Movements Surrounding the Basement

For the X-Disp analysis, the soil movement relationships used for the embedded retaining walls are the default values within CIRIA report C580[6], which were derived from a number of historic case studies.

The ground movement curves for ‘excavations in front of high stiffness wall in clay’ have been adopted as being considered most appropriate for the proposed excavation and its support at this site.

The ground movement curves for ‘installation of a planar diaphragm wall in stiff clay’ have been adopted as being considered most appropriate for the proposed underpin phase at this site, whilst the ground movement curves for ‘installation of contiguous bored pile wall in stiff clay’ have been adopted for the proposed contiguous bored pile wall sections.

The results are presented to the degree of accuracy required to allow predicted variations in ground movements around the structure(s) to be illustrated, but may not reflect the anticipated accuracy of the predictions.

The predicted movements are based on the worst case of the individually analysed segments of ‘hogging’ and ‘sagging’ and are summarised in the table below.

6 Gaba, A, Simpson, B, Powrie, W and Beadman, D (2003) *Embedded retaining walls – guidance for economic design* .CIRIA Report C580.

Phase of Works	Wall Movement (mm)	
	Vertical Settlement	Horizontal Movement
Combined underpin and contiguous bored pile wall installation	<5	<5
Combined Movements	9	16

The analysis has indicated that the maximum vertical and horizontal settlements that will result from underpin and contiguous piled wall installation are less than 5 mm. The movements arising from the combined underpin / contiguous piled wall and excavation are therefore not likely to exceed 10 mm vertical settlement, whilst the maximum horizontal movements are also anticipated to be less than 20 mm.

The movements set out in the table above are the maximum movements and generally occur immediately or just outside the line of the piled wall; the effects of the excavation reduce with distance away from the piled wall. For the example combined movements of between 6 mm to 10 mm occur at foundation level below No 30A Thurlow Road, while combined movements of between 4 mm to 8 mm occur at foundation level below No 30 Thurlow Road and 10d Eldon Crescent. Less than 10 mm of both combined vertical and horizontal movement occur along the existing retaining wall at the boundary with 30 Thurlow Road and 10d Eldon Grove.

For the purpose of the analysis the retaining wall parallel to No 30A Thurlow Road has been modelled using the movement curves for ‘installation of contiguous bored pile wall in stiff clay’. However, only a 4.0 m stretch of this wall will be formed using a contiguous bored pile wall, with the remainder formed by essentially underpinning. Due to the limitations of the software, it is not possible to model both forms of installation along the same line and therefore the contiguous bored pile wall movement curves have been adopted in order to provide a worst case scenario.

Taking the above into account, in reality the movements along the northern extent of the proposed excavation would be expected to be less than those shown by the analysis, with the overall general movements resulting from the excavation likely to be somewhat less, as they will be minimised due to control of the propping in the temporary works and a regime of monitoring.

10.2 Ground Movements within the Excavation (Heave)

Unloading of the London Clay will take place as a result of the excavation of the proposed lower ground floor extension. The reduction in vertical stress will cause heave to take place. Undrained soil parameters have been used to estimate the potential short term movements, which include the “immediate” or elastic movements as a result of the existing building and basement excavation. Drained parameters have been used to provide an estimate of the total long-term movement.

The elastic analysis requires values of soil stiffness at various levels to calculate displacements. Values of stiffness for the soils at this site are readily available from published data and we have used a well-established method to provide our estimates. This relates values of E_u and E', the drained and undrained stiffness respectively, to values of undrained cohesion, as described by Padfield and Sharrock[7] and Butler[8] and more recently by O'Brien and Sharp[9]. Relationships of E_u = 500 C_u and E' = 300 C_u for the cohesive soils and 2000 x SPT 'N' for granular soils have been used to obtain values of Young's modulus. More recent published data[10] indicates stiffness values of 750 x Cu for the London Clay and a ratio of E' to Cu of 0.75, but it is considered that the use of the more conservative values provides a sensible approach for this stage in the design.

The excavation of a 3.0 m thickness of soil across the majority of the proposed extension will result in a net unloading of roughly 60 kN/m², whilst where only a 1.0 m excavation is required to form the extension, an unloading of approximately 20 kN/m² will occur, assuming a unit weight of 20 kN/m^3 for the London Clay and 19 kN/m^2 for the Claygate Member.

A rigid boundary for the analysis has been set at a depth of 60.0 m below the proposed excavation, within the London Clay. Below this depth the clay is considered to be essentially incompressible.

The P-Disp analysis indicates that the heave resulting from the excavation of the proposed basement will be up to 16 mm within the centre the excavation and reducing to between 5 mm and 8 mm toward the edges. These movements would be expected to be complete by the end of the excavation and construction period. Taking into account the loads of the proposed extension, the analysis has shown that in the long term, the majority of the short-term movement will be recovered, with total heave movements at the centre of the excavation likely to actually be between 3 mm and 5 mm, whilst across the western half of the excavation, where the majority of the load from the proposed structure will be applied, between 1 mm and 4 mm settlement will take place below new foundations.

The results of the P-Disp analysis also indicate the likely impact of the proposed basement construction beyond the site boundaries. On the basis of the analysis, total vertical movements outside the proposed extension to the east are unlikely to exceed 1 mm to 3 mm of heave, whilst beyond the western extent between 1 mm and 2 mm of settlement maybe expected to occur. These movements however occur within 2 m of the edge of the excavation and are therefore considered to be very negligible and will not have detrimental impact on any surrounding structures.

The potential movements are summarised in the table below.

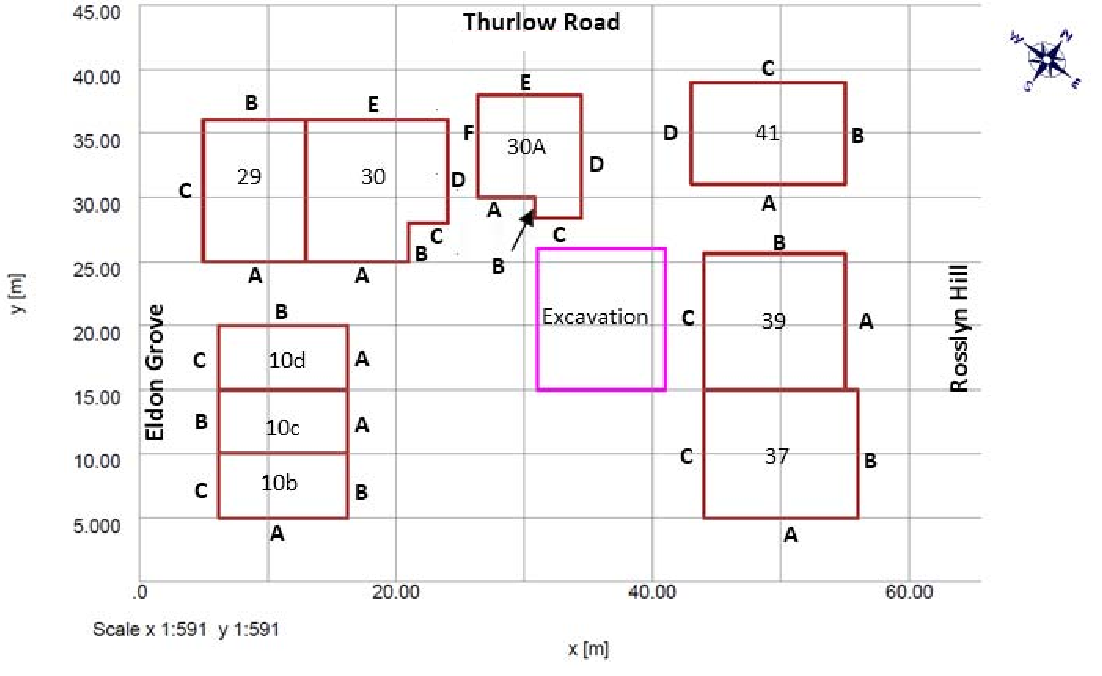
Location	Movement (mm)	
	Short-term Movement (Excavation Phase)	Total Movement
Centre of new deep excavation	16 (heave)	1 to 3 (heave)
Edge of excavations	5 to 10 (heave)	1 to 4

If a compressible material is used beneath the slab, it will need to be designed to be able to resist the potential uplift forces generated by the ground movements. In this respect potential heave pressures are typically taken to equate to around 30% to 40% of the total unloading pressure.

7 Padfield CJ and Sharrock MJ (1983) *Settlement of structures on clay soils*. CIRIA Special Publication 27
8 Butler FG (1974) *Heavily overconsolidated clays: a state of the art review.* Proc Conf Settlement of Structures, Cambridge, 531-578, Pentech Press, Lond
9 O'Brien AS and Sharp P (2001) *Settlement and heave of overconsolidated clays - a simplified non-linear method.* Part Two, Ground Engineering, Nov 2001, 48-53
10 Burland JB, Standing, JR, and Jardine, FM (2001) Building response to tunnelling, case studies from construction of the Jubilee Line Extension.. CIRIA Special Publication 200

11.0 DAMAGE ASSESSMENT

In addition to the above assessment of the likely movements that will result from the proposed development, some of the neighbouring structures have been considered as sensitive structures, requiring Building Damage Assessments, on the basis of the classification given in Table 2.5 of C580[1]. The sensitive structures outlined above have been modelled as lines in the analysis and are the lines along which the damage assessment has been undertaken. A plan of the sensitive structures is provided below, and a key plan detailing the specific lines is included in the Appendix.



For the purpose of the analysis the below assumptions were made:

- ground level has been assumed to be the level of the highest from which excavation will take place, at a level of 84.33 m OD, in order to keep the models consistent with each other with regard to excavation depth and assumed founding levels of the existing foundations to neighbouring structures;
- neighbouring properties were drawn in the analysis from drawings '1411_L_001' and 1411_1-011, which were drawn by Square Feet Architects and provided by Conisbee;
- founding levels of neighbouring properties have been assumed from information provided by Conisbee and on the basis of the heights and approximate age of the buildings.
- the excavation founding level is 81.30 m OD as provided by Conisbee; and
- building heights have been derived from drawing '1411_L_015, which was drawn by Square Feet Architects and provided by Conisbee.

11.1 Damage to Neighbouring Structures

The combined short term movements resulting from both retaining wall installation and basement excavation calculated using the X-Disp modelling software have been used to carry out an assessment of the likely damage to adjacent properties and the results are summarised in the table below. The detailed tabular output is included in the Appendix alongside a key plan for reference.

Building Damage Assessment		
Sensitive Structure	**Elevation**	**Category of Damage***
10b Eldon Grove	A	0 (Negligible)
	B	0 (Negligible)
	C	0 (Negligible)
	Party Wall with No 10c	0 (Negligible)
10c Eldon Grove	A	0 (Negligible)
	B	0 (Negligible)
	Party Wall with No 10b	0 (Negligible)
	Party Wall with No 10d	0 (Negligible)
10d Eldon Grove	A	0 (Negligible)
	B	0 (Negligible)
	C	0 (Negligible)
	Party Wall with No 10c	0 (Negligible)
29 Thurlow Road	A	0 (Negligible)
	B	0 (Negligible)
	C	0 (Negligible)
	Party Wall with No 30	0 (Negligible)
30 Thurlow Road	A	0 (Negligible)
	B	0 (Negligible)
	C	0 (Negligible)
	D	0 (Negligible)
	E	0 (Negligible)
	Party Wall with No 29	0 (Negligible)

Building Damage Assessment		
Sensitive Structure	**Elevation**	**Category of Damage***
30A Thurlow Road	A	0 (Negligible)
	B	0 (Negligible)
	C	1 (Very Slight)
	D	2 (Slight)
	E	0 (Negligible)
	F	0 (Negligible)
41 Rosslyn Hill	A	0 (Negligible)
	B	0 (Negligible)
	C	0 (Negligible)
	D	0 (Negligible)
39 Rosslyn Hill	A	0 (Negligible)
	B	0 (Negligible)
	C	0 (Negligible)
	Party Wall with No 37	0 (Negligible)
37 Rosslyn Hill	A	0 (Negligible)
	B	0 (Negligible)
	C	0 (Negligible)
	Party Wall with No 39	0 (Negligible)

**From Table 2.5 of C580[1]: Classification of visible damage to walls.*

The building damage reports for sensitive structures, highlighted in the above table, predict that the damage to the neighbouring structures would generally be Category 0 (Negligible) and therefore within acceptable limits. There is a single area, along the elevations C and D of 30A Thurlow Road, which are indicated by the assessment to fall within Category 1 (very slight) and Category 2 (Slight) respectively. However, this building is founded on a piled raft foundation and therefore this building will not be sensitive to the ground movements that might arise from the construction and excavation of the proposed development.

11.2 Monitoring of Ground Movements

The predictions of ground movement based on the ground movement analysis should be checked by monitoring of adjacent properties and structures. Condition surveys of the above existing structures should be carried out before and after the proposed works.

The precise monitoring strategy will be developed at a later stage and it will be subject to discussions and agreements with the owners of the adjacent properties and structures. Contingency measures will be implemented if movements of the adjacent structures exceed predefined trigger levels. Both contingency measures and trigger levels will need to be developed within a future monitoring specification for the works.

12.0 SLOPE STABILITY

The answers to the stability screening questions in Section 3.1.2 identified the need to carry out an assessment of the potential impact of the proposed development on the stability of the existing slope and therefore the structural stability of the properties positioned up slope from the proposed development, in particular No 10d Eldon Grove and No 30 Thurlow Road. An analysis has therefore been carried out using the Geostudio™ 2007 Slope/W© software and is based on recognised correlations between site specific data and commonly accepted input parameters, using the Bishop-Janbu effective stress slip circle failure mechanism.

At present the slope is well vegetated with established mature trees and shows no sign of any previous movement, in particular there is no sign of damage to the existing retaining walls, which are considered to be performing adequately. The slope is therefore considered to be stable. Conservative soil parameters have been used for the Claygate Member and London Clay, in addition to assuming a theoretical groundwater table of approximately 1.00 m below ground level, which also provides a conservative approach.

Modelling of the existing profile has shown the overall slope to be stable with a factor of safety (FOS) of 1.3. This would be considered to be an adequate FOS despite taking a conservative approach, particularly with regard to the loads applied by the existing building at the toe of the slope and the effects of the existing retaining walls. Although the retaining walls have been placed within model, as the founding depths are not known, the self-weight of the walls have been applied at a shallow depth. In reality, these are going to be much deeper, providing greater stability to the slope.

Using the same conservative parameters and assumptions, the analysis of the re-profiled slope, based upon the layout of the proposed development, has indicated that no slip circles are likely to form beneath the level of the proposed extension and through the slope as a whole, with an increased FOS of 1.4. As with the initial analysis of the existing slope, the conservative approach to the model means that the actual FOS of the slope, post development, is likely to be much higher, particularly as conservative new loads of the proposed extension into the slope were used in the analysis. The proposed development is therefore considered to be provide an increased stability to the slope and will therefore not have an impact on the properties up slope of the development.

13.0 CONCLUSIONS

The ground movement analysis has concluded that the predicted damage to the neighbouring properties would generally be ‘Negligible’. On this basis, the damage that would inevitably occur as a result of such an excavation would fall well within the acceptable limits. It is recommended that movement monitoring is carried out on all structures prior to and during the proposed excavation and construction.

The separate phases of work, including excavation of the proposed maximum 3.0 m thickness of soil, will in practice be separated by a number of weeks during which time construction of permanent supports, basement slab and underpin curing will take place. This will provide an opportunity for the ground movements during and immediately after underpin and contiguous piled wall construction to be measured and the data acquired can be fed back into the design and compared with the predicted values. Such a comparison will allow the ground model to be reviewed and the predicted wall movements to be reassessed prior to the main excavation taking place so that propping arrangements can be adjusted if required.

The slope stability analysis has indicated that the existing slope is in a stable condition, with the proposed development likely to provide an increased stability to the slope. There is therefore not considered to be a risk of slope instability and therefore potential structural damage to the properties positioned up slope from the development.

14.0 BASEMENT IMPACT ASSESSMENT

The screening identified a number of potential impacts. The desk study and ground investigation information has been used below to review the potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

The table below summarises the previously identified potential impacts and the additional information that is now available from the site investigation in consideration of each impact.

Potential Impact	Site Investigation Conclusions
The site is located directly above an aquifer	The investigation has indicated that the site is located on the boundary between the Claygate Member and the London Clay, such that the Claygate Member is only present below the higher level of the site, in the southwestern half of the rear garden. The Claygate Member in any case comprises a sandy clay and therefore behaves more hydraulically like the underlying London Clay. A continuous groundwater table has not been encountered below the site, as discussed below.
The proposed basement extends beneath the water table surface	Seepages of groundwater were encountered in the London Clay associated with a claystone and silt parting, although at depths of 2.00 m and 6.00 m, levels of 75.30 m OD and 81.46 m OD, below the level of the proposed development of 81.32 m OD. Groundwater was measured in the standpipes, although it is clear that a continuous groundwater table is not present and therefore the proposed development will not have an effect on the hydrogeological setting.
There will be an increase in the proportion of hard-surfacing	Although the majority of the area currently covered in artificial grass will be replaced with a concrete slab and decking, resulting in an increase in the proportion of hardstanding, this area is currently drained using a land drain that feeds into the main sewer. This remain the case as the decking area will continue to be collected by combined drains such that an increase in surface run-off will not occur. Furthermore, the proportion of the permeable area will remain and actually slightly be increase with the provision of a green roof made up of a 600 mm thickness of permeable material.
The site contains slopes of greater than 7˚.	The slope stability analysis has indicated that the existing slope is suitability retained and stable and that the proposed development will actually increase the stability of the slope, preventing slope failure and the potential for structural damage to occur to the properties positioned up slope.
The site neighbours land that include slopes of greater than 7˚.	
The development will increase the differential founding depth	The investigation has indicated that the northern and southern boundary walls are currently founded on

	conventional strip foundations bearing on the Claygate Member. As it is proposed to underpin these foundations as part of the construction, this will prevent differential founding depths and maintain structural stability. This has been confirmed by the results of the ground movement analysis which has indicated that any building damage is likely to be Category 0 and negligible.

The results of the site investigation have therefore been used below to review the remaining potential impacts, to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

The site is underlain by a Secondary 'A' Aquifer

The investigation has indicated that the site is located on the boundary between the London Clay and Claygate Member, such that only the southwestern part of the existing garden, across the higher level, is underlain by the Claygate Member, whilst the remaining areas of the site is directly underlain by the London Clay, which is designated as a Non-Aquifer. A continuous groundwater table has not been encountered during the investigation, with groundwater not encountered within the Claygate Member during the drilling of the boreholes and only seepages of groundwater encountered in the London Clay associated with a claystone and silt parting. These were however encountered at depths below the formation level of the proposed extension.

Groundwater was measured in the standpipes, although rising head tests indicate no recharge rate, suggesting that the levels measured were as a result of the building up of surface water inflows within the standpipes, or draining very slowly from the clay

In any case, it is proposed to incorporate sufficient drainage as part of the retaining wall design, which will allow perched water from behind the wall to drain to the existing drainage, preventing any effect on neighbouring properties.

The search of records of nearby basements discussed previously in Section 2.3, has highlighted a number of or lower ground floor levels beneath properties neighbouring the site, with a planning application for the construction of a new basement recently submitted for No 30A Thurlow Road. There is adequate space between these structures, such that there will not be a cumulative impact on any groundwater flow.

On the basis of all of the above, it is still concluded that the proposed development will not have an impact on the hydrogeological setting.

There will be an increase in the proportion of hardstanding

Although the majority of the area currently covered in artificial grass will be replaced with a concrete slab and decking, resulting in an increase in the proportion of hardstanding, this area is currently drained using a land drain that feeds into the main sewer. This will remain the case as the decking area will continue to be collected by combined drains such that an increase in surface run-off will not occur. Furthermore, the proportion of the permeable area will remain and actually slightly be increase with the provision of a green roof made up of a 600 mm thickness of permeable material. The existing drainage plan is included in the appendix.

The site includes slopes of greater than 7º

The slope stability analysis has indicated that the existing slope is suitability retained and stable and that proposed development will actually increase the stability of the slope, preventing slope failure and the potential for structural damage to occur to the properties positioned up slope.

Differential founding depths

The northern and southern boundary walls, close to the proposed excavation, are currently founded on conventional strip foundations bearing on the Claygate Member. As indicated in the CMS produced by Conisbee, these foundations will be underpinned as part of the basement construction, which will prevent differential founding depths and maintain structural stability. This has been confirmed by the results of the ground movement analysis which has indicated that any building damage is likely to be Category 0 and negligible.

14.1 Non-Technical Summary of Evidence

This section provides a short summary of the evidence acquired and used to form the conclusions made within the BIA.

14.1.1 Screening

The following table provides the evidence used to answer the surface water flow and flooding screening questions.

Question	Evidence
1. Is the site within the catchment of the pond chains on Hampstead Heath?	Topographical maps acquired as part of the desk study and Figures 12 and 14 of the Arup report
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	A site walkover and existing plans of the site have confirmed the proportions of hardstanding and soft landscaping, which have been compared to the proposed drawings to determine the changes in the proportions. The existing drainage drawings have also been consulted.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	
4. Will the proposed basement development result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	As above.
5. Will the proposed basement result in changes to the quantity of surface water being received by adjacent properties or downstream watercourses?	
6. Is the site in an area known to be at risk from surface water flooding such as South Hampstead, West Hampstead, Gospel Oak and Kings Cross, or is it at risk of flooding because the proposed basement is below the static water level of a nearby surface water feature?	Flood risk maps acquired from the Environment Agency as part of the desk study, Figure 15 of the Arup report, the Camden Flood Risk Management Strategy dated 2013 and the North London Strategic Flood Risk Assessment dated 2008.

The following table provides the evidence used to answer the subterranean (groundwater flow) screening questions.

Question	Evidence
1a. Is the site located directly above an aquifer?	Aquifer designation maps acquired from the Environment Agency as part of the desk study and Figures 3, 5 and 8 of the Arup report.
1b. Will the proposed basement extend beneath the water table surface?	Previous nearby GEA investigations and BGS archive borehole records and ESG investigation.
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	Topographical maps acquired as part of the desk study and Figures 11 and 12 of the Arup report.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	Topographical maps acquired as part of the desk study and Figures 12 and 14 of the Arup report
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	A site walkover and existing plans of the site have confirmed the proportions of hardstanding and soft landscaping, which have been compared to the proposed drawings to determine the changes in the proportions. The existing drainage drawings have also been consulted.
5. As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	The details of the proposed development do not indicate the use soakaway drainage.
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 line?	Topographical maps acquired as part of the desk study and Figures 11 and 12 of the Arup report.

The following table provides the evidence used to answer the subterranean (groundwater flow) screening questions.

Question	Evidence
1. Does the existing site include slopes, natural or manmade, greater than 7°?	Topographical maps and Figures 16 and 17 of the Arup report and confirmed during a site walkover
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	The details of the proposed development provided do not include the re-profiling of the site to create new slopes
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	Topographical maps and Figures 16 and 17 of the Arup report and confirmed during a site walkover
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	
5. Is the London Clay the shallowest strata at the site?	Geological maps and Figures 3, 5 and 8 of the Arup report
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?	A site walkover confirmed that there are trees on site, but the proposals do not include for the removal of any trees and the measures for tree protection are set out in the Arboricultural Method Statement.
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	Knowledge on the ground conditions of the area were used to make an assessment of this, in addition to a visual inspection of the buildings carried out during the site walkover
8. Is the site within 100 m of a watercourse or potential spring line?	Topographical maps acquired as part of the desk study and Figures 11 and 12 of the Arup report
9. Is the site within an area of previously worked ground?	Geological maps and Figures 3, 5 and 8 of the Arup report
10. Is the site within an aquifer?	Aquifer designation maps acquired from the Environment Agency as part of the desk study and Figures 3, 5 and 8 of the Arup report.

Question	Evidence
11. Is the site within 50 m of Hampstead Heath ponds?	Topographical maps acquired as part of the desk study and Figures 12 and 14 of the Arup report.
12. Is the site within 5 m of a highway or pedestrian right of way?	Aerial photography, site plans and the site walkover.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Records of basements being present below neighbouring properties and the site walkover confirmed the position of the proposed basement relative the neighbouring properties.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	Maps and plans of infrastructure tunnels were reviewed, in addition to online infrastructure maps, showing exclusions zones, made available by Transport for London, as shown in Section 2.3 of this report.

14.1.2 Scoping and Site Investigation

The questions in the screening stage that there were answered 'yes', were taken forward to a scoping stage and the potential impacts discussed in Section 4.0 of this report, with reference to the possible impacts outlined in the Arup report.

A ground investigation was carried out, which has allowed an assessment of the potential impacts of the basement development on the various receptors identified from the screening and scoping stages. Principally the investigation aimed to establish the ground conditions, including the groundwater level, the engineering properties of the underlying soils to enable suitable design of the basement development and the configuration of existing party wall foundations. The findings of the investigation are discussed in Section 5.0 of this report and summarized in both Section 7.0 and the Executive Summary.

14.1.3 Impact Assessment

Section 9.0 of this report summarises whether or not, on the basis of the findings of the investigation, the potential impacts still need to be given consideration and identifies ongoing risks that will require suitable engineering mitigation. Section 8.0 of this report also provides recommendations for the design of the proposed development, whilst Part 3 provides the outcomes of a ground movement analysis, building damage assessment and slope stability analysis, which has also been used to provide a conclusion on any potential impacts from the proposed basement development.

15.0 OUTSTANDING RISKS AND ISSUES

This section of the report aims to highlight areas where further work is required as a result of limitations on the scope of this investigation, or where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive, but covers the main areas where additional work may be required.

The ground is a heterogeneous natural material and variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the ground conditions based on the discrete points at which the ground was sampled, but the ground conditions should be subject to review as the work proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

APPENDIX

Borehole Records

Borehole Cross-section

Trial Pit Records

Geotechnical Test Results

SPT & Cohesion/ Level Graph

Existing Drainage Plan

Site Plan

Slope Stability Analysis Results

X-DISP ANALYSIS

Basement Excavation
Contour Plots of Vertical Movements and Horizontal Movements for both Existing Basement and New Basement Analysis

Installation of underpins
Contour Plot of Vertical Movements and Horizontal Movements for both Existing Basement and New Basement Analysis

Basement Excavation and Underpin Analysis
Contour Plots of Combined Vertical Movements and Horizontal Movements for both Existing Basement and New Basement Analysis

P-DISP ANALYSIS
Short Term Movement
Total Movement

BUILDING DAMAGE ASSESSMENT (X-DISP)

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
SG12 7QE

Site	Borehole Number
39 Rosslyn Hill, London NW3 5UJ	**BH1**

Boring Method	Casing Diameter		Ground Level (mOD)	Client	Job Number
Dismantlable Cable Percussion Drilling Rig	Depth	Diameter	81.30	Mr J Cohen and Ms A Lindsay	J15236
	1.30	150			
	Location		**Dates**	**Engineer**	**Sheet**
	526835.00E 185497.00N		01/09/2015 - 03/09/2015	Conisbee	Sheet 1 of 3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
						(0.20)	Decking
					81.10	0.20	Concrete reinforced with 6 mm reinforcement
						(0.35)	
0.65	D1				80.75	0.55 (0.10)	Made Ground (clayey sandy gravelly Type 1)
0.85	D2				80.65	0.65 (0.20)	Made Ground (building rubble in a brown clay matrix)
1.00 - 1.45	U3				80.45	0.85	Stiff fissured locally thinly laminated high strength brown silty CLAY with bluish grey veins, partings of pale grey silt and selenite crystals
1.45	D4						
1.70	D5						
2.00 - 2.45	D6						
2.00 - 2.45	SPT (S)N=11	1.30		N=11 (1,2/2,2,3,4)		(2.60)	
2.70	D7						
3.00 - 3.45	U8						
3.45	D9				77.85	3.45	Stiff becoming very stiff fissured high strength to very high strength dark grey silty CLAY with occasional partings of pale grey and brownish grey silt and fine sand and traces of selenite
3.70	D10						
4.00 - 4.45	D11						
4.00 - 4.45	SPT (S)N=15	1.30		N=15 (2,2/3,3,4,5)			
4.70	D12						
5.00 - 5.45	U13						
5.45	D14						
6.00	D15						*silt parting*
6.50 - 6.95	D16						
6.50 - 6.95	SPT (S)N=20	1.30		N=20 (2,2/3,5,5,7)			
7.50	D17						
8.00 - 8.45	U18						
8.45	D19						
9.00	D20						
9.50 - 9.95	D21						
9.50 - 9.95	SPT (S)N=25	1.30		N=25 (2,3/5,5,7,8)			

Continued on Next Page

Remarks

4 hrs manhandling equipment to position and lifting decking.
Groundwater monitoring standpipe installed to 7.00 m.
4 hrs manhandling equipment off of site.
Groundwater monitoring on 5/10/2015 recorded groundwater at 2.16 m.

Scale (approx)	Logged By
1:50	ML

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
SG12 7QE

Site	Borehole Number
39 Rosslyn Hill, London NW3 5UJ	BH1

Boring Method	Casing Diameter		Ground Level (mOD)	Client	Job Number
	Depth	Diameter			
Dismantlable Cable Percussion Drilling Rig	1.30	150	81.30	Mr J Cohen and Ms A Lindsay	J15236

Location	Dates	Engineer	Sheet
526835.00E 185497.00N	01/09/2015 - 03/09/2015	Conisbee	Sheet 2 of 3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.50	D22								
11.00 - 11.45	U23								
11.45	D24								
12.00	D25								
12.50 - 12.95	D26								
12.50 - 12.95	SPT (S)N=25	1.30		N=25 (2,3/5,6,6,8)					
13.50	D27								
14.00 - 14.45	U28								
14.45	D29								
15.00	D30					(17.00)			
15.50 - 15.95	D31								
15.50 - 15.95	SPT (S)N=29	1.30		N=29 (2,4/5,7,8,9)					
16.50	D32								
17.00 - 17.45	U33								
17.45	D34								
18.00	D35								
18.50 - 18.95	D36								
18.50 - 18.95	SPT (S)N=33	1.30		N=33 (3,5/6,7,9,11)					
19.50	D37								
~~20.00 - 20.45~~	~~U38~~								

Continued on Next Page

Remarks	Scale (approx)	Logged By
4 hrs manhandling equipment to position and lifting decking. Groundwater monitoring standpipe installed to 7.00 m. 4 hrs manhandling equipment off of site. Groundwater monitoring on 5/10/2015 recorded groundwater at 2.16 m.	1:50	ML

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware SG12 7QE	Site 39 Rosslyn Hill, London NW3 5UJ	Borehole Number **BH1**

Boring Method	**Casing Diameter**		**Ground Level (mOD)**	**Client**	**Job Number**
Dismantlable Cable Percussion Drilling Rig	Depth	Diameter	81.30	Mr J Cohen and Ms A Lindsay	J15236
	1.30	150			
	Location		**Dates**	**Engineer**	**Sheet**
	526835.00E 185497.00N		01/09/2015 - 03/09/2015	Conisbee	Sheet 3 of 3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
20.45	D39				60.85	20.45	Complete at 20.450m		

Remarks

4 hrs manhandling equipment to position and lifting decking.
Groundwater monitoring standpipe installed to 7.00 m.
4 hrs manhandling equipment off of site.
Groundwater monitoring on 5/10/2015 recorded groundwater at 2.16 m.

Scale (approx)	Logged By
1:50	ML

GEA Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
SG12 7QE

Site	Borehole Number
39 Rosslyn Hill, London NW3 5UJ	BH2

Boring Method	Casing Diameter: Depth	Casing Diameter: Diameter	Ground Level (mOD)	Client	Job Number
			84.74	Mr J Cohen and Ms A Lindsay	J15236

Location	Dates	Engineer	Sheet
526833.00E 185489.00N	29/08/2015	Conisbee	Sheet 1 of 1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					84.64	(0.10) 0.10	Topsoil		
0.40	ES1					(0.50)	Made Ground (brown silty clay with occasional gravel, fine brick and coal fragments)		
					84.14	0.60			
0.70	D2						Firm pale brown mottled orange-brown silty slightly sandy CLAY with decayed rootlets, traces of selenite, partings of pale grey silt and fibrous rootlets to 2.00 m		
1.20	D3					(1.40)			
1.80	D4								
					82.74	2.00			
2.20	D5						Firm becoming stiff below 4.70 m fissured brown silty CLAY with partings and small pockets of grey silt, occasional small pockets of orange-brown fine sand and fine selenite crystals		
2.80	D6								
3.20	D7					(3.00)			
3.80	D8								
4.20	D9								
4.80	D10								
					79.74	5.00	Complete at 5.000m		

Remarks	Scale (approx)	Logged By
Groundwater not encountered.	1:50	ML

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
SG12 7QE

Site	**Borehole Number**
39 Rosslyn Hill, London NW3 5UJ	**BH3**

Boring Method	**Casing Diameter** (Depth / Diameter)	**Ground Level (mOD)**	**Client**	**Job Number**
Drive-in Window Sampler		82.46	Mr J Cohen and Ms A Lindsay	J15236

Location	**Dates**	**Engineer**	**Sheet**
526835.00E 185491.00N	29/08/2015	Conisbee	Sheet 1 of 1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.50)	Made Ground (artificial grass over geotextile over brown silty clay with gravel and fine brick fragments)		
0.50	D1				81.96	0.50	Firm fissured locally thinly laminated brown silty CLAY with bluish grey veins, partings of pale grey silt, occasional pockets of orange-brown fine sand and selenite crystals		
1.50	D2								
						(3.20)	claystone		▼
2.50	D3								
3.70	D4				78.76	3.70	Stiff fissured dark grey silty CLAY with traces of selenite		
						(1.30)			
4.70	D5								
					77.46	5.00	Complete at 5.000m		

Remarks

Groundwater monitoring standpipe installed to 5.00 m.
Groundwater monitoring on 14/09/2015 recorded groundwater at 0.60 m.
Groundwater monitoring on 5/10/2015 recorded groundwater at 0.60 m.

Scale (approx)	**Logged By**
1:50	ML

Geotechnical & Environmental Associates (GEA)	Widbury Barn, Widbury Hill, Ware, SG12 7QE	**Site** 39 Rosslyn Hill, London NW3 5UJ	**Borehole Number** **BH4**

Boring Method	**Casing Diameter** (Depth / Diameter)	**Ground Level (mOD)**	**Client**	**Job Number**
Drive-in Window Sampler		82.44	Mr J Cohen and Ms A Lindsay	J15236
	Location	**Dates**	**Engineer**	**Sheet**
	526828.00E 185496.00N	29/08/2015	Conisbee	Sheet 1 of 1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	ES1				82.04	(0.40) 0.40	Made Ground (artificial grass over brown clayey silt with gravel and brick fragments)		
					78.64	(3.40) 3.80	Firm fissured brown silty CLAY with bluish grey veins, partings of pale grey silt, sparse small pockets of orange-brown fine sand and selenite crystals		
					78.44	(0.20) 4.00	Stiff fissured dark grey silty CLAY		
							Complete at 4.000m		

Remarks

Groundwater not encountered.

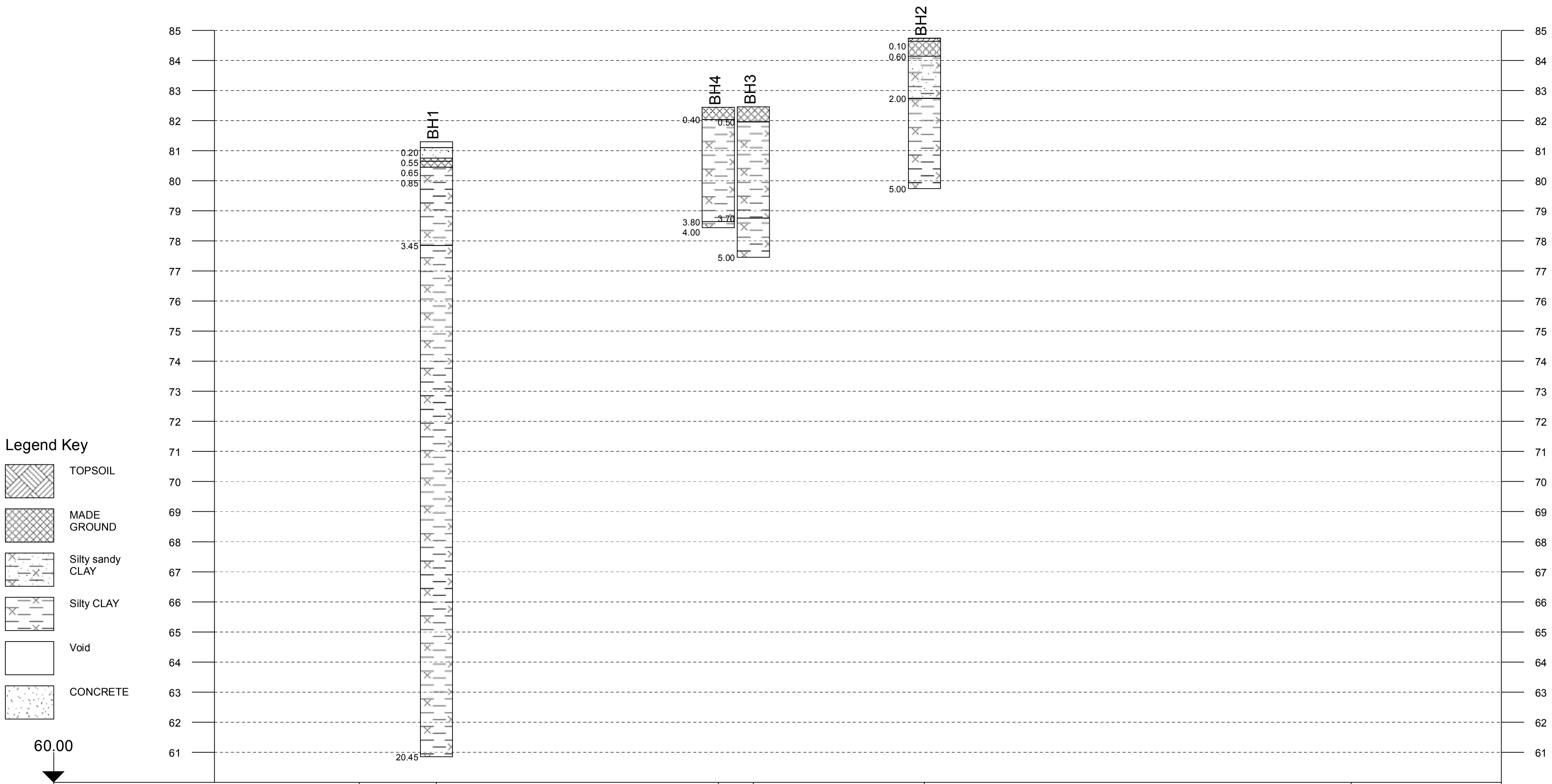
Scale (approx) 1:50

Logged By ML

Project Id: J15236
Project Title: 39 Rosslyn Hill, London NW3 5UJ
Location: 39 Rosslyn Hill, London NW3 5UJ
Client: Mr J Cohen and Ms A Lindsay

Title: Borehole Section
Vertical Scale: 1:192
Horizontal Scale: 1:93
Engineer: Matt Legg

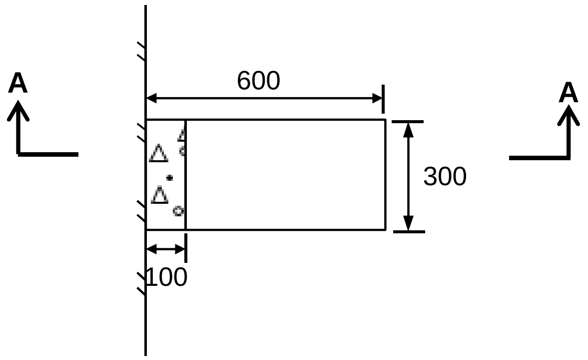
Geotechnical & Environmental Associates



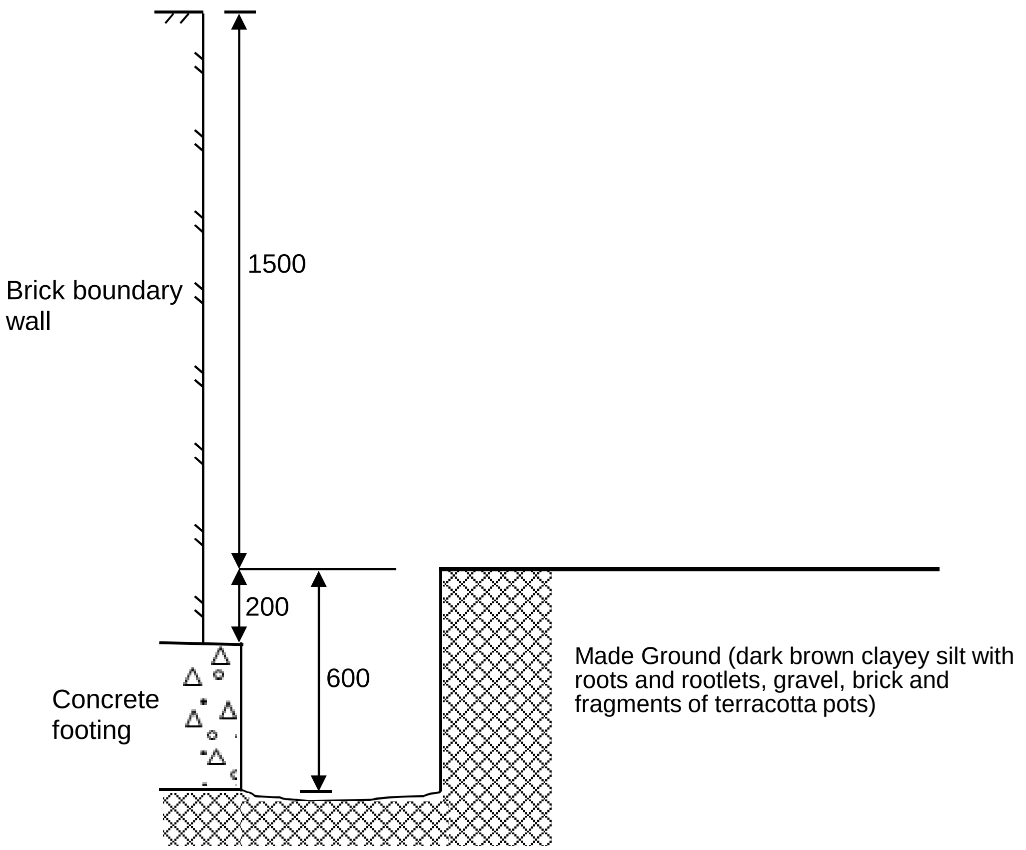
Chainage (m)	0.00	1.24	5.78	6.34	9.10	15.96
Offset (m)		2.75	8.17	0.41	0.23	
Elevation (mAOD)		81.30	82.44	82.46	84.74	

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	**Site** 39 Rosslyn Hill, London NW3 5UJ		**Trial Pit Number** **1**
Excavation Method Manual	**Dimensions** 600 x 300 x 700	**Ground Level (mOD)** 86.02	**Client** Mr J Cohen and Ms A Lindsay	**Job Number** J15236
	Location	**Dates** 29/08/2015	**Engineer** Conisbee	**Sheet** 1 / 2

Plan: -



Section A - A: -



Remarks:	Scale:
All dimensions in millimetres	1:20
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: not encountered	ML

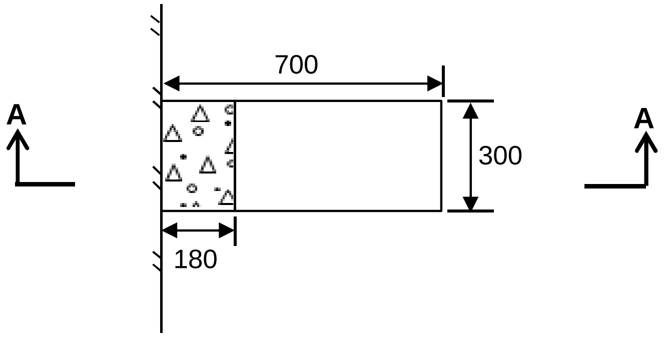
Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	**Site** 39 Rosslyn Hill, London NW3 5UJ	**Trial Pit Number** **1**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Manual	600 x 300 x 700	86.02	Mr J Cohen and Ms A Lindsay	J15275
	Location	**Dates**	**Engineer**	**Sheet**
		29/08/2015	Conisbee	2 / 2

Remarks:	Scale:
All dimensions in millimetres	1:20
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: not encountered	ML

GEA Geotechnical & Environmental Associates Widbury Barn Widbury Hill Ware Herts SG12 7QE			**Site** 39 Rosslyn Hill, London NW3 5UJ	**Trial Pit Number** **2**
Excavation Method **Manual**	**Dimensions** 700 x 300 x 1300	**Ground Level (mOD)** 85.12	**Client** Mr J Cohen and Ms A Lindsay	**Job Number** J15236
	Location	**Dates** 29/08/2015	**Engineer** Conisbee	**Sheet** 1 / 2

Plan: -



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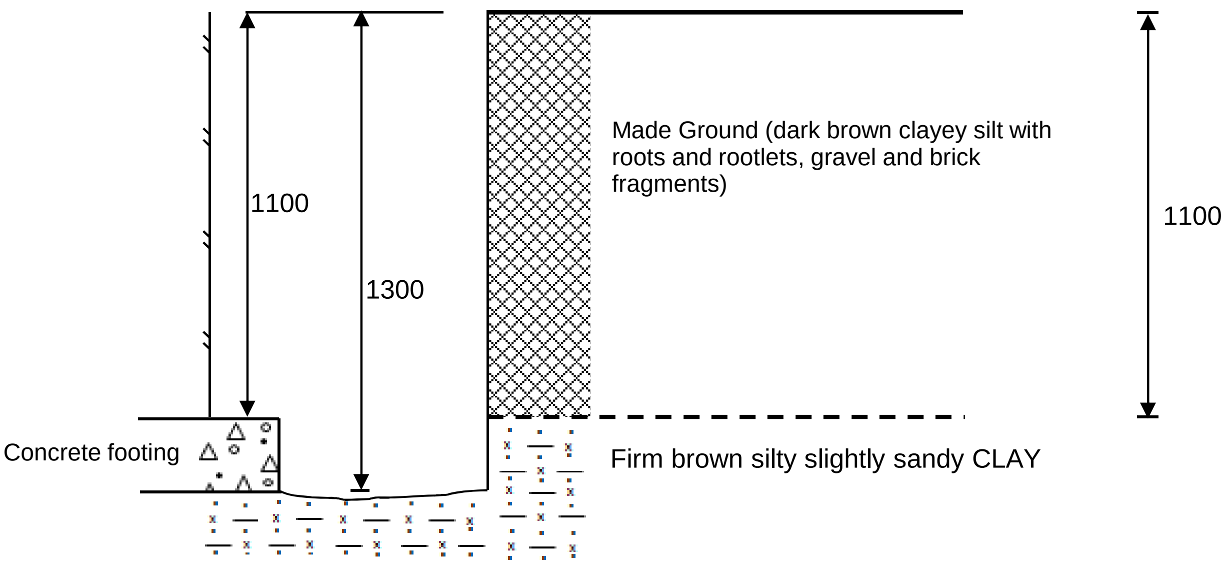


Remarks:	Scale:
All dimensions in millimetres	1:20
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: not encountered	ML

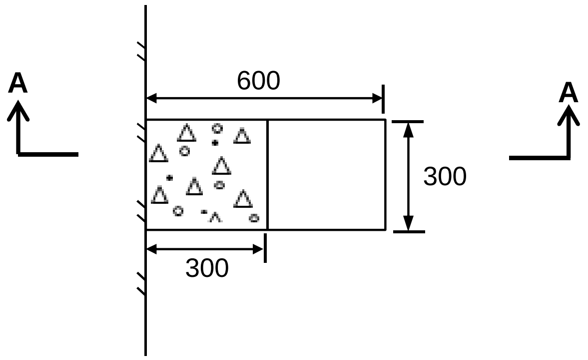
Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	Site 39 Rosslyn Hill, London NW3 5UJ	Trial Pit Number 2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Manual	700 x 300 x 1300	85.12	Mr J Cohen and Ms A Lindsay	J15236
	Location	**Dates**	**Engineer**	**Sheet**
		29/08/2015	Conisbee	2 / 2

Remarks:	Scale:
All dimensions in millimetres	1:20
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: not encountered	ML

Geotechnical & Environmental Associates Widbury Barn Widbury Hill Ware Herts SG12 7QE			**Site** 39 Rosslyn Hill, London NW3 5UJ	**Trial Pit Number** 3
Excavation Method Manual	**Dimensions** 600 x 300 x 400	**Ground Level (mOD)** 85.99	**Client** Mr J Cohen and Ms A Lindsay	**Job Number** J15236
	Location	**Dates** 29/08/2015	**Engineer** Conisbee	**Sheet** 1 / 2

Plan: -



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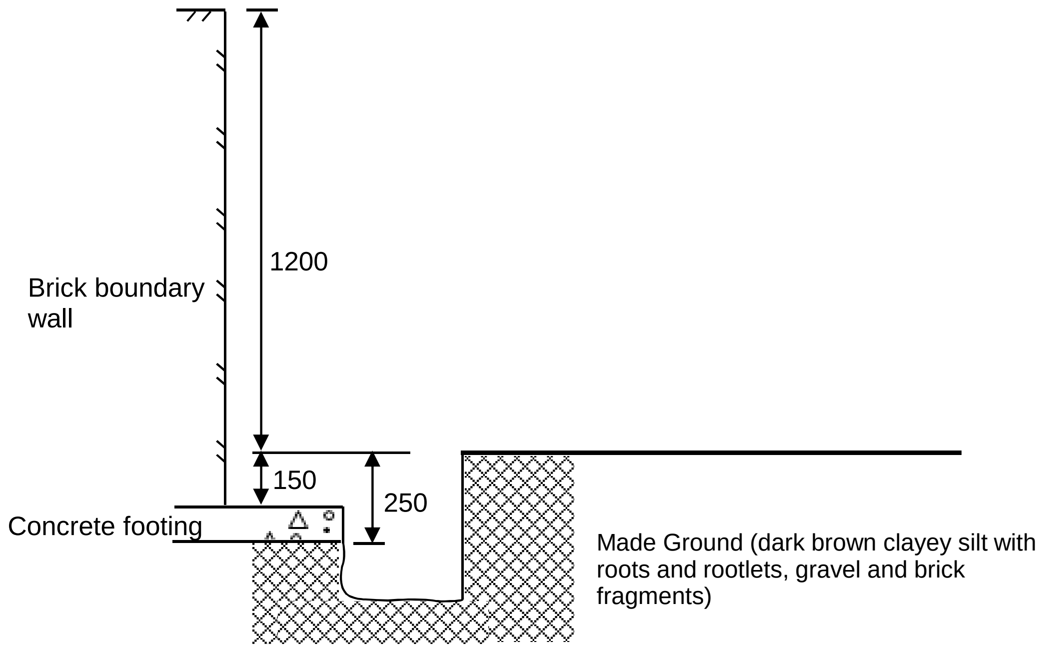

Remarks:	Scale:
All dimensions in millimetres	1:20
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: not encountered	ML

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	**Site** 39 Rosslyn Hill, London NW3 5UJ	**Trial Pit Number** **3**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Manual	600 x 300 x 400	85.99	Mr J Cohen and Ms A Lindsay	J15236
	Location	**Dates**	**Engineer**	**Sheet**
		29/08/2015	Conisbee	2 / 2

Remarks:	Scale:
All dimensions in millimetres	1:20
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: not encountered	ML

Summary of Test Results

Job No.	Project Name	Programme	
19487	39 Rosslyn Hill, London NW3 5UJ	Samples received	07/09/2015
		Schedule received	09/09/2015
Project No.	Client	Project started	10/09/2015
J15236	GEA	Testing Started	25/09/2015

Hole No.	Sample Ref	Sample Top	Sample Base	Sample Type	Soil Description	NMC %	Passing 425µm %	LL %	PL %	PI %	Remarks
BH1		0.85		D	Brown and occasional grey slightly sandy silty CLAY with occasional pockets of selenite crystals and rare fm and sub-angular gravel	32	99	69	29	40	
BH1		1.70		D	Brown silty CLAY with pockets of selenite crystals	30	100	70	28	42	
BH2		0.70		D	Orange brown slightly sandy slightly gravelly silty CLAY (gravel is fmc and sub-angular to angular)	24	99	55	23	32	
BH2		1.20		D	Orange brown and grey silty CLAY	27					
BH2		1.80		D	Brown and occasional grey silty CLAY with traces of carbonaceous deposits	28					
BH2		2.20		D	Brown and occasional grey silty CLAY	37	100	74	30	44	
BH2		2.80		D	Brown and occasional grey silty CLAY	31					
BH2		3.20		D	Brown and occasional grey silty CLAY with rare fine gravel and scattered traces of selenite	30					
BH2		3.80		D	Brown and occasional grey silty CLAY with rare pockets of orange silt	32					
BH3		1.50		D	Brown silty CLAY with occasional pockets of selenite crystals	33	99	69	28	41	
BH3		2.50		D	Brown and occasional grey silty CLAY with occasional pockets of orange fine sand/silt	32					
BH3		3.70		D	Brown and dark brown slightly gravelly silty CLAY (gravel is fine and sub-angular)	30	99	72	27	45	

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3 and 5.0

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved
Initials J.P
Date: 29/09/2015

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Summary of Test Results

Job No.	Project Name	Programme	
19487	39 Rosslyn Hill, London NW3 5UJ	Samples received	07/09/2015
		Schedule received	09/09/2015
Project No.	**Client**	Project started	10/09/2015
J15236	GEA	Testing Started	25/09/2015

Hole No.	Sample Ref	Sample Top	Sample Base	Sample Type	Soil Description	NMC %	Passing 425µm %	LL %	PL %	PI %	Remarks
BH3		4.70		D	Grey and occasional brown silty CLAY	30					

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3 and 5.0

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Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

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Email: James@k4soils.com

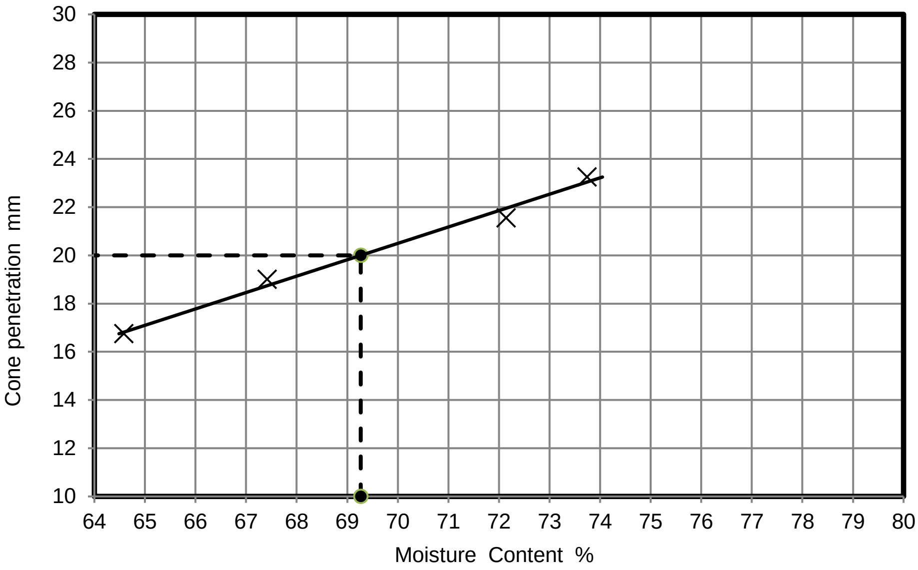
Checked and Approved
Initials **J.P**
Date: 29/09/2015

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R1(a) -Rev. 0

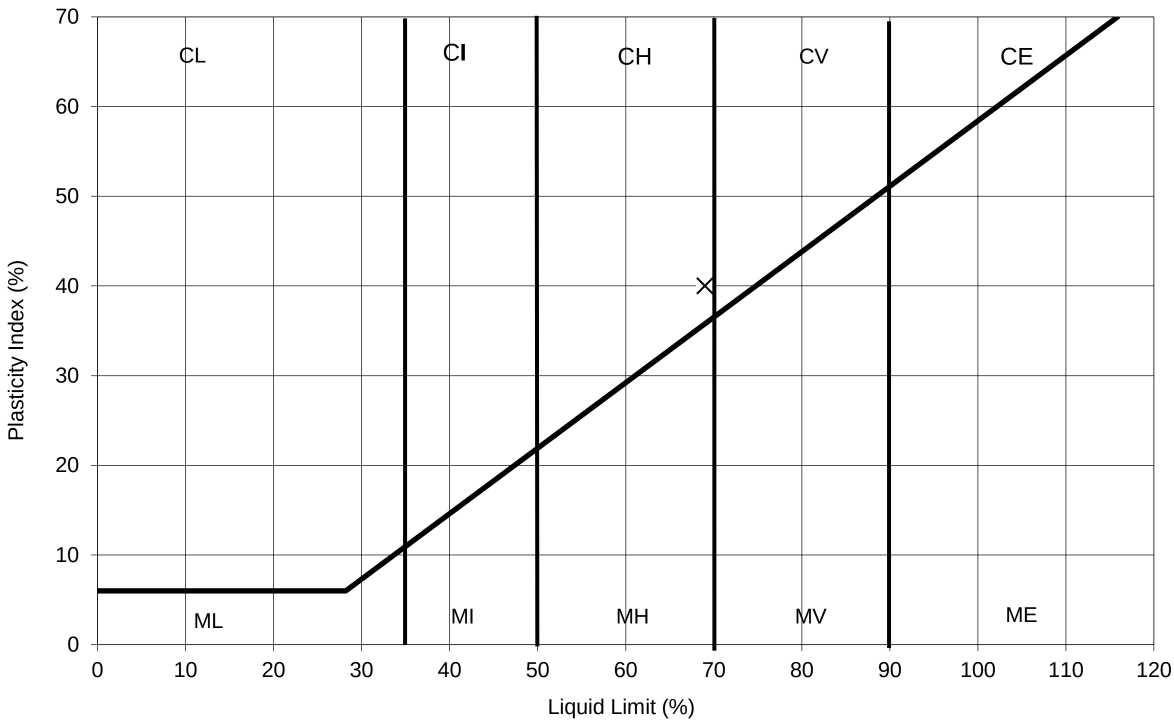
	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX			Job No.	19487
				Borehole/Pit No.	BH1
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.	
Project No.	J15236	Client	GEA	Depth m	0.85
Soil Description	Brown and occasional grey slightly sandy silty CLAY with occasional pockets of selenite crystals and rare fm and sub-angular gravel			Sample Type	D
				Samples received	07/09/2015
				Schedules received	09/09/2015
				Project Started	10/09/2015
				Date Tested	25/09/2015



NATURAL MOISTURE CONTENT	**32**	**%**
% PASSING 425µm SIEVE	**99**	**%**
LIQUID LIMIT	**69**	**%**
PLASTIC LIMIT	**29**	**%**
PLASTICITY INDEX	**40**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 29/09/2015

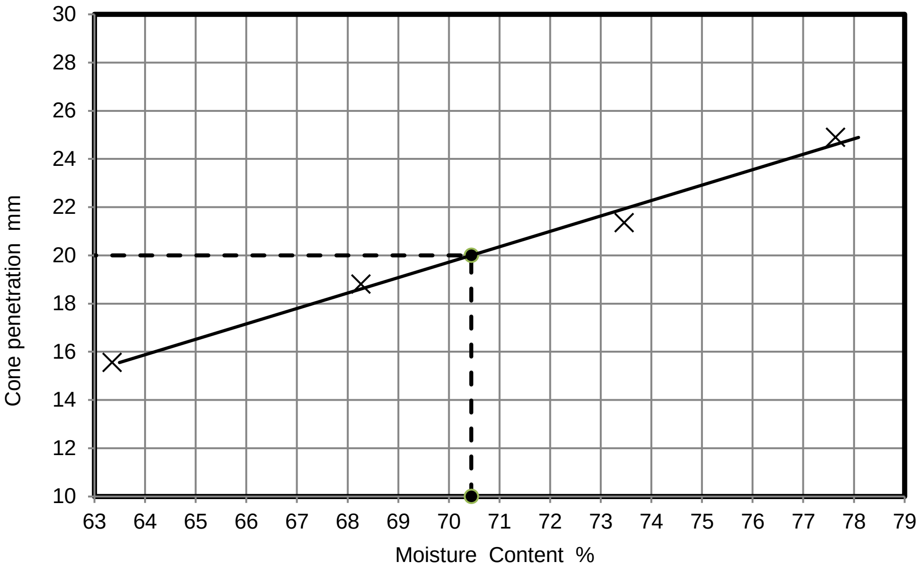
UKAS TESTING 2519

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2 (Rev.0)

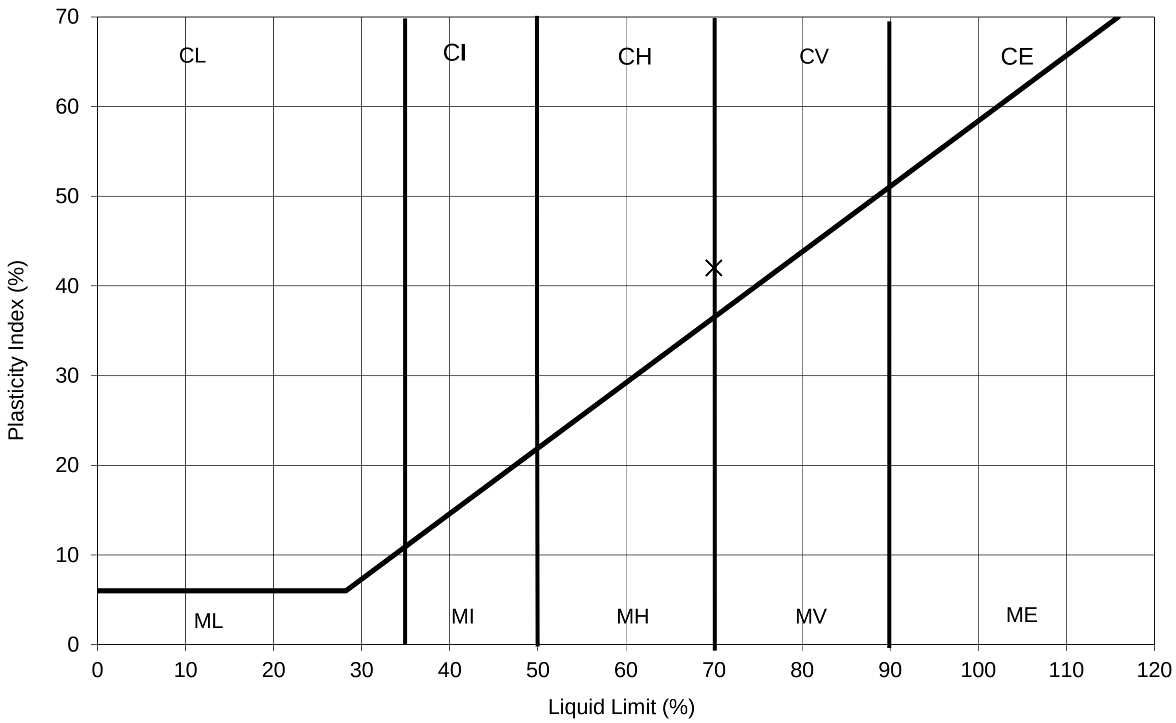
K4 SOILS	**LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX**			Job No.	19487
				Borehole/Pit No.	BH1
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.	
Project No.	J15236	Client	GEA	Depth m	1.70
Soil Description	Brown silty CLAY with pockets of selenite crystals			Sample Type	D
				Samples received	07/09/2015
				Schedules received	09/09/2015
				Project Started	10/09/2015
				Date Tested	25/09/2015



NATURAL MOISTURE CONTENT	**30**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**70**	**%**
PLASTIC LIMIT	**28**	**%**
PLASTICITY INDEX	**42**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

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BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

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Date: 29/09/2015

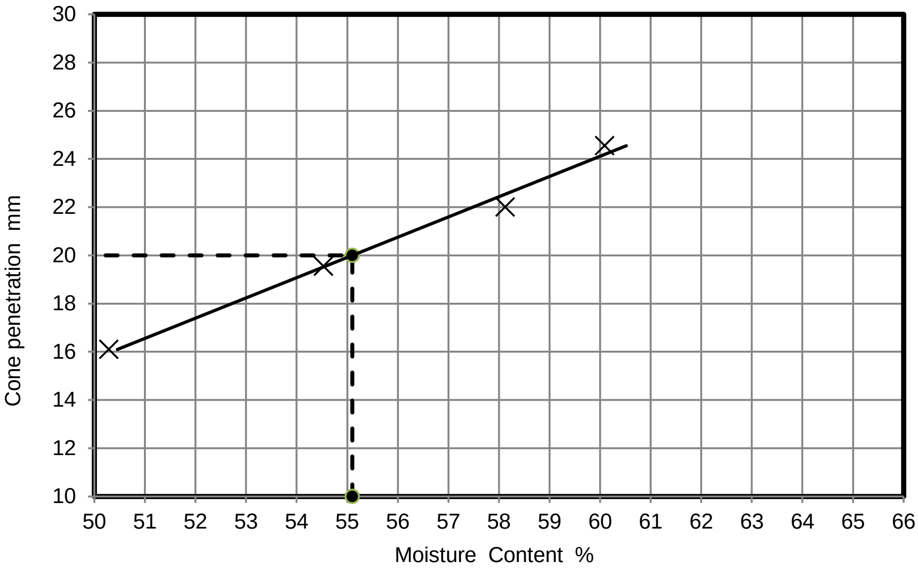
UKAS TESTING 2519

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

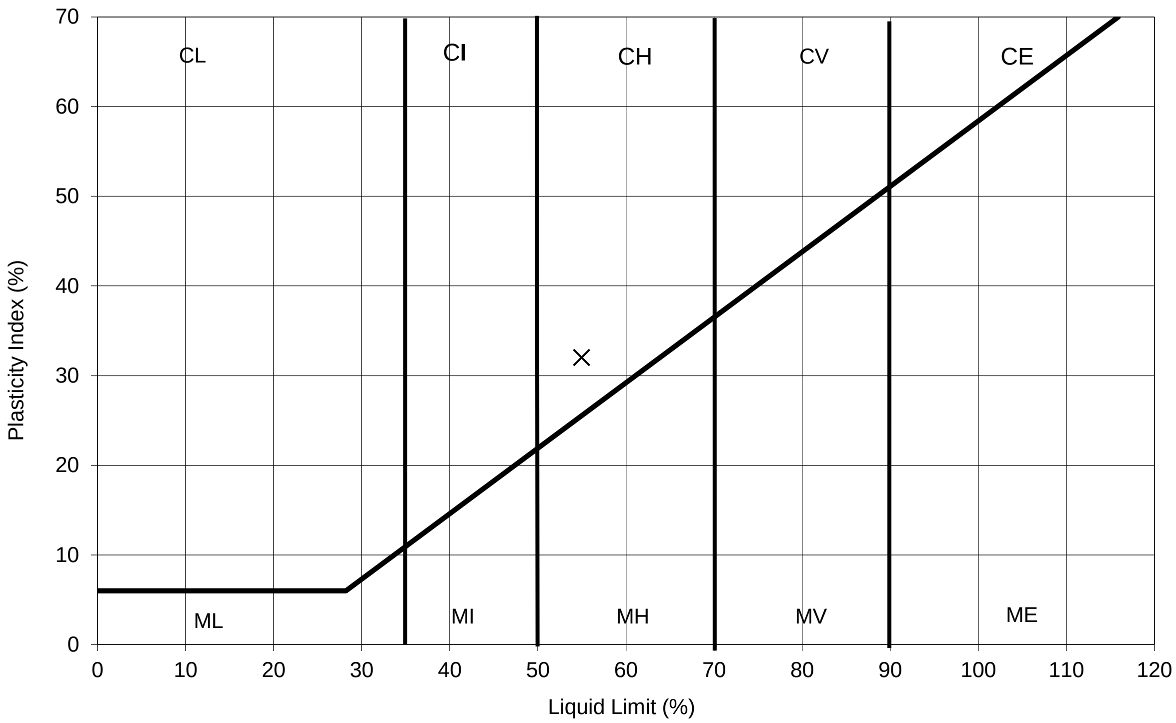
K4 SOILS	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX			Job No.	19487
				Borehole/Pit No.	BH2
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.	
Project No.	J15236	Client	GEA	Depth m	0.70
Soil Description	Orange brown slightly sandy slightly gravelly silty CLAY (gravel is fmc and sub-angular to angular)			Sample Type	D
				Samples received	07/09/2015
				Schedules received	09/09/2015
				Project Started	10/09/2015
				Date Tested	24/09/2015



NATURAL MOISTURE CONTENT	**24**	**%**
% PASSING 425µm SIEVE	**99**	**%**
LIQUID LIMIT	**55**	**%**
PLASTIC LIMIT	**23**	**%**
PLASTICITY INDEX	**32**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD
BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method
BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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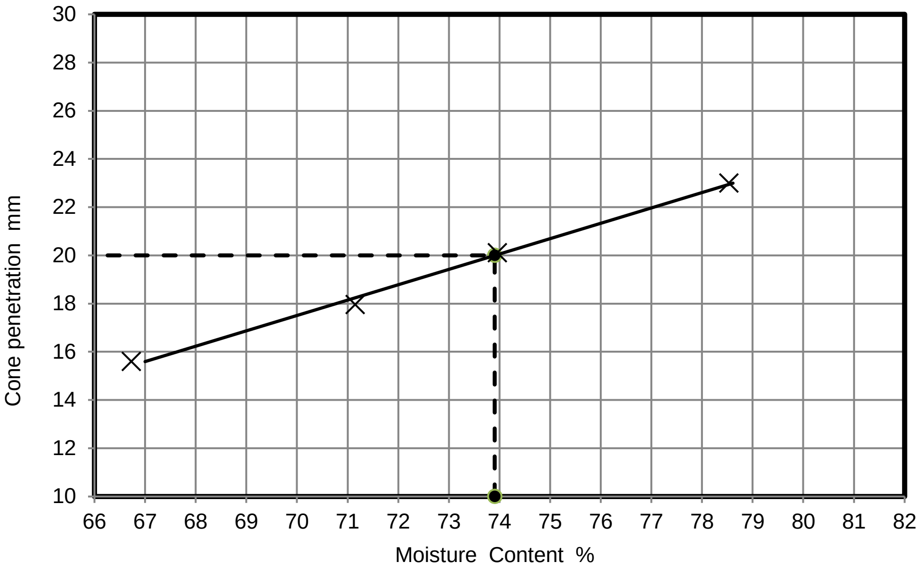
MSF-5 R2 (Rev.0)

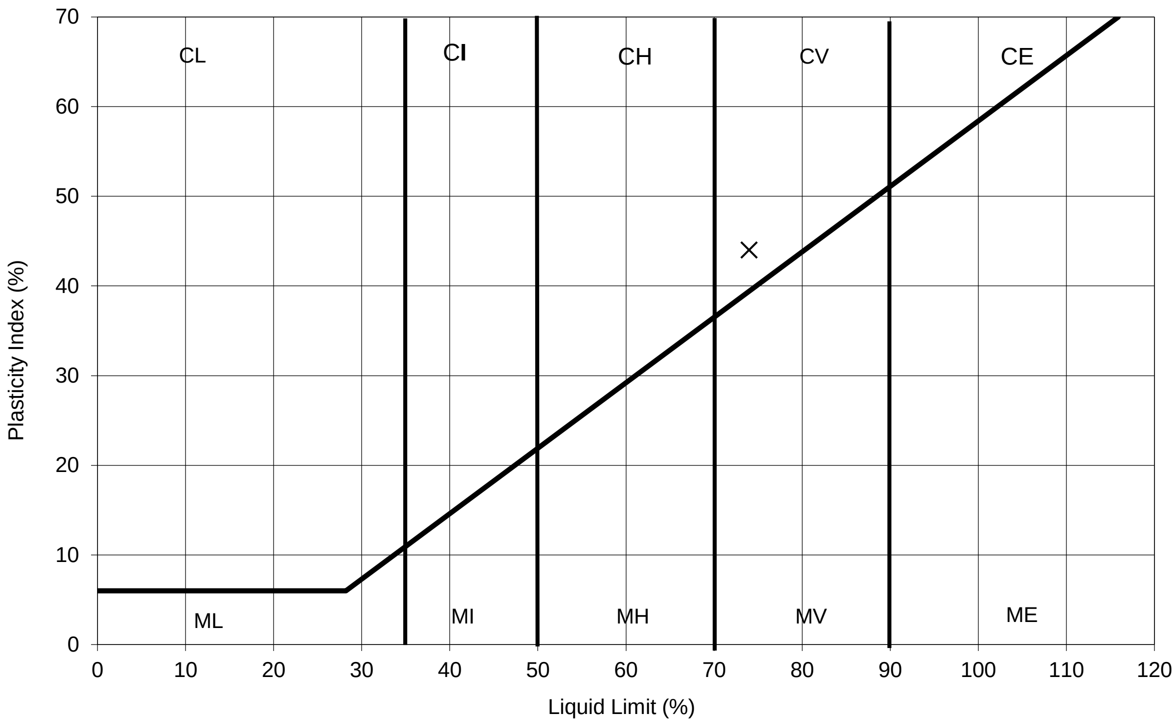
K4 SOILS	**LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX**	Job No.	19487
		Borehole/Pit No.	BH2
Site Name	39 Rosslyn Hill, London NW3 5UJ	Sample No.	
Project No.	J15236 Client GEA	Depth m	2.20
Soil Description	Brown and occasional grey silty CLAY	Sample Type	D
		Samples received	07/09/2015
		Schedules received	09/09/2015
		Project Started	10/09/2015
		Date Tested	24/09/2015



NATURAL MOISTURE CONTENT	**37**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**74**	**%**
PLASTIC LIMIT	**30**	**%**
PLASTICITY INDEX	**44**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD
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BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Checked and Approved
Initials: J.P
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UKAS TESTING 2519

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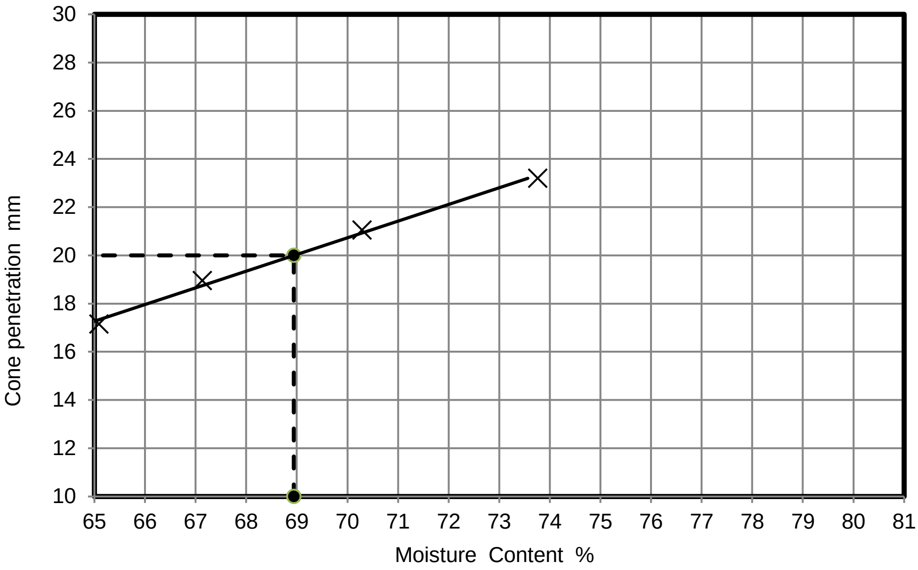
MSF-5 R2 (Rev.0)

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

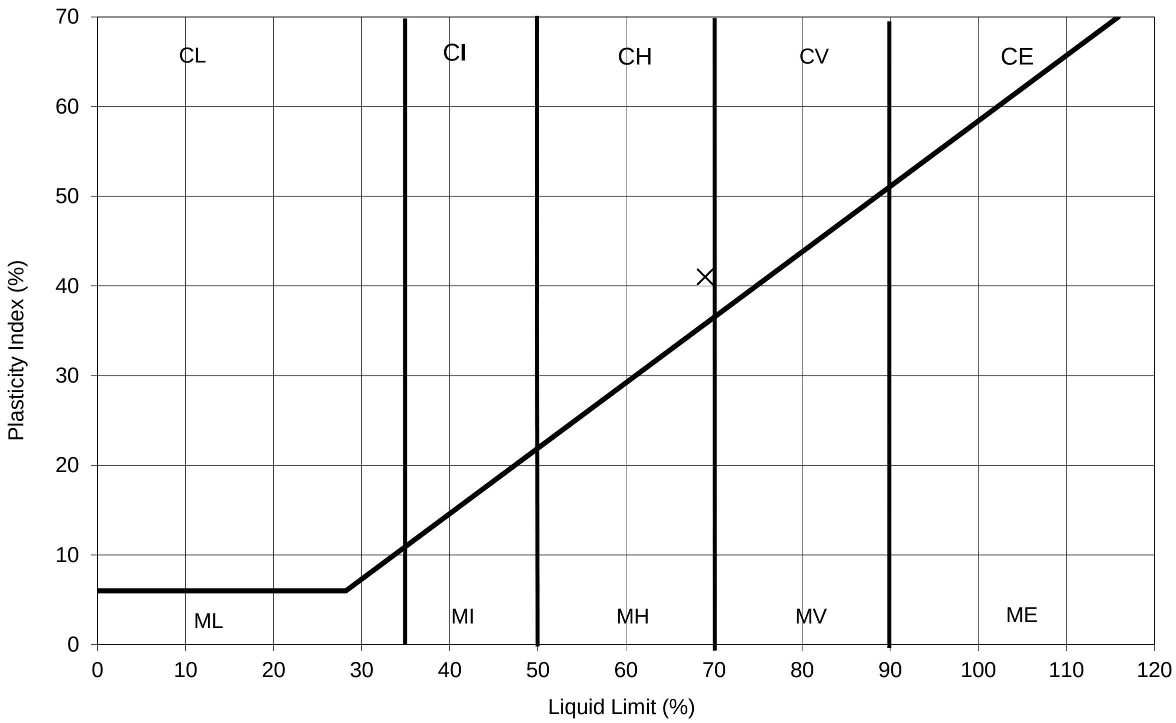
K4 SOILS	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX			Job No.	19487
				Borehole/Pit No.	BH3
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.	
Project No.	J15236	Client	GEA	Depth m	1.50
Soil Description	Brown silty CLAY with occasional pockets of selenite crystals			Sample Type	D
				Samples received	07/09/2015
				Schedules received	09/09/2015
				Project Started	10/09/2015
				Date Tested	25/09/2015



NATURAL MOISTURE CONTENT	**33**	**%**
% PASSING 425µm SIEVE	**99**	**%**
LIQUID LIMIT	**69**	**%**
PLASTIC LIMIT	**28**	**%**
PLASTICITY INDEX	**41**	**%**

Remarks

PLASTICITY INDEX



TEST METHOD

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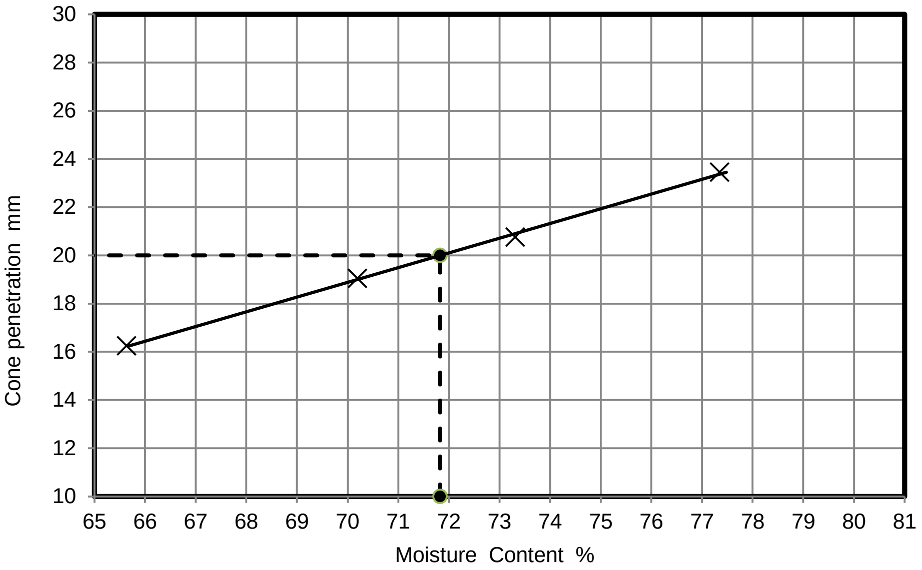
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved

Initials: J.P
Date: 29/09/2015

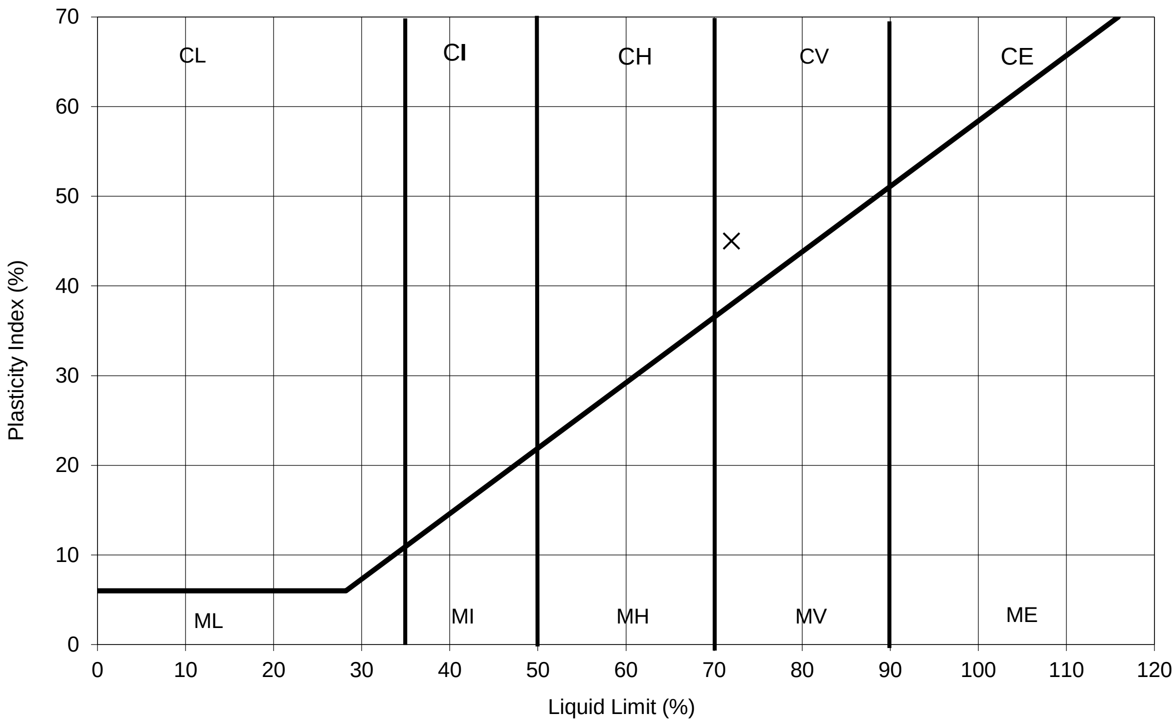
	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX	Job No.	19487
		Borehole/Pit No.	BH3
Site Name	39 Rosslyn Hill, London NW3 5UJ	Sample No.	
Project No.	J15236 Client GEA	Depth m	3.70
Soil Description	Brown and dark brown slightly gravelly silty CLAY (gravel is fine and sub-angular)	Sample Type	D
		Samples received	07/09/2015
		Schedules received	09/09/2015
		Project Started	10/09/2015
		Date Tested	25/09/2015



NATURAL MOISTURE CONTENT	**30**	**%**
% PASSING 425µm SIEVE	**99**	**%**
LIQUID LIMIT	**72**	**%**
PLASTIC LIMIT	**27**	**%**
PLASTICITY INDEX	**45**	**%**

Remarks

PLASTICITY INDEX



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BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index
BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Checked and Approved
Initials: J.P
Date: 29/09/2015

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
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UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2 (Rev.0)

Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results

Tested in accordance with BS1377 : Part 3 : 1990, clause 5.3 and clause 9

Job No.	Project Name	Programme	
19487	39 Rosslyn Hill, London NW3 5UJ	Samples received	07/09/2015
		Schedule received	09/09/2015
Project No.	Client	Project started	10/09/2015
J15236	GEA	Testing Started	25/09/2015

Hole No.	Sample				Soil description	Dry Mass passing 2mm	SO3 Content	SO4 Content	pH	Remarks
	Ref	Top	Base	Type		%	g/l	g/l		
BH1		1.45		D	Brown silty CLAY with scatered traces of selenite crystals	100	1.42	1.70	8.02	
BH1		6.00		D	Dark grey sandy silty CLAY	100	0.80	0.96	7.99	
BH2		1.80		D	Brown and occasional grey silty CLAY with traces of carbonaceous deposits	100	0.28	0.34	8.12	

UKAS TESTING 2519

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Checked and Approved
Initials **J.P**
Date: **29/09/2015**

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure
Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
19487	39 Rosslyn Hill, London NW3 5UJ	Samples received	07/09/2015
		Schedule received	09/09/2015
Project No.	Client	Project started	10/09/2015
J15236	GEA	Testing Started	24/09/2015

Hole No.	Sample Ref	Sample Top	Sample Base	Sample Type	Soil Description	Test Type	Density bulk (Mg/m3)	Density dry (Mg/m3)	w (%)	Length (mm)	Diameter (mm)	σ3 (kPa)	At failure: Axial strain (%)	At failure: σ1 - σ3 (kPa)	At failure: cu (kPa)	Mode	Remarks
BH1		1.00		U	High strength fissured brown silty CLAY with rare selenite crystals	UU	1.93	1.48	31	205	105	20	5.9	159	80	B	
BH1		3.00		U	High strength fissured brown slightly mottled blue grey silty CLAY	UU	1.93	1.48	31	205	105	60	7.3	193	96	B	
BH1		5.00		D	High strength fissured dark grey silty CLAY	UU	1.95	1.50	30	205	105	100	2.0	150	75	B	
BH1		8.00		U	Very high strength fissured dark grey silty CLAY with light grey fine sand partings	UU	1.95	1.53	27	205	105	160	9.3	305	153	B	
BH1		11.00		U	High strength fissured dark grey silty CLAY	UU	1.95	1.49	31	205	105	220	5.9	173	86	B	
BH1		14.00		U	High strength fissured dark grey silty CLAY	UU	1.97	1.52	30	205	105	280	4.4	214	107	B	
BH1		17.00		U	High strength fissured dark grey silty CLAY	UU	1.98	1.55	28	205	105	340	5.9	283	142	B	
BH1		20.00		U	High strength fissured dark grey silty CLAY	UU	1.96	1.54	27	205	105	400	3.4	213	107	B	

Legend
UU - single stage test (single and multiple specimens) — σ3 Cell pressure — Mode of failure ; B - Brittle
UUM - Multistage test on a single specimen — σ1 - σ3 Maximum corrected deviator stress — P - Plastic
suffix R - remoulded or recompacted — cu Undrained shear strength, ½ (σ1 - σ3) — C - Compound

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: james@k4soils.com

Checked and Approved
Initials: J.P
Date: 29/09/2015

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

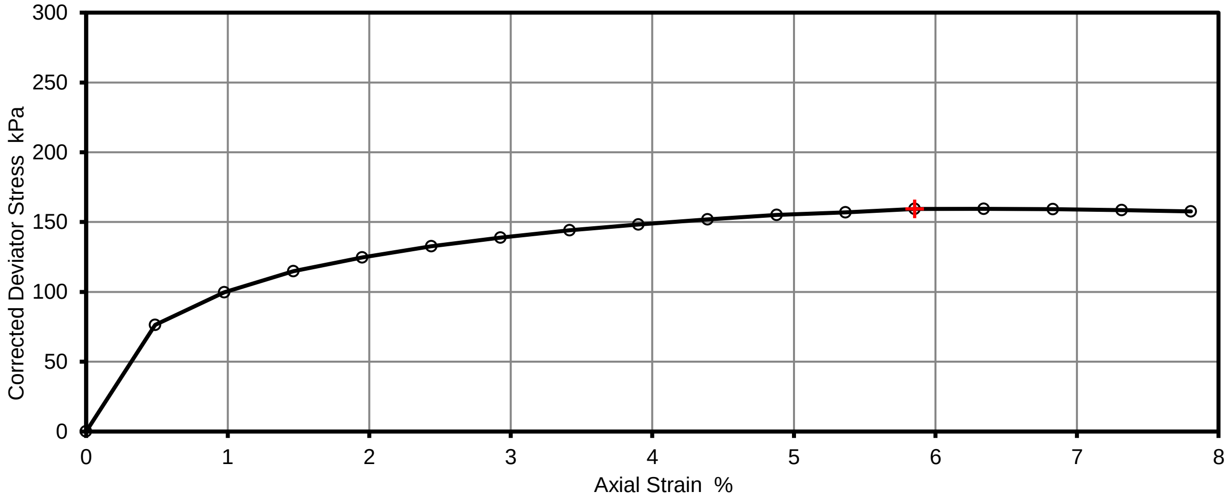
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	19487	
				Borehole/Pit No.	BH1	
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.		
Project No.	J15236	Client	GEA	Depth	1.00	m
Soil Description	High strength fissured brown silty CLAY with rare selenite crystals			Sample Type	U	
				Samples received	07/09/2015	
				Schedules received	07/09/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/09/2015	

Remarks

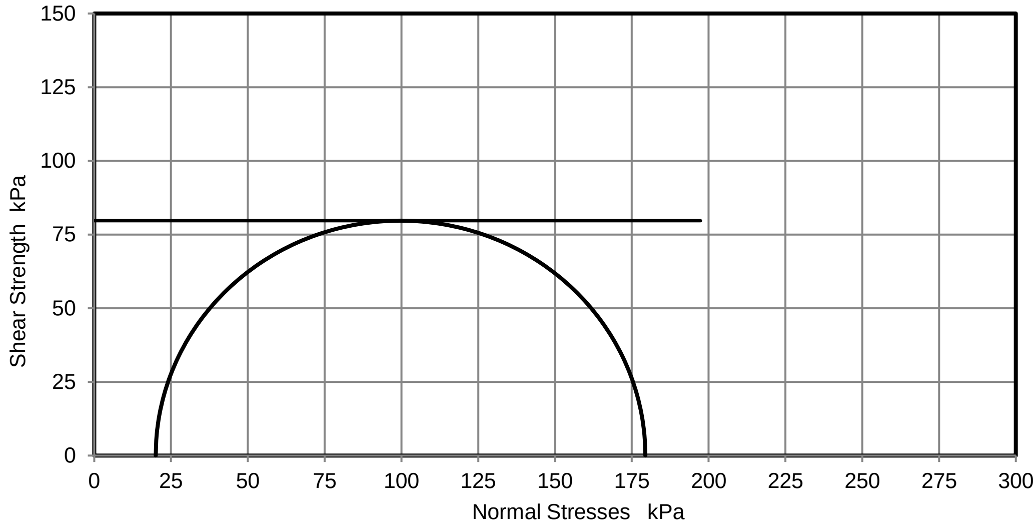
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	1.93	Mg/m3
Moisture Content	31	%
Dry Density	1.48	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	20	kPa
Axial Strain	5.9	%
Deviator Stress, (σ1 - σ3)f	159	kPa
Undrained Shear Strength, cu	80	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

UKAS TESTING 2519

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved
Initials: J.P
Date 29/09/2015

MSF-5 R7 (Rev.0)

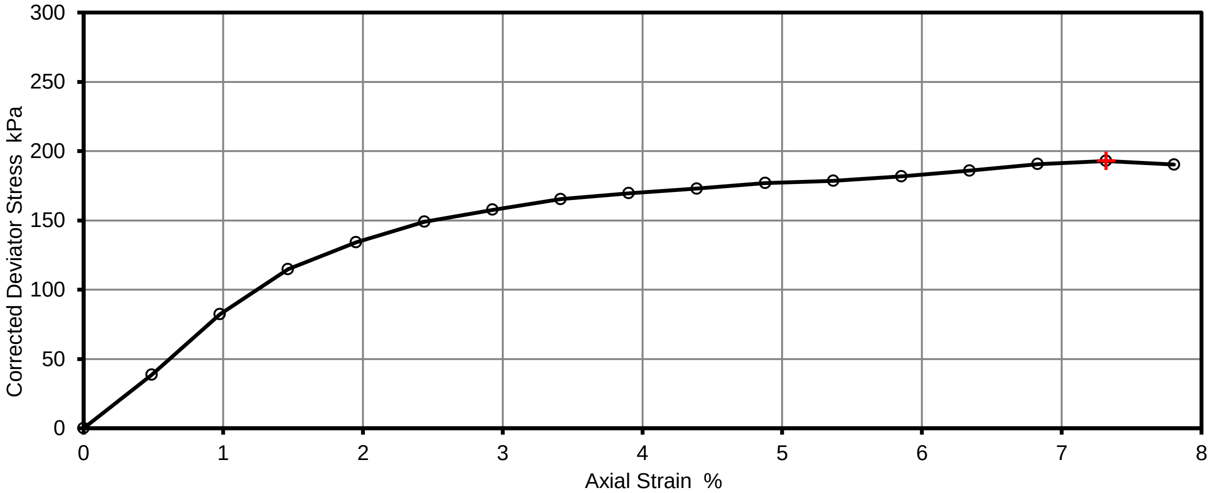
K4 SOILS	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	19487	
				Borehole/Pit No.	BH1	
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.		
Project No.	J15236	Client	GEA	Depth	3.00	m
Soil Description	High strength fissured brown slightly mottled blue grey silty CLAY			Sample Type	U	
				Samples received	07/09/2015	
				Schedules received	07/09/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/09/2015	

Remarks

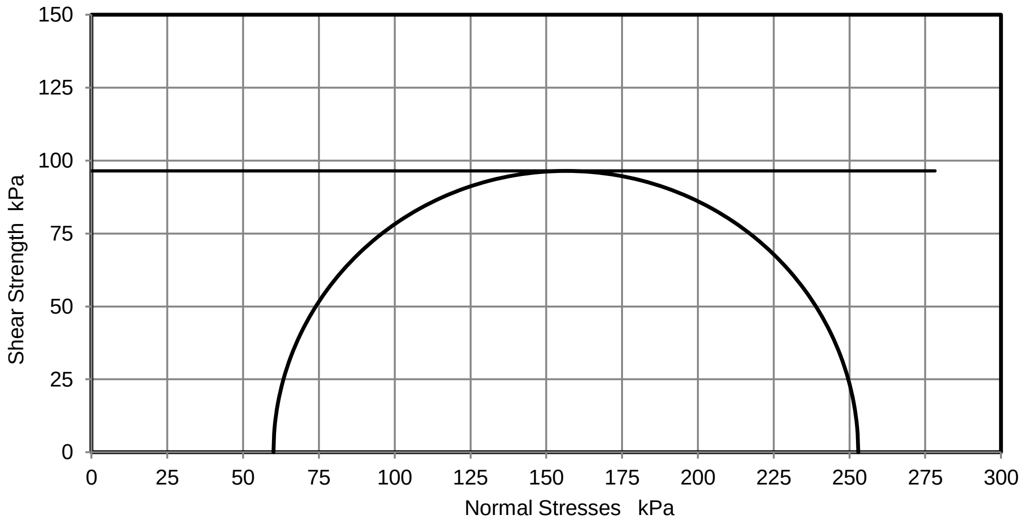
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	1.93	Mg/m3
Moisture Content	31	%
Dry Density	1.48	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	60	kPa
Axial Strain	7.3	%
Deviator Stress, (σ1 - σ3)f	193	kPa
Undrained Shear Strength, cu	96	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved
Initials: J.P
Date 29/09/2015

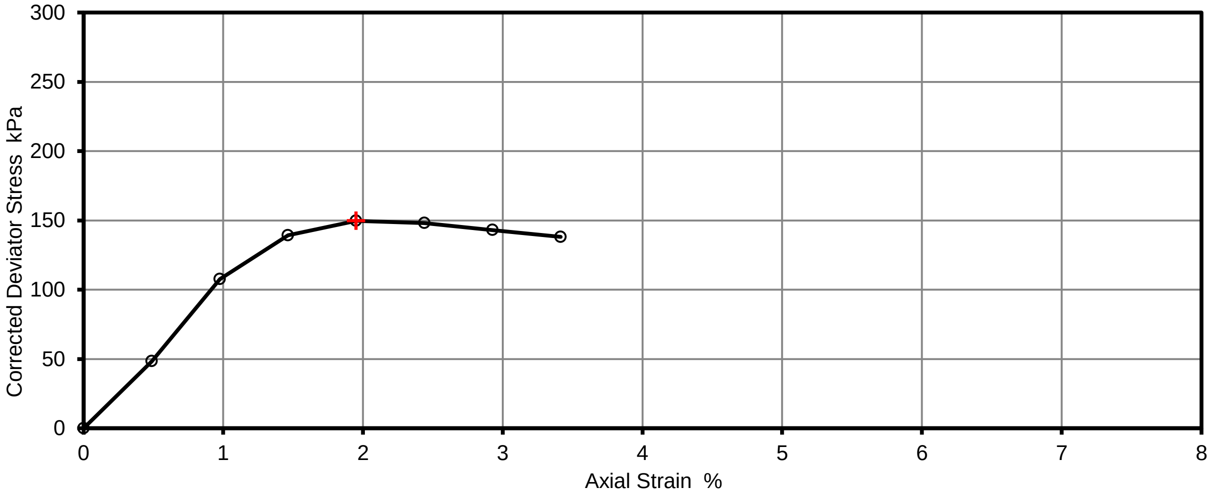
K4 SOILS	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	19487
				Borehole/Pit No.	BH1
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.	
Project No.	J15236	Client	GEA	Depth	5.00 m
Soil Description	High strength fissured dark grey silty CLAY			Sample Type	D
				Samples received	07/09/2015
				Schedules received	07/09/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/09/2015

Remarks

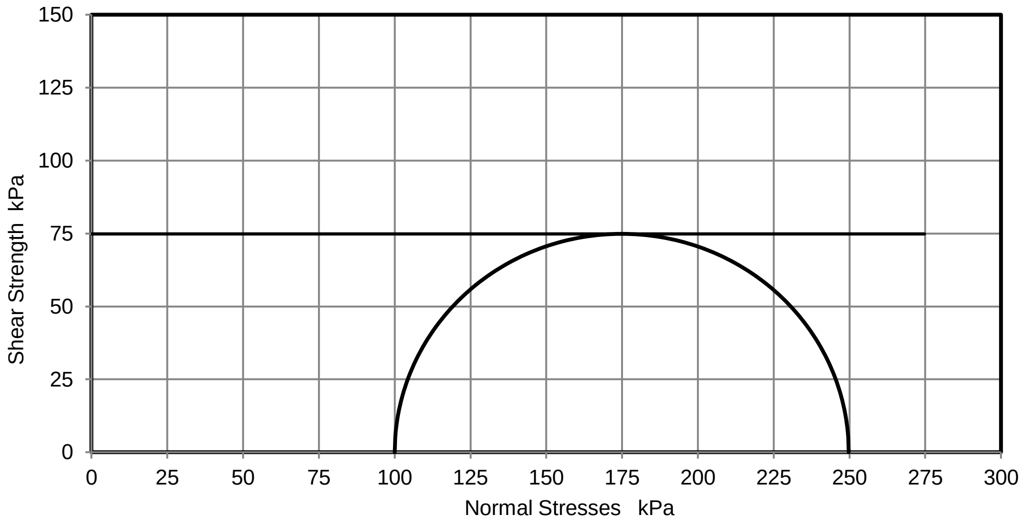
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	1.95	Mg/m3
Moisture Content	30	%
Dry Density	1.50	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	100	kPa
Axial Strain	2.0	%
Deviator Stress, (σ1 - σ3)f	150	kPa
Undrained Shear Strength, cu	75	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
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UKAS TESTING 2519

Checked and Approved
Initials: J.P
Date 29/09/2015

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

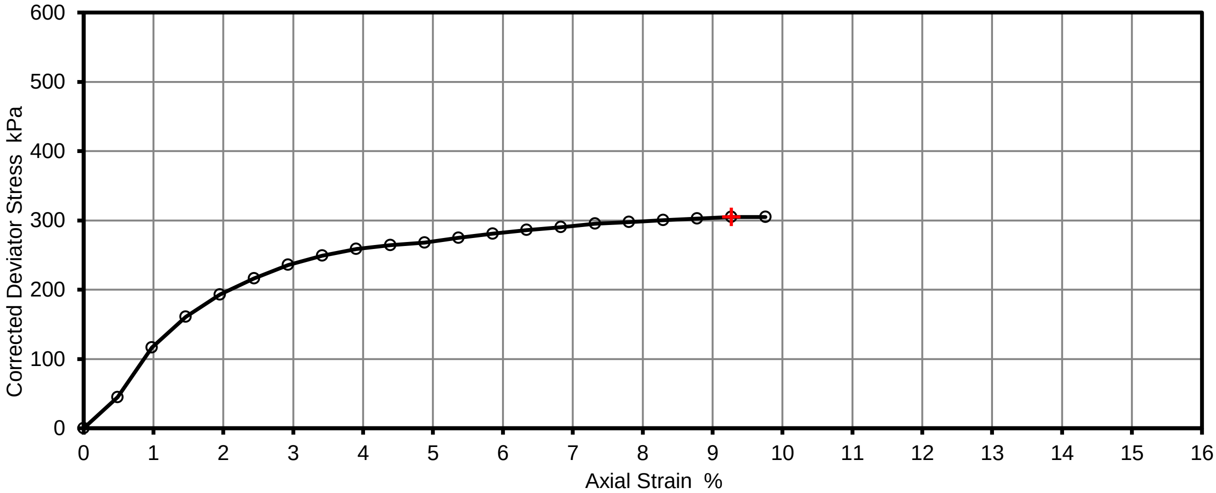
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	19487	
				Borehole/Pit No.	BH1	
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.		
Project No.	J15236	Client	GEA	Depth	8.00	m
Soil Description	Very high strength fissured dark grey silty CLAY with light grey fine sand partings			Sample Type	U	
				Samples received	07/09/2015	
				Schedules received	07/09/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/09/2015	

Remarks

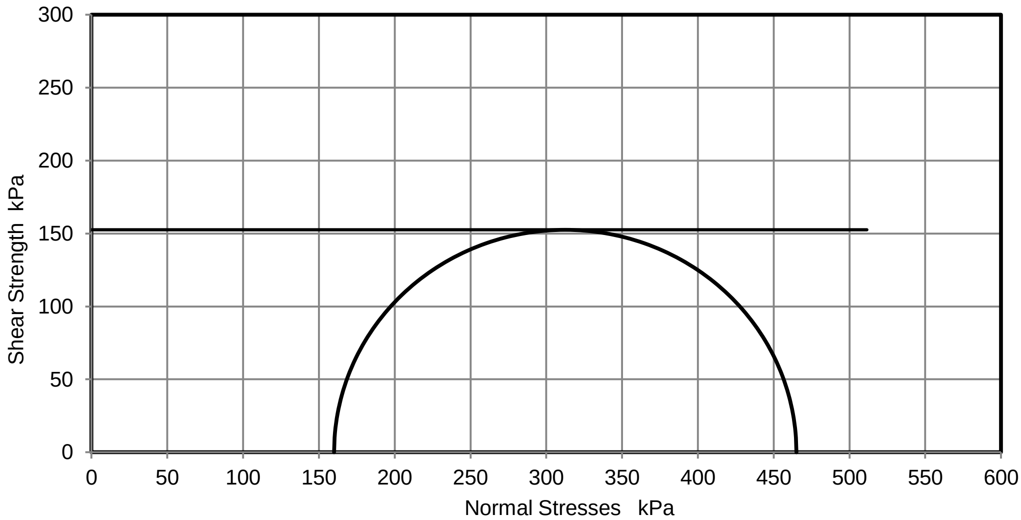
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	1.95	Mg/m3
Moisture Content	27	%
Dry Density	1.53	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	160	kPa
Axial Strain	9.3	%
Deviator Stress, (σ1 - σ3)f	305	kPa
Undrained Shear Strength, cu	153	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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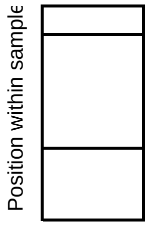
UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

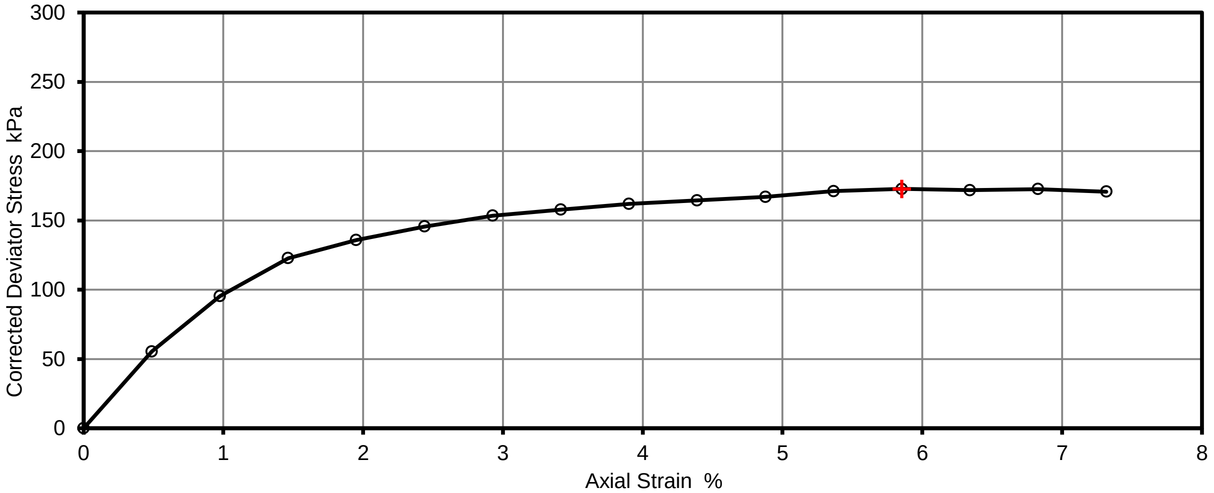
K4 SOILS	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	19487
				Borehole/Pit No.	BH1
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.	
Project No.	J15236	Client	GEA	Depth	11.00 m
Soil Description	High strength fissured dark grey silty CLAY			Sample Type	U
				Samples received	07/09/2015
				Schedules received	07/09/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/09/2015

Remarks

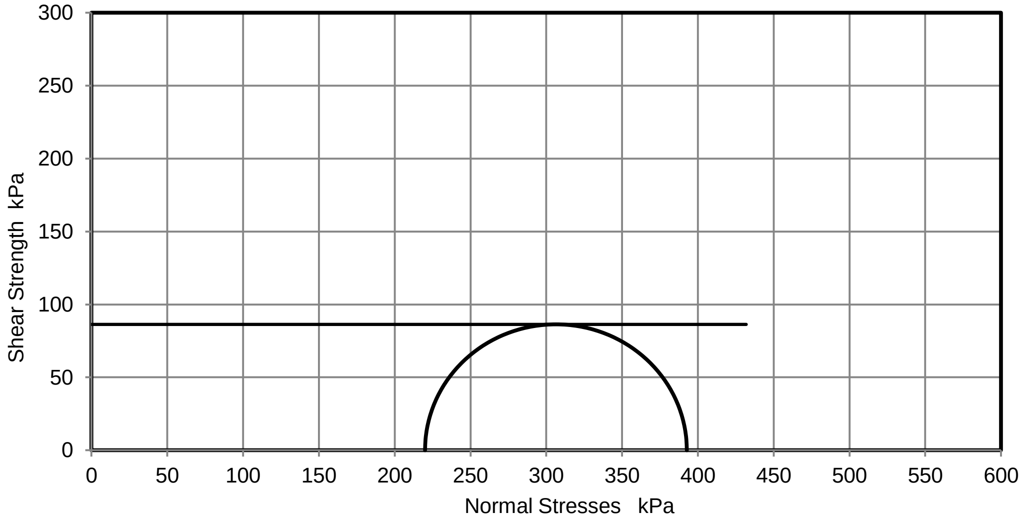


Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	1.95	Mg/m3
Moisture Content	31	%
Dry Density	1.49	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	220	kPa
Axial Strain	5.9	%
Deviator Stress, (σ1 - σ3)f	173	kPa
Undrained Shear Strength, cu	86	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R7 (Rev.0)

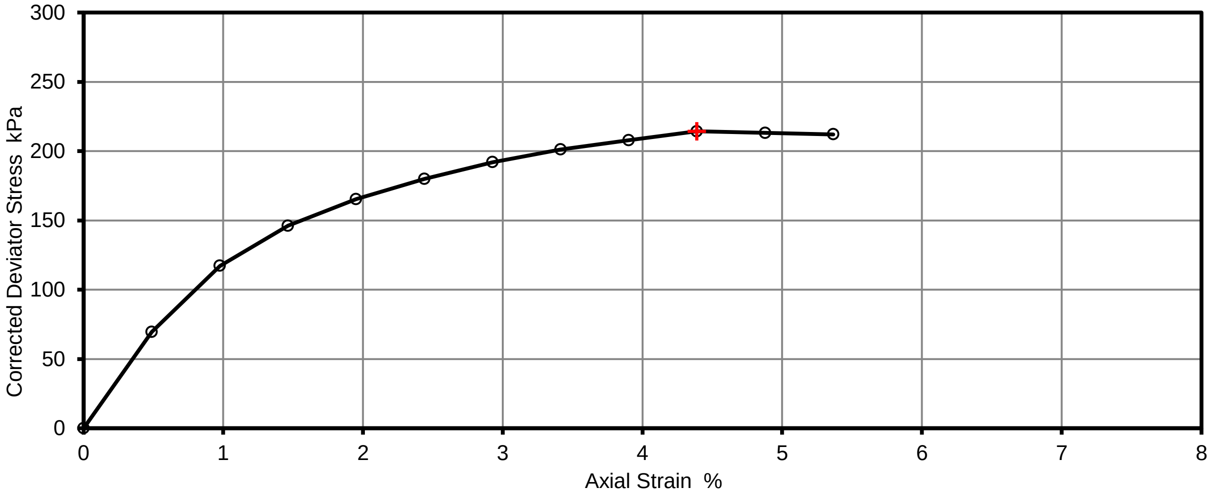
Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen				Job Ref	19487	
				Borehole/Pit No.	BH1	
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.		
Project No.	J15236	Client	GEA	Depth	14.00	m
Soil Description	High strength fissured dark grey silty CLAY			Sample Type	U	
				Samples received	07/09/2015	
				Schedules received	07/09/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/09/2015	

Remarks

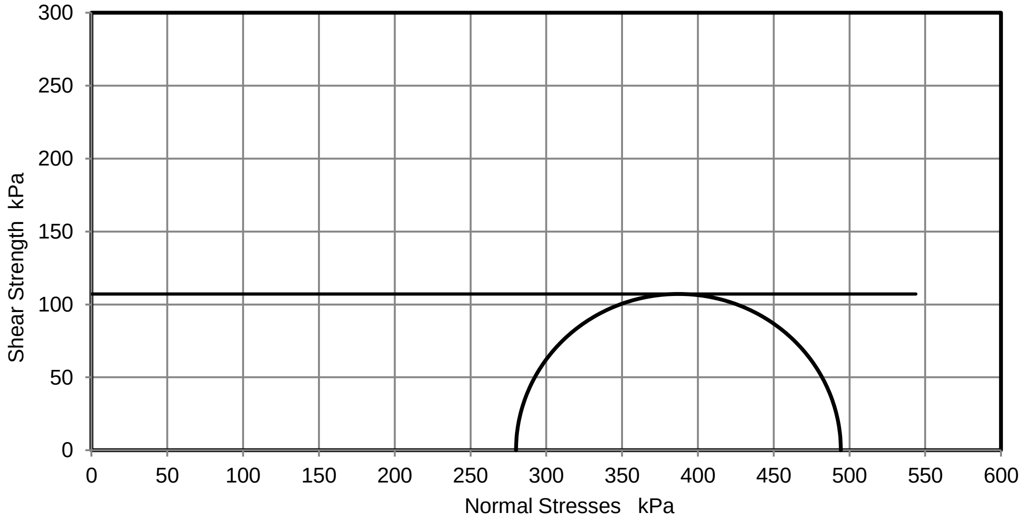
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	1.97	Mg/m3
Moisture Content	30	%
Dry Density	1.52	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	280	kPa
Axial Strain	4.4	%
Deviator Stress, (σ1 - σ3)f	214	kPa
Undrained Shear Strength, cu	107	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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MSF-5 R7 (Rev.0)

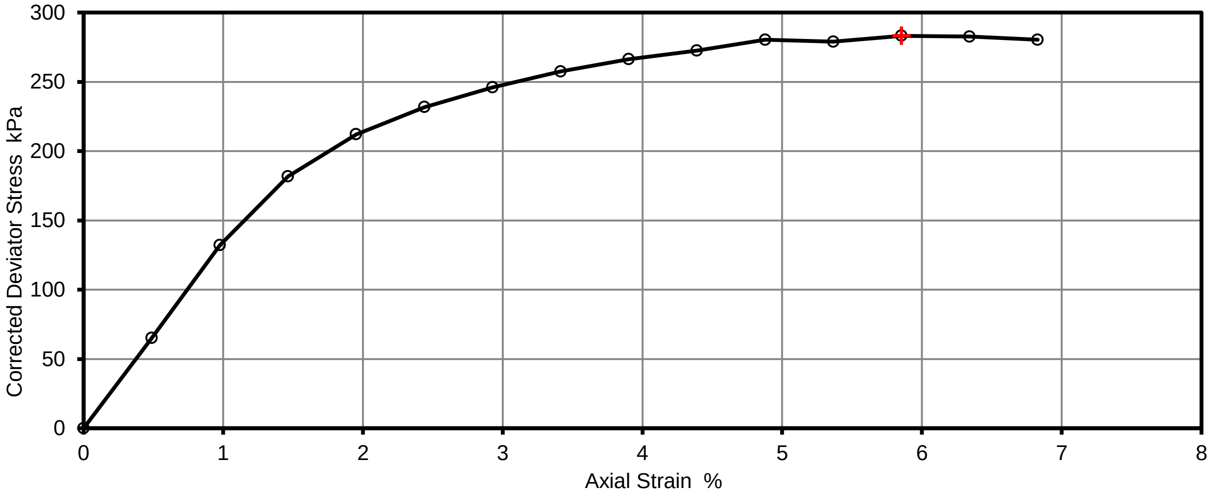
Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen				Job Ref	19487	
				Borehole/Pit No.	BH1	
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.		
Project No.	J15236	Client	GEA	Depth	17.00	m
Soil Description	High strength fissured dark grey silty CLAY			Sample Type	U	
				Samples received	07/09/2015	
				Schedules received	07/09/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/09/2015	

Remarks

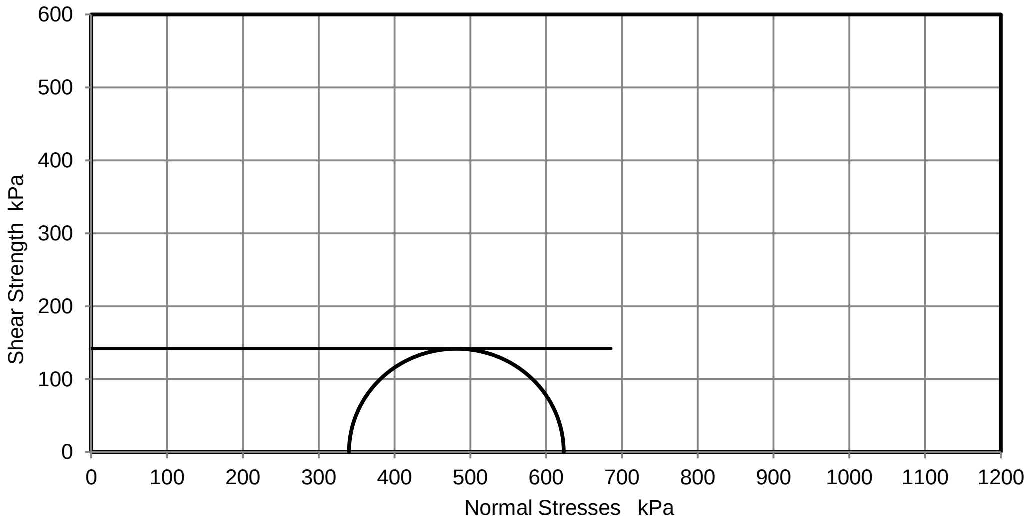
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	1.98	Mg/m3
Moisture Content	28	%
Dry Density	1.55	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	340	kPa
Axial Strain	5.9	%
Deviator Stress, (σ1 - σ3)f	283	kPa
Undrained Shear Strength, cu	142	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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MSF-5 R7 (Rev.0)

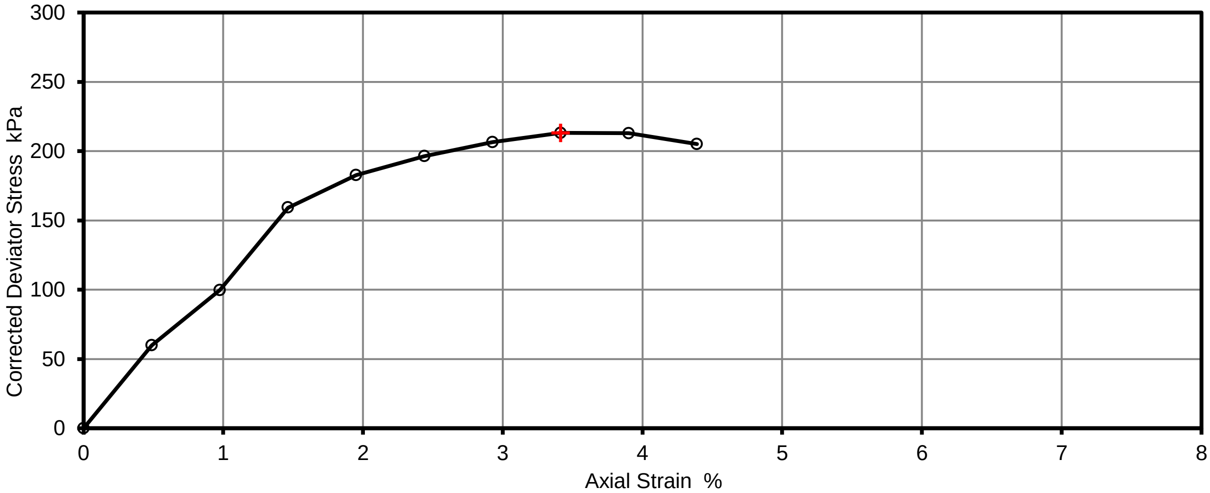
K4 SOILS	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	19487
				Borehole/Pit No.	BH1
Site Name	39 Rosslyn Hill, London NW3 5UJ			Sample No.	
Project No.	J15236	Client	GEA	Depth	20.00 m
Soil Description	High strength fissured dark grey silty CLAY			Sample Type	U
				Samples received	07/09/2015
				Schedules received	07/09/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	24/09/2015

Remarks

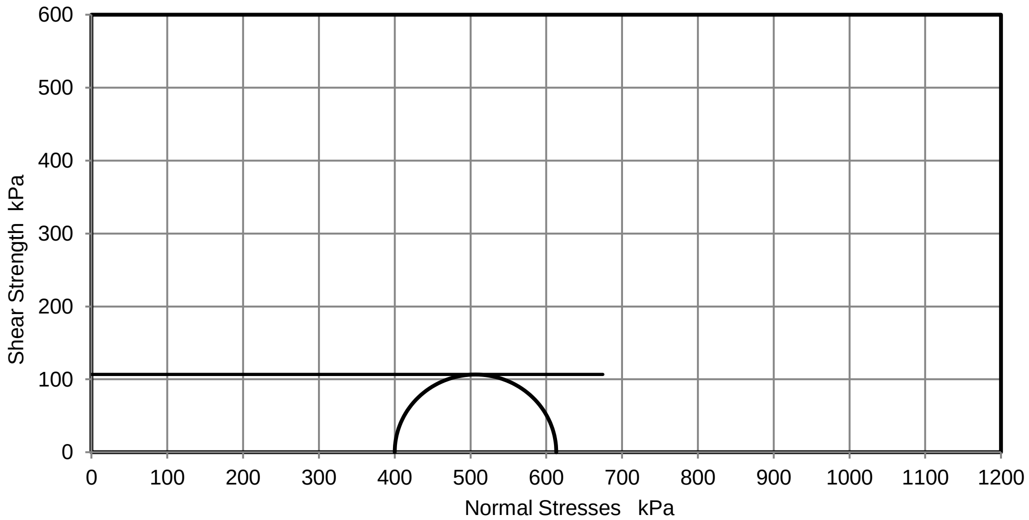
Position within sample

Test Number	1	
Length	205.0	mm
Diameter	105.0	mm
Bulk Density	1.96	Mg/m3
Moisture Content	27	%
Dry Density	1.54	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	400	kPa
Axial Strain	3.4	%
Deviator Stress, (σ1 - σ3)f	213	kPa
Undrained Shear Strength, cu	107	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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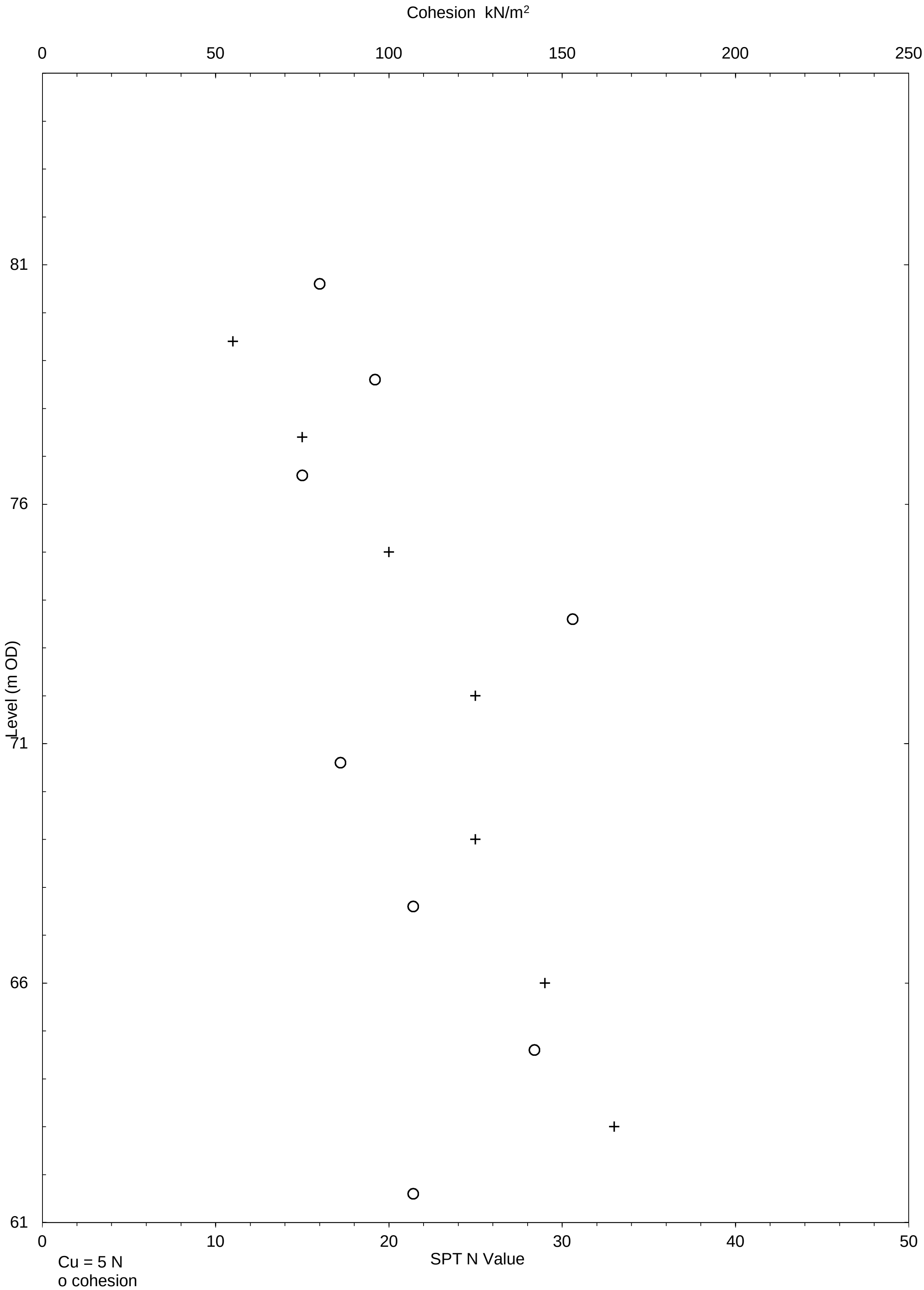
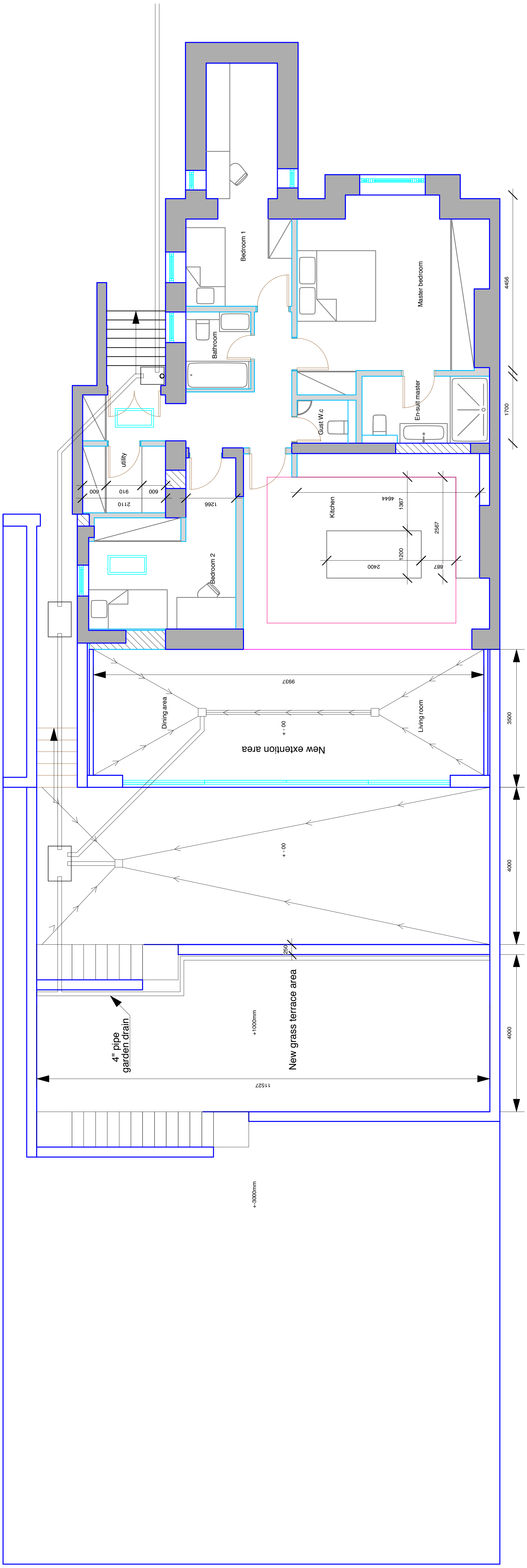
Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

SPT & Cohesion / Level Graph

Site	39 Rosslyn Hill, London NW3 5UJ	**Job Number** J15236
Client	Mr J Cohen and Ms A Lindsay	**Sheet** 1 / 1
Engineer	Conisbee	





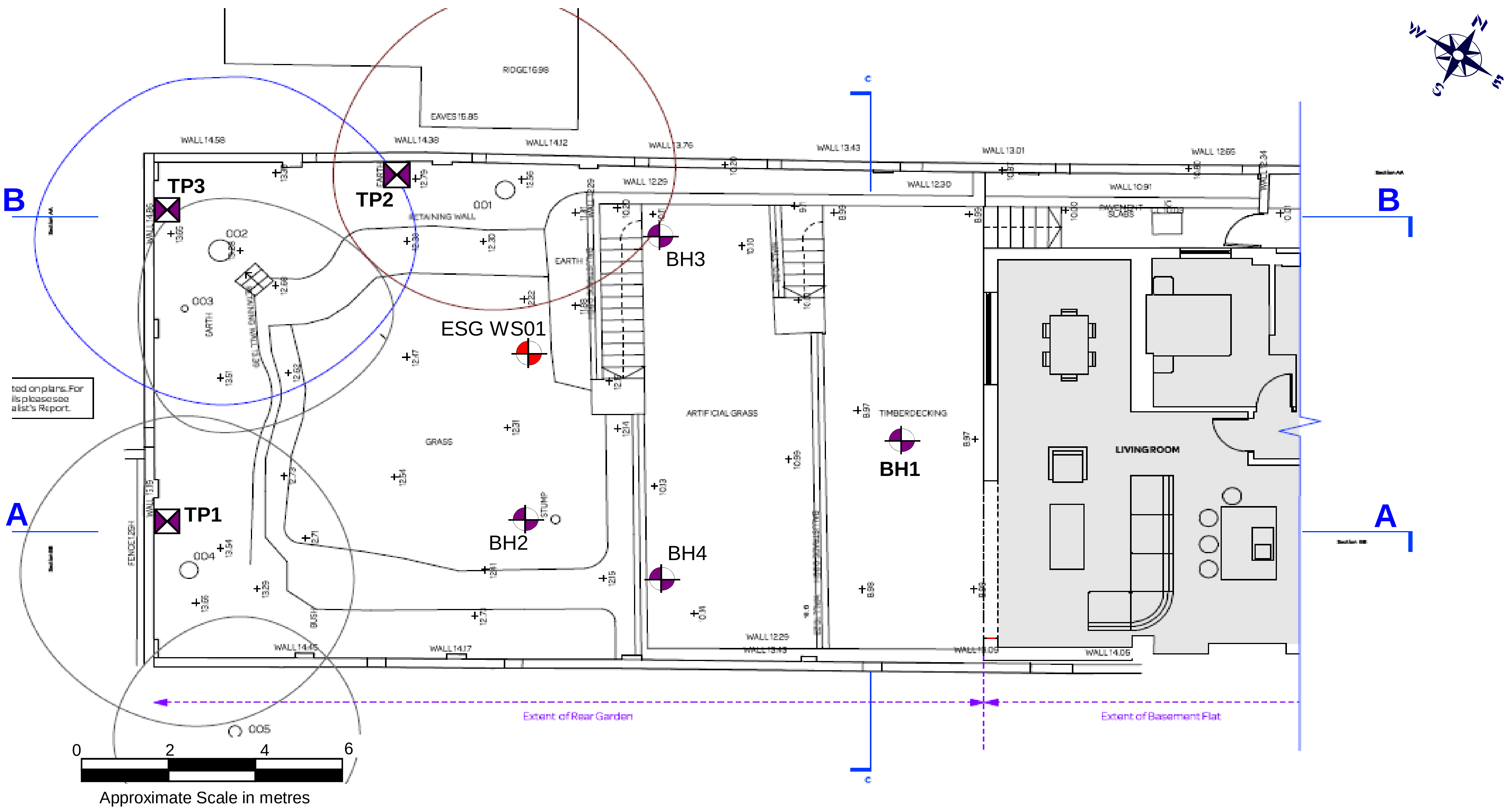
Bedroom 1
Master bedroom
Bathroom
Gust W.c
En-suit master
utility
Bedroom 2
Kitchen
Dining area
Living room
New extention area
New grass terrace area
4" pipe
garden drain
+1000mm
+3000mm
+ - 00
4456
1700
3500
4000
4000
9937
11527
4644
1367
2567
1200
2400
887
600
910
600
2110
1266
250

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Site Plan

Site	39 Rosslyn Hill, London NW3 5UJ	**Job Number**	J15236
Client	Mr Jonny Cohen & Ms Alicia Lindsay	**Sheet**	1 / 1
Engineer	Conisbee		

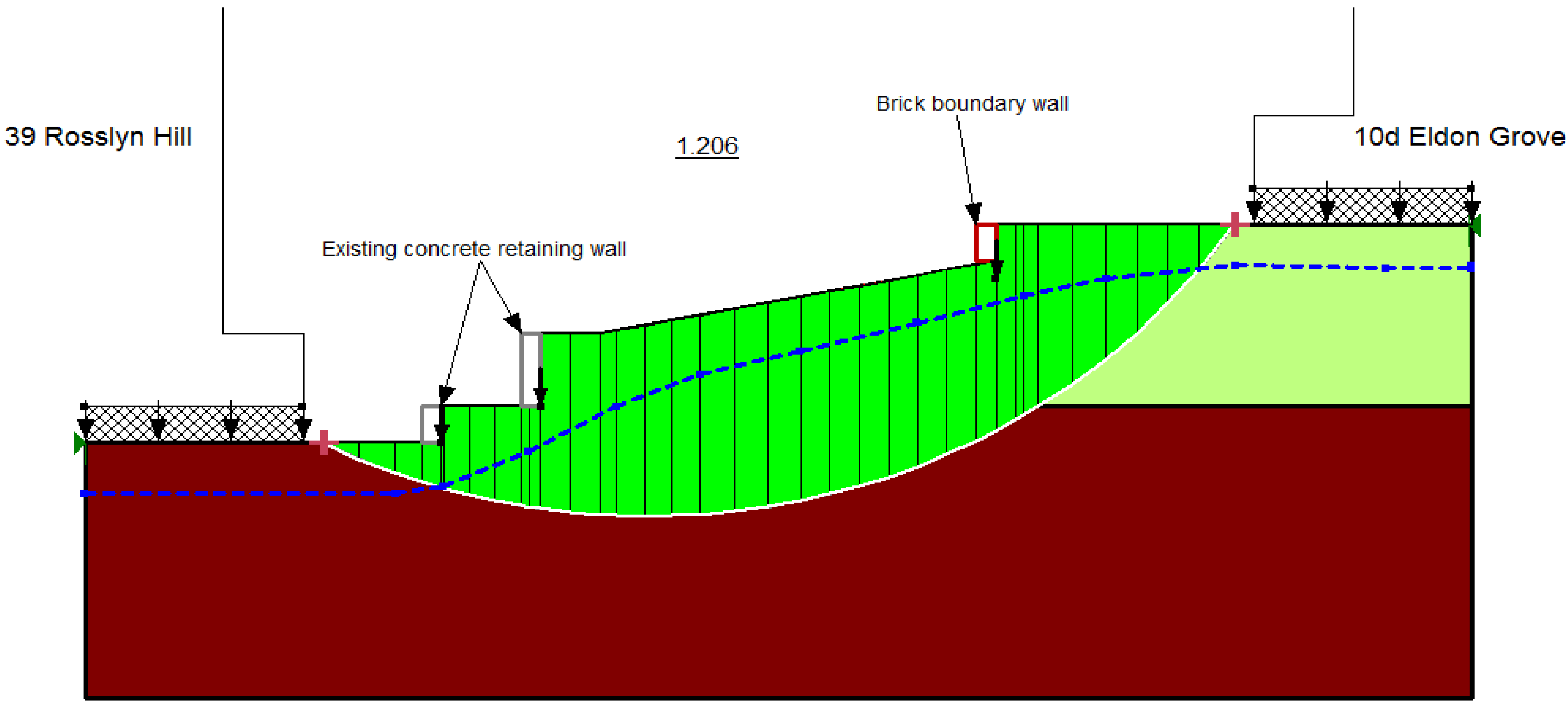


Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Slope Stability Assesment - Existing Section A-A

Site	39 Rosslyn Hill, London, NW3 5UJ	**Job Number**	J15236
Client	Mr J Cohen and Ms A Lindsay	**Sheet**	1 / 3
Engineer	Conisbee		

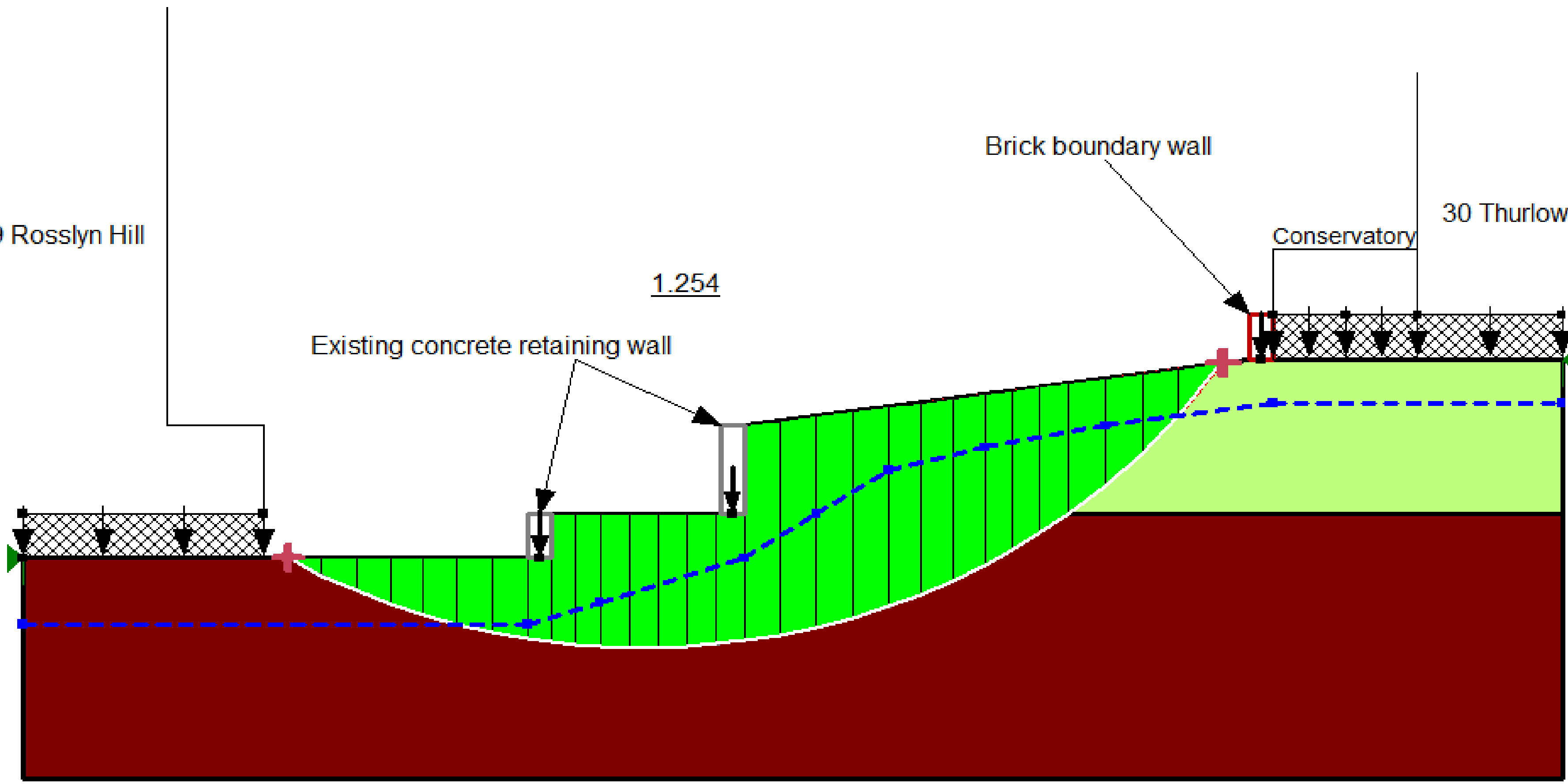


Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Slope Stability Assesment - Existing Section B-B

Site	39 Rosslyn Hill, London, NW3 5UJ	**Job Number**	J15236
Client	Mr J Cohen and Ms A Lindsay	**Sheet**	2 / 3
Engineer	Conisbee		

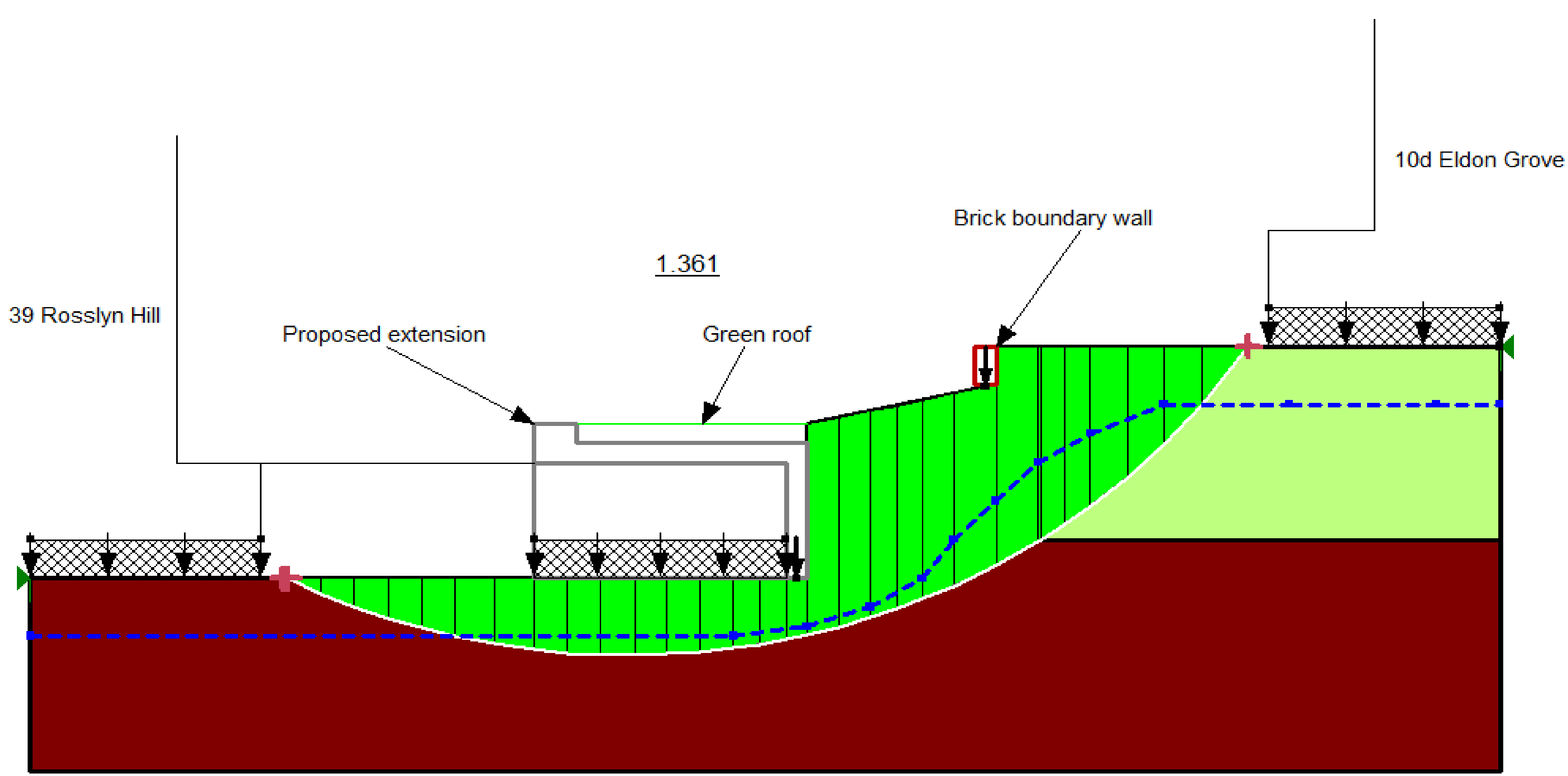


Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Slope Stability Assesment - Proposed Section A-A

Site	39 Rosslyn Hill, London, NW3 5UJ	**Job Number**	J15236
Client	Mr J Cohen and Ms A Lindsay	**Sheet**	3 / 3
Engineer	Conisbee		

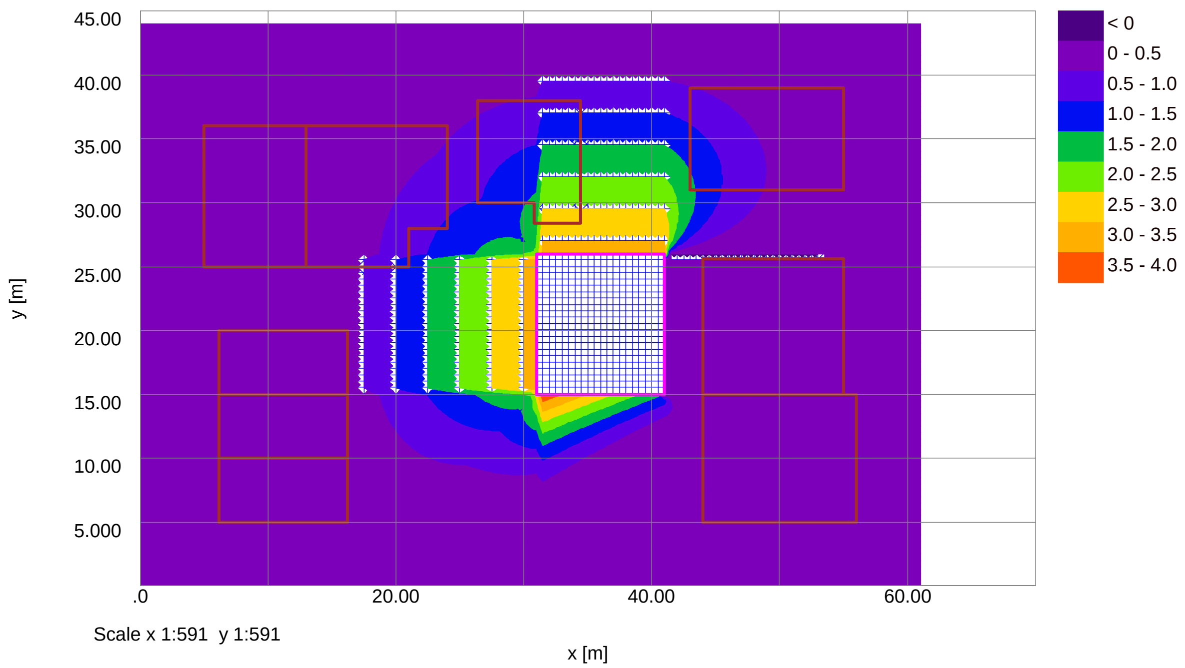


Oasys

39 Rosslyn Hill, London NW3 5UJ
GMA - Wall Installation

Job No.	Sheet No.	Rev.
J15236		
Drg. Ref.		
Made by ML	Date 05-Nov-2015	Checked

Vertical Settlement Contours: Grid 1 (level 84.330m) (Interval 0.5mm)



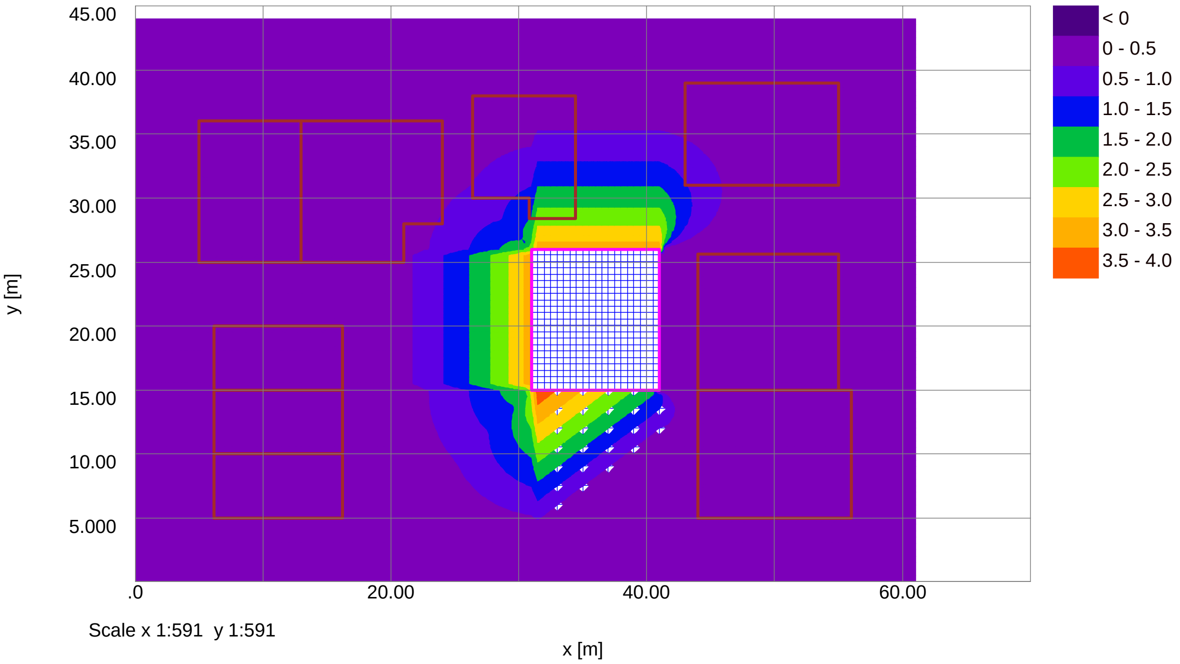
Scale x 1:591 y 1:591

Oasys

39 Rosslyn Hill, London NW3 5UJ
GMA - Wall Installation

Job No.	Sheet No.	Rev.
J15236		
Drg. Ref.		
Made by ML	Date 05-Nov-2015	Checked

Horizontal Displacement Contours: Grid 1 (level 84.330m) Interval 0.5mm



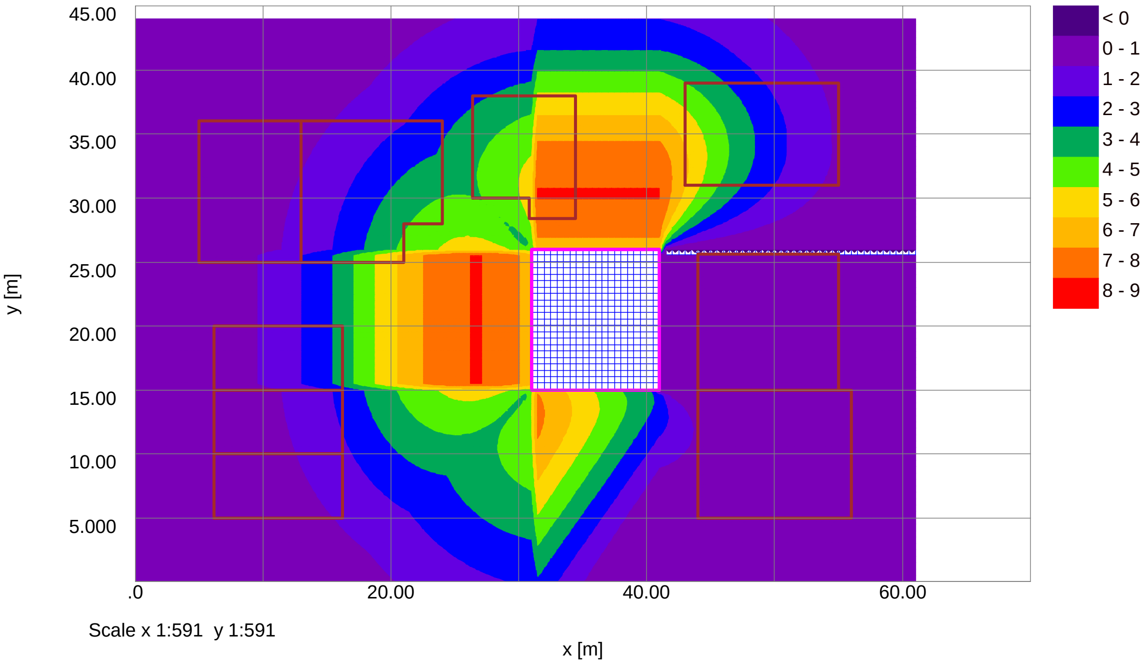
Scale x 1:591 y 1:591

Oasys

39 Rosslyn Hill, London NW3 5UJ
GMA - Combined Movement

Job No.	Sheet No.	Rev.
J15236		
Drg. Ref.		
Made by ML	Date 05-Nov-2015	Checked

Vertical Settlement Contours: Grid 1 (level 84.330m) (Interval 1mm)



Scale x 1:591 y 1:591

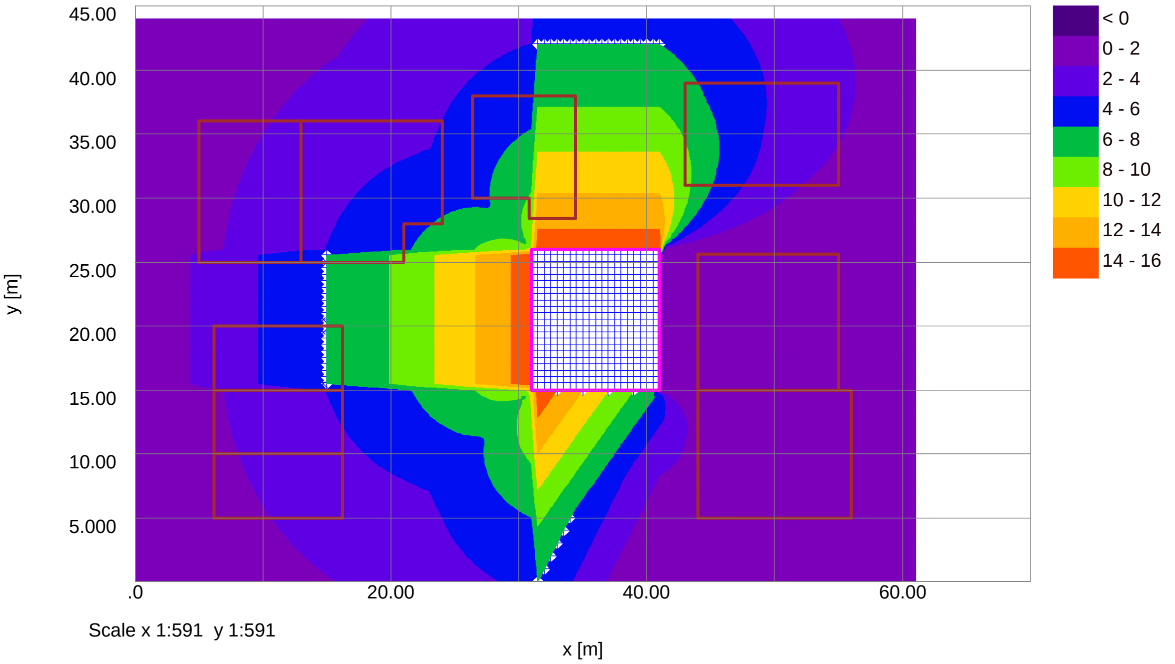
Oasys

39 Rosslyn Hill, London NW3 5UJ

GMA - Combined Movement

Job No.	Sheet No.	Rev.
J15236		
Drg. Ref.		
Made by ML	Date 05-Nov-2015	Checked

Horizontal Displacement Contours: Grid 1 (level 84.330m) Interval 2mm



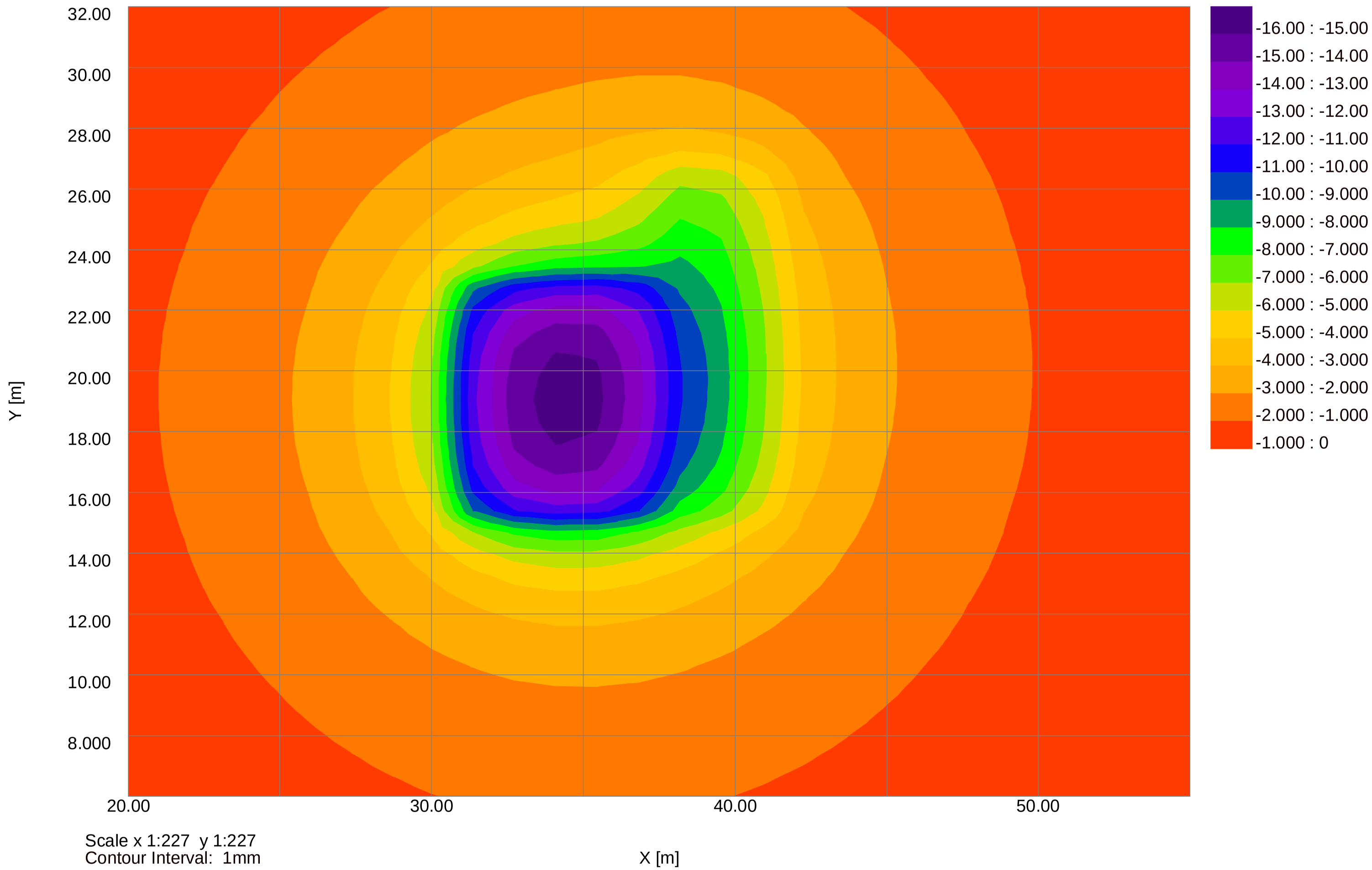
Scale x 1:591 y 1:591

Oasys

39 Rosslyn Hill, London NW3 5UJ
Heave Analysis

Job No.	Sheet No.	Rev.
J15236		
Drg. Ref.		
Made by ML	Date	Checked

Settlement Contours : Grid 1 at 0.0000m



Scale x 1:227 y 1:227
Contour Interval: 1mm

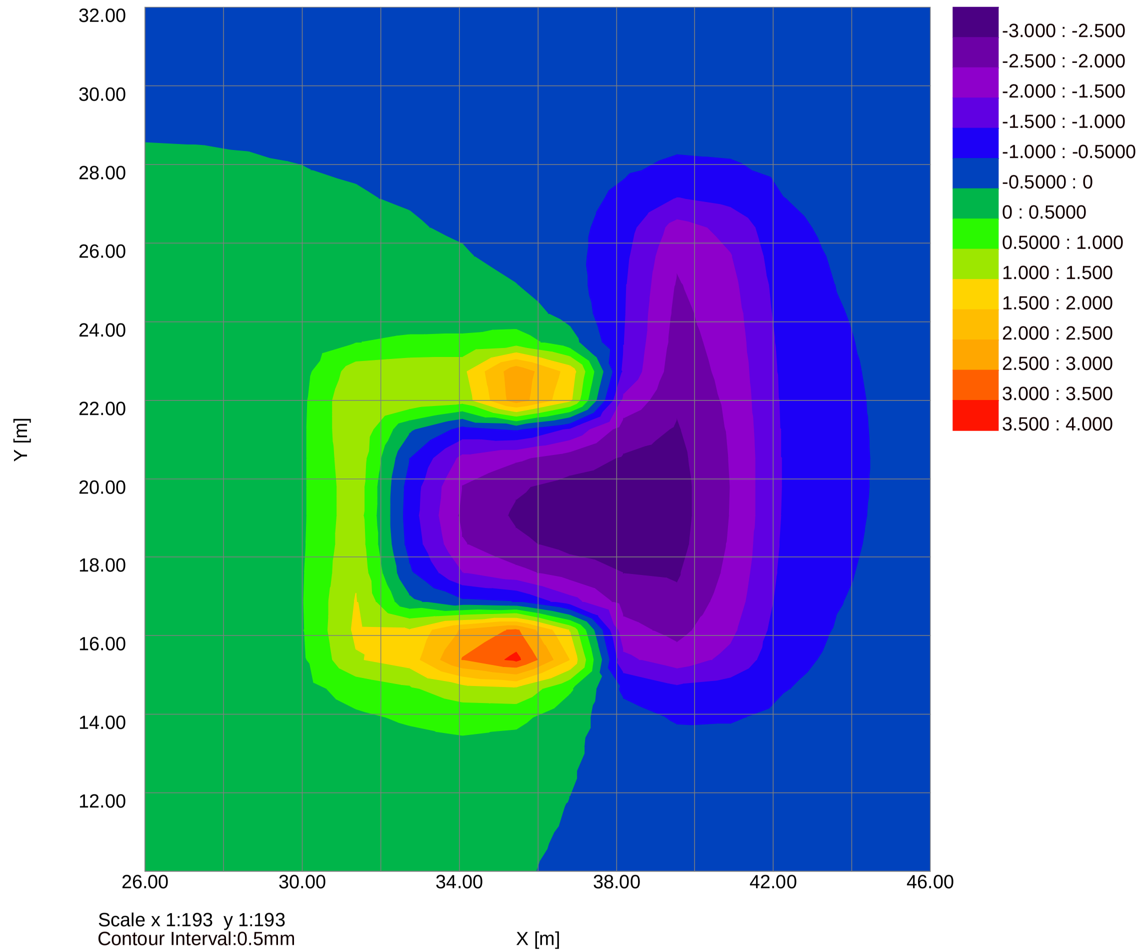
Oasys

39 Rosslyn Hill, London NW3 5UJ

Heave Analysis - Total Movement

Job No.	Sheet No.	Rev.
J15236		
Drg. Ref.		
Made by ML	Date	Checked

Settlement Contours : Grid 1 at 0.0000m



Scale x 1:193 y 1:193
Contour Interval:0.5mm

Specific Building Damage Results - Horizontal Displacements

Structure: 10b Eldon A | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	6.20000	5.00000	86.33000	1.0739	0.43301	1.0739	0.43301
1.0000	7.20000	5.00000	86.33000	1.2485	0.52456	1.2485	0.52456
2.0000	8.20000	5.00000	86.33000	1.4162	0.62114	1.4162	0.62114
3.0000	9.20000	5.00000	86.33000	1.5762	0.72304	1.5762	0.72304
4.0000	10.20000	5.00000	86.33000	1.7276	0.83058	1.7276	0.83058
5.0000	11.20000	5.00000	86.33000	1.8692	0.94404	1.8692	0.94404
6.0000	12.20000	5.00000	86.33000	1.9997	1.0637	1.9997	1.0637
7.0000	13.20000	5.00000	86.33000	2.1177	1.1897	2.1177	1.1897
8.0000	14.20000	5.00000	86.33000	2.2215	1.3223	2.2215	1.3223
9.0000	15.20000	5.00000	86.33000	2.3091	1.4615	2.3091	1.4615
10.000	16.20000	5.00000	86.33000	2.3783	1.6070	2.3783	1.6070

Structure: 10b Eldon B | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	16.20000	5.00000	86.33000	2.3783	1.6070	1.6070	-2.3783
1.0000	16.20000	6.00000	86.33000	2.5949	1.5780	1.5780	-2.5949
2.0000	16.20000	7.00000	86.33000	2.8173	1.5229	1.5229	-2.8173
3.0000	16.20000	8.00000	86.33000	3.0429	1.4392	1.4392	-3.0429
4.0000	16.20000	9.00000	86.33000	3.2681	1.3249	1.3249	-3.2681
5.0000	16.20000	10.00000	86.33000	3.4882	1.1785	1.1785	-3.4882

Structure: Eldon Party b-c | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	16.20000	10.00000	86.33000	3.4882	1.1785	-3.4882	-1.1785
1.0000	15.20000	10.00000	86.33000	3.3297	1.0537	-3.3297	-1.0537
2.0000	14.20000	10.00000	86.33000	3.1593	0.94026	-3.1593	-0.94026
3.0000	13.20000	10.00000	86.33000	2.9790	0.83681	-2.9790	-0.83681
4.0000	12.20000	10.00000	86.33000	2.7906	0.74217	-2.7906	-0.74217
5.0000	11.20000	10.00000	86.33000	2.5952	0.65534	-2.5952	-0.65534
6.0000	10.20000	10.00000	86.33000	2.3938	0.57544	-2.3938	-0.57544
7.0000	9.20000	10.00000	86.33000	2.1874	0.50170	-2.1874	-0.50170
8.0000	8.20000	10.00000	86.33000	1.9767	0.43348	-1.9767	-0.43348
9.0000	7.20000	10.00000	86.33000	1.7622	0.37020	-1.7622	-0.37020
10.000	6.20000	10.00000	86.33000	1.5443	0.31136	-1.5443	-0.31136

Structure: 10b Eldon C | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	6.20000	10.00000	86.33000	1.5443	0.31136	-0.31136	1.5443
1.0000	6.20000	9.00000	86.33000	1.4621	0.35374	-0.35374	1.4621
2.0000	6.20000	8.00000	86.33000	1.3728	0.38748	-0.38748	1.3728
3.0000	6.20000	7.00000	86.33000	1.2775	0.41210	-0.41210	1.2775
4.0000	6.20000	6.00000	86.33000	1.1775	0.42732	-0.42732	1.1775
5.0000	6.20000	5.00000	86.33000	1.0739	0.43301	-0.43301	1.0739

Structure: 10c Eldon A | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	16.20000	10.00000	86.33000	3.4882	1.1785	1.1785	-3.4882
1.0000	16.20000	11.00000	86.33000	3.6982	0.99953	0.99953	-3.6982
2.0000	16.20000	12.00000	86.33000	3.8924	0.78900	0.78900	-3.8924
3.0000	16.20000	13.00000	86.33000	4.0647	0.54928	0.54928	-4.0647
4.0000	16.20000	14.00000	86.33000	4.2094	0.28442	0.28442	-4.2094
5.0000	16.20000	15.00000	86.33000	4.3215	0.0	0.0	-4.3215

Structure: Eldon Party c-d | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	16.20000	15.00000	86.33000	4.3215	0.0	-4.3215	0.0
1.0000	15.20000	15.00000	86.33000	4.0702	0.0	-4.0702	0.0
2.0000	14.20000	15.00000	86.33000	3.8190	0.0	-3.8190	0.0
3.0000	13.20000	15.00000	86.33000	3.5677	0.0	-3.5677	0.0
4.0000	12.20000	15.00000	86.33000	3.3165	0.0	-3.3165	0.0
5.0000	11.20000	15.00000	86.33000	3.0652	0.0	-3.0652	0.0
6.0000	10.20000	15.00000	86.33000	2.8140	0.0	-2.8140	0.0
7.0000	9.20000	15.00000	86.33000	2.5627	0.0	-2.5627	0.0
8.0000	8.20000	15.00000	86.33000	2.3115	0.0	-2.3115	0.0
9.0000	7.20000	15.00000	86.33000	2.0602	0.0	-2.0602	0.0
10.000	6.20000	15.00000	86.33000	1.8090	0.0	-1.8090	0.0

Structure: 10c Eldon B | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	6.20000	15.00000	86.33000	1.8090	0.0	0.0	1.8090
1.0000	6.20000	14.00000	86.33000	1.7790	0.071734	-0.071734	1.7790
2.0000	6.20000	13.00000	86.33000	1.7366	0.14005	-0.14005	1.7366
3.0000	6.20000	12.00000	86.33000	1.6827	0.20356	-0.20356	1.6827
4.0000	6.20000	11.00000	86.33000	1.6183	0.26101	-0.26101	1.6183
5.0000	6.20000	10.00000	86.33000	1.5443	0.31136	-0.31136	1.5443

Structure: 10d Eldon A | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	16.20000	15.00000	86.33000	4.3215	0.0	0.0	-4.3215
1.0000	16.20000	16.00000	86.33000	6.4500	0.0	0.0	-6.4500
2.0000	16.20000	17.00000	86.33000	6.4500	0.0	0.0	-6.4500
3.0000	16.20000	18.00000	86.33000	6.4500	0.0	0.0	-6.4500
4.0000	16.20000	19.00000	86.33000	6.4500	0.0	0.0	-6.4500
5.0000	16.20000	20.00000	86.33000	6.4500	0.0	0.0	-6.4500

Structure: 10d Eldon B | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	16.20000	20.00000	86.33000	6.4500	0.0	-6.4500	0.0
1.0000	15.20000	20.00000	86.33000	6.0750	0.0	-6.0750	0.0
2.0000	14.20000	20.00000	86.33000	5.7000	0.0	-5.7000	0.0
3.0000	13.20000	20.00000	86.33000	5.3250	0.0	-5.3250	0.0
4.0000	12.20000	20.00000	86.33000	4.9500	0.0	-4.9500	0.0
5.0000	11.20000	20.00000	86.33000	4.5750	0.0	-4.5750	0.0
6.0000	10.20000	20.00000	86.33000	4.2000	0.0	-4.2000	0.0
7.0000	9.20000	20.00000	86.33000	3.8250	0.0	-3.8250	0.0
8.0000	8.20000	20.00000	86.33000	3.4500	0.0	-3.4500	0.0
9.0000	7.20000	20.00000	86.33000	3.0750	0.0	-3.0750	0.0
10.000	6.20000	20.00000	86.33000	2.7000	0.0	-2.7000	0.0

Structure: 10d Eldon C | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	6.20000	20.00000	86.33000	2.7000	0.0	0.0	2.7000
1.0000	6.20000	19.00000	86.33000	2.7000	0.0	0.0	2.7000
2.0000	6.20000	18.00000	86.33000	2.7000	0.0	0.0	2.7000
3.0000	6.20000	17.00000	86.33000	2.7000	0.0	0.0	2.7000
4.0000	6.20000	16.00000	86.33000	2.7000	0.0	0.0	2.7000
5.0000	6.20000	15.00000	86.33000	1.8090	0.0	0.0	1.8090

Structure: 29 Thurlow A | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	5.00000	25.00000	84.33000	2.2500	0.0	2.2500	0.0
1.0000	6.00000	25.00000	84.33000	2.6250	0.0	2.6250	0.0
2.0000	7.00000	25.00000	84.33000	3.0000	0.0	3.0000	0.0
3.0000	8.00000	25.00000	84.33000	3.3750	0.0	3.3750	0.0
4.0000	9.00000	25.00000	84.33000	3.7500	0.0	3.7500	0.0
5.0000	10.00000	25.00000	84.33000	4.1250	0.0	4.1250	0.0
6.0000	11.00000	25.00000	84.33000	4.5000	0.0	4.5000	0.0
7.0000	12.00000	25.00000	84.33000	4.8750	0.0	4.8750	0.0
8.0000	13.00000	25.00000	84.33000	5.2500	0.0	5.2500	0.0

Structure: Party 29-30 | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	13.00000	25.00000	84.33000	5.2500	0.0	0.0	-5.2500
1.0000	13.00000	26.00000	84.33000	3.5175	0.0	0.0	-3.5175
2.0000	13.00000	27.00000	84.33000	3.4423	-0.19124	-0.19124	-3.4423
3.0000	13.00000	28.00000	84.33000	3.3443	-0.37159	-0.37159	-3.3443
4.0000	13.00000	29.00000	84.33000	3.2263	-0.53771	-0.53771	-3.2263
5.0000	13.00000	30.00000	84.33000	3.0911	-0.68691	-0.68691	-3.0911
6.0000	13.00000	31.00000	84.33000	2.9420	-0.81721	-0.81721	-2.9420
7.0000	13.00000	32.00000	84.33000	2.7822	-0.92739	-0.92739	-2.7822
8.0000	13.00000	33.00000	84.33000	2.6149	-1.0169	-1.0169	-2.6149
9.0000	13.00000	34.00000	84.33000	2.4429	-1.0857	-1.0857	-2.4429
10.000	13.00000	35.00000	84.33000	2.2690	-1.1345	-1.1345	-2.2690
11.000	13.00000	36.00000	84.33000	2.0952	-1.1640	-1.1640	-2.0952

Structure: 29 Thurlow B | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	13.00000	36.00000	84.33000	2.0952	-1.1640	-2.0952	1.1640
1.0000	12.00000	36.00000	84.33000	1.9746	-1.0393	-1.9746	1.0393
2.0000	11.00000	36.00000	84.33000	1.8417	-0.92086	-1.8417	0.92086
3.0000	10.00000	36.00000	84.33000	1.6981	-0.80861	-1.6981	0.80861
4.0000	9.00000	36.00000	84.33000	1.5449	-0.70222	-1.5449	0.70222
5.0000	8.00000	36.00000	84.33000	1.3832	-0.60140	-1.3832	0.60140
6.0000	7.00000	36.00000	84.33000	1.2141	-0.50586	-1.2141	0.50586
7.0000	6.00000	36.00000	84.33000	1.0382	-0.41528	-1.0382	0.41528
8.0000	5.00000	36.00000	84.33000	0.85635	-0.32936	-0.85635	0.32936

Structure: 29 Thurlow C | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	5.00000	36.00000	84.33000	0.85635	-0.32936	0.32936	0.85635
1.0000	5.00000	35.00000	84.33000	0.95051	-0.32902	0.32902	0.95051
2.0000	5.00000	34.00000	84.33000	1.0409	-0.32027	0.32027	1.0409
3.0000	5.00000	33.00000	84.33000	1.1265	-0.30328	0.30328	1.1265
4.0000	5.00000	32.00000	84.33000	1.2062	-0.27836	0.27836	1.2062
5.0000	5.00000	31.00000	84.33000	1.2792	-0.24600	0.24600	1.2792
6.0000	5.00000	30.00000	84.33000	1.3443	-0.20681	0.20681	1.3443
7.0000	5.00000	29.00000	84.33000	1.4005	-0.16160	0.16160	1.4005
8.0000	5.00000	28.00000	84.33000	1.4470	-0.11131	0.11131	1.4470
9.0000	5.00000	27.00000	84.33000	1.4829	-0.057035	0.057035	1.4829
10.000	5.00000	26.00000	84.33000	1.5075	0.0	0.0	1.5075
11.000	5.00000	25.00000	84.33000	2.2500	0.0	0.0	2.2500

Structure: 30 Thurlow A | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	13.00000	25.00000	84.33000	5.2500	0.0	5.2500	0.0
1.0000	14.00000	25.00000	84.33000	5.6250	0.0	5.6250	0.0
2.0000	15.00000	25.00000	84.33000	6.0000	0.0	6.0000	0.0
3.0000	16.00000	25.00000	84.33000	6.3750	0.0	6.3750	0.0
4.0000	17.00000	25.00000	84.33000	6.7500	0.0	6.7500	0.0
5.0000	18.00000	25.00000	84.33000	7.1250	0.0	7.1250	0.0
6.0000	19.00000	25.00000	84.33000	7.5019	0.0	7.5019	0.0
7.0000	20.00000	25.00000	84.33000	8.0537	0.0	8.0537	0.0
8.0000	21.00000	25.00000	84.33000	8.6093	0.0	8.6093	0.0

Structure: 30 Thurlow B | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	21.00000	25.00000	84.33000	8.6093	0.0	0.0	-8.6093
1.0000	21.00000	26.00000	84.33000	5.7683	0.0	0.0	-5.7683
2.0000	21.00000	27.00000	84.33000	5.5368	-0.55368	-0.55368	-5.5368
3.0000	21.00000	28.00000	84.33000	5.2275	-1.0455	-1.0455	-5.2275

Structure: 30 Thurlow C | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	21.00000	28.00000	84.33000	5.2275	-1.0455	5.2275	-1.0455
1.0000	22.00000	28.00000	84.33000	5.4999	-1.2222	5.4999	-1.2222
2.0000	23.00000	28.00000	84.33000	5.7493	-1.4373	5.7493	-1.4373
3.0000	24.00000	28.00000	84.33000	5.9640	-1.7040	5.9640	-1.7040

Structure: 30 Thurlow D | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	24.00000	28.00000	84.33000	5.9640	-1.7040	-1.7040	-5.9640
1.0000	24.00000	29.00000	84.33000	5.3386	-2.2880	-2.2880	-5.3386
2.0000	24.00000	30.00000	84.33000	4.7022	-2.6870	-2.6870	-4.7022
3.0000	24.00000	31.00000	84.33000	4.0980	-2.9272	-2.9272	-4.0980
4.0000	24.00000	32.00000	84.33000	3.5492	-3.0421	-3.0421	-3.5492
5.0000	24.00000	33.00000	84.33000	3.0637	-3.0637	-3.0637	-3.0637
6.0000	24.00000	34.00000	84.33000	2.7975	-3.1971	-3.1971	-2.7975
7.0000	24.00000	35.00000	84.33000	2.5335	-3.2574	-3.2574	-2.5335
8.0000	24.00000	36.00000	84.33000	2.2892	-3.2703	-3.2703	-2.2892

Structure: 30 Thurlow E | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	24.00000	36.00000	84.33000	2.2892	-3.2703	-2.2892	3.2703
1.0000	23.00000	36.00000	84.33000	2.3559	-2.9448	-2.3559	2.9448
2.0000	22.00000	36.00000	84.33000	2.3792	-2.6436	-2.3792	2.6436
3.0000	21.00000	36.00000	84.33000	2.3676	-2.3676	-2.3676	2.3676
4.0000	20.00000	36.00000	84.33000	2.4261	-2.2056	-2.4261	2.2056
5.0000	19.00000	36.00000	84.33000	2.4519	-2.0433	-2.4519	2.0433
6.0000	18.00000	36.00000	84.33000	2.4484	-1.8834	-2.4484	1.8834
7.0000	17.00000	36.00000	84.33000	2.4188	-1.7277	-2.4188	1.7277
8.0000	16.00000	36.00000	84.33000	2.3661	-1.5774	-2.3661	1.5774
9.0000	15.00000	36.00000	84.33000	2.2930	-1.4331	-2.2930	1.4331
10.000	14.00000	36.00000	84.33000	2.2020	-1.2953	-2.2020	1.2953
11.000	13.00000	36.00000	84.33000	2.0952	-1.1640	-2.0952	1.1640

Structure: 30A Thurlow A | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	26.40000	30.00000	83.33000	4.2333	-3.6811	4.2333	-3.6811
1.1000	27.50000	30.00000	83.33000	3.8559	-4.4068	3.8559	-4.4068
2.2000	28.60000	30.00000	83.33000	3.3589	-5.5981	3.3589	-5.5981
3.3000	29.70000	30.00000	83.33000	2.2532	-6.9330	2.2532	-6.9330
4.4000	30.80000	30.00000	83.33000	0.40310	-8.0620	0.40310	-8.0620

Structure: 30A Thurlow B | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	30.80000	30.00000	83.33000	0.40310	-8.0620	8.0620	0.40310
0.80000	30.80000	29.20000	83.33000	0.52407	-8.3851	8.3851	0.52407
1.6000	30.80000	28.40000	83.33000	0.72400	-8.6880	8.6880	0.72400

Structure: 30A Thurlow C | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	30.80000	28.40000	83.33000	0.72400	-8.6880	0.72400	-8.6880
0.90000	31.70000	28.40000	83.33000	0.0	-13.377	0.0	-13.377
1.8000	32.60000	28.40000	83.33000	0.0	-13.377	0.0	-13.377
2.7000	33.50000	28.40000	83.33000	0.0	-13.377	0.0	-13.377
3.6000	34.40000	28.40000	83.33000	0.0	-13.377	0.0	-13.377

Structure: 30A Thurlow D | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	34.40000	28.40000	83.33000	0.0	-13.377	-13.377	0.0
0.96000	34.40000	29.36000	83.33000	0.0	-12.690	-12.690	0.0
1.9200	34.40000	30.32000	83.33000	0.0	-12.034	-12.034	0.0
2.8800	34.40000	31.28000	83.33000	0.0	-11.406	-11.406	0.0
3.8400	34.40000	32.24000	83.33000	0.0	-10.802	-10.802	0.0
4.8000	34.40000	33.20000	83.33000	0.0	-10.220	-10.220	0.0
5.7600	34.40000	34.16000	83.33000	0.0	-9.6554	-9.6554	0.0
6.7200	34.40000	35.12000	83.33000	0.0	-9.1047	-9.1047	0.0
7.6800	34.40000	36.08000	83.33000	0.0	-8.5646	-8.5646	0.0
8.6400	34.40000	37.04000	83.33000	0.0	-8.0315	-8.0315	0.0
9.6000	34.40000	38.00000	83.33000	0.0	-7.5019	-7.5019	0.0

Structure: 30A Thurlow E | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	34.40000	38.00000	83.33000	0.0	-7.5019	0.0	7.5019
1.0000	33.40000	38.00000	83.33000	0.0	-7.5019	0.0	7.5019
2.0000	32.40000	38.00000	83.33000	0.0	-7.5019	0.0	7.5019
3.0000	31.40000	38.00000	83.33000	0.0	-7.5019	0.0	7.5019
4.0000	30.40000	38.00000	83.33000	0.24670	-4.9340	-0.24670	4.9340
5.0000	29.40000	38.00000	83.33000	0.63231	-4.7423	-0.63231	4.7423
6.0000	28.40000	38.00000	83.33000	0.97692	-4.5089	-0.97692	4.5089
7.0000	27.40000	38.00000	83.33000	1.2734	-4.2447	-1.2734	4.2447
8.0000	26.40000	38.00000	83.33000	1.5184	-3.9611	-1.5184	3.9611

Structure: 30A Thurlow F | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	26.40000	38.00000	83.33000	1.5184	-3.9611	3.9611	1.5184
1.0000	26.40000	37.00000	83.33000	1.7006	-4.0666	4.0666	1.7006
2.0000	26.40000	36.00000	83.33000	1.9399	-4.2173	4.2173	1.9399
3.0000	26.40000	35.00000	83.33000	2.2090	-4.3219	4.3219	2.2090

Dist.	Coordinates x	Coordinates y	Coordinates z	Displacements x	Displacements y	Along the Line	Perpendicular to Line
4.0000	26.40000	34.00000	83.33000	2.5111	-4.3671	4.3671	2.5111
5.0000	26.40000	33.00000	83.33000	2.8480	-4.3340	4.3340	2.8480
6.0000	26.40000	32.00000	83.33000	3.2171	-4.1962	4.1962	3.2171
7.0000	26.40000	31.00000	83.33000	3.6062	-3.9197	3.9197	3.6062
8.0000	26.40000	30.00000	83.33000	4.2333	-3.6811	3.6811	4.2333

Structure: 41 Rosslyn A | Sub-structure:

Dist.	Coordinates x	Coordinates y	Coordinates z	Displacements x	Displacements y	Along the Line	Perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	43.00000	31.00000	80.33000	-3.1909	-7.9773	-3.1909	-7.9773
1.0000	44.00000	31.00000	80.33000	-3.7314	-6.2191	-3.7314	-6.2191
2.0000	45.00000	31.00000	80.33000	-3.8137	-4.7671	-3.8137	-4.7671
3.0000	46.00000	31.00000	80.33000	-3.6406	-3.6406	-3.6406	-3.6406
4.0000	47.00000	31.00000	80.33000	-3.3499	-2.7916	-3.3499	-2.7916
5.0000	48.00000	31.00000	80.33000	-3.0204	-2.1574	-3.0204	-2.1574
6.0000	49.00000	31.00000	80.33000	-2.6921	-1.6825	-2.6921	-1.6825
7.0000	50.00000	31.00000	80.33000	-2.3830	-1.3239	-2.3830	-1.3239
8.0000	51.00000	31.00000	80.33000	-2.0999	-1.0499	-2.0999	-1.0499
9.0000	52.00000	31.00000	80.33000	-1.8467	-0.83942	-1.8467	-0.83942
10.000	53.00000	31.00000	80.33000	-1.6530	-0.68875	-1.6530	-0.68875
11.000	54.00000	31.00000	80.33000	-1.4785	-0.56866	-1.4785	-0.56866
12.000	55.00000	31.00000	80.33000	-1.3214	-0.47192	-1.3214	-0.47192

Structure: 41 Rosslyn B | Sub-structure:

Dist.	Coordinates x	Coordinates y	Coordinates z	Displacements x	Displacements y	Along the Line	Perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	55.00000	31.00000	80.33000	-1.3214	-0.47192	-0.47192	1.3214
1.0000	55.00000	32.00000	80.33000	-1.4898	-0.63848	-0.63848	1.4898
2.0000	55.00000	33.00000	80.33000	-1.6184	-0.80922	-0.80922	1.6184
3.0000	55.00000	34.00000	80.33000	-1.7083	-0.97618	-0.97618	1.7083
4.0000	55.00000	35.00000	80.33000	-1.7619	-1.1327	-1.1327	1.7619
5.0000	55.00000	36.00000	80.33000	-1.7827	-1.2734	-1.2734	1.7827
6.0000	55.00000	37.00000	80.33000	-1.7747	-1.3944	-1.3944	1.7747
7.0000	55.00000	38.00000	80.33000	-1.7418	-1.4930	-1.4930	1.7418
8.0000	55.00000	39.00000	80.33000	-1.6882	-1.5677	-1.5677	1.6882

Structure: 41 Rosslyn C | Sub-structure:

Dist.	Coordinates x	Coordinates y	Coordinates z	Displacements x	Displacements y	Along the Line	Perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	55.00000	39.00000	80.33000	-1.6882	-1.5677	1.6882	1.5677
1.0000	54.00000	39.00000	80.33000	-1.8051	-1.8051	1.8051	1.8051
2.0000	53.00000	39.00000	80.33000	-1.9123	-2.0717	1.9123	2.0717
3.0000	52.00000	39.00000	80.33000	-2.0051	-2.3697	2.0051	2.3697
4.0000	51.00000	39.00000	80.33000	-2.0778	-2.7011	2.0778	2.7011
5.0000	50.00000	39.00000	80.33000	-2.1234	-3.0671	2.1234	3.0671
6.0000	49.00000	39.00000	80.33000	-2.1340	-3.4678	2.1340	3.4678
7.0000	48.00000	39.00000	80.33000	-2.1007	-3.9012	2.1007	3.9012
8.0000	47.00000	39.00000	80.33000	-2.0138	-4.3632	2.0138	4.3632
9.0000	46.00000	39.00000	80.33000	-1.8641	-4.8466	1.8641	4.8466
10.000	45.00000	39.00000	80.33000	-1.6435	-5.3412	1.6435	5.3412
11.000	44.00000	39.00000	80.33000	-1.3462	-5.8333	1.3462	5.8333
12.000	43.00000	39.00000	80.33000	-0.97025	-6.3066	0.97025	6.3066

Structure: 41 Rosslyn D | Sub-structure:

Dist.	Coordinates x	Coordinates y	Coordinates z	Displacements x	Displacements y	Along the Line	Perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	43.00000	39.00000	80.33000	-0.97025	-6.3066	6.3066	-0.97025
1.0000	43.00000	38.00000	80.33000	-1.0942	-6.5654	6.5654	-1.0942
2.0000	43.00000	37.00000	80.33000	-1.2599	-6.9297	6.9297	-1.2599
3.0000	43.00000	36.00000	80.33000	-1.4573	-7.2865	7.2865	-1.4573
4.0000	43.00000	35.00000	80.33000	-1.6896	-7.6032	7.6032	-1.6896
5.0000	43.00000	34.00000	80.33000	-1.9663	-7.8653	7.8653	-1.9663
6.0000	43.00000	33.00000	80.33000	-2.2994	-8.0480	8.0480	-2.2994
7.0000	43.00000	32.00000	80.33000	-2.7032	-8.1095	8.1095	-2.7032
8.0000	43.00000	31.00000	80.33000	-3.1909	-7.9773	7.9773	-3.1909

Structure: Party 37-39 | Sub-structure:

Dist.	Coordinates x	Coordinates y	Coordinates z	Displacements x	Displacements y	Along the Line	Perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	44.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
1.0000	45.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
2.0000	46.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
3.0000	47.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
4.0000	48.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
5.0000	49.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
6.0000	50.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
7.0000	51.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
8.0000	52.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
9.0000	53.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
10.000	54.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
11.000	55.00000	15.00000	80.33000	0.0	0.0	0.0	0.0

Structure: 39 Rosslyn A | Sub-structure:

Dist.	Coordinates x	Coordinates y	Coordinates z	Displacements x	Displacements y	Along the Line	Perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	55.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
1.0600	55.00000	16.06000	80.33000	0.0	0.0	0.0	0.0
2.1200	55.00000	17.12000	80.33000	0.0	0.0	0.0	0.0
3.1800	55.00000	18.18000	80.33000	0.0	0.0	0.0	0.0
4.2400	55.00000	19.24000	80.33000	0.0	0.0	0.0	0.0
5.3000	55.00000	20.30000	80.33000	0.0	0.0	0.0	0.0
6.3600	55.00000	21.36000	80.33000	0.0	0.0	0.0	0.0
7.4200	55.00000	22.42000	80.33000	0.0	0.0	0.0	0.0
8.4800	55.00000	23.48000	80.33000	0.0	0.0	0.0	0.0
9.5400	55.00000	24.54000	80.33000	0.0	0.0	0.0	0.0
10.600	55.00000	25.60000	80.33000	0.0	0.0	0.0	0.0

Structure: 39 Rosslyn B | Sub-structure:

Dist.	Coordinates x	Coordinates y	Coordinates z	Displacements x	Displacements y	Along the Line	Perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	55.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
1.0000	54.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
2.0000	53.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
3.0000	52.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
4.0000	51.00000	25.60000	80.33000	0.0	0.0	0.0	0.0

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
5.0000	50.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
6.0000	49.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
7.0000	48.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
8.0000	47.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
9.0000	46.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
10.000	45.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
11.000	44.00000	25.60000	80.33000	0.0	0.0	0.0	0.0

Structure: 39 Rosslyn C | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	44.00000	25.60000	80.33000	0.0	0.0	0.0	0.0
1.0600	44.00000	24.54000	80.33000	0.0	0.0	0.0	0.0
2.1200	44.00000	23.48000	80.33000	0.0	0.0	0.0	0.0
3.1800	44.00000	22.42000	80.33000	0.0	0.0	0.0	0.0
4.2400	44.00000	21.36000	80.33000	0.0	0.0	0.0	0.0
5.3000	44.00000	20.30000	80.33000	0.0	0.0	0.0	0.0
6.3600	44.00000	19.24000	80.33000	0.0	0.0	0.0	0.0
7.4200	44.00000	18.18000	80.33000	0.0	0.0	0.0	0.0
8.4800	44.00000	17.12000	80.33000	0.0	0.0	0.0	0.0
9.5400	44.00000	16.06000	80.33000	0.0	0.0	0.0	0.0
10.600	44.00000	15.00000	80.33000	0.0	0.0	0.0	0.0

Structure: 37 Rosslyn A | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	44.00000	5.00000	80.33000	-0.13688	0.45627	-0.13688	0.45627
1.0000	45.00000	5.00000	80.33000	-0.12977	0.32443	-0.12977	0.32443
2.0000	46.00000	5.00000	80.33000	-0.096887	0.19377	-0.096887	0.19377
3.0000	47.00000	5.00000	80.33000	-0.042789	0.071315	-0.042789	0.071315
4.0000	48.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
5.0000	49.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
6.0000	50.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
7.0000	51.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
8.0000	52.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
9.0000	53.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
10.000	54.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
11.000	55.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
12.000	56.00000	5.00000	80.33000	0.0	0.0	0.0	0.0

Structure: 37 Rosslyn B | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	56.00000	5.00000	80.33000	0.0	0.0	0.0	0.0
1.0000	56.00000	6.00000	80.33000	0.0	0.0	0.0	0.0
2.0000	56.00000	7.00000	80.33000	0.0	0.0	0.0	0.0
3.0000	56.00000	8.00000	80.33000	0.0	0.0	0.0	0.0
4.0000	56.00000	9.00000	80.33000	0.0	0.0	0.0	0.0
5.0000	56.00000	10.00000	80.33000	0.0	0.0	0.0	0.0
6.0000	56.00000	11.00000	80.33000	0.0	0.0	0.0	0.0
7.0000	56.00000	12.00000	80.33000	0.0	0.0	0.0	0.0
8.0000	56.00000	13.00000	80.33000	0.0	0.0	0.0	0.0
9.0000	56.00000	14.00000	80.33000	0.0	0.0	0.0	0.0
10.000	56.00000	15.00000	80.33000	0.0	0.0	0.0	0.0

Structure: 37 Rosslyn C | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	56.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
1.0000	55.00000	15.00000	80.33000	0.0	0.0	0.0	0.0

Structure: 37 Rosslyn D | Sub-structure: Sub 37

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Along the Line [mm]	Perpendicular to Line [mm]
0.0	44.00000	15.00000	80.33000	0.0	0.0	0.0	0.0
1.0000	44.00000	14.00000	80.33000	-0.73066	0.24355	-0.24355	-0.73066
2.0000	44.00000	13.00000	80.33000	-1.0733	0.71555	-0.71555	-1.0733
3.0000	44.00000	12.00000	80.33000	-1.0588	1.0588	-1.0588	-1.0588
4.0000	44.00000	11.00000	80.33000	-0.92978	1.2397	-1.2397	-0.92978
5.0000	44.00000	10.00000	80.33000	-0.78074	1.3012	-1.3012	-0.78074
6.0000	44.00000	9.00000	80.33000	-0.62551	1.2510	-1.2510	-0.62551
7.0000	44.00000	8.00000	80.33000	-0.48070	1.1216	-1.1216	-0.48070
8.0000	44.00000	7.00000	80.33000	-0.35112	0.93632	-0.93632	-0.35112
9.0000	44.00000	6.00000	80.33000	-0.23698	0.71094	-0.71094	-0.23698
10.000	44.00000	5.00000	80.33000	-0.13688	0.45627	-0.45627	-0.13688

Specific Building Damage Results - Vertical Displacements

Structure: 10b Eldon A | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	6.20000	5.00000	86.33000	0.15333
1.0000	7.20000	5.00000	86.33000	0.19191
2.0000	8.20000	5.00000	86.33000	0.24205
3.0000	9.20000	5.00000	86.33000	0.30528
4.0000	10.20000	5.00000	86.33000	0.38241
5.0000	11.20000	5.00000	86.33000	0.47355
6.0000	12.20000	5.00000	86.33000	0.57813
7.0000	13.20000	5.00000	86.33000	0.69497
8.0000	14.20000	5.00000	86.33000	0.82224
9.0000	15.20000	5.00000	86.33000	0.95759
10.000	16.20000	5.00000	86.33000	1.0982

Structure: 10b Eldon B | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	16.20000	5.00000	86.33000	1.0982
1.0000	16.20000	6.00000	86.33000	1.2249
2.0000	16.20000	7.00000	86.33000	1.3524
3.0000	16.20000	8.00000	86.33000	1.4787
4.0000	16.20000	9.00000	86.33000	1.6044
5.0000	16.20000	10.00000	86.33000	1.7564

Structure: Eldon Party b-c | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	16.20000	10.00000	86.33000	1.7564
1.0000	15.20000	10.00000	86.33000	1.5080
2.0000	14.20000	10.00000	86.33000	1.3034
3.0000	13.20000	10.00000	86.33000	1.1092
4.0000	12.20000	10.00000	86.33000	0.92896
5.0000	11.20000	10.00000	86.33000	0.76532
6.0000	10.20000	10.00000	86.33000	0.62018
7.0000	9.20000	10.00000	86.33000	0.49468
8.0000	8.20000	10.00000	86.33000	0.38915
9.0000	7.20000	10.00000	86.33000	0.30314
10.000	6.20000	10.00000	86.33000	0.23537

Structure: 10b Eldon C | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	6.20000	10.00000	86.33000	0.23537
1.0000	6.20000	9.00000	86.33000	0.21959
2.0000	6.20000	8.00000	86.33000	0.20304
3.0000	6.20000	7.00000	86.33000	0.18619
4.0000	6.20000	6.00000	86.33000	0.16949
5.0000	6.20000	5.00000	86.33000	0.15333

Structure: 10c Eldon A | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	16.20000	10.00000	86.33000	1.7564
1.0000	16.20000	11.00000	86.33000	1.8991
2.0000	16.20000	12.00000	86.33000	2.0288
3.0000	16.20000	13.00000	86.33000	2.1419
4.0000	16.20000	14.00000	86.33000	2.2345
5.0000	16.20000	15.00000	86.33000	2.3031

Structure: Eldon Party c-d | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	16.20000	15.00000	86.33000	2.3031
1.0000	15.20000	15.00000	86.33000	1.9007
2.0000	14.20000	15.00000	86.33000	1.6162
3.0000	13.20000	15.00000	86.33000	1.3735
4.0000	12.20000	15.00000	86.33000	1.1493
5.0000	11.20000	15.00000	86.33000	0.94636
6.0000	10.20000	15.00000	86.33000	0.76654
7.0000	9.20000	15.00000	86.33000	0.61085
8.0000	8.20000	15.00000	86.33000	0.47951
9.0000	7.20000	15.00000	86.33000	0.37188
10.000	6.20000	15.00000	86.33000	0.28650

Structure: 10c Eldon B | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	6.20000	15.00000	86.33000	0.28650
1.0000	6.20000	14.00000	86.33000	0.28129
2.0000	6.20000	13.00000	86.33000	0.27324
3.0000	6.20000	12.00000	86.33000	0.26265
4.0000	6.20000	11.00000	86.33000	0.24988
5.0000	6.20000	10.00000	86.33000	0.23537

Structure: 10d Eldon A | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	16.20000	15.00000	86.33000	2.3031
1.0000	16.20000	16.00000	86.33000	3.4375
2.0000	16.20000	17.00000	86.33000	3.4375
3.0000	16.20000	18.00000	86.33000	3.4375
4.0000	16.20000	19.00000	86.33000	3.4375
5.0000	16.20000	20.00000	86.33000	3.4375

Structure: 10d Eldon B | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	16.20000	20.00000	86.33000	3.4375
1.0000	15.20000	20.00000	86.33000	2.8369
2.0000	14.20000	20.00000	86.33000	2.4122
3.0000	13.20000	20.00000	86.33000	2.0499
4.0000	12.20000	20.00000	86.33000	1.7154
5.0000	11.20000	20.00000	86.33000	1.4125
6.0000	10.20000	20.00000	86.33000	1.1441
7.0000	9.20000	20.00000	86.33000	0.91172
8.0000	8.20000	20.00000	86.33000	0.71569
9.0000	7.20000	20.00000	86.33000	0.55505
10.000	6.20000	20.00000	86.33000	0.42762

Structure: 10d Eldon C | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	6.20000	20.00000	86.33000	0.42762
1.0000	6.20000	19.00000	86.33000	0.42762
2.0000	6.20000	18.00000	86.33000	0.42762
3.0000	6.20000	17.00000	86.33000	0.42762
4.0000	6.20000	16.00000	86.33000	0.42762
5.0000	6.20000	15.00000	86.33000	0.28650

Structure: 29 Thurlow A | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]

Vertical Offset 1

0.0	5.00000	25.00000	84.33000	0.31363
1.0000	6.00000	25.00000	84.33000	0.40584
2.0000	7.00000	25.00000	84.33000	0.52700
3.0000	8.00000	25.00000	84.33000	0.68078
4.0000	9.00000	25.00000	84.33000	0.86962
5.0000	10.00000	25.00000	84.33000	1.0947
6.0000	11.00000	25.00000	84.33000	1.3560
7.0000	12.00000	25.00000	84.33000	1.6521
8.0000	13.00000	25.00000	84.33000	1.9807

Structure: Party 29-30 | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	13.00000	25.00000	84.33000	1.9807
1.0000	13.00000	26.00000	84.33000	1.3270
2.0000	13.00000	27.00000	84.33000	1.2970
3.0000	13.00000	28.00000	84.33000	1.2551
4.0000	13.00000	29.00000	84.33000	1.2027
5.0000	13.00000	30.00000	84.33000	1.1411
6.0000	13.00000	31.00000	84.33000	1.0719
7.0000	13.00000	32.00000	84.33000	0.99682
8.0000	13.00000	33.00000	84.33000	0.91746
9.0000	13.00000	34.00000	84.33000	0.83555
10.000	13.00000	35.00000	84.33000	0.75277
11.000	13.00000	36.00000	84.33000	0.67070

Structure: 29 Thurlow B | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	13.00000	36.00000	84.33000	0.67070
1.0000	12.00000	36.00000	84.33000	0.55619
2.0000	11.00000	36.00000	84.33000	0.45422
3.0000	10.00000	36.00000	84.33000	0.36586
4.0000	9.00000	36.00000	84.33000	0.29154
5.0000	8.00000	36.00000	84.33000	0.23102
6.0000	7.00000	36.00000	84.33000	0.18333
7.0000	6.00000	36.00000	84.33000	0.14681
8.0000	5.00000	36.00000	84.33000	0.11904

Structure: 29 Thurlow C | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	5.00000	36.00000	84.33000	0.11904
1.0000	5.00000	35.00000	84.33000	0.13026
2.0000	5.00000	34.00000	84.33000	0.14169
3.0000	5.00000	33.00000	84.33000	0.15317
4.0000	5.00000	32.00000	84.33000	0.16442
5.0000	5.00000	31.00000	84.33000	0.17515
6.0000	5.00000	30.00000	84.33000	0.18503
7.0000	5.00000	29.00000	84.33000	0.19374
8.0000	5.00000	28.00000	84.33000	0.20099
9.0000	5.00000	27.00000	84.33000	0.20652
10.000	5.00000	26.00000	84.33000	0.21013
11.000	5.00000	25.00000	84.33000	0.31363

Structure: 30 Thurlow A | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	13.00000	25.00000	84.33000	1.9807
1.0000	14.00000	25.00000	84.33000	2.3378
2.0000	15.00000	25.00000	84.33000	2.7185
3.0000	16.00000	25.00000	84.33000	3.3165
4.0000	17.00000	25.00000	84.33000	3.9243
5.0000	18.00000	25.00000	84.33000	4.5333
6.0000	19.00000	25.00000	84.33000	5.1334
7.0000	20.00000	25.00000	84.33000	5.7133
8.0000	21.00000	25.00000	84.33000	6.2608

Structure: 30 Thurlow B | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	21.00000	25.00000	84.33000	6.2608
1.0000	21.00000	26.00000	84.33000	4.1947
2.0000	21.00000	27.00000	84.33000	4.0426
3.0000	21.00000	28.00000	84.33000	3.8612

Structure: 30 Thurlow C | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	21.00000	28.00000	84.33000	3.8612
1.0000	22.00000	28.00000	84.33000	4.1449
2.0000	23.00000	28.00000	84.33000	4.3807
3.0000	24.00000	28.00000	84.33000	4.5561

Structure: 30 Thurlow D | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	24.00000	28.00000	84.33000	4.5561
1.0000	24.00000	29.00000	84.33000	4.2812
2.0000	24.00000	30.00000	84.33000	4.0020
3.0000	24.00000	31.00000	84.33000	3.7209
4.0000	24.00000	32.00000	84.33000	3.4389
5.0000	24.00000	33.00000	84.33000	3.1567
6.0000	24.00000	34.00000	84.33000	3.0455
7.0000	24.00000	35.00000	84.33000	2.8894
8.0000	24.00000	36.00000	84.33000	2.6948

Structure: 30 Thurlow E | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z

[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	24.00000	36.00000	84.33000	2.6948
1.0000	23.00000	36.00000	84.33000	2.4367
2.0000	22.00000	36.00000	84.33000	2.1772
3.0000	21.00000	36.00000	84.33000	1.9188
4.0000	20.00000	36.00000	84.33000	1.7337
5.0000	19.00000	36.00000	84.33000	1.5296
6.0000	18.00000	36.00000	84.33000	1.3536
7.0000	17.00000	36.00000	84.33000	1.2122
8.0000	16.00000	36.00000	84.33000	1.0698
9.0000	15.00000	36.00000	84.33000	0.93001
10.000	14.00000	36.00000	84.33000	0.79606
11.000	13.00000	36.00000	84.33000	0.67070

Structure: 30A Thurlow A | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	26.40000	30.00000	83.33000	4.0236
1.1000	27.50000	30.00000	83.33000	4.0906
2.2000	28.60000	30.00000	83.33000	4.4299
3.3000	29.70000	30.00000	83.33000	4.8255
4.4000	30.80000	30.00000	83.33000	5.2793

Structure: 30A Thurlow B | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	30.80000	30.00000	83.33000	5.2793
0.80000	30.80000	29.20000	83.33000	5.1971
1.6000	30.80000	28.40000	83.33000	5.0300

Structure: 30A Thurlow C | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	30.80000	28.40000	83.33000	5.0300
0.90000	31.70000	28.40000	83.33000	7.7120
1.8000	32.60000	28.40000	83.33000	7.7120
2.7000	33.50000	28.40000	83.33000	7.7120
3.6000	34.40000	28.40000	83.33000	7.7120

Structure: 30A Thurlow D | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	34.40000	28.40000	83.33000	7.7120
0.96000	34.40000	29.36000	83.33000	7.9424
1.9200	34.40000	30.32000	83.33000	8.0175
2.8800	34.40000	31.28000	83.33000	7.9565
3.8400	34.40000	32.24000	83.33000	7.7780
4.8000	34.40000	33.20000	83.33000	7.4992
5.7600	34.40000	34.16000	83.33000	7.1364
6.7200	34.40000	35.12000	83.33000	6.7048
7.6800	34.40000	36.08000	83.33000	6.2185
8.6400	34.40000	37.04000	83.33000	5.6907
9.6000	34.40000	38.00000	83.33000	5.1334

Structure: 30A Thurlow E | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	34.40000	38.00000	83.33000	5.1334
1.0000	33.40000	38.00000	83.33000	5.1334
2.0000	32.40000	38.00000	83.33000	5.1334
3.0000	31.40000	38.00000	83.33000	5.1334
4.0000	30.40000	38.00000	83.33000	3.3780
5.0000	29.40000	38.00000	83.33000	3.2517
6.0000	28.40000	38.00000	83.33000	3.0990
7.0000	27.40000	38.00000	83.33000	2.9241
8.0000	26.40000	38.00000	83.33000	2.7313

Structure: 30A Thurlow F | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	26.40000	38.00000	83.33000	2.7313
1.0000	26.40000	37.00000	83.33000	3.0258
2.0000	26.40000	36.00000	83.33000	3.2924
3.0000	26.40000	35.00000	83.33000	3.5221
4.0000	26.40000	34.00000	83.33000	3.7057
5.0000	26.40000	33.00000	83.33000	3.8334
6.0000	26.40000	32.00000	83.33000	3.8955
7.0000	26.40000	31.00000	83.33000	3.8829
8.0000	26.40000	30.00000	83.33000	4.0236

Structure: 41 Rosslyn A | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	43.00000	31.00000	80.33000	6.0184
1.0000	44.00000	31.00000	80.33000	5.1606
2.0000	45.00000	31.00000	80.33000	4.4137
3.0000	46.00000	31.00000	80.33000	3.7709
4.0000	47.00000	31.00000	80.33000	3.2186
5.0000	48.00000	31.00000	80.33000	2.7424
6.0000	49.00000	31.00000	80.33000	2.3297
7.0000	50.00000	31.00000	80.33000	1.9703
8.0000	51.00000	31.00000	80.33000	1.6561
9.0000	52.00000	31.00000	80.33000	1.3808
10.000	53.00000	31.00000	80.33000	1.1394
11.000	54.00000	31.00000	80.33000	0.92752
12.000	55.00000	31.00000	80.33000	0.74193

Structure: 41 Rosslyn B | Sub-structure:

Dist.	Coordinates			Displacements
	x	y	z	z

[m]	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	55.00000	31.00000	80.33000	0.74193
1.0000	55.00000	32.00000	80.33000	0.81887
2.0000	55.00000	33.00000	80.33000	0.86327
3.0000	55.00000	34.00000	80.33000	0.88242
4.0000	55.00000	35.00000	80.33000	0.89882
5.0000	55.00000	36.00000	80.33000	0.89341
6.0000	55.00000	37.00000	80.33000	0.86844
7.0000	55.00000	38.00000	80.33000	0.82675
8.0000	55.00000	39.00000	80.33000	0.77157

Structure: 41 Rosslyn C | Sub-structure:

Dist.	**Coordinates**			**Displacements**
	x	**y**	**z**	**z**
[m]	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	55.00000	39.00000	80.33000	0.77157
1.0000	54.00000	39.00000	80.33000	0.92532
2.0000	53.00000	39.00000	80.33000	1.0971
3.0000	52.00000	39.00000	80.33000	1.2866
4.0000	51.00000	39.00000	80.33000	1.4933
5.0000	50.00000	39.00000	80.33000	1.7391
6.0000	49.00000	39.00000	80.33000	2.0484
7.0000	48.00000	39.00000	80.33000	2.3712
8.0000	47.00000	39.00000	80.33000	2.7036
9.0000	46.00000	39.00000	80.33000	3.0405
10.000	45.00000	39.00000	80.33000	3.3755
11.000	44.00000	39.00000	80.33000	3.7011
12.000	43.00000	39.00000	80.33000	4.0089

Structure: 41 Rosslyn D | Sub-structure:

Dist.	**Coordinates**			**Displacements**
	x	**y**	**z**	**z**
[m]	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	43.00000	39.00000	80.33000	4.0089
1.0000	43.00000	38.00000	80.33000	4.5057
2.0000	43.00000	37.00000	80.33000	4.9683
3.0000	43.00000	36.00000	80.33000	5.3820
4.0000	43.00000	35.00000	80.33000	5.7300
5.0000	43.00000	34.00000	80.33000	5.9929
6.0000	43.00000	33.00000	80.33000	6.1481
7.0000	43.00000	32.00000	80.33000	6.1683
8.0000	43.00000	31.00000	80.33000	6.0184

Structure: Party 37-39 | Sub-structure:

Dist.	**Coordinates**			**Displacements**
	x	**y**	**z**	**z**
[m]	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	44.00000	15.00000	80.33000	0.0
1.0000	45.00000	15.00000	80.33000	0.0
2.0000	46.00000	15.00000	80.33000	0.0
3.0000	47.00000	15.00000	80.33000	0.0
4.0000	48.00000	15.00000	80.33000	0.0
5.0000	49.00000	15.00000	80.33000	0.0
6.0000	50.00000	15.00000	80.33000	0.0
7.0000	51.00000	15.00000	80.33000	0.0
8.0000	52.00000	15.00000	80.33000	0.0
9.0000	53.00000	15.00000	80.33000	0.0
10.000	54.00000	15.00000	80.33000	0.0
11.000	55.00000	15.00000	80.33000	0.0

Structure: 39 Rosslyn A | Sub-structure:

Dist.	**Coordinates**			**Displacements**
	x	**y**	**z**	**z**
[m]	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	55.00000	15.00000	80.33000	0.0
1.0600	55.00000	16.06000	80.33000	0.0
2.1200	55.00000	17.12000	80.33000	0.0
3.1800	55.00000	18.18000	80.33000	0.0
4.2400	55.00000	19.24000	80.33000	0.0
5.3000	55.00000	20.30000	80.33000	0.0
6.3600	55.00000	21.36000	80.33000	0.0
7.4200	55.00000	22.42000	80.33000	0.0
8.4800	55.00000	23.48000	80.33000	0.0
9.5400	55.00000	24.54000	80.33000	0.0
10.600	55.00000	25.60000	80.33000	0.0

Structure: 39 Rosslyn B | Sub-structure:

Dist.	**Coordinates**			**Displacements**
	x	**y**	**z**	**z**
[m]	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	55.00000	25.60000	80.33000	0.0
1.0000	54.00000	25.60000	80.33000	0.0
2.0000	53.00000	25.60000	80.33000	0.0
3.0000	52.00000	25.60000	80.33000	0.0
4.0000	51.00000	25.60000	80.33000	0.0
5.0000	50.00000	25.60000	80.33000	0.0
6.0000	49.00000	25.60000	80.33000	0.0
7.0000	48.00000	25.60000	80.33000	0.0
8.0000	47.00000	25.60000	80.33000	0.0
9.0000	46.00000	25.60000	80.33000	0.0
10.000	45.00000	25.60000	80.33000	0.0
11.000	44.00000	25.60000	80.33000	0.0

Structure: 39 Rosslyn C | Sub-structure:

Dist.	**Coordinates**			**Displacements**
	x	**y**	**z**	**z**
[m]	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	44.00000	25.60000	80.33000	0.0
1.0600	44.00000	24.54000	80.33000	0.0
2.1200	44.00000	23.48000	80.33000	0.0
3.1800	44.00000	22.42000	80.33000	0.0
4.2400	44.00000	21.36000	80.33000	0.0
5.3000	44.00000	20.30000	80.33000	0.0
6.3600	44.00000	19.24000	80.33000	0.0
7.4200	44.00000	18.18000	80.33000	0.0
8.4800	44.00000	17.12000	80.33000	0.0
9.5400	44.00000	16.06000	80.33000	0.0
10.600	44.00000	15.00000	80.33000	0.0

Structure: 37 Rosslyn A | Sub-structure:

Dist.	**Coordinates**			**Displacements**
	x	**y**	**z**	**z**

[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	44.00000	5.00000	80.33000	0.061791
1.0000	45.00000	5.00000	80.33000	0.047169
2.0000	46.00000	5.00000	80.33000	0.033027
3.0000	47.00000	5.00000	80.33000	0.016344
4.0000	48.00000	5.00000	80.33000	0.0
5.0000	49.00000	5.00000	80.33000	0.0
6.0000	50.00000	5.00000	80.33000	0.0
7.0000	51.00000	5.00000	80.33000	0.0
8.0000	52.00000	5.00000	80.33000	0.0
9.0000	53.00000	5.00000	80.33000	0.0
10.000	54.00000	5.00000	80.33000	0.0
11.000	55.00000	5.00000	80.33000	0.0
12.000	56.00000	5.00000	80.33000	0.0

Structure: 37 Rosslyn B | Sub-structure:

Dist. [m]	**Coordinates** x [m]	y [m]	z [m]	**Displacements** z [mm]
Vertical Offset 1				
0.0	56.00000	5.00000	80.33000	0.0
1.0000	56.00000	6.00000	80.33000	0.0
2.0000	56.00000	7.00000	80.33000	0.0
3.0000	56.00000	8.00000	80.33000	0.0
4.0000	56.00000	9.00000	80.33000	0.0
5.0000	56.00000	10.00000	80.33000	0.0
6.0000	56.00000	11.00000	80.33000	0.0
7.0000	56.00000	12.00000	80.33000	0.0
8.0000	56.00000	13.00000	80.33000	0.0
9.0000	56.00000	14.00000	80.33000	0.0
10.000	56.00000	15.00000	80.33000	0.0

Structure: 37 Rosslyn C | Sub-structure:

Dist. [m]	**Coordinates** x [m]	y [m]	z [m]	**Displacements** z [mm]
Vertical Offset 1				
0.0	56.00000	15.00000	80.33000	0.0
1.0000	55.00000	15.00000	80.33000	0.0

Structure: 37 Rosslyn D | Sub-structure: Sub 37

Dist. [m]	**Coordinates** x [m]	y [m]	z [m]	**Displacements** z [mm]
Vertical Offset 1				
0.0	44.00000	15.00000	80.33000	0.0
1.0000	44.00000	14.00000	80.33000	0.44222
2.0000	44.00000	13.00000	80.33000	0.74567
3.0000	44.00000	12.00000	80.33000	0.86885
4.0000	44.00000	11.00000	80.33000	0.84066
5.0000	44.00000	10.00000	80.33000	0.71241
6.0000	44.00000	9.00000	80.33000	0.53368
7.0000	44.00000	8.00000	80.33000	0.35391
8.0000	44.00000	7.00000	80.33000	0.20791
9.0000	44.00000	6.00000	80.33000	0.11197
10.000	44.00000	5.00000	80.33000	0.061791

Specific Building Damage Results - All Segments

Structure: 10b Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	9.9990	Hogging	0.0015201	0.013045	0.014055	-174.56E-6	-140.56E-6	72301.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 10b Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	1.3393	Hogging	15.105E-6	-0.0035620	712.43E-6	55.079E-6	-127.54E-6	762870.	0 (Negligible)
	2	1.3393	0.74744	Sagging	12.615E-6	-0.0058391	0.0011678	83.662E-6	-127.54E-6	1.7724E+6	0 (Negligible)
	3	2.0867	2.9123	Hogging	586.50E-6	-0.011573	0.0023391	146.45E-6	-152.03E-6	30235.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: Eldon Party b-c | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	9.9990	Hogging	0.0023018	0.019439	0.020967	-217.77E-6	248.40E-6	19182.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 10b Eldon C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	2.6881	Sagging	20.897E-6	-0.0034620	692.47E-6	42.380E-6	16.850E-6	1.1146E+6	0 (Negligible)
	2	2.6881	2.3109	Hogging	14.005E-6	-0.0012369	247.51E-6	24.626E-6	16.850E-6	1.5820E+6	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 10c Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	4.9990	Sagging	0.0011468	-0.023568	0.0047555	284.50E-6	-142.69E-6	40032.	0

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
											(Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: Eldon Party c-d | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	9.9990	Hogging	0.0034829	0.025125	0.027438	-251.19E-6	402.32E-6	7309.3	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 10c Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	4.9990	Sagging	143.65E-6	-0.0062274	0.0012479	71.739E-6	14.512E-6	344780.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 10d Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	3.0000	Sagging	0.025209	0.0	0.024737	0.0	-0.0011344	705.23	0 (Negligible)
	2	3.0000	1.9990	None	0.0	0.0	0.0	0.0	0.0	-	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 10d Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	9.9990	Hogging	0.0051977	0.037500	0.040952	-374.86E-6	600.40E-6	4898.4	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 10d Eldon C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	2.0000	None	0.0	0.0	0.0	0.0	0.0	-	0 (Negligible)
	2	2.0000	2.9990	Sagging	0.0031338	0.0	0.0030751	0.0	141.11E-6	5666.9	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 29 Thurlow A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	7.9990	Hogging	0.0034591	0.037500	0.038893	-374.86E-6	-328.40E-6	27854.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: Party 29-30 | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	2.9333	Hogging	0.013830	-0.012258	0.010731	191.27E-6	653.62E-6	1278.0	0 (Negligible)
	2	2.9333	6.8042	Sagging	467.69E-6	-0.011201	0.0022548	180.39E-6	82.786E-6	95026.	0 (Negligible)
	3	9.7375	1.2615	Hogging	11.713E-6	-0.0033531	670.66E-6	48.743E-6	82.786E-6	899380.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 29 Thurlow B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	7.9990	Hogging	0.0012886	0.015486	0.016005	-181.81E-6	114.50E-6	72126.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 29 Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	2.0785	Hogging	5.6786E-6	-501.77E-6	100.39E-6	16.993E-6	-11.475E-6	3.6536E+6	0 (Negligible)
	2	2.0785	5.9888	Sagging	65.981E-6	-0.0035279	706.57E-6	54.277E-6	-11.475E-6	591400.	0 (Negligible)
	3	8.0674	2.9316	Hogging	0.0022139	-0.0036721	0.0016508	57.038E-6	-103.50E-6	7975.3	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30 Thurlow A | Sub-structure:

Vertical Offset from Line for Vertical	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal	Maximum Gradient of Vertical	Min. Radius of Curvature	Damage Category

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	0.25662	None	0.0	0.037500	0.037500	-374.86E-6	-356.98E-6	40256.	0 (Negligible)
	2	0.25662	3.8223	Hogging	0.0057479	0.037500	0.038622	-374.86E-6	-608.72E-6	8572.1	0 (Negligible)
	3	4.0789	3.9201	Sagging	0.0010150	0.046662	0.047063	-555.37E-6	-608.72E-6	28083.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30 Thurlow B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	2.4694	Hogging	0.045779	-0.031771	0.036807	553.99E-6	0.0020661	416.60	0 (Negligible)
	2	2.4694	0.52958	Hogging	0.0	-0.049182	0.0098365	492.07E-6	181.44E-6	1942.0	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30 Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	2.9990	Sagging	0.0018713	0.024550	0.025120	-272.32E-6	-283.58E-6	15765.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30 Thurlow D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	3.0210	Sagging	115.71E-6	-0.040569	0.0081140	584.29E-6	281.95E-6	202380.	0 (Negligible)
	2	3.0210	3.1898	Hogging	0.0038115	-0.0087861	0.0029844	133.41E-6	282.21E-6	13558.	0 (Negligible)
	3	6.2108	1.7882	Sagging	943.18E-6	-0.0033802	883.16E-6	60.271E-6	194.58E-6	24967.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30 Thurlow E | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	1.0385	Sagging	4.7842E-6	-0.0065058	0.0013012	66.665E-6	259.46E-6	512340.	0 (Negligible)
	2	1.0385	9.9605	Hogging	0.0019950	0.0026247	0.0036157	-106.75E-6	259.46E-6	31763.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30A Thurlow A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	4.3990	Hogging	0.0056161	-0.087031	0.017666	0.0016848	-413.18E-6	3705.4	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30A Thurlow B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	1.5990	Sagging	0.0026267	0.039124	0.040675	-403.67E-6	208.74E-6	7540.1	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30A Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	2.7000	Sagging	0.066239	-0.026815	0.050728	805.09E-6	-0.0029824	241.34	1 (Very Slight)
	2	2.7000	0.89900	Sagging	0.0	0.0	0.0	0.0	0.0	745.93E+15	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30A Thurlow D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	9.5990	Sagging	0.011417	0.061203	0.078222	-715.88E-6	580.23E-6	5759.8	2 (Slight)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30A Thurlow E | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Deflection Ratio [%]	Average Horizontal Strain [%]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature [m]	Damage Category
0	1	0.0	1.0000	None	0.0	0.0	0.0	0.0	0.0	-	0 (Negligible)
	2	1.0000	2.5602	Sagging	0.029874	-0.0053978	0.025069	246.76E-6	0.0017558	2126.8	0 (Negligible)

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
	3	3.5602	2.3858	Hogging	0.024076	-0.034374	0.017546	385.76E-6	0.0017558	2574.6	0 (Negligible)
	4	5.9460	2.0530	Sagging	477.47E-6	-0.027270	0.0054601	344.73E-6	192.94E-6	45113.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 30A Thurlow F | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	1	0.0	6.1378	Sagging	0.0036234	0.0032102	0.0085438	276.52E-6	-294.54E-6	15366.	0 (Negligible)
	2	6.1378	1.8612	Hogging	0.0038040	-0.025616	0.0055745	276.52E-6	-140.73E-6	4749.5	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 41 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	1	0.0	11.999	Hogging	0.0089707	0.015579	0.020882	540.84E-6	858.27E-6	8847.2	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 41 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	1	0.0	7.9990	Sagging	0.0017714	-0.013698	0.0029037	170.76E-6	-76.951E-6	29093.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 41 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	1	0.0	8.6607	Hogging	0.0031913	0.0026168	0.0045436	149.71E-6	-336.91E-6	22305.	0 (Negligible)
	2	8.6607	3.3383	Sagging	490.77E-6	-0.028286	0.0056640	376.04E-6	-336.91E-6	50058.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 41 Rosslyn D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	1	0.0	7.9990	Sagging	0.0090842	0.020887	0.027833	-364.15E-6	-496.66E-6	5588.8	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: Party 37-39 | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	All settlements are less than the Settlement Trough Limit Sensitivity.										

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 39 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	All settlements are less than the Settlement Trough Limit Sensitivity.										

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 39 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	All settlements are less than the Settlement Trough Limit Sensitivity.										

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 39 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	All settlements are less than the Settlement Trough Limit Sensitivity.										

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 37 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	All settlements are less than the Settlement Trough Limit Sensitivity.										

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 37 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	All settlements are less than the Settlement Trough Limit Sensitivity.										

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 37 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	All settlements are less than the Settlement Trough Limit Sensitivity.										

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 37 Rosslyn D | Sub-structure: Sub 37

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]			[m]	
0	1	1.0000	5.1386	Sagging	0.0077803	-0.019257	0.0061011	472.22E-6	-442.33E-6	6150.1	0 (Negligible)
	2	6.1386	2.8614	Hogging	0.0014904	0.018248	0.018466	-254.60E-6	179.75E-6	21353.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Specific Building Damage Results - Critical Values for All Segments within Each Sub-Structure

Structure: 10b Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0015201	0.013045	-140.56E-6	1.0980	0.014055	-174.56E-6	-140.56E-6	72301.	-	0 (Negligible)

Structure: 10b Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	586.50E-6	-0.011573	-152.03E-6	1.7563	0.0023391	146.45E-6	-152.03E-6	30235.	1.7724E+6	0 (Negligible)

Structure: Eldon Party b-c | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0023018	0.019439	248.40E-6	1.7564	0.020967	-217.77E-6	248.40E-6	19182.	-	0 (Negligible)

Structure: 10b Eldon C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	20.897E-6	-0.0034620	16.850E-6	0.23537	692.47E-6	42.380E-6	16.850E-6	1.5820E+6	1.1146E+6	0 (Negligible)

Structure: 10c Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0011468	-0.023568	-142.69E-6	2.3031	0.0047555	284.50E-6	-142.69E-6	-	40032.	0 (Negligible)

Structure: Eldon Party c-d | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0034829	0.025125	402.32E-6	2.3031	0.027438	-251.19E-6	402.32E-6	7309.3	-	0 (Negligible)

Structure: 10c Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	143.65E-6	-0.0062274	14.512E-6	0.28650	0.0012479	71.739E-6	14.512E-6	-	344780.	0 (Negligible)

Structure: 10d Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.025209	0.0	-0.0011344	3.4375	0.024737	0.0	-0.0011344	-	705.23	0 (Negligible)

Vertical Offset from Line for Vertical	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement	Maximum Gradient of Vertical Displacement	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category

Structure: 10d Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0051977	0.037500	600.40E-6	3.4375	0.040952	-374.86E-6	600.40E-6	4898.4	-	0 (Negligible)

Structure: 10d Eldon C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0031338	0.0	141.11E-6	0.42762	0.0030751	0.0	141.11E-6	-	5666.9	0 (Negligible)

Structure: 29 Thurlow A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0034591	0.037500	-328.40E-6	1.9803	0.038893	-374.86E-6	-328.40E-6	27854.	-	0 (Negligible)

Structure: Party 29-30 | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.013830	-0.012258	653.62E-6	1.9807	0.010731	191.27E-6	653.62E-6	1278.0	95026.	0 (Negligible)

Structure: 29 Thurlow B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0012886	0.015486	114.50E-6	0.67070	0.016005	-181.81E-6	114.50E-6	72126.	-	0 (Negligible)

Structure: 29 Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0022139	-0.0036721	-103.50E-6	0.31353	0.0016508	57.038E-6	-103.50E-6	7975.3	591400.	0 (Negligible)

Structure: 30 Thurlow A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0057479	0.046662	-608.72E-6	6.2602	0.047063	-555.37E-6	-608.72E-6	8572.1	28083.	0 (Negligible)

Structure: 30 Thurlow B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.045779	-0.049182	0.0020661	6.2608	0.036807	553.99E-6	0.0020661	416.60	-	0 (Negligible)

Structure: 30 Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0018713	0.024550	-283.58E-6	4.5559	0.025120	-272.32E-6	-283.58E-6	-	15765.	0 (Negligible)

Structure: 30 Thurlow D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0038115	-0.040569	282.21E-6	4.5561	0.0081140	584.29E-6	282.21E-6	13558.	24967.	0 (Negligible)

Structure: 30 Thurlow E | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio [%]	Average Horizontal Strain [%]	Maximum Slope	Maximum Settlement [mm]	Max. Tensile Strain [%]	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging) [m]	Min. Radius of Curvature (Sagging) [m]	Damage Category
0	0.0019950	-0.0065058	259.46E-6	2.6948	0.0036157	-106.75E-6	259.46E-6	31763.	512340.	0 (Negligible)

Structure: 30A Thurlow A | Sub-structure:

Vertical Offset from Line for	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal	Maximum Gradient of Vertical	Min. Radius of Curvature	Min. Radius of Curvature	Damage Category

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0056161	-0.087031	-413.18E-6	5.2789	0.017666	0.0016848	-413.18E-6	3705.4	-	0 (Negligible)

Structure: 30A Thurlow B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0026267	0.039124	208.74E-6	5.2793	0.040675	-403.67E-6	208.74E-6	-	7540.1	0 (Negligible)

Structure: 30A Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.066239	-0.026815	-0.0029824	7.7120	0.050728	805.09E-6	-0.0029824	-	241.34	1 (Very Slight)

Structure: 30A Thurlow D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.011417	0.061203	580.23E-6	8.0163	0.078222	-715.88E-6	580.23E-6	-	5759.8	2 (Slight)

Structure: 30A Thurlow E | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.029874	-0.034374	0.0017558	5.1334	0.025069	385.76E-6	0.0017558	2574.6	2126.8	0 (Negligible)

Structure: 30A Thurlow F | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0038040	-0.025616	-294.54E-6	4.0234	0.0085438	276.52E-6	-294.54E-6	4749.5	15366.	0 (Negligible)

Structure: 41 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0089707	0.015579	858.27E-6	6.0184	0.020882	540.84E-6	858.27E-6	8847.2	-	0 (Negligible)

Structure: 41 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0017714	-0.013698	-76.951E-6	0.89860	0.0029037	170.76E-6	-76.951E-6	-	29093.	0 (Negligible)

Structure: 41 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0031913	-0.028286	-336.91E-6	4.0086	0.0056640	376.04E-6	-336.91E-6	22305.	50058.	0 (Negligible)

Structure: 41 Rosslyn D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0090842	0.020887	-496.66E-6	6.1673	0.027833	-364.15E-6	-496.66E-6	-	5588.8	0 (Negligible)

Structure: Party 37-39 | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: 39 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Vertical Offset from Line for Vertical	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement	Maximum Gradient of Vertical Displacement	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category

Structure: 39 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: 39 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: 37 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: 37 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: 37 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: 37 Rosslyn D | Sub-structure: Sub 37

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Maximum Gradient of Horizontal Displacement Curve	Maximum Gradient of Vertical Displacement Curve	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0	0.0077803	-0.019257	-442.33E-6	0.86816	0.018466	472.22E-6	-442.33E-6	21353.	6150.1	0 (Negligible)

Specific Building Damage Results - Critical Segments within Each Structure

Structure Name	Parameter	Critical Sub-Structure	Critical Segment	Start	End	Curvature	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
				[m]	[m]			[mm]	[%]	[m]	[m]	
10b Eldon A	Maximum Slope		1	0.0	9.9990	Hogging	**140.56E-6**	1.0980	0.014055	72301.	-	0 (Negligible)
	Maximum Settlement		1	0.0	9.9990	Hogging	140.56E-6	**1.0980**	0.014055	72301.	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	9.9990	Hogging	140.56E-6	1.0980	**0.014055**	72301.	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	9.9990	Hogging	140.56E-6	1.0980	0.014055	**72301.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
10b Eldon B	Maximum Slope		3	2.0867	4.9990	Hogging	**152.03E-6**	1.7563	0.0023391	30235.	-	0 (Negligible)
	Maximum Settlement		3	2.0867	4.9990	Hogging	152.03E-6	**1.7563**	0.0023391	30235.	-	0 (Negligible)
	Max. Tensile Strain		3	2.0867	4.9990	Hogging	152.03E-6	1.7563	**0.0023391**	30235.	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		3	2.0867	4.9990	Hogging	152.03E-6	1.7563	0.0023391	**30235.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		2	1.3393	2.0867	Sagging	127.54E-6	1.3634	0.0011678	-	**1.7724E+6**	0 (Negligible)
Eldon Party b-c	Maximum Slope		1	0.0	9.9990	Hogging	**248.40E-6**	1.7564	0.020967	19182.	-	0 (Negligible)
	Maximum Settlement		1	0.0	9.9990	Hogging	248.40E-6	**1.7564**	0.020967	19182.	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	9.9990	Hogging	248.40E-6	1.7564	**0.020967**	19182.	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	9.9990	Hogging	248.40E-6	1.7564	0.020967	**19182.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
10b Eldon C	Maximum Slope		1	0.0	2.6881	Sagging	**16.850E-6**	0.23537	692.47E-6	-	1.1146E+6	0 (Negligible)
	Maximum Settlement		1	0.0	2.6881	Sagging	16.850E-6	**0.23537**	692.47E-6	-	1.1146E+6	0 (Negligible)
	Max. Tensile Strain		1	0.0	2.6881	Sagging	16.850E-6	0.23537	**692.47E-6**	-	1.1146E+6	0 (Negligible)
	Min. Radius of Curvature (Hogging)		2	2.6881	4.9990	Hogging	16.850E-6	0.19144	247.51E-6	**1.5820E+6**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		1	0.0	2.6881	Sagging	16.850E-6	0.23537	692.47E-6	-	**1.1146E+6**	0 (Negligible)
10c Eldon A	Maximum Slope		1	0.0	4.9990	Sagging	**142.69E-6**	2.3031	0.0047555	-	40032.	0 (Negligible)
	Maximum Settlement		1	0.0	4.9990	Sagging	142.69E-6	**2.3031**	0.0047555	-	40032.	0 (Negligible)
	Max. Tensile Strain		1	0.0	4.9990	Sagging	142.69E-6	2.3031	**0.0047555**	-	40032.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	4.9990	Sagging	142.69E-6	2.3031	0.0047555	-	**40032.**	0 (Negligible)
Eldon Party c-d	Maximum Slope		1	0.0	9.9990	Hogging	**402.32E-6**	2.3031	0.027438	7309.3	-	0 (Negligible)
	Maximum Settlement		1	0.0	9.9990	Hogging	402.32E-6	**2.3031**	0.027438	7309.3	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	9.9990	Hogging	402.32E-6	2.3031	**0.027438**	7309.3	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	9.9990	Hogging	402.32E-6	2.3031	0.027438	**7309.3**	-	0 (Negligible)

Structure Name	Parameter	Critical Sub-Structure	Critical Segment	Start	End	Curvature	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
10c Eldon B	Maximum Slope		1	0.0	4.9990	Sagging	**14.512E-6**	0.28650	0.0012479	-	344780.	0 (Negligible)
	Maximum Settlement		1	0.0	4.9990	Sagging	14.512E-6	**0.28650**	0.0012479	-	344780.	0 (Negligible)
	Max. Tensile Strain		1	0.0	4.9990	Sagging	14.512E-6	0.28650	**0.0012479**	-	344780.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	4.9990	Sagging	14.512E-6	0.28650	0.0012479	-	**344780.**	0 (Negligible)
10d Eldon A	Maximum Slope		1	0.0	3.0000	Sagging	**0.0011344**	3.4375	0.024737	-	705.23	0 (Negligible)
	Maximum Settlement		1	0.0	3.0000	Sagging	0.0011344	**3.4375**	0.024737	-	705.23	0 (Negligible)
	Max. Tensile Strain		1	0.0	3.0000	Sagging	0.0011344	3.4375	**0.024737**	-	705.23	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	3.0000	Sagging	0.0011344	3.4375	0.024737	-	**705.23**	0 (Negligible)
10d Eldon B	Maximum Slope		1	0.0	9.9990	Hogging	**600.40E-6**	3.4375	0.040952	4898.4	-	0 (Negligible)
	Maximum Settlement		1	0.0	9.9990	Hogging	600.40E-6	**3.4375**	0.040952	4898.4	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	9.9990	Hogging	600.40E-6	3.4375	**0.040952**	4898.4	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	9.9990	Hogging	600.40E-6	3.4375	0.040952	**4898.4**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
10d Eldon C	Maximum Slope		2	2.0000	4.9990	Sagging	**141.11E-6**	0.42762	0.0030751	-	5666.9	0 (Negligible)
	Maximum Settlement		1	0.0	2.0000	Sagging	0.0	**0.42762**	0.0	-	-	0 (Negligible)
	Max. Tensile Strain		2	2.0000	4.9990	Sagging	141.11E-6	0.42762	**0.0030751**	-	5666.9	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		2	2.0000	4.9990	Sagging	141.11E-6	0.42762	0.0030751	-	**5666.9**	0 (Negligible)
29 Thurlow A	Maximum Slope		1	0.0	7.9990	Hogging	**328.40E-6**	1.9803	0.038893	27854.	-	0 (Negligible)
	Maximum Settlement		1	0.0	7.9990	Hogging	328.40E-6	**1.9803**	0.038893	27854.	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	7.9990	Hogging	328.40E-6	1.9803	**0.038893**	27854.	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	7.9990	Hogging	328.40E-6	1.9803	0.038893	**27854.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
Party 29-30	Maximum Slope		1	0.0	2.9333	Hogging	**653.62E-6**	1.9807	0.010731	1278.0	-	0 (Negligible)
	Maximum Settlement		1	0.0	2.9333	Hogging	653.62E-6	**1.9807**	0.010731	1278.0	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	2.9333	Hogging	653.62E-6	1.9807	**0.010731**	1278.0	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	2.9333	Hogging	653.62E-6	1.9807	0.010731	**1278.0**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		2	2.9333	9.7375	Sagging	82.786E-6	1.2579	0.0022548	-	**95026.**	0 (Negligible)
29 Thurlow B	Maximum Slope		1	0.0	7.9990	Hogging	**114.50E-6**	0.67070	0.016005	72126.	-	0 (Negligible)
	Maximum Settlement		1	0.0	7.9990	Hogging	114.50E-6	**0.67070**	0.016005	72126.	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	7.9990	Hogging	114.50E-6	0.67070	**0.016005**	72126.	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	7.9990	Hogging	114.50E-6	0.67070	0.016005	**72126.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
29 Thurlow C	Maximum Slope		3	8.0674	10.999	Hogging	**103.50E-6**	0.31353	0.0016508	7975.3	-	0 (Negligible)
	Maximum Settlement		3	8.0674	10.999	Hogging	103.50E-6	**0.31353**	0.0016508	7975.3	-	0 (Negligible)
	Max. Tensile Strain		3	8.0674	10.999	Hogging	103.50E-6	0.31353	**0.0016508**	7975.3	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		3	8.0674	10.999	Hogging	103.50E-6	0.31353	0.0016508	**7975.3**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		2	2.0785	8.0674	Sagging	11.475E-6	0.20136	706.57E-6	-	**591400.**	0 (Negligible)
30 Thurlow A	Maximum Slope		2	0.25662	4.0789	Hogging	**608.72E-6**	3.9724	0.038622	8572.1	-	0 (Negligible)
	Maximum Settlement		3	4.0789	7.9990	Sagging	608.72E-6	**6.2602**	0.047063	-	28083.	0 (Negligible)
	Max. Tensile Strain		3	4.0789	7.9990	Sagging	608.72E-6	6.2602	**0.047063**	-	28083.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		2	0.25662	4.0789	Hogging	608.72E-6	3.9724	0.038622	**8572.1**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		3	4.0789	7.9990	Sagging	608.72E-6	6.2602	0.047063	-	**28083.**	0 (Negligible)
30 Thurlow B	Maximum Slope		1	0.0	2.4694	Hogging	**0.0020661**	6.2608	0.036807	416.60	-	0 (Negligible)
	Maximum Settlement		1	0.0	2.4694	Hogging	0.0020661	**6.2608**	0.036807	416.60	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	2.4694	Hogging	0.0020661	6.2608	**0.036807**	416.60	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	2.4694	Hogging	0.0020661	6.2608	0.036807	**416.60**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
30 Thurlow C	Maximum Slope		1	0.0	2.9990	Sagging	**283.58E-6**	4.5559	0.025120	-	15765.	0 (Negligible)
	Maximum Settlement		1	0.0	2.9990	Sagging	283.58E-6	**4.5559**	0.025120	-	15765.	0 (Negligible)
	Max. Tensile Strain		1	0.0	2.9990	Sagging	283.58E-6	4.5559	**0.025120**	-	15765.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	2.9990	Sagging	283.58E-6	4.5559	0.025120	-	**15765.**	0 (Negligible)
30 Thurlow D	Maximum Slope		2	3.0210	6.2108	Hogging	**282.21E-6**	3.7150	0.0029844	13558.	-	0 (Negligible)
	Maximum Settlement		1	0.0	3.0210	Sagging	281.95E-6	**4.5561**	0.0081140	-	202380.	0 (Negligible)
	Max. Tensile Strain		1	0.0	3.0210	Sagging	281.95E-6	4.5561	**0.0081140**	-	202380.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		2	3.0210	6.2108	Hogging	282.21E-6	3.7150	0.0029844	**13558.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		3	6.2108	7.9990	Sagging	194.58E-6	3.0126	883.16E-6	-	**24967.**	0 (Negligible)
30 Thurlow E	Maximum Slope		1	0.0	1.0385	Sagging	**259.46E-6**	2.6948	0.0013012	-	512340.	0 (Negligible)
	Maximum Settlement		1	0.0	1.0385	Sagging	259.46E-6	**2.6948**	0.0013012	-	512340.	0 (Negligible)

Structure Name	Parameter	Critical Sub-Structure	Critical Segment	Start	End	Curvature	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
	Max. Tensile Strain		2	1.0385	10.999	Hogging	259.46E-6	2.4267	**0.0036157**	31763.	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		2	1.0385	10.999	Hogging	259.46E-6	2.4267	0.0036157	**31763.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		1	0.0	1.0385	Sagging	259.46E-6	2.6948	0.0013012	-	**512340.**	0 (Negligible)
30A Thurlow A	Maximum Slope		1	0.0	4.3990	Hogging	**413.18E-6**	5.2789	0.017666	3705.4	-	0 (Negligible)
	Maximum Settlement		1	0.0	4.3990	Hogging	413.18E-6	**5.2789**	0.017666	3705.4	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	4.3990	Hogging	413.18E-6	5.2789	**0.017666**	3705.4	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	4.3990	Hogging	413.18E-6	5.2789	0.017666	**3705.4**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
30A Thurlow B	Maximum Slope		1	0.0	1.5990	Sagging	**208.74E-6**	5.2793	0.040675	-	7540.1	0 (Negligible)
	Maximum Settlement		1	0.0	1.5990	Sagging	208.74E-6	**5.2793**	0.040675	-	7540.1	0 (Negligible)
	Max. Tensile Strain		1	0.0	1.5990	Sagging	208.74E-6	5.2793	**0.040675**	-	7540.1	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	1.5990	Sagging	208.74E-6	5.2793	0.040675	-	**7540.1**	0 (Negligible)
30A Thurlow C	Maximum Slope		1	0.0	2.7000	Sagging	**0.0029824**	7.7120	0.050728	-	241.34	1 (Very Slight)
	Maximum Settlement		2	2.7000	3.5990	Sagging	0.0	**7.7120**	0.0	-	745.93E+15	0 (Negligible)
	Max. Tensile Strain		1	0.0	2.7000	Sagging	0.0029824	7.7120	**0.050728**	-	241.34	1 (Very Slight)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	2.7000	Sagging	0.0029824	7.7120	0.050728	-	**241.34**	1 (Very Slight)
30A Thurlow D	Maximum Slope		1	0.0	9.5990	Sagging	**580.23E-6**	8.0163	0.078222	-	5759.8	2 (Slight)
	Maximum Settlement		1	0.0	9.5990	Sagging	580.23E-6	**8.0163**	0.078222	-	5759.8	2 (Slight)
	Max. Tensile Strain		1	0.0	9.5990	Sagging	580.23E-6	8.0163	**0.078222**	-	5759.8	2 (Slight)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	9.5990	Sagging	580.23E-6	8.0163	0.078222	-	**5759.8**	2 (Slight)
30A Thurlow E	Maximum Slope		2	1.0000	3.5602	Sagging	**0.0017558**	5.1334	0.025069	-	2126.8	0 (Negligible)
	Maximum Settlement		1	0.0	1.0000	Sagging	0.0	**5.1334**	0.0	-	-	0 (Negligible)
	Max. Tensile Strain		2	1.0000	3.5602	Sagging	0.0017558	5.1334	**0.025069**	-	2126.8	0 (Negligible)
	Min. Radius of Curvature (Hogging)		3	3.5602	5.9460	Hogging	0.0017558	4.1501	0.017546	**2574.6**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		2	1.0000	3.5602	Sagging	0.0017558	5.1334	0.025069	-	**2126.8**	0 (Negligible)
30A Thurlow F	Maximum Slope		1	0.0	6.1378	Sagging	**294.54E-6**	3.8954	0.0085438	-	15366.	0 (Negligible)
	Maximum Settlement		2	6.1378	7.9990	Hogging	140.73E-6	**4.0234**	0.0055745	4749.5	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	6.1378	Sagging	294.54E-6	3.8954	**0.0085438**	-	15366.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		2	6.1378	7.9990	Hogging	140.73E-6	4.0234	0.0055745	**4749.5**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		1	0.0	6.1378	Sagging	294.54E-6	3.8954	0.0085438	-	**15366.**	0 (Negligible)
41 Rosslyn A	Maximum Slope		1	0.0	11.999	Hogging	**858.27E-6**	6.0184	0.020882	8847.2	-	0 (Negligible)
	Maximum Settlement		1	0.0	11.999	Hogging	858.27E-6	**6.0184**	0.020882	8847.2	-	0 (Negligible)
	Max. Tensile Strain		1	0.0	11.999	Hogging	858.27E-6	6.0184	**0.020882**	8847.2	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	11.999	Hogging	858.27E-6	6.0184	0.020882	**8847.2**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
41 Rosslyn B	Maximum Slope		1	0.0	7.9990	Sagging	**76.951E-6**	0.89860	0.0029037	-	29093.	0 (Negligible)
	Maximum Settlement		1	0.0	7.9990	Sagging	76.951E-6	**0.89860**	0.0029037	-	29093.	0 (Negligible)
	Max. Tensile Strain		1	0.0	7.9990	Sagging	76.951E-6	0.89860	**0.0029037**	-	29093.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	7.9990	Sagging	76.951E-6	0.89860	0.0029037	-	**29093.**	0 (Negligible)
41 Rosslyn C	Maximum Slope		1	0.0	8.6607	Hogging	**336.91E-6**	2.9262	0.0045436	22305.	-	0 (Negligible)
	Maximum Settlement		2	8.6607	11.999	Sagging	336.91E-6	**4.0086**	0.0056640	-	50058.	0 (Negligible)
	Max. Tensile Strain		2	8.6607	11.999	Sagging	336.91E-6	4.0086	**0.0056640**	-	50058.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		1	0.0	8.6607	Hogging	336.91E-6	2.9262	0.0045436	**22305.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)		2	8.6607	11.999	Sagging	336.91E-6	4.0086	0.0056640	-	**50058.**	0 (Negligible)
41 Rosslyn D	Maximum Slope		1	0.0	7.9990	Sagging	**496.66E-6**	6.1673	0.027833	-	5588.8	0 (Negligible)
	Maximum Settlement		1	0.0	7.9990	Sagging	496.66E-6	**6.1673**	0.027833	-	5588.8	0 (Negligible)
	Max. Tensile Strain		1	0.0	7.9990	Sagging	496.66E-6	6.1673	**0.027833**	-	5588.8	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		1	0.0	7.9990	Sagging	496.66E-6	6.1673	0.027833	-	**5588.8**	0 (Negligible)
Party 37-39	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
39 Rosslyn A	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
39 Rosslyn B	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
39 Rosslyn C	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											

Structure Name	Parameter	Critical Sub-Structure	Critical Segment	Start	End	Curvature	Maximum Slope	Maximum Settlement	Max. Tensile Strain	Min. Radius of Curvature (Hogging)	Min. Radius of Curvature (Sagging)	Damage Category
37 Rosslyn A	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
37 Rosslyn B	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
37 Rosslyn C	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
37 Rosslyn D	Maximum Slope	Sub 37	1	1.0000	6.1386	Sagging	**442.33E-6**	0.86816	0.0061011	-	6150.1	0 (Negligible)
	Maximum Settlement	Sub 37	1	1.0000	6.1386	Sagging	442.33E-6	**0.86816**	0.0061011	-	6150.1	0 (Negligible)
	Max. Tensile Strain	Sub 37	2	6.1386	9.0000	Hogging	179.75E-6	0.50877	**0.018466**	21353.	-	0 (Negligible)
	Min. Radius of Curvature (Hogging)	Sub 37	2	6.1386	9.0000	Hogging	179.75E-6	0.50877	0.018466	**21353.**	-	0 (Negligible)
	Min. Radius of Curvature (Sagging)	Sub 37	1	1.0000	6.1386	Sagging	442.33E-6	0.86816	0.0061011	-	**6150.1**	0 (Negligible)

Specific Building Damage Results - All Combined Segments

Structure: 10b Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 10b Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: Eldon Party b-c | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 10b Eldon C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 10c Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: Eldon Party c-d | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 10c Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 10d Eldon A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 10d Eldon B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Vertical Offset from Line for Vertical ...	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category

Structure: 10d Eldon C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 29 Thurlow A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: Party 29-30 | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 29 Thurlow B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 29 Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30 Thurlow A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30 Thurlow B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30 Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30 Thurlow D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30 Thurlow E | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30A Thurlow A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30A Thurlow B | Sub-structure:

Vertical	Combined	Start	Length	Curvature	Deflection	Average	Max.	Damage Category

Offset from Line for Vertical Movement Calculations	Segment			Ratio	Horizontal Strain	Tensile Strain
[m]	[m]	[m]		[%]	[%]	[%]

No structures have segments combined.

Structure: 30A Thurlow C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30A Thurlow D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30A Thurlow E | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 30A Thurlow F | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 41 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 41 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 41 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 41 Rosslyn D | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: Party 37-39 | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 39 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 39 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category

Calculations								
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 39 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	**Combined Segment**	**Start**	**Length**	**Curvature**	**Deflection Ratio**	**Average Horizontal Strain**	**Max. Tensile Strain**	**Damage Category**
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 37 Rosslyn A | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	**Combined Segment**	**Start**	**Length**	**Curvature**	**Deflection Ratio**	**Average Horizontal Strain**	**Max. Tensile Strain**	**Damage Category**
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 37 Rosslyn B | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	**Combined Segment**	**Start**	**Length**	**Curvature**	**Deflection Ratio**	**Average Horizontal Strain**	**Max. Tensile Strain**	**Damage Category**
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 37 Rosslyn C | Sub-structure:

Vertical Offset from Line for Vertical Movement Calculations	**Combined Segment**	**Start**	**Length**	**Curvature**	**Deflection Ratio**	**Average Horizontal Strain**	**Max. Tensile Strain**	**Damage Category**
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: 37 Rosslyn D | Sub-structure: Sub 37

Vertical Offset from Line for Vertical Movement Calculations	**Combined Segment**	**Start**	**Length**	**Curvature**	**Deflection Ratio**	**Average Horizontal Strain**	**Max. Tensile Strain**	**Damage Category**
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Geotechnical & Environmental Associates (GEA)
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