Appendix A

Basement Impact Assessment (GEA, 2015)

13491 Haverstock Hill

Cambridge Gate Properties

Site Investigation & Basement Impact Assessment Report GEA

July 2016

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SITE INVESTIGATION & BASEMENT IMPACT ASSESSMENT REPORT

5-17 Haverstock Hill
London NW3 2BL

Client: Cambridge Gate Properties

Engineer: Conisbee

J15316

May 2016




Geotechnical & Environmental Associates

Document Control

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CONTENTS

Part 3: GROUND MOVEMENT ANALYSIS

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 by Geotechnical and Environmental Associates Limited (GEA) on the instructions of Conisbee, on behalf of Cambridge Gate Properties, with respect to the proposed redevelopment of the site, which is understood, will comprise two new buildings, up to seven storeys, plus a semi-level basement beneath part of the site. The purpose of the investigation has been to research the history of the site with respect to possible contaminative uses, to determine the ground conditions and hydrogeology, to assess the extent of any contamination and to provide information to assist with the design of the basement structure and suitable foundations for the proposed development. The report also includes information required to comply with London Borough of Camden (LBC) Planning Guidance CPG4, relating to the requirement for a Basement Impact Assessment (BIA), including a ground movement analysis and building damage assessment..

DESK STUDY FINDINGS

The site and immediate surrounding area were developed prior to 1875 with housing and gardens. The historical maps indicate that at some time between 1916 and 1954 the site was redeveloped with the existing six-storey building. Anecdotal information indicates that redevelopment took place in the late 1930s and the site was occupied by a garage used for parking, a motor showroom and offices, along with a petrol station, workshop, washing bays, store, battery charging rooms and six shops. By 1966 the garage was used as a depot and was until recently occupied by the Metropolitan Police, who vacated in Summer 2014. An enquiry has been made with regard the presence of buried fuel tanks and no information is held by the local petroleum officer regarding fuel storage tanks below the site. The immediate surrounding area has not had a particularly contaminative history. A risk of soil gas has not been identified.

GROUND CONDITIONS

Beneath a moderate to significant thickness of made ground, London Clay was encountered and proved to the maximum depth investigated of 24.70 m. The made ground extended to depths of between 0.80 m and 2.60 m below ground level and generally comprised brown clay with flint gravel and sand partings, fragments of concrete and brick and rootlets. At a single location a layer of soft dark grey mottled black silty sandy clay with wood was noted to extend from 0.15 m to 0.45 m below basement level. The London Clay initially comprised firm becoming stiff fissured high strength and very high strength brown mottled grey silty clay to depths of 9.60 m and 9.80 m from ground level and to a depth of 8.30 m below existing basement level. Below this depth, stiff becoming very stiff fissured high strength to extremely high strength grey silty clay was encountered. Claystones were encountered at various depths within the London Clay. The clay was noted to be desiccated to a depth of 2.30 m below ground level, in close proximity to an existing tree. Seepages were encountered from the made ground locally and perched water was encountered around claystones. Monitoring has measured groundwater at depths of between 1.87 m and 3.72 m. No vapours were detected during a soil vapour survey or during headspace analysis on recovered soils. Contamination testing has revealed elevated concentrations of lead and arsenic within the made ground and elevated lead was measured within a single sample of London Clay, near the top of this stratum.

RECOMMENDATIONS

Excavations for the proposed basement structure will require temporary support to maintain stability of the excavation and surrounding structures at all times. Shallow groundwater has been measured within the standpipes and this probably reflects the presence of perched water that has become trapped by the low permeability clay and a contiguous bored pile wall should be appropriate, subject to further testing and trial excavations.

End users will be isolated from direct contact with the identified contaminants by the extent of the new building and areas of external hardstanding. Within any proposed soft landscaped areas or private gardens, some form of remedial measures will be required. Suitable precautions should be undertaken to protect site workers and a watching brief should be maintained during groundworks. If any odorous, discoloured or suspicious material is encountered, or evidence of any buried tanks, works should be suspended in that area until an experienced geoenvironmental engineer has attended site to provide further advice.

BASEMENT IMPACT ASSESSMENT

The BIA has not indicated any concerns with regard to the effects of the proposed basement on the site and surrounding area. It has been concluded that the impacts identified can be mitigated by appropriate design and standard construction practice. A ground movement analysis and building damage assessment has been carried out in support of the planning application and the findings are included in this report and a copy will need to be provided to London Underground Limited (LUL)

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 Limited (GEA) has been commissioned by Conisbee, on behalf of Cambridge Gate Properties, to carry out a desk study and ground investigation at 5-17 Haverstock Hill, London, NW3 2BL. This report also forms part of a Basement Impact Assessment (BIA), which has been carried out in accordance with guidelines from the London Borough of Camden (LBC) in support of a planning application, including a ground movement analysis and building damage assessment.

1.1 Proposed Development

It is proposed to demolish the existing building and construct a couple of buildings, ranging from five-storey up to seven-storeys, around a central raised courtyard. The redevelopment will provide 77 residential units and include retail floor space at ground floor level on the Adelaide Road frontage. A semi-basement will be constructed beneath the central northern part of the site, extending to a depth of about 1.80 m, with the underside of the basement slab at a level of approximately 30.185 m OD, including slab make up. It is understood that soft landscaped areas will be incorporated.

A plan by Piercy and Company of the proposed ground floor layout (drawing ref 13491, dated May 2016), provided by the consulting engineers is included above and shows the existing partial basement in red and proposed new partial basement in blue.

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 determine the history of the site and surrounding area, particularly with respect to any previous or present potentially contaminative uses;
- to determine the ground conditions and their engineering properties;
- to investigate the configuration of existing foundations;
- to provide advice and information with respect to the design of suitable foundations and retaining walls;
- to assess the impact of the proposed basement on the local hydrogeology, hydrology and stability of the surrounding natural and build environment;
- to provide an indication of the degree of soil contamination present; and
- to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.3 Scope of Work

In order to meet the above objectives, a desk study was carried out followed by a ground investigation. The desk study comprised:

- a review of available historical Ordnance Survey (OS) maps;
- a preliminary UXO risk assessment, carried out by First Line Defence;
- to check records of data on groundwater, surface water and other publicly available environmental data;
- a review of readily available geology maps;
- a review of planning records;
- an enquiry to the contaminated land department at the local authority;
- an enquiry to the petroleum officer with respect to records of underground storage tanks (USTs); and
- a walkover survey of the site carried out prior to the fieldwork.

In the light of this desk study an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- two boreholes advanced to depths of 15.00 m and 24.70 m from ground level by means of a standard cable percussion drilling rig;
- a total of five open-drive sampler boreholes advanced to depths of 4.00 m and 5.20 m below ground level and to depths of 3.00 m and 10.00 m below the existing lower car park level;
- standard penetration tests (SPTs), carried out at regular intervals in the cable percussion boreholes and a single open-drive sampler borehole, to provide quantitative data on the strength of the soils;
- a soil vapour survey carried out at 32 locations within the existing lower level car park and three locations from internal ground level, using a Photo-Ionisation Detector (PID);
- headspace testing on all samples of recovered soils from the open-drive sampler boreholes;
- installation of three groundwater monitoring standpipes to depths of 6.00 m and two subsequent monitoring visits, roughly two weeks and six weeks after installation;
- a single hand-dug trial pit excavated to a depth of 1.20 m to expose the footings shared with Chalk Farm LUL station;
- testing of selected soil samples for contamination and 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.

The report includes a contaminated land assessment which has been undertaken in accordance with the methodology presented in Contaminated Land Report (CLR) 11[1] and involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. The risk assessment is thus divided into three stages comprising Preliminary Risk Assessment, Generic Quantitative Risk Assessment, and Site-Specific Risk Assessment.

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[2] and their Guidance for Subterranean Development[3] 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 appropriately mitigated by the design of the development.

1 *Model Procedures for the Management of Land Contamination* issued jointly by the Environment Agency and the Department for Environment, Food and Rural Affairs (DEFRA) Sept 2004

2 London Borough of Camden Planning Guidance CPG4 *Basements and lightwells*

3 Ove Arup & Partners (2010) *Camden geological, hydrogeological and hydrological study. Guidance for Subterranean Development.* For London Borough of Camden November 2010

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 (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

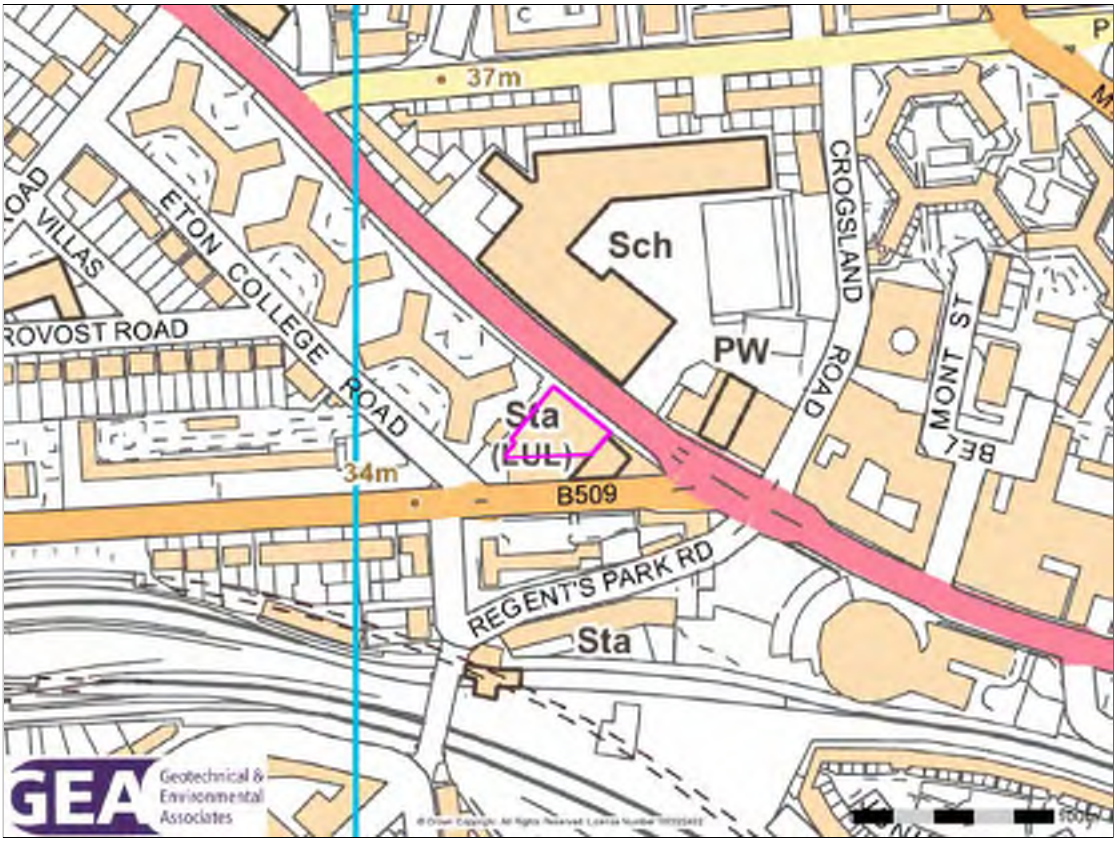
The site is located in the London Borough of Camden, in a mixed residential and commercial area. It fronts onto Haverstock Hill to the northeast and Adelaide Road to the south. It is adjoined to the southeast by Chalk Farm London Underground station, a two-storey Grade II listed building, and is bordered to the northwest by Eton Place, a six-storey apartment block, which fronts onto Eton College Road to the southwest. The site may be additionally located by National Grid Reference 528100, 184430 and is shown on the next page.

A walkover survey of the site was carried out by an engineer from GEA on 10 November 2015 and selected photographs are included below.

The local topography slopes down towards the southeast, although the site is sensibly level at a level of about 32 m OD. It is roughly triangular in shape, measuring approximately 60 m by 40 m in maximum dimensions. The central and southern part of the site is occupied by a brick building comprised of up to six-storeys with a partial basement extending to a depth of roughly 1.20 m below existing ground level to a level of approximately 31.02 m OD, which comprises the lowest level of car park and is located beneath the central part of the site.

A shutter door is present along the northwestern elevation of the six-storey building, which leads to the ground floor, with a ramp that leads down to the basement, and another ramp that leads up to the first floor. It is understood that in total there are 10 levels of car parking with ancillary office space, associated with its former use by the British Transport Police.

At lower ground floor level, three chambers were noted within the floor, to the north of a column. The covers of the chambers were lifted and the chambers were full of sludge and a sewage odour was noted; it is understood that these are interceptors. A compressor was noted in the corner of the room and the floor was noted to be gently sloping down towards the south. A storage room was noted in the southeastern corner, with spare car parts left in the room and storage containers of chemicals.



On the Haverstock Hill frontage, a two-storey building is present, which is currently vacant and is understood to have been a showroom on the ground floor. Along the Adelaide Road frontage a two-storey building comprises retail units on the ground floor, currently in use and occupied by a newsagents, wine shop, dry cleaners, café and estate agents. The main building is tenanted for security purposes by VPS.

An area of hardstanding is present in the northwest of the site, which can be accessed from Haverstock Hill via two sets of double gates or from Adelaide Road via a double gate. This area contains numerous services, which are evident from surface scarring and also shown on the service plans. In this area, a vent was noted along with a manhole cover, which was lifted and found to have be infilled. A further three chambers were noted in this area and are understood to have been interceptors.

In the central northern part of the hardstanding area, a single storey detached building is present and along the northern boundary is a brick wall. Cracks were noted in both of these structures, up to 40 mm in width and monitoring points were observed.

Mature trees, up to 20 m in height are present in the grounds of Eton Place along the northern perimeter of the site. Semi-mature trees, ranging from 6 m to 8 m in height, are present along on the pavement along the Haverstock Hill frontage. The site itself is however essentially devoid of vegetation.

During heavy rainfall it is understood that part of the lower ground floor becomes flooded, but it is not known how this water enters the building.


Adelaide Road frontage


Haverstock Hill frontage


Adelaide Road frontage


Manhole covers in lower car park level


Manhole covers in external car park


Store room at lower car park


Single storey outbuilding


Northern part of site, looking east towards Haverstock Hill

2.2 Site History

The site history has been researched by reference to internet sources and historical Ordnance Survey (OS) maps obtained from the Envirocheck database.

The earliest map studied, dated 1875, indicates the site and surrounding area had been developed with what appears to be housing with front and rear gardens. The site fronted onto

Haverstock Hill to the northeast and Adelaide Road was in its current layout to the south. A railway track was present 120 m to the south of the site with associated goods shed and goods depot and Chalk Farm Station is shown 100 m to the south of the site. A timber yard was present 240 m to the southwest of the site and a watercourse was shown issuing 200 m to the southwest of the site, which appeared to be flowing in a roughly southwesterly direction. A pond like feature was present 400 m to the southwest of the site.

By the time of the next map, studied, dated 1896, the site and immediate surrounding area appear to have remained unchanged. The goods shed had been renamed as a warehouse and a coal depot was present 80 m to the southeast of the site. The watercourse and pond are no longer shown.

On the 1916 map, there were relatively few changes to the site and surrounding area. The housing directly to the northeast of the site, located on the opposite side of Haverstock Hill, had been demolished and replaced by a school.

Between 1916 and 1954, significant changes occurred to the site and surrounding area. The houses on the site and to the northwest and west were replaced with what appears to be the existing buildings. A garage is shown on the site, along with Chalk Farm parade along the Adelaide Road frontage. Chalk Farm Station had been renamed Primrose Hill Station and Chalk Farm Station was relocated immediately to the southeast of the site, on a corner plot, fronting onto both Adelaide Road and Haverstock Hill. To the northwest of the site, three apartment blocks had been constructed, fronting onto Eton College Road to the southwest. The school also appears to have been extended.

Anecdotal information in the form of an article was provided by the consulting engineer, indicates that the site was built for Messrs Bell Property Trust Ltd in 1939. The three apartment blocks to the northwest of the site were to be constructed as part of the same development. The article appears to have been written following construction of the garage on site but not the apartment blocks.

It is understood that part of the building was to provide garaging facilities for the tenants of the site and other residential developments in the immediate neighbourhood. Space was provided for 300 cars over ten levels, a motor showroom for 60 cars and offices. On the Adelaide Road frontage there was a petrol station, workshop, washing bays, store, battery charging rooms and six shops.

Bomb damage maps indicate that the school to the north of the site was completely destroyed and damage was recorded to the southeastern wing of Eton Place.

By the time of the 1966 map the garage is shown as a depot and it is understood that it has most recently been used by the Metropolitan Police until 2014 for vehicle storage. The site and immediate surrounding area appear to have remained unchanged to the present day.

2.3 Other Information

A search of public registers and databases has been made via the Envirocheck database and relevant extracts from the search are appended. Full results of the search can be provided if required.

The Envirocheck report has indicated no landfill sites, waste management or waste transfer sites located within 500 m of the site. In addition, there are no pollution incidents to controlled waters within 250 m of the site and there are no discharge consents within 500 m of the site.

Reference to records compiled by the Health Protection Agency (formerly the National Radiological Protection Board) indicates that the site falls within an area where less than 1% of homes are affected by radon emissions and therefore radon protective measures will not be necessary.

The site is not located within a nitrate vulnerable zone or any other sensitive land use.

A fuel station was recorded within 250 m of the site at a distance of 72 m northeast of the site, which is now recorded as obsolete.

An enquiry was made to the London Fire and Emergency Planning Authority, given the former petrol station on the Adelaide Road frontage. No information was held on any tanks present on site and it is therefore not known if tanks have been filled or removed.

Contact was also made with the contaminated land department at Camden but no information was held on the site.

The LUL Northern Line Tunnel is located to the north of the site, beneath Haverstock Hill, with the crown levels at a depth of roughly 10 m (21.90 m OD) below ground level. Contact has been made with London Underground Limited (LUL) regarding their assets beneath the site and their response is included in the appendix, regarding permission to undertake site investigation. Further liaisons will need to be made with LUL to ensure that the development proposals do not impact upon their assets.

A tunnel correlation survey was instructed by the client and has been undertaken by LUL. A copy of the correlation survey for the site with the Northbound Northern Line has been provided by LUL (drawing reference NO46-00000-01, dated 19 November 2015).

2.4 Preliminary UXO Risk Assessment

A preliminary UXO risk assessment has been carried out by 1st Line Defence (ref OPN2876, dated 5 November 2015) and the report is included in the appendix. The risk assessment has been carried out in accordance with the guidelines provided by CIRIA, which state that the likelihood of encountering and detonating unexploded ordnance (UXO) below a site should be assessed along with establishing the consequences that may arise. The first phase comprises a preliminary risk assessment, which should be undertaken at an early stage of the development planning. If such an assessment identifies a high level of risk then a detailed risk assessment should be carried out by a UXO specialist, which will identify an appropriate course of action with regard to risk mitigation.

The preliminary UXO risk assessment has identified a minimal risk of encountering unexploded ordnance at the site and therefore no further action is required.

2.5 Geology

The British Geological Survey (BGS) map of the area[4], and the BGS 1:50,000 Bedrock and Superficial Geological Map Sheet 256 indicate that the site is directly underlain by the London Clay Formation.

[4] www.bgs.ac.uk/geoindex

According to the British Geological Society memoir, the London Clay Formation is homogenous, slightly calcareous silty clay to very silty clay, with some beds of clayey silt grading to silty fine grained sand.

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A search of archive BGS borehole records indicate that a borehole has been undertaken to the east of the site at Chalk Farm station (reference TQ28SE299). The borehole found made ground to a depth of 0.61 m, overlying London Clay, proved to a depth of 10.36 m.

Two boreholes were drilled to the north of the site, at the school (references TQ28SE217 and TQ28SE217/A-B). Made ground was found to extend to depths of 0.61 m and 1.22 m, overlying brown clay, proved to depths of 5.03 m.

2.6 Hydrology and Hydrogeology

The London Clay is classified by the Environment Agency as unproductive strata, which refers to deposits that have low permeability and negligible significance for water supply or river base flow.

There are no Environment Agency designated Groundwater Source Protection Zones (SPZs) on the site and there are no listed water abstraction points within 500 m of the site.

The nearest surface water feature is Regents Canal, located 529 m southeast of the site.

The site lies outside the catchment of the Hampstead Heath chain of ponds.

Due to the predominantly cohesive nature of the soils, the groundwater flow rate is likely to be negligible. Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between 1×10^{-10} m/s and 1×10^{-8} m/s, with an even lower vertical permeability.

The site is not at risk of flooding from rivers or sea, as defined by the Environment Agency and Haverstock Hill and Adelaide Road have not been identified as a street at risk of surface water flooding, specified in the London Borough of Camden (LBC) Planning Guidance CPG4.

Historically a tributary of the River Fleet flowed in a roughly southeasterly direction, about 150 m to the east of the site. It is understood that the River Fleet is now covered and culverted and forms part of the surface water sewerage system.

The site is largely covered by the existing building and hardstanding and therefore infiltration of rain water into the ground beneath the site is limited and therefore the majority of surface runoff is likely to drain into combined sewers in the road.

2.7 Preliminary Risk Assessment

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

2.7.1 Source

The desk study research indicates that the site and immediate surrounding area were developed prior to 1875 with housing and gardens. At some time between the 1916 map and 1954 map the site was redeveloped with the existing six-storey building, apartment blocks to the northwest and Chalk Farm station to the southeast. Anecdotal information indicates that redevelopment took place in the 1930s. It is understood that the six-storey building was occupied by a garage used for parking of 300 cars over ten levels, a motor showroom for 60 cars and offices. On Adelaide Road frontage there was a petrol station, workshop, washing bays, store, battery charging rooms and six shops. By 1966, the garage was used as a depot, and it is understood that this was used by the Metropolitan Police.

It is not known if any buried tanks, associated with the former fuel station, have been decommissioned or removed. There is a risk of contamination at the site as a result of leakage of any buried fuel tanks.

The former use of the site as filling station and a garage / depot may have involved storage, garaging and maintenance of motor vehicles has involved the storage of a range of potentially hazardous materials or potential contaminants. Reference to the relevant DoE Industry Profile[5] indicates the main following potential contaminants:

- petrol and diesel fuels;
- lead from fuels;
- car wash detergents;
- engine and lubricating oils;
- lighter oils from machining operations;
- fuel oils;
- copper from engine bearings and other metals from engine parts;
- ethylene glycol and methanol from anti-freeze;
- glycols and ethers from brake fluids;
- asbestos from brake linings; and
- a range of solvents used in degreasers, thinners, fillers, adhesives, strippers and paints.

A fuel station was present 72 m northeast of the site, but was located downslope of the site so does not present a risk of migration of contaminants to the site.

The site is directly underlain by low permeability London Clay and there is a limited pathway for the migration of potential contaminants on or off-site, except through made ground.

There are no historical or existing landfill sites within 250 m of the site, such that no potential sources of soil gas have therefore been identified.

[5] Department of the Environment Industry Profile (1996) *Road vehicle fuelling, services and repair: garages and filling stations.* HMSO

2.7.2 Receptor

The site is to be redeveloped for residential purposes, with some retail units at ground floor. The residential end use is considered a high sensitivity end-use. Buried services are likely to come into contact with any contaminants present within the soils through which they pass and site workers are likely to come into direct contact with any contaminants present in the soil and through inhalation of vapours during demolition and construction. Being underlain by unproductive strata, groundwater is not considered to be a receptor.

2.7.3 Pathway

Whilst below the proposed buildings and hardstanding, end users will be effectively isolated from any contamination in the shallow soils, a pathway will exist in any proposed soft landscaped areas.

The presence of negligibly permeable London Clay beneath the site will limit the potential for groundwater percolation into the underlying chalk, and thus a pathway is not considered likely to exist to the principal aquifer. There will be limited potential for contaminants to move on or off the site, except horizontally within any made ground in association with perched groundwater movements, although this pathway is also already in existence. A pathway for ground workers to come into contact with any contamination will exist during demolition and construction work and services will come into contact with any contamination within the soils in which they are laid.

There is thus considered to be a low / moderate potential for a contaminant pathway to be present between any potential contaminant source and a target for the particular contaminant.

2.7.4 Preliminary Risk Appraisal

On the basis of the above it is considered that there is a LOW / MODERATE risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work. Furthermore as there is no evidence of filled ground within the vicinity of the site and no landfill sites, there is not considered to be a significant potential for hazardous soil gas to be present on or migrating towards the site: there should thus be no need to consider landfill gas exclusion systems.

3.0 SCREENING

The LBC guidance suggests that any development proposal that includes a subterranean basement should be screened to determine whether or not a full BIA is required.

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.

3.1.1 Subterranean (groundwater) Screening Assessment

Question	Response for 5-17 Haverstock Hill
1a. Is the site located directly above an aquifer?	No. The Site is underlain by the London Clay which is designated as Unproductive Strata by the Environment Agency and cannot store and transmit water in sufficient

Question	Response for 5-17 Haverstock Hill
	quantities to support groundwater abstractions or watercourses.
1b. Will the proposed basement extend beneath the water table surface?	Unlikely. The London Clay cannot transmit groundwater flow and therefore cannot support a water table.
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	No. The nearest surface water is the Regent's Canal which is located 529 m southeast of the site and there are no historic rivers located within 100 m of the site.
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?	No.
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. The London Clay is not suitable for SUDS based soakaways.
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. There are no groundwater dependent ponds or spring lines within 1 km of the proposed development.

The above assessment has identified no potential issues that need to be addressed.

Any potential issues that need to be addressed, along with the possible effects of the basement construction on the local hydrology and hydrogeology and are discussed further in Part 2 of this report.

3.1.2 Stability Screening Assessment

Question	Response for 5-17 Haverstock Hill
1. Does the existing site include slopes, natural or manmade, greater than 7°?	No.
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°?	No. With reference to the Camden Geological, Hydrogeological and Hydrological Study, (refer Figure (16).
4. Is the site within a wider hillside setting in which the general slope is greater than 7°?	No. With reference to the Camden Geological, Hydrogeological and Hydrological Study, (refer Figure (16).
5. Is the London Clay the shallowest strata at the site?	*Yes.*
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?	Possibly.
7. Is there a history of seasonal shrink-swell subsidence in the local area and / or evidence of such effects at the site?	*Yes. The area is prone to these effects as a result of the presence of shrinkable clay soils, such as London Clay and cracking was noted along the northern boundary wall and in the single storey outbuilding.*
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?	No. The site is underlain by the London Clay which is designated as Unproductive Strata by the Environment Agency and cannot store and transmit usable amounts of water.

Question	Response for 5-17 Haverstock Hill
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?	*Yes. The site fronts onto Haverstock Hill and Adelaide Road.*
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Unlikely. The proposed new partial basement is not extending much deeper than the existing.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	*Yes. The Northern Line Tunnel is located to the north of the site, beneath Haverstock Hill, with the crown levels at a depth of roughly 10 m (21.90 m OD) below ground level.*

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

Q5. London Clay is the shallowest stratum at the site.
Q6. The proposal may be within tree protection zones.
Q7. The site is within an area of seasonal shrink-swell.
Q12. The site is within 5 m of a public highway.
Q14. The site is located within the exclusion zone of a tunnel.

The potential issues that need to be assessed, along with the possible effects of the basement construction on the local hydrology and hydrogeology, are discussed further in Part 2 of this report.

3.1.3 Surface Flow and Flooding Screening Assessment

Question	Response for Response for 5-17 Haverstock Hill
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No. Figure 14 of the Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010, 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. There will not be an increase in impermeable area across the ground surface above the basement, so the surface water flow regime will be unchanged. There will be no surface expression of the basement development, so the surface water flow regime will be unchanged. The basement will entirely be beneath the existing hardstanding/building footprint, therefore the 1m distance between the roof of the basement and ground surface as recommended by the Arup report and para 2.16 of the CPG4 does not apply.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No. There will not be an increase in impermeable area across the ground surface above the basement. There will be no surface expression of the basement development.
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. There will not be an increase in impermeable area across the ground surface above the basement, so the surface water flow regime will be unchanged. There will be no surface expression of the basement development, so the surface water flow regime will be unchanged. The basement will entirely be beneath the existing hardstanding/building footprint, therefore the 1m distance

Question	Response for Response for 5-17 Haverstock Hill
	between the roof of the basement and ground surface as recommended by the Arup report and para 2.16 of the CPG4 does not apply.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No. The proposed basement is 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 identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk of flooding, for example because the proposed basement is below the static water level of nearby surface water feature?	No. The Camden Flood Risk Management Strategy dated 2013, together with Figures 3ii, 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 in the basement in order to further protect the site from sewer flooding. The BIA indicates that the water table will be located sufficiently below the floor of the basement. The site is located within the Critical Drainage Area number GROUP3-003, but is not in a Local Flood Risk Zone, as identified in the Camden SWMP and Updated SFRA Figure 6/Rev 2.

The above screening has identified no potential issues that need to be assessed.

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 screening process

Potential Impact	Consequence
London Clay is the shallowest stratum on the site.	The London Clay is prone to seasonal shrink-swell and can cause structural damage.
Proposed new building may be located within tree protection zone	Damage to tree roots.
Seasonal shrink-swell	If a new basement is not dug to below the depth likely to be affected by tree roots this could lead to damaging differential movement between the subject site and adjoining properties.
Site within 5 m of a public highway.	Excavation of a basement may result in structural damage to the road or footway.
The location of the Northern Line Underground tunnel	If not designed and constructed appropriately, the basement may affect the tunnel structure.

These potential impacts have been investigated through the site investigation, as detailed in Section 9.0.

5.0 EXPLORATORY WORK

The locations of the boreholes were governed by the 15 m exclusion zone of the Northern Line tunnel, located to the north of the site below Haverstock Hill.

In order to meet the objectives described in Section 1.2, a soil vapour survey using a Photo-Ionisation Detector (PID) was initially undertaken on a grid pattern at a total of 32 probe locations from lower car park level and three probe locations from internal ground level to investigate the potential risk of hydrocarbon vapours. At ground level the external car park area contained numerous services, so it was not possible to drill any probe holes within the hardstanding, without the risk of damaging potentially buried services and therefore four hand-dug services inspection pits were undertaken in the area, closest to the Adelaide Road frontage to provide shallow samples for subsequent headspace analysis.

Two cable percussion boreholes were drilled externally within the hardstanding area in the northern part of the site, to depths of 15.00 m and 24.70 m. Disturbed and undisturbed samples were recovered for subsequent laboratory examination and testing.

A total of five open-drive sampler boreholes were advanced across the site, using a tracked rig (Terrier), to provide additional coverage of the site, with respect to contamination. Two boreholes were drilled from the lower car park level to a depth of 3.00 m and 10.00 m. In addition, three further boreholes were drilled at ground level to depths of 4.00 m and 5.20 m.

Standard Penetration Tests (SPTs) were carried out at regular intervals in the cable percussion boreholes and single 10 m deep open-drive sampler borehole, to provide quantitative data on the strength of soils encountered.

In addition, a single hand-dug trial pit was excavated to a depth of 1.20 m against the eastern boundary wall, adjoining Chalk Farm Station.

Head space testing was undertaken on samples recovered from the open-drive sampler boreholes and trial pits using a Photo-Ionisation Detector (PID) to detect any hydrocarbon vapours within the soil.

Groundwater monitoring standpipes were installed in three boreholes to depths of 6.00 m from ground level and lower car park level and have been monitored on two occasions to date, following the fieldwork, roughly two weeks and six weeks after installation.

A selection of the samples recovered from the boreholes and trial pits was submitted to a soil mechanics laboratory for a programme of geotechnical testing and an analytical laboratory for a programme of contamination testing.

All of the above work was carried out under the supervision of a geotechnical engineer from GEA.

The borehole and trial pit records and results of the laboratory testing are enclosed, 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 drawing by Conisbee (reference SSK104 rev P3, dated November 2015), which was provided by the consulting engineer. Internal floor levels have not been provided to date.

5.1 Sampling Strategy

The initial scope of the works and locations of the cable percussion boreholes and trial pits was specified by Conisbee, with input from GEA, and was finalised following a site visit to check access and following a review of the desk study findings and service plans. The proposed locations of the trial pits and boreholes, along with our Method Statements and Risk Assessments were approved in writing by LUL on 19 November 2015.

The boreholes and trial pit were positioned on site in accessible locations by GEA to avoid areas of known services and following the results of the soil vapour survey.

A total of 15 samples from across the site were analysed, including four samples of made ground and 11 samples of natural soils for a range of common industrial contaminants and contamination indicative parameters. For this investigation the analytical suite for the soil included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. The soil samples were selected to provide a general view of the chemical conditions of the soils that are likely to be involved in a human exposure or groundwater pathway and to provide advice in respect of re-use or for waste disposal classification. In addition three samples of made ground were screened for asbestos as a precautionary measure.

The contamination analyses were carried out at a MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. Details of the MCERTs accreditation and test methods are included in the Appendix together with the analytical results.

A number of 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.

6.0 GROUND CONDITIONS

The investigation has confirmed the expected ground conditions in that, below a moderate to significant thickness of made ground, London Clay was encountered to the full depth investigated.

6.1 Made Ground

The concrete hardstanding in the external car park extended to depths of between 0.20 m and 0.35 m, over a layer of metal square mesh and the existing ground floor slab and lower ground floor slab were between 0.15 m and 0.19 m in thickness.

The made ground extends to depths of 0.80 m and 2.60 m below ground level and generally comprised brown clay with flint gravel and sand partings, fragments of concrete and brick and rootlets.

The thickness of made ground appeared to be greatest in the northern part of the site, towards Eton Place, which may be associated with the removal of former fuel tanks, or the former buildings on site.

In Borehole No 2, a layer of concrete was noted from 2.50 m to 2.60 m, which may possibly represent an old basement slab from the former houses.

The base of the made ground was not proved in Borehole Nos 3 and 3A. In Borehole No 3, metal was encountered at a depth of 0.14 m, along one edge of the service pit, so the borehole was relocated 1.00 m to the northeast. At a depth of 0.56 m rusty metal was noted across the entire base of the service pit and the borehole location was relocated 3 m to the northeast. It is possible that the metal encountered within Borehole No 3A, located close to the chambers within the external car park, may be a buried fuel tank from the former fuel station.

At lower car park level, the floor slab comprised screed over concrete, extending to depths of 0.15 m and 0.19 m, with no reinforcement noted in the recovered cores. In Borehole No 6, a layer of cobbly gravel with brick fragments was noted beneath the slab, which was in turn underlain by soft dark grey mottled black silty sandy clay with decayed wood and an organic odour, extending to a depth of 0.45 m.

No vapours were detected with the PID during headspace analysis on recovered samples.

At existing lower car park level the slab is generally directly underlain by natural soils.

Apart from the presence of fragments of extraneous material noted above, no visual or olfactory evidence of contamination was observed during the fieldwork. Four samples of the made ground have been sent for contamination testing as a precautionary measure and the results are presented in Section 5.5.

6.2 London Clay

The London Clay initially comprised firm becoming stiff brown mottled grey silty fissured clay with occasional partings of orange-brown fine sand and silt and selenite crystals, which extended to depths of 9.60 m and 9.80 m from ground level and to a depth of 8.30 m below existing basement level. Below this depth, unweathered London Clay comprised of stiff becoming very stiff grey silty fissured clay with rare grey burrows was encountered and proved to the maximum depth investigated of 24.70 m.

Claystones were encountered at various depths within the London Clay and Borehole No 1 was terminated on a claystone at a depth of 24.70 m.

In Borehole No 2 a pyrite nodule was encountered at a depth of 14.50 m.

Live rootlets were noted to depths of 2.10 m and 2.60 m and dead rootlets to a maximum depth of 4.80 m below ground level. Below existing lower car park level dead rootlets were noted to a depth of 2.60 m. In Borehole No 3B, the clay was noted to be ‘stiff’ and desiccated to a depth of about 2.30 m, in close proximity to existing mature trees and it is possible the clay was also potentially desiccated in Borehole No 5 to a similar depth.

Atterberg limit tests indicate the clay to be of high volume change potential. The results of the undrained triaxial tests generally indicate an increase in strength with depth. The results indicate the clay to be of high strength to extremely high strength.

No evidence of contamination was noted in these soils, although a total of 11 samples of natural soil were sent for contamination testing as a precautionary measure and the results are discussed in Section 4.5 below.

6.3 Groundwater

A seepage was noted from within the base of the made ground at a depth of 2.50 m in Borehole No 2. Perched water was encountered around a claystone in Borehole No 3B at a depth of 3.43 m. Perched water was also encountered at the base of the trial pit excavated to expose the footings of Chalk Farm London Underground Station and water was measured at a depth of 0.98 m below floor level on completion of the trial pit.

Three standpipes were installed to a depth of 6.00 m and have been monitored on two occasions to date, roughly two weeks and six weeks after installation. The results of the monitoring visit are shown in the table below. The second monitoring visit was undertaken after a period of heavy sustained rainfall.

Date	Borehole No	Depth to water (m)
18/12/2015	1	2.08
	2	1.88
	6	DRY
13/01/2016	1	2.05
	2	1.87
	6	3.72

6.4 Soil Contamination

Initially a soil vapour survey (SVS) was undertaken on a grid pattern, in the existing lower level car park in the area of the manhole covers, understood to have been interceptor tanks. The SVS comprised 32 probe holes at lower car park level and three positions at internal ground level, drilled with a 'Hilti' drill to a depth of 1.00 m. A plan showing the locations of the probe holes are included in the appendix. No vapours were detected during the soil vapour survey (SVS).

The table below sets out the values measured within four samples of made ground analysed; all concentrations are in mg/kg unless otherwise stated.

Determinant	BH3A: 0.40 m	BH3B: 0.80 m	BH4: 0.60 m	BH5: 0.60 m
pH	10.8	11.4	9.9	8.4
Arsenic	31	26	**70**	16
Cadmium	0.10	0.10	<0.10	<0.10
Chromium	32	34	33	47
Copper	34	42	29	30
Mercury	0.18	0.35	0.20	<0.10
Nickel	26	32	22	45
Lead	**210**	**1100**	60	**390**
Selenium	<0.20	<0.20	<0.20	<0.20

Determinant	BH3A: 0.40 m	BH3B: 0.80 m	BH4: 0.60 m	BH5: 0.60 m
Zinc	130	200	58	110
Total Cyanide	<0.50	<0.50	<0.50	<0.50
Total Phenols	<0.30	<0.30	<0.30	<0.30
Sulphide	95	11	1.5	2.6
Total PAH	13	6.1	14	2.6
Benzo(a)pyrene	1.5	0.74	1.1	0.26
Naphthalene	<0.10	<0.10	2.3	<0.10
TPH	38	27	32	<10
Total organic carbon %	0.47	0.71	1.2	0.31
Notes: Figure in **bold** indicates concentration in excess of risk-based soil guideline values, as discussed in Part 2 of this report				

6.4.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. To this end the table below indicates those contaminants of concern that have values in excess of a generic human health risk based guideline values which are either that of the CLEA[6] Soil Guideline Value where available, or is a Generic Screening Value calculated using the CLEA UK Version 1.06[7] software assuming a residential end use, or is based on the DEFRA Category 4 Screening values[8]. The key generic assumptions for this end use are as follows:

- that groundwater will not be a critical risk receptor;
- that the critical receptor for human health will be a young female child aged 0 to six years old;
- that young children will not have prolonged exposure to the site;
- that the exposure duration will be six years;
- that the critical exposure pathways will be direct soil and indoor dust ingestion, consumption of homegrown produce, consumption of soil adhering to homegrown produce, skin contact with soils and dust, and inhalation of dust and vapours; and
- that the building type equates to a two-storey small terraced house

It is considered that these assumptions are acceptable for this generic assessment of this site, albeit conservative as the site is to be covered entirely covered by hard surfaces.

The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

6 *Updated Technical Background to the CLEA Model (Science Report SC050021/SR3) Jan 2009* and Soil Guideline Value reports for specific contaminants; all DEFRA and Environment Agency.

7 Contaminated Land Exposure Assessment (CL|EA) Software Version 1.06 Environment Agency 2009

8 CL:AIRE (2013) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination* Final Project Report SP1010 and DEFRA (2014) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination* Policy Companion Document SP1010

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of these generic screening values there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include;

- additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

The results of the contamination testing have revealed elevated arsenic and lead within some samples of the made ground. In addition, 11 samples of natural soils were tested and generally no elevated concentrations of contaminants were measured, although a slightly elevated concentration of lead was noted in Borehole No 3B at a depth of 2.10 m.

No asbestos was detected within the three samples of made ground screened.

This assessment is based upon the potential for risk to human health, which at this site is considered to be the critical risk receptor. The significance of the contamination results is considered further in Part 2 of the report.

6.5 Existing Foundations

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

Trial Pit No	Structure	Foundation detail	Bearing Stratum
1	Chalk Farm London Underground station	Concrete Top 0.16 m Base of footing not proved, extends at least to a depth of 1.20 m Lateral projection 0.16 m	Not proved

Perched water was encountered at the base of the trial pit and was at a depth of 0.98 m below floor level on completion of the trial pit.

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.

7.0 INTRODUCTION

It is proposed to demolish the existing building and construct a couple of buildings, ranging from five-storey up to seven-storeys, around a central raised courtyard. The redevelopment will provide 77 residential units and include retail floor space at ground floor level on the Adelaide Road frontage. A semi-basement will be constructed beneath the central northern part of the site, extending to a depth of about 1.80 m, with the underside of the basement slab at a level of approximately 30.185 m OD, including slab make up. It is understood that soft landscaped areas will be incorporated.

Proposed pile loads have not been provided to date, but are anticipated to be relatively high, such that piled foundation will provide a suitable foundation solution.

8.0 GROUND MODEL

The desk study has revealed that the site has had a potentially contaminative history, given that it was used a filling station and garage, and on the basis of the fieldwork, the ground conditions at this site can be characterised as follows:

- below a moderate to significant thickness of made ground below ground level or nominal thickness below existing lower car park level, the London Clay was encountered and proved to the maximum depth investigated of 24.70 m;
- the concrete hardstanding in the external car park extends to depths of between 0.20 m and 0.35 m, over a layer of metal square mesh and the existing ground floor slab and lower ground floor slab were between 0.15 m and 0.19 m in thickness;
- the made ground extends to depths of 0.80 m and 2.60 m below ground level and generally comprises brown clay with flint gravel and sand partings, fragments of concrete and brick and rootlets, with the greatest thickness in the north of the site;
- metal was encountered at a depth of 0.56 m across the entire base of the services inspection pit located close to the chambers within the external car park may be a buried fuel tank from the former fuel station;
- a layer of concrete was encountered from 2.50 m to 2.60 m below ground level at a single location, and may represent a former basement slab with a backfilled basement;
- at existing lower car park level the slab is generally directly underlain by natural soils;
- soft dark grey mottled black silty sandy clay with decayed wood was noted at a single location extending to a depth of 0.45 m below existing lower car park level;
- the London Clay initially comprises firm becoming stiff fissured high strength and

very high strength brown mottled grey silty clay with occasional partings of orange-brown fine sand and silt and selenite crystals, which extends to depths of 9.60 m and 9.80 m from ground level and to a depth of 8.30 m below existing lower level car park;

- below this depth, stiff becoming very stiff fissured high strength to extremely high strength grey silty clay with rare grey burrows was encountered and proved to the maximum depth investigated of 24.70 m;

- claystones were encountered at various depths across the site within the London Clay;

- the clay was noted to be desiccated to a depth of 2.30 m below ground level;

- seepages were encountered during made ground locally and perched water was encountered around claystones. Subsequent monitoring has measured groundwater at depths of between 1.87 m and 3.72 m; and

- contamination testing has revealed elevated concentrations of lead and arsenic within the made ground and a slightly elevated concentration of lead within a single sample of London Clay.

9.0 ADVICE AND RECOMMENDATIONS

All foundations will need to bypass the made ground and any potentially desiccated clay soils and NHBC guidelines should be followed in this respect. In view of the anticipated relatively high loads, piled foundations are in any case likely to be required.

Formation level for the 1.80 m deep partial level basement is likely to be within the firm London Clay and some form of groundwater control is likely to be required during excavation of the partial basement, although significant groundwater inflows are not anticipated.

Excavations for the proposed basement structure will require temporary support to prevent any excessive ground movements and the stability of neighbouring structures will need to be ensured at all times.

9.1 Basement Excavation

9.1.1 Basement Construction

It is understood that it is proposed to form a partial basement, which will extend to a depth of approximately 1.80 m below existing ground level, extending to a level of approximately 30.185 m OD, including the basement slab. On this basis, formation level is likely to be within the firm weathered London Clay.

Groundwater seepages were noted during the fieldwork, perched near the base of the made ground and around claystones in the London Clay. Subsequent groundwater monitoring has measured groundwater at depths of between 1.87 m and 3.72 m. Whilst groundwater monitoring should be continued, it is not possible to draw entirely meaningful conclusions from the measurements made in the standpipes, as the level of the water is not necessarily as significant as the volume of water that may flow into the excavation. For example, a high level of water measured in a standpipe may not be significant if this represents only a small volume of water. The London Clay includes thin partings of fine sand and silt and the occurrence of groundwater into the basement will to a large extent be determined by the presence of these more permeable materials. Shallow inflows of perched water may also be encountered from within the made ground, particularly within the vicinity of existing foundations, although such inflows are unlikely to be significant and should be adequately dealt with through sump pumping.

It would be prudent, once access is available, to carry out a number of trial excavations, to depths as close to the full basement depth as possible, to provide an indication of the likely groundwater conditions. At this stage it is recommended that simple permeability tests are undertaken within the standpipes installed provide preliminary information on likely groundwater inflow rates into the proposed basement excavation.

There are a number of methods by which the sides of the basement 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. Consultation with LUL will also need to be undertaken at the earliest opportunity to ensure the safety of the Northern Line tunnel and Chalk Farm London Underground station, once the proposals have been finalised.

The noise and vibrations associated with sheet piling is likely to make it unacceptable. A bored pile wall is likely to be the most appropriate method of supporting the basement excavation in the temporary and permanent conditions and could have the advantage of being incorporated into the permanent works and will be able to provide support for structural loads.

On the basis of the monitoring to date, it should be possible to adopt a contiguous bored pile wall, with the use of localised grouting and / or pumping if necessary in order to deal with groundwater inflows, subject to the results of the further testing and investigation to assess the rate of groundwater inflow as noted above.

The ground movements associated with the basement 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. In this respect the timing of the provision of support to the wall will have an important effect on movements. The stability of the adjacent foundations will need to be ensured at all times and the existing foundations will need to be underpinned prior to construction of the proposed new basement or will need to be supported by new retaining walls.

9.1.2 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	20
London Clay	1950	Zero	24

Groundwater has been measured at depths of between 1.87 m and 3.72 m and groundwater may be encountered during basement excavation. Further groundwater monitoring and trial excavations should be undertaken as detailed in Section 8.1.1. Reference should be made to

BS8102:2009[9] with regard to requirements for waterproofing and design with respect to groundwater pressures.

9.1.3 Basement Heave

Formation level of the approximately 1.80 m deep semi-level basement is likely to be within the firm weathered London Clay and will result in a net unloading of up to approximately 33 kN/m². The proposed excavations will result in elastic heave and long term swelling of the London Clay. The effects of the longer term swelling movement will to a certain extent be counteracted by the applied loads from the development. Further consideration is given to heave movements in Part 3.0 of this report.

9.2 Spread Foundations

The made ground was found to extend to a maximum depth of 2.60 m and desiccated clay soils were noted to extend to a depth of about 2.30 m, in close proximity to existing mature trees. Spread foundations bearing in the firm London Clay may be designed to apply a net allowable bearing pressure of 120 kN/m² at a minimum depth of 1.0 m, assuming that restrictions are applied on planting of shrubs in the vicinity of foundations, or at a depth of 1.5 m if there is unrestricted planting of shrubs in the new development, subject also to the further restrictions on new tree planting as detailed in the NHBC guidelines. Foundations, will however, need to be extended to depths greater than 2.60 m to bypass the made ground.

In any case, foundations will need to be deepened in the vicinity of existing and proposed trees and National House Building Council (NHBC) guidelines should be followed in this respect. High shrinkability clays should be assumed. Where trees are to be removed the required founding depth should be determined on the basis of the existing tree height if it is less than 50% of the mature height and on the basis of full mature height if the current height is more than 50% of the mature height. Where a tree is to be retained the final mature height should be adopted. Notwithstanding NHBC guidelines, all foundations should extend beyond the zone of desiccation. In this respect all foundation excavations should be inspected by a suitably experienced engineer.

The requirement for compressible material alongside foundations should be determined by reference to the NHBC guidelines.

If the proposed loads are high or the required founding depths become uneconomic piled foundations would provide a suitable foundation option.

9.3 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 but consideration will need to be given to the possible instability and water ingress in the made ground and within any silty or sandy zones within the London Clay. The use of bored piles installed using continuous flight auger (cfa) techniques may therefore be the most appropriate.

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

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

Stratum	Depth (m)	kN / m^2
Ultimate Skin Friction		
Made Ground	All soil above 2.60	Ignore
London Clay	2.60 to 24.00	Increasing linearly from 30 to 145
Ultimate End Bearing		
London Clay	2.60 to 24.00	Increasing linearly from 540 to 2610

In the absence of pile tests, guidance from the London District Surveyors Association (LDSA)[10] 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, the following pile capacities have been estimated.

Pile Diameter mm	Pile length m	Safe Working Load (kN)
450	22.00 m	985
600	18.00 m	955
600	22.00 m	1375

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 and claystones within the London Clay.

In the design of piled foundations the effect of potential future shrinkage and swelling of the clay should be taken into account. In designing for compressive loads it should be assumed that further desiccation, and hence shrinkage of the clay, could continue where trees are to remain. Pile shaft adhesion within the theoretical maximum future desiccated thickness should therefore be ignored.

Consideration will also need to be given to the effects of heave as a result of the basement excavation.

9.4 Ground and Basement Floor Slabs

Following the excavation of the partial basement, it is likely that the floor slab for the proposed basement will need to be suspended over a void to accommodate the anticipated heave and any potential uplift forces from groundwater pressures unless the slab can be

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

suitably reinforced to cope with these movements. This should be reviewed once the levels and loads are known.

Where the new buildings do not include a basement, the ground floor slab will need to be suspended over a void in in accordance with NHBC guidelines within the zone of influence of any existing or proposed trees. Outside the zone of influence of trees and following the removal of the made ground and a proof rolling exercise it should be possible to adopt a ground bearing floor slab bearing on the natural soils.

9.5 Shallow Excavations

On the basis of the borehole and trial pit findings it is considered likely that it will be feasible to form relatively shallow excavations terminating within the made ground and London Clay without the requirement for lateral support, although localised instabilities may occur. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

Significant inflows of groundwater into shallow excavations are not generally anticipated, although seepages may be encountered from perched water tables within the made ground or from within more silty and sandy horizons or around claystones from within the London Clay, although such inflows should be suitably controlled by sump pumping. However, if deeper excavations are considered or if excavations are to remain open for prolonged periods it is recommended that provision be made for battered side slopes or lateral support. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

9.6 Effect of Sulphates

Chemical analyses carried out on a total of four samples, including three samples of natural soils and a single sample of made ground have revealed concentrations of soluble sulphate and near-neutral pH in accordance with Class DS-2 conditions of Table C2 of BRE Special Digest 1 Part C (2005). The measured pH value of the samples shows that an ACEC class of AC-1s would be appropriate for the site. This assumes a static water condition at the site. The guidelines contained in the above digest should be followed in the design of foundation concrete.

9.7 Site Specific Risk Assessment

The desk study research has indicated that the site was developed prior to 1875 with housing and gardens and redeveloped in the 1930s with the existing building. The site has had a potentially contaminative history, having previously been developed with a filling station in the northwest part of the site. There are no records relating to any fuel tanks and it is not known if the tanks have been decommissioned or removed. The existing building has been used a garage for parking and maintenance of police vehicles at lower ground floor level. The site is currently vacant and occupied by live-in security.

The results of the contamination testing have revealed elevated arsenic and lead within some samples of the made ground. Arsenic was measured to be elevated within a single sample of made ground, at 70 mg/kg, above the screening value of 40 g/kg. Lead was noted to be elevated within two of the four samples of made ground tested, above the screening value of 310 mg/kg at 390 mg/kg from Borehole No 5 at a depth of 0.60 m and 1100 mg/kg from Borehole No 3B at a depth of 0.80 m.

The source of the metal contamination is likely to be extraneous fragments such as metal or ash. The lead and arsenic is likely to be non-volatile or of a low volatility and does not thus present a significant vapour risk. In addition the compounds are considered likely to be of low solubility and a risk to groundwater has not been identified. The contamination could, however, pose an unacceptable risk to human health through direct contact, accidental ingestion or inhalation of soil or soil derived dust.

No elevated concentrations of Total TPH were measured. In Borehole Nos 3A, 3B and 4 at depths of 0.40 m, 0.80 m and 0.60 m respectively, carbon chain lengths 16-35, which represent diesel and heavy heating oil were measured marginally above the detection limits.

In addition, 11 samples of natural soils were screened and generally no elevated concentrations of contaminants were measured, although a slightly elevated concentration of lead was noted in Borehole No 3B at a depth of 2.10 m at 230 mg/kg. This sample of London Clay was taken near the top of this stratum, directly beneath made ground, where elevated lead concentrations were measured and is likely to be the result of leaching from the made ground above.

Currently end users are isolated from direct contact with the identified contaminants by the extent of buildings and areas of external hardstanding, although within any soft landscaped areas, a pathway to end users may exist.

9.7.1 Protection of End Users and Planting

End users will be effectively isolated from direct contact with the other identified contaminants by the building and areas of external hardstanding. Protection measures will be required where any soft landscaping is included in the design proposals. At this stage it is recommended that a cover thickness of imported subsoil and topsoil of 600 mm in thickness should be specified for any areas of landscaping in accordance with recommendations from BRE[11]. It is likely to be possible to reduce the final thickness of cover required, but this will need to be determined once final levels have been established and the concentrations of potential contaminants within the imported material and in the soils at formation level are known. Imported soils should be certified as clean with appropriate documentation.

9.7.2 Protection of Site Workers

Site workers should be made aware of the metal contamination and potential hydrocarbon contamination within the soils and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE[12] and CIRIA[13] and the requirements of the Local Authority Environmental Health Officer.

A watching brief should also be maintained during the groundwork, and if suspicious soils are encountered then a suitably qualified geoenvironmental engineer should inspect the soils and further testing carried out if required.

A Discovery Strategy should be in place during the construction phase, the purpose of which is to define the procedures to be followed on site in the event that previously unidentified contamination or suspicious objects are discovered. It is intended to be understood and

11 BRE (2004) *Cover systems for land regeneration. Thickness of cover systems for contaminated land.* BRE pub 465
12 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land* HMSO
13 CIRIA (1996) *A guide for safe working on contaminated sites* Report 132, Construction Industry Research and Information Association

followed by all on-site workers and for all new site workers to be made aware of the procedure.

Confirmation of the correct installation of the imported topsoil will need to be validated by inspection of the soil as it is placed or by a series of trial holes / hand auger boreholes undertaken. In addition to the visual examination further samples of the material will be taken for laboratory testing and assessment against the Generic Risk Based Guideline Values for residential end use with plant uptake.

The report will include written and photographic records of the site inspections carried out, together with the results of the validation analyses and will present an assessment of the condition of the remediated site with respect to the end use.

9.7.3 Protection of Buried Services

Consideration may need to be given to the protection of buried plastic services laid. Details of the proposed protection measures for buried plastic services will in any case need to be approved by the EHO and local water authority prior to the adoption of any scheme. It is possible that barrier pipe will be required or additional testing will need to be carried out.

9.8 Waste Disposal

Under the European Waste Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste classification is a staged process and this investigation represents the preliminary sampling exercise of that process. Once the extent and location of the waste that is to be removed has been defined, further sampling and testing may be necessary. The results from this ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site. It should however be noted that the Environment Agency guidance WM3[14] states that landfill WAC analysis, specifically leaching test results, must not be used for waste classification purposes.

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE[15] guidance, will need to be disposed of to a licensed tip. Waste going to landfill is subject to landfill tax at either the standard rate of £82.60 per tonne (about £150 per m^3) or at the lower rate of £2.60 per tonne (roughly £5 per m^3). However, the classifications for tax purposes and disposal purposes differ and currently all made ground and topsoil is taxable at the ‘standard’ rate and only naturally occurring soil and stones, which are accurately described as such in terms of the 2011 Order , would qualify for the ‘lower rate’ of landfill tax.

Based upon on the technical guidance provided by the Environment Agency it is considered likely that the soils encountered during this ground investigation, as represented by the 15 chemical analyses carried out, would be generally classified as follows;

14 Environment Agency 2015. *Guidance on the classification and assessment of waste.* Technical Guidance WM3 First Edition
15 CL:AIRE March 2011. *The Definition of Waste: Development Industry Code of Practice* Version 2

Soil Type	Waste Classification (Waste Code)	WAC Testing Required Prior to Landfill Disposal?	Comments
Made ground	Non-hazardous (17 05 04)	No	Any soils saturated with hydrocarbons would be classified as a hazardous waste, so on site screening may be required
London Clay	Inert (17 05 04)	Yes	

As the site has previously been used as a fuel station / garage and depot for the maintenance of cars it is possible that WAC leaching tests may be required by the receiving landfill to confirm that these natural soils could be disposed of to landfill as an inert waste.

Any soils saturated it would be prudent to assume that they would be classified as a hazardous waste under the waste code 17 05 03 (soils and stones containing dangerous substances) and would be taxable at the standard rate.

Under the requirements of the European Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper[16] which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be segregated onsite prior to excavation by sufficiently characterising the soils insitu prior to excavation.

The above opinion with regard to the classification of the excavated soils is provided for guidance only and should be confirmed by the receiving landfill once the soils to be discarded have been identified.

The local waste regulation department of the Environment Agency (EA) should be contacted to obtain details of tips that are licensed to accept the soil represented by the test results. The tips will be able to provide costs for disposing of this material but may require further testing.

16 Environment Agency 23 Oct 2007 *Regulatory Position Statement Treating non-hazardous waste for landfill - Enforcing the new requirement*

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.

10.0 INTRODUCTION

The sides of a basement 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 together with the efficiency of the various support systems employed during construction.

An analysis has been carried out of the likely movements arising from the proposed basement excavation and the results of this analysis have been used to predict the effect of these movements on surrounding sensitive structures, including the adjacent Chalk Farm London Underground station box.

10.1 Construction Methodology

The existing building, which is supported on ground bearing foundations will be demolished to ground level.

It is anticipated that the existing basement walls may require temporary propping to prevent them failing once the existing ground slab is removed. The existing basement structure can then be safely excavated with its foundations grubbed out. It is likely that this work can be carried out using ‘open-cut’ excavation although some nominal temporary sheet piling may be required.

The extent of the new basement construction largely overlaps with the existing. In areas where it is extended this is adjacent to a boundary where existing buildings are a significant distance away. On this basis it is anticipated that the new boundary can be constructed using temporary sheet piling as support to the excavation.

Beyond the areas described above the existing ground slab can be removed and the existing foundations grubbed out without compromising the stability of adjoining buildings or public footpaths. There are only nominal existing retaining features at the perimeter of the existing buildings. The new piled foundations can then be installed using traditional ground support techniques to local excavations (eg for the pile caps and ground beams). The new structure can then be constructed above this.

11.0 BASIS OF ANALYSIS

The ground movement assessment has used the following drawings to model the sensitive structures and proposed excavations.

Drawing Reference	Purpose of Information
140870-X-00-DR-S-1100_P3	Proposed Development
140870-X-00-DR-S-1099_P2	Proposed Development
140870_EXISTING BS LOCATION & NEW LG LEVEL 27.06.16	Existing Site
140870_LUL SURVEY_Section Location	Location of tunnel closest to site, furthest tunnel is assumed to follow the same line, 3 m from first tunnel
LU Metro plan produced by ‘14:51 11/11/2015’	LU Tube line drawings
Tube line drawings N047-04s rev C dated 15/10/12, N047-05s rev A dated 23/01/09 and N047-02s no rev, survey date 03/10/08.	LU Tube line drawings
Drawing No N.7124, from London Transport Executive	Alignment of tunnel to the east of Chalk farm station and position and dimensions of Chalk Farm Station box
Extract from The Architect and Building News’ dated 060/01/39	Existing building column positions and depths
SSK104, dated Nov 2015	For recently constructed 2 storey column positions and existing loads
13491-AP-L00-00-100 dated May 2016	Position of existing and proposed basements
DWG-SUR-N046-0000001, dated 19 November 2015	LU survey drawing, assuming tunnel levels are track level
N7124 dated 1950s	LU Tube line drawings

Ground Movement Assessment assumptions:

- No evidence of lower ground floor of Eton Place on planning portal or street view, therefore foundations are assumed to be 0.6 m deep.
- Track level of Tunnel 1 is assumed equal to Tunnel 2.
- Access tunnels – base assumed at top level of main tunnels (7.5 m below ground level of 32.2) and assumed 2.5 m high.
- Foundations of Chalk Farm station are assumed to extend to 1.2 m below ground level based on recent trial pit findings.
- The construction sequence and details of the proposed foundations have been provided by Conisbee and are summarised in section 9.1 of this report.

The following sequence of operations has been assumed to enable analysis of the ground movements around the proposed basement both during and after construction.

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

1. Demolish the existing six-storey building.

2. Construct reinforced concrete retaining walls. These are commonly formed in a 'hit and miss' sequence following a partial excavation of the basement with berms to prevent significant ground unloading and using a trench box excavation, commonly sheet lined, shored and strutted; all temporary shoring and propping to be inspected by a suitably qualified person; and

3. Fully excavate new basement and temporarily retain and strengthen, with sufficient propping and walling beams, the new retaining walls. Construct new ground beams.

The new retaining walls will be adequately laterally propped and sufficiently dowelled together, concrete cast and adequately cured prior to excavation of the basement and removal of the formwork and supports. It is assumed that the corners of the excavation will not be stiffened and that the new retaining walls will be cantilevered during the construction process.

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 contractor once appointed.

When the final excavation depths have been reached the permanent works will be formed, which are likely to comprise reinforced concrete walls with a drained cavity lining the inside of the retaining walls. Reinforced concrete will be used for floor slabs at basement and ground level and it is anticipated that heave protection may be installed beneath the basement slab.

Following this, the temporary props will be removed.

12.0 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 southwest-northeast, whilst the y-direction is parallel with the orientation of southeast-northwest. Vertical movement is in the z-direction. Wall lengths of less than 10 m have been modelled as 1 m long structural elements, while greater than 10 m wall lengths have been modelled as 2 m elements to reflect the greater stiffness of the longer walls. The full outputs of all the analyses can be provided on request and samples of the output movement contour plots are included within the appendix.

12.1 Ground Movements – Surrounding the Basement

12.1.1 Model Used

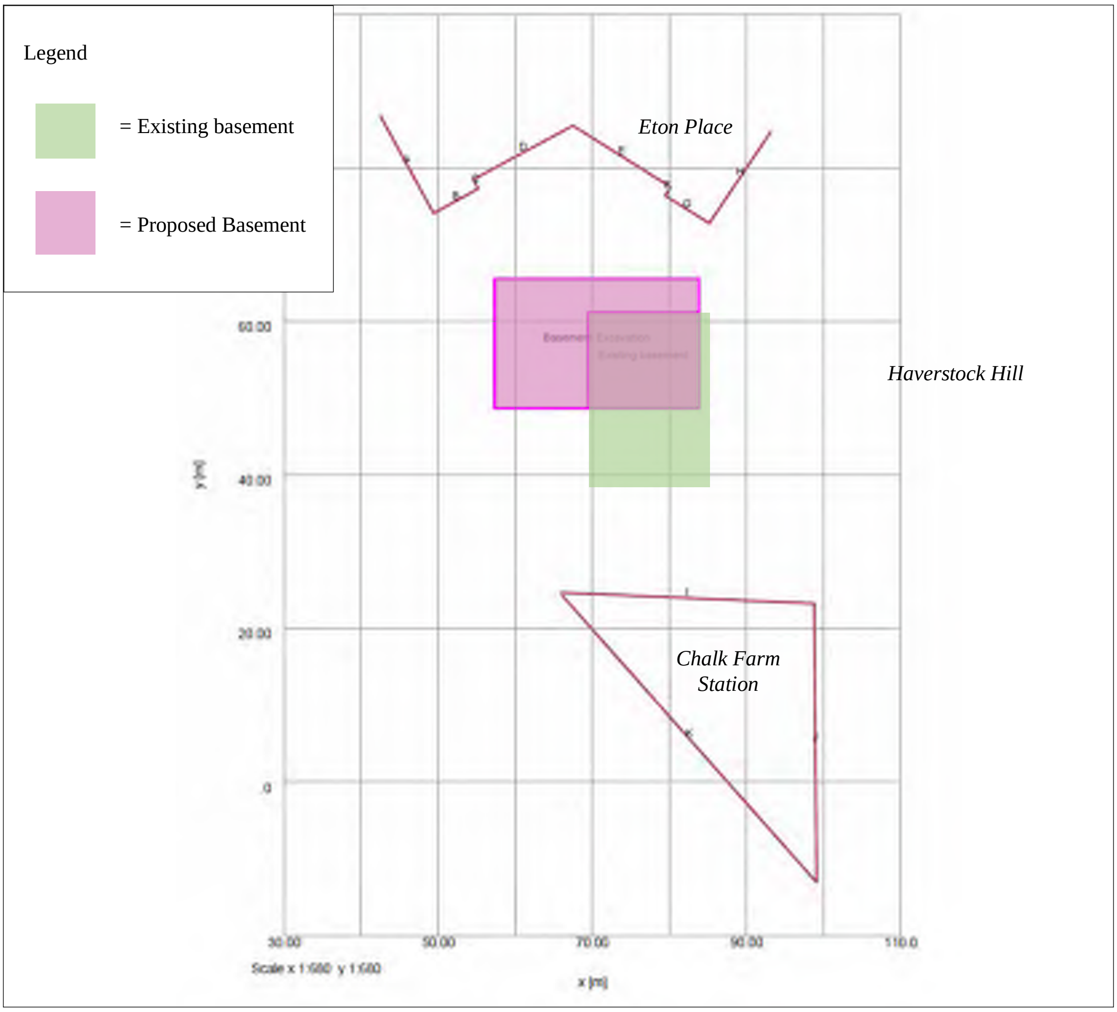
For the X-Disp analysis, the soil movement relationships used for the embedded retaining walls are the default values within CIRIA report C580[17], which were derived from a number of historic case studies. The analysis has adopted the values for 'installation of a planar diaphragm wall' to represent the installation of the reinforced concrete retaining walls. The ground movement curves for 'excavations in front of a low stiffness wall in stiff clay' have been adopted as being considered most appropriate for the proposed excavation and its support at this site as the walls will be generally supporting cohesive soils.

5.1.2 Results

The predicted movements are based on the worst case of the individually analysed segments of 'hogging' and 'sagging' and these are summarised in the tables overleaf. It should be noted that the combined effect of segments acting together typically improve the resultant movements and the values below are therefore deemed to be conservative. The diagram below details the relevant sensitive structures in relation to the proposed excavations.

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

Displacement Analysis Points:



The heights and basement depths of each of the nearby sensitive structures are summarised in the table below. All heights are measured from existing lower ground floor level.

Sensitive Structure	Elevation	Depth below existing ground floor level of basement / foundations (m)	Height of building above ground level (m)
Eton Place	A to H	0.6	18.9
Chalk Farm Station	I to K	1.2	7.9

The results are tabulated below and have been 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.

Wall Installation Phase:

Sensitive Structure	Elevation	Vertical Movement (Settlement) (mm)	Horizontal Movement (mm)
Eton Place	A to H	0	0
Chalk Farm Station	I to K	0	0

Wall Installation and Excavation Phases Combined:

Sensitive Structure	Elevation	Vertical Movement (Settlement) (mm)	Horizontal Movement (mm)
Eton Place	A to H	< 1	< 1
Chalk Farm Station	I to K	0	0

The analysis has indicated that the maximum vertical settlements and horizontal movements that will result from the new retaining wall construction are negligible. Furthermore, the analysis has indicated that the maximum vertical settlements and horizontal movements that will result from the combined effect of the retaining wall installation and excavation are less than 1 mm.

12.2 Movements within the Excavation (Heave)

12.2.1 Model Used

At this site unloading of the London Clay will take place as a result of the proposed basement excavation and the reduction in vertical stress in the short term 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 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[18] and Butler[19] and more recently by O'Brien and Sharp[20]. Relationships of $E_u = 500\ C_u$ and $E' = 300\ C_u$ for the cohesive soils have been used to obtain values of Young's modulus. More recent published data[21] indicates stiffness values of 750 x Cu for the London Clay and a ratio of E' to Eu of 0.75, and it is considered that the use of the more conservative values provides a sensible approach for this stage in the design. The profile of the underlying London Clay has been interpolated from the recent ground investigation carried out by GEA.

It is understood that the new building will be supported by means of piled foundations and it

18 Padfield CJ and Sharrock MJ (1983) *Settlement of structures on clay soils.* CIRIA Special Publication 27

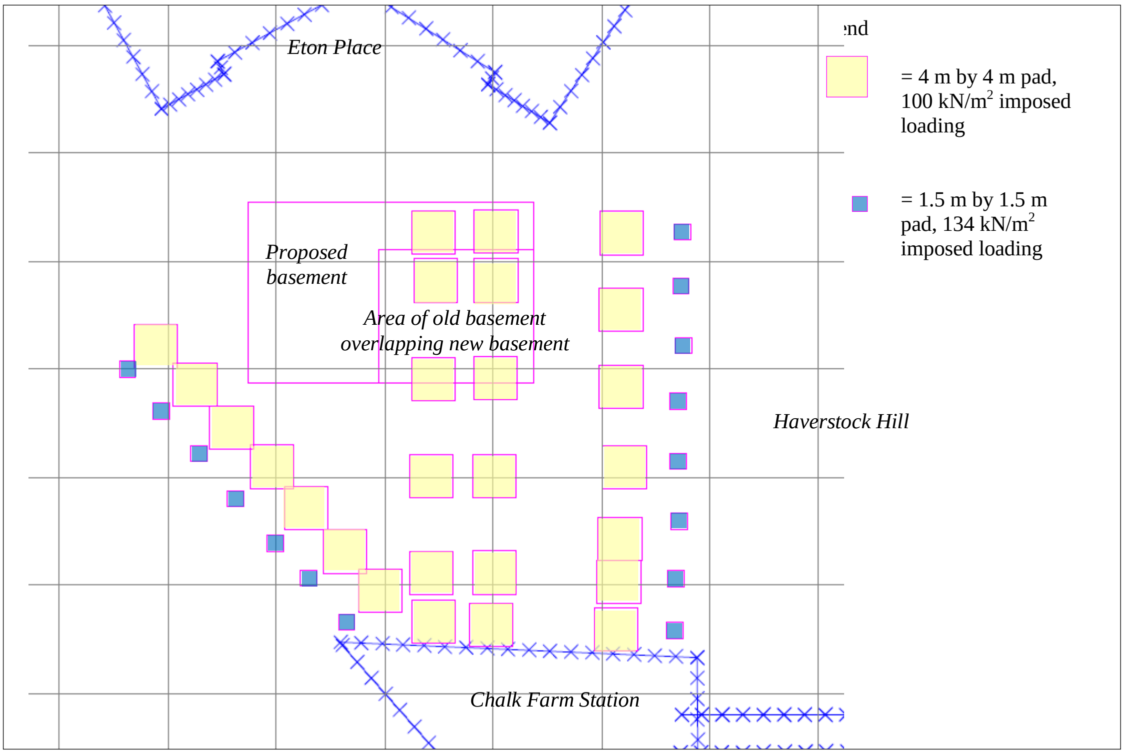
19 Butler FG (1974) *Heavily overconsolidated clays: a state of the art review.* Proc Conf Settlement of Structures, Cambridge, 531-578, Pentech Press, Lond

20 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

21 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

is assumed that there will be no new net loading applied at proposed basement level.

The proposed basement excavation will result in a net unloading of around 42 kN/m^2 which is assumed to act at a depth of 2.1 m below existing lower ground floor level. It is assumed that the existing 0.9 m basement deepening, where it is not intersected by the new proposed basement, will be backfilled with a small loading of around 15 kN/m^2. The existing six-storey building is supported by means of a number of pad foundations. For the purpose of this assessment, these have been rationalised into large pads and small pads and these are shown on the diagram below.



Plan: Proposed Unloading Arrangement

The soil parameters used in this assessment are tabulated below.

Stratum	Depth range (m) [Level range mOD]	Eu (MPa)	E' (MPa)
Made Ground	GL to 3.0	20.0	20.0
London Clay	3.0 to 25.0	45.0 – 132.5	27.0 – 79.5

A rigid boundary for the analysis has been set within the clay of the Lambeth Group that underlies the London Clay at a depth of 68 m below existing ground level, where nearby BGS records indicate that the base of these formations are likely to be present.

12.2.2 Results

The P-Disp analysis indicates that, in general, the heave magnitudes are dominated by the removal of the pad loading and to a lesser extent by the excavation of the proposed basement, although it is assumed that both the basement excavation and foundation removal happen simultaneously. By the time the basement construction is complete, around 10 mm to 15 mm of heave is likely to have taken place at the centre of the proposed excavation, with magnitudes ranging between 5 mm and 15 mm at the edges due to the close proximity of the

pad unloading.
An additional 15 mm to 20 mm of long term heave may theoretically occur at the centre of the proposed excavation following construction, although this again dominated by the removal of pad foundations. In general across the remainder of the site, total heave movement due to the removal of the pad foundations vary between about 5 mm and 25 mm.

The results of the P-Disp analysis can be used to indicate the likely impact of the proposed basement construction beyond the site boundaries; about 5 m away from the excavation a total movement of around 5 mm to 10 mm is predicted, reducing to movements of less than 5 mm about 10 m away. The heave effects on the nearby LU tunnel are addressed in Section 14.

A void or layer of compressible material may need to be incorporated into the design to accommodate these potential long term movements. 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 % of the total unloading pressure.

13.0 DAMAGE ASSESSMENT

In addition to the above assessment of the likely movements that will result from the proposed development, the neighbouring buildings are considered to be sensitive structures, requiring Building Damage Assessments, on the basis of the classification given in Table 2.5 of C580[1].

All structures are shown on the plan in Section 5.1.2.

13.1 Damage to Neighbouring Structures

The movements resulting from the wall installation phase and the combined retaining wall installation and basement excavation phases, have been calculated using the X-Disp modelling software to carry out an assessment of the likely damage to adjacent properties and the results are summarised for the combined wall installation and basement excavation in the table below.

The potential heave movements predicted by P-Disp have not been included in this assessment, which can therefore be considered as conservative, as these movements are likely to have a mitigating effect on the downward settlement predicted by X-Disp. The resultant total stress and strain due to the proposed development on the nearby LU tunnel is addressed in Section 14.

Sensitive Structure	Elevation	Maximum Category of Damage*
Eton Place	A to H	Category 0 - Negligible
Chalk Farm Station	I to K	Category 0 - Negligible

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

The analysis has predicted that the proposed installation of the retaining walls and excavation of the proposed basement may generally result in a building damage for sensitive structures of Category 0 (negligible), which falls within acceptable limits according to the Camden Planning Guidance (CPG4).

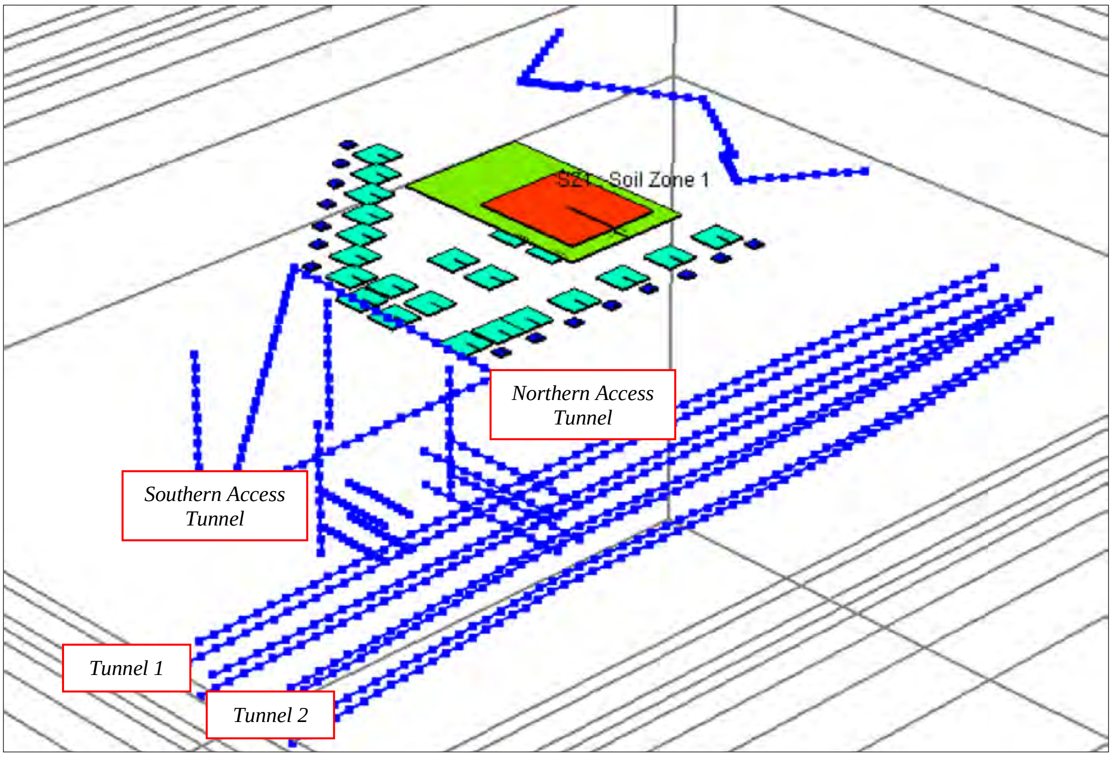
13.2 Monitoring of Ground Movements

The predictions of ground movement based on the ground movement analysis should be checked by monitoring of the adjacent properties and structures. The structures to be monitored during the construction stages should include the neighbouring 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.

14.0 TUNNEL MOVEMENTS

The proposed basement extension will be in close proximity to the Northern Line of the London Underground which runs below Haverstock Hill, adjacent to the site. Chalk Farm London Underground station is located adjacent to the southeastern boundary of the site.

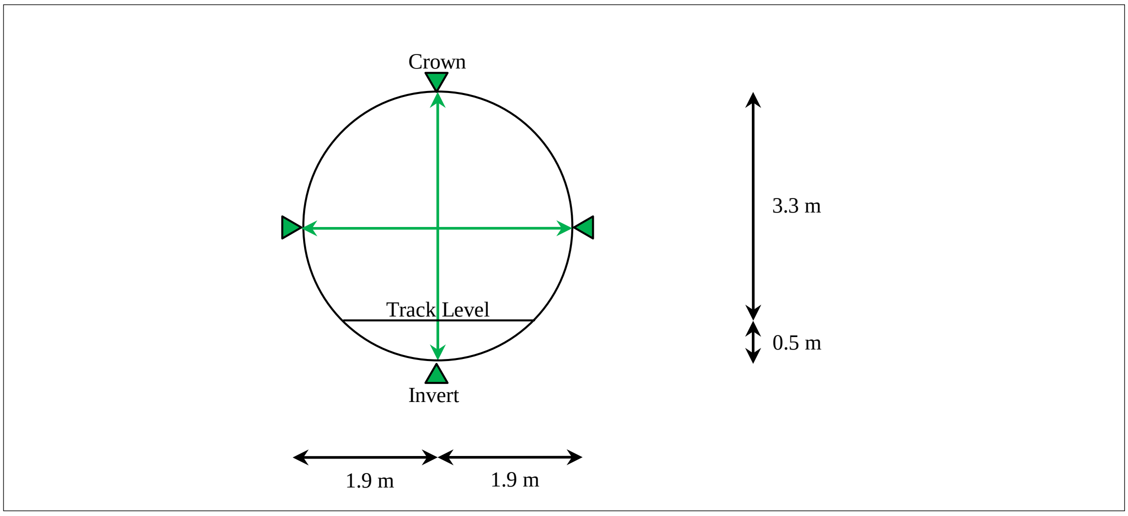


3-Dimensional View of tunnel arrangement

London Underground Drawing Ref N7124 dated 1950s

The Chalk Farm station box extends to a depth of 9.2 m below ground level and it is assumed that the proposed demolition and basement construction will not have a notable effect on this structure, as it is presumably formed of stiff piled foundations that are not likely to be affected by any ground movement. The Northern Line tunnels are circular in cross section, with diameters of 3.8 m. The tunnels have been modelled from LU drawings provided by the consulting engineers at depths of around 6.5 m at the northwestern extent of Haverstock Hill and around 7.5 m depth at the southeastern extent of Haverstock Hill. All levels are measured from an arbitrary site datum level and corrected to take account of the downward slope of Haverstock Hill to the southeast.

There are two access tunnels that lead from the station box horizontally over the two Northern Line Tunnels to provide pedestrian access to the platforms. These tunnels have been modelled at a depth of 5 m below ground level and are assumed to be rectangular in shape, with a width and height of roughly 3 m and 2.5 m respectively.



Typical Section through Tunnels 1 or 2

The analysis has been carried out using the Oasys PDisp software. The LU tunnel has been modelled at four discrete reference points; the crown level, invert level, and the widest points along the northern and southern walls.

The approximate locations of the four reference points described above have been analysed along the length of the tunnel adjacent to the site based on drawings provided by the consulting engineers. The four points have been modelled at roughly 1.9 m intervals.

The analysis will assess the change in vertical movement of the four reference points in order to demonstrate the differential movement, if any, across the tunnel structure. The analysis will also provide an assessment of the vertical stress and strain along the crown level of the tunnel.

Tunnel 1 Short term movements:

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m^2)	Maximum Vertical Strain (%)
Crown	2 mm heave	-3	48×10^{-6}
Invert	2 mm heave	-6	24×10^{-6}
Northern side wall	2 mm heave	-3	37×10^{-6}
Southern side wall	2 mm heave	-7	31×10^{-6}

Tunnel 1 Total movements:

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m^2)	Maximum Vertical Strain (%)
Crown	5 mm heave	-3	-35×10^{-6}
Invert	4 mm heave	-6	-73×10^{-6}
Northern side wall	4 mm heave	-3	-27×10^{-6}
Southern side wall	5 mm heave	-7	104×10^{-6}

Tunnel 2 Short term movements:

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m^2)	Maximum Vertical Strain (%)
Crown	1 mm heave	-0.3	27×10^{-6}
Invert	1 mm heave	-0.7	24×10^{-6}
Northern side wall	1 mm heave	-0.3	23×10^{-6}
Southern side wall	1 mm heave	-0.7	31×10^{-6}

Tunnel 2 Total movements:

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m^2)	Maximum Vertical Strain (%)
Crown	2 mm heave	-0.3	11×10^{-6}
Invert	2 mm heave	-0.7	6×10^{-6}
Northern side wall	2 mm heave	-0.3	8×10^{-6}
Southern side wall	3 mm heave	-0.7	7×10^{-6}

Northern Access Tunnel Short Term movements:

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m^2)	Maximum Vertical Strain (%)
Top North	1 mm heave	-0.8	50×10^{-6}
Top South	1 mm heave	-0.3	36×10^{-6}
Base North	1 mm heave	-2.1	35×10^{-6}
Base South	1 mm heave	-0.9	35×10^{-6}

Northern Access Tunnel Total movements:

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m^2)	Maximum Vertical Strain (%)
Top North	4 mm heave	-0.8	12×10^{-6}
Top South	3 mm heave	-0.3	14×10^{-6}
Base North	4 mm heave	-2.1	-20×10^{-6}
Base South	3 mm heave	-0.9	8×10^{-6}

Southern Access Tunnel Short Term movements:

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m^2)	Maximum Vertical Strain (%)
Top North	1 mm heave	-0.03	15×10^{-6}
Top South	1 mm heave	-0.02	12×10^{-6}
Base North	1 mm heave	-0.11	19×10^{-6}
Base South	1 mm heave	-0.07	15×10^{-6}

Southern Access Tunnel Total movements:

Tunnel Reference Point	Maximum Vertical Displacement (mm)	Maximum Vertical Stress (kN/m^2)	Maximum Vertical Strain (%)
Top North	2 mm heave	-0.03	8×10^{-6}
Top South	1 mm heave	-0.02	6×10^{-6}
Base North	2 mm heave	-0.11	8×10^{-6}
Base South	1 mm heave	-0.07	7×10^{-6}

A total displacement of 5 mm is likely to fall outside LU tolerances and further consideration may need to be given to mitigate such movements. It is possible that if new loads generated by the proposed building are transmitted by means of new pads or a raft foundation, this may control to some extent any undesirable movements on the adjacent tunnels and further analysis is likely to be required in this respect.

15.0 CONCLUSIONS

The analysis has predicted that the proposed installation of the retaining walls and excavation of the proposed basement may generally result in a building damage for sensitive structures of Category 0 (negligible), which falls within acceptable limits according to the Camden Planning Guidance (CPG4).

The separate phases of work, including excavation of the proposed basement, will in practice be separated by a number of weeks during which time construction of permanent supports, basement slab and retaining wall curing will take place. This will provide an opportunity for the ground movements during and immediately after retaining 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.

16.0 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.

The ground investigation has confirmed the presence of London Clay beneath the site, proved to the maximum depth investigated of 24.70 m.

It is proposed to construct two new buildings, up to seven storeys, plus a semi-level basement, extending to a depth of approximately 1.80 m below the central northern part of the site. The proposed basement will be wholly within the London Clay. Monitored water levels in the standpipes have been measured between 1.87 m and 3.72 m. Shallow monitored groundwater levels within standpipes is a common feature of low permeability clay strata and is not necessarily indicative of a consistent water table as would be the case within a permeable water bearing strata. Thus, although the basement may extend below the monitored water levels in standpipes it is not the case that it extends below a general and continuous groundwater table.

The London Clay is classified by the Environment Agency as Unproductive Strata; not capable of storing and transmitting groundwater in sufficient quantities to support baseflow to watercourses or private supplies.

On the basis of the results of the ground investigation, it is not considered that the proposed basement would result in a significant change to the groundwater flow regime in the vicinity of the proposal or on the amount of annual recharge into the London Clay. This is due to its very low permeability and its inability to conduct groundwater flow.

Potential Impact	Site Investigation Conclusions
Seasonal shrink-swell can result in foundation movements	The London Clay is the shallowest stratum at the site and laboratory testing has indicated a high low volume potential change. Shrinkable clay is present within a depth that can be affected by tree roots and desiccation of the clay soils was noted and should be bypassed. New foundations will need to be designed in accordance with NHBC guidelines to protect from future shrinking and swelling associated with tree removal / growth. Subject to inspection of foundation excavations in the normal way.
Damage to trees – heave of clay soils	Damage to tree roots during construction works may lead to the death of trees, which would result in long term swelling of the clay. An arboriculturist should be consulted for advice, along with the tree officer at the Local Authority, to ensure damage does not occur and this could lead to structural damage of neighbouring properties and new building on site.
Site within 5 m of a highway – excavation of basement could lead to damage	The investigation has not indicated any specific problems, such as weak or unstable ground, voids or a high water table that would make working within 5 m of public infrastructure particularly problematic at this site. A retention system will be adopted that maintains the stability of the excavation at all times.
Location of the Northern Line Underground tunnel	A ground movement assessment has been to confirm movements that may affect the tunnel as a result of demolition of the existing building and construction of a new building and the results are discussed in Section 3 of this report. Consultation will be required with LUL prior to commencement.

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

Shrink / swell potential of / London Clay

Shrinkable clay is present below the site and damage is noted on site to some structures, in close proximity to existing trees. Numerous trees are present on the site and desiccation was noted within two boreholes, drilled in close proximity to existing trees. The proposed single level basement is likely to extend well below the potential depth of root action, but this should be confirmed once proposals have been finalised.

Tree protection orders

A check should be undertaken by an arboriculturist to ensure that the proposals do not damage tree roots which could lead to death of the trees and long term swelling of clay, which could lead to structural damage on site. Foundations of the proposed basement should extend beyond the zone of tree root activity.

Location of public highway

A retention system will be adopted that maintains the stability of the excavation at all times.

16.1 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.

16.1.1 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?	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.
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.
2. Is the site within 100 m of a watercourse, well (used/ disused) or potential spring line?	Historical 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?	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.
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.

Question	Evidence
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°?	Site survey drawing 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 along the northern perimeter of the site and along the Haverstock Hill frontage. An arboriculturist should be consulted to ensure no damage to tree roots and if trees are to be removed
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 was 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.
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?	Site plans and the site walkover.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Camden planning portal 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.

16.1.2 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 has been 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 foundations of the Chalk Farm LUL station. The findings of the investigation are discussed in Section 6.0 of this report and summarized in both Section 8.0 and the Executive Summary.

16.1.3 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 and building damage assessment, which has also been used to provide a conclusion on any potential impacts from the proposed basement development.

17.0 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.

Further groundwater monitoring should be carried out to establish equilibrium levels and the extent of any seasonal fluctuations. It would be prudent to carry out a number of trial excavations, to depths as close to the full basement depth once access becomes available, to provide an indication of the likely groundwater conditions.

All new foundations should extend beyond the zone of desiccation. In this respect it would be prudent to have all foundation excavations inspected by a suitably experienced engineer.

It is understood that part of the site was occupied by a fuel station built in the late 1930s, but no further details are known. It is possible that buried fuel tanks are still present beneath the site and trace concentrations of hydrocarbon contamination was identified in the external car park, near three chambers. It would be prudent to undertake trial excavation around the three chambers once services have been disconnected to investigate the metal obstruction encountered in Borehole No 3A at a depth of 0.56 m.

Ground workers should be made aware of the potential for contamination at this site, given the history of the site and should any odorous, discoloured or suspicious material be encountered, or evidence of buried tanks, are encountered during groundworks the works should be suspended in that area and an experienced geoenvironmental engineer should be contacted to attend site to inspect and provide further advice in this regard, with regards to remedial measures.

Appropriate records, such as waste transfer notes, demonstrating that the transport of soil material off-site for treatment and/or disposal should be kept appropriately. Waste tickets should be retained for the production of the verification report.

These areas of doubt should be drawn to the attention of prospective contractors and further investigation will be required or sufficient contingency should be provided to cover the outstanding risk.

APPENDIX

Borehole Records

SPT Summary Sheet

Trial Pit Records

Results of Soil Vapour Survey

Geotechnical Laboratory Test Results

SPT & Cohesion / Depth Graph

Chemical Analyses (Soil)

Generic Risk Based Screening Values

SOIL DISPLACEMENT MODEL RESULTS

X-DISP ANALYSIS

Underpinning

Contour Plots of Vertical Movements and Horizontal Movements

Basement Excavation

Contour Plots of Vertical Movements and Horizontal Movements

Underpinning and Basement Excavation

Contour Plots of Combined Vertical Movements and Horizontal Movements

P-DISP ANALYSIS

Short Term Movement

Total Movement

BUILDING DAMAGE ASSESSMENT (X-DISP)

Tabular Output of Results

Envirocheck Report Summary

Historical Maps

Findings of Petroleum Search

Camden Contaminated Land Department correspondence

Preliminary UXO Risk Assessment by First Line Defence

LUL correspondence

Tunnel correlation survey

Site Plan

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	Site 5 - 17 Haverstock Hill, London NW3 2BL	Borehole Number **BH 1**

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 02/12/2015	**Engineer** Conisbee	**Sheet** 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.05) 0.05	Tarmac		
						(0.15) 0.20	Reinforced concrete		
0.60	D						MADE GROUND (brown clay with rare orange-brown partings of sand and silt, half bricks, charcoal, concrete and roots. Rare medium to coarse subangular flint gravel noted from a depth of 2.00 m)		
1.20-1.65 1.20-1.65	CPT N=7 B	1.20	DRY	1,1/2,1,2,2		(2.40)			
1.80	D								
2.00-2.45 2.00-2.45	CPT N=15 B	2.00	DRY	2,3/5,5,3,2					
						2.60	Firm becoming stiff fissured high strength brown mottled grey silty CLAY with abundant selenite crystals, rare occasional partings of orange-brown fine sand and silt. Dead rootlets noted to a depth of 3.00 m. Claystone encountered at a depth of 3.50 m. Rare carbonaceous material noted from a depth of 5.00 m		
2.70	D								
3.00-3.45	U								
3.50	D								
3.80	D								
4.00-4.45 4.00-4.45	SPT N=15 D	3.00	DRY	2,3/3,3,4,5					
4.70	D								
5.00-5.45	U								
5.50	D								
6.00-6.45 6.00	SPT N=18 D	3.00	DRY	3,3/4,4,5,5		(7.00)			
7.50-7.95	U								
8.00	D								
9.00-9.45 9.00	SPT N=21 D	3.00	DRY	4,5/5,5,5,6					
						9.60	Stiff becoming very stiff fissured high strength becoming extremely high strength grey silty CLAY with rare grey burrows, specklings of mica and black specks. Claystones		
9.90	D								

Remarks
Hand-dug service pit to a depth of 1.20 m (60 minutes)
Chiselling from 10.20 m and 10.30 m (30 minutes) and 17.60 m to 17.80 m (30 minutes)
Standpipe installed to a depth of 6.0 m
Groundwater measured at a depth of 2..08 m on 18/12/2015 and 2.05 m on 13/01/2016

Scale (approx)	Logged By
1:50	HD

Figure No.
J15316.BH 1

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Site 5 - 17 Haverstock Hill, London NW3 2BL				**Borehole Number** BH 1
Boring Method Cable Percussion	**Casing Diameter** 150mm cased to 3.00m	**Ground Level (mOD)**	**Client** Mark Steinberg	**Job Number** J15316
	Location	**Dates** 02/12/2015	**Engineer** Conisbee	**Sheet** 2/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							encountered at depths of 10.20 m, 17.60 m and 24.60 m		
10.30	D								
10.50-10.95	U								
11.00	D								
12.00-12.45	SPT N=23	3.00	DRY	5,5/5,5,6,7					
12.00	D								
13.50-13.95	U								
14.00	D								
15.00-15.45	SPT N=26	3.00	DRY	6,6/6,6,7,7					
15.00	D								
16.50-16.95	U								
17.00	D								
						(15.10)			
17.80	D								
18.00-18.45	SPT N=35	3.00	DRY	6,7/8,8,9,10					
18.00	D								
19.50-19.95	U								

Remarks	**Scale (approx)** 1:50	**Logged By** HD
	Figure No. J15316.BH 1	

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Borehole Number** **BH 1**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 02/12/2015	**Engineer** Conisbee	**Sheet** 3/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
20.00	D								
21.00-21.45 21.00	SPT N=45 D	3.00	DRY	7,8/9,11,12,13					
						(15.10)			
22.50-22.95	U								
23.00	D								
24.50-24.73 24.50	SPT 32/75 D	3.00	DRY	9,10/32		24.70			
							Complete at 24.70m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No. J15316.BH 1	

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Borehole Number** **BH 2**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 03/12/2015	**Engineer** Conisbee	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.05) 0.05	Tarmac		
						(0.20) 0.25	Reinforced concrete		
0.60	D1						MADE GROUND (brown mottled greyish brown silty sandy clay with fine to coarse subangular to rounded flint, brick, ash, coal and rootlets. Concrete encountered between 2.50 m and 2.60 m)		
1.20-1.65 1.20-1.65	CPT N=5 B2	1.20	DRY	1,0/1,1,2,1		(2.35)			
2.00-2.45 2.00-2.45	CPT N=3 B3	2.00	DRY	1,0/0,1,1,1					
				Seepage(1) at 2.50m, sealed at 3.00m.					∇1
						2.60	Firm becoming stiff fissured high strength and very high strength brown mottled grey silty CLAY with rare partings of orange-brown fine sand and silt, selenite crystals. Rare carbonaceous material noted from a depth of 4.00 m. Claystone encountered at a depth of 3.80 m. Dead rootlets noted at a depth of 4.80 m		
2.80	D4								
3.00-3.45 3.00	SPT N=8 D5	3.00	DRY	1,1/1,2,2,3					
3.60 3.80	D6 D7								
4.00-4.45	U8								
4.50	D9								
4.80	D10								
5.00-5.45 5.00	SPT N=14 D11	3.00	DRY	2,3/3,3,4,4					
6.00-6.45	U12								
						(7.20)			
6.50	D13								
7.50-7.95 7.50	SPT N=16 D14	3.00	DRY	3,3/3,4,4,5					
9.00-9.45	U15								
9.50	D16								
						9.80	Stiff becoming very stiff fissured high strength and very high		

Remarks
Hand-dug service pit to a depth of 1.20 m
Standpipe installed to a depth of 6.00 m
Groundwater measured at depths of 1.88 m on 18/12/2015 and 1.87 m on 13/01/2016

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

Figure No.
J15316.BH 2

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Borehole Number** **BH 2**

Boring Method	**Casing Diameter**	**Ground Level (mOD)**	**Client**	**Job Number**
Cable Percussion	150mm cased to 3.00m		Mark Steinberg	J15316
	Location	**Dates** 03/12/2015	**Engineer** Conisbee	**Sheet** 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00	D17						strength silty CLAY with rare shell fragments. Rare partings of grey fine sand and silt. Pyrite nodule noted at a depth of 14.50 m		
10.50-10.95 10.50	SPT N=23 D18	3.00	DRY	4,4/5,5,6,7					
12.00-12.45	U19								
12.50	D20					(5.20)			
13.50-13.95 13.50	SPT N=26 D21	3.00	DRY	5,5/6,6,7,7					
14.50-14.95	U22								
15.00	D23					15.00			
							Complete at 15.00m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No. J15316.BH 2	

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Site 5 - 17 Haverstock Hill, London NW3 2BL				**Number** BH 3
Excavation Method Hand-dug service pit	**Dimensions**	**Ground Level (mOD)**	**Client** Mark Steinberg	**Job Number** J15316
	Location	**Dates** 24/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.08) 0.08	Tarmac		
					(0.08) 0.16	Concrete. At a depth of 0.08 m, exposed 50 mm of metal on side of pit. Borehole terminated and relocated 1 m		
						Complete at 0.14m		

Remarks	**Scale (approx)** 1:50	**Logged By** HD
	Figure No. J15316.BH 3	

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Site	5 - 17 Haverstock Hill, London NW3 2BL			**Number** BH 3A
Excavation Method Hand-dug service pit	**Dimensions**	**Ground Level (mOD)**	**Client** Mark Steinberg	**Job Number** J15316
	Location	**Dates** 24/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.06) 0.06	Tarmac		
					(0.13) 0.19	Concrete		
0.40	D1				(0.07) 0.26	Concrete		
					(0.08) 0.34	Concrete with metal mesh on underside of concrete at a depth of 0.34 m		
					(0.22) 0.56	MADE GROUND (orange-brown sand with fragments of brick, metal and charcoal. At a depth of 0.56 m rusty metal encountered at base of pit)		
						Complete at 0.56m		

Remarks	**Scale (approx)** 1:50	**Logged By** HD
	Figure No. J15316.BH 3A	

Geotectnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH3B**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open-drive sampler			Mark Steinberg	J15316
	Location	**Dates** 24/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.07) 0.07	Tarmac		
					(0.53) 0.60	Reinforced concrete (rebar at a depth of 0.35 m)		
0.80	D1				(0.30) 0.90	MADE GROUND (brown sand with fragments of concrete and brick. Rootlets at a depth of 0.60 m)		
					(1.10) 2.00	MADE GROUND (no recovery - concrete pushed down in core barrel)		
2.00 2.10 2.30	D2 D3 D4		(PP) over 4.50 (PP) 3.25		(0.30) 2.30	'Stiff' brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and rare selenite crystals. Fine rootlet at 2.20 m - desiccated soil		
2.60 2.90	D5 D6		(PP) 2.75 (PP) 3.00		(0.70) 3.00	Firm brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and rare selenite crystals		
3.00 3.20 3.50 3.80 4.00	D7 D8 D9 D10 D11		(PP) 3.00 Seepage(1) at 3.43m. (PP) 3.00 (PP) 3.00 (PP) 3.00		(1.00) 4.00	Stiff brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and rare selenite crystals. Claystone encountered at a depth of 3.43 m to 3.50 m		∇1
						Complete at 4.00m		

Remarks	**Scale (approx)**	**Logged By**
	1:50	HD
	Figure No. J15316.BH3B	

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	Site 5 - 17 Haverstock Hill, London NW3 2BL	Number **BH 4**

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Open-drive sampler			Mark Steinberg	J15316
	Location	**Dates** 24/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.09) 0.09	Tarmac		
					(0.12) 0.21	Reinforced concrete with rebar at a depth of 0.20 m (5 mm diameter)		
0.60	D1				(0.12) 0.33	Concrete		
					(0.67) 1.00	MADE GROUND (orange-brown silty sandy clay with medium rounded flint gravel and brick fragments)		
					(0.50) 1.50	Soft brown mottled grey silty fissured CLAY. Claystones encountered between 1.20 m and 1.60 m		
1.50	D2		(PP) 1.50			Firm brown mottled grey silty fissured CLAY. Rootlets noted to a depth of 2.10 m and dead rootlets noted at a depth of 2.60 m. Claystone encountered at a depth of 4.00 m		
1.60	D3							
1.80	D4		(PP) 2.00					
2.10	D5		(PP) 2.50					
2.40	D6		(PP) 2.50					
2.60	D7							
2.70	D8		(PP) 2.50		(2.50)			
3.00	D9		(PP) 3.50					
3.30	D10		(PP) 2.25					
3.60	D11		(PP) 2.50					
3.90	D12		(PP) 3.75		4.00			
4.00	D13					Stiff brown mottled grey silty fissured CLAY.		
			(PP) 2.50					
4.50	D14		(PP) 3.00		(1.20)			
			(PP) 3.25					
5.00	D15				5.20			
			(PP) 3.75					
						Complete at 5.20m		

Remarks	Scale (approx)	Logged By
	1:50	HD
	Figure No. J15316.BH 4	

Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH 5**

Excavation Method	**Dimensions**	**Ground Level (mOD)**	**Client**	**Job Number**
Open-drive sampler			Mark Steinberg	J15316
	Location	**Dates** 25/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.04) 0.04	Screed		
					(0.12) 0.16	Concrete		
0.60	D1				(0.34) 0.50	MADE GROUND (brick with sand and gravel)		
0.80	D2				(0.30) 0.80	MADE GROUND (brown silty sandy clay with rare medium well rounded flint, concrete fragments, fine rootlets and decayed wood. Brick fragments encountered at a depth of 0.80 m)		
1.00	D3		(PP) 1.50					
1.30	D4		(PP) 3.00			Stiff brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and selenite crystals. Root fibres noted to a depth of 2.10 m - possibly desiccated soil?		
1.60	D5		(PP) 3.50		(1.50)			
1.80	D6							
1.90	D7		(PP) 3.00					
2.20	D8		(PP) 2.25		2.30			
2.50	D9		(PP) 2.50			Firm brown mottled grey silty fissured CLAY		
2.60	D10							
2.80	D11		(PP) 2.50		(1.00)			
3.00	D12							
			(PP) 3.00					
			(PP) 3.50		3.30 (0.20) 3.50	Stiff brown mottled grey silty fissured CLAY		
3.60	D13				(0.50)	Stiff brownish grey silty fissured CLAY		
3.90	D14		(PP) 3.50					
4.00	D15		(PP) 3.75		4.00			
						Complete at 4.00m		

Remarks	**Scale (approx)** 1:50	**Logged By** HD
	Figure No. J15316.BH 5	

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware, Herts
SG12 7QE

Site	Number
5 - 17 Haverstock Hill, London NW3 2BL	BH 6

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Open-drive sampler			Mark Steinberg	J15316
	Location	**Dates**	**Engineer**	**Sheet**
		25/11/2015	Conisbee	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
					(0.05) 0.05	Screed
0.30	D1				(0.10) 0.15	Concrete overlying cobbly gravel with brick fragments
0.60	D2		(PP) 1.50		(0.30) 0.45	Soft dark grey mottled black silty sandy CLAY with decayed wood - organic odour
			(PP) 1.50			Firm brown mottled grey silty fissured CLAY with abundant selenite crystals
1.00	D3		(PP) 1.75			
1.00-1.45	SPT N=9		1,1/2,2,2,3			
1.30	D4		(PP) 2.50		(1.75)	
1.60	D5		(PP) 2.50			
			(PP) 2.25			
2.00-2.45	SPT N=22		2,9/10,5,4,3			
2.00	D6		(PP) 2.50		2.20	Stiff brown mottled grey silty fissured CLAY with abundant selenite crystals
2.30	D7					
			(PP) 2.75			
2.50	D8					
2.60	D9					
			(PP) 3.00			
2.90	D10					
			(PP) 3.25			
3.00-3.45	SPT N=16		2,2/3,4,4,5			
3.20	D11		(PP) 3.50			
3.50	D12				(2.80)	
			(PP) 3.50			
3.90	D13					
4.00-4.45	SPT N=18		3,3/3,4,5,6			
4.00	D14					
			(PP) over 4.50			
4.50	D15					
					5.00	Stiff brownish grey silty fissured CLAY. Dead roolets at 4.00 m
5.00-5.45	SPT N=19		3,3/4,4,5,6			
5.00	D16					
5.50	D17					
6.00-6.45	SPT N=19		3,3/4,4,5,6			
6.00	D18					
					(3.30)	
7.00-7.45	SPT N=21		3,4/4,5,6,6			
8.00-8.45	SPT N=24		3,5/5,5,7,7			
					8.30	Stiff grey silty fissured CLAY with rare orange-brown silt and fine sand
9.00-9.45	SPT N=25		4,5/5,6,6,8			
					(1.70)	
					10.00	

Remarks
Standpipe installed to a depth of 6.00 m
Standpipe recorded to be dry on 18/12/2015 and groundwater measured at a depth of 3.72 m on 13/01/2016

Scale (approx)	Logged By
1:50	HD

Figure No. J15316.BH 6

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware,Herts SG12 7QE	**Site** 5 - 17 Haverstock Hill, London NW3 2BL	**Number** **BH 7**
Excavation Method Open-drive sampler	**Dimensions** / **Ground Level (mOD)**	**Client** Mark Steinberg	**Job Number** J15316
	Location / **Dates** 26/11/2015	**Engineer** Conisbee	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
					(0.04) 0.04	Screed
					(0.15) 0.19	Concrete
0.40	D1		(PP) 0.75			Soft becoming firm brown mottled grey silty CLAY
0.50	D2		(PP) 1.00			
0.80	D3		(PP) 2.50			
1.10	D4		(PP) 2.25		(1.81)	
1.40	D5		(PP) 2.25			
1.50	D6		(PP) 2.75			
1.70	D7				2.00	
2.00	D8		(PP) 3.00			Stiff brown mottled grey silty fissured CLAY with occasional partings of orange-brown fine sand and silt and selenite crystals. Decayed rootlets noted to a depth of 2.60 m
2.30	D9		(PP) 3.50		(1.00)	
2.60	D10		(PP) 3.50			
2.90	D11		(PP) 3.50		3.00	
3.00	D12					
						Complete at 3.00m

Remarks	**Scale (approx)** 1:50	**Logged By** HD
	Figure No. J15316.BH 7	

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware,Herts
SG12 7QE

Standard Penetration Test Results

Site : 5 - 17 Haverstock Hill, London NW3 2BL

Client : Mark Steinberg

Engineer : Conisbee

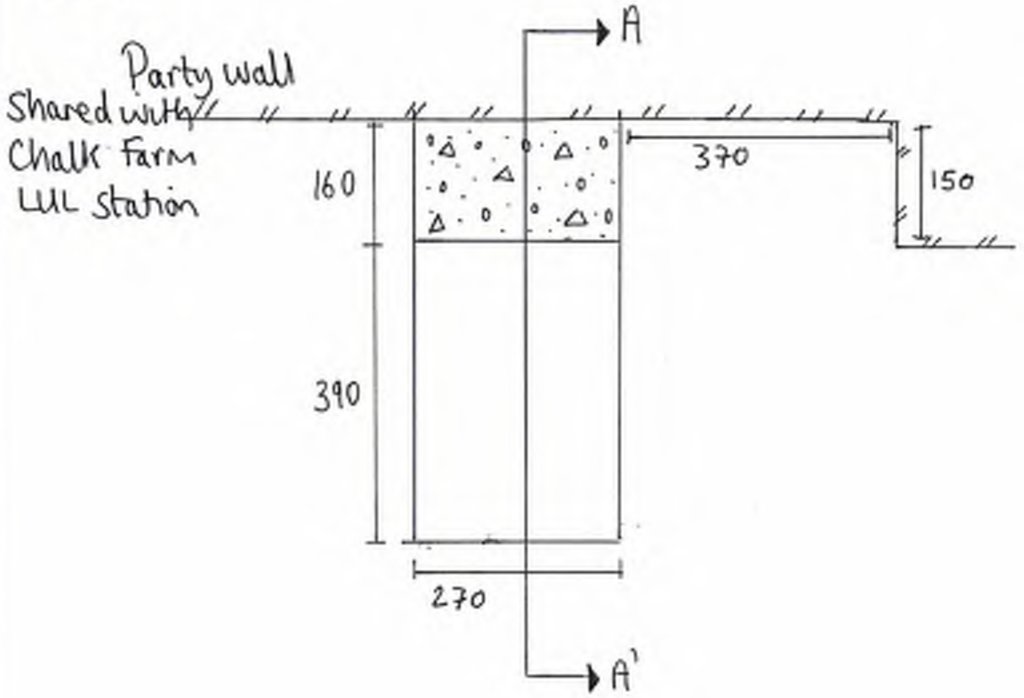
Job Number J15316

Sheet 1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH 1	1.20	1.35	1.65	CPT	1	1	2	1	2	2	N=7	
BH 1	2.00	2.15	2.45	CPT	2	3	5	5	3	2	N=15	
BH 1	4.00	4.15	4.45	SPT	2	3	3	3	4	5	N=15	
BH 1	6.00	6.15	6.45	SPT	3	3	4	4	5	5	N=18	
BH 1	9.00	9.15	9.45	SPT	4	5	5	5	5	6	N=21	
BH 1	12.00	12.15	12.45	SPT	5	5	5	5	6	7	N=23	
BH 1	15.00	15.15	15.45	SPT	6	6	6	6	7	7	N=26	
BH 1	18.00	18.15	18.45	SPT	6	7	8	8	9	10	N=35	
BH 1	21.00	21.15	21.45	SPT	7	8	9	11	12	13	N=45	
BH 1	24.50	24.65	24.73	SPT	9	10	32				32/75mm	
BH 2	1.20	1.35	1.65	CPT	1	0	1	1	2	1	N=5	
BH 2	2.00	2.15	2.45	CPT	1	0	0	1	1	1	N=3	
BH 2	3.00	3.15	3.45	SPT	1	1	1	2	2	3	N=8	
BH 2	5.00	5.15	5.45	SPT	2	3	3	3	4	4	N=14	
BH 2	7.50	7.65	7.95	SPT	3	3	3	4	4	5	N=16	
BH 2	10.50	10.65	10.95	SPT	4	4	5	5	6	7	N=23	
BH 2	13.50	13.65	13.95	SPT	5	5	6	6	7	7	N=26	
BH 6	1.00	1.15	1.45	SPT	1	1	2	2	2	3	N=9	
BH 6	2.00	2.15	2.45	SPT	2	9	10	5	4	3	N=22	
BH 6	3.00	3.15	3.45	SPT	2	2	3	4	4	5	N=16	
BH 6	4.00	4.15	4.45	SPT	3	3	3	4	5	6	N=18	
BH 6	5.00	5.15	5.45	SPT	3	3	4	4	5	6	N=19	
BH 6	6.00	6.15	6.45	SPT	3	3	4	4	5	6	N=19	
BH 6	7.00	7.15	7.45	SPT	3	4	4	5	6	6	N=21	
BH 6	8.00	8.15	8.45	SPT	3	5	5	5	7	7	N=24	
BH 6	9.00	9.15	9.45	SPT	4	5	5	6	6	8	N=25	

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	Site 5-17 Haverstock Hill, London, NW3 2BL	Trial Pit Number 1
Excavation Method Manual	Dimensions 270 x 550 x 1200 (mm)	Ground Level (mOD)	Client Mark Steinberg	Job Number J15316
	Location Room G12	Dates 28/11/2015	Engineer Conisbee	Sheet 1 / 3

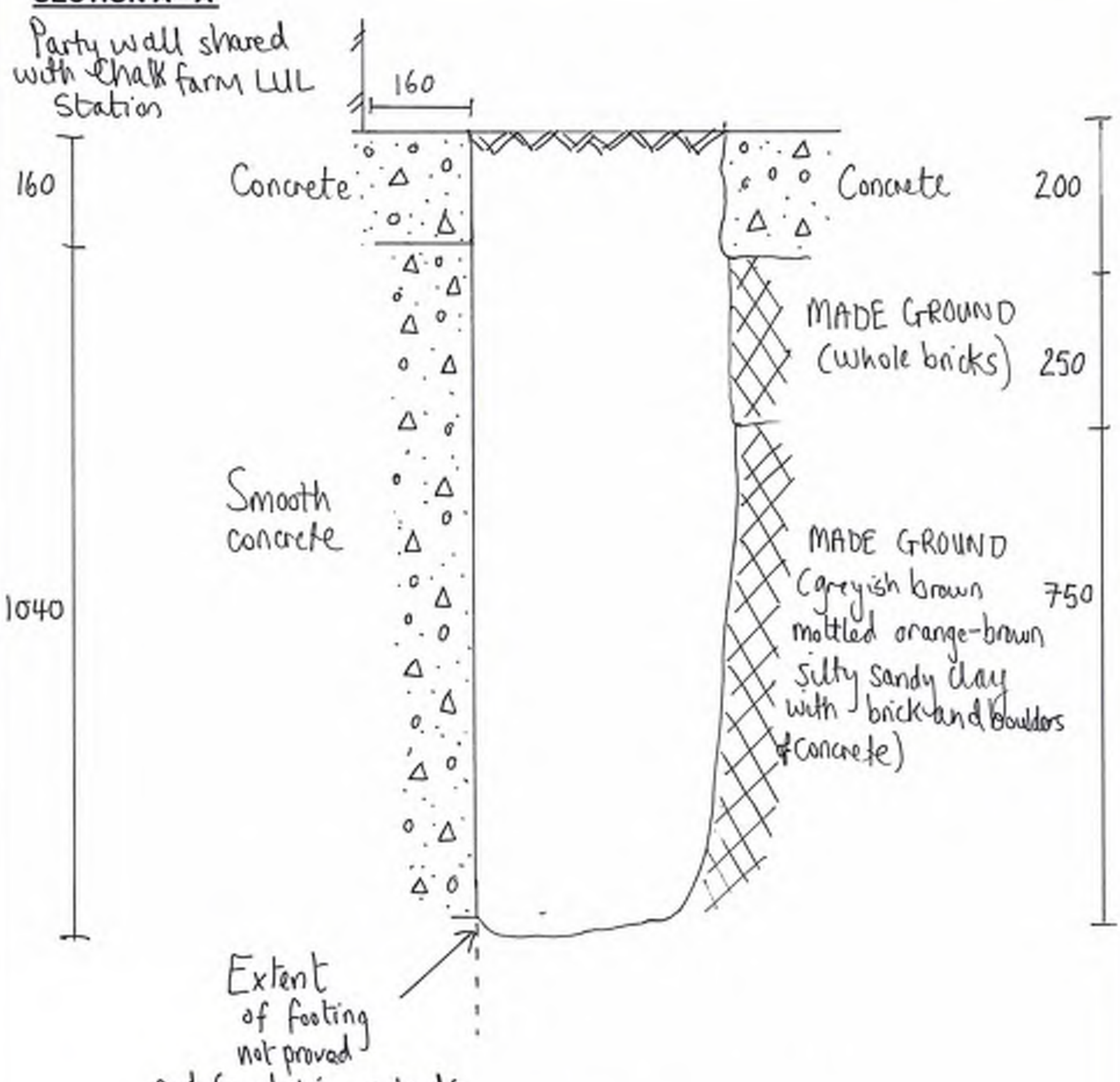
PLAN



Remarks:	Scale:
All dimensions in millimetres	1:10
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: Perched water enocuntered at the base of the pit, standing at a depth of 0.98 m on completion	HD

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	Site 5-17 Haverstock Hill, London, NW3 2BL		Trial Pit Number 1
Excavation Method Manual	Dimensions 270 x 550 x 1200 (mm)	Ground Level (mOD)	Client Mark Steinberg	Job Number J15316
	Location Room G12	Dates 26/11/2015	Engineer Conisbee	Sheet 2 / 3

SECTION A - A'



and foundation extends to a depth of at least 1.2m below floor level in G12 room

Remarks:	Scale:
All dimensions in millimetres	1:10
Sides of trial pit remained stable during excavation	Logged by:
Groundwater: Perched water enocuntered at the base of the pit, standing at a depth of 0.98 m on completion	HD

Site	5-17 Haverstock Hill, London, NW3 2BL	**Job Number**	J15316
Client	Mark Steinberg	**Sheet**	3/3
Engineer	Conisbee		

Geotechnical & Environmental Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Soil Vapour Survey

Site	5-17 Haverstock Hill, NW3 2BL	**Job Number** J15316
Client	Mark Steinberg	**Sheet** 1/1
Engineer	Conisbee	

SOIL VAPOUR SURVEY

Survey Position	1	2	3	4	5	6	7	8	9
VOCS (ppmv)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Survey Position	10	11	12	13	14	15	16	17	18
VOCS (ppmv)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Survey Position	19	20	21	22	23	24	25	26	27
VOCS (ppmv)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Survey Position	28	29	30	31	32	33	34	35	
VOCS (ppmv)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Equipment Photo-ionistation detector (PID) fitted with a 10.6 eV lamp

Summary of Classification Test Results

Job No.	Project Name	Programme	
20073	5-15 Haverstock Hill, London NW3 2BL	Samples received	08/12/2015
		Schedule received	15/12/2015
Project No.	Client	Project started	16/12/2015
J15316	GEA	Testing Started	06/01/2016

Hole No.	Sample				Soil Description	NMC	Passing 425μm	LL	PL	PI	Remarks
	Ref	Top	Base	Type		%	%	%	%	%	
BH 1	-	3.00		U	High strength fissured brown mottled blue silty CLAY with occasional selenite crystals	33	100	81	30	51	
BH 2	5	3.00		D	Brown CLAY with blue grey veins	34	100	76	30	46	
BH 6	10	2.90		D	Brown CLAY with blue grey veins	33	100	79	31	48	
BH3B	2	2.00		D	Brown CLAY with blue grey veins, orange brown sandy patches and scattered selenite crystals	30	100	75	30	45	
BH3B	4	2.30		D	Brown CLAY with blue grey veins and orange brown sandy patches	31					
BH3B	5	2.60		D	Brown CLAY with blue grey veins and scattered selenite crystals	33					
BH3B	6	2.90		D	Brown CLAY with blue grey veins and scattered selenite	34	100	77	31	46	
BH3B	8	3.20		D	Brown CLAY with blue grey veins	33					
BH3B	9	3.50		D	Brown CLAY with orange brown sandy patches and scattered selenite crystals	31					
BH3B	10	3.80		D	Brown CLAY with scattered selenite crystals	32					

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

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

Checked and Approved
Initials **J.P**
Date: 08/01/2016

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

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	
20073	5-15 Haverstock Hill, London NW3 2BL	Samples received	08/12/2015
		Schedule received	15/12/2015
Project No.	Client	Project started	16/12/2015
J15316	GEA	Testing Started	08/01/2016

Hole No.	Sample				Soil description	Dry Mass passing 2mm	SO3 Content	SO4 Content	pH	Remarks
	Ref	Top	Base	Type		%	g/l	g/l		
BH 1	-	2.00		B	Brown slightly mottled bluish grey silty CLAY	100	0.44	0.52	7.83	
BH 1	-	3.80		D	Brown slightly mottled bluish grey silty CLAY with scattered traces of selenite crystals	100	0.74	0.88	7.82	
BH 1	-	14.00		D	Dark grey silty CLAY	100	0.79	0.95	7.92	
BH 6	1	0.30		D	Dark grey and greyish brown slightly gravelly CLAY (gravel is fm and sub-angular to sub-rounded)	97	0.62	0.74	7.83	

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

Checked and Approved
Initials **J.P**
Date: **08/01/2016**

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

MSF-5-R29 (Rev. 0)

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	
20073	5-15 Haverstock Hill, London NW3 2BL	Samples received	08/12/2015
		Schedule received	15/12/2015
Project No.	Client	Project started	16/12/2015
J15316	GEA	Testing Started	18/12/2015

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
BH 1	-	3.00		U	High strength fissured brown mottled blue silty CLAY with occasional selenite crystals	UU	1.92	1.46	31	198	102	60	4.0	178	89	B	
BH 1	-	5.00		U	High strength fissured brown silty CLAY with occasional selenite crystals	UU	1.94	1.49	30	198	102	100	9.1	247	124	B	Sample slightly disturbed
BH 1	-	7.50		U	High strength fissured brown silty CLAY with occsional selenite crystals	UU	1.91	1.46	31	198	102	150	10	261	131	B	
BH 1	-	10.50		U	Very high strength slightly fissured dark grey silty CLAY	UU	2.00	1.58	27	198	102	210	4.5	348	174	B	
BH 1	-	13.50		U	High strength fissured dark grey silty CLAY	UU	2.05	1.64	25	198	102	270	3.0	261	131	B	
BH 1	-	16.50		U	Very high strength fissured dark grey silty CLAY	UU	2.00	1.56	28	198	102	330	3.5	479	239	B	Sample slightly disturbed
BH 1	-	19.50		U	Very high strength fissured dark grey silty CLAY	UU	1.94	1.54	26	198	102	390	9.6	576	288	B	Sample very disturbed
BH 1	-	22.50		U	Extremely high strength fissured dark grey silty CLAY	UU	1.91	1.51	26	198	102	450	8.1	708	354	B	
BH 2	8	4.00		U	High strength fissured brown silty CLAY with occasional selenite crystals	UU	1.97	1.51	31	198	102	80	7.6	204	102	B	
BH 2	12	6.00		U	High strength fissured brown silty CLAY with occasional selenite crystals	UU	1.95	1.48	32	198	102	120	5.1	232	116	B	
BH 2	15	9.00		U	Very high strength fissured brown silty CLAY	UU	1.96	1.52	29	198	102	180	6.6	327	163	B	
BH 2	19	12.00		U	Very high strength slightly fissured dark grey silty CLAY	UU	2.03	1.60	27	198	102	240	5.6	373	186	B	Sample slightly disturbed
BH 2	22	14.50		U	High strength fissured dark grey silty CLAY	UU	1.98	1.58	25	198	102	290	3.5	239	120	B	Sample very disturbed

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: 08/01/2016

2519 Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

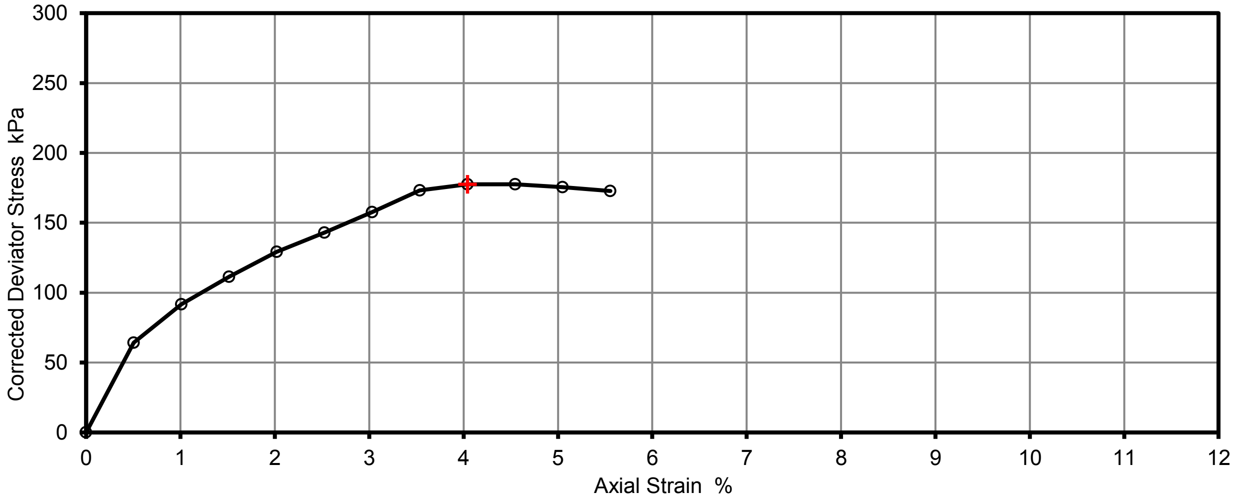
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 1	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-	
Project No.	J15316	Client	GEA	Depth	3.00	m
Soil Description	High strength fissured brown mottled blue silty CLAY with occasional selenite crystals			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

Remarks

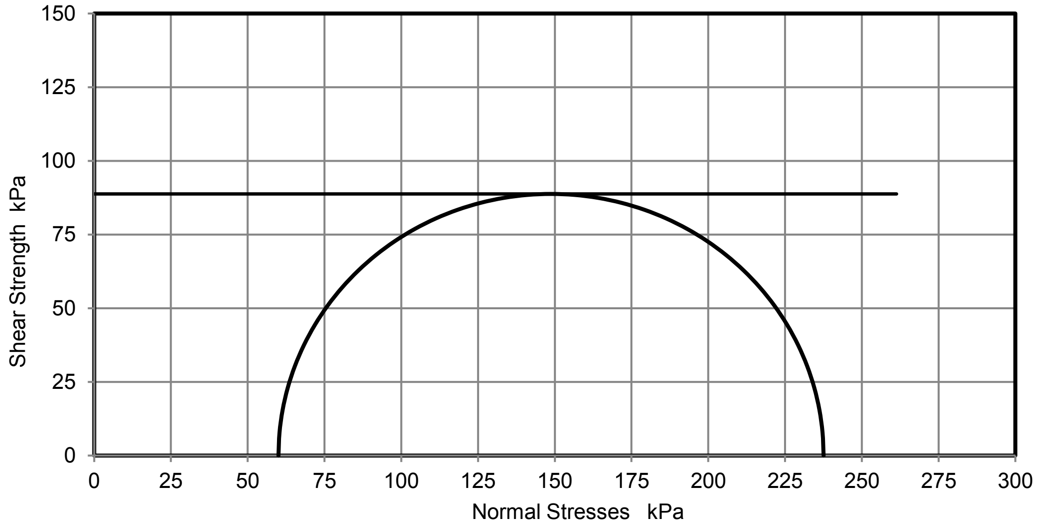
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.92	Mg/m3
Moisture Content	31	%
Dry Density	1.46	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	60	kPa
Axial Strain	4.0	%
Deviator Stress, (σ1 - σ3)f	178	kPa
Undrained Shear Strength, cu	89	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

Checked and Approved
Initials: J.P
Date 08/01/2016

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	20073	
				Borehole/Pit No.	BH 1	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-	
Project No.	J15316	Client	GEA	Depth	5.00	m
Soil Description	High strength fissured brown silty CLAY with occasional selenite crystals			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

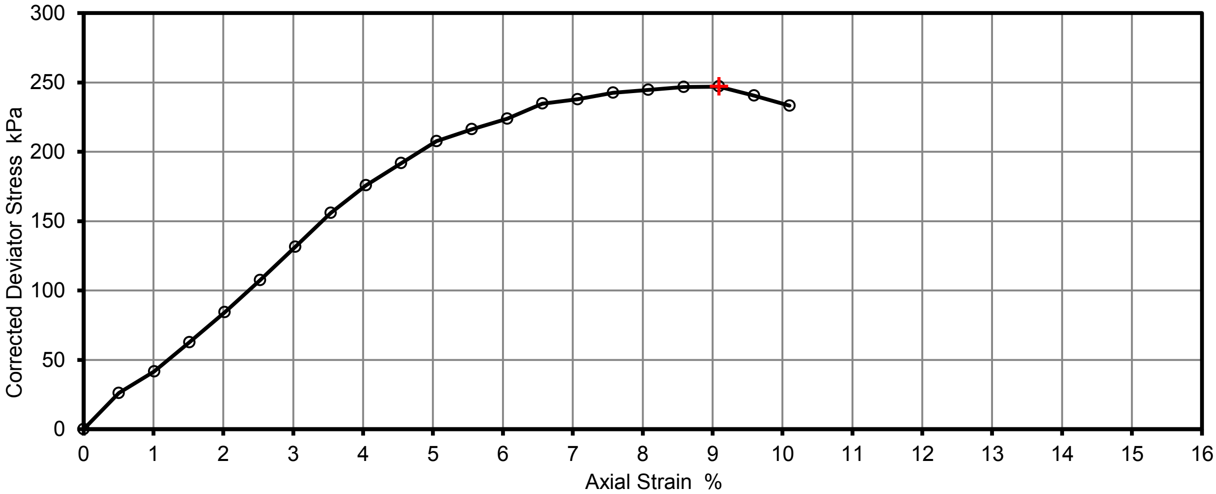
Remarks

Sample slightly disturbed

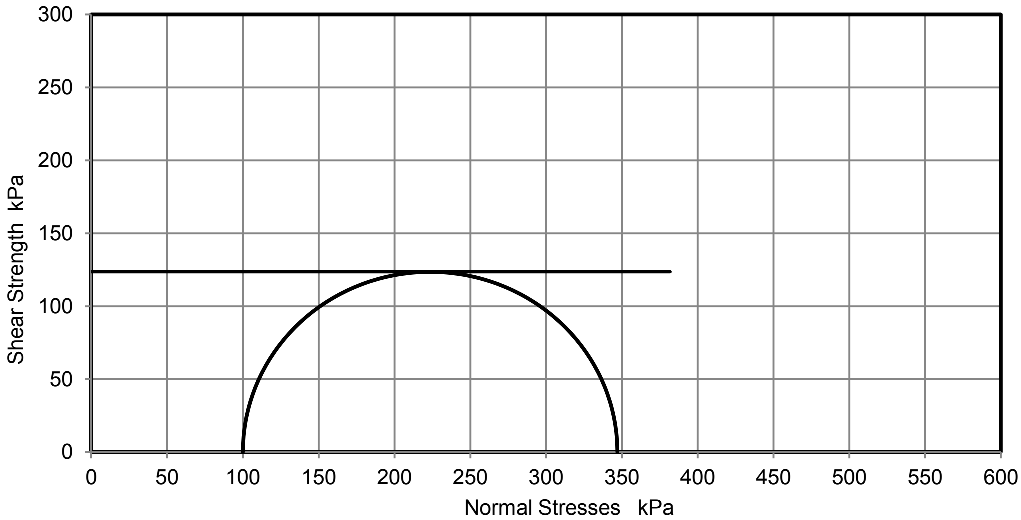
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.94	Mg/m3
Moisture Content	30	%
Dry Density	1.49	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	100	kPa
Axial Strain	9.1	%
Deviator Stress, (σ1 - σ3)f	247	kPa
Undrained Shear Strength, cu	124	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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Checked and Approved
Initials: J.P
Date 08/01/2016

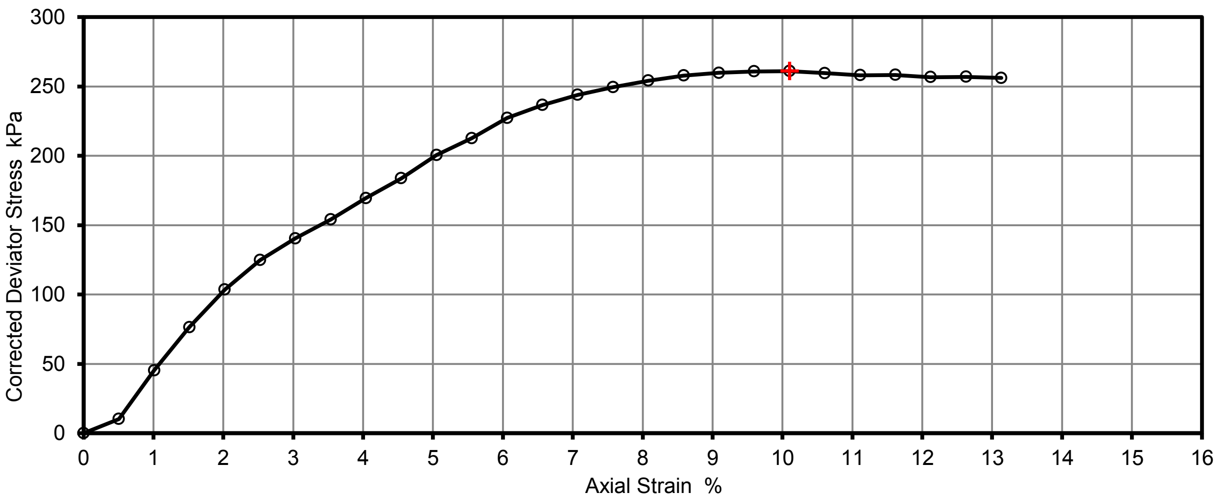
K4 SOILS	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	20073
				Borehole/Pit No.	BH 1
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-
Project No.	J15316	Client	GEA	Depth	7.50 m
Soil Description	High strength fissured brown silty CLAY with occsional selenite crystals			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

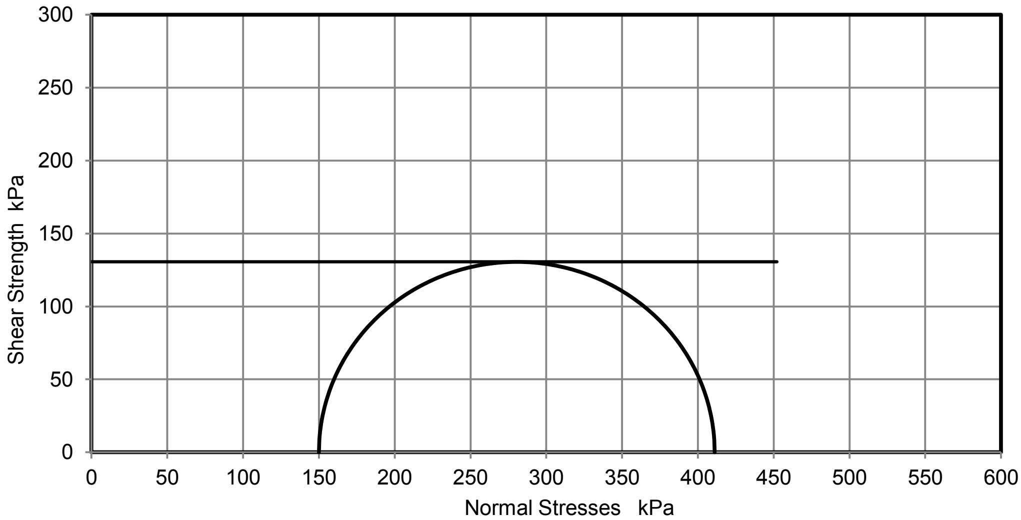
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.91	Mg/m3
Moisture Content	31	%
Dry Density	1.46	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	150	kPa
Axial Strain	10.1	%
Deviator Stress, (σ1 - σ3)f	261	kPa
Undrained Shear Strength, cu	131	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)

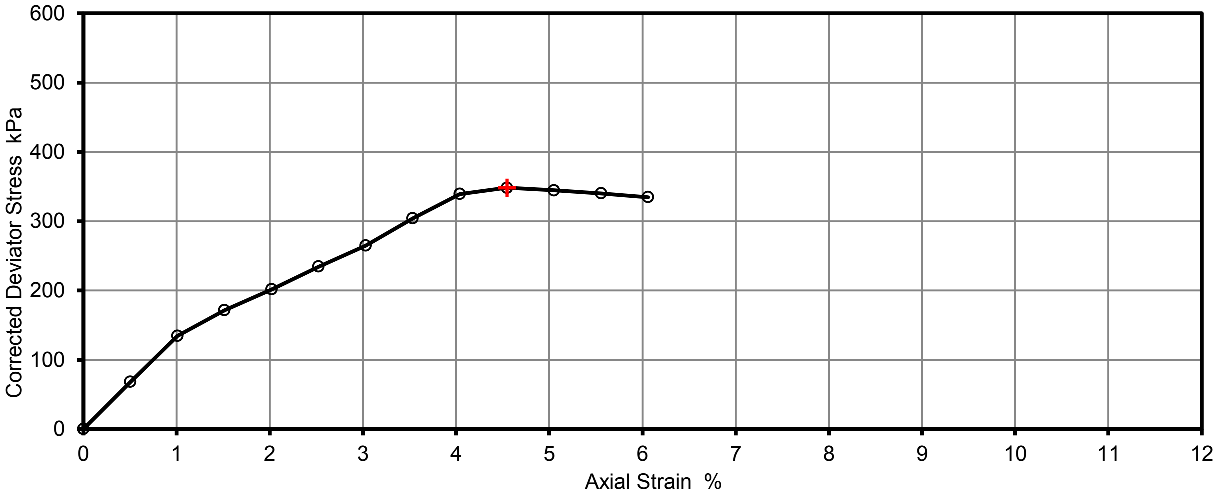
K4 SOILS	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073
				Borehole/Pit No.	BH 1
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-
Project No.	J15316	Client	GEA	Depth	10.50 m
Soil Description	Very high strength slightly fissured dark grey silty CLAY			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

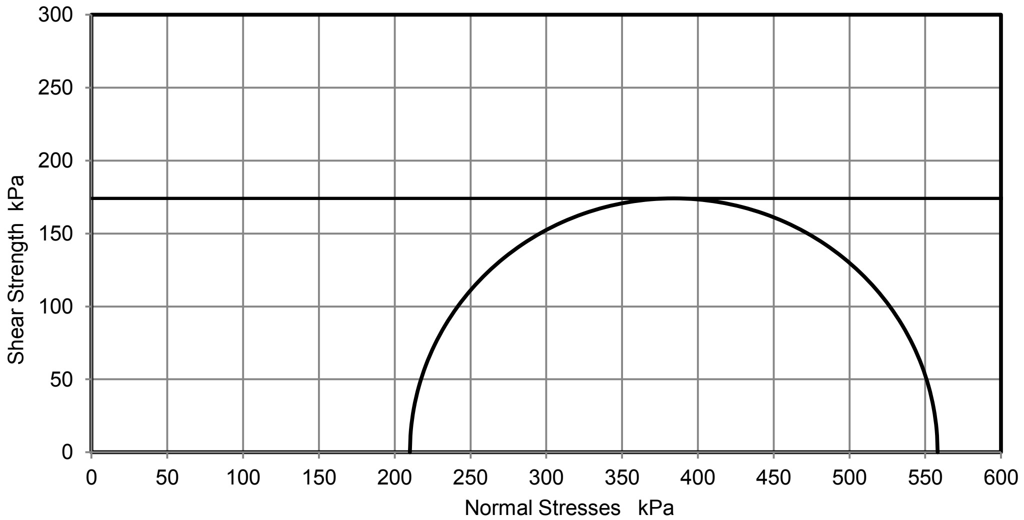
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.00	Mg/m3
Moisture Content	27	%
Dry Density	1.58	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	210	kPa
Axial Strain	4.5	%
Deviator Stress, (σ1 - σ3)f	348	kPa
Undrained Shear Strength, cu	174	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)

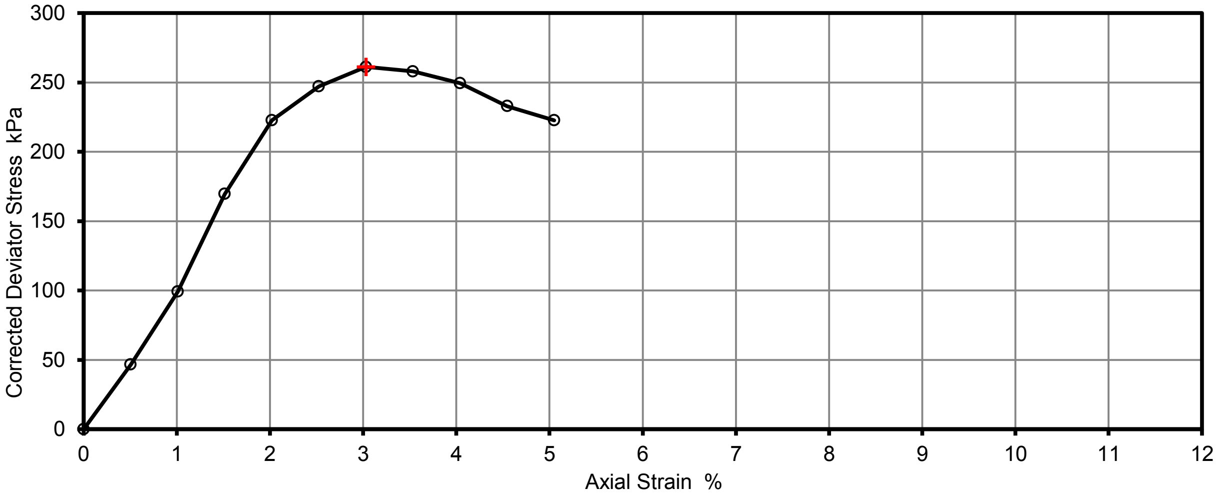
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 1	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-	
Project No.	J15316	Client	GEA	Depth	13.50	m
Soil Description	High strength fissured dark grey silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

Remarks

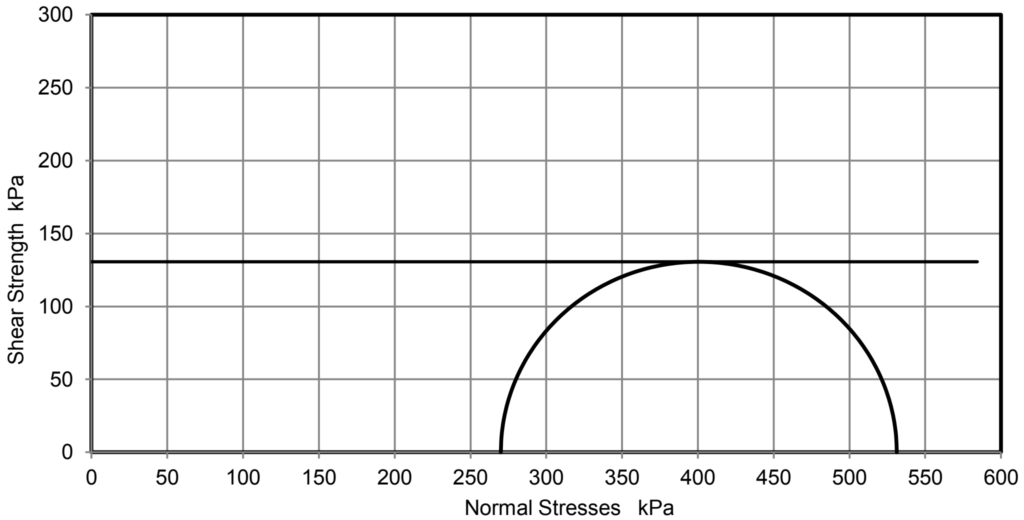
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.05	Mg/m3
Moisture Content	25	%
Dry Density	1.64	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	270	kPa
Axial Strain	3.0	%
Deviator Stress, (σ1 - σ3)f	261	kPa
Undrained Shear Strength, cu	131	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 1	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-	
Project No.	J15316	Client	GEA	Depth	16.50	m
Soil Description	Very high strength fissured dark grey silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test		

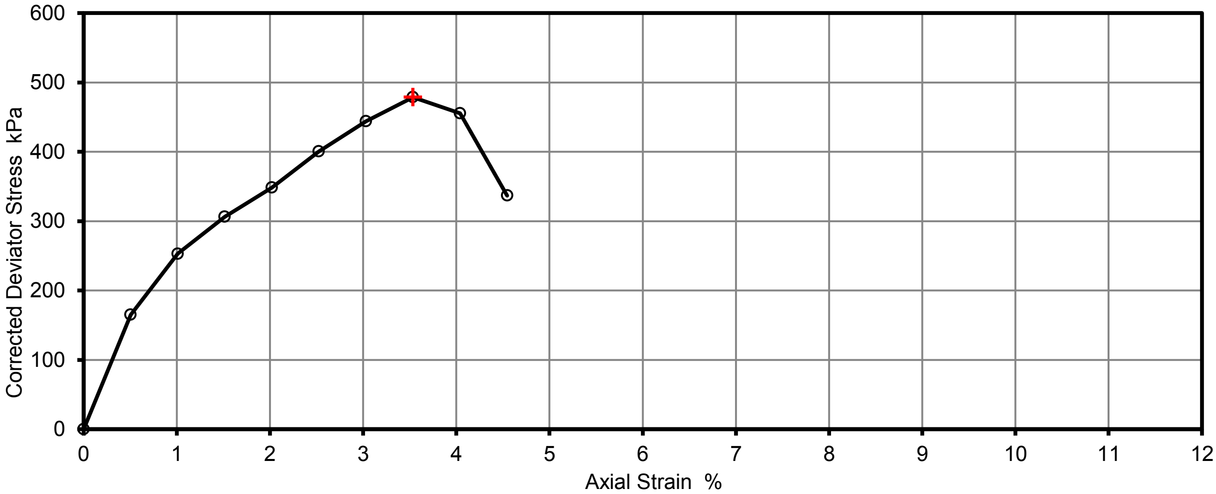
Remarks

Sample slightly disturbed

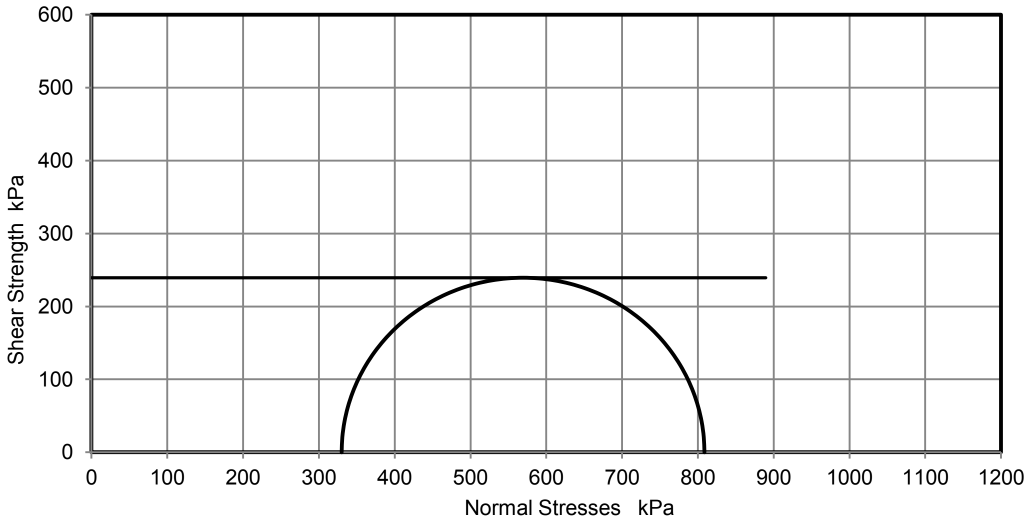
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.00	Mg/m3
Moisture Content	28	%
Dry Density	1.56	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	330	kPa
Axial Strain	3.5	%
Deviator Stress, (σ1 - σ3)f	479	kPa
Undrained Shear Strength, cu	239	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	20073	
				Borehole/Pit No.	BH 1	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	-	
Project No.	J15316	Client	GEA	Depth	19.50	m
Soil Description	Very high strength fissured dark grey silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

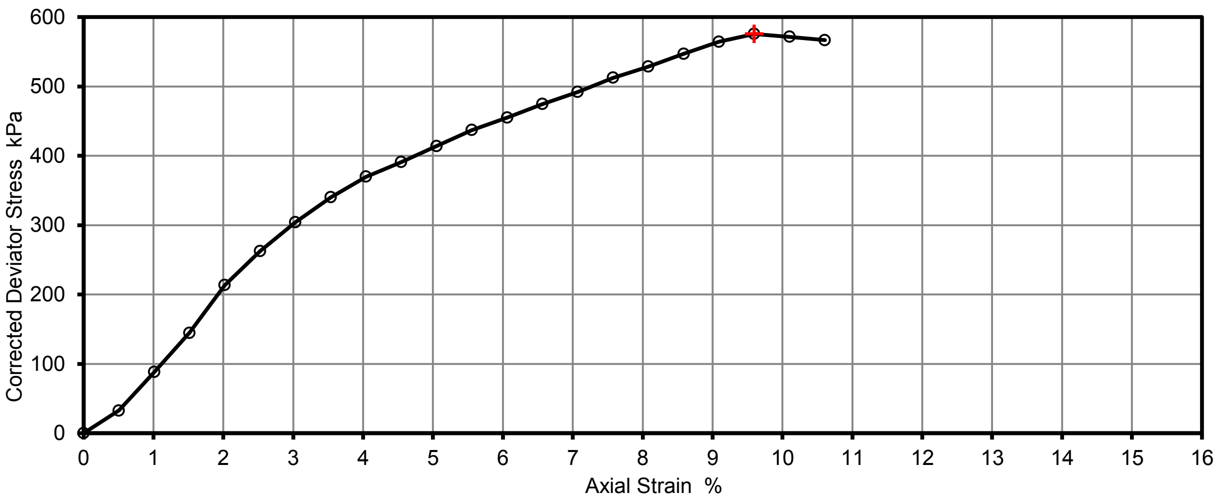
Remarks

Sample very disturbed

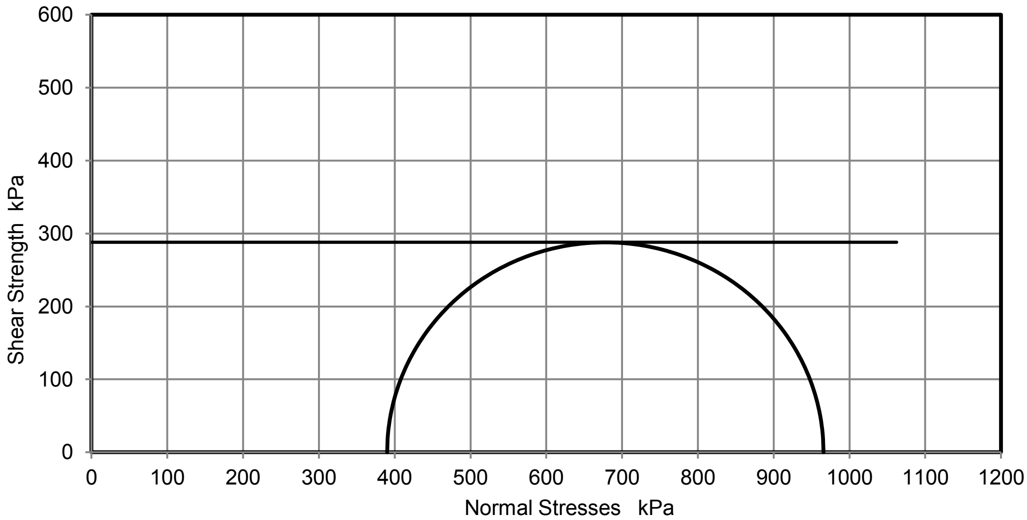
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.94	Mg/m3
Moisture Content	26	%
Dry Density	1.54	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	390	kPa
Axial Strain	9.6	%
Deviator Stress, (σ1 - σ3)f	576	kPa
Undrained Shear Strength, cu	288	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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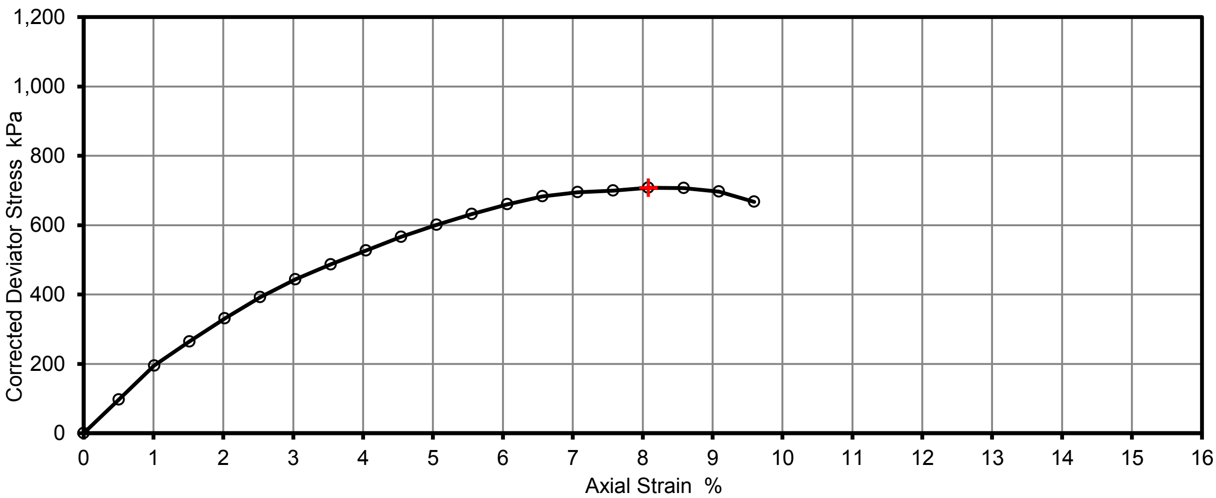
K4 SOILS	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**	Job Ref	20073
		Borehole/Pit No.	BH 1
Site Name	5-15 Haverstock Hill, London NW3 2BL	Sample No.	-
Project No.	J15316 Client GEA	Depth	22.50 m
Soil Description	Extremely high strength fissured dark grey silty CLAY	Sample Type	U
		Samples received	08/12/2015
		Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen	Date of test	18/12/2015

Remarks

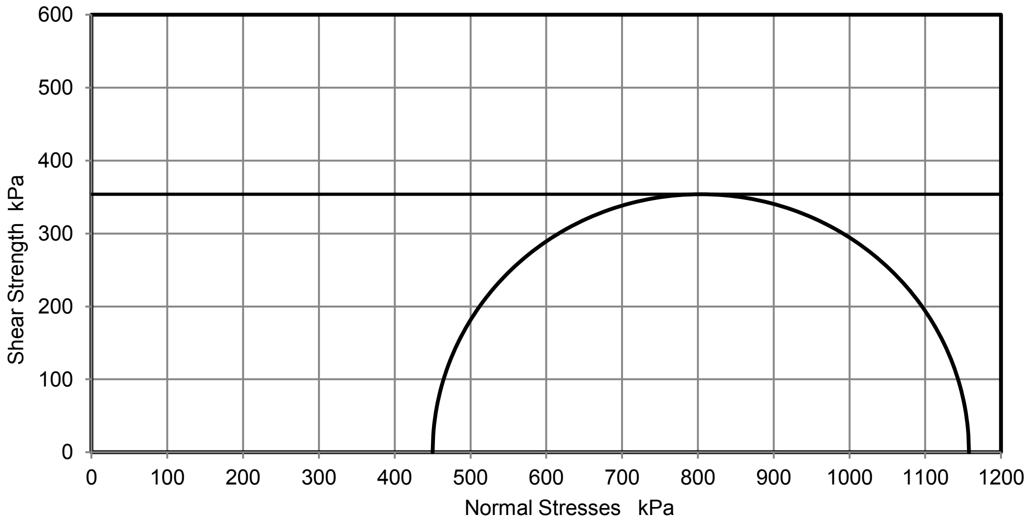
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.91	Mg/m3
Moisture Content	26	%
Dry Density	1.51	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	450	kPa
Axial Strain	8.1	%
Deviator Stress, (σ1 - σ3)f	708	kPa
Undrained Shear Strength, cu	354	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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UKAS TESTING 2519

Checked and Approved

Initials: J.P

Date 08/01/2016

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

MSF-5 R7 (Rev.0)

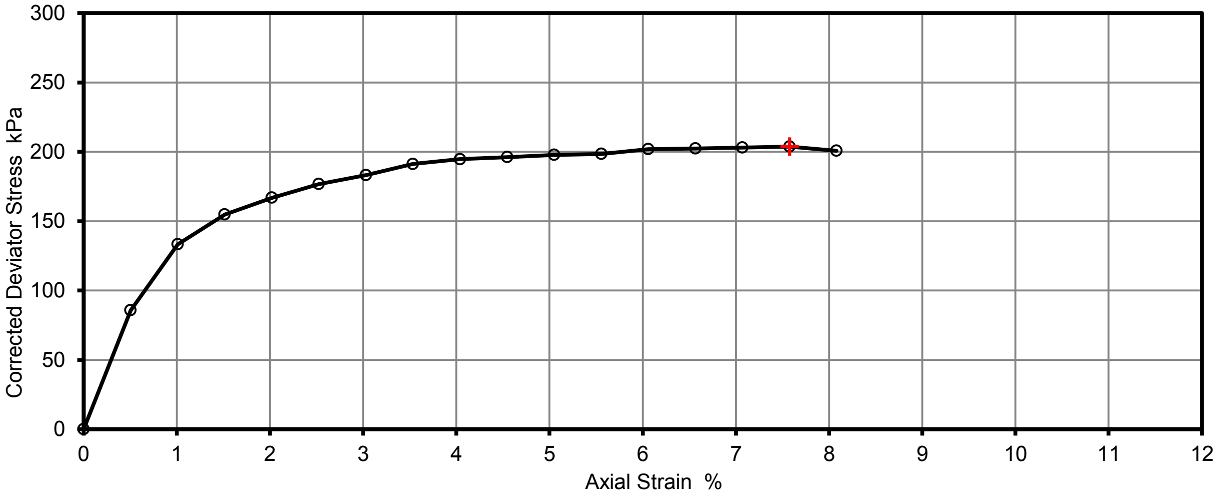
K4 SOILS	**Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen**			Job Ref	20073
				Borehole/Pit No.	BH 2
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	8
Project No.	J15316	Client	GEA	Depth	4.00 m
Soil Description	High strength fissured brown silty CLAY with occasional selenite crystals			Sample Type	U
				Samples received	08/12/2015
				Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015

Remarks

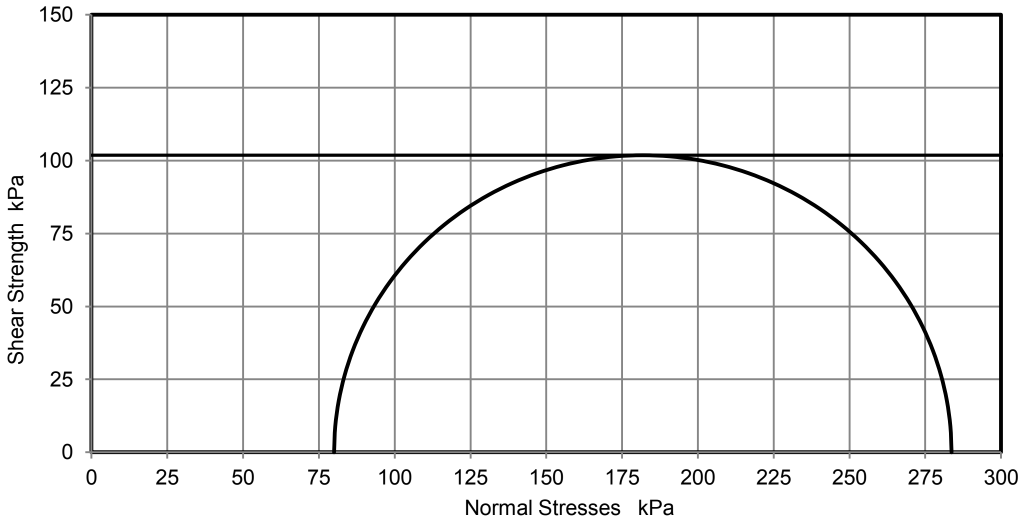
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.97	Mg/m3
Moisture Content	31	%
Dry Density	1.51	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	80	kPa
Axial Strain	7.6	%
Deviator Stress, (σ1 - σ3)f	204	kPa
Undrained Shear Strength, cu	102	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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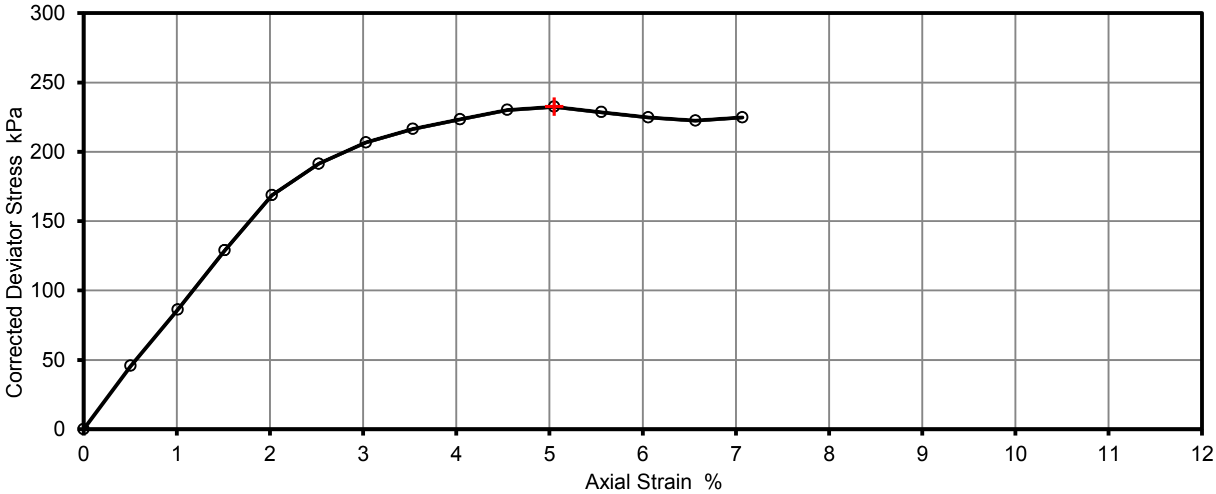
				Borehole/Pit No.	BH 2	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	12	
Project No.	J15316	Client	GEA	Depth	6.00	m
Soil Description	High strength fissured brown silty CLAY with occasional selenite crystals			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

Remarks

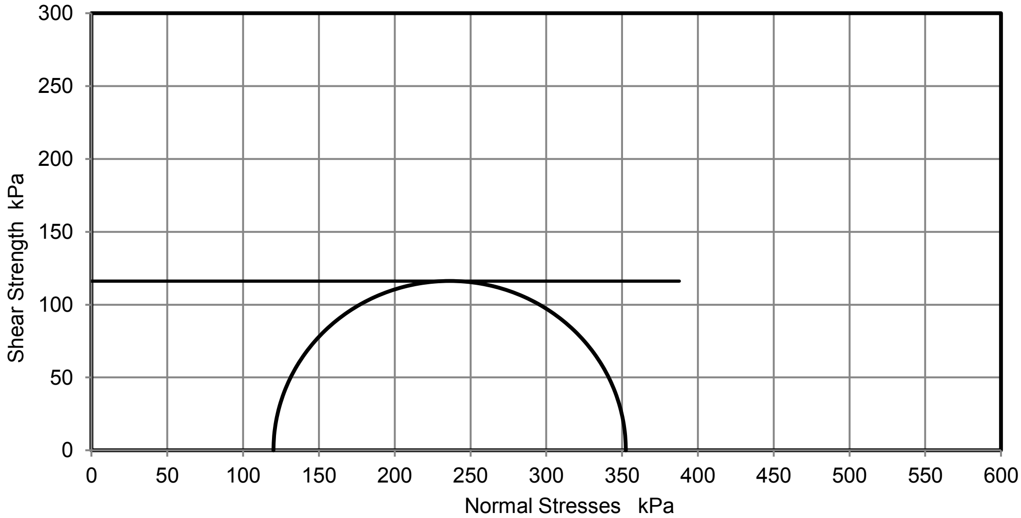
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.95	Mg/m3
Moisture Content	32	%
Dry Density	1.48	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	120	kPa
Axial Strain	5.1	%
Deviator Stress, (σ1 - σ3)f	232	kPa
Undrained Shear Strength, cu	116	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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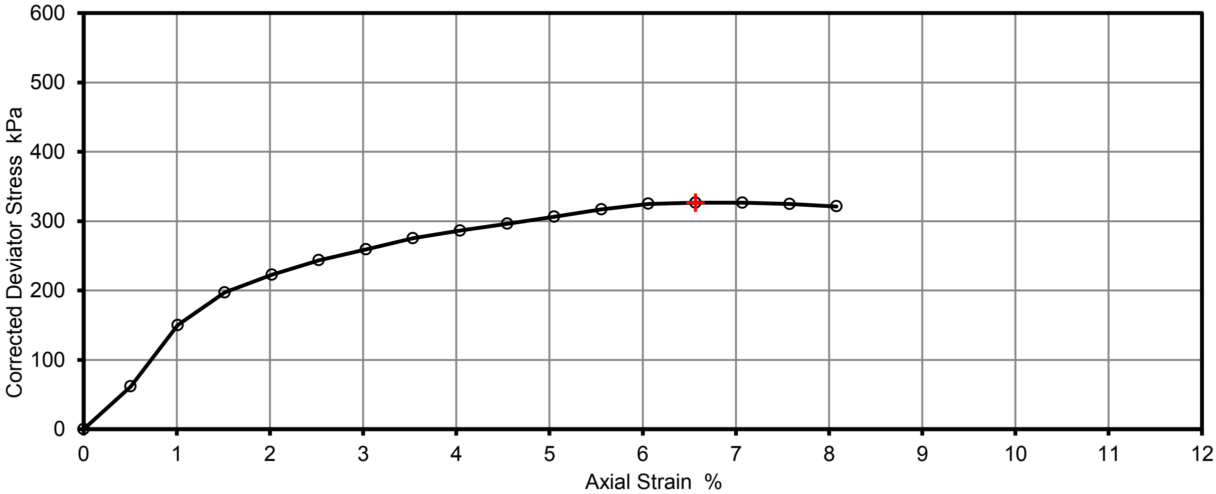
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 2	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	15	
Project No.	J15316	Client	GEA	Depth	9.00	m
Soil Description	Very high strength fissured brown silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	18/12/2015	

Remarks

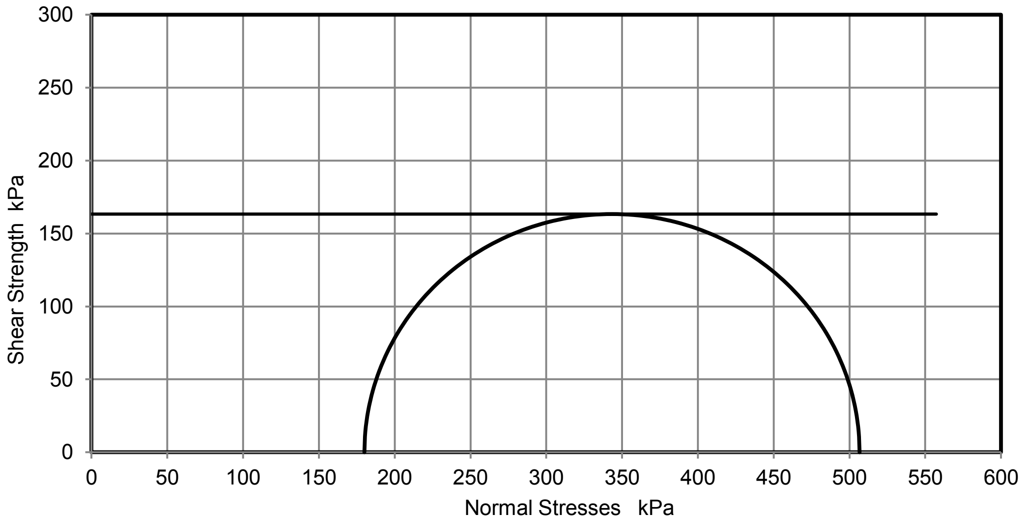
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.96	Mg/m3
Moisture Content	29	%
Dry Density	1.52	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	180	kPa
Axial Strain	6.6	%
Deviator Stress, (σ1 - σ3)f	327	kPa
Undrained Shear Strength, cu	163	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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MSF-5 R7 (Rev.0)

	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	20073	
				Borehole/Pit No.	BH 2	
Site Name	5-15 Haverstock Hill, London NW3 2BL			Sample No.	19	
Project No.	J15316	Client	GEA	Depth	12.00	m
Soil Description	Very high strength slightly fissured dark grey silty CLAY			Sample Type	U	
				Samples received	08/12/2015	
				Schedules received	15/12/2015	
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	10/12/2015	

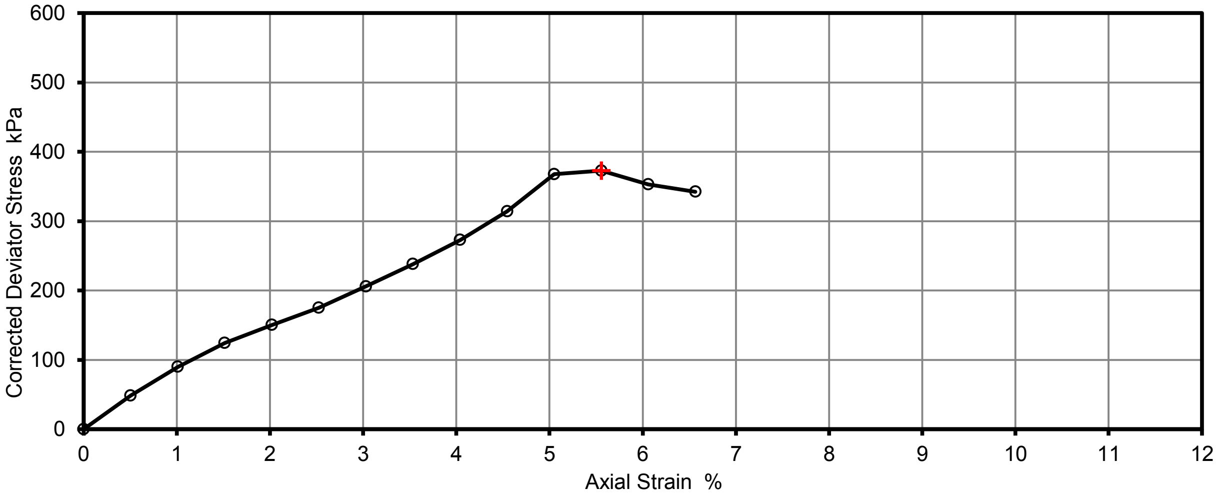
Remarks

Sample slightly disturbed

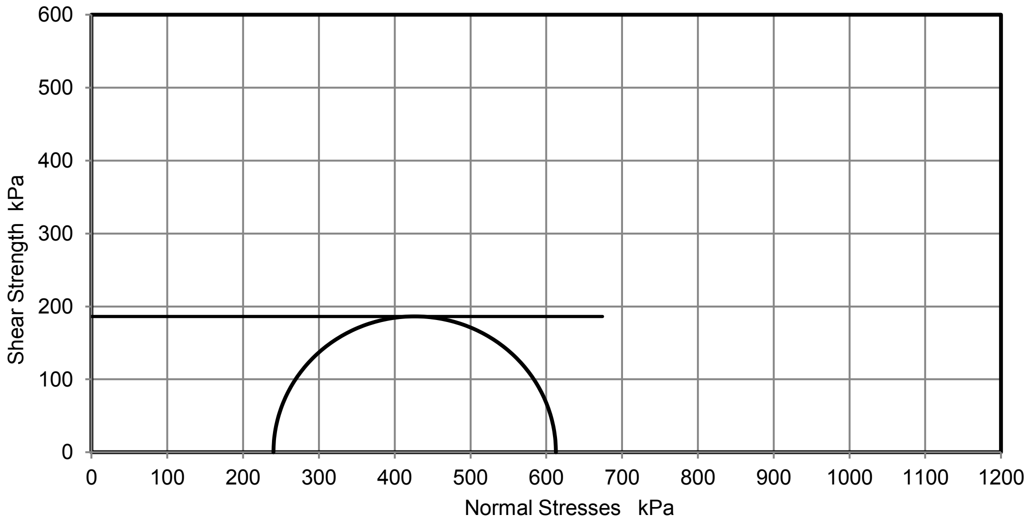
Position within sample

Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	2.03	Mg/m3
Moisture Content	27	%
Dry Density	1.60	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	240	kPa
Axial Strain	5.6	%
Deviator Stress, (σ1 - σ3)f	373	kPa
Undrained Shear Strength, cu	186	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



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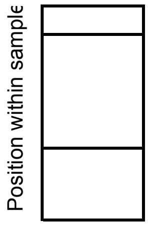
Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R7 (Rev.0)

Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen		Job Ref	20073
		Borehole/Pit No.	BH 2
Site Name	5-15 Haverstock Hill, London NW3 2BL	Sample No.	22
Project No.	J15316 Client GEA	Depth	14.50 m
Soil Description	High strength fissured dark grey silty CLAY	Sample Type	U
		Samples received	08/12/2015
		Schedules received	15/12/2015
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen	Date of test	18/12/2015

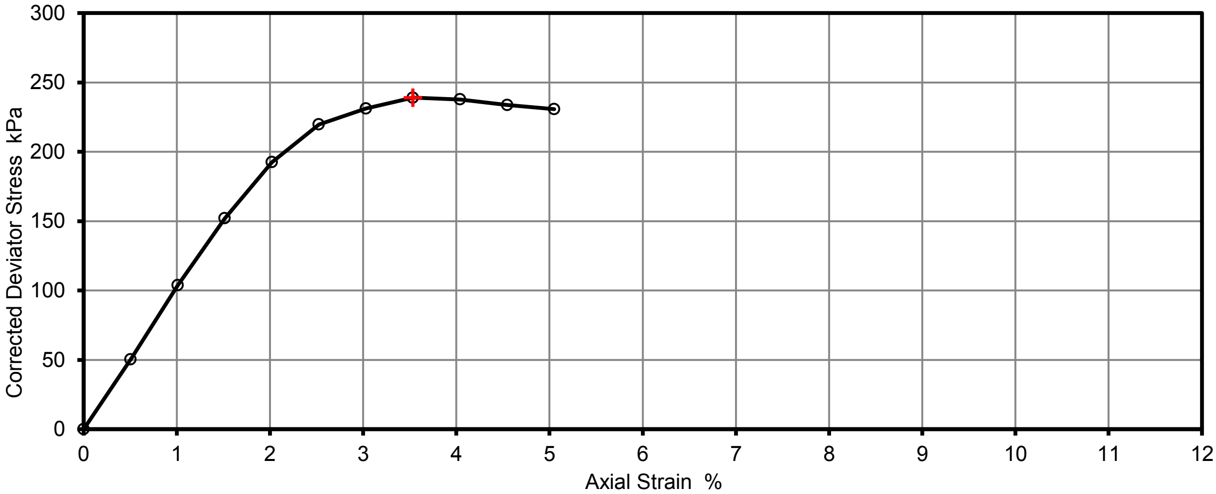
Remarks

Sample very disturbed

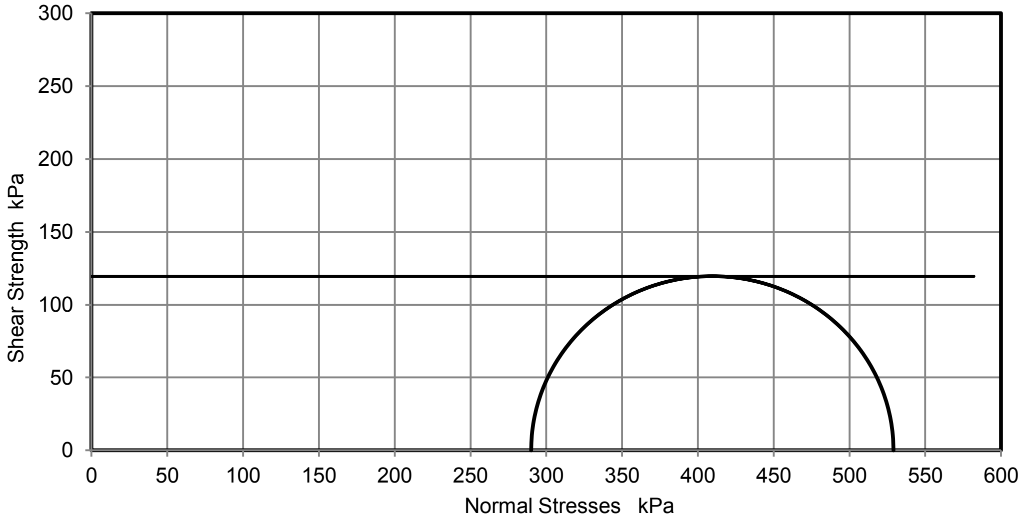


Test Number	1	
Length	198.0	mm
Diameter	102.0	mm
Bulk Density	1.98	Mg/m3
Moisture Content	25	%
Dry Density	1.58	Mg/m3
Rate of Strain	2.0	%/min
Cell Pressure	290	kPa
Axial Strain	3.5	%
Deviator Stress, (σ1 - σ3)f	239	kPa
Undrained Shear Strength, cu	120	kPa ½(σ1 - σ3)f
Mode of Failure	Brittle	

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

Checked and Approved
Initials: J.P
Date 08/01/2016

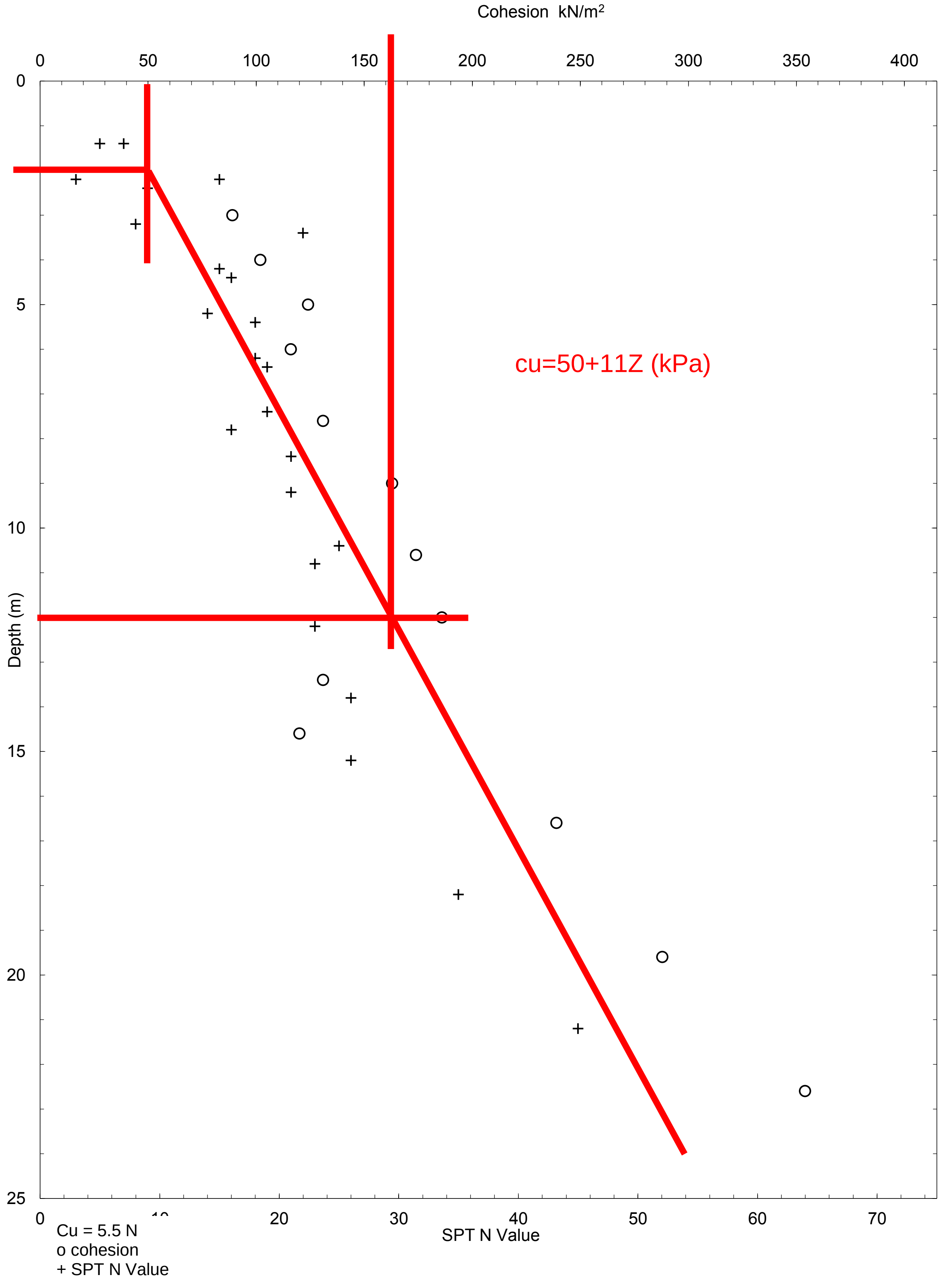
UKAS TESTING 2519

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

MSF-5 R7 (Rev.0)

GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	**SPT & Cohesion / Depth Graph**

Site	5-17 Haverstock Hill, London, NW3 2BL	**Job Number** J15316
Client	Mark Steinberg	**Sheet** 1 / 1
Engineer	Conisbee	



Results - Soil

Project: J15316 - Haverstock Hill

Client: GEA				Chemtest Job No.:	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103
Quotation No.:				Chemtest Sample ID.:	225952	225953	225954	225955	225956	225957	225958	225960	225961
				Client Sample ID.:	BH3A	BH3B	BH3B	BH3B	BH3B	BH4	BH4	BH4	BH5
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.4	0.8	2.1	3.0	4.0	0.6	1.6	3.6	0.6
				Date Sampled:	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	25-Nov-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A		-				-			-
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected				No Asbestos Detected			No Asbestos Detected
Moisture	N	2030	%	0.020	7.1	9.3	17	20	20	16	20	19	22
Stones	N	2030	%	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones, NONE	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Clay	Clay	Clay	Clay	Clay	Clay	Clay
pH	M	2010		N/A	10.8	11.4	8.5	8.2	8.4	9.9	8.3	8.3	8.4
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.13	0.26	1.5	1.6	0.95	0.43	0.052	0.88	0.21
Chloride (Extractable)	M	2220	g/l	0.010	0.058	0.038	0.039	0.038	0.065	0.048	0.087	0.071	0.19
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	M	2325	mg/kg	0.50	95	11	3.3	2.9	2.5	1.5	1.9	1.6	2.6
Sulphate (Total)	M	2430	mg/kg	100	1300	2700	15000	12000	5100	3200	530	4400	1500
Arsenic	M	2450	mg/kg	1.0	31	26	15	14	18	70	14	16	16
Cadmium	M	2450	mg/kg	0.10	0.10	0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10	0.11	< 0.10
Chromium	M	2450	mg/kg	1.0	32	34	59	46	53	33	59	58	47
Copper	M	2450	mg/kg	0.50	34	42	38	31	39	29	29	31	30
Mercury	M	2450	mg/kg	0.10	0.18	0.35	< 0.10	< 0.10	< 0.10	0.20	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	26	32	53	50	57	22	49	53	45
Lead	M	2450	mg/kg	0.50	210	1100	230	34	20	60	17	16	390
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.21	< 0.20	< 0.20	< 0.20	< 0.20
Zinc	M	2450	mg/kg	0.50	130	200	94	87	88	58	82	76	110
Total Organic Carbon	M	2625	%	0.20	0.47	0.71	0.27	0.31	0.33	1.2	0.27	0.31	0.31
TPH >C5-C6	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C6-C7	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C7-C8	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C10-C12	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C12-C16	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C16-C21	N	2670	mg/kg	1.0	9.6	4.4	< 1.0	< 1.0	< 1.0	7.7	< 1.0	< 1.0	< 1.0
TPH >C21-C35	N	2670	mg/kg	1.0	28	23	< 1.0	< 1.0	< 1.0	25	< 1.0	< 1.0	< 1.0
Total TPH >C5-C35	N	2670	mg/kg	10	38	27	< 10	< 10	< 10	32	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.3	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.14	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.20	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	0.63	< 0.10	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	0.35
Anthracene	M	2700	mg/kg	0.10	0.21	< 0.10	< 0.10	< 0.10	< 0.10	0.34	< 0.10	< 0.10	0.12
Fluoranthene	M	2700	mg/kg	0.10	1.8	0.67	< 0.10	< 0.10	< 0.10	1.6	< 0.10	< 0.10	0.50

Results - Soil

Project: J15316 - Haverstock Hill

Client: GEA	**Chemtest Job No.:**				15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103
Quotation No.:	**Chemtest Sample ID.:**				225952	225953	225954	225955	225956	225957	225958	225960	225961
	Client Sample ID.:				BH3A	BH3B	BH3B	BH3B	BH3B	BH4	BH4	BH4	BH5
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.4	0.8	2.1	3.0	4.0	0.6	1.6	3.6	0.6
	Date Sampled:				24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	24-Nov-2015	25-Nov-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Pyrene	M	2700	mg/kg	0.10	2.0	0.88	< 0.10	< 0.10	< 0.10	1.9	< 0.10	< 0.10	0.56
Benzo[a]anthracene	M	2700	mg/kg	0.10	1.0	0.53	< 0.10	< 0.10	< 0.10	0.88	< 0.10	< 0.10	0.19
Chrysene	M	2700	mg/kg	0.10	1.2	0.67	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	0.24
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	1.8	0.98	< 0.10	< 0.10	< 0.10	1.6	< 0.10	< 0.10	0.30
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.84	0.42	< 0.10	< 0.10	< 0.10	0.68	< 0.10	< 0.10	0.11
Benzo[a]pyrene	M	2700	mg/kg	0.10	1.5	0.74	< 0.10	< 0.10	< 0.10	1.1	< 0.10	< 0.10	0.26
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	0.83	0.44	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	0.29	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	0.78	0.65	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	13	6.1	< 2.0	< 2.0	< 2.0	13	< 2.0	< 2.0	2.6
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Chemtest
The right chemistry to deliver results

Results - Soil

Project: J15316 - Haverstock Hill

Client: GEA				Chemtest Job No.:	15-28103	15-28103	15-28103	15-28103	15-28103	15-28103
Quotation No.:				Chemtest Sample ID.:	225962	225964	225965	225969	225971	225972
				Client Sample ID.:	BH5	BH5	BH6	BH6	BH7	BH7
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.8	4.0	0.3	4.0	0.4	1.5
				Date Sampled:	25-Nov-2015	25-Nov-2015	25-Nov-2015	25-Nov-2015	26-Nov-2015	26-Nov-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
ACM Type	U	2192		N/A						
Asbestos Identification	U	2192	%	0.001						
Moisture	N	2030	%	0.020	17	21	22	20	21	19
Stones	N	2030	%	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Clay	Clay	Clay	Clay	Clay	Clay
pH	M	2010		N/A	8.5	8.2	8.9	8.3	8.5	8.0
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.34	1.6	0.25	1.3	0.17	0.97
Chloride (Extractable)	M	2220	g/l	0.010	0.064	0.071	0.078	0.17	0.021	0.053
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	M	2325	mg/kg	0.50	1.6	1.5	83	3.8	15	2.0
Sulphate (Total)	M	2430	mg/kg	100	1200	16000	8900	12000	990	8500
Arsenic	M	2450	mg/kg	1.0	11	21	18	17	16	16
Cadmium	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10
Chromium	M	2450	mg/kg	1.0	44	55	33	53	57	61
Copper	M	2450	mg/kg	0.50	27	37	49	32	28	37
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	0.51	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	43	57	28	49	51	54
Lead	M	2450	mg/kg	0.50	39	18	160	19	17	17
Selenium	M	2450	mg/kg	0.20	< 0.20	0.36	< 0.20	< 0.20	< 0.20	< 0.20
Zinc	M	2450	mg/kg	0.50	69	90	64	82	90	89
Total Organic Carbon	M	2625	%	0.20	0.20	0.64	1.4	0.22	0.25	0.21
TPH >C5-C6	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C6-C7	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C7-C8	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C10-C12	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C12-C16	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C16-C21	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C21-C35	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total TPH >C5-C35	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10

Results - Soil

Project: J15316 - Haverstock Hill

Client: GEA	**Chemtest Job No.:**				15-28103	15-28103	15-28103	15-28103	15-28103	15-28103
Quotation No.:	**Chemtest Sample ID.:**				225962	225964	225965	225969	225971	225972
	Client Sample ID.:				BH5	BH5	BH6	BH6	BH7	BH7
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.8	4.0	0.3	4.0	0.4	1.5
	Date Sampled:				25-Nov-2015	25-Nov-2015	25-Nov-2015	25-Nov-2015	26-Nov-2015	26-Nov-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

Generic Risk-Based Soil Screening Values

Site	5-17 Haverstock Hill, London, NW3 2BL	**Job Number**	J15316
Client	Mark Steinberg	**Sheet**	1 / 2
Engineer	Conisbee		

Proposed End Use Residential with plant uptake

Soil pH 8

Soil Organic Matter content % 1.0

Contaminant	Screening Value mg/kg	Data Source
Metals		
Arsenic	37	C4SL
Cadmium	26	C4SL
Chromium (III)	3000	LQM/CIEH
Chromium (VI)	21	C4SL
Copper	2,330	LQM/CIEH
Lead	200	C4SL
Elemental Mercury	1	SGV
Inorganic Mercury	170	SGV
Nickel	97	LQM/CIEH
Selenium	350	SGV
Zinc	3,750	LQM/CIEH
Hydrocarbons		
Benzene	0.2	C4SL
Toluene	120	SGV
Ethyl Benzene	65	SGV
Xylene	42	SGV
Aliphatic C5-C6	30	LQM/CIEH
Aliphatic C6-C8	73	LQM/CIEH
Aliphatic C8-C10	19	LQM/CIEH
Aliphatic C10-C12	93	LQM/CIEH
Aliphatic C12-C16	740	LQM/CIEH
Aliphatic C16-C35	45,000	LQM/CIEH
Aromatic C6-C7	See Benzene	LQM/CIEH
Aromatic C7-C8	See Toluene	LQM/CIEH
Aromatic C8-C10	27	LQM/CIEH
Aromatic C10-C12	69	LQM/CIEH
Aromatic C12-C16	140	LQM/CIEH
Aromatic C16-C21	250	LQM/CIEH
Aromatic C21-C35	890	LQM/CIEH
PRO (C_5 –C_{10})	269	Calc
DRO (C_{12} –C_{28})	46,130	Calc
Lube Oil (C_{28} –C_{44})	45,890	Calc
TPH	**1000**	Trigger for speciated testing

Contaminant	Screening Value mg/kg	Data Source
Anions		
Soluble Sulphate	500 mg/l	Structures
Sulphide	50	Structures
Chloride	400	Structures
Others		
Organic Carbon (%)	6	Methanogenic potential
Total Cyanide	140	WRAS
Total Mono Phenols	184	SGV
PAH		
Naphthalene	2.20	C4SL exp & LQM/CIEH
Acenaphthylene	170	LQM/CIEH
Acenaphthene	210	LQM/CIEH
Fluorene	160	LQM/CIEH
Phenanthrene	92	LQM/CIEH
Anthracene	2,300	LQM/CIEH
Fluoranthene	260	LQM/CIEH
Pyrene	560	LQM/CIEH
Benzo(a) Anthracene	4.3	C4SL exp & LQM/CIEH
Chrysene	8	C4SL exp & LQM/CIEH
Benzo(b) Fluoranthene	7.7	C4SL exp & LQM/CIEH
Benzo(k) Fluoranthene	12.1	C4SL exp & LQM/CIEH
Benzo(a) pyrene	4.35	C4SL
Indeno(1 2 3 cd) Pyrene	4.4	C4SL exp & LQM/CIEH
Dibenzo(a h) Anthracene	1.10	C4SL exp & LQM/CIEH
Benzo (g h i) Perylene	65	C4SL exp & LQM/CIEH
Screening value for PAH	**62.1**	B(a)P / 0.15
Chlorinated Solvents		
1,1,1 trichloroethane (TCA)	11.7	LQM/CIEH
tetrachloroethane (PCA)	0.56	LQM/CIEH
tetrachloroethene (PCE)	1.01	LQM/CIEH
trichloroethene (TCE)	0.134	LQM/CIEH
1,2-dichloroethane (DCA)	0.0054	LQM/CIEH
vinyl chloride (Chloroethene)	0.000953	LQM/CIEH
tetrachloromethane (Carbon tetra	0.018	LQM/CIEH
trichloromethane (Chloroform)	0.888	LQM/CIEH

Notes

Concentrations measured below the above values may be considered to represent 'uncontaminated conditions' which pose 'LOW' risk to human health. Concentrations measured in excess of these valuesindicate a potential risk which require further, site specific risk assessment.

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009

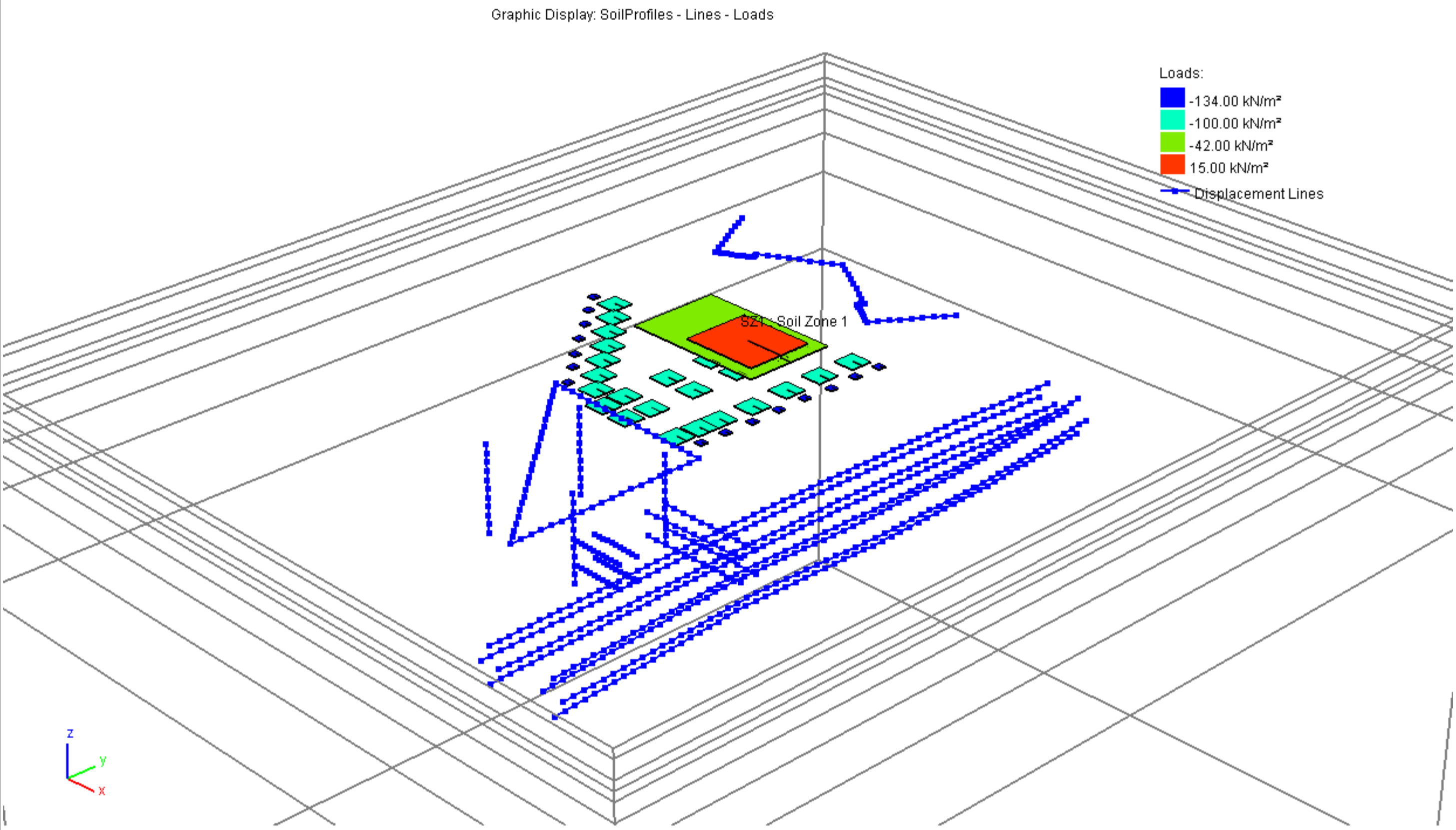
LQM/CIEH - Generic Assessment Criteria for Human Health Risk Assessment 2nd edition (2009)derived using CLEA 1.04 model 2009

C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk

C4SL exp & LQM/CIEH calculated using C4SL revisions to exposure assessment but LQM/CIEH health croiteria values

Calc - sum of nearest available carbon range specified including BTEX for PRO fraction

B(a)P / 0.15 - GEA experince indicates that Benzo(a) pyrene (one of the most common and most carcenogenic of the PAHs) rarely exceeds 15% of the total PAH concentration, hence this Total PAH threshold is regarded as being conservative


Graphic Display: SoilProfiles - Lines - Loads
Loads:
-134.00 kN/m²
-100.00 kN/m²
-42.00 kN/m²
15.00 kN/m²
Displacement Lines
SZ1 : Soil Zone 1
z
y
x

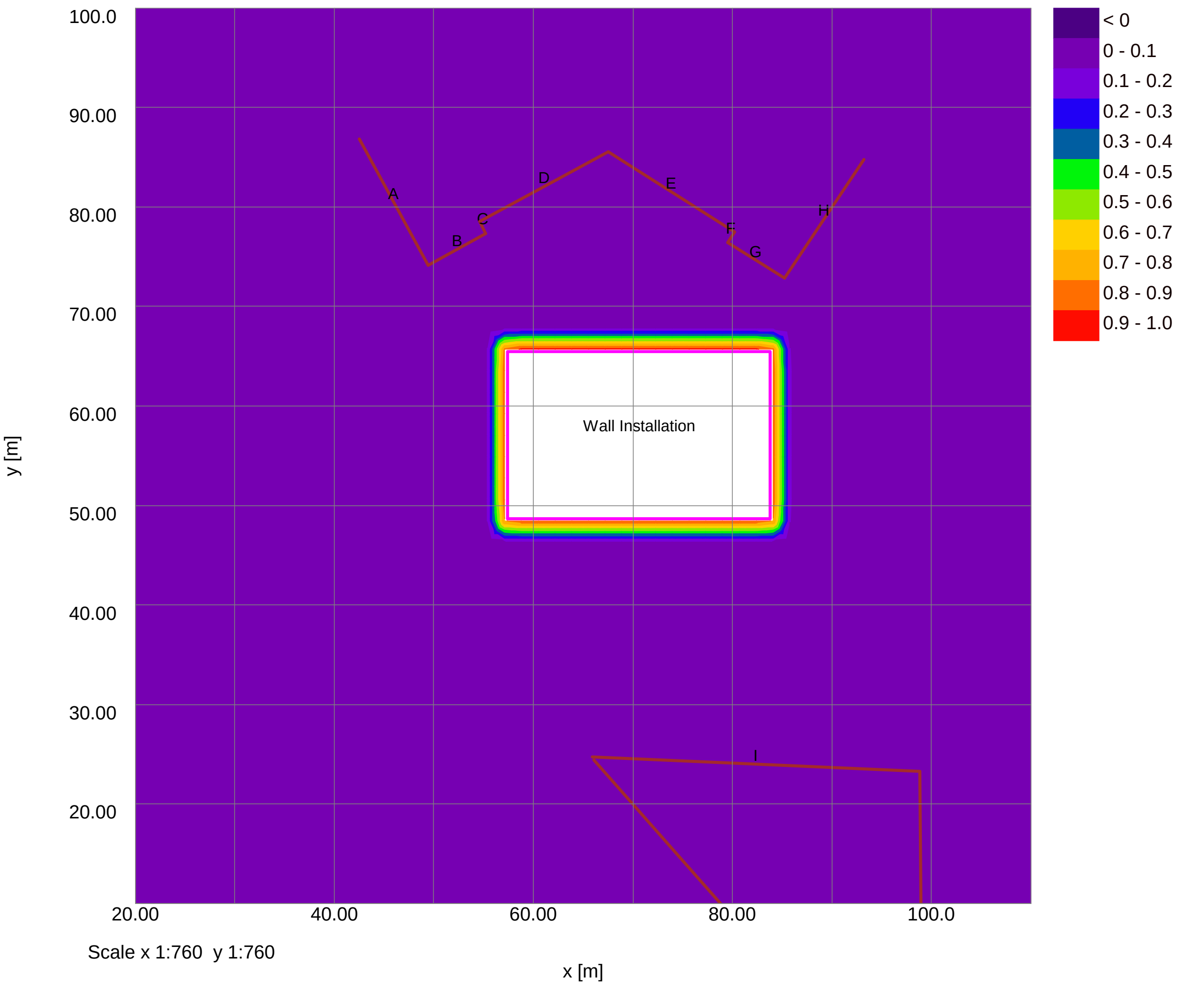
Oasys

GEA LIMITED
(GEOTECHNICAL &ENV ASSOC)

5-17 Haverstock Hill, London NW3 2BL
Wall installation

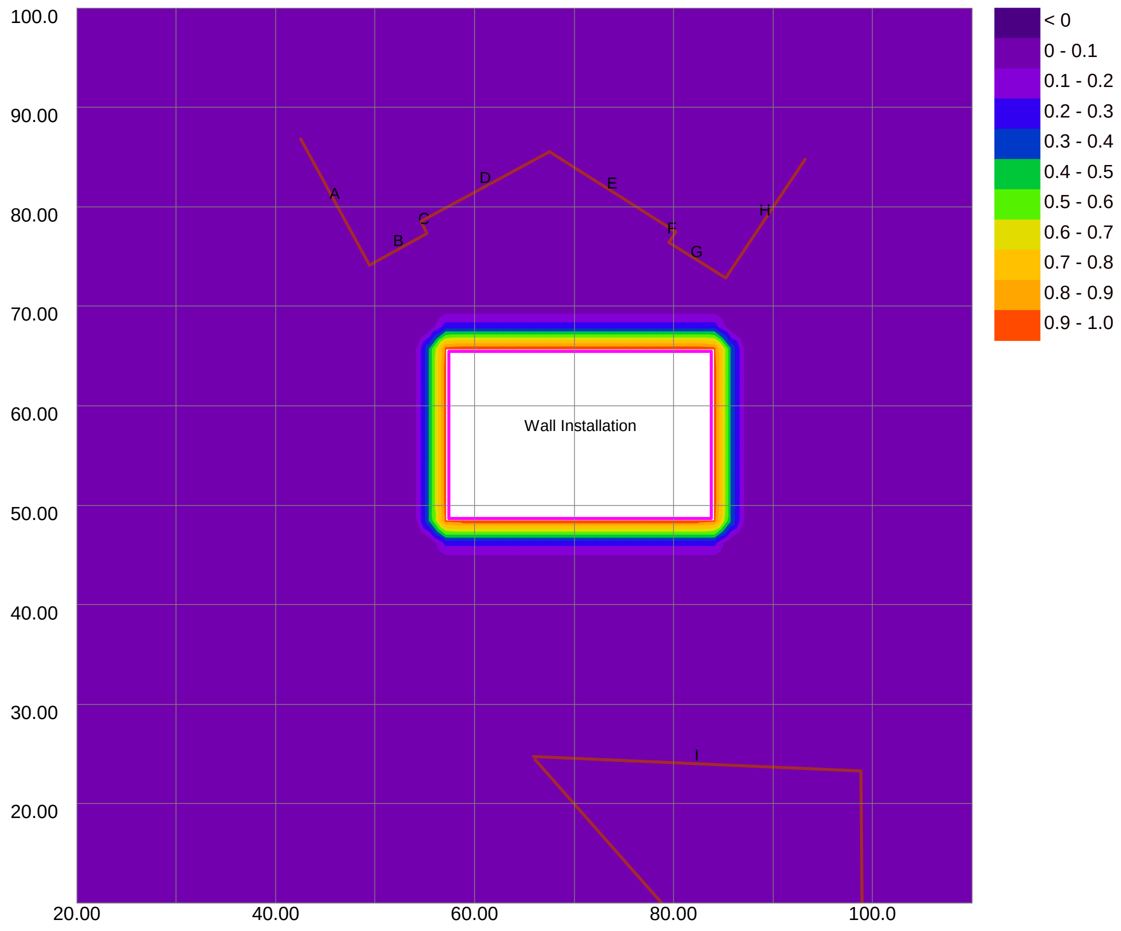
Job No.	Sheet No.	Rev.
J15316A		
Drg. Ref.		
Made by	Date 19-May-2016	Checked

Vertical Settlement Contours: Grid 1 (level 0.000m) (Interval 0.1mm)



Scale x 1:760 y 1:760

Horizontal Displacement Contours: Grid 1 (level 0.000m) Interval 0.1mm



Scale x 1:760 y 1:760

x [m]

Problem Type

Problem Type : Tunnelling and Embedded Wall Excavations

Displacement Data

Type	Name	Direction of extrusion	First point X [m]	First point Y [m]	First point Z(level) [m]	Second point X [m]	Second point Y [m]	Second point Z(level) [m]	No. of intervals across extrusion/line	Extrusion depth [m]	No. of intervals along extrusion	Calculate	Surface type for tunnels
Grid	Grid 1	Global X	1.50000	-51.00000	0.00000	-	150.00000	0.00000	93	150.00000	89	Yes	Surface
Line	A	-	42.50000	86.80000	-0.60000	49.40000	74.10000	-0.60000	8	-	-	Yes	Surface
Line	B	-	49.40000	74.10000	-0.60000	55.20000	77.30000	-0.60000	7	-	-	Yes	Surface
Line	C	-	55.20000	77.30000	-0.60000	54.60000	78.50000	-0.60000	2	-	-	Yes	Surface
Line	D	-	54.60000	78.50000	-0.60000	67.50000	85.50000	-0.60000	8	-	-	Yes	Surface
Line	E	-	67.50000	85.50000	-0.60000	80.20000	77.50000	-0.60000	8	-	-	Yes	Surface
Line	F	-	80.20000	77.50000	-0.60000	79.50000	76.40000	-0.60000	2	-	-	Yes	Surface
Line	G	-	79.50000	76.40000	-0.60000	85.20000	72.80000	-0.60000	7	-	-	Yes	Surface
Line	H	-	85.20000	72.80000	-0.60000	93.20000	84.80000	-0.60000	8	-	-	Yes	Surface
Line	I	-	65.90000	24.70000	-1.20000	98.80000	23.30000	-1.20000	17	-	-	Yes	Surface
Line	J	-	98.80000	23.30000	-1.20000	99.10000	-13.10000	-1.20000	19	-	-	Yes	Surface
Line	K	-	99.10000	-13.10000	-1.20000	66.10000	24.40000	-1.20000	25	-	-	Yes	Surface

Vertical Ground Movement Curves

Curve Name: **Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))**
Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)]
[0.000,0.000,0.050][0.050,0.000,0.047][0.100,0.000,0.043][0.150,0.000,0.040]
[0.200,0.000,0.037][0.250,0.000,0.034][0.300,0.000,0.031][0.350,0.000,0.028]
[0.400,0.000,0.025][0.450,0.000,0.022][0.500,0.000,0.020][0.550,0.000,0.018]
[0.600,0.000,0.016][0.650,0.000,0.014][0.700,0.000,0.012][0.750,0.000,0.010]
[0.800,0.000,0.008][0.850,0.000,0.007][0.900,0.000,0.006][0.950,0.000,0.005]
[1.000,0.000,0.004][1.050,0.000,0.003][1.100,0.000,0.003][1.150,0.000,0.002]
[1.200,0.000,0.002][1.250,0.000,0.001][1.300,0.000,0.001][1.350,0.000,0.001]
[1.400,0.000,0.001][1.450,0.000,0.000][1.500,0.000,0.000]
Curve Fitting Method: Polynomial
x Order: 4
y Order: 0
Polynomial: z = $-1.2355E{-2}x^4 + 3.4814E{-2}x^3 - 2.8885E{-3}x^2 - 6.5618E{-2}x + 4.9987E{-2}$
Coeff. of Determination: 1.0000

Horizontal Ground Movement Curves

Curve Name: **Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))**
Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)]
[0.000,0.000,0.050][1.500,0.000,0.000]
Curve Fitting Method: Polynomial
x Order: 1
y Order: 0
Polynomial: z = -3.33E-2x + 5.00E-2
Coeff. of Determination: 1.00

Polygonal Excavations

Excavation Name: **Wall Installation**
Surface level [m]: 0.0
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: -2.1000

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	57.400	48.700	-2.1000	No	-	-	-	-	-	-
2	83.800	48.700	-2.1000	No	-	-	-	-	-	-
3	83.800	65.500	-2.1000	No	-	-	-	-	-	-
4	57.400	65.500	-2.1000	No	-	-	-	-	-	-

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal
1	57.400	48.700	83.800	48.700	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))
2	83.800	48.700	83.800	65.500	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))
3	83.800	65.500	57.400	65.500	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))
4	57.400	65.500	57.400	48.700	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))

Damage Category Strains

Name	0 (Negligible) to 1 (Very Slight)	1 (Very Slight) to 2 (Slight)	2 (Slight) to 3 (Moderate)	3 (Moderate) to 4 (Severe)
Burland Strain Limits	0.0	500.00E-6	750.00E-6	0.0015000

Specific Structures - Geometry

Structure Name	Sub-Structure Name	Displacement Line	Start Distance Along Line [m]	End Distance Along Line [m]	Vertical Offsets from Line for Vertical Movement Calculations [m]	Vertical Displacement Limit Sensitivity [mm]	Damage Category Strains	Poisson's Ratio	E/G
A		A	0.00000	14.45237	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
B	Sub #	B	0.00000	6.62320	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
C	Sub #	C	0.00000	1.34064	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
D	Sub #	D	0.00000	14.67585	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
E	Sub #	E	0.00000	15.00866	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
F	Sub #	F	0.00000	1.30284	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
G	Sub #	G	0.00000	6.74066	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
H	Sub #	H	0.00000	14.42121	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
I		I	0.00000	32.92877	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
J		J	0.00000	36.40024	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
K		K	0.00000	49.95148	0.0	0.10000	Burland Strain Limits	0.20000	2.6000

Specific Structures - Bending Parameters

Structure Name	Sub-Structure Name	Height	Default Properties	Hogging	Sagging

				2nd Moment of Area (per unit width)	Distance of Bending Strain from N.A.	Distance of N.A. from Edge of Beam in Tension	2nd Moment of Area (per unit width)	Distance of Bending Strain from N.A.	Distance of N.A. from Edge of Beam in Tension
		[m]		[m³]	[m]	[m]	[m³]	[m]	[m]
A		19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
B	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
C	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
D	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
E	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
F	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
G	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
H	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
I		9.1000	Yes	251.19	9.1000	9.1000	62.798	4.5500	4.5500
J		9.1000	Yes	251.19	9.1000	9.1000	62.798	4.5500	4.5500
K		9.1000	Yes	251.19	9.1000	9.1000	62.798	4.5500	4.5500

Specific Building Damage Results - Horizontal Displacements

Structure: A | Sub-structure:

Dist.	**Coordinates**			**Displacements**			
	x	**y**	**z**	**x**	**y**	**Horizontal displacement along the Line**	**Horizontal displacement perpendicular to Line**
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	42.50000	86.80000	-0.60000	0.0	0.0	0.0	0.0
1.8067	43.36250	85.21250	-0.60000	0.0	0.0	0.0	0.0
3.6133	44.22500	83.62500	-0.60000	0.0	0.0	0.0	0.0
5.4200	45.08750	82.03750	-0.60000	0.0	0.0	0.0	0.0
7.2267	45.95000	80.45000	-0.60000	0.0	0.0	0.0	0.0
9.0334	46.81250	78.86250	-0.60000	0.0	0.0	0.0	0.0
10.840	47.67500	77.27500	-0.60000	0.0	0.0	0.0	0.0
12.647	48.53750	75.68750	-0.60000	0.0	0.0	0.0	0.0
14.453	49.40000	74.10000	-0.60000	0.0	0.0	0.0	0.0

Structure: B | Sub-structure: Sub #

Dist.	**Coordinates**			**Displacements**			
	x	**y**	**z**	**x**	**y**	**Horizontal displacement along the Line**	**Horizontal displacement perpendicular to Line**
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	49.40000	74.10000	-0.60000	0.0	0.0	0.0	0.0
0.94631	50.22857	74.55714	-0.60000	0.0	0.0	0.0	0.0
1.8926	51.05714	75.01429	-0.60000	0.0	0.0	0.0	0.0
2.8389	51.88571	75.47143	-0.60000	0.0	0.0	0.0	0.0
3.7853	52.71429	75.92857	-0.60000	0.0	0.0	0.0	0.0
4.7316	53.54286	76.38571	-0.60000	0.0	0.0	0.0	0.0
5.6779	54.37143	76.84286	-0.60000	0.0	0.0	0.0	0.0
6.6242	55.20000	77.30000	-0.60000	0.0	0.0	0.0	0.0

Structure: C | Sub-structure: Sub #

Dist.	**Coordinates**			**Displacements**			
	x	**y**	**z**	**x**	**y**	**Horizontal displacement along the Line**	**Horizontal displacement perpendicular to Line**
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	55.20000	77.30000	-0.60000	0.0	0.0	0.0	0.0
0.67082	54.90000	77.90000	-0.60000	0.0	0.0	0.0	0.0
1.3416	54.60000	78.50000	-0.60000	0.0	0.0	0.0	0.0

Structure: D | Sub-structure: Sub #

Dist.	**Coordinates**			**Displacements**			
	x	**y**	**z**	**x**	**y**	**Horizontal displacement along the Line**	**Horizontal displacement perpendicular to Line**
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	54.60000	78.50000	-0.60000	0.0	0.0	0.0	0.0
1.8346	56.21250	79.37500	-0.60000	0.0	0.0	0.0	0.0
3.6692	57.82500	80.25000	-0.60000	0.0	0.0	0.0	0.0
5.5038	59.43750	81.12500	-0.60000	0.0	0.0	0.0	0.0
7.3384	61.05000	82.00000	-0.60000	0.0	0.0	0.0	0.0
9.1730	62.66250	82.87500	-0.60000	0.0	0.0	0.0	0.0
11.008	64.27500	83.75000	-0.60000	0.0	0.0	0.0	0.0
12.842	65.88750	84.62500	-0.60000	0.0	0.0	0.0	0.0
14.677	67.50000	85.50000	-0.60000	0.0	0.0	0.0	0.0

Structure: E | Sub-structure: Sub #

Dist.	**Coordinates**			**Displacements**			
	x	**y**	**z**	**x**	**y**	**Horizontal displacement along the Line**	**Horizontal displacement perpendicular to Line**
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	67.50000	85.50000	-0.60000	0.0	0.0	0.0	0.0
1.8762	69.08750	84.50000	-0.60000	0.0	0.0	0.0	0.0
3.7524	70.67500	83.50000	-0.60000	0.0	0.0	0.0	0.0
5.6286	72.26250	82.50000	-0.60000	0.0	0.0	0.0	0.0
7.5048	73.85000	81.50000	-0.60000	0.0	0.0	0.0	0.0
9.3810	75.43750	80.50000	-0.60000	0.0	0.0	0.0	0.0
11.257	77.02500	79.50000	-0.60000	0.0	0.0	0.0	0.0
13.133	78.61250	78.50000	-0.60000	0.0	0.0	0.0	0.0
15.010	80.20000	77.50000	-0.60000	0.0	0.0	0.0	0.0

Structure: F | Sub-structure: Sub #

Dist.	**Coordinates**			**Displacements**			
	x	**y**	**z**	**x**	**y**	**Horizontal displacement along the Line**	**Horizontal displacement perpendicular to Line**
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	80.20000	77.50000	-0.60000	0.0	0.0	0.0	0.0
0.65192	79.85000	76.95000	-0.60000	0.0	0.0	0.0	0.0
1.3038	79.50000	76.40000	-0.60000	0.0	0.0	0.0	0.0

Structure: G | Sub-structure: Sub #

Dist.	**Coordinates**			**Displacements**			
	x	**y**	**z**	**x**	**y**	**Horizontal displacement along the Line**	**Horizontal displacement perpendicular to Line**
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	79.50000	76.40000	-0.60000	0.0	0.0	0.0	0.0
0.96309	80.31429	75.88571	-0.60000	0.0	0.0	0.0	0.0
1.9262	81.12857	75.37143	-0.60000	0.0	0.0	0.0	0.0
2.8893	81.94286	74.85714	-0.60000	0.0	0.0	0.0	0.0
3.8524	82.75714	74.34286	-0.60000	0.0	0.0	0.0	0.0
4.8155	83.57143	73.82857	-0.60000	0.0	0.0	0.0	0.0
5.7786	84.38571	73.31429	-0.60000	0.0	0.0	0.0	0.0

Dist.	Coordinates x	y	z	Displacements x	y	Horizontal displacement along the	Horizontal displacement perpendicular
6.7417	85.20000	72.80000	-0.60000	0.0	0.0	0.0	0.0

Structure: H | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	85.20000	72.80000	-0.60000	0.0	0.0	0.0	0.0
1.8028	86.20000	74.30000	-0.60000	0.0	0.0	0.0	0.0
3.6056	87.20000	75.80000	-0.60000	0.0	0.0	0.0	0.0
5.4083	88.20000	77.30000	-0.60000	0.0	0.0	0.0	0.0
7.2111	89.20000	78.80000	-0.60000	0.0	0.0	0.0	0.0
9.0139	90.20000	80.30000	-0.60000	0.0	0.0	0.0	0.0
10.817	91.20000	81.80000	-0.60000	0.0	0.0	0.0	0.0
12.619	92.20000	83.30000	-0.60000	0.0	0.0	0.0	0.0
14.422	93.20000	84.80000	-0.60000	0.0	0.0	0.0	0.0

Structure: I | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	65.90000	24.70000	-1.20000	0.0	0.0	0.0	0.0
1.9370	67.83529	24.61765	-1.20000	0.0	0.0	0.0	0.0
3.8741	69.77059	24.53529	-1.20000	0.0	0.0	0.0	0.0
5.8111	71.70588	24.45294	-1.20000	0.0	0.0	0.0	0.0
7.7482	73.64118	24.37059	-1.20000	0.0	0.0	0.0	0.0
9.6852	75.57647	24.28824	-1.20000	0.0	0.0	0.0	0.0
11.622	77.51176	24.20588	-1.20000	0.0	0.0	0.0	0.0
13.559	79.44706	24.12353	-1.20000	0.0	0.0	0.0	0.0
15.496	81.38235	24.04118	-1.20000	0.0	0.0	0.0	0.0
17.433	83.31765	23.95882	-1.20000	0.0	0.0	0.0	0.0
19.370	85.25294	23.87647	-1.20000	0.0	0.0	0.0	0.0
21.308	87.18824	23.79412	-1.20000	0.0	0.0	0.0	0.0
23.245	89.12353	23.71176	-1.20000	0.0	0.0	0.0	0.0
25.182	91.05882	23.62941	-1.20000	0.0	0.0	0.0	0.0
27.119	92.99412	23.54706	-1.20000	0.0	0.0	0.0	0.0
29.056	94.92941	23.46471	-1.20000	0.0	0.0	0.0	0.0
30.993	96.86471	23.38235	-1.20000	0.0	0.0	0.0	0.0
32.930	98.80000	23.30000	-1.20000	0.0	0.0	0.0	0.0

Structure: J | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	98.80000	23.30000	-1.20000	0.0	0.0	0.0	0.0
1.9159	98.81579	21.38421	-1.20000	0.0	0.0	0.0	0.0
3.8317	98.83158	19.46842	-1.20000	0.0	0.0	0.0	0.0
5.7476	98.84737	17.55263	-1.20000	0.0	0.0	0.0	0.0
7.6634	98.86316	15.63684	-1.20000	0.0	0.0	0.0	0.0
9.5793	98.87895	13.72105	-1.20000	0.0	0.0	0.0	0.0
11.495	98.89474	11.80526	-1.20000	0.0	0.0	0.0	0.0
13.411	98.91053	9.88947	-1.20000	0.0	0.0	0.0	0.0
15.327	98.92632	7.97368	-1.20000	0.0	0.0	0.0	0.0
17.243	98.94211	6.05789	-1.20000	0.0	0.0	0.0	0.0
19.159	98.95789	4.14211	-1.20000	0.0	0.0	0.0	0.0
21.074	98.97368	2.22632	-1.20000	0.0	0.0	0.0	0.0
22.990	98.98947	0.31053	-1.20000	0.0	0.0	0.0	0.0
24.906	99.00526	-1.60526	-1.20000	0.0	0.0	0.0	0.0
26.822	99.02105	-3.52105	-1.20000	0.0	0.0	0.0	0.0
28.738	99.03684	-5.43684	-1.20000	0.0	0.0	0.0	0.0
30.654	99.05263	-7.35263	-1.20000	0.0	0.0	0.0	0.0
32.570	99.06842	-9.26842	-1.20000	0.0	0.0	0.0	0.0
34.485	99.08421	-11.18421	-1.20000	0.0	0.0	0.0	0.0
36.401	99.10000	-13.10000	-1.20000	0.0	0.0	0.0	0.0

Structure: K | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	99.10000	-13.10000	-1.20000	0.0	0.0	0.0	0.0
1.9981	97.78000	-11.60000	-1.20000	0.0	0.0	0.0	0.0
3.9962	96.46000	-10.10000	-1.20000	0.0	0.0	0.0	0.0
5.9943	95.14000	-8.60000	-1.20000	0.0	0.0	0.0	0.0
7.9924	93.82000	-7.10000	-1.20000	0.0	0.0	0.0	0.0
9.9905	92.50000	-5.60000	-1.20000	0.0	0.0	0.0	0.0
11.989	91.18000	-4.10000	-1.20000	0.0	0.0	0.0	0.0
13.987	89.86000	-2.60000	-1.20000	0.0	0.0	0.0	0.0
15.985	88.54000	-1.10000	-1.20000	0.0	0.0	0.0	0.0
17.983	87.22000	0.40000	-1.20000	0.0	0.0	0.0	0.0
19.981	85.90000	1.90000	-1.20000	0.0	0.0	0.0	0.0
21.979	84.58000	3.40000	-1.20000	0.0	0.0	0.0	0.0
23.977	83.26000	4.90000	-1.20000	0.0	0.0	0.0	0.0
25.975	81.94000	6.40000	-1.20000	0.0	0.0	0.0	0.0
27.973	80.62000	7.90000	-1.20000	0.0	0.0	0.0	0.0
29.971	79.30000	9.40000	-1.20000	0.0	0.0	0.0	0.0
31.970	77.98000	10.90000	-1.20000	0.0	0.0	0.0	0.0
33.968	76.66000	12.40000	-1.20000	0.0	0.0	0.0	0.0
35.966	75.34000	13.90000	-1.20000	0.0	0.0	0.0	0.0
37.964	74.02000	15.40000	-1.20000	0.0	0.0	0.0	0.0
39.962	72.70000	16.90000	-1.20000	0.0	0.0	0.0	0.0
41.960	71.38000	18.40000	-1.20000	0.0	0.0	0.0	0.0
43.958	70.06000	19.90000	-1.20000	0.0	0.0	0.0	0.0
45.956	68.74000	21.40000	-1.20000	0.0	0.0	0.0	0.0
47.954	67.42000	22.90000	-1.20000	0.0	0.0	0.0	0.0
49.952	66.10000	24.40000	-1.20000	0.0	0.0	0.0	0.0

Specific Building Damage Results - Vertical Displacements

Structure: A | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	42.50000	86.80000	-0.60000	0.0
1.8067	43.36250	85.21250	-0.60000	0.0
3.6133	44.22500	83.62500	-0.60000	0.0
5.4200	45.08750	82.03750	-0.60000	0.0
7.2267	45.95000	80.45000	-0.60000	0.0
9.0334	46.81250	78.86250	-0.60000	0.0
10.840	47.67500	77.27500	-0.60000	0.0
12.647	48.53750	75.68750	-0.60000	0.0
14.453	49.40000	74.10000	-0.60000	0.0

Structure: B | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	49.40000	74.10000	-0.60000	0.0
0.94631	50.22857	74.55714	-0.60000	0.0
1.8926	51.05714	75.01429	-0.60000	0.0
2.8389	51.88571	75.47143	-0.60000	0.0
3.7853	52.71429	75.92857	-0.60000	0.0
4.7316	53.54286	76.38571	-0.60000	0.0
5.6779	54.37143	76.84286	-0.60000	0.0
6.6242	55.20000	77.30000	-0.60000	0.0

Structure: C | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	55.20000	77.30000	-0.60000	0.0
0.67082	54.90000	77.90000	-0.60000	0.0
1.3416	54.60000	78.50000	-0.60000	0.0

Structure: D | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	54.60000	78.50000	-0.60000	0.0
1.8346	56.21250	79.37500	-0.60000	0.0
3.6692	57.82500	80.25000	-0.60000	0.0
5.5038	59.43750	81.12500	-0.60000	0.0
7.3384	61.05000	82.00000	-0.60000	0.0
9.1730	62.66250	82.87500	-0.60000	0.0
11.008	64.27500	83.75000	-0.60000	0.0
12.842	65.88750	84.62500	-0.60000	0.0
14.677	67.50000	85.50000	-0.60000	0.0

Structure: E | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	67.50000	85.50000	-0.60000	0.0
1.8762	69.08750	84.50000	-0.60000	0.0
3.7524	70.67500	83.50000	-0.60000	0.0
5.6286	72.26250	82.50000	-0.60000	0.0
7.5048	73.85000	81.50000	-0.60000	0.0
9.3810	75.43750	80.50000	-0.60000	0.0
11.257	77.02500	79.50000	-0.60000	0.0
13.133	78.61250	78.50000	-0.60000	0.0
15.010	80.20000	77.50000	-0.60000	0.0

Structure: F | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	80.20000	77.50000	-0.60000	0.0
0.65192	79.85000	76.95000	-0.60000	0.0
1.3038	79.50000	76.40000	-0.60000	0.0

Structure: G | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	79.50000	76.40000	-0.60000	0.0
0.96309	80.31429	75.88571	-0.60000	0.0
1.9262	81.12857	75.37143	-0.60000	0.0
2.8893	81.94286	74.85714	-0.60000	0.0
3.8524	82.75714	74.34286	-0.60000	0.0
4.8155	83.57143	73.82857	-0.60000	0.0
5.7786	84.38571	73.31429	-0.60000	0.0
6.7417	85.20000	72.80000	-0.60000	0.0

Structure: H | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	85.20000	72.80000	-0.60000	0.0
1.8028	86.20000	74.30000	-0.60000	0.0
3.6056	87.20000	75.80000	-0.60000	0.0
5.4083	88.20000	77.30000	-0.60000	0.0
7.2111	89.20000	78.80000	-0.60000	0.0
9.0139	90.20000	80.30000	-0.60000	0.0
10.817	91.20000	81.80000	-0.60000	0.0
12.619	92.20000	83.30000	-0.60000	0.0
14.422	93.20000	84.80000	-0.60000	0.0

Structure: I | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	65.90000	24.70000	-1.20000	0.0
1.9370	67.83529	24.61765	-1.20000	0.0
3.8741	69.77059	24.53529	-1.20000	0.0
5.8111	71.70588	24.45294	-1.20000	0.0
7.7482	73.64118	24.37059	-1.20000	0.0
9.6852	75.57647	24.28824	-1.20000	0.0
11.622	77.51176	24.20588	-1.20000	0.0
13.559	79.44706	24.12353	-1.20000	0.0
15.496	81.38235	24.04118	-1.20000	0.0
17.433	83.31765	23.95882	-1.20000	0.0
19.370	85.25294	23.87647	-1.20000	0.0
21.308	87.18824	23.79412	-1.20000	0.0
23.245	89.12353	23.71176	-1.20000	0.0
25.182	91.05882	23.62941	-1.20000	0.0
27.119	92.99412	23.54706	-1.20000	0.0
29.056	94.92941	23.46471	-1.20000	0.0
30.993	96.86471	23.38235	-1.20000	0.0
32.930	98.80000	23.30000	-1.20000	0.0

Structure: J | Sub-structure:

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	98.80000	23.30000	-1.20000	0.0
1.9159	98.81579	21.38421	-1.20000	0.0
3.8317	98.83158	19.46842	-1.20000	0.0
5.7476	98.84737	17.55263	-1.20000	0.0
7.6634	98.86316	15.63684	-1.20000	0.0
9.5793	98.87895	13.72105	-1.20000	0.0
11.495	98.89474	11.80526	-1.20000	0.0
13.411	98.91053	9.88947	-1.20000	0.0
15.327	98.92632	7.97368	-1.20000	0.0
17.243	98.94211	6.05789	-1.20000	0.0
19.159	98.95789	4.14211	-1.20000	0.0
21.074	98.97368	2.22632	-1.20000	0.0
22.990	98.98947	0.31053	-1.20000	0.0
24.906	99.00526	-1.60526	-1.20000	0.0
26.822	99.02105	-3.52105	-1.20000	0.0
28.738	99.03684	-5.43684	-1.20000	0.0
30.654	99.05263	-7.35263	-1.20000	0.0
32.570	99.06842	-9.26842	-1.20000	0.0
34.485	99.08421	-11.18421	-1.20000	0.0
36.401	99.10000	-13.10000	-1.20000	0.0

Structure: K | Sub-structure:

Dist.	Coordinates x	y	z	Displacements z
[m]	[m]	[m]	[m]	[mm]
Vertical Offset 1				
0.0	99.10000	-13.10000	-1.20000	0.0
1.9981	97.78000	-11.60000	-1.20000	0.0
3.9962	96.46000	-10.10000	-1.20000	0.0
5.9943	95.14000	-8.60000	-1.20000	0.0
7.9924	93.82000	-7.10000	-1.20000	0.0
9.9905	92.50000	-5.60000	-1.20000	0.0
11.989	91.18000	-4.10000	-1.20000	0.0
13.987	89.86000	-2.60000	-1.20000	0.0
15.985	88.54000	-1.10000	-1.20000	0.0
17.983	87.22000	0.40000	-1.20000	0.0
19.981	85.90000	1.90000	-1.20000	0.0
21.979	84.58000	3.40000	-1.20000	0.0
23.977	83.26000	4.90000	-1.20000	0.0
25.975	81.94000	6.40000	-1.20000	0.0
27.973	80.62000	7.90000	-1.20000	0.0
29.971	79.30000	9.40000	-1.20000	0.0
31.970	77.98000	10.90000	-1.20000	0.0
33.968	76.66000	12.40000	-1.20000	0.0
35.966	75.34000	13.90000	-1.20000	0.0
37.964	74.02000	15.40000	-1.20000	0.0
39.962	72.70000	16.90000	-1.20000	0.0
41.960	71.38000	18.40000	-1.20000	0.0
43.958	70.06000	19.90000	-1.20000	0.0
45.956	68.74000	21.40000	-1.20000	0.0
47.954	67.42000	22.90000	-1.20000	0.0
49.952	66.10000	24.40000	-1.20000	0.0

Specific Building Damage Results - All Segments

Structure: 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]	
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: B | Sub-structure: Sub #

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]	
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: C | Sub-structure: Sub #

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]	
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: D | Sub-structure: Sub #

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]	
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: E | Sub-structure: Sub #

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]	
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: F | Sub-structure: Sub #

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]	
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: G | Sub-structure: Sub #

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

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]	

0.0 All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: H | Sub-structure: Sub #

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]	

0.0 All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: I | 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]	

0.0 All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: J | 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]	

0.0 All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: K | 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]	

0.0 All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

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

Structure: 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: B | Sub-structure: Sub #

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: C | Sub-structure: Sub #

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: D | Sub-structure: Sub #

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: E | Sub-structure: Sub #

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: F | Sub-structure: Sub #

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: G | Sub-structure: Sub #

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: H | Sub-structure: Sub #

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: I | 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: J | 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: K | 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]	

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]	
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.											
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.											
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.											
D	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.											
E	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.											
F	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.											
G	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.											
H	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.											
I	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.											
J	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.											
K	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.											

Specific Building Damage Results - All Combined Segments

Structure: 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: B | Sub-structure: Sub #

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: C | Sub-structure: Sub #

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: D | Sub-structure: Sub #

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: E | Sub-structure: Sub #

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: F | Sub-structure: Sub #

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: G | Sub-structure: Sub #

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: H | Sub-structure: Sub #

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: I | 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: J | 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.

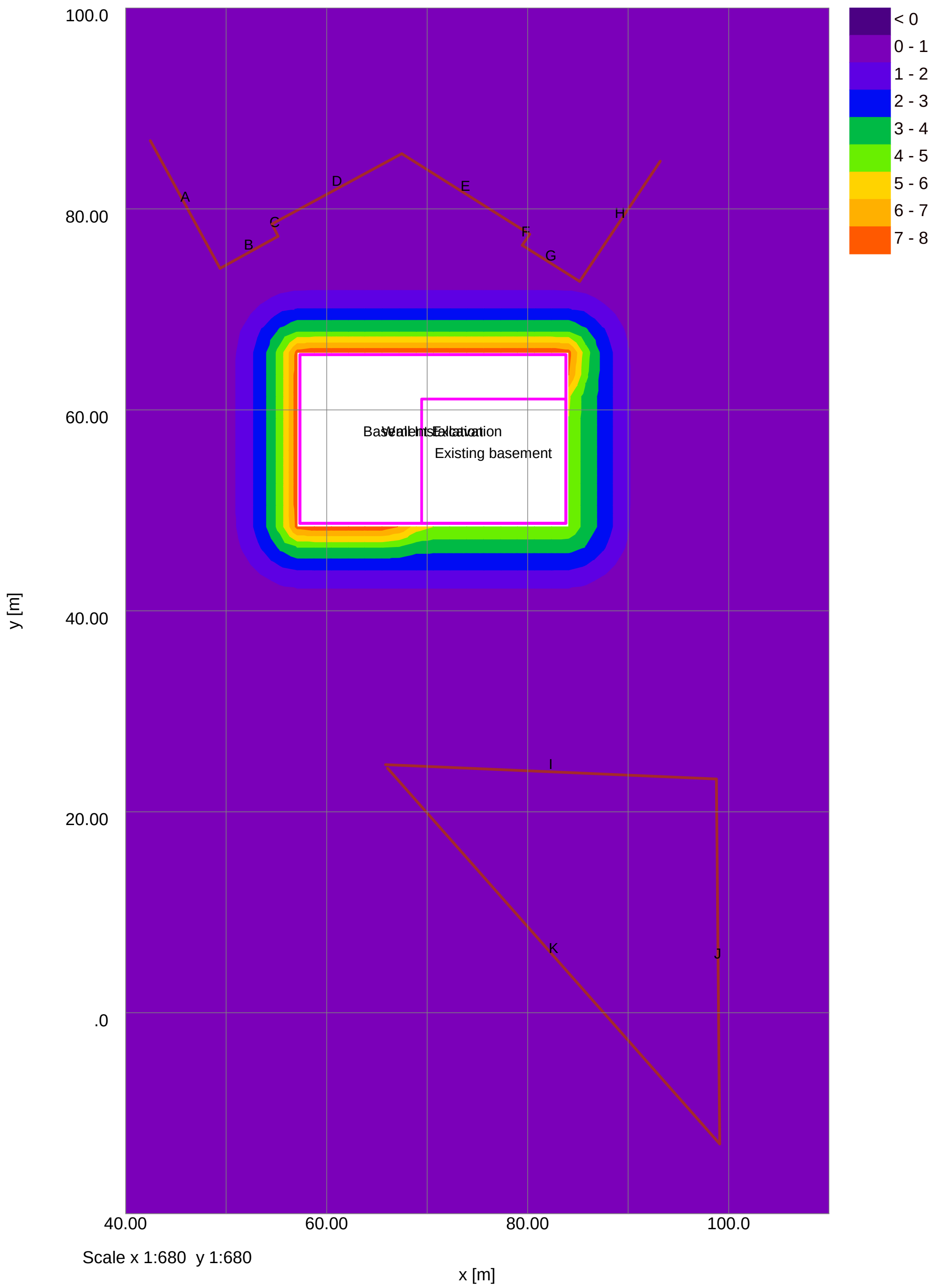
Structure: K | Sub-structure:

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.

Oasys	GEA LIMITED (GEOTECHNICAL &ENV ASSOC)	Job No. J15316A	Sheet No.	Rev.
5-17 Haverstock Hill, London NW3 2BL		Drg. Ref.		
Wall installation and excavation		Made by	Date 19-May-2016	Checked

Vertical Settlement Contours: Grid 1 (level 0.000m) (Interval 1mm)



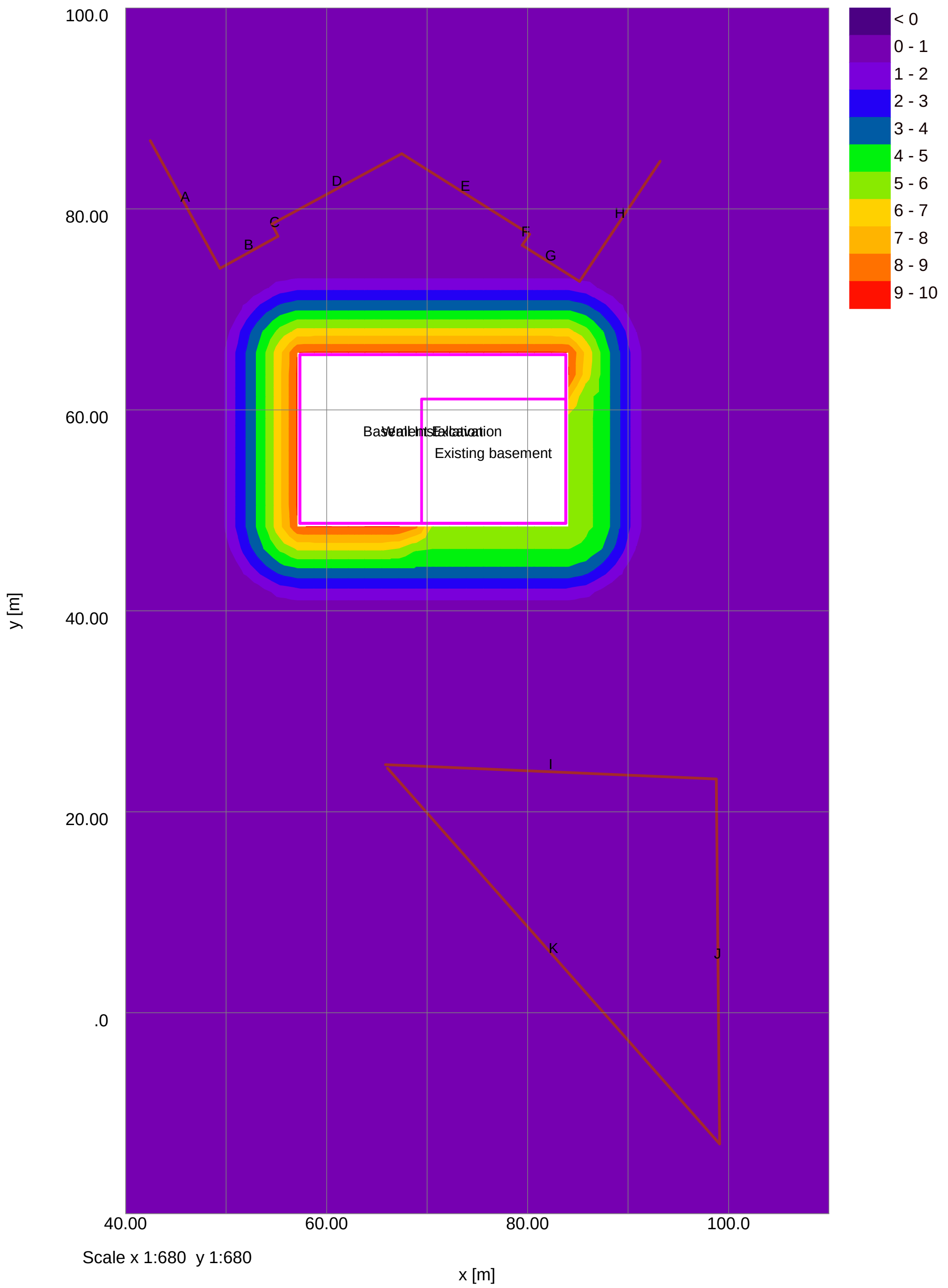
Oasys **GEA LIMITED (GEOTECHNICAL &ENV ASSOC)**

5-17 Haverstock Hill, London NW3 2BL

Wall installation and excavation

Job No.	Sheet No.	Rev.
J15316A		
Drg. Ref.		
Made by	Date 19-May-2016	Checked

Horizontal Displacement Contours: Grid 1 (level 0.000m) Interval 1mm



Problem Type

Problem Type : Tunnelling and Embedded Wall Excavations

Displacement Data

Type	Name	Direction of extrusion	First point X [m]	First point Y [m]	First point Z(level) [m]	Second point X [m]	Second point Y [m]	Second point Z(level) [m]	No. of intervals across extrusion/line	Extrusion depth [m]	No. of intervals along extrusion	Calculate	Surface type for tunnels
Grid	Grid 1	Global X	1.50000	-51.00000	0.00000	-	150.00000	0.00000	93	150.00000	89	Yes	Surface
Line	A	-	42.50000	86.80000	-0.60000	49.40000	74.10000	-0.60000	8	-	-	Yes	Surface
Line	B	-	49.40000	74.10000	-0.60000	55.20000	77.30000	-0.60000	7	-	-	Yes	Surface
Line	C	-	55.20000	77.30000	-0.60000	54.60000	78.50000	-0.60000	2	-	-	Yes	Surface
Line	D	-	54.60000	78.50000	-0.60000	67.50000	85.50000	-0.60000	8	-	-	Yes	Surface
Line	E	-	67.50000	85.50000	-0.60000	80.20000	77.50000	-0.60000	8	-	-	Yes	Surface
Line	F	-	80.20000	77.50000	-0.60000	79.50000	76.40000	-0.60000	2	-	-	Yes	Surface
Line	G	-	79.50000	76.40000	-0.60000	85.20000	72.80000	-0.60000	7	-	-	Yes	Surface
Line	H	-	85.20000	72.80000	-0.60000	93.20000	84.80000	-0.60000	8	-	-	Yes	Surface
Line	I	-	65.90000	24.70000	-1.20000	98.80000	23.30000	-1.20000	17	-	-	Yes	Surface
Line	J	-	98.80000	23.30000	-1.20000	99.10000	-13.10000	-1.20000	19	-	-	Yes	Surface
Line	K	-	99.10000	-13.10000	-1.20000	66.10000	24.40000	-1.20000	25	-	-	Yes	Surface

Vertical Ground Movement Curves

Curve Name: **Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))**

Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)]
[0.000,0.000,0.050][0.050,0.000,0.047][0.100,0.000,0.043][0.150,0.000,0.040]
[0.200,0.000,0.037][0.250,0.000,0.034][0.300,0.000,0.031][0.350,0.000,0.028]
[0.400,0.000,0.025][0.450,0.000,0.022][0.500,0.000,0.020][0.550,0.000,0.018]
[0.600,0.000,0.016][0.650,0.000,0.014][0.700,0.000,0.012][0.750,0.000,0.010]
[0.800,0.000,0.008][0.850,0.000,0.007][0.900,0.000,0.006][0.950,0.000,0.005]
[1.000,0.000,0.004][1.050,0.000,0.003][1.100,0.000,0.003][1.150,0.000,0.002]
[1.200,0.000,0.002][1.250,0.000,0.001][1.300,0.000,0.001][1.350,0.000,0.001]
[1.400,0.000,0.001][1.450,0.000,0.000][1.500,0.000,0.000]

Curve Fitting Method: Polynomial
x Order: 4
y Order: 0
Polynomial: z = $-1.2355E{-}2x^4 + 3.4814E{-}2x^3 - 2.8885E{-}3x^2 - 6.5618E{-}2x + 4.9987E{-}2$
Coeff. of Determination: 1.0000

Curve Name: **Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))**

Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Settlement / wall depth or max. excavation depth (z)(%)]
[0.000,0.000,0.345][0.100,0.000,0.327][0.200,0.000,0.311][0.300,0.000,0.294]
[0.400,0.000,0.279][0.500,0.000,0.264][0.600,0.000,0.250][0.700,0.000,0.237]
[0.800,0.000,0.224][0.900,0.000,0.212][1.000,0.000,0.200][1.100,0.000,0.189]
[1.200,0.000,0.178][1.300,0.000,0.168][1.400,0.000,0.158][1.500,0.000,0.149]
[1.600,0.000,0.140][1.700,0.000,0.132][1.800,0.000,0.124][1.900,0.000,0.116]
[2.000,0.000,0.109][2.100,0.000,0.101][2.200,0.000,0.095][2.300,0.000,0.088]
[2.400,0.000,0.082][2.500,0.000,0.076][2.600,0.000,0.070][2.700,0.000,0.065]
[2.800,0.000,0.059][2.900,0.000,0.054][3.000,0.000,0.049][3.100,0.000,0.044]
[3.200,0.000,0.039][3.300,0.000,0.034][3.400,0.000,0.029][3.500,0.000,0.025]
[3.600,0.000,0.020][3.700,0.000,0.015][3.800,0.000,0.010][3.900,0.000,0.005]
[4.000,0.000,0.000]

Curve Fitting Method: Polynomial
x Order: 3
y Order: 0
Polynomial: z = $-3.5383E{-}3x^3 + 3.7194E{-}2x^2 - 1.7831E{-}1x + 3.4467E{-}1$
Coeff. of Determination: 9.9999E-1

Horizontal Ground Movement Curves

Curve Name: **Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))**

Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)]
[0.000,0.000,0.050][1.500,0.000,0.000]

Curve Fitting Method: Polynomial
x Order: 1
y Order: 0
Polynomial: z = -3.33E-2x + 5.00E-2
Coeff. of Determination: 1.00

Curve Name: **Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))**

Coordinates: [Distance from wall / wall depth or max. excavation depth (x), Depth / wall depth or max. excavation depth (y), Horizontal movement / wall depth or max. excavation depth (z)(%)]
[0.000,0.000,0.400][4.000,0.000,0.000]

Curve Fitting Method: Polynomial
x Order: 1
y Order: 0
Polynomial: z = -10.E-2x + 4.0E-1
Coeff. of Determination: 1.0

Polygonal Excavations

Excavation Name: **Wall Installation**
Surface level [m]: 0.0
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: -2.1000

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	57.400	48.700	-2.1000	No	-	-	-	-	-	-
2	83.800	48.700	-2.1000	No	-	-	-	-	-	-
3	83.800	65.500	-2.1000	No	-	-	-	-	-	-
4	57.400	65.500	-2.1000	No	-	-	-	-	-	-

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal
1	57.400	48.700	83.800	48.700	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))
2	83.800	48.700	83.800	65.500	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))
3	83.800	65.500	57.400	65.500	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))
4	57.400	65.500	57.400	48.700	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal

Excavation Name: **Existing basement**
Surface level [m]: 0.0
Contribution: Negative
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: -0.90000

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	69.500	48.700	-0.90000	No	-	-	-	-	-	-
2	83.800	48.700	-0.90000	No	-	-	-	-	-	-
3	83.800	61.100	-0.90000	No	-	-	-	-	-	-
4	69.500	61.100	-0.90000	No	-	-	-	-	-	-

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal
1	69.500	48.700	83.800	48.700	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
2	83.800	48.700	83.800	61.100	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
3	83.800	61.100	69.500	61.100	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
4	69.500	61.100	69.500	48.700	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))

Excavation Name: **Basement Excavation**
Surface level [m]: 0.0
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: -2.1000

Corner	x [m]	y [m]	Base Level [m]	Stiffened	Previous Side d [m]	Previous Side p1 [%]	Previous Side p2* [%]	Next Side d [m]	Next Side p1 [%]	Next Side p2* [%]
1	57.400	48.700	-2.1000	No	-	-	-	-	-	-
2	83.800	48.700	-2.1000	No	-	-	-	-	-	-
3	83.800	65.500	-2.1000	No	-	-	-	-	-	-
4	57.400	65.500	-2.1000	No	-	-	-	-	-	-

Side	Corner 1 x [m]	Corner 1 y [m]	Corner 2 x [m]	Corner 2 y [m]	Ground Movement Curve Vertical	Ground Movement Curve Horizontal
1	57.400	48.700	83.800	48.700	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
2	83.800	48.700	83.800	65.500	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
3	83.800	65.500	57.400	65.500	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
4	57.400	65.500	57.400	48.700	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))	Excavation in front of low stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))

Damage Category Strains

Name	0 (Negligible) to 1 (Very Slight)	1 (Very Slight) to 2 (Slight)	2 (Slight) to 3 (Moderate)	3 (Moderate) to 4 (Severe)
Burland Strain Limits	0.0	500.00E-6	750.00E-6	0.0015000

Specific Structures - Geometry

Structure Name	Sub-Structure Name	Displacement Line	Start Distance Along Line [m]	End Distance Along Line [m]	Vertical Offsets from Line for Vertical Movement Calculations [m]	Vertical Displacement Limit Sensitivity [mm]	Damage Category Strains	Poisson's Ratio	E/G
A		A	0.00000	14.45237	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
B	Sub #	B	0.00000	6.62320	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
C	Sub #	C	0.00000	1.34064	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
D	Sub #	D	0.00000	14.67585	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
E	Sub #	E	0.00000	15.00866	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
F	Sub #	F	0.00000	1.30284	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
G	Sub #	G	0.00000	6.74066	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
H	Sub #	H	0.00000	14.42121	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
I		I	0.00000	32.92877	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
J		J	0.00000	36.40024	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
K		K	0.00000	49.95148	0.0	0.10000	Burland Strain Limits	0.20000	2.6000

Specific Structures - Bending Parameters

Structure Name	Sub-Structure Name	Height [m]	Default Properties	Hogging: 2nd Moment of Area (per unit width) [m³]	Hogging: Distance of Bending Strain from N.A. [m]	Hogging: Distance of N.A. from Edge of Beam in Tension [m]	Sagging: 2nd Moment of Area (per unit width) [m³]	Sagging: Distance of Bending Strain from N.A. [m]	Sagging: Distance of N.A. from Edge of Beam in Tension [m]
A		19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
B	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
C	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
D	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
E	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
F	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
G	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
H	Sub #	19.500	Yes	2471.6	19.500	19.500	617.91	9.7500	9.7500
I		9.1000	Yes	251.19	9.1000	9.1000	62.798	4.5500	4.5500
J		9.1000	Yes	251.19	9.1000	9.1000	62.798	4.5500	4.5500
K		9.1000	Yes	251.19	9.1000	9.1000	62.798	4.5500	4.5500

Building Segment Combinations

Structure Name	Sub-Structure Name	Vertical Offset from Line for Vertical Movement Calculations [m]	Segment	Start [m]	Length [m]	Curvature	Combined Segment

No structures have segments combined.

Specific Building Damage Results - Horizontal Displacements

Structure: A | Sub-structure:

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	42.50000	86.80000	-0.60000	0.0	0.0	0.0	0.0
1.8067	43.36250	85.21250	-0.60000	0.0	0.0	0.0	0.0
3.6133	44.22500	83.62500	-0.60000	0.0	0.0	0.0	0.0
5.4200	45.08750	82.03750	-0.60000	0.0	0.0	0.0	0.0
7.2267	45.95000	80.45000	-0.60000	0.0	0.0	0.0	0.0
9.0334	46.81250	78.86250	-0.60000	0.0	0.0	0.0	0.0
10.840	47.67500	77.27500	-0.60000	0.0	0.0	0.0	0.0
12.647	48.53750	75.68750	-0.60000	0.0	0.0	0.0	0.0
14.453	49.40000	74.10000	-0.60000	0.0	0.0	0.0	0.0

Structure: B | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	49.40000	74.10000	-0.60000	0.0	0.0	0.0	0.0
0.94631	50.22857	74.55714	-0.60000	0.0	0.0	0.0	0.0
1.8926	51.05714	75.01429	-0.60000	0.0	0.0	0.0	0.0
2.8389	51.88571	75.47143	-0.60000	0.0	0.0	0.0	0.0
3.7853	52.71429	75.92857	-0.60000	0.0	0.0	0.0	0.0
4.7316	53.54286	76.38571	-0.60000	0.0	0.0	0.0	0.0
5.6779	54.37143	76.84286	-0.60000	0.0	0.0	0.0	0.0
6.6242	55.20000	77.30000	-0.60000	0.0	0.0	0.0	0.0

Structure: C | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	55.20000	77.30000	-0.60000	0.0	0.0	0.0	0.0
0.67082	54.90000	77.90000	-0.60000	0.0	0.0	0.0	0.0
1.3416	54.60000	78.50000	-0.60000	0.0	0.0	0.0	0.0

Structure: D | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	54.60000	78.50000	-0.60000	0.0	0.0	0.0	0.0
1.8346	56.21250	79.37500	-0.60000	0.0	0.0	0.0	0.0
3.6692	57.82500	80.25000	-0.60000	0.0	0.0	0.0	0.0
5.5038	59.43750	81.12500	-0.60000	0.0	0.0	0.0	0.0
7.3384	61.05000	82.00000	-0.60000	0.0	0.0	0.0	0.0
9.1730	62.66250	82.87500	-0.60000	0.0	0.0	0.0	0.0
11.008	64.27500	83.75000	-0.60000	0.0	0.0	0.0	0.0
12.842	65.88750	84.62500	-0.60000	0.0	0.0	0.0	0.0
14.677	67.50000	85.50000	-0.60000	0.0	0.0	0.0	0.0

Structure: E | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	67.50000	85.50000	-0.60000	0.0	0.0	0.0	0.0
1.8762	69.08750	84.50000	-0.60000	0.0	0.0	0.0	0.0
3.7524	70.67500	83.50000	-0.60000	0.0	0.0	0.0	0.0
5.6286	72.26250	82.50000	-0.60000	0.0	0.0	0.0	0.0
7.5048	73.85000	81.50000	-0.60000	0.0	0.0	0.0	0.0
9.3810	75.43750	80.50000	-0.60000	0.0	0.0	0.0	0.0
11.257	77.02500	79.50000	-0.60000	0.0	0.0	0.0	0.0
13.133	78.61250	78.50000	-0.60000	0.0	0.0	0.0	0.0
15.010	80.20000	77.50000	-0.60000	0.0	0.0	0.0	0.0

Structure: F | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	80.20000	77.50000	-0.60000	0.0	0.0	0.0	0.0
0.65192	79.85000	76.95000	-0.60000	0.0	0.0	0.0	0.0
1.3038	79.50000	76.40000	-0.60000	0.0	0.0	0.0	0.0

Structure: G | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	79.50000	76.40000	-0.60000	0.0	0.0	0.0	0.0
0.96309	80.31429	75.88571	-0.60000	0.0	0.0	0.0	0.0
1.9262	81.12857	75.37143	-0.60000	0.0	0.0	0.0	0.0
2.8893	81.94286	74.85714	-0.60000	0.0	0.0	0.0	0.0
3.8524	82.75714	74.34286	-0.60000	0.0	0.0	0.0	0.0
4.8155	83.57143	73.82857	-0.60000	0.0	-0.071429	0.038142	-0.060392
5.7786	84.38571	73.31429	-0.60000	-0.042141	-0.56222	0.26459	-0.49785
6.7417	85.20000	72.80000	-0.60000	-0.18213	-0.94966	0.35313	-0.90018

Structure: H | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements x [mm]	y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	85.20000	72.80000	-0.60000	-0.18213	-0.94966	-0.89119	-0.37524
1.8028	86.20000	74.30000	-0.60000	0.0	0.0	0.0	0.0
3.6056	87.20000	75.80000	-0.60000	0.0	0.0	0.0	0.0
5.4083	88.20000	77.30000	-0.60000	0.0	0.0	0.0	0.0
7.2111	89.20000	78.80000	-0.60000	0.0	0.0	0.0	0.0
9.0139	90.20000	80.30000	-0.60000	0.0	0.0	0.0	0.0
10.817	91.20000	81.80000	-0.60000	0.0	0.0	0.0	0.0
12.619	92.20000	83.30000	-0.60000	0.0	0.0	0.0	0.0
14.422	93.20000	84.80000	-0.60000	0.0	0.0	0.0	0.0

Structure: I | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	65.90000	24.70000	-1.20000	0.0	0.0	0.0	0.0
1.9370	67.83529	24.61765	-1.20000	0.0	0.0	0.0	0.0
3.8741	69.77059	24.53529	-1.20000	0.0	0.0	0.0	0.0
5.8111	71.70588	24.45294	-1.20000	0.0	0.0	0.0	0.0
7.7482	73.64118	24.37059	-1.20000	0.0	0.0	0.0	0.0
9.6852	75.57647	24.28824	-1.20000	0.0	0.0	0.0	0.0
11.622	77.51176	24.20588	-1.20000	0.0	0.0	0.0	0.0
13.559	79.44706	24.12353	-1.20000	0.0	0.0	0.0	0.0
15.496	81.38235	24.04118	-1.20000	0.0	0.0	0.0	0.0
17.433	83.31765	23.95882	-1.20000	0.0	0.0	0.0	0.0
19.370	85.25294	23.87647	-1.20000	0.0	0.0	0.0	0.0
21.308	87.18824	23.79412	-1.20000	0.0	0.0	0.0	0.0
23.245	89.12353	23.71176	-1.20000	0.0	0.0	0.0	0.0
25.182	91.05882	23.62941	-1.20000	0.0	0.0	0.0	0.0
27.119	92.99412	23.54706	-1.20000	0.0	0.0	0.0	0.0
29.056	94.92941	23.46471	-1.20000	0.0	0.0	0.0	0.0
30.993	96.86471	23.38235	-1.20000	0.0	0.0	0.0	0.0
32.930	98.80000	23.30000	-1.20000	0.0	0.0	0.0	0.0

Structure: J | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	98.80000	23.30000	-1.20000	0.0	0.0	0.0	0.0
1.9159	98.81579	21.38421	-1.20000	0.0	0.0	0.0	0.0
3.8317	98.83158	19.46842	-1.20000	0.0	0.0	0.0	0.0
5.7476	98.84737	17.55263	-1.20000	0.0	0.0	0.0	0.0
7.6634	98.86316	15.63684	-1.20000	0.0	0.0	0.0	0.0
9.5793	98.87895	13.72105	-1.20000	0.0	0.0	0.0	0.0
11.495	98.89474	11.80526	-1.20000	0.0	0.0	0.0	0.0
13.411	98.91053	9.88947	-1.20000	0.0	0.0	0.0	0.0
15.327	98.92632	7.97368	-1.20000	0.0	0.0	0.0	0.0
17.243	98.94211	6.05789	-1.20000	0.0	0.0	0.0	0.0
19.159	98.95789	4.14211	-1.20000	0.0	0.0	0.0	0.0
21.074	98.97368	2.22632	-1.20000	0.0	0.0	0.0	0.0
22.990	98.98947	0.31053	-1.20000	0.0	0.0	0.0	0.0
24.906	99.00526	-1.60526	-1.20000	0.0	0.0	0.0	0.0
26.822	99.02105	-3.52105	-1.20000	0.0	0.0	0.0	0.0
28.738	99.03684	-5.43684	-1.20000	0.0	0.0	0.0	0.0
30.654	99.05263	-7.35263	-1.20000	0.0	0.0	0.0	0.0
32.570	99.06842	-9.26842	-1.20000	0.0	0.0	0.0	0.0
34.485	99.08421	-11.18421	-1.20000	0.0	0.0	0.0	0.0
36.401	99.10000	-13.10000	-1.20000	0.0	0.0	0.0	0.0

Structure: K | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements x [mm]	Displacements y [mm]	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]
0.0	99.10000	-13.10000	-1.20000	0.0	0.0	0.0	0.0
1.9981	97.78000	-11.60000	-1.20000	0.0	0.0	0.0	0.0
3.9962	96.46000	-10.10000	-1.20000	0.0	0.0	0.0	0.0
5.9943	95.14000	-8.60000	-1.20000	0.0	0.0	0.0	0.0
7.9924	93.82000	-7.10000	-1.20000	0.0	0.0	0.0	0.0
9.9905	92.50000	-5.60000	-1.20000	0.0	0.0	0.0	0.0
11.989	91.18000	-4.10000	-1.20000	0.0	0.0	0.0	0.0
13.987	89.86000	-2.60000	-1.20000	0.0	0.0	0.0	0.0
15.985	88.54000	-1.10000	-1.20000	0.0	0.0	0.0	0.0
17.983	87.22000	0.40000	-1.20000	0.0	0.0	0.0	0.0
19.981	85.90000	1.90000	-1.20000	0.0	0.0	0.0	0.0
21.979	84.58000	3.40000	-1.20000	0.0	0.0	0.0	0.0
23.977	83.26000	4.90000	-1.20000	0.0	0.0	0.0	0.0
25.975	81.94000	6.40000	-1.20000	0.0	0.0	0.0	0.0
27.973	80.62000	7.90000	-1.20000	0.0	0.0	0.0	0.0
29.971	79.30000	9.40000	-1.20000	0.0	0.0	0.0	0.0
31.970	77.98000	10.90000	-1.20000	0.0	0.0	0.0	0.0
33.968	76.66000	12.40000	-1.20000	0.0	0.0	0.0	0.0
35.966	75.34000	13.90000	-1.20000	0.0	0.0	0.0	0.0
37.964	74.02000	15.40000	-1.20000	0.0	0.0	0.0	0.0
39.962	72.70000	16.90000	-1.20000	0.0	0.0	0.0	0.0
41.960	71.38000	18.40000	-1.20000	0.0	0.0	0.0	0.0
43.958	70.06000	19.90000	-1.20000	0.0	0.0	0.0	0.0
45.956	68.74000	21.40000	-1.20000	0.0	0.0	0.0	0.0
47.954	67.42000	22.90000	-1.20000	0.0	0.0	0.0	0.0
49.952	66.10000	24.40000	-1.20000	0.0	0.0	0.0	0.0

Specific Building Damage Results - Vertical Displacements

Structure: A | Sub-structure:

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	42.50000	86.80000	-0.60000	0.0
1.8067	43.36250	85.21250	-0.60000	0.0
3.6133	44.22500	83.62500	-0.60000	0.0
5.4200	45.08750	82.03750	-0.60000	0.0
7.2267	45.95000	80.45000	-0.60000	0.0
9.0334	46.81250	78.86250	-0.60000	0.0
10.840	47.67500	77.27500	-0.60000	0.0
12.647	48.53750	75.68750	-0.60000	0.0
14.453	49.40000	74.10000	-0.60000	0.0

Structure: B | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	49.40000	74.10000	-0.60000	0.0
0.94631	50.22857	74.55714	-0.60000	0.0
1.8926	51.05714	75.01429	-0.60000	0.0
2.8389	51.88571	75.47143	-0.60000	0.0
3.7853	52.71429	75.92857	-0.60000	0.0
4.7316	53.54286	76.38571	-0.60000	0.0
5.6779	54.37143	76.84286	-0.60000	0.0
6.6242	55.20000	77.30000	-0.60000	0.0

Structure: C | Sub-structure: Sub #

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
Vertical Offset 1				
0.0	55.20000	77.30000	-0.60000	0.0
0.67082	54.90000	77.90000	-0.60000	0.0

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
1.3416	54.60000	78.50000	-0.60000	0.0

Structure: D | Sub-structure: Sub #

Vertical Offset 1

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
0.0	54.60000	78.50000	-0.60000	0.0
1.8346	56.21250	79.37500	-0.60000	0.0
3.6692	57.82500	80.25000	-0.60000	0.0
5.5038	59.43750	81.12500	-0.60000	0.0
7.3384	61.05000	82.00000	-0.60000	0.0
9.1730	62.66250	82.87500	-0.60000	0.0
11.008	64.27500	83.75000	-0.60000	0.0
12.842	65.88750	84.62500	-0.60000	0.0
14.677	67.50000	85.50000	-0.60000	0.0

Structure: E | Sub-structure: Sub #

Vertical Offset 1

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
0.0	67.50000	85.50000	-0.60000	0.0
1.8762	69.08750	84.50000	-0.60000	0.0
3.7524	70.67500	83.50000	-0.60000	0.0
5.6286	72.26250	82.50000	-0.60000	0.0
7.5048	73.85000	81.50000	-0.60000	0.0
9.3810	75.43750	80.50000	-0.60000	0.0
11.257	77.02500	79.50000	-0.60000	0.0
13.133	78.61250	78.50000	-0.60000	0.0
15.010	80.20000	77.50000	-0.60000	0.0

Structure: F | Sub-structure: Sub #

Vertical Offset 1

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
0.0	80.20000	77.50000	-0.60000	0.0
0.65192	79.85000	76.95000	-0.60000	0.0
1.3038	79.50000	76.40000	-0.60000	0.0

Structure: G | Sub-structure: Sub #

Vertical Offset 1

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
0.0	79.50000	76.40000	-0.60000	0.0
0.96309	80.31429	75.88571	-0.60000	0.0
1.9262	81.12857	75.37143	-0.60000	0.0
2.8893	81.94286	74.85714	-0.60000	0.0
3.8524	82.75714	74.34286	-0.60000	0.0
4.8155	83.57143	73.82857	-0.60000	0.037993
5.7786	84.38571	73.31429	-0.60000	0.28071
6.7417	85.20000	72.80000	-0.60000	0.47504

Structure: H | Sub-structure: Sub #

Vertical Offset 1

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
0.0	85.20000	72.80000	-0.60000	0.47504
1.8028	86.20000	74.30000	-0.60000	0.0
3.6056	87.20000	75.80000	-0.60000	0.0
5.4083	88.20000	77.30000	-0.60000	0.0
7.2111	89.20000	78.80000	-0.60000	0.0
9.0139	90.20000	80.30000	-0.60000	0.0
10.817	91.20000	81.80000	-0.60000	0.0
12.619	92.20000	83.30000	-0.60000	0.0
14.422	93.20000	84.80000	-0.60000	0.0

Structure: I | Sub-structure:

Vertical Offset 1

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
0.0	65.90000	24.70000	-1.20000	0.0
1.9370	67.83529	24.61765	-1.20000	0.0
3.8741	69.77059	24.53529	-1.20000	0.0
5.8111	71.70588	24.45294	-1.20000	0.0
7.7482	73.64118	24.37059	-1.20000	0.0
9.6852	75.57647	24.28824	-1.20000	0.0
11.622	77.51176	24.20588	-1.20000	0.0
13.559	79.44706	24.12353	-1.20000	0.0
15.496	81.38235	24.04118	-1.20000	0.0
17.433	83.31765	23.95882	-1.20000	0.0
19.370	85.25294	23.87647	-1.20000	0.0
21.308	87.18824	23.79412	-1.20000	0.0
23.245	89.12353	23.71176	-1.20000	0.0
25.182	91.05882	23.62941	-1.20000	0.0
27.119	92.99412	23.54706	-1.20000	0.0
29.056	94.92941	23.46471	-1.20000	0.0
30.993	96.86471	23.38235	-1.20000	0.0
32.930	98.80000	23.30000	-1.20000	0.0

Structure: J | Sub-structure:

Vertical Offset 1

Dist. [m]	Coordinates x [m]	Coordinates y [m]	Coordinates z [m]	Displacements z [mm]
0.0	98.80000	23.30000	-1.20000	0.0
1.9159	98.81579	21.38421	-1.20000	0.0
3.8317	98.83158	19.46842	-1.20000	0.0
5.7476	98.84737	17.55263	-1.20000	0.0
7.6634	98.86316	15.63684	-1.20000	0.0
9.5793	98.87895	13.72105	-1.20000	0.0
11.495	98.89474	11.80526	-1.20000	0.0
13.411	98.91053	9.88947	-1.20000	0.0
15.327	98.92632	7.97368	-1.20000	0.0
17.243	98.94211	6.05789	-1.20000	0.0
19.159	98.95789	4.14211	-1.20000	0.0
21.074	98.97368	2.22632	-1.20000	0.0
22.990	98.98947	0.31053	-1.20000	0.0
24.906	99.00526	-1.60526	-1.20000	0.0
26.822	99.02105	-3.52105	-1.20000	0.0
28.738	99.03684	-5.43684	-1.20000	0.0
30.654	99.05263	-7.35263	-1.20000	0.0
32.570	99.06842	-9.26842	-1.20000	0.0
34.485	99.08421	-11.18421	-1.20000	0.0
36.401	99.10000	-13.10000	-1.20000	0.0

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

Structure: K | Sub-structure:

Vertical Offset 1

Dist. [m]	Coordinates x [m]	y [m]	z [m]	Displacements z [mm]
0.0	99.10000	-13.10000	-1.20000	0.0
1.9981	97.78000	-11.60000	-1.20000	0.0
3.9962	96.46000	-10.10000	-1.20000	0.0
5.9943	95.14000	-8.60000	-1.20000	0.0
7.9924	93.82000	-7.10000	-1.20000	0.0
9.9905	92.50000	-5.60000	-1.20000	0.0
11.989	91.18000	-4.10000	-1.20000	0.0
13.987	89.86000	-2.60000	-1.20000	0.0
15.985	88.54000	-1.10000	-1.20000	0.0
17.983	87.22000	0.40000	-1.20000	0.0
19.981	85.90000	1.90000	-1.20000	0.0
21.979	84.58000	3.40000	-1.20000	0.0
23.977	83.26000	4.90000	-1.20000	0.0
25.975	81.94000	6.40000	-1.20000	0.0
27.973	80.62000	7.90000	-1.20000	0.0
29.971	79.30000	9.40000	-1.20000	0.0
31.970	77.98000	10.90000	-1.20000	0.0
33.968	76.66000	12.40000	-1.20000	0.0
35.966	75.34000	13.90000	-1.20000	0.0
37.964	74.02000	15.40000	-1.20000	0.0
39.962	72.70000	16.90000	-1.20000	0.0
41.960	71.38000	18.40000	-1.20000	0.0
43.958	70.06000	19.90000	-1.20000	0.0
45.956	68.74000	21.40000	-1.20000	0.0
47.954	67.42000	22.90000	-1.20000	0.0
49.952	66.10000	24.40000	-1.20000	0.0

Specific Building Damage Results - All Segments

Structure: 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
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: B | Sub-structure: Sub #

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
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: C | Sub-structure: Sub #

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
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: D | Sub-structure: Sub #

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
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: E | Sub-structure: Sub #

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
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: F | Sub-structure: Sub #

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
0.0	All settlements are less than the Settlement Trough Limit Sensitivity.										

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

Structure: G | Sub-structure: Sub #

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
0.0	1	5.7786	0.11302	Sagging	0.0	0.0091928	0.0091928	-235.07E-6	-251.96E-6	62453.	0 (Negligible)
	2	5.8916	0.84907	Sagging	0.0	0.0091928	0.0091928	-91.919E-6	-201.76E-6	8313.5	0 (Negligible)

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

Structure: H | Sub-structure: Sub #

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
0.0	1	0.0	0.0	None	0.0	0.0	0.0	-494.10E-6	263.37E-6	5477.0	0 (Negligible)

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

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

Structure: I | 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]	

0.0 All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: J | 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]	

0.0 All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: K | 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]	

0.0 All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

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

Structure: 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: B | Sub-structure: Sub #

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: C | Sub-structure: Sub #

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: D | Sub-structure: Sub #

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: E | Sub-structure: Sub #

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: F | Sub-structure: Sub #

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: G | Sub-structure: Sub #

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	0.0	0.0091928	-251.96E-6	0.47484	0.0091928	-235.07E-6	-251.96E-6	-	8313.5	0 (Negligible)

Structure: H | Sub-structure: Sub #

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	0.0	0.0	263.37E-6	0.47504	0.0	-494.10E-6	263.37E-6	-	-	0 (Negligible)

Structure: I | 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 Movement Calculations						Displacement Curve	Displacement Curve	(Hogging)	(Sagging)	
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: J | 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: K | 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]	

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]	
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.											
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.											
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.											
D	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.											
E	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.											
F	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.											
G	Maximum Slope	Sub #	1	5.7786	5.8916	Sagging	**251.96E-6**	0.30351	0.0091928	-	62453.	0 (Negligible)
	Maximum Settlement	Sub #	2	5.8916	6.7407	Sagging	201.76E-6	**0.47484**	0.0091928	-	8313.5	0 (Negligible)
	Max. Tensile Strain	Sub #	1	5.7786	5.8916	Sagging	251.96E-6	0.30351	**0.0091928**	-	62453.	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)	Sub #	2	5.8916	6.7407	Sagging	201.76E-6	0.47484	0.0091928	-	**8313.5**	0 (Negligible)
H	Maximum Slope	Sub #	1	0.0	0.0	Sagging	**263.37E-6**	0.47504	0.0	-	5477.0	0 (Negligible)
	Maximum Settlement	Sub #	1	0.0	0.0	Sagging	263.37E-6	**0.47504**	0.0	-	5477.0	0 (Negligible)
	Max. Tensile Strain	Sub #	1	0.0	0.0	Sagging	263.37E-6	0.47504	**0.0**	-	5477.0	0 (Negligible)
	Min. Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-	-	-
	Min. Radius of Curvature (Sagging)		-	-	-	-	-	-	-	-	-	-
I	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.											
J	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.											
K	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.											

Specific Building Damage Results - All Combined Segments

Structure: 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: B | Sub-structure: Sub #

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: C | Sub-structure: Sub #

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

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: D | Sub-structure: Sub #

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: E | Sub-structure: Sub #

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: F | Sub-structure: Sub #

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: G | Sub-structure: Sub #

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: H | Sub-structure: Sub #

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: I | 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: J | Sub-structure:

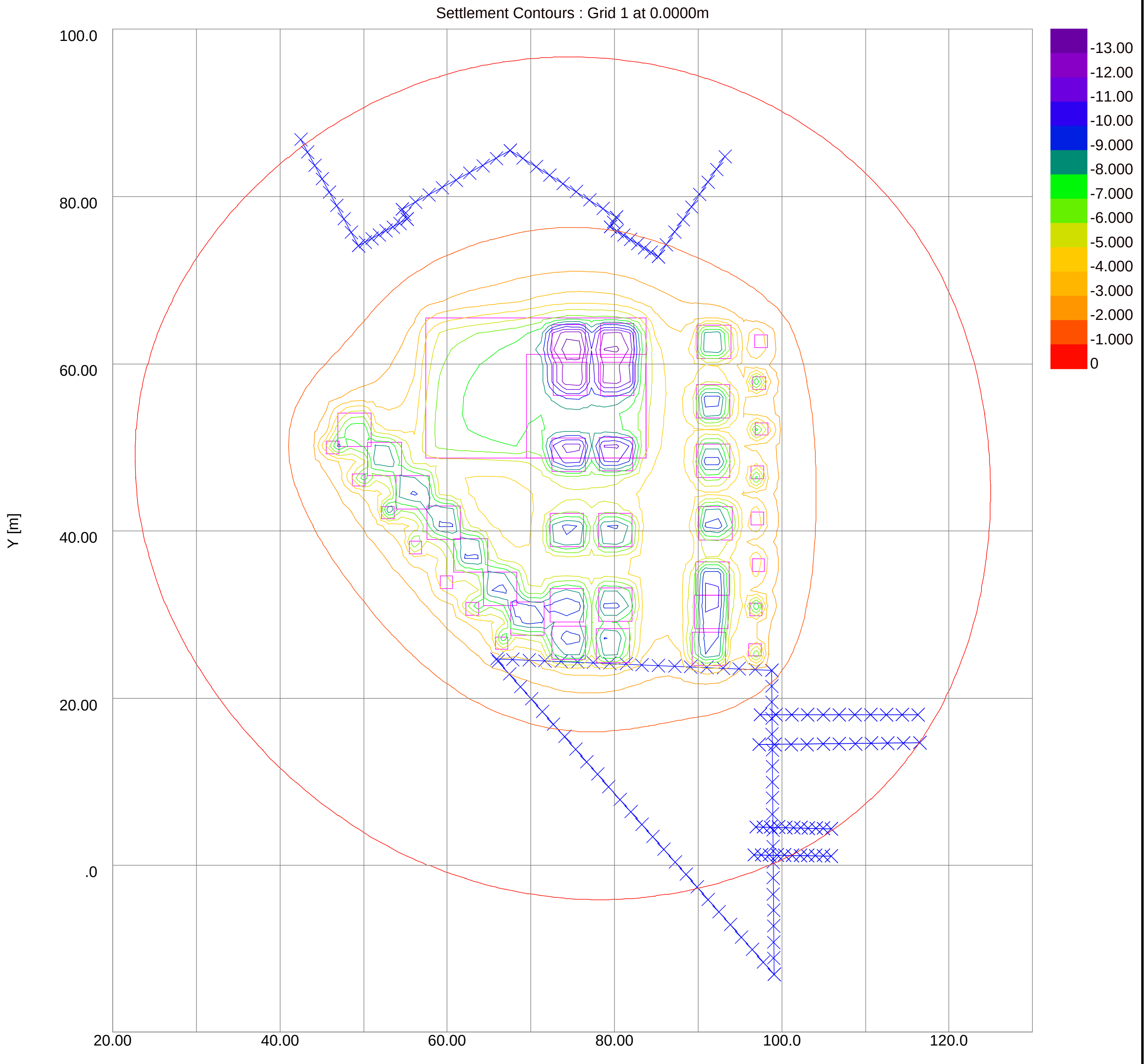
Vertical Offset from Line for Vertical Movement Calculations	Combined Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max. Tensile Strain	Damage Category
[m]		[m]	[m]		[%]	[%]	[%]	

No structures have segments combined.

Structure: K | 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.



Scale x 1:726 y 1:726
Contour Interval: 1mm

RESULTS FOR GRIDS

```
Analysis: Boussinesq
Global Poisson's ratio: 0.50
Horizontal rigid boundary level: -68.00  [m OD]

The maximum displacement difference between
Boussinesq method (-3.7376mm) and Mindlin method (-4.1575mm)
occurs at point X=91.059m Y=23.629m Level -1.2000mOD and is 0.41994mm
```

Name	Location					Stresses		
	X	Y	Z[Level]	Z	Calc Level	Vert Stress	Sum Princ	Vert Strain
	[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[-]
Pad01	48.90000	52.10000	-2.20000	-8.0756	-2.6000	-99.915	-256.22	-0.0010882
Pad02	52.50000	48.60000	-2.20000	-8.9384	-2.6000	-99.714	-258.54	-0.0010151
Pad03	55.90000	44.60000	-2.20000	-9.2274	-2.6000	-99.738	-258.85	-0.0010090
Pad04	59.60000	41.00000	-2.20000	-9.3067	-2.6000	-99.617	-257.89	-0.0010241
Pad05	62.80000	37.10000	-2.20000	-9.3110	-2.6000	-99.646	-257.95	-0.0010246
Pad06	66.30000	33.10000	-2.20000	-9.4193	-2.6000	-99.697	-259.08	-0.0010001
Pad07	69.60000	29.50000	-2.20000	-9.5283	-2.6000	-99.672	-260.30	-967.82E-6
Pad08	74.50000	62.70000	-2.20000	-13.389	-2.6000	-139.99	-363.39	-0.0014144
Pad09	74.70000	58.20000	-2.20000	-13.193	-2.6000	-127.05	-343.79	-933.96E-6
Pad10	74.50000	49.10000	-2.20000	-11.729	-2.6000	-126.40	-318.29	-0.0015226
Pad11	74.30000	40.10000	-2.20000	-9.3783	-2.6000	-99.436	-252.68	-0.0011408
Pad12	74.30000	31.10000	-2.20000	-9.9414	-2.6000	-99.544	-260.24	-959.68E-6
Pad13	74.50000	26.60000	-2.20000	-9.3326	-2.6000	-99.534	-258.70	-997.50E-6
Pad14	80.30000	62.80000	-2.20000	-12.946	-2.6000	-140.15	-362.14	-0.0014580
Pad15	80.30000	58.20000	-2.20000	-12.705	-2.6000	-127.19	-342.82	-968.42E-6
Pad16	80.20000	49.20000	-2.20000	-11.499	-2.6000	-127.64	-322.01	-0.0015225
Pad17	80.10000	40.10000	-2.20000	-9.2218	-2.6000	-99.449	-253.19	-0.0011290
Pad18	80.10000	31.20000	-2.20000	-9.3456	-2.6000	-99.501	-256.75	-0.0010439
Pad19	79.80000	26.30000	-2.20000	-8.8860	-2.6000	-99.503	-256.24	-0.0010566
Pad20	91.90000	62.60000	-1.40000	-9.2897	-1.8000	-99.476	-249.11	-0.0012329
Pad21	91.80000	55.50000	-1.40000	-9.8428	-1.8000	-99.479	-250.17	-0.0012067
Pad22	91.80000	48.40000	-1.40000	-9.8875	-1.8000	-99.490	-250.47	-0.0012000
Pad23	92.10000	40.90000	-1.40000	-9.8598	-1.8000	-99.513	-251.41	-0.0011782
Pad24	91.70000	34.30000	-1.40000	-10.275	-1.8000	-99.611	-257.28	-0.0010388
Pad25	91.60000	30.30000	-1.40000	-10.360	-1.8000	-99.678	-260.52	-962.83E-6
Pad26	91.30000	25.90000	-1.40000	-9.5114	-1.8000	-99.542	-253.73	-0.0011223
Pad27	46.30000	50.00000	-1.50000	-8.7537	-1.8750	-124.60	-237.83	-0.0033997
Pad28	49.40000	46.10000	-1.50000	-9.0595	-1.8750	-124.61	-238.20	-0.0033906
Pad29	52.90000	42.20000	-1.50000	-9.3331	-1.8750	-124.61	-238.16	-0.0033915
Pad30	56.20000	38.00000	-1.50000	-9.1592	-1.8750	-124.61	-238.13	-0.0033923
Pad31	59.90000	33.90000	-1.50000	-9.2645	-1.8750	-124.61	-238.40	-0.0033855
Pad32	63.00000	30.70000	-1.50000	-9.3722	-1.8750	-124.61	-238.42	-0.0033852
Pad33	66.50000	26.60000	-1.50000	-9.0327	-1.8750	-124.60	-237.83	-0.0033994
Pad34	97.50000	62.70000	-0.70000	-8.1849	-0.85000	-133.24	-331.00	-0.0017177
Pad35	97.30000	57.70000	-0.70000	-8.5488	-0.85000	-133.24	-331.13	-0.0017145
Pad36	97.60000	52.20000	-0.70000	-8.6056	-0.85000	-133.24	-331.12	-0.0017146
Pad37	97.10000	47.00000	-0.70000	-8.7879	-0.85000	-133.24	-331.13	-0.0017145
Pad38	97.10000	41.50000	-0.70000	-8.8382	-0.85000	-133.24	-331.10	-0.0017152
Pad39	97.20000	35.90000	-0.70000	-8.7925	-0.85000	-133.24	-331.11	-0.0017149
Pad40	96.90000	30.60000	-0.70000	-8.8138	-0.85000	-133.24	-331.17	-0.0017135
Pad41	96.80000	25.80000	-0.70000	-8.3362	-0.85000	-133.24	-331.02	-0.0017171
New Basement Excavation	70.60000	57.10000	-2.10000	-7.5100	-2.5500	-29.687	-102.77	342.74E-6
Infilled basement	76.65000	54.90000	-0.90000	-7.8481	-0.95000	15.000	44.674	8.1580E-6
A	42.50000	86.80000	-0.60000	0.011207	-0.80000	0.0	-357.09E-6	0.0
	43.36250	85.21250	-0.60000	-0.016585	-0.80000	0.0	-383.49E-6	0.0
	44.22500	83.62500	-0.60000	-0.049481	-0.80000	0.0	-412.32E-6	0.0
	45.08750	82.03750	-0.60000	-0.088349	-0.80000	0.0	-443.84E-6	0.0
	45.95000	80.45000	-0.60000	-0.13424	-0.80000	0.0	-478.31E-6	0.0
	46.81250	78.86250	-0.60000	-0.18846	-0.80000	0.0	-516.04E-6	0.0
	47.67500	77.27500	-0.60000	-0.25263	-0.80000	0.0	-557.36E-6	0.0
	48.53750	75.68750	-0.60000	-0.32885	-0.80000	0.0	-602.65E-6	0.0
	49.40000	74.10000	-0.60000	-0.41986	-0.80000	0.0	-652.28E-6	0.0
B	49.40000	74.10000	-0.60000	-0.41986	-0.80000	0.0	-652.28E-6	0.0
	50.22857	74.55714	-0.60000	-0.42937	-0.80000	0.0	-671.27E-6	0.0
	51.05714	75.01428	-0.60000	-0.43778	-0.80000	0.0	-690.67E-6	0.0
	51.88572	75.47143	-0.60000	-0.44497	-0.80000	0.0	-710.49E-6	0.0
	52.71429	75.92857	-0.60000	-0.45085	-0.80000	0.0	-730.71E-6	0.0
	53.54286	76.38571	-0.60000	-0.45535	-0.80000	0.0	-751.31E-6	0.0
	54.37143	76.84286	-0.60000	-0.45841	-0.80000	0.0	-772.27E-6	0.0
	55.20000	77.30000	-0.60000	-0.46001	-0.80000	0.0	-793.58E-6	0.0
C	55.20000	77.30000	-0.60000	-0.46001	-0.80000	0.0	-793.58E-6	0.0
	54.90000	77.90000	-0.60000	-0.42085	-0.80000	0.0	-767.86E-6	0.0
	54.60000	78.50000	-0.60000	-0.38438	-0.80000	0.0	-743.12E-6	0.0
D	54.60000	78.50000	-0.60000	-0.38438	-0.80000	0.0	-743.12E-6	0.0
	56.21250	79.37500	-0.60000	-0.38420	-0.80000	0.0	-781.22E-6	0.0
	57.82500	80.25000	-0.60000	-0.37959	-0.80000	0.0	-820.03E-6	0.0
	59.43750	81.12500	-0.60000	-0.37081	-0.80000	0.0	-859.27E-6	0.0
	61.05000	82.00000	-0.60000	-0.35820	-0.80000	0.0	-898.57E-6	0.0
	62.66250	82.87500	-0.60000	-0.34217	-0.80000	0.0	-937.50E-6	0.0
	64.27500	83.75000	-0.60000	-0.32316	-0.80000	0.0	-975.55E-6	0.0
	65.88750	84.62500	-0.60000	-0.30165	-0.80000	0.0	-0.0010121	0.0
	67.50000	85.50000	-0.60000	-0.27810	-0.80000	0.0	-0.0010466	0.0
E	67.50000	85.50000	-0.60000	-0.27810	-0.80000	0.0	-0.0010466	0.0
	69.08750	84.50000	-0.60000	-0.33254	-0.80000	0.0	-0.0011837	0.0
	70.67500	83.50000	-0.60000	-0.39140	-0.80000	0.0	-0.0013465	0.0
	72.26250	82.50000	-0.60000	-0.45457	-0.80000	0.0	-0.0015417	0.0
	73.85000	81.50000	-0.60000	-0.52176	-0.80000	0.0	-0.0017781	0.0
	75.43750	80.50000	-0.60000	-0.59245	-0.80000	0.0	-0.0020677	0.0
	77.02500	79.50000	-0.60000	-0.66581	-0.80000	0.0	-0.0024269	0.0
	78.61250	78.50000	-0.60000	-0.74058	-0.80000	0.0	-0.0028792	0.0
	80.20000	77.50000	-0.60000	-0.81501	-0.80000	0.0	-0.0034585	0.0
F	80.20000	77.50000	-0.60000	-0.81501	-0.80000	0.0	-0.0034585	0.0
	79.85000	76.95000	-0.60000	-0.87745	-0.80000	0.0	-0.0035252	0.0
	79.50000	76.40000	-0.60000	-0.94463	-0.80000	0.0	-0.0035881	0.0
G	79.50000	76.40000	-0.60000	-0.94463	-0.80000	0.0	-0.0035881	0.0
	80.31429	75.88571	-0.60000	-0.99027	-0.80000	0.0	-0.0039720	0.0
	81.12857	75.37143	-0.60000	-1.0349	-0.80000	0.0	-0.0044165	0.0
	81.94286	74.85714	-0.60000	-1.0780	-0.80000	0.0	-0.0049346	0.0
	82.75714	74.34286	-0.60000	-1.1191	-0.80000	0.0	-0.0055432	0.0
	83.57143	73.82858	-0.60000	-1.1577	-0.80000	0.0	-0.0062641	0.0
	84.38571	73.31429	-0.60000	-1.1933	-0.80000	0.0	-0.0071262	0.0
	85.20000	72.80000	-0.60000	-1.2257	-0.80000	0.0	-0.0081681	0.0
H	85.20000	72.80000	-0.60000	-1.2257	-0.80000	0.0	-0.0081681	0.0
	86.20000	74.30000	-0.60000	-0.98495	-0.80000	0.0	-0.0075674	0.0
	87.20000	75.80000	-0.60000	-0.79399	-0.80000	0.0	-0.0068686	0.0
	88.20000	77.30000	-0.60000	-0.63912	-0.80000	0.0	-0.0061299	0.0
	89.20000	78.80000	-0.60000	-0.51169	-0.80000	0.0	-0.0054016	0.0
	90.20000	80.30000	-0.60000	-0.40579	-0.80000	0.0	-0.0047190	0.0
	91.20000	81.80000	-0.60000	-0.31717	-0.80000	0.0	-0.0041022	0.0
	92.20000	83.30000	-0.60000	-0.24265	-0.80000	0.0	-0.0035585	0.0
	93.20000	84.80000	-0.60000	-0.17978	-0.80000	0.0	-0.0030873	0.0
I	65.90000	24.70000	-1.20000	-2.4879	-1.6500	-0.028333	-3.5200	85.875E-6
	67.83530	24.61765	-1.20000	-2.7091	-1.6500	-0.0099469	-1.9755	48.641E-6
	69.77059	24.53529	-1.20000	-2.9244	-1.6500	-684.68E-6	-0.50596	12.598E-6
	71.70588	24.45294	-1.20000	-3.4120	-1.6500	-126.13E-6	-0.24335	6.0742E-6
	73.64117	24.37059	-1.20000	-4.4257	-1.6500	-75.039E-6	-0.19387	4.8412E-6
	75.57647	24.28823	-1.20000	-4.3278	-1.6500	-95.080E-6	-0.20653	5.1561E-6
	77.51176	24.20588	-1.20000	-4.0870	-1.6500	-151.72E-6	-0.25618	6.3930E-6
	79.44706	24.12353	-1.20000	-4.5860	-1.6500	-262.84E-6	-0.34766	8.6719E-6
	81.38235	24.04118	-1.20000	-3.7324	-1.6500	-493.41E-6	-0.50770	12.655E-6
	83.31765	23.95882	-1.20000	-2.6545	-1.6500	-0.0010594	-0.80836	20.130E-6
	85.25294	23.87647	-1.20000	-2.2981	-1.6500	-0.0029956	-1.4763	36.682E-6
	87.18823	23.79412	-1.20000	-2.3136	-1.6500	-0.017399	-3.6063	88.852E-6
	89.12353	23.71177	-1.20000	-3.0340	-1.6500	-3.1252	-29.130	493.86E-6
	91.05882	23.62941	-1.20000	-3.7376	-1.6500	-7.8546	-60.556	924.81E-6
	92.99412	23.54706	-1.20000	-3.0140	-1.6500	-3.8531	-37.639	652.00E-6
	94.92941	23.46471	-1.20000	-2.0100	-1.6500	-0.53822	-9.3443	193.24E-6
	96.86471	23.38235	-1.20000	-1.6780	-1.6500	-1.3684	-10.487	159.54E-6
	98.80000	23.30000	-1.20000	-1.2152	-1.6500	-0.36925	-5.1049	99.929E-6
J	98.80000	23.30000	-1.20000	-1.2152	-1.6500	-0.36925	-5.1049	99.929E-6
	98.81579	21.38421	-1.20000	-0.92475	-1.6500	-0.048022	-1.9350	44.773E-6
	98.83158	19.46842	-1.20000	-0.72745	-1.6500	-0.010498	-0.97340	23.548E-6
	98.84737	17.55263	-1.20000	-0.57570	-1.6500	-0.0032788	-0.57447	14.116E-6
	98.86316	15.63684	-1.20000	-0.45495	-1.6500	-0.0012931	-0.37229	9.2102E-6
	98.87894	13.72105	-1.20000	-0.35699	-1.6500	-598.01E-6	-0.25678	6.3746E-6

Name	Location X [m]	Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	98.89474	11.80526	-1.20000	-0.27631	-1.6500	-309.93E-6	-0.18536	4.6107E-6
	98.91053	9.88947	-1.20000	-0.20909	-1.6500	-174.88E-6	-0.13859	3.4516E-6
	98.92632	7.97368	-1.20000	-0.15261	-1.6500	-105.37E-6	-0.10658	2.6565E-6
	98.94211	6.05789	-1.20000	-0.10488	-1.6500	-66.870E-6	-0.083873	2.0918E-6
	98.95789	4.14211	-1.20000	-0.064412	-1.6500	-44.265E-6	-0.067289	1.6789E-6
	98.97369	2.22632	-1.20000	-0.030069	-1.6500	-30.340E-6	-0.054873	1.3695E-6
	98.98947	0.31053	-1.20000	-933.82E-6	-1.6500	-21.413E-6	-0.045380	1.1329E-6
	99.00526	-1.60526	-1.20000	0.023735	-1.6500	-15.493E-6	-0.037989	0.0
	99.02105	-3.52105	-1.20000	0.044552	-1.6500	-11.453E-6	-0.032142	0.0
	99.03684	-5.43684	-1.20000	0.062037	-1.6500	-8.6258E-6	-0.027452	0.0
	99.05264	-7.35263	-1.20000	0.076632	-1.6500	-6.6038E-6	-0.023644	0.0
	99.06842	-9.26842	-1.20000	0.088719	-1.6500	-5.1297E-6	-0.020518	0.0
	99.08421	-11.18421	-1.20000	0.098627	-1.6500	-4.0366E-6	-0.017925	0.0
	99.10000	-13.10000	-1.20000	0.10665	-1.6500	-3.2136E-6	-0.015756	0.0
K	99.10000	-13.10000	-1.20000	0.10665	-1.6500	-3.2136E-6	-0.015756	0.0
	97.78000	-11.60000	-1.20000	0.098509	-1.6500	-3.8590E-6	-0.017575	0.0
	96.46000	-10.10000	-1.20000	0.088406	-1.6500	-4.6473E-6	-0.019649	0.0
	95.14000	-8.60000	-1.20000	0.076044	-1.6500	-5.6092E-6	-0.022016	0.0
	93.82000	-7.10000	-1.20000	0.061097	-1.6500	-6.7800E-6	-0.024715	0.0
	92.50000	-5.60000	-1.20000	0.043198	-1.6500	-8.1980E-6	-0.027789	0.0
	91.18000	-4.10000	-1.20000	0.021935	-1.6500	-9.9025E-6	-0.031278	0.0
	89.86000	-2.60000	-1.20000	-0.0031505	-1.6500	-11.928E-6	-0.035222	0.0
	88.54000	-1.10000	-1.20000	-0.032571	-1.6500	-14.298E-6	-0.039644	0.0
	87.22000	0.40000	-1.20000	-0.066899	-1.6500	-17.009E-6	-0.044554	1.1126E-6
	85.90000	1.90000	-1.20000	-0.10678	-1.6500	-20.025E-6	-0.049925	1.2466E-6
	84.58000	3.40000	-1.20000	-0.15294	-1.6500	-23.254E-6	-0.055687	1.3904E-6
	83.26000	4.90000	-1.20000	-0.20622	-1.6500	-26.541E-6	-0.061712	1.5408E-6
	81.94000	6.40000	-1.20000	-0.26762	-1.6500	-29.670E-6	-0.067799	1.6928E-6
	80.62000	7.90000	-1.20000	-0.33834	-1.6500	-32.377E-6	-0.073688	1.8398E-6
	79.30000	9.40000	-1.20000	-0.41987	-1.6500	-34.390E-6	-0.079082	1.9745E-6
	77.98000	10.90000	-1.20000	-0.51408	-1.6500	-35.477E-6	-0.083711	2.0901E-6
	76.66000	12.40000	-1.20000	-0.62322	-1.6500	-35.507E-6	-0.087436	2.1832E-6
	75.34000	13.90000	-1.20000	-0.74990	-1.6500	-34.511E-6	-0.090395	2.2573E-6
	74.02000	15.40000	-1.20000	-0.89678	-1.6500	-32.753E-6	-0.093215	2.3279E-6
	72.70000	16.90000	-1.20000	-1.0660	-1.6500	-30.938E-6	-0.097454	2.4340E-6
	71.38000	18.40000	-1.20000	-1.2581	-1.6500	-31.085E-6	-0.10680	2.6677E-6
	70.06000	19.90000	-1.20000	-1.4708	-1.6500	-41.116E-6	-0.13125	3.2783E-6
	68.74000	21.40000	-1.20000	-1.7026	-1.6500	-107.83E-6	-0.20564	5.1329E-6
	67.42000	22.90000	-1.20000	-1.9705	-1.6500	-724.95E-6	-0.50630	12.603E-6
	66.10000	24.40000	-1.20000	-2.3591	-1.6500	-0.013664	-2.3963	58.881E-6
StationboxA	76.70000	1.60000	-9.20000	-0.21605	-9.6000	-0.17628	-3.3862	20.173E-6
	76.70000	1.60000	-8.28000	-0.19777	-8.7029	-0.12556	-3.0401	19.853E-6
	76.70000	1.60000	-7.36000	-0.18016	-7.7960	-0.084086	-2.6717	19.111E-6
	76.70000	1.60000	-6.44000	-0.16373	-6.7200	-0.047225	-2.2125	17.566E-6
	76.70000	1.60000	-5.52000	-0.14902	-5.8873	-0.027198	-1.8428	15.777E-6
	76.70000	1.60000	-4.60000	-0.13659	-4.8000	-0.010675	-1.3445	12.744E-6
	76.70000	1.60000	-3.68000	-0.12690	-3.8400	-0.0033052	-0.89323	9.3772E-6
	76.70000	1.60000	-2.76000	-0.11948	-2.8800	-531.75E-6	-0.43491	10.833E-6
	76.70000	1.60000	-1.84000	-0.11558	-2.1300	-63.977E-6	-0.095736	2.3886E-6
	76.70000	1.60000	-0.92000	-0.11515	-0.96000	0.0	-0.0033885	0.0
	76.70000	1.60000	0.00000	-0.11515	-0.25000	0.0	0.0	0.0
StationboxB	96.70000	0.70000	-9.20000	-0.097998	-9.6000	-0.11659	-2.4744	15.000E-6
	96.70000	0.70000	-8.28000	-0.084475	-8.7029	-0.084248	-2.2223	14.681E-6
	96.70000	0.70000	-7.36000	-0.071499	-7.7960	-0.057596	-1.9560	14.085E-6
	96.70000	0.70000	-6.44000	-0.059397	-6.7200	-0.033548	-1.6265	12.943E-6
	96.70000	0.70000	-5.52000	-0.048522	-5.8873	-0.020164	-1.3626	11.665E-6
	96.70000	0.70000	-4.60000	-0.039257	-4.8000	-0.0086809	-1.0083	9.5374E-6
	96.70000	0.70000	-3.68000	-0.031893	-3.8400	-0.0031484	-0.68813	7.2049E-6
	96.70000	0.70000	-2.76000	-0.025912	-2.8800	-715.67E-6	-0.36321	9.0265E-6
	96.70000	0.70000	-1.84000	-0.021959	-2.1300	-123.03E-6	-0.11859	2.9556E-6
	96.70000	0.70000	-0.92000	-0.021402	-0.96000	0.0	-0.0057895	0.0
	96.70000	0.70000	0.00000	-0.021398	-0.25000	0.0	0.0	0.0
StationboxC	97.30000	18.00000	-9.20000	-1.0229	-9.6000	-2.7857	-11.468	21.964E-6
	97.30000	18.00000	-8.28000	-0.99696	-8.7029	-2.4017	-11.024	28.467E-6
	97.30000	18.00000	-7.36000	-0.96456	-7.7960	-1.9804	-10.423	35.400E-6
	97.30000	18.00000	-6.44000	-0.92593	-6.7200	-1.4568	-9.4660	43.225E-6
	97.30000	18.00000	-5.52000	-0.88234	-5.8873	-1.0576	-8.5112	47.821E-6
	97.30000	18.00000	-4.60000	-0.83639	-4.8000	-0.59111	-6.9439	50.205E-6
	97.30000	18.00000	-3.68000	-0.79169	-3.8400	-0.27726	-5.2431	46.831E-6
	97.30000	18.00000	-2.76000	-0.74581	-2.8800	-0.086400	-3.2651	75.148E-6
	97.30000	18.00000	-1.84000	-0.70244	-2.1300	-0.019995	-1.6014	38.537E-6
	97.30000	18.00000	-0.92000	-0.69373	-0.96000	-99.877E-6	-0.10999	2.7422E-6
	97.30000	18.00000	0.00000	-0.69368	-0.25000	0.0	0.0	0.0
StationboxD	77.30000	19.20000	-9.20000	-2.1086	-9.6000	-7.2256	-23.571	13.375E-6
	77.30000	19.20000	-8.28000	-2.0802	-8.7029	-6.3159	-23.202	31.713E-6
	77.30000	19.20000	-7.36000	-2.0316	-7.7960	-5.2199	-22.413	53.346E-6
	77.30000	19.20000	-6.44000	-1.9615	-6.7200	-3.7377	-20.728	80.713E-6
	77.30000	19.20000	-5.52000	-1.8721	-5.8873	-2.5485	-18.695	98.978E-6
	77.30000	19.20000	-4.60000	-1.7720	-4.8000	-1.1702	-14.860	110.20E-6
	77.30000	19.20000	-3.68000	-1.6761	-3.8400	-0.35940	-10.287	97.760E-6
	77.30000	19.20000	-2.76000	-1.5955	-2.8800	-0.033284	-4.7722	116.81E-6
	77.30000	19.20000	-1.84000	-1.5632	-2.1300	-957.43E-6	-0.48723	12.109E-6
	77.30000	19.20000	-0.92000	-1.5596	-0.96000	-1.5387E-6	-0.011704	0.0
	77.30000	19.20000	0.00000	-1.5595	-0.25000	0.0	0.0	0.0
T1CrownAB	106.80000	91.60000	-6.58000	0.034822	-6.7900	-0.013642	-1.0638	8.6381E-6
	106.63333	89.64167	-6.61083	0.013826	-6.8054	-0.017167	-1.1934	9.6335E-6
	106.46667	87.68333	-6.64167	-0.010783	-6.8208	-0.021856	-1.3443	10.778E-6
	106.30000	85.72500	-6.67250	-0.039507	-6.8362	-0.028190	-1.5212	12.096E-6
	106.13333	83.76667	-6.70333	-0.072923	-6.8517	-0.036897	-1.7298	13.620E-6
	105.96667	81.80833	-6.73417	-0.11170	-6.8671	-0.049090	-1.9777	15.382E-6
	105.80000	79.85000	-6.76500	-0.15663	-6.8825	-0.066514	-2.2744	17.419E-6
	105.63333	77.89167	-6.79583	-0.20864	-6.8979	-0.091944	-2.6323	19.764E-6
	105.46667	75.93333	-6.82667	-0.26882	-6.9133	-0.12984	-3.0674	22.438E-6
	105.30000	73.97500	-6.85750	-0.33839	-6.9288	-0.18735	-3.5995	25.425E-6
	105.13333	72.01667	-6.88833	-0.41867	-6.9442	-0.27570	-4.2516	28.638E-6
	104.96667	70.05833	-6.91917	-0.51074	-6.9596	-0.41113	-5.0472	31.863E-6
	104.80000	68.10000	-6.95000	-0.61484	-6.9750	-0.61279	-6.0002	34.736E-6
T1CrownBC	104.80000	68.10000	-6.95000	-0.61484	-6.9750	-0.61279	-6.0002	34.736E-6
	104.72308	66.23077	-6.97462	-0.71645	-6.9873	-0.85633	-6.9715	36.717E-6
	104.64616	64.36154	-6.99923	-0.82035	-6.9996	-1.1332	-7.9859	38.219E-6
	104.56923	62.49231	-7.02385	-0.92041	-7.5196	-1.5873	-9.4073	37.378E-6
	104.49231	60.62308	-7.04846	-1.0116	-7.5398	-1.8239	-10.302	38.816E-6
	104.41538	58.75385	-7.07308	-1.0918	-7.5600	-2.0055	-11.071	40.561E-6
	104.33846	56.88462	-7.09769	-1.1609	-7.5802	-2.1473	-11.719	42.289E-6
	104.26154	55.01538	-7.12231	-1.2199	-7.6005	-2.2663	-12.262	43.723E-6
	104.18462	53.14615	-7.14692	-1.2695	-7.6207	-2.3711	-12.717	44.781E-6
	104.10769	51.27692	-7.17154	-1.3102	-7.6409	-2.4524	-13.089	45.746E-6
	104.03077	49.40769	-7.19615	-1.3426	-7.6612	-2.5090	-13.391	46.739E-6
	103.95385	47.53846	-7.22077	-1.3684	-7.6814	-2.5577	-13.645	47.536E-6
	103.87692	45.66923	-7.24538	-1.3892	-7.7017	-2.6120	-13.872	47.978E-6
	103.80000	43.80000	-7.27000	-1.4060	-7.7219	-2.6839	-14.087	47.908E-6
T1CrownCD	103.80000	43.80000	-7.27000	-1.4060	-7.7219	-2.6839	-14.087	47.908E-6
	103.76923	41.82308	-7.28923	-1.4105	-7.7377	-2.7397	-14.201	47.435E-6
	103.73846	39.84615	-7.30846	-1.4093	-7.7536	-2.8006	-14.284	46.597E-6
	103.70770	37.86923	-7.32769	-1.4009	-7.7694	-2.8635	-14.317	45.311E-6
	103.67693	35.89231	-7.34692	-1.3832	-7.7852	-2.9186	-14.267	43.567E-6
	103.64616	33.91539	-7.36615	-1.3527	-7.8011	-2.9397	-14.089	41.615E-6
	103.61539	31.93846	-7.38538	-1.3061	-7.8169	-2.9106	-13.734	39.454E-6
	103.58462	29.96154	-7.40462	-1.2405	-7.8328	-2.8099	-13.156	37.242E-6
	103.55385	27.98462	-7.42385	-1.1542	-7.8486	-2.6098	-12.327	35.400E-6
	103.52308	26.00769	-7.44308	-1.0480	-7.8645	-2.2980	-11.253	34.279E-6
	103.49231	24.03077	-7.46231	-0.92671	-7.8803	-1.8894	-9.9936	33.977E-6
	103.46154	22.05385	-7.48154	-0.79871	-7.8962	-1.4460	-8.6577	33.898E-6
	103.43077	20.07692	-7.50077	-0.67367	-7.9120	-1.0465	-7.3701	33.162E-6
	103.40000	18.10000	-7.52000	-0.55857	-7.9279	-0.73418	-6.2186	31.449E-6
T1CrownDE	103.40000	18.10000	-7.52000	-0.55857	-7.9279	-0.73418	-6.2186	31.449E-6
	103.45715	16.18571	-7.52667	-0.45527	-7.9334	-0.50690	-5.2236	28.986E-6
	103.51428	14.27143	-7.53333	-0.36640	-7.9389	-0.35252	-4.4068	26.208E-6
	103.57143	12.35714	-7.54000	-0.29046	-7.9444	-0.24863	-3.7416	23.433E-6
	103.62857	10.44286	-7.54667	-0.22572	-7.9499	-0.17840	-3.2000	20.837E-6
	103.68571	8.52857	-7.55333	-0.17051	-7.9554	-0.13037	-2.7572	18.495E-6
	103.74286	6.61429	-7.56000	-0.12341	-7.9609	-0.096998	-2.3928	16.423E-6
	103.80000	4.70000	-7.56667	-0.083200	-7.9664	-0.073416	-2.0905	14.608E-6
	103.85714	2.78571	-7.57333	-0.048882	-7.9719	-0.056457	-1.8377	13.027E-6
	103.91428	0.87143	-7.58000	-0.019619	-7.9774	-0.044051	-1.6248	11.651E-6
	103.97143	-1.04286	-7.58667	0.0052883	-7.9829	-0.034830	-1.4440	10.452E-6
	104.02857	-2.95714	-7.59333	0.026429	-7.9884	-0.027872	-1.2896	9.4061E-6
	104.08572	-4.87143	-7.60000	0.044304	-7.9939	-0.022548	-1.1567	8.4911E-6
	104.14286	-6.78571	-7.60667	0.059341	-7.9994	-0.018423	-1.0417	7.6883E-6
	104.20000	-8.70000	-7.61333	0.071911	-8.0049	-0.015188	-0.94165	6.9817E-6
	104.25714	-10.61429	-7.62000	0.082335	-8.0104	-0.012625	-0.85418	6.3578E-6

Name	Location X [m]	Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	104.31429	-12.52857	-7.62667	0.090891	-8.0159	-0.010574	-0.77733	5.8052E-6
	104.37143	-14.44286	-7.63333	0.097824	-8.0214	-0.0089176	-0.70953	5.3141E-6
	104.42857	-16.35714	-7.64000	0.10335	-8.0269	-0.0075687	-0.64947	4.8764E-6
	104.48572	-18.27143	-7.64667	0.10765	-8.0325	-0.0064618	-0.59606	4.4851E-6
	104.54285	-20.18571	-7.65333	0.11089	-8.0380	-0.0055470	-0.54841	4.1343E-6
	104.60000	-22.10000	-7.66000	0.11321	-8.0435	-0.0047860	-0.50574	3.8189E-6
T1InvertAB	106.80000	91.60000	-10.38000	-0.0025758	-10.835	-0.073330	-1.8686	10.871E-6
	106.63333	89.64167	-10.41083	-0.027645	-10.863	-0.090595	-2.0844	11.935E-6
	106.46667	87.68333	-10.44167	-0.056864	-10.890	-0.11287	-2.3327	13.111E-6
	106.30000	85.72500	-10.47250	-0.090801	-10.917	-0.14192	-2.6194	14.403E-6
	106.13333	83.76667	-10.50333	-0.13010	-10.944	-0.18018	-2.9516	15.807E-6
	105.96667	81.80833	-10.53417	-0.17549	-10.972	-0.23113	-3.3377	17.312E-6
	105.80000	79.85000	-10.56500	-0.22778	-10.999	-0.29964	-3.7879	18.887E-6
	105.63333	77.89167	-10.59583	-0.28785	-11.026	-0.39256	-4.3137	20.472E-6
	105.46667	75.93333	-10.62667	-0.35663	-11.054	-0.51923	-4.9278	21.969E-6
	105.30000	73.97500	-10.65750	-0.43499	-11.081	-0.69184	-5.6430	23.223E-6
	105.13333	72.01667	-10.68833	-0.52355	-11.108	-0.92481	-6.4699	24.021E-6
	104.96667	70.05833	-10.71917	-0.62236	-11.136	-1.2320	-7.4123	24.122E-6
	104.80000	68.10000	-10.75000	-0.73042	-11.163	-1.6205	-8.4619	23.336E-6
T1InvertBC	104.80000	68.10000	-10.75000	-0.73042	-11.163	-1.6205	-8.4619	23.336E-6
	104.72308	66.23077	-10.77462	-0.83269	-11.185	-2.0275	-9.4671	21.914E-6
	104.64616	64.36154	-10.79923	-0.93549	-11.207	-2.4566	-10.483	20.134E-6
	104.56923	62.49231	-10.82385	-1.0347	-11.228	-2.8699	-11.463	18.435E-6
	104.49231	60.62308	-10.84846	-1.1269	-11.250	-3.2366	-12.369	17.155E-6
	104.41538	58.75385	-10.87308	-1.2096	-11.272	-3.5438	-13.174	16.388E-6
	104.33846	56.88462	-10.89769	-1.2819	-11.294	-3.7937	-13.871	16.026E-6
	104.26154	55.01538	-10.92231	-1.3438	-11.316	-3.9961	-14.461	15.899E-6
	104.18462	53.14615	-10.94692	-1.3958	-11.338	-4.1607	-14.952	15.866E-6
	104.10769	51.27692	-10.97154	-1.4386	-11.360	-4.2953	-15.356	15.848E-6
	104.03077	49.40769	-10.99615	-1.4730	-11.381	-4.4080	-15.685	15.770E-6
	103.95385	47.53846	-11.02077	-1.5001	-11.504	-4.5531	-15.979	14.778E-6
	103.87692	45.66923	-11.04538	-1.5208	-11.525	-4.6535	-16.195	14.214E-6
	103.80000	43.80000	-11.07000	-1.5356	-11.546	-4.7605	-16.367	13.253E-6
T1InvertCD	103.80000	43.80000	-11.07000	-1.5356	-11.546	-4.7605	-16.367	13.253E-6
	103.76923	41.82308	-11.08923	-1.5371	-11.563	-4.8349	-16.419	12.157E-6
	103.73846	39.84615	-11.10846	-1.5313	-11.579	-4.9095	-16.414	10.694E-6
	103.70770	37.86923	-11.12769	-1.5169	-11.596	-4.9729	-16.334	8.9715E-6
	103.67693	35.89231	-11.14692	-1.4920	-11.613	-5.0077	-16.153	7.1596E-6
	103.64616	33.91539	-11.16615	-1.4539	-11.629	-4.9885	-15.841	5.5396E-6
	103.61539	31.93846	-11.18538	-1.4004	-11.646	-4.8856	-15.364	4.4690E-6
	103.58462	29.96154	-11.20462	-1.3294	-11.663	-4.6713	-14.697	4.3160E-6
	103.55385	27.98462	-11.22385	-1.2407	-11.679	-4.3287	-13.834	5.3521E-6
	103.52308	26.00769	-11.24308	-1.1361	-11.696	-3.8626	-12.794	7.6073E-6
	103.49231	24.03077	-11.26231	-1.0198	-11.713	-3.3052	-11.623	10.764E-6
	103.46154	22.05385	-11.28154	-0.89773	-11.729	-2.7131	-10.392	14.183E-6
	103.43077	20.07692	-11.30077	-0.77640	-11.746	-2.1485	-9.1717	17.152E-6
	103.40000	18.10000	-11.32000	-0.66114	-11.763	-1.6572	-8.0243	19.191E-6
T1InvertDE	103.40000	18.10000	-11.32000	-0.66114	-11.763	-1.6572	-8.0243	19.191E-6
	103.45715	16.18571	-11.32667	-0.55414	-11.768	-1.2529	-6.9741	20.208E-6
	103.51428	14.27143	-11.33333	-0.45913	-11.774	-0.94305	-6.0586	20.289E-6
	103.57143	12.35714	-11.34000	-0.37588	-11.780	-0.71122	-5.2721	19.712E-6
	103.62857	10.44286	-11.34667	-0.30352	-11.786	-0.53971	-4.6016	18.727E-6
	103.68571	8.52857	-11.35333	-0.24093	-11.791	-0.41316	-4.0319	17.529E-6
	103.74286	6.61429	-11.36000	-0.18694	-11.797	-0.31951	-3.5476	16.247E-6
	103.80000	4.70000	-11.36667	-0.14045	-11.803	-0.24972	-3.1350	14.968E-6
	103.85714	2.78571	-11.37333	-0.10049	-11.809	-0.19725	-2.7823	13.738E-6
	103.91428	0.87143	-11.38000	-0.066191	-11.815	-0.15742	-2.4795	12.586E-6
	103.97143	-1.04286	-11.38667	-0.036810	-11.820	-0.12685	-2.2185	11.521E-6
	104.02857	-2.95714	-11.39333	-0.011701	-11.826	-0.10316	-1.9925	10.546E-6
	104.08572	-4.87143	-11.40000	0.0096930	-11.832	-0.084618	-1.7959	9.6602E-6
	104.14286	-6.78571	-11.40667	0.027854	-11.838	-0.069960	-1.6242	8.8572E-6
	104.20000	-8.70000	-11.41333	0.043200	-11.843	-0.058270	-1.4735	8.1310E-6
	104.25714	-10.61429	-11.42000	0.056095	-11.849	-0.048868	-1.3408	7.4748E-6
	104.31429	-12.52857	-11.42667	0.066856	-11.855	-0.041245	-1.2236	6.8819E-6
	104.37143	-14.44286	-11.43333	0.075760	-11.861	-0.035018	-1.1195	6.3460E-6
	104.42857	-16.35714	-11.44000	0.083049	-11.867	-0.029897	-1.0269	5.8611E-6
	104.48572	-18.27143	-11.44667	0.088936	-11.872	-0.025658	-0.94425	5.4220E-6
	104.54285	-20.18571	-11.45333	0.093606	-11.878	-0.022127	-0.87018	5.0237E-6
	104.60000	-22.10000	-11.46000	0.097222	-11.884	-0.019169	-0.80365	4.6620E-6
T1SouthAB	105.10000	91.80000	-8.48000	0.0074322	-8.8527	-0.039720	-1.5599	10.639E-6
	104.93333	89.85000	-8.51083	-0.017681	-8.8758	-0.049805	-1.7510	11.810E-6
	104.76667	87.90000	-8.54167	-0.047125	-8.8989	-0.063127	-1.9736	13.138E-6
	104.60000	85.95000	-8.57250	-0.081546	-8.9220	-0.080980	-2.2343	14.643E-6
	104.43333	84.00000	-8.60333	-0.12170	-8.9452	-0.10528	-2.5415	16.342E-6
	104.26667	82.05000	-8.63417	-0.16849	-8.9683	-0.13892	-2.9058	18.250E-6
	104.10000	80.10000	-8.66500	-0.22297	-8.9915	-0.18635	-3.3406	20.366E-6
	103.93333	78.15000	-8.69583	-0.28643	-9.0146	-0.25444	-3.8631	22.664E-6
	103.76667	76.20000	-8.72667	-0.36037	-9.0378	-0.35390	-4.4948	25.065E-6
	103.60000	74.25000	-8.75750	-0.44652	-9.0609	-0.50116	-5.2613	27.398E-6
	103.43333	72.30000	-8.78833	-0.54671	-9.0841	-0.72046	-6.1915	29.342E-6
	103.26667	70.35000	-8.81917	-0.66243	-9.1073	-1.0439	-7.3115	30.387E-6
	103.10000	68.40000	-8.85000	-0.79397	-9.1305	-1.5046	-8.6323	29.901E-6
T1SouthBC	103.10000	68.40000	-8.85000	-0.79397	-9.1305	-1.5046	-8.6323	29.901E-6
	103.00769	66.51538	-8.87462	-0.92673	-9.1490	-2.0584	-10.002	27.748E-6
	102.91538	64.63077	-8.89923	-1.0636	-9.1675	-2.6842	-11.432	24.478E-6
	102.82307	62.74615	-8.92385	-1.1961	-9.1860	-3.2878	-12.817	21.374E-6
	102.73077	60.86154	-8.94846	-1.3172	-9.2046	-3.7899	-14.068	19.501E-6
	102.63846	58.97692	-8.97308	-1.4232	-9.2231	-4.1762	-15.142	18.869E-6
	102.54615	57.09231	-8.99769	-1.5138	-9.2416	-4.4713	-16.041	18.947E-6
	102.45385	55.20769	-9.02231	-1.5901	-9.5112	-4.8300	-16.887	17.014E-6
	102.36154	53.32308	-9.04692	-1.6538	-9.5235	-5.0288	-17.499	17.108E-6
	102.26923	51.43846	-9.07154	-1.7059	-9.5358	-5.1902	-17.998	17.206E-6
	102.17693	49.55384	-9.09615	-1.7479	-9.5481	-5.3182	-18.406	17.362E-6
	102.08462	47.66923	-9.12077	-1.7818	-9.5604	-5.4328	-18.747	17.332E-6
	101.99231	45.78461	-9.14538	-1.8095	-9.5727	-5.5548	-19.049	16.861E-6
	101.90000	43.90000	-9.17000	-1.8326	-9.5850	-5.7069	-19.332	15.622E-6
T1SouthCD	101.90000	43.90000	-9.17000	-1.8326	-9.5850	-5.7069	-19.332	15.622E-6
	101.86923	41.91539	-9.18923	-1.8391	-9.5946	-5.8212	-19.467	14.147E-6
	101.83846	39.93077	-9.20846	-1.8393	-9.6042	-5.9466	-19.564	12.171E-6
	101.80769	37.94616	-9.22769	-1.8311	-9.6138	-6.0733	-19.596	9.7099E-6
	101.77692	35.96154	-9.24692	-1.8115	-9.6235	-6.1883	-19.525	6.7696E-6
	101.74615	33.97692	-9.26615	-1.7759	-9.6331	-6.2455	-19.285	3.8683E-6
	101.71539	31.99231	-9.28538	-1.7187	-9.6427	-6.1927	-18.802	1.5752E-6
	101.68462	30.00769	-9.30462	-1.6350	-9.6523	-5.9713	-18.005	0.0
	101.65385	28.02308	-9.32385	-1.5221	-9.6619	-5.5300	-16.855	1.8619E-6
	101.62308	26.03846	-9.34308	-1.3819	-9.6715	-4.8567	-15.369	5.6200E-6
	101.59231	24.05385	-9.36231	-1.2212	-9.6812	-3.9978	-13.635	11.533E-6
	101.56154	22.06923	-9.38154	-1.0519	-9.6908	-3.0778	-11.800	18.026E-6
	101.53077	20.08462	-9.40077	-0.88716	-9.7004	-2.2446	-10.031	23.139E-6
	101.50000	18.10000	-9.42000	-0.73641	-9.7100	-1.5838	-8.4450	25.908E-6
T1SouthDE	101.50000	18.10000	-9.42000	-0.73641	-9.7100	-1.5838	-8.4450	25.908E-6
	101.56667	16.17619	-9.42667	-0.60239	-9.7133	-1.0989	-7.0781	26.518E-6
	101.63333	14.25238	-9.43333	-0.48823	-9.7167	-0.76578	-5.9551	25.646E-6
	101.70000	12.32857	-9.44000	-0.39173	-9.7200	-0.54021	-5.0414	23.980E-6
	101.76667	10.40476	-9.44667	-0.31031	-9.7233	-0.38733	-4.2989	21.985E-6
	101.83334	8.48095	-9.45333	-0.24157	-9.7267	-0.28270	-3.6933	19.937E-6
	101.90000	6.55714	-9.46000	-0.18341	-9.7300	-0.21003	-3.1960	17.976E-6
	101.96667	4.63333	-9.46667	-0.13412	-9.7333	-0.15871	-2.7845	16.169E-6
	102.03333	2.70952	-9.47333	-0.092309	-9.7367	-0.12185	-2.4415	14.538E-6
	102.10000	0.78571	-9.48000	-0.056823	-9.7400	-0.094906	-2.1531	13.082E-6
	102.16666	-1.13810	-9.48667	-0.026723	-9.7433	-0.074903	-1.9090	11.790E-6
	102.23333	-3.06190	-9.49333	-0.0012304	-9.7467	-0.059827	-1.7008	10.648E-6
	102.30000	-4.98571	-9.50000	0.020306	-9.7500	-0.048307	-1.5222	9.6376E-6
	102.36667	-6.90952	-9.50667	0.038435	-9.7533	-0.039391	-1.3680	8.7441E-6
	102.43333	-8.83333	-9.51333	0.053625	-9.7567	-0.032411	-1.2342	7.9527E-6
	102.50000	-10.75714	-9.52000	0.066274	-9.7600	-0.026887	-1.1174	7.2504E-6
	102.56667	-12.68095	-9.52667	0.076727	-9.7633	-0.022473	-1.0150	6.6258E-6
	102.63333	-14.60476	-9.53333	0.085280	-9.7667	-0.018914	-0.92489	6.0690E-6
	102.70000	-16.52857	-9.54000	0.092191	-9.7700	-0.016020	-0.84520	5.5715E-6
	102.76667	-18.45238	-9.54667	0.097683	-9.7733	-0.013650	-0.77447	5.1258E-6
	102.83334	-20.37619	-9.55333	0.10195	-9.7767	-0.011694	-0.71147	4.7257E-6
	102.90000	-22.30000	-9.56000	0.10516	-9.7800	-0.010069	-0.65516	4.3655E-6
T1NorthAB	108.60000	91.50000	-8.48000	0.028314	-8.8527	-0.033209	-1.4025	9.6212E-6
	108.43333	89.53333	-8.51083	0.0076710	-8.8758	-0.041113	-1.5635	10.620E-6
	108.26667	87.56667	-8.54167	-0.016411	-8.8989	-0.051353	-1.7486	11.742E-6
	108.10000	85.60000	-8.57250	-0.044376	-8.9220	-0.064766	-1.9623	13.000E-6
	107.93333	83.63333	-8.60333	-0.076721	-8.9452	-0.082537	-2.2100	14.409E-6
	107.76667	81.66666	-8.63417	-0.11400	-8.9683	-0.10636	-2.4981	15.977E-6
	107.60000	79.70000	-8.66500	-0.15682	-8.9915	-0.13866	-2.8344	17.708E-6
	107.43333	77.73333	-8.69583	-0.20586	-9.0146	-0.18290	-3.2280	19.590E-6
	107.26667	75.76667	-8.72667	-0.26178	-9.0378	-0.24394	-3.6891	21.591E-6

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Short Term

Name	Location X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Stresses Sum Princ [kN/m²]	Vert Strain [-]
	107.10000	73.80000	-8.75750	-0.32525	-9.0609	-0.32832	-4.2282	23.646E-6
	106.93333	71.83334	-8.78833	-0.39671	-9.0841	-0.44416	-4.8548	25.645E-6
	106.76667	69.86667	-8.81917	-0.47622	-9.1073	-0.59995	-5.5738	27.437E-6
	106.60000	67.90000	-8.85000	-0.56304	-9.1305	-0.80110	-6.3805	28.875E-6
T1NorthBC	106.60000	67.90000	-8.85000	-0.56304	-9.1305	-0.80110	-6.3805	28.875E-6
	106.53077	66.04615	-8.87462	-0.64322	-9.1490	-1.0093	-7.1389	29.812E-6
	106.46154	64.19231	-8.89923	-0.72365	-9.1675	-1.2296	-7.9063	30.550E-6
	106.39231	62.33846	-8.92385	-0.80132	-9.1860	-1.4413	-8.6472	31.281E-6
	106.32307	60.48462	-8.94846	-0.87360	-9.2046	-1.6283	-9.3315	32.138E-6
	106.25385	58.63077	-8.97308	-0.93885	-9.2231	-1.7847	-9.9417	33.120E-6
	106.18462	56.77692	-8.99769	-0.99633	-9.2416	-1.9129	-10.472	34.135E-6
	106.11539	54.92308	-9.02231	-1.0460	-9.5112	-2.1177	-11.089	33.612E-6
	106.04615	53.06923	-9.04692	-1.0880	-9.5235	-2.2062	-11.469	34.403E-6
	105.97692	51.21539	-9.07154	-1.1229	-9.5358	-2.2776	-11.784	35.089E-6
	105.90769	49.36154	-9.09615	-1.1511	-9.5481	-2.3358	-12.042	35.653E-6
	105.83846	47.50769	-9.12077	-1.1734	-9.5604	-2.3867	-12.252	36.035E-6
	105.76923	45.65385	-9.14538	-1.1904	-9.5727	-2.4368	-12.424	36.162E-6
	105.70000	43.80000	-9.17000	-1.2026	-9.5850	-2.4908	-12.564	35.977E-6
T1NorthCD	105.70000	43.80000	-9.17000	-1.2026	-9.5850	-2.4908	-12.564	35.977E-6
	105.69231	41.83077	-9.18923	-1.2009	-9.5946	-2.5152	-12.581	35.560E-6
	105.68462	39.86154	-9.20846	-1.1931	-9.6042	-2.5395	-12.553	34.826E-6
	105.67693	37.89231	-9.22769	-1.1782	-9.6138	-2.5575	-12.466	33.813E-6
	105.66923	35.92308	-9.24692	-1.1548	-9.6235	-2.5599	-12.301	32.582E-6
	105.66154	33.95385	-9.26615	-1.1212	-9.6331	-2.5344	-12.037	31.240E-6
	105.65385	31.98462	-9.28538	-1.0760	-9.6427	-2.4678	-11.650	29.907E-6
	105.64616	30.01538	-9.30462	-1.0180	-9.6523	-2.3481	-11.125	28.722E-6
	105.63846	28.04615	-9.32385	-0.94727	-9.6619	-2.1672	-10.458	27.826E-6
	105.63077	26.07692	-9.34308	-0.86521	-9.6715	-1.9269	-9.6619	27.286E-6
	105.62308	24.10769	-9.36231	-0.77485	-9.6812	-1.6422	-8.7726	27.022E-6
	105.61539	22.13846	-9.38154	-0.68046	-9.6908	-1.3416	-7.8405	26.794E-6
	105.60769	20.16923	-9.40077	-0.58668	-9.7004	-1.0570	-6.9204	26.314E-6
	105.60000	18.20000	-9.42000	-0.49736	-9.7100	-0.81126	-6.0571	25.414E-6
T1NorthDE	105.60000	18.20000	-9.42000	-0.49736	-9.7100	-0.81126	-6.0571	25.414E-6
	105.63809	16.28572	-9.42667	-0.41498	-9.7133	-0.61299	-5.2780	24.117E-6
	105.67619	14.37143	-9.43333	-0.34108	-9.7167	-0.46120	-4.5966	22.527E-6
	105.71429	12.45714	-9.44000	-0.27566	-9.7200	-0.34772	-4.0094	20.793E-6
	105.75238	10.54286	-9.44667	-0.21827	-9.7233	-0.26380	-3.5074	19.036E-6
	105.79047	8.62857	-9.45333	-0.16820	-9.7267	-0.20191	-3.0797	17.336E-6
	105.82858	6.71429	-9.46000	-0.12470	-9.7300	-0.15611	-2.7152	15.741E-6
	105.86667	4.80000	-9.46667	-0.087001	-9.7333	-0.12199	-2.4039	14.275E-6
	105.90476	2.88571	-9.47333	-0.054430	-9.7367	-0.096342	-2.1372	12.943E-6
	105.94286	0.97143	-9.48000	-0.026364	-9.7400	-0.076874	-1.9078	11.743E-6
	105.98095	-0.94286	-9.48667	-0.0022544	-9.7433	-0.061942	-1.7096	10.667E-6
	106.01905	-2.85714	-9.49333	0.018383	-9.7467	-0.050371	-1.5376	9.7042E-6
	106.05714	-4.77143	-9.50000	0.035972	-9.7500	-0.041315	-1.3878	8.8438E-6
	106.09524	-6.68571	-9.50667	0.050888	-9.7533	-0.034158	-1.2566	8.0747E-6
	106.13333	-8.60000	-9.51333	0.063457	-9.7567	-0.028451	-1.1414	7.3868E-6
	106.17142	-10.51429	-9.52000	0.073971	-9.7600	-0.023861	-1.0397	6.7707E-6
	106.20953	-12.42857	-9.52667	0.082685	-9.7633	-0.020140	-0.94973	6.2182E-6
	106.24762	-14.34286	-9.53333	0.089825	-9.7667	-0.017101	-0.86978	5.7218E-6
	106.28571	-16.25714	-9.54000	0.095590	-9.7700	-0.014601	-0.79851	5.2749E-6
	106.32381	-18.17143	-9.54667	0.10016	-9.7733	-0.012531	-0.73479	4.8720E-6
	106.36191	-20.08571	-9.55333	0.10368	-9.7767	-0.010806	-0.67764	4.5079E-6
	106.40000	-22.00000	-9.56000	0.10630	-9.7800	-0.0093619	-0.62624	4.1783E-6
T2CrownAB	113.70000	91.10000	-6.58000	0.069828	-6.7900	-0.0092269	-0.84703	6.9191E-6
	113.80769	89.24615	-6.60846	0.058921	-6.8042	-0.010908	-0.92010	7.4868E-6
	113.91538	87.39231	-6.63692	0.046690	-6.8185	-0.012936	-1.0002	8.1041E-6
	114.02308	85.53846	-6.66538	0.033088	-6.8327	-0.015387	-1.0880	8.7740E-6
	114.13077	83.68462	-6.69385	0.018085	-6.8469	-0.018348	-1.1839	9.4986E-6
	114.23846	81.83077	-6.72231	0.0016759	-6.8612	-0.021919	-1.2885	10.279E-6
	114.34615	79.97692	-6.75077	-0.016114	-6.8754	-0.026210	-1.4021	11.116E-6
	114.45385	78.12308	-6.77923	-0.035220	-6.8896	-0.031331	-1.5247	12.005E-6
	114.56154	76.26923	-6.80769	-0.055525	-6.9038	-0.037377	-1.6561	12.944E-6
	114.66923	74.41538	-6.83615	-0.076854	-6.9181	-0.044408	-1.7954	13.923E-6
	114.77692	72.56154	-6.86462	-0.098962	-6.9323	-0.052414	-1.9415	14.932E-6
	114.88461	70.70770	-6.89308	-0.12153	-6.9465	-0.061287	-2.0921	15.955E-6
	114.99231	68.85384	-6.92154	-0.14418	-6.9608	-0.070794	-2.2445	16.976E-6
	115.10000	67.00000	-6.95000	-0.16647	-6.9750	-0.080582	-2.3954	17.975E-6
T2CrownBC	115.10000	67.00000	-6.95000	-0.16647	-6.9750	-0.080582	-2.3954	17.975E-6
	115.10000	65.04166	-6.97667	-0.19258	-6.9883	-0.092505	-2.5725	19.139E-6
	115.10000	63.08333	-7.00333	-0.21781	-7.5027	-0.13071	-2.9723	20.784E-6
	115.10000	61.12500	-7.03000	-0.24169	-7.5246	-0.14488	-3.1493	21.835E-6
	115.10000	59.16667	-7.05667	-0.26371	-7.5465	-0.15783	-3.3126	22.802E-6
	115.10000	57.20833	-7.08333	-0.28352	-7.5684	-0.16930	-3.4594	23.670E-6
	115.10000	55.25000	-7.11000	-0.30083	-7.5903	-0.17917	-3.5879	24.427E-6
	115.10000	53.29167	-7.13667	-0.31549	-7.6123	-0.18750	-3.6973	25.066E-6
	115.10000	51.33333	-7.16333	-0.32738	-7.6342	-0.19438	-3.7874	25.584E-6
	115.10000	49.37500	-7.19000	-0.33647	-7.6561	-0.20000	-3.8585	25.979E-6
	115.10000	47.41667	-7.21667	-0.34275	-7.6780	-0.20452	-3.9108	26.250E-6
	115.10000	45.45833	-7.24333	-0.34622	-7.7000	-0.20808	-3.9448	26.397E-6
	115.10000	43.50000	-7.27000	-0.34688	-7.7219	-0.21074	-3.9603	26.418E-6
T2CrownCD	115.10000	43.50000	-7.27000	-0.34688	-7.7219	-0.21074	-3.9603	26.418E-6
	115.02308	41.53846	-7.28923	-0.34813	-7.7377	-0.21489	-3.9819	26.463E-6
	114.94615	39.57692	-7.30846	-0.34645	-7.7536	-0.21800	-3.9839	26.377E-6
	114.86923	37.61538	-7.32769	-0.34172	-7.7694	-0.21977	-3.9646	26.154E-6
	114.79230	35.65385	-7.34692	-0.33383	-7.7852	-0.21980	-3.9222	25.791E-6
	114.71539	33.69231	-7.36615	-0.32269	-7.8011	-0.21763	-3.8549	25.284E-6
	114.63846	31.73077	-7.38538	-0.30828	-7.8169	-0.21283	-3.7615	24.635E-6
	114.56154	29.76923	-7.40462	-0.29066	-7.8328	-0.20507	-3.6417	23.848E-6
	114.48462	27.80769	-7.42385	-0.27005	-7.8486	-0.19425	-3.4963	22.934E-6
	114.40769	25.84615	-7.44308	-0.24681	-7.8645	-0.18056	-3.3279	21.909E-6
	114.33077	23.88461	-7.46231	-0.22144	-7.8803	-0.16452	-3.1408	20.795E-6
	114.25385	21.92308	-7.48154	-0.19458	-7.8962	-0.14696	-2.9405	19.614E-6
	114.17693	19.96154	-7.50077	-0.16691	-7.9120	-0.12886	-2.7331	18.394E-6
	114.10000	18.00000	-7.52000	-0.13913	-7.9279	-0.11117	-2.5249	17.160E-6
T2CrownDE	114.10000	18.00000	-7.52000	-0.13913	-7.9279	-0.11117	-2.5249	17.160E-6
	114.25500	16.03500	-7.52700	-0.10678	-7.9337	-0.091205	-2.2809	15.713E-6
	114.41000	14.07000	-7.53400	-0.076864	-7.9394	-0.074444	-2.0574	14.351E-6
	114.56500	12.10500	-7.54100	-0.049540	-7.9452	-0.060633	-1.8548	13.085E-6
	114.72000	10.14000	-7.54800	-0.024861	-7.9510	-0.049394	-1.6728	11.921E-6
	114.87500	8.17500	-7.55500	-0.0027876	-7.9568	-0.040321	-1.5101	10.858E-6
	115.03000	6.21000	-7.56200	0.016780	-7.9626	-0.033025	-1.3652	9.8921E-6
	115.18500	4.24500	-7.56900	0.033981	-7.9683	-0.027165	-1.2363	9.0192E-6
	115.34000	2.28000	-7.57600	0.048977	-7.9741	-0.022452	-1.1218	8.2320E-6
	115.49500	0.31500	-7.58300	0.061940	-7.9799	-0.018654	-1.0200	7.5232E-6
	115.65000	-1.65000	-7.59000	0.073044	-7.9857	-0.015580	-0.92936	6.8855E-6
	115.80500	-3.61500	-7.59700	0.082461	-7.9914	-0.013082	-0.84862	6.3117E-6
	115.96000	-5.58000	-7.60400	0.090356	-7.9972	-0.011042	-0.77655	5.7952E-6
	116.11500	-7.54500	-7.61100	0.096883	-8.0030	-0.0093681	-0.71209	5.3299E-6
	116.27000	-9.51000	-7.61800	0.10219	-8.0088	-0.0079872	-0.65432	4.9101E-6
	116.42500	-11.47500	-7.62500	0.10641	-8.0146	-0.0068423	-0.60244	4.5311E-6
	116.58000	-13.44000	-7.63200	0.10967	-8.0203	-0.0058882	-0.55575	4.1883E-6
	116.73500	-15.40500	-7.63900	0.11207	-8.0261	-0.0050892	-0.51364	3.8777E-6
	116.89000	-17.37000	-7.64600	0.11374	-8.0319	-0.0044168	-0.47558	3.5959E-6
	117.04500	-19.33500	-7.65300	0.11475	-8.0377	-0.0038484	-0.44111	3.3398E-6
	117.20000	-21.30000	-7.66000	0.11520	-8.0435	-0.0033658	-0.40983	3.1067E-6
T2InvertAB	113.70000	91.10000	-10.38000	0.039662	-10.835	-0.049799	-1.4950	8.8726E-6
	113.80769	89.24615	-10.40846	0.026393	-10.861	-0.058095	-1.6178	9.5060E-6
	113.91538	87.39231	-10.43692	0.011616	-10.886	-0.067903	-1.7515	10.179E-6
	114.02308	85.53846	-10.46538	-0.0047202	-10.911	-0.079494	-1.8966	10.890E-6
	114.13077	83.68462	-10.49385	-0.022646	-10.936	-0.093165	-2.0537	11.637E-6
	114.23846	81.83077	-10.52231	-0.042163	-10.961	-0.10924	-2.2231	12.416E-6
	114.34615	79.97692	-10.55077	-0.063236	-10.986	-0.12803	-2.4050	13.221E-6
	114.45385	78.12308	-10.57923	-0.085779	-11.012	-0.14981	-2.5991	14.044E-6
	114.56154	76.26923	-10.60769	-0.10965	-11.037	-0.17479	-2.8044	14.876E-6
	114.66923	74.41538	-10.63615	-0.13463	-11.062	-0.20300	-3.0194	15.706E-6
	114.77692	72.56154	-10.66462	-0.16044	-11.087	-0.23423	-3.2420	16.524E-6
	114.88461	70.70770	-10.69308	-0.18669	-11.112	-0.26798	-3.4689	17.319E-6
	114.99231	68.85384	-10.72154	-0.21296	-11.138	-0.30343	-3.6962	18.082E-6
	115.10000	67.00000	-10.75000	-0.23875	-11.163	-0.33943	-3.9196	18.806E-6
T2InvertBC	115.10000	67.00000	-10.75000	-0.23875	-11.163	-0.33943	-3.9196	18.806E-6
	115.10000	65.04166	-10.77667	-0.26890	-11.187	-0.38279	-4.1804	19.629E-6
	115.10000	63.08333	-10.80333	-0.29802	-11.210	-0.42542	-4.4321	20.405E-6
	115.10000	61.12500	-10.83000	-0.32552	-11.234	-0.46583	-4.6693	21.129E-6
	115.10000	59.16667	-10.85667	-0.35087	-11.258	-0.50283	-4.8876	21.795E-6
	115.10000	57.20833	-10.88333	-0.37365	-11.281	-0.53566	-5.0832	22.394E-6
	115.10000	55.25000	-10.91000	-0.39357	-11.305	-0.56398	-5.2538	22.918E-6
	115.10000	53.29167	-10.93667	-0.41041	-11.329	-0.58782	-5.3981	23.358E-6
	115.10000	51.33333	-10.96333	-0.42406	-11.352	-0.60741	-5.5156	23.706E-6
	115.10000	49.37500	-10.99000	-0.43447	-11.376	-0.62311	-5.6061	23.955E-6
	115.10000	47.41667	-11.01667	-0.44159	-11.500	-0.64970	-5.7091	23.954E-6

5-17 Haverstock Hill, London NW3 2BL

Short Term

Name	Location				Stresses			
	X [m]	Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	115.10000	45.45833	-11.04333	-0.44546	-11.523	-0.65871	-5.7463	23.990E-6
	115.10000	43.50000	-11.07000	-0.44604	-11.546	-0.66450	-5.7567	23.918E-6
T2InvertCD	115.10000	43.50000	-11.07000	-0.44604	-11.546	-0.66450	-5.7567	23.918E-6
	115.02308	41.53846	-11.08923	-0.44725	-11.563	-0.67404	-5.7743	23.827E-6
	114.94615	39.57692	-11.10846	-0.44505	-11.579	-0.67993	-5.7638	23.628E-6
	114.86923	37.61538	-11.12769	-0.43932	-11.596	-0.68144	-5.7235	23.325E-6
	114.79230	35.65385	-11.14692	-0.42994	-11.613	-0.67762	-5.6519	22.924E-6
	114.71539	33.69231	-11.16615	-0.41684	-11.629	-0.66747	-5.5474	22.436E-6
	114.63846	31.73077	-11.18538	-0.40000	-11.646	-0.65009	-5.4091	21.872E-6
	114.56154	29.76923	-11.20462	-0.37953	-11.663	-0.62490	-5.2373	21.246E-6
	114.48462	27.80769	-11.22385	-0.35570	-11.679	-0.59189	-5.0339	20.569E-6
	114.40769	25.84615	-11.24308	-0.32890	-11.696	-0.55172	-4.8023	19.851E-6
	114.33077	23.88461	-11.26231	-0.29972	-11.713	-0.50579	-4.5477	19.098E-6
	114.25385	21.92308	-11.28154	-0.26884	-11.729	-0.45610	-4.2766	18.313E-6
	114.17693	19.96154	-11.30077	-0.23702	-11.746	-0.40496	-3.9962	17.499E-6
	114.10000	18.00000	-11.32000	-0.20501	-11.763	-0.35460	-3.7137	16.658E-6
T2InvertDE	114.10000	18.00000	-11.32000	-0.20501	-11.763	-0.35460	-3.7137	16.658E-6
	114.25500	16.03500	-11.32700	-0.16769	-11.769	-0.29738	-3.3828	15.653E-6
	114.41000	14.07000	-11.33400	-0.13300	-11.775	-0.24801	-3.0756	14.648E-6
	114.56500	12.10500	-11.34100	-0.10115	-11.781	-0.20619	-2.7935	13.660E-6
	114.72000	10.14000	-11.34800	-0.072241	-11.787	-0.17122	-2.5367	12.702E-6
	114.87500	8.17500	-11.35500	-0.046242	-11.793	-0.14226	-2.3043	11.785E-6
	115.03000	6.21000	-11.36200	-0.023058	-11.799	-0.11841	-2.0948	10.916E-6
	115.18500	4.24500	-11.36900	-0.0025451	-11.805	-0.098827	-1.9066	10.100E-6
	115.34000	2.28000	-11.37600	0.015472	-11.811	-0.082760	-1.7378	9.3408E-6
	115.49500	0.31500	-11.38300	0.031184	-11.817	-0.069569	-1.5864	8.6368E-6
	115.65000	-1.65000	-11.39000	0.044783	-11.823	-0.058720	-1.4506	7.9873E-6
	115.80500	-3.61500	-11.39700	0.056464	-11.829	-0.049771	-1.3288	7.3897E-6
	115.96000	-5.58000	-11.40400	0.066409	-11.835	-0.042366	-1.2194	6.8413E-6
	116.11500	-7.54500	-11.41100	0.074797	-11.841	-0.036214	-1.1210	6.3386E-6
	116.27000	-9.51000	-11.41800	0.081789	-11.847	-0.031085	-1.0323	5.8782E-6
	116.42500	-11.47500	-11.42500	0.087540	-11.854	-0.026790	-0.95238	5.4567E-6
	116.58000	-13.44000	-11.43200	0.092189	-11.860	-0.023179	-0.88014	5.0709E-6
	116.73500	-15.40500	-11.43900	0.095864	-11.866	-0.020131	-0.81475	4.7176E-6
	116.89000	-17.37000	-11.44600	0.098681	-11.872	-0.017547	-0.75545	4.3939E-6
	117.04500	-19.33500	-11.45300	0.10075	-11.878	-0.015348	-0.70159	4.0972E-6
	117.20000	-21.30000	-11.46000	0.10215	-11.884	-0.013470	-0.65258	3.8249E-6
T2SouthAB	111.30000	91.30000	-8.48000	0.043486	-8.8527	-0.028524	-1.2843	8.8521E-6
	111.40000	89.45385	-8.50846	0.029131	-8.8740	-0.033844	-1.3998	9.5749E-6
	111.50000	87.60769	-8.53692	0.013005	-8.8953	-0.040306	-1.5273	10.358E-6
	111.60000	85.76154	-8.56538	-0.0049878	-8.9167	-0.048176	-1.6679	11.205E-6
	111.70000	83.91538	-8.59385	-0.024930	-8.9381	-0.057773	-1.8228	12.117E-6
	111.80000	82.06923	-8.62231	-0.046880	-8.9594	-0.069478	-1.9930	13.092E-6
	111.90000	80.22308	-8.65077	-0.070860	-8.9808	-0.083727	-2.1796	14.129E-6
	112.00000	78.37692	-8.67923	-0.096844	-9.0021	-0.10099	-2.3830	15.219E-6
	112.10000	76.53077	-8.70769	-0.12474	-9.0235	-0.12173	-2.6033	16.355E-6
	112.20000	74.68462	-8.73615	-0.15436	-9.0449	-0.14631	-2.8398	17.521E-6
	112.30000	72.83846	-8.76462	-0.18542	-9.0663	-0.17490	-3.0906	18.701E-6
	112.40000	70.99231	-8.79308	-0.21750	-9.0877	-0.20727	-3.3524	19.876E-6
	112.50000	69.14616	-8.82154	-0.25004	-9.1091	-0.24267	-3.6203	21.025E-6
	112.60000	67.30000	-8.85000	-0.28237	-9.1305	-0.27980	-3.8882	22.135E-6
T2SouthBC	112.60000	67.30000	-8.85000	-0.28237	-9.1305	-0.27980	-3.8882	22.135E-6
	112.60833	65.33334	-8.87667	-0.31977	-9.1505	-0.32455	-4.1991	23.388E-6
	112.61667	63.36666	-8.90333	-0.35596	-9.1706	-0.36867	-4.5004	24.584E-6
	112.62500	61.40000	-8.93000	-0.39005	-9.1907	-0.40992	-4.7837	25.708E-6
	112.63333	59.43333	-8.95667	-0.42128	-9.2107	-0.44665	-5.0421	26.747E-6
	112.64167	57.46667	-8.98333	-0.44912	-9.2308	-0.47806	-5.2708	27.685E-6
	112.65000	55.50000	-9.01000	-0.47317	-9.5050	-0.54201	-5.5999	28.217E-6
	112.65833	53.53333	-9.03667	-0.49330	-9.5183	-0.56334	-5.7630	28.897E-6
	112.66666	51.56667	-9.06333	-0.50945	-9.5317	-0.57981	-5.8932	29.446E-6
	112.67500	49.60000	-9.09000	-0.52164	-9.5450	-0.59219	-5.9916	29.857E-6
	112.68333	47.63334	-9.11667	-0.52995	-9.5583	-0.60125	-6.0599	30.124E-6
	112.69167	45.66667	-9.14333	-0.53445	-9.5717	-0.60765	-6.0994	30.244E-6
	112.70000	43.70000	-9.17000	-0.53518	-9.5850	-0.61174	-6.1107	30.212E-6
T2SouthCD	112.70000	43.70000	-9.17000	-0.53518	-9.5850	-0.61174	-6.1107	30.212E-6
	112.62308	41.72308	-9.18923	-0.53738	-9.5946	-0.62241	-6.1402	30.177E-6
	112.54615	39.74615	-9.20846	-0.53562	-9.6042	-0.63045	-6.1396	29.985E-6
	112.46923	37.76923	-9.22769	-0.52967	-9.6138	-0.63490	-6.1058	29.636E-6
	112.39231	35.79231	-9.24692	-0.51929	-9.6235	-0.63441	-6.0353	29.132E-6
	112.31538	33.81538	-9.26615	-0.50421	-9.6331	-0.62740	-5.9243	28.482E-6
	112.23846	31.83846	-9.28538	-0.48428	-9.6427	-0.61232	-5.7698	27.696E-6
	112.16154	29.86154	-9.30462	-0.45949	-9.6523	-0.58796	-5.5703	26.790E-6
	112.08462	27.88461	-9.32385	-0.43010	-9.6619	-0.55381	-5.3270	25.784E-6
	112.00769	25.90769	-9.34308	-0.39662	-9.6715	-0.51049	-5.0443	24.695E-6
	111.93077	23.93077	-9.36231	-0.35986	-9.6812	-0.45985	-4.7300	23.540E-6
	111.85384	21.95385	-9.38154	-0.32089	-9.6908	-0.40483	-4.3944	22.330E-6
	111.77692	19.97692	-9.40077	-0.28086	-9.7004	-0.34889	-4.0494	21.073E-6
	111.70000	18.00000	-9.42000	-0.24090	-9.7100	-0.29525	-3.7062	19.783E-6
T2SouthDE	111.70000	18.00000	-9.42000	-0.24090	-9.7100	-0.29525	-3.7062	19.783E-6
	111.86000	16.03000	-9.42700	-0.19555	-9.7135	-0.23802	-3.3193	18.270E-6
	112.02000	14.06000	-9.43400	-0.15401	-9.7170	-0.19097	-2.9690	16.799E-6
	112.18000	12.09000	-9.44100	-0.11642	-9.7205	-0.15302	-2.6554	15.396E-6
	112.34000	10.12000	-9.44800	-0.082771	-9.7240	-0.12278	-2.3769	14.077E-6
	112.50000	8.15000	-9.45500	-0.052906	-9.7275	-0.098836	-2.1309	12.853E-6
	112.66000	6.18000	-9.46200	-0.026597	-9.7310	-0.079934	-1.9141	11.729E-6
	112.82000	4.21000	-9.46900	-0.0035794	-9.7345	-0.065001	-1.7232	10.703E-6
	112.98000	2.24000	-9.47600	0.016429	-9.7380	-0.053174	-1.5551	9.7726E-6
	113.14000	0.27000	-9.48300	0.033709	-9.7415	-0.043768	-1.4069	8.9306E-6
	113.30000	-1.70000	-9.49000	0.048530	-9.7450	-0.036249	-1.2760	8.1706E-6
	113.46000	-3.67000	-9.49700	0.061148	-9.7485	-0.030205	-1.1602	7.4854E-6
	113.62000	-5.64000	-9.50400	0.071798	-9.7520	-0.025318	-1.0575	6.8677E-6
	113.78000	-7.61000	-9.51100	0.080701	-9.7555	-0.021343	-0.96618	6.3108E-6
	113.94000	-9.58000	-9.51800	0.088054	-9.7590	-0.018090	-0.88478	5.8084E-6
	114.10000	-11.55000	-9.52500	0.094040	-9.7625	-0.015413	-0.81203	5.3547E-6
	114.26000	-13.52000	-9.53200	0.098822	-9.7660	-0.013196	-0.74686	4.9445E-6
	114.42000	-15.49000	-9.53900	0.10255	-9.7695	-0.011351	-0.68833	4.5731E-6
	114.58000	-17.46000	-9.54600	0.10535	-9.7730	-0.0098077	-0.63564	4.2364E-6
	114.74000	-19.43000	-9.55300	0.10735	-9.7765	-0.0085095	-0.58810	3.9305E-6
	114.90000	-21.40000	-9.56000	0.10865	-9.7800	-0.0074125	-0.54511	3.6524E-6
T2NorthAB	115.50000	91.00000	-8.48000	0.064356	-8.8527	-0.022195	-1.1136	7.7321E-6
	115.65385	89.13846	-8.50846	0.054113	-8.8740	-0.025788	-1.2013	8.2888E-6
	115.80769	87.27692	-8.53692	0.042751	-8.8953	-0.030003	-1.2959	8.8820E-6
	115.96154	85.41538	-8.56538	0.030257	-8.9167	-0.034936	-1.3979	9.5115E-6
	116.11539	83.55385	-8.59385	0.016639	-8.9381	-0.040693	-1.5074	10.176E-6
	116.26923	81.69231	-8.62231	0.0019328	-8.9594	-0.047378	-1.6243	10.873E-6
	116.42308	79.83077	-8.65077	-0.013797	-8.9808	-0.055082	-1.7485	11.600E-6
	116.57692	77.96923	-8.67923	-0.030446	-9.0021	-0.063872	-1.8795	12.350E-6
	116.73077	76.10769	-8.70769	-0.047867	-9.0235	-0.073770	-2.0163	13.117E-6
	116.88461	74.24615	-8.73615	-0.065868	-9.0449	-0.084727	-2.1578	13.893E-6
	117.03846	72.38461	-8.76462	-0.084205	-9.0663	-0.096603	-2.3021	14.667E-6
	117.19231	70.52308	-8.79308	-0.10260	-9.0877	-0.10915	-2.4471	15.429E-6
	117.34615	68.66154	-8.82154	-0.12072	-9.1091	-0.12203	-2.5901	16.167E-6
	117.50000	66.80000	-8.85000	-0.13824	-9.1305	-0.13482	-2.7284	16.872E-6
T2NorthBC	117.50000	66.80000	-8.85000	-0.13824	-9.1305	-0.13482	-2.7284	16.872E-6
	117.50000	64.85000	-8.87667	-0.15989	-9.1505	-0.15108	-2.8986	17.732E-6
	117.50000	62.90000	-8.90333	-0.18079	-9.1706	-0.16709	-3.0629	18.552E-6
	117.50000	60.95000	-8.93000	-0.20055	-9.1907	-0.18236	-3.2181	19.321E-6
	117.50000	59.00000	-8.95667	-0.21883	-9.2107	-0.19647	-3.3614	20.027E-6
	117.50000	57.05000	-8.98333	-0.23533	-9.2308	-0.20916	-3.4906	20.660E-6
	117.50000	55.10000	-9.01000	-0.24980	-9.5050	-0.23891	-3.7029	21.204E-6
	117.50000	53.15000	-9.03667	-0.26212	-9.5183	-0.24860	-3.7989	21.661E-6
	117.50000	51.20000	-9.06333	-0.27215	-9.5317	-0.25657	-3.8770	22.028E-6
	117.50000	49.25000	-9.09000	-0.27982	-9.5450	-0.26291	-3.9371	22.301E-6
	117.50000	47.30000	-9.11667	-0.28510	-9.5583	-0.26774	-3.9790	22.478E-6
	117.50000	45.35000	-9.14333	-0.28795	-9.5717	-0.27113	-4.0027	22.555E-6
	117.50000	43.40000	-9.17000	-0.28836	-9.5850	-0.27310	-4.0082	22.534E-6
T2NorthCD	117.50000	43.40000	-9.17000	-0.28836	-9.5850	-0.27310	-4.0082	22.534E-6
	117.40769	41.44616	-9.18923	-0.28985	-9.5946	-0.27726	-4.0240	22.545E-6
	117.31538	39.49231	-9.20846	-0.28880	-9.6042	-0.27986	-4.0206	22.453E-6
	117.22308	37.53846	-9.22769	-0.28513	-9.6138	-0.28062	-3.9970	22.257E-6
	117.13077	35.58461	-9.24692	-0.27880	-9.6235	-0.27923	-3.9523	21.959E-6
	117.03846	33.63077	-9.26615	-0.26975	-9.6331	-0.27531	-3.8857	21.559E-6
	116.94615	31.67692	-9.28538	-0.25802	-9.6427	-0.26858	-3.7966	21.062E-6
	116.85384	29.72308	-9.30462	-0.24369	-9.6523	-0.25883	-3.6855	20.474E-6
	116.76154	27.76923	-9.32385	-0.22696	-9.6619	-0.24607	-3.5535	19.803E-6
	116.66923	25.81538	-9.34308	-0.20809	-9.6715	-0.23052	-3.4026	19.059E-6
	116.57692	23.86154	-9.36231	-0.18747	-9.6812	-0.21269	-3.2360	18.253E-6
	116.48462	21.90769	-9.38154	-0.16554	-9.6908	-0.19328	-3.0577	17.400E-6
	116.39231	19.95385	-9.40077	-0.14281	-9.7004	-0.17312	-2.8720	16.511E-6
	116.30000	18.00000	-9.42000	-0.11977	-9.7100	-0.15303	-2.6833	15.601E-6
T2NorthDE	116.30000	18.00000	-9.42000	-0.11977	-9.7100	-0.15303	-2.6833	15.601E-6

Name	Location					Stresses		
	X [m]	Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	116.43000	16.04000	-9.42700	-0.092422	-9.7135	-0.12973	-2.4589	14.514E-6
	116.56000	14.08000	-9.43400	-0.066790	-9.7170	-0.10934	-2.2485	13.465E-6
	116.69000	12.12000	-9.44100	-0.043078	-9.7205	-0.091812	-2.0536	12.464E-6
	116.82000	10.16000	-9.44800	-0.021391	-9.7240	-0.076958	-1.8745	11.519E-6
	116.95000	8.20000	-9.45500	-0.0017616	-9.7275	-0.064491	-1.7110	10.633E-6
	117.08000	6.24000	-9.46200	0.015837	-9.7310	-0.054097	-1.5625	9.8090E-6
	117.21000	4.28000	-9.46900	0.031474	-9.7345	-0.045467	-1.4280	9.0465E-6
	117.34000	2.32000	-9.47600	0.045246	-9.7380	-0.038314	-1.3065	8.3441E-6
	117.47000	0.36000	-9.48300	0.057269	-9.7415	-0.032388	-1.1969	7.6992E-6
	117.60000	-1.60000	-9.49000	0.067669	-9.7450	-0.027473	-1.0980	7.1084E-6
	117.73000	-3.56000	-9.49700	0.076576	-9.7485	-0.023389	-1.0087	6.5682E-6
	117.86000	-5.52000	-9.50400	0.084120	-9.7520	-0.019988	-0.92816	6.0746E-6
	117.99000	-7.48000	-9.51100	0.090426	-9.7555	-0.017146	-0.85538	5.6238E-6
	118.12000	-9.44000	-9.51800	0.095617	-9.7590	-0.014764	-0.78955	5.2123E-6
	118.25000	-11.40000	-9.52500	0.099806	-9.7625	-0.012760	-0.72994	4.8364E-6
	118.38000	-13.36000	-9.53200	0.10310	-9.7660	-0.011068	-0.67588	4.4930E-6
	118.51000	-15.32000	-9.53900	0.10560	-9.7695	-0.0096338	-0.62679	4.1790E-6
	118.64000	-17.28000	-9.54600	0.10740	-9.7730	-0.0084144	-0.58214	3.8916E-6
	118.77000	-19.24000	-9.55300	0.10858	-9.7765	-0.0073735	-0.54146	3.6285E-6
	118.90000	-21.20000	-9.56000	0.10921	-9.7800	-0.0064820	-0.50435	3.3872E-6
NorthAccesstunneltopN	97.40000	18.00000	-5.00000	-0.84941	-5.3269	-0.79288	-7.6790	49.337E-6
	99.29000	18.00000	-5.00000	-0.71832	-5.3269	-0.56445	-6.3766	43.592E-6
	101.18000	18.00000	-5.00000	-0.59647	-5.3269	-0.38183	-5.2270	37.991E-6
	103.07000	18.00000	-5.00000	-0.48808	-5.3269	-0.25080	-4.2715	32.756E-6
	104.96000	18.00000	-5.00000	-0.39417	-5.3269	-0.16403	-3.5060	28.054E-6
	106.85000	18.00000	-5.00000	-0.31380	-5.3269	-0.10870	-2.9024	23.981E-6
	108.74000	18.00000	-5.00000	-0.24527	-5.3269	-0.073638	-2.4274	20.539E-6
	110.63000	18.00000	-5.00000	-0.18683	-5.3269	-0.051129	-2.0513	17.666E-6
	112.52000	18.00000	-5.00000	-0.13692	-5.3269	-0.036373	-1.7505	15.278E-6
	114.41000	18.00000	-5.00000	-0.094233	-5.3269	-0.026468	-1.5072	13.290E-6
	116.30000	18.00000	-5.00000	-0.057702	-5.3269	-0.019660	-1.3083	11.629E-6
NorthAccesstunneltopS	97.30000	14.50000	-5.00000	-0.53699	-5.3269	-0.24639	-4.5286	35.273E-6
	99.22000	14.52000	-5.00000	-0.46549	-5.3269	-0.19665	-3.9876	31.626E-6
	101.14000	14.54000	-5.00000	-0.39526	-5.3269	-0.15078	-3.4654	28.046E-6
	103.06000	14.56000	-5.00000	-0.32888	-5.3269	-0.11241	-2.9889	24.682E-6
	104.98000	14.58000	-5.00000	-0.26785	-5.3269	-0.082518	-2.5706	21.624E-6
	106.90000	14.60000	-5.00000	-0.21282	-5.3269	-0.060317	-2.2126	18.911E-6
	108.82000	14.62000	-5.00000	-0.16385	-5.3269	-0.044259	-1.9103	16.546E-6
	110.74000	14.64000	-5.00000	-0.12064	-5.3269	-0.032769	-1.6567	14.505E-6
	112.66000	14.66000	-5.00000	-0.082748	-5.3269	-0.024545	-1.4440	12.755E-6
	114.58000	14.68000	-5.00000	-0.049665	-5.3269	-0.018621	-1.2652	11.257E-6
	116.50000	14.70000	-5.00000	-0.020902	-5.3269	-0.014310	-1.1143	9.9727E-6
NorthAccesstunnelbaseN	97.40000	18.00000	-7.50000	-0.96240	-7.9114	-2.0071	-10.427	34.541E-6
	99.29000	18.00000	-7.50000	-0.82219	-7.9114	-1.5020	-8.9202	34.603E-6
	101.18000	18.00000	-7.50000	-0.69032	-7.9114	-1.0827	-7.5400	33.644E-6
	103.07000	18.00000	-7.50000	-0.57155	-7.9114	-0.76285	-6.3419	31.775E-6
	104.96000	18.00000	-7.50000	-0.46752	-7.9114	-0.53333	-5.3372	29.297E-6
	106.85000	18.00000	-7.50000	-0.37781	-7.9114	-0.37448	-4.5107	26.554E-6
	108.74000	18.00000	-7.50000	-0.30099	-7.9114	-0.26610	-3.8362	23.814E-6
	110.63000	18.00000	-7.50000	-0.23538	-7.9114	-0.19210	-3.2857	21.240E-6
	112.52000	18.00000	-7.50000	-0.17934	-7.9114	-0.14108	-2.8347	18.904E-6
	114.41000	18.00000	-7.50000	-0.13144	-7.9114	-0.10539	-2.4627	16.827E-6
	116.30000	18.00000	-7.50000	-0.090474	-7.9114	-0.080018	-2.1537	15.001E-6
NorthAccesstunnelbaseS	97.30000	14.50000	-7.50000	-0.62723	-7.9114	-0.80137	-6.7942	34.415E-6
	99.22000	14.52000	-7.50000	-0.54747	-7.9114	-0.65105	-6.0480	32.100E-6
	101.14000	14.54000	-7.50000	-0.46901	-7.9114	-0.51177	-5.3233	29.695E-6
	103.06000	14.56000	-7.50000	-0.39470	-7.9114	-0.39305	-4.6525	27.228E-6
	104.98000	14.58000	-7.50000	-0.32628	-7.9114	-0.29780	-4.0529	24.767E-6
	106.90000	14.60000	-7.50000	-0.26452	-7.9114	-0.22449	-3.5292	22.387E-6
	108.82000	14.62000	-7.50000	-0.20954	-7.9114	-0.16946	-3.0786	20.148E-6
	110.74000	14.64000	-7.50000	-0.16104	-7.9114	-0.12868	-2.6937	18.090E-6
	112.66000	14.66000	-7.50000	-0.11852	-7.9114	-0.098544	-2.3660	16.230E-6
	114.58000	14.68000	-7.50000	-0.081428	-7.9114	-0.076221	-2.0868	14.566E-6
	116.50000	14.70000	-7.50000	-0.049186	-7.9114	-0.059575	-1.8484	13.089E-6
SouthAccesstunneltopN	96.90000	4.60000	-5.00000	-0.12397	-5.3269	-0.025406	-1.6023	14.205E-6
	97.80000	4.58000	-5.00000	-0.11378	-5.3269	-0.024234	-1.5531	13.780E-6
	98.70000	4.56000	-5.00000	-0.10353	-5.3269	-0.023024	-1.5033	13.350E-6
	99.60000	4.54000	-5.00000	-0.093271	-5.3269	-0.021791	-1.4532	12.918E-6
	100.50000	4.52000	-5.00000	-0.083042	-5.3269	-0.020551	-1.4030	12.486E-6
	101.40000	4.50000	-5.00000	-0.072886	-5.3269	-0.019316	-1.3531	12.055E-6
	102.30000	4.48000	-5.00000	-0.062841	-5.3269	-0.018100	-1.3036	11.628E-6
	103.20000	4.46000	-5.00000	-0.052943	-5.3269	-0.016913	-1.2547	11.207E-6
	104.10000	4.44000	-5.00000	-0.043226	-5.3269	-0.015764	-1.2067	10.792E-6
	105.00000	4.42000	-5.00000	-0.033718	-5.3269	-0.014660	-1.1597	10.385E-6
	105.90000	4.40000	-5.00000	-0.024446	-5.3269	-0.013606	-1.1138	9.9879E-6
SouthAccesstunneltopS	96.70000	1.30000	-5.00000	-0.054014	-5.3269	-0.014773	-1.2360	11.092E-6
	97.62000	1.28000	-5.00000	-0.046787	-5.3269	-0.014194	-1.2029	10.801E-6
	98.54000	1.26000	-5.00000	-0.039507	-5.3269	-0.013595	-1.1694	10.505E-6
	99.46000	1.24000	-5.00000	-0.032203	-5.3269	-0.012981	-1.1355	10.207E-6
	100.38000	1.22000	-5.00000	-0.024905	-5.3269	-0.012358	-1.1014	9.9070E-6
	101.30000	1.20000	-5.00000	-0.017641	-5.3269	-0.011732	-1.0673	9.6068E-6
	102.22000	1.18000	-5.00000	-0.010437	-5.3269	-0.011108	-1.0332	9.3074E-6
	103.14000	1.16000	-5.00000	-0.0033205	-5.3269	-0.010492	-0.99944	9.0099E-6
	104.06000	1.14000	-5.00000	0.0036863	-5.3269	-0.0098873	-0.96598	8.7154E-6
	104.98000	1.12000	-5.00000	0.010561	-5.3269	-0.0092980	-0.93299	8.4247E-6
	105.90000	1.10000	-5.00000	0.017285	-5.3269	-0.0087275	-0.90055	8.1387E-6
SouthAccesstunnelbaseN	96.90000	4.60000	-7.50000	-0.16404	-7.9114	-0.10918	-2.6598	18.283E-6
	97.80000	4.58000	-7.50000	-0.15268	-7.9114	-0.10393	-2.5786	17.770E-6
	98.70000	4.56000	-7.50000	-0.14124	-7.9114	-0.098593	-2.4967	17.254E-6
	99.60000	4.54000	-7.50000	-0.12979	-7.9114	-0.093232	-2.4146	16.736E-6
	100.50000	4.52000	-7.50000	-0.11837	-7.9114	-0.087894	-2.3325	16.218E-6
	101.40000	4.50000	-7.50000	-0.10702	-7.9114	-0.082625	-2.2510	15.703E-6
	102.30000	4.48000	-7.50000	-0.095802	-7.9114	-0.077467	-2.1703	15.191E-6
	103.20000	4.46000	-7.50000	-0.084742	-7.9114	-0.072457	-2.0907	14.685E-6
	104.10000	4.44000	-7.50000	-0.073880	-7.9114	-0.067624	-2.0125	14.186E-6
	105.00000	4.42000	-7.50000	-0.063249	-7.9114	-0.062991	-1.9360	13.695E-6
	105.90000	4.40000	-7.50000	-0.052878	-7.9114	-0.058577	-1.8614	13.214E-6
SouthAccesstunnelbaseS	96.70000	1.30000	-7.50000	-0.085671	-7.9114	-0.066137	-2.0787	14.740E-6
	97.62000	1.28000	-7.50000	-0.077622	-7.9114	-0.063383	-2.0230	14.368E-6
	98.54000	1.26000	-7.50000	-0.069508	-7.9114	-0.060578	-1.9667	13.992E-6
	99.46000	1.24000	-7.50000	-0.061364	-7.9114	-0.057744	-1.9099	13.614E-6
	100.38000	1.22000	-7.50000	-0.053222	-7.9114	-0.054903	-1.8529	13.234E-6
	101.30000	1.20000	-7.50000	-0.045114	-7.9114	-0.052076	-1.7960	12.855E-6
	102.22000	1.18000	-7.50000	-0.037069	-7.9114	-0.049282	-1.7394	12.476E-6
	103.14000	1.16000	-7.50000	-0.029117	-7.9114	-0.046539	-1.6832	12.100E-6
	104.06000	1.14000	-7.50000	-0.021283	-7.9114	-0.043862	-1.6276	11.728E-6
	104.98000	1.12000	-7.50000	-0.013591	-7.9114	-0.041266	-1.5729	11.360E-6
	105.90000	1.10000	-7.50000	-0.0060641	-7.9114	-0.038760	-1.5191	10.997E-6

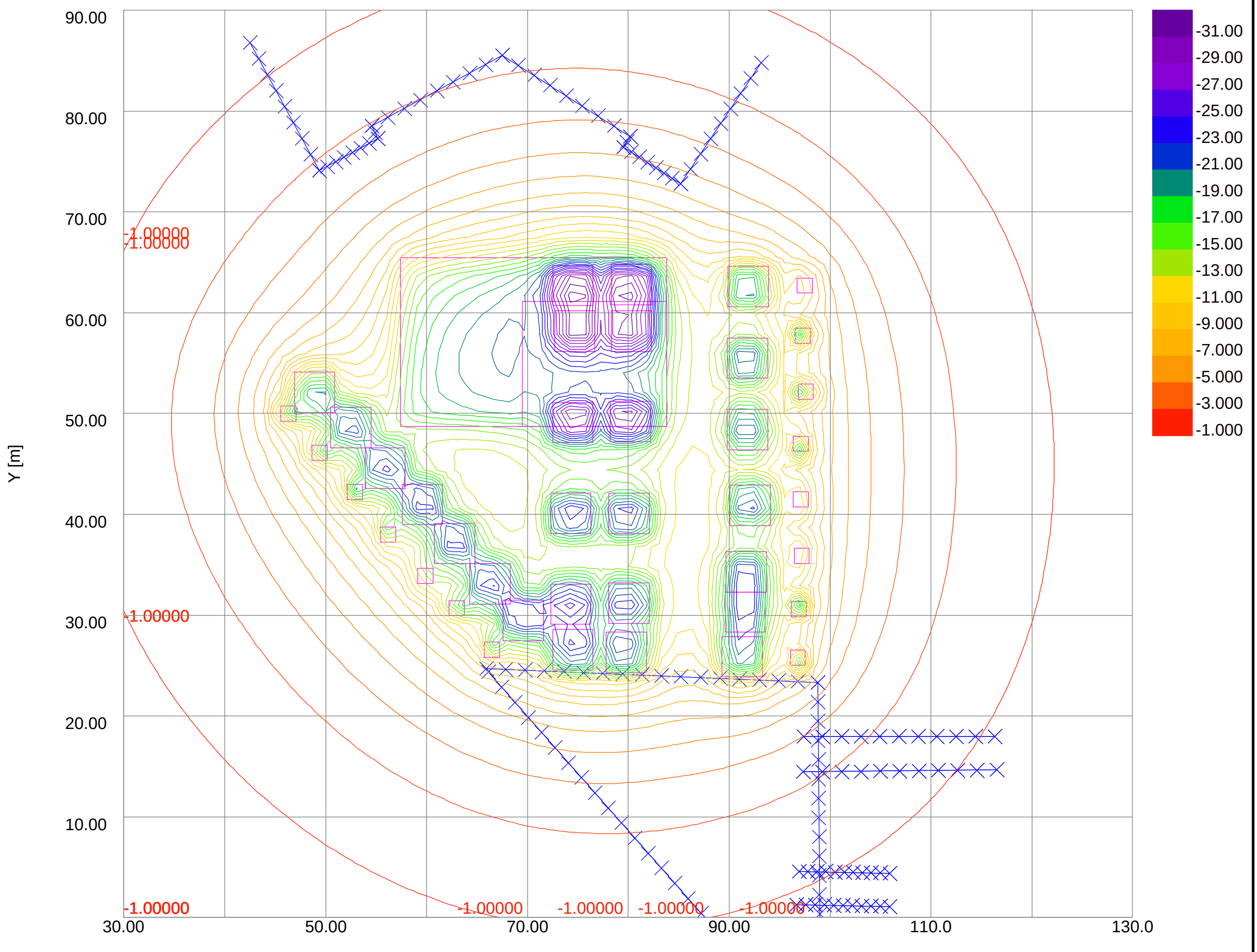
Oasys

GEA LIMITED
(GEOTECHNICAL &ENV ASSOC)

5-17 Haverstock Hill, London NW3 2BL
Total

Job No.	Sheet No.	Rev.
J15316A		
Drg. Ref.		
Made by	Date	Checked

Settlement Contours : Grid 1 at 0.0000m



Scale x 1:660 y 1:660
Contour Interval: 1mm

RESULTS FOR GRIDS

Analysis: Boussinesq
Global Poisson's ratio: 0.20
Horizontal rigid boundary level: -68.00 [m OD]

The maximum displacement difference between
Boussinesq method (-13.719mm) and Mindlin method (-13.243mm)
occurs at point X=79.447m Y=24.124m Level -1.2000mOD and is 0.47559mm

Name	Location				Stresses			
	X	Y	Z[Level]	Z	Calc Level	Vert Stress	Sum Princ	Vert Strain
	[m]	[m]	[mOD]	[mm]	[mOD]	[kN/m²]	[kN/m²]	[-]
Pad01	48.90000	52.10000	-2.20000	-19.790	-2.6000	-99.915	-204.98	-0.0039452
Pad02	52.50000	48.60000	-2.20000	-22.154	-2.6000	-99.714	-206.83	-0.0039145
Pad03	55.90000	44.60000	-2.20000	-22.977	-2.6000	-99.738	-207.08	-0.0039134
Pad04	59.60000	41.00000	-2.20000	-23.226	-2.6000	-99.617	-206.31	-0.0039139
Pad05	62.80000	37.10000	-2.20000	-23.247	-2.6000	-99.646	-206.36	-0.0039151
Pad06	66.30000	33.10000	-2.20000	-23.522	-2.6000	-99.697	-207.27	-0.0039091
Pad07	69.60000	29.50000	-2.20000	-23.771	-2.6000	-99.672	-208.24	-0.0038979
Pad08	74.50000	62.70000	-2.20000	-32.722	-2.6000	-139.99	-290.71	-0.0054922
Pad09	74.70000	58.20000	-2.20000	-33.292	-2.6000	-127.05	-275.03	-0.0048727
Pad10	74.50000	49.10000	-2.20000	-29.057	-2.6000	-126.40	-254.63	-0.0050375
Pad11	74.30000	40.10000	-2.20000	-23.532	-2.6000	-99.436	-202.14	-0.0039448
Pad12	74.30000	31.10000	-2.20000	-24.898	-2.6000	-99.544	-208.19	-0.0038907
Pad13	74.50000	26.60000	-2.20000	-23.212	-2.6000	-99.534	-206.96	-0.0039024
Pad14	80.30000	62.80000	-2.20000	-31.529	-2.6000	-140.15	-289.71	-0.0055121
Pad15	80.30000	58.20000	-2.20000	-31.987	-2.6000	-127.19	-274.26	-0.0048886
Pad16	80.20000	49.20000	-2.20000	-28.444	-2.6000	-127.64	-257.61	-0.0050821
Pad17	80.10000	40.10000	-2.20000	-23.125	-2.6000	-99.449	-202.55	-0.0039415
Pad18	80.10000	31.20000	-2.20000	-23.351	-2.6000	-99.501	-205.40	-0.0039161
Pad19	79.80000	26.30000	-2.20000	-22.045	-2.6000	-99.503	-205.00	-0.0039202
Pad20	91.90000	62.60000	-1.40000	-20.609	-1.8000	-99.476	-199.29	-0.0039757
Pad21	91.80000	55.50000	-1.40000	-22.233	-1.8000	-99.479	-200.14	-0.0039674
Pad22	91.80000	48.40000	-1.40000	-22.400	-1.8000	-99.490	-200.37	-0.0039656
Pad23	92.10000	40.90000	-1.40000	-22.360	-1.8000	-99.513	-201.13	-0.0039595
Pad24	91.70000	34.30000	-1.40000	-23.655	-1.8000	-99.611	-205.83	-0.0039184
Pad25	91.60000	30.30000	-1.40000	-23.953	-1.8000	-99.678	-208.42	-0.0038965
Pad26	91.30000	25.90000	-1.40000	-21.369	-1.8000	-99.542	-202.99	-0.0039427
Pad27	46.30000	50.00000	-1.50000	-17.403	-1.8750	-124.60	-190.26	-0.0055737
Pad28	49.40000	46.10000	-1.50000	-18.208	-1.8750	-124.61	-190.56	-0.0055708
Pad29	52.90000	42.20000	-1.50000	-19.001	-1.8750	-124.61	-190.53	-0.0055711
Pad30	56.20000	38.00000	-1.50000	-18.535	-1.8750	-124.61	-190.50	-0.0055713
Pad31	59.90000	33.90000	-1.50000	-18.843	-1.8750	-124.61	-190.72	-0.0055693
Pad32	63.00000	30.70000	-1.50000	-19.131	-1.8750	-124.61	-190.74	-0.0055692
Pad33	66.50000	26.60000	-1.50000	-18.170	-1.8750	-124.60	-190.27	-0.0055736
Pad34	97.50000	62.70000	-0.70000	-15.022	-0.85000	-133.24	-264.80	-0.0053462
Pad35	97.30000	57.70000	-0.70000	-16.117	-0.85000	-133.24	-264.90	-0.0053451
Pad36	97.60000	52.20000	-0.70000	-16.296	-0.85000	-133.24	-264.90	-0.0053451
Pad37	97.10000	47.00000	-0.70000	-16.846	-0.85000	-133.24	-264.90	-0.0053451
Pad38	97.10000	41.50000	-0.70000	-17.001	-0.85000	-133.24	-264.88	-0.0053454
Pad39	97.20000	35.90000	-0.70000	-16.857	-0.85000	-133.24	-264.89	-0.0053453
Pad40	96.90000	30.60000	-0.70000	-16.919	-0.85000	-133.24	-264.93	-0.0053448
Pad41	96.80000	25.80000	-0.70000	-15.476	-0.85000	-133.24	-264.82	-0.0053459
New Basement Excavation	70.60000	57.10000	-2.10000	-21.154	-2.5500	-29.687	-82.217	-959.05E-6
Infilled basement	76.65000	54.90000	-0.90000	-21.480	-0.95000	15.000	35.739	542.61E-6
A	42.50000	86.80000	-0.60000	-0.77073	-0.80000	0.0	-285.67E-6	0.0
	43.36250	85.21250	-0.60000	-0.87194	-0.80000	0.0	-306.79E-6	0.0
	44.22500	83.62500	-0.60000	-0.98727	-0.80000	0.0	-329.86E-6	0.0
	45.08750	82.03750	-0.60000	-1.1190	-0.80000	0.0	-355.07E-6	0.0
	45.95000	80.45000	-0.60000	-1.2701	-0.80000	0.0	-382.64E-6	0.0
	46.81250	78.86250	-0.60000	-1.4439	-0.80000	0.0	-412.83E-6	0.0
	47.67500	77.27500	-0.60000	-1.6449	-0.80000	0.0	-445.89E-6	0.0
	48.53750	75.68750	-0.60000	-1.8787	-0.80000	0.0	-482.12E-6	0.0
	49.40000	74.10000	-0.60000	-2.1528	-0.80000	0.0	-521.82E-6	0.0
B	49.40000	74.10000	-0.60000	-2.1528	-0.80000	0.0	-521.82E-6	0.0
	50.22857	74.55714	-0.60000	-2.1817	-0.80000	0.0	-537.01E-6	0.0
	51.05714	75.01428	-0.60000	-2.2072	-0.80000	0.0	-552.54E-6	0.0
	51.88572	75.47143	-0.60000	-2.2291	-0.80000	0.0	-568.39E-6	0.0
	52.71429	75.92857	-0.60000	-2.2471	-0.80000	0.0	-584.57E-6	0.0
	53.54286	76.38571	-0.60000	-2.2609	-0.80000	0.0	-601.05E-6	0.0
	54.37143	76.84286	-0.60000	-2.2705	-0.80000	0.0	-617.82E-6	0.0
	55.20000	77.30000	-0.60000	-2.2758	-0.80000	0.0	-634.86E-6	0.0
C	55.20000	77.30000	-0.60000	-2.2758	-0.80000	0.0	-634.86E-6	0.0
	54.90000	77.90000	-0.60000	-2.1592	-0.80000	0.0	-614.29E-6	0.0
	54.60000	78.50000	-0.60000	-2.0500	-0.80000	0.0	-594.50E-6	0.0
D	54.60000	78.50000	-0.60000	-2.0500	-0.80000	0.0	-594.50E-6	0.0
	56.21250	79.37500	-0.60000	-2.0504	-0.80000	0.0	-624.98E-6	0.0
	57.82500	80.25000	-0.60000	-2.0374	-0.80000	0.0	-656.03E-6	0.0
	59.43750	81.12500	-0.60000	-2.0117	-0.80000	0.0	-687.42E-6	0.0
	61.05000	82.00000	-0.60000	-1.9743	-0.80000	0.0	-718.85E-6	0.0
	62.66250	82.87500	-0.60000	-1.9263	-0.80000	0.0	-750.00E-6	0.0
	64.27500	83.75000	-0.60000	-1.8691	-0.80000	0.0	-780.44E-6	0.0
	65.88750	84.62500	-0.60000	-1.8037	-0.80000	0.0	-809.71E-6	0.0
	67.50000	85.50000	-0.60000	-1.7318	-0.80000	0.0	-837.30E-6	0.0
E	67.50000	85.50000	-0.60000	-1.7318	-0.80000	0.0	-837.30E-6	0.0
	69.08750	84.50000	-0.60000	-1.8986	-0.80000	0.0	-946.93E-6	0.0
	70.67500	83.50000	-0.60000	-2.0768	-0.80000	0.0	-0.0010772	0.0
	72.26250	82.50000	-0.60000	-2.2659	-0.80000	0.0	-0.0012334	0.0
	73.85000	81.50000	-0.60000	-2.4653	-0.80000	0.0	-0.0014225	0.0
	75.43750	80.50000	-0.60000	-2.6733	-0.80000	0.0	-0.0016541	0.0
	77.02500	79.50000	-0.60000	-2.8877	-0.80000	0.0	-0.0019415	0.0
	78.61250	78.50000	-0.60000	-3.1050	-0.80000	0.0	-0.0023034	0.0
	80.20000	77.50000	-0.60000	-3.3205	-0.80000	0.0	-0.0027668	0.0
F	80.20000	77.50000	-0.60000	-3.3205	-0.80000	0.0	-0.0027668	0.0
	79.85000	76.95000	-0.60000	-3.4989	-0.80000	0.0	-0.0028202	0.0
	79.50000	76.40000	-0.60000	-3.6900	-0.80000	0.0	-0.0028705	0.0
G	79.50000	76.40000	-0.60000	-3.6900	-0.80000	0.0	-0.0028705	0.0
	80.31429	75.88571	-0.60000	-3.8205	-0.80000	0.0	-0.0031776	0.0
	81.12857	75.37143	-0.60000	-3.9481	-0.80000	0.0	-0.0035332	0.0
	81.94286	74.85714	-0.60000	-4.0715	-0.80000	0.0	-0.0039477	0.0
	82.75714	74.34286	-0.60000	-4.1892	-0.80000	0.0	-0.0044345	0.0
	83.57143	73.82858	-0.60000	-4.3002	-0.80000	0.0	-0.0050113	0.0
	84.38571	73.31429	-0.60000	-4.4034	-0.80000	0.0	-0.0057009	0.0
	85.20000	72.80000	-0.60000	-4.4984	-0.80000	0.0	-0.0065344	0.0
H	85.20000	72.80000	-0.60000	-4.4984	-0.80000	0.0	-0.0065344	0.0
	86.20000	74.30000	-0.60000	-3.8190	-0.80000	0.0	-0.0060539	0.0
	87.20000	75.80000	-0.60000	-3.2717	-0.80000	0.0	-0.0054949	0.0
	88.20000	77.30000	-0.60000	-2.8214	-0.80000	0.0	-0.0049039	0.0
	89.20000	78.80000	-0.60000	-2.4453	-0.80000	0.0	-0.0043212	0.0
	90.20000	80.30000	-0.60000	-2.1280	-0.80000	0.0	-0.0037752	0.0
	91.20000	81.80000	-0.60000	-1.8579	-0.80000	0.0	-0.0032817	0.0
	92.20000	83.30000	-0.60000	-1.6266	-0.80000	0.0	-0.0028468	0.0
	93.20000	84.80000	-0.60000	-1.4273	-0.80000	0.0	-0.0024698	0.0
I	65.90000	24.70000	-1.20000	-7.9777	-1.6500	-0.028333	-2.8160	26.460E-6
	67.83530	24.61765	-1.20000	-8.5862	-1.6500	-0.0099469	-1.5804	15.207E-6
	69.77059	24.53529	-1.20000	-9.1134	-1.6500	-684.68E-6	-0.40477	4.0066E-6
	71.70588	24.45294	-1.20000	-10.505	-1.6500	-126.13E-6	-0.19468	1.9392E-6
	73.64117	24.37059	-1.20000	-13.444	-1.6500	-75.039E-6	-0.15510	1.5465E-6
	75.57647	24.28823	-1.20000	-13.307	-1.6500	-95.080E-6	-0.16522	1.6465E-6
	77.51176	24.20588	-1.20000	-12.503	-1.6500	-151.72E-6	-0.20494	2.0403E-6
	79.44706	24.12353	-1.20000	-13.719	-1.6500	-262.84E-6	-0.27813	2.7655E-6
	81.38235	24.04118	-1.20000	-11.555	-1.6500	-493.41E-6	-0.40616	4.0320E-6
	83.31765	23.95882	-1.20000	-8.4659	-1.6500	-0.0010594	-0.64669	6.4033E-6
	85.25294	23.87647	-1.20000	-7.5613	-1.6500	-0.0029956	-1.1810	11.630E-6
	87.18823	23.79412	-1.20000	-7.7318	-1.6500	-0.017399	-2.8850	27.806E-6
	89.12353	23.71177	-1.20000	-9.6868	-1.6500	-3.1252	-23.304	45.528E-6
	91.05882	23.62941	-1.20000	-11.474	-1.6500	-7.8546	-48.445	13.172E-6
	92.99412	23.54706	-1.20000	-9.6398	-1.6500	-3.8531	-30.111	69.930E-6
	94.92941	23.46471	-1.20000	-6.9319	-1.6500	-0.53822	-7.4754	42.461E-6
	96.86471	23.38235	-1.20000	-5.7992	-1.6500	-1.3684	-8.3894	1.7922E-6
	98.80000	23.30000	-1.20000	-4.5626	-1.6500	-0.36925	-4.0839	18.684E-6
J	98.80000	23.30000	-1.20000	-4.5626	-1.6500	-0.36925	-4.0839	18.684E-6
	98.81579	21.38421	-1.20000	-3.7127	-1.6500	-0.048022	-1.5480	12.599E-6
	98.83158	19.46842	-1.20000	-3.1100	-1.6500	-0.010498	-0.77872	7.1573E-6
	98.84737	17.55263	-1.20000	-2.6462	-1.6500	-0.0032788	-0.45958	4.3990E-6
	98.86316	15.63684	-1.20000	-2.2757	-1.6500	-0.0012931	-0.29783	2.9007E-6
	98.87894	13.72105	-1.20000	-1.9724	-1.6500	-598.01E-6	-0.20542	2.0183E-6

Name	X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	98.89474	11.80526	-1.20000	-1.7194	-1.6500	-309.93E-6	-0.14829	1.4643E-6
	98.91053	9.88947	-1.20000	-1.5053	-1.6500	-174.88E-6	-0.11087	1.0982E-6
	98.92632	7.97368	-1.20000	-1.3221	-1.6500	-105.37E-6	-0.085262	0.0
	98.94211	6.05789	-1.20000	-1.1638	-1.6500	-66.870E-6	-0.067098	0.0
	98.95789	4.14211	-1.20000	-1.0262	-1.6500	-44.265E-6	-0.053831	0.0
	98.97369	2.22632	-1.20000	-0.90600	-1.6500	-30.340E-6	-0.043898	0.0
	98.98947	0.31053	-1.20000	-0.80055	-1.6500	-21.413E-6	-0.036304	0.0
	99.00526	-1.60526	-1.20000	-0.70778	-1.6500	-15.493E-6	-0.030391	0.0
	99.02105	-3.52105	-1.20000	-0.62597	-1.6500	-11.453E-6	-0.025714	0.0
	99.03684	-5.43684	-1.20000	-0.55369	-1.6500	-8.6258E-6	-0.021962	0.0
	99.05264	-7.35263	-1.20000	-0.48974	-1.6500	-6.6038E-6	-0.018915	0.0
	99.06842	-9.26842	-1.20000	-0.43310	-1.6500	-5.1297E-6	-0.016414	0.0
	99.08421	-11.18421	-1.20000	-0.38288	-1.6500	-4.0366E-6	-0.014340	0.0
	99.10000	-13.10000	-1.20000	-0.33832	-1.6500	-3.2136E-6	-0.012605	0.0
K	99.10000	-13.10000	-1.20000	-0.33832	-1.6500	-3.2136E-6	-0.012605	0.0
	97.78000	-11.60000	-1.20000	-0.38433	-1.6500	-3.8590E-6	-0.014060	0.0
	96.46000	-10.10000	-1.20000	-0.43623	-1.6500	-4.6473E-6	-0.015719	0.0
	95.14000	-8.60000	-1.20000	-0.49479	-1.6500	-5.6092E-6	-0.017613	0.0
	93.82000	-7.10000	-1.20000	-0.56086	-1.6500	-6.7800E-6	-0.019772	0.0
	92.50000	-5.60000	-1.20000	-0.63538	-1.6500	-8.1980E-6	-0.022231	0.0
	91.18000	-4.10000	-1.20000	-0.71942	-1.6500	-9.9025E-6	-0.025023	0.0
	89.86000	-2.60000	-1.20000	-0.81418	-1.6500	-11.928E-6	-0.028177	0.0
	88.54000	-1.10000	-1.20000	-0.92097	-1.6500	-14.298E-6	-0.031716	0.0
	87.22000	0.40000	-1.20000	-1.0413	-1.6500	-17.009E-6	-0.035643	0.0
	85.90000	1.90000	-1.20000	-1.1769	-1.6500	-20.025E-6	-0.039940	0.0
	84.58000	3.40000	-1.20000	-1.3296	-1.6500	-23.254E-6	-0.044550	0.0
	83.26000	4.90000	-1.20000	-1.5016	-1.6500	-26.541E-6	-0.049369	0.0
	81.94000	6.40000	-1.20000	-1.6955	-1.6500	-29.670E-6	-0.054240	0.0
	80.62000	7.90000	-1.20000	-1.9145	-1.6500	-32.377E-6	-0.058951	0.0
	79.30000	9.40000	-1.20000	-2.1624	-1.6500	-34.390E-6	-0.063265	0.0
	77.98000	10.90000	-1.20000	-2.4441	-1.6500	-35.477E-6	-0.066969	0.0
	76.66000	12.40000	-1.20000	-2.7654	-1.6500	-35.507E-6	-0.069949	0.0
	75.34000	13.90000	-1.20000	-3.1330	-1.6500	-34.511E-6	-0.072316	0.0
	74.02000	15.40000	-1.20000	-3.5534	-1.6500	-32.753E-6	-0.074572	0.0
	72.70000	16.90000	-1.20000	-4.0320	-1.6500	-30.938E-6	-0.077963	0.0
	71.38000	18.40000	-1.20000	-4.5699	-1.6500	-31.085E-6	-0.085442	0.0
	70.06000	19.90000	-1.20000	-5.1617	-1.6500	-41.116E-6	-0.10500	1.0476E-6
	68.74000	21.40000	-1.20000	-5.8058	-1.6500	-107.83E-6	-0.16451	1.6387E-6
	67.42000	22.90000	-1.20000	-6.5603	-1.6500	-724.95E-6	-0.40504	4.0069E-6
	66.10000	24.40000	-1.20000	-7.6518	-1.6500	-0.013664	-1.9170	18.350E-6
StationboxA	76.70000	1.60000	-9.20000	-1.2564	-9.6000	-0.17628	-2.7089	7.7719E-6
	76.70000	1.60000	-8.28000	-1.2487	-8.7029	-0.12556	-2.4321	8.3420E-6
	76.70000	1.60000	-7.36000	-1.2408	-7.7960	-0.084086	-2.1373	8.5984E-6
	76.70000	1.60000	-6.44000	-1.2330	-6.7200	-0.047225	-1.7700	8.4072E-6
	76.70000	1.60000	-5.52000	-1.2258	-5.8873	-0.027198	-1.4743	7.8298E-6
	76.70000	1.60000	-4.60000	-1.2194	-4.8000	-0.010675	-1.0756	6.5481E-6
	76.70000	1.60000	-3.68000	-1.2144	-3.8400	-0.0033052	-0.71458	4.9170E-6
	76.70000	1.60000	-2.76000	-1.2110	-2.8800	-531.75E-6	-0.34793	3.4474E-6
	76.70000	1.60000	-1.84000	-1.2098	-2.1300	-63.977E-6	-0.076589	0.0
	76.70000	1.60000	-0.92000	-1.2096	-0.96000	0.0	-0.0027108	0.0
	76.70000	1.60000	0.00000	-1.2096	-0.25000	0.0	0.0	0.0
StationboxB	96.70000	0.70000	-9.20000	-0.91162	-9.6000	-0.11659	-1.9796	6.0248E-6
	96.70000	0.70000	-8.28000	-0.90581	-8.7029	-0.084248	-1.7778	6.3225E-6
	96.70000	0.70000	-7.36000	-0.89991	-7.7960	-0.057596	-1.5648	6.4203E-6
	96.70000	0.70000	-6.44000	-0.89414	-6.7200	-0.033548	-1.3012	6.2201E-6
	96.70000	0.70000	-5.52000	-0.88876	-5.8873	-0.020164	-1.0901	5.7876E-6
	96.70000	0.70000	-4.60000	-0.88405	-4.8000	-0.0086809	-0.80662	4.8843E-6
	96.70000	0.70000	-3.68000	-0.88023	-3.8400	-0.0031484	-0.55051	3.7624E-6
	96.70000	0.70000	-2.76000	-0.87754	-2.8800	-715.67E-6	-0.29057	2.8627E-6
	96.70000	0.70000	-1.84000	-0.87628	-2.1300	-123.03E-6	-0.094876	0.0
	96.70000	0.70000	-0.92000	-0.87610	-0.96000	0.0	-0.0046316	0.0
	96.70000	0.70000	0.00000	-0.87610	-0.25000	0.0	0.0	0.0
StationboxC	97.30000	18.00000	-9.20000	-3.0109	-9.6000	-2.7857	-9.1746	-35.488E-6
	97.30000	18.00000	-8.28000	-3.0367	-8.7029	-2.4017	-8.8193	-27.781E-6
	97.30000	18.00000	-7.36000	-3.0541	-7.7960	-1.9804	-8.3382	-18.664E-6
	97.30000	18.00000	-6.44000	-3.0621	-6.7200	-1.4568	-7.5728	-6.6036E-6
	97.30000	18.00000	-5.52000	-3.0605	-5.8873	-1.0576	-6.8089	2.7674E-6
	97.30000	18.00000	-4.60000	-3.0505	-4.8000	-0.59111	-5.5551	13.001E-6
	97.30000	18.00000	-3.68000	-3.0350	-3.8400	-0.27726	-4.1945	17.912E-6
	97.30000	18.00000	-2.76000	-3.0181	-2.8800	-0.086400	-2.6121	20.937E-6
	97.30000	18.00000	-1.84000	-3.0052	-2.1300	-0.019995	-1.2812	11.612E-6
	97.30000	18.00000	-0.92000	-3.0025	-0.96000	-99.877E-6	-0.087989	0.0
	97.30000	18.00000	0.00000	-3.0025	-0.25000	0.0	0.0	0.0
StationboxD	77.30000	19.20000	-9.20000	-5.3081	-9.6000	-7.2256	-18.857	-115.30E-6
	77.30000	19.20000	-8.28000	-5.3973	-8.7029	-6.3159	-18.562	-96.073E-6
	77.30000	19.20000	-7.36000	-5.4629	-7.7960	-5.2199	-17.931	-70.506E-6
	77.30000	19.20000	-6.44000	-5.4992	-6.7200	-3.7377	-16.583	-33.047E-6
	77.30000	19.20000	-5.52000	-5.5042	-5.8873	-2.5485	-14.956	-2.0014E-6
	77.30000	19.20000	-4.60000	-5.4816	-4.8000	-1.1702	-11.888	31.504E-6
	77.30000	19.20000	-3.68000	-5.4435	-3.8400	-0.35940	-8.2296	42.982E-6
	77.30000	19.20000	-2.76000	-5.4092	-2.8800	-0.033284	-3.8177	36.180E-6
	77.30000	19.20000	-1.84000	-5.3990	-2.1300	-957.43E-6	-0.38978	3.8404E-6
	77.30000	19.20000	-0.92000	-5.3978	-0.96000	-1.5387E-6	-0.0093634	0.0
	77.30000	19.20000	0.00000	-5.3978	-0.25000	0.0	0.0	0.0
T1CrownAB	106.80000	91.60000	-6.58000	-0.59720	-6.7900	-0.013642	-0.85106	4.3305E-6
	106.63333	89.64167	-6.61083	-0.67111	-6.8054	-0.017167	-0.95472	4.7903E-6
	106.46667	87.68333	-6.64167	-0.75375	-6.8208	-0.021856	-1.0755	5.3059E-6
	106.30000	85.72500	-6.67250	-0.84615	-6.8362	-0.028190	-1.2170	5.8816E-6
	106.13333	83.76667	-6.70333	-0.94947	-6.8517	-0.036897	-1.3839	6.5189E-6
	105.96667	81.80833	-6.73417	-1.0650	-6.8671	-0.049090	-1.5822	7.2135E-6
	105.80000	79.85000	-6.76500	-1.1943	-6.8825	-0.066514	-1.8195	7.9498E-6
	105.63333	77.89167	-6.79583	-1.3389	-6.8979	-0.091944	-2.1059	8.6901E-6
	105.46667	75.93333	-6.82667	-1.5008	-6.9133	-0.12984	-2.4539	9.3559E-6
	105.30000	73.97500	-6.85750	-1.6820	-6.9288	-0.18735	-2.8796	9.7962E-6
	105.13333	72.01667	-6.88833	-1.8841	-6.9442	-0.27570	-3.4013	9.7403E-6
	104.96667	70.05833	-6.91917	-2.1084	-6.9596	-0.41113	-4.0378	8.7499E-6
	104.80000	68.10000	-6.95000	-2.3542	-6.9750	-0.61279	-4.8002	6.2510E-6
T1CrownBC	104.80000	68.10000	-6.95000	-2.3542	-6.9750	-0.61279	-4.8002	6.2510E-6
	104.72308	66.23077	-6.97462	-2.5885	-6.9873	-0.85633	-5.5772	2.4423E-6
	104.64616	64.36154	-6.99923	-2.8246	-6.9996	-1.1332	-6.3888	-2.2809E-6
	104.56923	62.49231	-7.02385	-3.0513	-7.5196	-1.5873	-7.5259	-10.716E-6
	104.49231	60.62308	-7.04846	-3.2591	-7.5398	-1.8239	-8.2419	-14.470E-6
	104.41538	58.75385	-7.07308	-3.4432	-7.5600	-2.0055	-8.8571	-16.990E-6
	104.33846	56.88462	-7.09769	-3.6029	-7.5802	-2.1473	-9.3753	-18.742E-6
	104.26154	55.01538	-7.12231	-3.7393	-7.6005	-2.2663	-9.8100	-20.206E-6
	104.18462	53.14615	-7.14692	-3.8536	-7.6207	-2.3711	-10.173	-21.594E-6
	104.10769	51.27692	-7.17154	-3.9466	-7.6409	-2.4524	-10.471	-22.576E-6
	104.03077	49.40769	-7.19615	-4.0198	-7.6612	-2.5090	-10.713	-23.065E-6
	103.95385	47.53846	-7.22077	-4.0761	-7.6814	-2.5577	-10.916	-23.504E-6
	103.87692	45.66923	-7.24538	-4.1182	-7.7017	-2.6120	-11.098	-24.240E-6
	103.80000	43.80000	-7.27000	-4.1479	-7.7219	-2.6839	-11.270	-25.580E-6
T1CrownCD	103.80000	43.80000	-7.27000	-4.1479	-7.7219	-2.6839	-11.270	-25.580E-6
	103.76923	41.82308	-7.28923	-4.1478	-7.7377	-2.7397	-11.361	-26.841E-6
	103.73846	39.84615	-7.30846	-4.1318	-7.7536	-2.8006	-11.427	-28.390E-6
	103.70770	37.86923	-7.32769	-4.0973	-7.7694	-2.8635	-11.453	-30.214E-6
	103.67693	35.89231	-7.34692	-4.0401	-7.7852	-2.9186	-11.414	-32.133E-6
	103.64616	33.91539	-7.36615	-3.9541	-7.8011	-2.9397	-11.271	-33.515E-6
	103.61539	31.93846	-7.38538	-3.8336	-7.8169	-2.9106	-10.987	-34.060E-6
	103.58462	29.96154	-7.40462	-3.6737	-7.8328	-2.8099	-10.525	-33.278E-6
	103.55385	27.98462	-7.42385	-3.4721	-7.8486	-2.6098	-9.8613	-30.424E-6
	103.52308	26.00769	-7.44308	-3.2315	-7.8645	-2.2980	-9.0025	-25.085E-6
	103.49231	24.03077	-7.46231	-2.9612	-7.8803	-1.8894	-7.9949	-17.499E-6
	103.46154	22.05385	-7.48154	-2.6768	-7.8962	-1.4460	-6.9262	-9.1527E-6
	103.43077	20.07692	-7.50077	-2.3960	-7.9120	-1.0465	-5.8961	-2.0020E-6
	103.40000	18.10000	-7.52000	-2.1319	-7.9279	-0.73418	-4.9749	2.9746E-6
T1CrownDE	103.40000	18.10000	-7.52000	-2.1319	-7.9279	-0.73418	-4.9749	2.9746E-6
	103.45715	16.18571	-7.52667	-1.8889	-7.9334	-0.50690	-4.1789	5.9361E-6
	103.51428	14.27143	-7.53333	-1.6731	-7.9389	-0.35252	-3.5254	7.3569E-6
	103.57143	12.35714	-7.54000	-1.4825	-7.9444	-0.24863	-2.9932	7.8300E-6
	103.62857	10.44286	-7.54667	-1.3144	-7.9499	-0.17840	-2.5600	7.7653E-6
	103.68571	8.52857	-7.55333	-1.1662	-7.9554	-0.13037	-2.2058	7.4184E-6
	103.74286	6.61429	-7.56000	-1.0354	-7.9609	-0.096998	-1.9142	6.9398E-6
	103.80000	4.70000	-7.56667	-0.91963	-7.9664	-0.073416	-1.6724	6.4148E-6
	103.85714	2.78571	-7.57333	-0.81708	-7.9719	-0.056457	-1.4702	5.8897E-6
	103.91428	0.87143	-7.58000	-0.72609	-7.9774	-0.044051	-1.2998	5.3885E-6
	103.97143	-1.04286	-7.58667	-0.64525	-7.9829	-0.034830	-1.1552	4.9222E-6
	104.02857	-2.95714	-7.59333	-0.57338	-7.9884	-0.027872	-1.0316	4.4948E-6
	104.08572	-4.87143	-7.60000	-0.50941	-7.9939	-0.022548	-0.92534	4.1067E-6
	104.14286	-6.78571	-7.60667	-0.45244	-7.9994	-0.018423	-0.83335	3.7558E-6
	104.20000	-8.70000	-7.61333	-0.40167	-8.0049	-0.015188	-0.75332	3.4396E-6
	104.25714	-10.61429	-7.62000	-0.35642	-8.0104	-0.012625	-0.68334	3.1548E-6

Name	Location X [m]	Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	104.31429	-12.52857	-7.62667	-0.31607	-8.0159	-0.010574	-0.62187	2.8985E-6
	104.37143	-14.44286	-7.63333	-0.28008	-8.0214	-0.0089176	-0.56763	2.6676E-6
	104.42857	-16.35714	-7.64000	-0.24797	-8.0269	-0.0075687	-0.51958	2.4594E-6
	104.48572	-18.27143	-7.64667	-0.21931	-8.0325	-0.0064618	-0.47685	2.2714E-6
	104.54285	-20.18571	-7.65333	-0.19374	-8.0380	-0.0055470	-0.43872	2.1014E-6
	104.60000	-22.10000	-7.66000	-0.17092	-8.0435	-0.0047860	-0.40459	1.9475E-6
T1InvertAB	106.80000	91.60000	-10.38000	-0.61490	-10.835	-0.073330	-1.4949	4.6373E-6
	106.63333	89.64167	-10.41083	-0.69042	-10.863	-0.090595	-1.6676	4.9339E-6
	106.46667	87.68333	-10.44167	-0.77478	-10.890	-0.11287	-1.8662	5.2116E-6
	106.30000	85.72500	-10.47250	-0.86898	-10.917	-0.14192	-2.0955	5.4452E-6
	106.13333	83.76667	-10.50333	-0.97413	-10.944	-0.18018	-2.3613	5.5953E-6
	105.96667	81.80833	-10.53417	-1.0914	-10.972	-0.23113	-2.6702	5.6015E-6
	105.80000	79.85000	-10.56500	-1.2221	-10.999	-0.29964	-3.0303	5.3715E-6
	105.63333	77.89167	-10.59583	-1.3676	-11.026	-0.39256	-3.4510	4.7681E-6
	105.46667	75.93333	-10.62667	-1.5291	-11.054	-0.51923	-3.9422	3.5934E-6
	105.30000	73.97500	-10.65750	-1.7078	-11.081	-0.69184	-4.5144	1.5770E-6
	105.13333	72.01667	-10.68833	-1.9041	-11.108	-0.92481	-5.1759	-1.6161E-6
	104.96667	70.05833	-10.71917	-2.1175	-11.136	-1.2320	-5.9298	-6.3280E-6
	104.80000	68.10000	-10.75000	-2.3456	-11.163	-1.6205	-6.7695	-12.763E-6
T1InvertBC	104.80000	68.10000	-10.75000	-2.3456	-11.163	-1.6205	-6.7695	-12.763E-6
	104.72308	66.23077	-10.77462	-2.5581	-11.185	-2.0275	-7.5736	-19.816E-6
	104.64616	64.36154	-10.79923	-2.7696	-11.207	-2.4566	-8.3864	-27.390E-6
	104.56923	62.49231	-10.82385	-2.9728	-11.228	-2.8699	-9.1707	-34.661E-6
	104.49231	60.62308	-10.84846	-3.1616	-11.250	-3.2366	-9.8949	-40.973E-6
	104.41538	58.75385	-10.87308	-3.3316	-11.272	-3.5438	-10.539	-46.076E-6
	104.33846	56.88462	-10.89769	-3.4809	-11.294	-3.7937	-11.096	-50.069E-6
	104.26154	55.01538	-10.92231	-3.6089	-11.316	-3.9961	-11.568	-53.194E-6
	104.18462	53.14615	-10.94692	-3.7161	-11.338	-4.1607	-11.962	-55.680E-6
	104.10769	51.27692	-10.97154	-3.8037	-11.360	-4.2953	-12.285	-57.690E-6
	104.03077	49.40769	-10.99615	-3.8729	-11.381	-4.4080	-12.548	-59.391E-6
	103.95385	47.53846	-11.02077	-3.9255	-11.504	-4.5531	-12.784	-61.721E-6
	103.87692	45.66923	-11.04538	-3.9628	-11.525	-4.6535	-12.956	-63.480E-6
	103.80000	43.80000	-11.07000	-3.9859	-11.546	-4.7605	-13.093	-65.547E-6
T1InvertCD	103.80000	43.80000	-11.07000	-3.9859	-11.546	-4.7605	-13.093	-65.547E-6
	103.76923	41.82308	-11.08923	-3.9800	-11.563	-4.8349	-13.135	-67.204E-6
	103.73846	39.84615	-11.10846	-3.9572	-11.579	-4.9095	-13.131	-69.058E-6
	103.70770	37.86923	-11.12769	-3.9152	-11.596	-4.9729	-13.067	-70.878E-6
	103.67693	35.89231	-11.14692	-3.8508	-11.613	-5.0077	-12.923	-72.309E-6
	103.64616	33.91539	-11.16615	-3.7603	-11.629	-4.9885	-12.673	-72.817E-6
	103.61539	31.93846	-11.18538	-3.6397	-11.646	-4.8856	-12.291	-71.763E-6
	103.58462	29.96154	-11.20462	-3.4866	-11.663	-4.6713	-11.758	-68.532E-6
	103.55385	27.98462	-11.22385	-3.3010	-11.679	-4.3287	-11.067	-62.730E-6
	103.52308	26.00769	-11.24308	-3.0864	-11.696	-3.8626	-10.235	-54.415E-6
	103.49231	24.03077	-11.26231	-2.8502	-11.713	-3.3052	-9.2988	-44.252E-6
	103.46154	22.05385	-11.28154	-2.6028	-11.729	-2.7131	-8.3133	-33.438E-6
	103.43077	20.07692	-11.30077	-2.3550	-11.746	-2.1485	-7.3374	-23.295E-6
	103.40000	18.10000	-11.32000	-2.1164	-11.763	-1.6572	-6.4195	-14.767E-6
T1InvertDE	103.40000	18.10000	-11.32000	-2.1164	-11.763	-1.6572	-6.4195	-14.767E-6
	103.45715	16.18571	-11.32667	-1.8910	-11.768	-1.2529	-5.5793	-8.1194E-6
	103.51428	14.27143	-11.33333	-1.6860	-11.774	-0.94305	-4.8469	-3.3988E-6
	103.57143	12.35714	-11.34000	-1.5014	-11.780	-0.71122	-4.2176	0.0
	103.62857	10.44286	-11.34667	-1.3363	-11.786	-0.53971	-3.6813	1.8547E-6
	103.68571	8.52857	-11.35333	-1.1892	-11.791	-0.41316	-3.2255	3.1241E-6
	103.74286	6.61429	-11.36000	-1.0582	-11.797	-0.31951	-2.8381	3.8532E-6
	103.80000	4.70000	-11.36667	-0.94165	-11.803	-0.24972	-2.5080	4.2229E-6
	103.85714	2.78571	-11.37333	-0.83797	-11.809	-0.19725	-2.2258	4.3581E-6
	103.91428	0.87143	-11.38000	-0.74570	-11.815	-0.15742	-1.9836	4.3436E-6
	103.97143	-1.04286	-11.38667	-0.66353	-11.820	-0.12685	-1.7748	4.2360E-6
	104.02857	-2.95714	-11.39333	-0.59035	-11.826	-0.10316	-1.5940	4.0732E-6
	104.08572	-4.87143	-11.40000	-0.52513	-11.832	-0.084618	-1.4367	3.8799E-6
	104.14286	-6.78571	-11.40667	-0.46698	-11.838	-0.069960	-1.2993	3.6723E-6
	104.20000	-8.70000	-11.41333	-0.41512	-11.843	-0.058270	-1.1788	3.4609E-6
	104.25714	-10.61429	-11.42000	-0.36886	-11.849	-0.048868	-1.0727	3.2525E-6
	104.31429	-12.52857	-11.42667	-0.32758	-11.855	-0.041245	-0.97885	3.0510E-6
	104.37143	-14.44286	-11.43333	-0.29074	-11.861	-0.035018	-0.89563	2.8588E-6
	104.42857	-16.35714	-11.44000	-0.25785	-11.867	-0.029897	-0.82155	2.6772E-6
	104.48572	-18.27143	-11.44667	-0.22849	-11.872	-0.025658	-0.75540	2.5067E-6
	104.54285	-20.18571	-11.45333	-0.20226	-11.878	-0.022127	-0.69615	2.3474E-6
	104.60000	-22.10000	-11.46000	-0.17885	-11.884	-0.019169	-0.64292	2.1990E-6
T1SouthAB	105.10000	91.80000	-8.48000	-0.63929	-8.8527	-0.039720	-1.2479	4.9703E-6
	104.93333	89.85000	-8.51083	-0.71941	-8.8758	-0.049805	-1.4008	5.4175E-6
	104.76667	87.90000	-8.54167	-0.80930	-8.8989	-0.063127	-1.5789	5.8915E-6
	104.60000	85.95000	-8.57250	-0.91021	-8.9220	-0.080980	-1.7875	6.3804E-6
	104.43333	84.00000	-8.60333	-1.0235	-8.9452	-0.10528	-2.0332	6.8606E-6
	104.26667	82.05000	-8.63417	-1.1509	-8.9683	-0.13892	-2.3246	7.2885E-6
	104.10000	80.10000	-8.66500	-1.2942	-8.9915	-0.18635	-2.6725	7.5873E-6
	103.93333	78.15000	-8.69583	-1.4555	-9.0146	-0.25444	-3.0905	7.6228E-6
	103.76667	76.20000	-8.72667	-1.6372	-9.0378	-0.35390	-3.5958	7.1669E-6
	103.60000	74.25000	-8.75750	-1.8419	-9.0609	-0.50116	-4.2091	5.8427E-6
	103.43333	72.30000	-8.78833	-2.0722	-9.0841	-0.72046	-4.9532	3.0601E-6
	103.26667	70.35000	-8.81917	-2.3295	-9.1073	-1.0439	-5.8492	-2.0087E-6
	103.10000	68.40000	-8.85000	-2.6133	-9.1305	-1.5046	-6.9058	-10.269E-6
T1SouthBC	103.10000	68.40000	-8.85000	-2.6133	-9.1305	-1.5046	-6.9058	-10.269E-6
	103.00769	66.51538	-8.87462	-2.8931	-9.1490	-2.0584	-8.0012	-21.027E-6
	102.91538	64.63077	-8.89923	-3.1775	-9.1675	-2.6842	-9.1453	-33.610E-6
	102.82307	62.74615	-8.92385	-3.4518	-9.1860	-3.2878	-10.254	-45.694E-6
	102.73077	60.86154	-8.94846	-3.7037	-9.2046	-3.7899	-11.254	-55.339E-6
	102.63846	58.97692	-8.97308	-3.9263	-9.2231	-4.1762	-12.114	-62.296E-6
	102.54615	57.09231	-8.99769	-4.1183	-9.2416	-4.4713	-12.833	-67.280E-6
	102.45385	55.20769	-9.02231	-4.2809	-9.5112	-4.8300	-13.510	-73.204E-6
	102.36154	53.32308	-9.04692	-4.4162	-9.5235	-5.0288	-13.999	-76.478E-6
	102.26923	51.43846	-9.07154	-4.5263	-9.5358	-5.1902	-14.399	-79.107E-6
	102.17693	49.55384	-9.09615	-4.6137	-9.5481	-5.3182	-14.725	-81.134E-6
	102.08462	47.66923	-9.12077	-4.6816	-9.5604	-5.4328	-14.998	-83.030E-6
	101.99231	45.78461	-9.14538	-4.7334	-9.5727	-5.5548	-15.239	-85.283E-6
	101.90000	43.90000	-9.17000	-4.7718	-9.5850	-5.7069	-15.465	-88.455E-6
T1SouthCD	101.90000	43.90000	-9.17000	-4.7718	-9.5850	-5.7069	-15.465	-88.455E-6
	101.86923	41.91539	-9.18923	-4.7732	-9.5946	-5.8212	-15.573	-91.123E-6
	101.83846	39.93077	-9.20846	-4.7577	-9.6042	-5.9466	-15.651	-94.244E-6
	101.80769	37.94616	-9.22769	-4.7219	-9.6138	-6.0733	-15.677	-97.645E-6
	101.77692	35.96154	-9.24692	-4.6607	-9.6235	-6.1883	-15.620	-101.10E-6
	101.74615	33.97692	-9.26615	-4.5663	-9.6331	-6.2455	-15.428	-103.55E-6
	101.71539	31.99231	-9.28538	-4.4296	-9.6427	-6.1927	-15.041	-103.82E-6
	101.68462	30.00769	-9.30462	-4.2430	-9.6523	-5.9713	-14.404	-100.52E-6
	101.65385	28.02308	-9.32385	-4.0032	-9.6619	-5.5300	-13.484	-92.364E-6
	101.62308	26.03846	-9.34308	-3.7139	-9.6715	-4.8567	-12.296	-78.945E-6
	101.59231	24.05385	-9.36231	-3.3877	-9.6812	-3.9978	-10.908	-61.263E-6
	101.56154	22.06923	-9.38154	-3.0449	-9.6908	-3.0778	-9.4403	-42.256E-6
	101.53077	20.08462	-9.40077	-2.7077	-9.7004	-2.2446	-8.0248	-25.467E-6
	101.50000	18.10000	-9.42000	-2.3927	-9.7100	-1.5838	-6.7560	-12.843E-6
T1SouthDE	101.50000	18.10000	-9.42000	-2.3927	-9.7100	-1.5838	-6.7560	-12.843E-6
	101.56667	16.17619	-9.42667	-2.1055	-9.7133	-1.0989	-5.6625	-4.3518E-6
	101.63333	14.25238	-9.43333	-1.8529	-9.7167	-0.76578	-4.7641	0.0
	101.70000	12.32857	-9.44000	-1.6322	-9.7200	-0.54021	-4.0331	3.7006E-6
	101.76667	10.40476	-9.44667	-1.4396	-9.7233	-0.38733	-3.4391	5.2104E-6
	101.83334	8.48095	-9.45333	-1.2712	-9.7267	-0.28270	-2.9546	5.8786E-6
	101.90000	6.55714	-9.46000	-1.1238	-9.7300	-0.21003	-2.5568	6.0558E-6
	101.96667	4.63333	-9.46667	-0.99431	-9.7333	-0.15871	-2.2276	5.9554E-6
	102.03333	2.70952	-9.47333	-0.88038	-9.7367	-0.12185	-1.9532	5.7056E-6
	102.10000	0.78571	-9.48000	-0.77989	-9.7400	-0.094906	-1.7225	5.3822E-6
	102.16666	-1.13810	-9.48667	-0.69111	-9.7433	-0.074903	-1.5272	5.0298E-6
	102.23333	-3.06190	-9.49333	-0.61255	-9.7467	-0.059827	-1.3607	4.6739E-6
	102.30000	-4.98571	-9.50000	-0.54295	-9.7500	-0.048307	-1.2178	4.3288E-6
	102.36667	-6.90952	-9.50667	-0.48122	-9.7533	-0.039391	-1.0944	4.0021E-6
	102.43333	-8.83333	-9.51333	-0.42642	-9.7567	-0.032411	-0.98733	3.6973E-6
	102.50000	-10.75714	-9.52000	-0.37774	-9.7600	-0.026887	-0.89392	3.4156E-6
	102.56667	-12.68095	-9.52667	-0.33448	-9.7633	-0.022473	-0.81202	3.1566E-6
	102.63333	-14.60476	-9.53333	-0.29600	-9.7667	-0.018914	-0.73991	2.9195E-6
	102.70000	-16.52857	-9.54000	-0.26177	-9.7700	-0.016020	-0.67616	2.7027E-6
	102.76667	-18.45238	-9.54667	-0.23130	-9.7733	-0.013650	-0.61958	2.5049E-6
	102.83334	-20.37619	-9.55333	-0.20418	-9.7767	-0.011694	-0.56918	2.3243E-6
	102.90000	-22.30000	-9.56000	-0.18002	-9.7800	-0.010069	-0.52413	2.1594E-6
T1NorthAB	108.60000	91.50000	-8.48000	-0.56708	-8.8527	-0.033209	-1.1220	4.5427E-6
	108.43333	89.53333	-8.51083	-0.63592	-8.8758	-0.041113	-1.2508	4.9362E-6
	108.26667	87.56667	-8.54167	-0.71258	-8.8989	-0.051353	-1.3989	5.3546E-6
	108.10000	85.60000	-8.57250	-0.79786	-8.9220	-0.064766	-1.5698	5.7906E-6
	107.93333	83.63333	-8.60333	-0.89268	-8.9452	-0.082537	-1.7680	6.2303E-6
	107.76667	81.66666	-8.63417	-0.99800	-8.9683	-0.10636	-1.9985	6.6495E-6
	107.60000	79.70000	-8.66500	-1.1148	-8.9915	-0.13866	-2.2675	7.0074E-6
	107.43333	77.73333	-8.69583	-1.2442	-9.0146	-0.18290	-2.5824	7.2384E-6
	107.26667	75.76667	-8.72667	-1.3872	-9.0378	-0.24394	-2.9513	7.2409E-6

Name	Location X [m]	Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	107.10000	73.80000	-8.75750	-1.5445	-9.0609	-0.32832	-3.3826	6.8664E-6
	106.93333	71.83334	-8.78833	-1.7165	-9.0841	-0.44416	-3.8839	5.9162E-6
	106.76667	69.86667	-8.81917	-1.9028	-9.1073	-0.59995	-4.4590	4.1650E-6
	106.60000	67.90000	-8.85000	-2.1012	-9.1305	-0.80110	-5.1044	1.4415E-6
T1NorthBC	106.60000	67.90000	-8.85000	-2.1012	-9.1305	-0.80110	-5.1044	1.4415E-6
	106.53077	66.04615	-8.87462	-2.2814	-9.1490	-1.0093	-5.7111	-1.6672E-6
	106.46154	64.19231	-8.89923	-2.4602	-9.1675	-1.2296	-6.3250	-5.0832E-6
	106.39231	62.33846	-8.92385	-2.6320	-9.1860	-1.4413	-6.9177	-8.3458E-6
	106.32307	60.48462	-8.94846	-2.7919	-9.2046	-1.6283	-7.4652	-11.104E-6
	106.25385	58.63077	-8.97308	-2.9365	-9.2231	-1.7847	-7.9534	-13.258E-6
	106.18462	56.77692	-8.99769	-3.0641	-9.2416	-1.9129	-8.3777	-14.901E-6
	106.11539	54.92308	-9.02231	-3.1744	-9.5112	-2.1177	-8.8709	-18.149E-6
	106.04615	53.06923	-9.04692	-3.2675	-9.5235	-2.2062	-9.1752	-19.205E-6
	105.97692	51.21539	-9.07154	-3.3440	-9.5358	-2.2776	-9.4271	-20.028E-6
	105.90769	49.36154	-9.09615	-3.4048	-9.5481	-2.3358	-9.6333	-20.687E-6
	105.83846	47.50769	-9.12077	-3.4510	-9.5604	-2.3867	-9.8016	-21.318E-6
	105.76923	45.65385	-9.14538	-3.4838	-9.5727	-2.4368	-9.9392	-22.070E-6
	105.70000	43.80000	-9.17000	-3.5039	-9.5850	-2.4908	-10.051	-23.055E-6
T1NorthCD	105.70000	43.80000	-9.17000	-3.5039	-9.5850	-2.4908	-10.051	-23.055E-6
	105.69231	41.83077	-9.18923	-3.4929	-9.5946	-2.5152	-10.065	-23.667E-6
	105.68462	39.86154	-9.20846	-3.4664	-9.6042	-2.5395	-10.042	-24.446E-6
	105.67693	37.89231	-9.22769	-3.4230	-9.6138	-2.5575	-9.9725	-25.265E-6
	105.66923	35.92308	-9.24692	-3.3602	-9.6235	-2.5599	-9.8409	-25.938E-6
	105.66154	33.95385	-9.26615	-3.2754	-9.6331	-2.5344	-9.6293	-26.197E-6
	105.65385	31.98462	-9.28538	-3.1662	-9.6427	-2.4678	-9.3201	-25.758E-6
	105.64616	30.01538	-9.30462	-3.0313	-9.6523	-2.3481	-8.9001	-24.344E-6
	105.63846	28.04615	-9.32385	-2.8709	-9.6619	-2.1672	-8.3661	-21.747E-6
	105.63077	26.07692	-9.34308	-2.6883	-9.6715	-1.9269	-7.7295	-17.958E-6
	105.62308	24.10769	-9.36231	-2.4890	-9.6812	-1.6422	-7.0181	-13.280E-6
	105.61539	22.13846	-9.38154	-2.2811	-9.6908	-1.3416	-6.2724	-8.3206E-6
	105.60769	20.16923	-9.40077	-2.0729	-9.7004	-1.0570	-5.5363	-3.7694E-6
	105.60000	18.20000	-9.42000	-1.8717	-9.7100	-0.81126	-4.8457	0.0
T1NorthDE	105.60000	18.20000	-9.42000	-1.8717	-9.7100	-0.81126	-4.8457	0.0
	105.63809	16.28572	-9.42667	-1.6830	-9.7133	-0.61299	-4.2224	2.5455E-6
	105.67619	14.37143	-9.43333	-1.5095	-9.7167	-0.46120	-3.6773	4.2538E-6
	105.71429	12.45714	-9.44000	-1.3517	-9.7200	-0.34772	-3.2075	5.2398E-6
	105.75238	10.54286	-9.44667	-1.2092	-9.7233	-0.26380	-2.8059	5.7150E-6
	105.79047	8.62857	-9.45333	-1.0809	-9.7267	-0.20191	-2.4637	5.8501E-6
	105.82858	6.71429	-9.46000	-0.96582	-9.7300	-0.15611	-2.1721	5.7704E-6
	105.86667	4.80000	-9.46667	-0.86265	-9.7333	-0.12199	-1.9231	5.5625E-6
	105.90476	2.88571	-9.47333	-0.77024	-9.7367	-0.096342	-1.7098	5.2837E-6
	105.94286	0.97143	-9.48000	-0.68749	-9.7400	-0.076874	-1.5262	4.9712E-6
	105.98095	-0.94286	-9.48667	-0.61340	-9.7433	-0.061942	-1.3677	4.6484E-6
	106.01905	-2.85714	-9.49333	-0.54707	-9.7467	-0.050371	-1.2301	4.3295E-6
	106.05714	-4.77143	-9.50000	-0.48768	-9.7500	-0.041315	-1.1102	4.0228E-6
	106.09524	-6.68571	-9.50667	-0.43451	-9.7533	-0.034158	-1.0053	3.7329E-6
	106.13333	-8.60000	-9.51333	-0.38691	-9.7567	-0.028451	-0.91311	3.4620E-6
	106.17142	-10.51429	-9.52000	-0.34429	-9.7600	-0.023861	-0.83178	3.2105E-6
	106.20953	-12.42857	-9.52667	-0.30613	-9.7633	-0.020140	-0.75979	2.9784E-6
	106.24762	-14.34286	-9.53333	-0.27198	-9.7667	-0.017101	-0.69582	2.7647E-6
	106.28571	-16.25714	-9.54000	-0.24140	-9.7700	-0.014601	-0.63881	2.5684E-6
	106.32381	-18.17143	-9.54667	-0.21403	-9.7733	-0.012531	-0.58783	2.3882E-6
	106.36191	-20.08571	-9.55333	-0.18953	-9.7767	-0.010806	-0.54211	2.2230E-6
	106.40000	-22.00000	-9.56000	-0.16760	-9.7800	-0.0093619	-0.50099	2.0715E-6
T2CrownAB	113.70000	91.10000	-6.58000	-0.45920	-6.7900	-0.0092269	-0.67762	3.5032E-6
	113.80769	89.24615	-6.60846	-0.50253	-6.8042	-0.010908	-0.73608	3.7721E-6
	113.91538	87.39231	-6.63692	-0.54890	-6.8185	-0.012936	-0.80018	4.0605E-6
	114.02308	85.53846	-6.66538	-0.59834	-6.8327	-0.015387	-0.87039	4.3685E-6
	114.13077	83.68462	-6.69385	-0.65084	-6.8469	-0.018348	-0.94715	4.6954E-6
	114.23846	81.83077	-6.72231	-0.70630	-6.8612	-0.021919	-1.0308	5.0400E-6
	114.34615	79.97692	-6.75077	-0.76457	-6.8754	-0.026210	-1.1217	5.4000E-6
	114.45385	78.12308	-6.77923	-0.82539	-6.8896	-0.031331	-1.2197	5.7719E-6
	114.56154	76.26923	-6.80769	-0.88838	-6.9038	-0.037377	-1.3248	6.1514E-6
	114.66923	74.41538	-6.83615	-0.95302	-6.9181	-0.044408	-1.4364	6.5330E-6
	114.77692	72.56154	-6.86462	-1.0186	-6.9323	-0.052414	-1.5532	6.9110E-6
	114.88461	70.70770	-6.89308	-1.0844	-6.9465	-0.061287	-1.6737	7.2797E-6
	114.99231	68.85384	-6.92154	-1.1494	-6.9608	-0.070794	-1.7956	7.6346E-6
	115.10000	67.00000	-6.95000	-1.2125	-6.9750	-0.080582	-1.9163	7.9726E-6
T2CrownBC	115.10000	67.00000	-6.95000	-1.2125	-6.9750	-0.080582	-1.9163	7.9726E-6
	115.10000	65.04166	-6.97667	-1.2857	-6.9883	-0.092505	-2.0580	8.3560E-6
	115.10000	63.08333	-7.00333	-1.3557	-7.5027	-0.13071	-2.3779	8.5580E-6
	115.10000	61.12500	-7.03000	-1.4213	-7.5246	-0.14488	-2.5195	8.8489E-6
	115.10000	59.16667	-7.05667	-1.4813	-7.5465	-0.15783	-2.6501	9.1189E-6
	115.10000	57.20833	-7.08333	-1.5349	-7.5684	-0.16930	-2.7675	9.3654E-6
	115.10000	55.25000	-7.11000	-1.5813	-7.5903	-0.17917	-2.8703	9.5841E-6
	115.10000	53.29167	-7.13667	-1.6201	-7.6123	-0.18750	-2.9578	9.7705E-6
	115.10000	51.33333	-7.16333	-1.6510	-7.6342	-0.19438	-3.0299	9.9200E-6
	115.10000	49.37500	-7.19000	-1.6739	-7.6561	-0.20000	-3.0868	10.029E-6
	115.10000	47.41667	-7.21667	-1.6887	-7.6780	-0.20452	-3.1287	10.092E-6
	115.10000	45.45833	-7.24333	-1.6954	-7.7000	-0.20808	-3.1558	10.108E-6
	115.10000	43.50000	-7.27000	-1.6941	-7.7219	-0.21074	-3.1683	10.075E-6
T2CrownCD	115.10000	43.50000	-7.27000	-1.6941	-7.7219	-0.21074	-3.1683	10.075E-6
	115.02308	41.53846	-7.28923	-1.6940	-7.7377	-0.21489	-3.1855	10.024E-6
	114.94615	39.57692	-7.30846	-1.6857	-7.7536	-0.21800	-3.1871	9.9232E-6
	114.86923	37.61538	-7.32769	-1.6688	-7.7694	-0.21977	-3.1716	9.7752E-6
	114.79230	35.65385	-7.34692	-1.6432	-7.7852	-0.21980	-3.1377	9.5853E-6
	114.71539	33.69231	-7.36615	-1.6089	-7.8011	-0.21763	-3.0839	9.3606E-6
	114.63846	31.73077	-7.38538	-1.5658	-7.8169	-0.21283	-3.0092	9.1095E-6
	114.56154	29.76923	-7.40462	-1.5143	-7.8328	-0.20507	-2.9133	8.8406E-6
	114.48462	27.80769	-7.42385	-1.4550	-7.8486	-0.19425	-2.7970	8.5616E-6
	114.40769	25.84615	-7.44308	-1.3888	-7.8645	-0.18056	-2.6623	8.2774E-6
	114.33077	23.88461	-7.46231	-1.3168	-7.8803	-0.16452	-2.5126	7.9889E-6
	114.25385	21.92308	-7.48154	-1.2406	-7.8962	-0.14696	-2.3524	7.6934E-6
	114.17693	19.96154	-7.50077	-1.1618	-7.9120	-0.12886	-2.1865	7.3860E-6
	114.10000	18.00000	-7.52000	-1.0820	-7.9279	-0.11117	-2.0199	7.0626E-6
T2CrownDE	114.10000	18.00000	-7.52000	-1.0820	-7.9279	-0.11117	-2.0199	7.0626E-6
	114.25500	16.03500	-7.52700	-0.98865	-7.9337	-0.091205	-1.8247	6.6666E-6
	114.41000	14.07000	-7.53400	-0.90027	-7.9394	-0.074444	-1.6459	6.2558E-6
	114.56500	12.10500	-7.54100	-0.81740	-7.9452	-0.060633	-1.4839	5.8407E-6
	114.72000	10.14000	-7.54800	-0.74027	-7.9510	-0.049394	-1.3383	5.4309E-6
	114.87500	8.17500	-7.55500	-0.66894	-7.9568	-0.040321	-1.2081	5.0343E-6
	115.03000	6.21000	-7.56200	-0.60330	-7.9626	-0.033025	-1.0922	4.6565E-6
	115.18500	4.24500	-7.56900	-0.54314	-7.9683	-0.027165	-0.98905	4.3011E-6
	115.34000	2.28000	-7.57600	-0.48818	-7.9741	-0.022452	-0.89743	3.9697E-6
	115.49500	0.31500	-7.58300	-0.43811	-7.9799	-0.018654	-0.81597	3.6630E-6
	115.65000	-1.65000	-7.59000	-0.39261	-7.9857	-0.015580	-0.74349	3.3806E-6
	115.80500	-3.61500	-7.59700	-0.35133	-7.9914	-0.013082	-0.67889	3.1214E-6
	115.96000	-5.58000	-7.60400	-0.31394	-7.9972	-0.011042	-0.62124	2.8842E-6
	116.11500	-7.54500	-7.61100	-0.28013	-8.0030	-0.0093681	-0.56967	2.6674E-6
	116.27000	-9.51000	-7.61800	-0.24960	-8.0088	-0.0079872	-0.52346	2.4694E-6
	116.42500	-11.47500	-7.62500	-0.22204	-8.0146	-0.0068423	-0.48195	2.2887E-6
	116.58000	-13.44000	-7.63200	-0.19721	-8.0203	-0.0058882	-0.44460	2.1237E-6
	116.73500	-15.40500	-7.63900	-0.17484	-8.0261	-0.0050892	-0.41091	1.9731E-6
	116.89000	-17.37000	-7.64600	-0.15471	-8.0319	-0.0044168	-0.38047	1.8354E-6
	117.04500	-19.33500	-7.65300	-0.13661	-8.0377	-0.0038484	-0.35289	1.7094E-6
	117.20000	-21.30000	-7.66000	-0.12035	-8.0435	-0.0033658	-0.32786	1.5941E-6
T2InvertAB	113.70000	91.10000	-10.38000	-0.47376	-10.835	-0.049799	-1.1960	3.9440E-6
	113.80769	89.24615	-10.40846	-0.51809	-10.861	-0.058095	-1.2943	4.1517E-6
	113.91538	87.39231	-10.43692	-0.56550	-10.886	-0.067903	-1.4012	4.3570E-6
	114.02308	85.53846	-10.46538	-0.61601	-10.911	-0.079494	-1.5173	4.5550E-6
	114.13077	83.68462	-10.49385	-0.66961	-10.936	-0.093165	-1.6429	4.7398E-6
	114.23846	81.83077	-10.52231	-0.72619	-10.961	-0.10924	-1.7785	4.9044E-6
	114.34615	79.97692	-10.55077	-0.78556	-10.986	-0.12803	-1.9240	5.0409E-6
	114.45385	78.12308	-10.57923	-0.84746	-11.012	-0.14981	-2.0792	5.1410E-6
	114.56154	76.26923	-10.60769	-0.91146	-11.037	-0.17479	-2.2435	5.1967E-6
	114.66923	74.41538	-10.63615	-0.97704	-11.062	-0.20300	-2.4155	5.2021E-6
	114.77692	72.56154	-10.66462	-1.0435	-11.087	-0.23423	-2.5936	5.1547E-6
	114.88461	70.70770	-10.69308	-1.1100	-11.112	-0.26798	-2.7751	5.0569E-6
	114.99231	68.85384	-10.72154	-1.1756	-11.138	-0.30343	-2.9570	4.9172E-6
	115.10000	67.00000	-10.75000	-1.2392	-11.163	-0.33943	-3.1357	4.7495E-6
T2InvertBC	115.10000	67.00000	-10.75000	-1.2392	-11.163	-0.33943	-3.1357	4.7495E-6
	115.10000	65.04166	-10.77667	-1.3129	-11.187	-0.38279	-3.3443	4.5212E-6
	115.10000	63.08333	-10.80333	-1.3834	-11.210	-0.42542	-3.5457	4.2810E-6
	115.10000	61.12500	-10.83000	-1.4493	-11.234	-0.46583	-3.7355	4.0491E-6
	115.10000	59.16667	-10.85667	-1.5097	-11.258	-0.50283	-3.9101	3.8402E-6
	115.10000	57.20833	-10.88333	-1.5636	-11.281	-0.53566	-4.0666	3.6617E-6
	115.10000	55.25000	-10.91000	-1.6103	-11.305	-0.56398	-4.2031	3.5138E-6
	115.10000	53.29167	-10.93667	-1.6494	-11.329	-0.58782	-4.3185	3.3914E-6
	115.10000	51.33333	-10.96333	-1.6805	-11.352	-0.60741	-4.4124	3.2863E-6
	115.10000	49.37500	-10.99000	-1.7035	-11.376	-0.62311	-4.4849	3.1892E-6
	115.10000	47.41667	-11.01667	-1.7183	-11.500	-0.64970	-4.5673	2.8419E-6

Name	Location X [m]	Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Sum Princ [kN/m²]	Vert Strain [-]
	115.10000	45.45833	-11.04333	-1.7249	-11.523	-0.65871	-4.5970	2.7352E-6
	115.10000	43.50000	-11.07000	-1.7233	-11.546	-0.66450	-4.6054	2.6201E-6
T2InvertCD	115.10000	43.50000	-11.07000	-1.7233	-11.546	-0.66450	-4.6054	2.6201E-6
	115.02308	41.53846	-11.08923	-1.7228	-11.563	-0.67404	-4.6194	2.4351E-6
	114.94615	39.57692	-11.10846	-1.7139	-11.579	-0.67993	-4.6110	2.2478E-6
	114.86923	37.61538	-11.12769	-1.6964	-11.596	-0.68144	-4.5788	2.0717E-6
	114.79230	35.65385	-11.14692	-1.6701	-11.613	-0.67762	-4.5215	1.9247E-6
	114.71539	33.69231	-11.16615	-1.6350	-11.629	-0.66747	-4.4379	1.8272E-6
	114.63846	31.73077	-11.18538	-1.5912	-11.646	-0.65009	-4.3273	1.7990E-6
	114.56154	29.76923	-11.20462	-1.5391	-11.663	-0.62490	-4.1899	1.8552E-6
	114.48462	27.80769	-11.22385	-1.4793	-11.679	-0.59189	-4.0271	2.0023E-6
	114.40769	25.84615	-11.24308	-1.4126	-11.696	-0.55172	-3.8418	2.2350E-6
	114.33077	23.88461	-11.26231	-1.3404	-11.713	-0.50579	-3.6382	2.5352E-6
	114.25385	21.92308	-11.28154	-1.2639	-11.729	-0.45610	-3.4213	2.8742E-6
	114.17693	19.96154	-11.30077	-1.1848	-11.746	-0.40496	-3.1970	3.2181E-6
	114.10000	18.00000	-11.32000	-1.1046	-11.763	-0.35460	-2.9709	3.5343E-6
T2InvertDE	114.10000	18.00000	-11.32000	-1.1046	-11.763	-0.35460	-2.9709	3.5343E-6
	114.25500	16.03500	-11.32700	-1.0108	-11.769	-0.29738	-2.7063	3.8628E-6
	114.41000	14.07000	-11.33400	-0.92167	-11.775	-0.24801	-2.4605	4.0729E-6
	114.56500	12.10500	-11.34100	-0.83790	-11.781	-0.20619	-2.2348	4.1774E-6
	114.72000	10.14000	-11.34800	-0.75977	-11.787	-0.17122	-2.0294	4.1942E-6
	114.87500	8.17500	-11.35500	-0.68736	-11.793	-0.14226	-1.8434	4.1420E-6
	115.03000	6.21000	-11.36200	-0.62062	-11.799	-0.11841	-1.6759	4.0385E-6
	115.18500	4.24500	-11.36900	-0.55937	-11.805	-0.098827	-1.5253	3.8991E-6
	115.34000	2.28000	-11.37600	-0.50335	-11.811	-0.082760	-1.3902	3.7362E-6
	115.49500	0.31500	-11.38300	-0.45226	-11.817	-0.069569	-1.2691	3.5596E-6
	115.65000	-1.65000	-11.39000	-0.40579	-11.823	-0.058720	-1.1605	3.3766E-6
	115.80500	-3.61500	-11.39700	-0.36360	-11.829	-0.049771	-1.0630	3.1928E-6
	115.96000	-5.58000	-11.40400	-0.32536	-11.835	-0.042366	-0.97549	3.0118E-6
	116.11500	-7.54500	-11.41100	-0.29076	-11.841	-0.036214	-0.89676	2.8364E-6
	116.27000	-9.51000	-11.41800	-0.25949	-11.847	-0.031085	-0.82586	2.6681E-6
	116.42500	-11.47500	-11.42500	-0.23126	-11.854	-0.026790	-0.76190	2.5079E-6
	116.58000	-13.44000	-11.43200	-0.20580	-11.860	-0.023179	-0.70411	2.3565E-6
	116.73500	-15.40500	-11.43900	-0.18285	-11.866	-0.020131	-0.65180	2.2139E-6
	116.89000	-17.37000	-11.44600	-0.16219	-11.872	-0.017547	-0.60436	2.0802E-6
	117.04500	-19.33500	-11.45300	-0.14360	-11.878	-0.015348	-0.56127	1.9549E-6
	117.20000	-21.30000	-11.46000	-0.12689	-11.884	-0.013470	-0.52207	1.8380E-6
T2SouthAB	111.30000	91.30000	-8.48000	-0.51227	-8.8527	-0.028524	-1.0274	4.2156E-6
	111.40000	89.45385	-8.50846	-0.56226	-8.8740	-0.033844	-1.1199	4.5076E-6
	111.50000	87.60769	-8.53692	-0.61612	-8.8953	-0.040306	-1.2219	4.8120E-6
	111.60000	85.76154	-8.56538	-0.67395	-8.9167	-0.048176	-1.3343	5.1258E-6
	111.70000	83.91538	-8.59385	-0.73585	-8.9381	-0.057773	-1.4582	5.4438E-6
	111.80000	82.06923	-8.62231	-0.80180	-8.9594	-0.069478	-1.5944	5.7592E-6
	111.90000	80.22308	-8.65077	-0.87173	-8.9808	-0.083727	-1.7436	6.0630E-6
	112.00000	78.37692	-8.67923	-0.94545	-9.0021	-0.10099	-1.9064	6.3435E-6
	112.10000	76.53077	-8.70769	-1.0226	-9.0235	-0.12173	-2.0826	6.5878E-6
	112.20000	74.68462	-8.73615	-1.1027	-9.0449	-0.14631	-2.2718	6.7820E-6
	112.30000	72.83846	-8.76462	-1.1848	-9.0663	-0.17490	-2.4725	6.9146E-6
	112.40000	70.99231	-8.79308	-1.2682	-9.0877	-0.20727	-2.6819	6.9795E-6
	112.50000	69.14616	-8.82154	-1.3513	-9.1091	-0.24267	-2.8963	6.9798E-6
	112.60000	67.30000	-8.85000	-1.4329	-9.1305	-0.27980	-3.1106	6.9300E-6
T2SouthBC	112.60000	67.30000	-8.85000	-1.4329	-9.1305	-0.27980	-3.1106	6.9300E-6
	112.60833	65.33334	-8.87667	-1.5264	-9.1505	-0.32455	-3.3593	6.8258E-6
	112.61667	63.36666	-8.90333	-1.6160	-9.1706	-0.36867	-3.6004	6.7032E-6
	112.62500	61.40000	-8.93000	-1.6998	-9.1907	-0.40992	-3.8270	6.5946E-6
	112.63333	59.43333	-8.95667	-1.7762	-9.2107	-0.44665	-4.0336	6.5204E-6
	112.64167	57.46667	-8.98333	-1.8440	-9.2308	-0.47806	-4.2166	6.4861E-6
	112.65000	55.50000	-9.01000	-1.9022	-9.5050	-0.54201	-4.4799	5.8124E-6
	112.65833	53.53333	-9.03667	-1.9506	-9.5183	-0.56334	-4.6104	5.8196E-6
	112.66666	51.56667	-9.06333	-1.9888	-9.5317	-0.57981	-4.7145	5.8399E-6
	112.67500	49.60000	-9.09000	-2.0169	-9.5450	-0.59219	-4.7933	5.8565E-6
	112.68333	47.63334	-9.11667	-2.0349	-9.5583	-0.60125	-4.8479	5.8531E-6
	112.69167	45.66667	-9.14333	-2.0430	-9.5717	-0.60765	-4.8795	5.8164E-6
	112.70000	43.70000	-9.17000	-2.0412	-9.5850	-0.61174	-4.8885	5.7384E-6
T2SouthCD	112.70000	43.70000	-9.17000	-2.0412	-9.5850	-0.61174	-4.8885	5.7384E-6
	112.62308	41.72308	-9.18923	-2.0423	-9.5946	-0.62241	-4.9122	5.5450E-6
	112.54615	39.74615	-9.20846	-2.0332	-9.6042	-0.63045	-4.9117	5.3123E-6
	112.46923	37.76923	-9.22769	-2.0135	-9.6138	-0.63490	-4.8847	5.0567E-6
	112.39231	35.79231	-9.24692	-1.9829	-9.6235	-0.63441	-4.8283	4.8026E-6
	112.31538	33.81538	-9.26615	-1.9409	-9.6331	-0.62740	-4.7395	4.5803E-6
	112.23846	31.83846	-9.28538	-1.8874	-9.6427	-0.61232	-4.6158	4.4220E-6
	112.16154	29.86154	-9.30462	-1.8226	-9.6523	-0.58796	-4.4562	4.3565E-6
	112.08462	27.88461	-9.32385	-1.7472	-9.6619	-0.55381	-4.2616	4.4020E-6
	112.00769	25.90769	-9.34308	-1.6623	-9.6715	-0.51049	-4.0354	4.5578E-6
	111.93077	23.93077	-9.36231	-1.5698	-9.6812	-0.45985	-3.7840	4.8006E-6
	111.85384	21.95385	-9.38154	-1.4718	-9.6908	-0.40483	-3.5155	5.0866E-6
	111.77692	19.97692	-9.40077	-1.3708	-9.7004	-0.34889	-3.2395	5.3626E-6
	111.70000	18.00000	-9.42000	-1.2691	-9.7100	-0.29525	-2.9650	5.5807E-6
T2SouthDE	111.70000	18.00000	-9.42000	-1.2691	-9.7100	-0.29525	-2.9650	5.5807E-6
	111.86000	16.03000	-9.42700	-1.1529	-9.7135	-0.23802	-2.6554	5.7378E-6
	112.02000	14.06000	-9.43400	-1.0439	-9.7170	-0.19097	-2.3752	5.7461E-6
	112.18000	12.09000	-9.44100	-0.94272	-9.7205	-0.15302	-2.1243	5.6367E-6
	112.34000	10.12000	-9.44800	-0.84948	-9.7240	-0.12278	-1.9016	5.4426E-6
	112.50000	8.15000	-9.45500	-0.76405	-9.7275	-0.098836	-1.7047	5.1931E-6
	112.66000	6.18000	-9.46200	-0.68613	-9.7310	-0.079934	-1.5313	4.9116E-6
	112.82000	4.21000	-9.46900	-0.61529	-9.7345	-0.065001	-1.3786	4.6159E-6
	112.98000	2.24000	-9.47600	-0.55106	-9.7380	-0.053174	-1.2441	4.3184E-6
	113.14000	0.27000	-9.48300	-0.49295	-9.7415	-0.043768	-1.1255	4.0276E-6
	113.30000	-1.70000	-9.49000	-0.44047	-9.7450	-0.036249	-1.0208	3.7487E-6
	113.46000	-3.67000	-9.49700	-0.39314	-9.7485	-0.030205	-0.92818	3.4849E-6
	113.62000	-5.64000	-9.50400	-0.35051	-9.7520	-0.025318	-0.84601	3.2376E-6
	113.78000	-7.61000	-9.51100	-0.31214	-9.7555	-0.021343	-0.77295	3.0075E-6
	113.94000	-9.58000	-9.51800	-0.27764	-9.7590	-0.018090	-0.70782	2.7942E-6
	114.10000	-11.55000	-9.52500	-0.24664	-9.7625	-0.015413	-0.64962	2.5972E-6
	114.26000	-13.52000	-9.53200	-0.21880	-9.7660	-0.013196	-0.59749	2.4157E-6
	114.42000	-15.49000	-9.53900	-0.19383	-9.7695	-0.011351	-0.55067	2.2486E-6
	114.58000	-17.46000	-9.54600	-0.17143	-9.7730	-0.0098077	-0.50852	2.0949E-6
	114.74000	-19.43000	-9.55300	-0.15134	-9.7765	-0.0085095	-0.47048	1.9536E-6
	114.90000	-21.40000	-9.56000	-0.13335	-9.7800	-0.0074125	-0.43609	1.8237E-6
T2NorthAB	115.50000	91.00000	-8.48000	-0.43210	-8.8527	-0.022195	-0.89090	3.7304E-6
	115.65385	89.13846	-8.50846	-0.47079	-8.8740	-0.025788	-0.96102	3.9642E-6
	115.80769	87.27692	-8.53692	-0.51184	-8.8953	-0.030003	-1.0368	4.2067E-6
	115.96154	85.41538	-8.56538	-0.55520	-8.9167	-0.034936	-1.1183	4.4561E-6
	116.11539	83.55385	-8.59385	-0.60077	-8.9381	-0.040693	-1.2059	4.7098E-6
	116.26923	81.69231	-8.62231	-0.64839	-8.9594	-0.047378	-1.2994	4.9650E-6
	116.42308	79.83077	-8.65077	-0.69781	-8.9808	-0.055082	-1.3988	5.2181E-6
	116.57692	77.96923	-8.67923	-0.74873	-9.0021	-0.063872	-1.5036	5.4651E-6
	116.73077	76.10769	-8.70769	-0.80072	-9.0235	-0.073770	-1.6131	5.7020E-6
	116.88461	74.24615	-8.73615	-0.85327	-9.0449	-0.084727	-1.7262	5.9254E-6
	117.03846	72.38461	-8.76462	-0.90579	-9.0663	-0.096603	-1.8417	6.1324E-6
	117.19231	70.52308	-8.79308	-0.95757	-9.0877	-0.10915	-1.9577	6.3217E-6
	117.34615	68.66154	-8.82154	-1.0079	-9.1091	-0.12203	-2.0721	6.4935E-6
	117.50000	66.80000	-8.85000	-1.0559	-9.1305	-0.13482	-2.1827	6.6493E-6
T2NorthBC	117.50000	66.80000	-8.85000	-1.0559	-9.1305	-0.13482	-2.1827	6.6493E-6
	117.50000	64.85000	-8.87667	-1.1147	-9.1505	-0.15108	-2.3189	6.8278E-6
	117.50000	62.90000	-8.90333	-1.1708	-9.1706	-0.16709	-2.4503	6.9902E-6
	117.50000	60.95000	-8.93000	-1.2233	-9.1907	-0.18236	-2.5745	7.1386E-6
	117.50000	59.00000	-8.95667	-1.2714	-9.2107	-0.19647	-2.6891	7.2742E-6
	117.50000	57.05000	-8.98333	-1.3144	-9.2308	-0.20916	-2.7924	7.3964E-6
	117.50000	55.10000	-9.01000	-1.3517	-9.5050	-0.23891	-2.9623	7.2372E-6
	117.50000	53.15000	-9.03667	-1.3830	-9.5183	-0.24860	-3.0391	7.3195E-6
	117.50000	51.20000	-9.06333	-1.4079	-9.5317	-0.25657	-3.1016	7.3831E-6
	117.50000	49.25000	-9.09000	-1.4263	-9.5450	-0.26291	-3.1497	7.4244E-6
	117.50000	47.30000	-9.11667	-1.4381	-9.5583	-0.26774	-3.1832	7.4400E-6
	117.50000	45.35000	-9.14333	-1.4432	-9.5717	-0.27113	-3.2022	7.4277E-6
	117.50000	43.40000	-9.17000	-1.4415	-9.5850	-0.27310	-3.2065	7.3865E-6
T2NorthCD	117.50000	43.40000	-9.17000	-1.4415	-9.5850	-0.27310	-3.2065	7.3865E-6
	117.40769	41.44616	-9.18923	-1.4424	-9.5946	-0.27726	-3.2192	7.3243E-6
	117.31538	39.49231	-9.20846	-1.4364	-9.6042	-0.27986	-3.2165	7.2340E-6
	117.22308	37.53846	-9.22769	-1.4234	-9.6138	-0.28062	-3.1976	7.1196E-6
	117.13077	35.58461	-9.24692	-1.4033	-9.6235	-0.27923	-3.1619	6.9868E-6
	117.03846	33.63077	-9.26615	-1.3761	-9.6331	-0.27531	-3.1085	6.8426E-6
	116.94615	31.67692	-9.28538	-1.3420	-9.6427	-0.26858	-3.0373	6.6940E-6
	116.85384	29.72308	-9.30462	-1.3013	-9.6523	-0.25883	-2.9484	6.5475E-6
	116.76154	27.76923	-9.32385	-1.2543	-9.6619	-0.24607	-2.8428	6.4075E-6
	116.66923	25.81538	-9.34308	-1.2019	-9.6715	-0.23052	-2.7221	6.2752E-6
	116.57692	23.86154	-9.36231	-1.1449	-9.6812	-0.21269	-2.5888	6.1486E-6
	116.48462	21.90769	-9.38154	-1.0843	-9.6908	-0.19328	-2.4462	6.0225E-6
	116.39231	19.95385	-9.40077	-1.0212	-9.7004	-0.17312	-2.2976	5.8900E-6
	116.30000	18.00000	-9.42000	-0.95673	-9.7100	-0.15303	-2.1467	5.7444E-6
T2NorthDE	116.30000	18.00000	-9.42000	-0.95673	-9.7100	-0.15303	-2.1467	5.7444E-6

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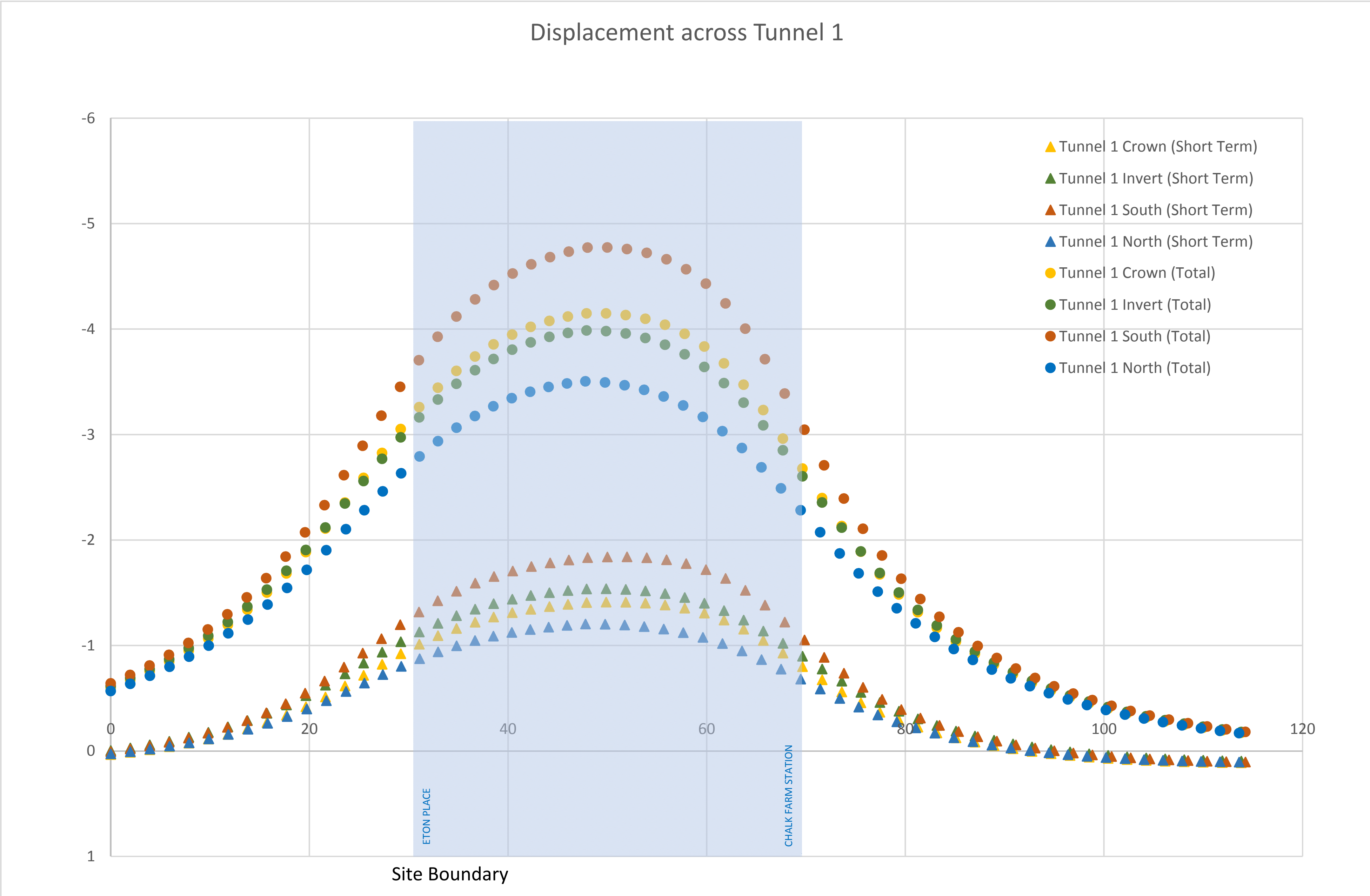
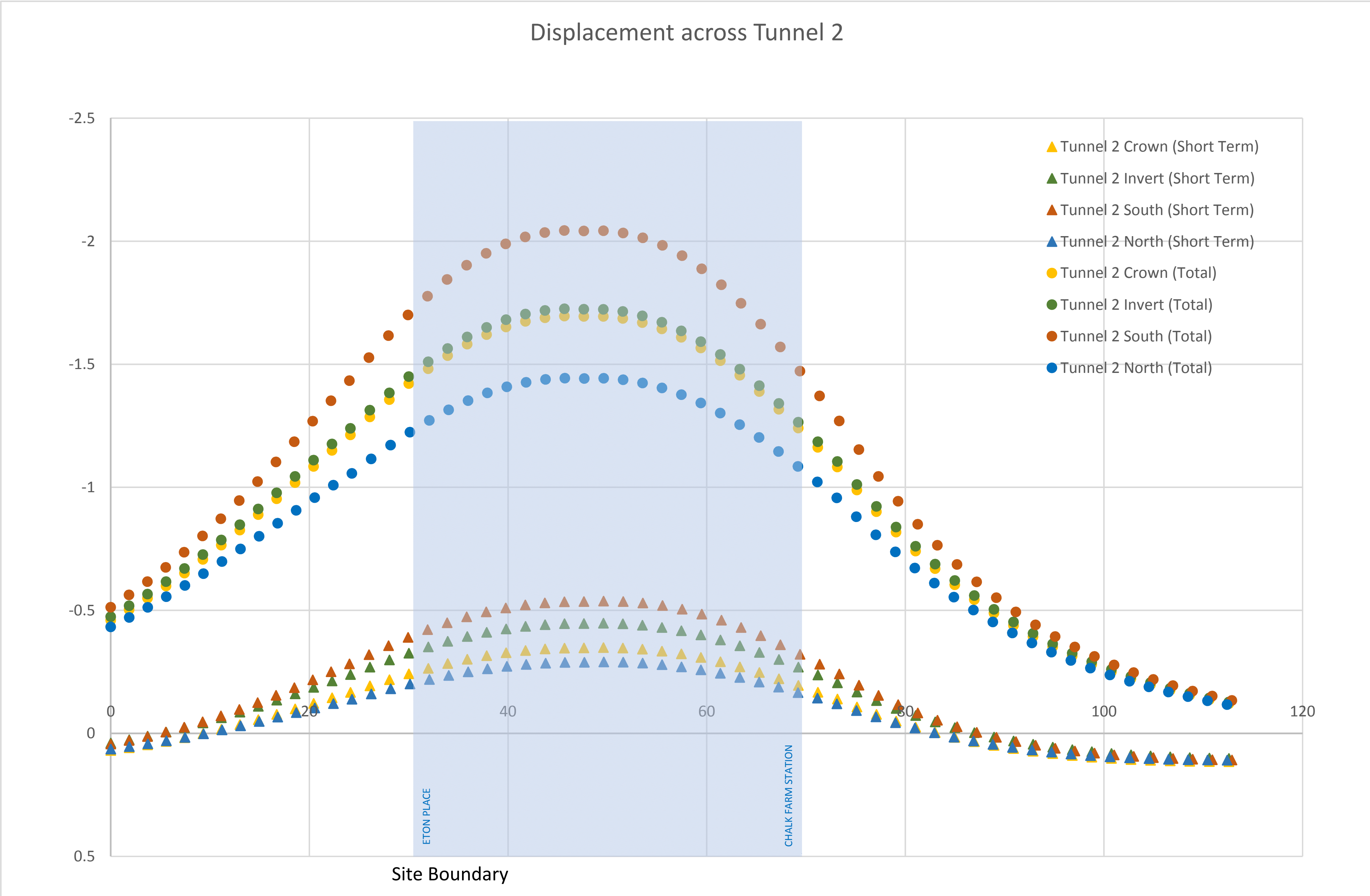
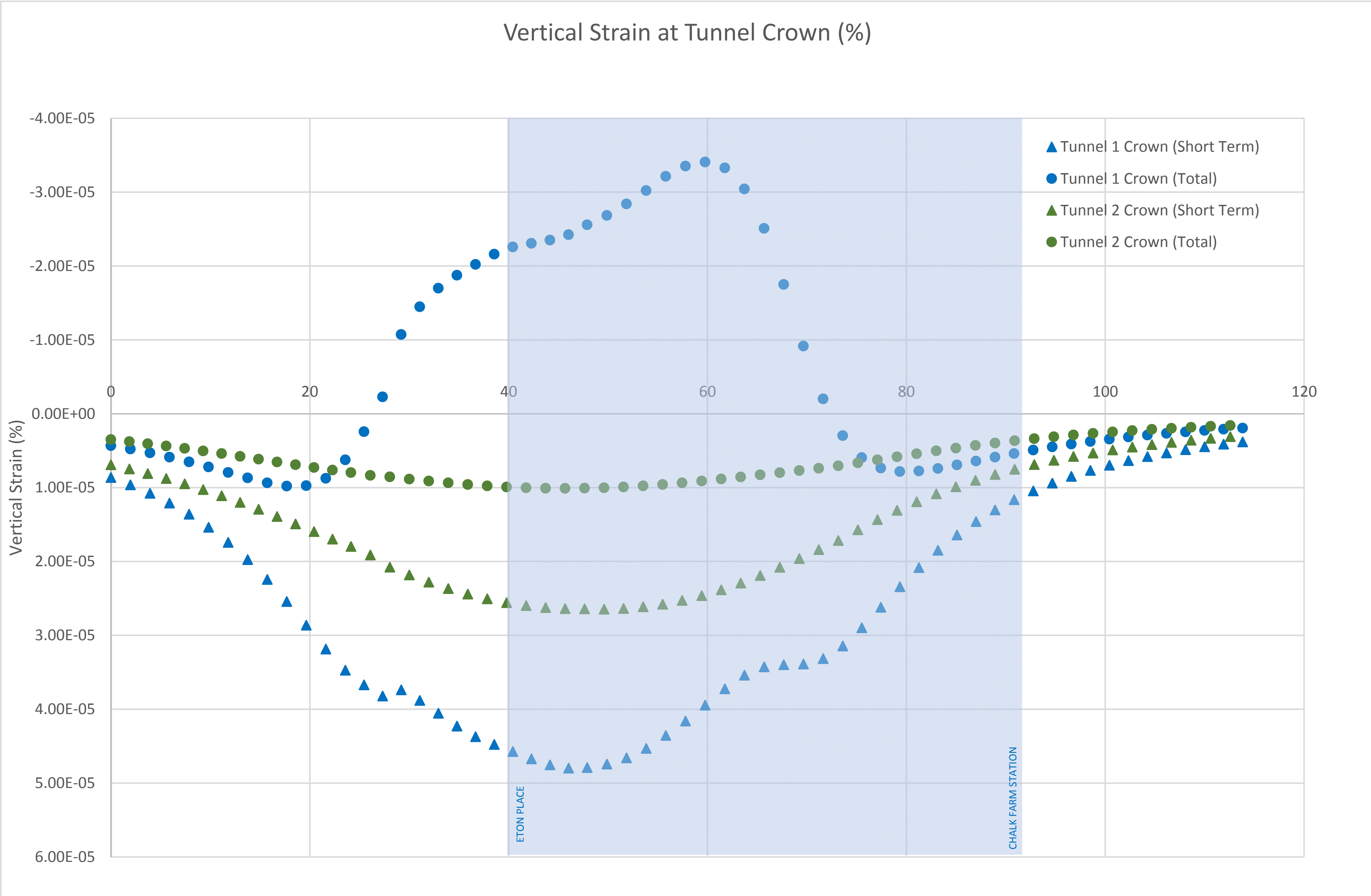
Total

Name	Location X [m]	Location Y [m]	Z[Level] [mOD]	Z [mm]	Calc Level [mOD]	Stresses Vert Stress [kN/m²]	Stresses Sum Princ [kN/m²]	Vert Strain [-]
	116.43000	16.04000	-9.42700	-0.88008	-9.7135	-0.12973	-1.9671	5.5574E-6
	116.56000	14.08000	-9.43400	-0.80667	-9.7170	-0.10934	-1.7988	5.3416E-6
	116.69000	12.12000	-9.44100	-0.73703	-9.7205	-0.091812	-1.6429	5.1031E-6
	116.82000	10.16000	-9.44800	-0.67149	-9.7240	-0.076958	-1.4996	4.8490E-6
	116.95000	8.20000	-9.45500	-0.61024	-9.7275	-0.064491	-1.3688	4.5865E-6
	117.08000	6.24000	-9.46200	-0.55331	-9.7310	-0.054097	-1.2500	4.3219E-6
	117.21000	4.28000	-9.46900	-0.50065	-9.7345	-0.045467	-1.1424	4.0605E-6
	117.34000	2.32000	-9.47600	-0.45215	-9.7380	-0.038314	-1.0452	3.8063E-6
	117.47000	0.36000	-9.48300	-0.40762	-9.7415	-0.032388	-0.95750	3.5620E-6
	117.60000	-1.60000	-9.49000	-0.36685	-9.7450	-0.027473	-0.87837	3.3296E-6
	117.73000	-3.56000	-9.49700	-0.32962	-9.7485	-0.023389	-0.80697	3.1102E-6
	117.86000	-5.52000	-9.50400	-0.29570	-9.7520	-0.019988	-0.74253	2.9041E-6
	117.99000	-7.48000	-9.51100	-0.26485	-9.7555	-0.017146	-0.68430	2.7115E-6
	118.12000	-9.44000	-9.51800	-0.23683	-9.7590	-0.014764	-0.63164	2.5321E-6
	118.25000	-11.40000	-9.52500	-0.21142	-9.7625	-0.012760	-0.58395	2.3653E-6
	118.38000	-13.36000	-9.53200	-0.18842	-9.7660	-0.011068	-0.54071	2.2106E-6
	118.51000	-15.32000	-9.53900	-0.16761	-9.7695	-0.0096338	-0.50143	2.0672E-6
	118.64000	-17.28000	-9.54600	-0.14880	-9.7730	-0.0084144	-0.46571	1.9344E-6
	118.77000	-19.24000	-9.55300	-0.13182	-9.7765	-0.0073735	-0.43317	1.8115E-6
	118.90000	-21.20000	-9.56000	-0.11651	-9.7800	-0.0064820	-0.40348	1.6978E-6
NorthAccesstunneltopN	97.40000	18.00000	-5.00000	-3.0386	-5.3269	-0.79288	-6.1432	8.6004E-6
	99.29000	18.00000	-5.00000	-2.7186	-5.3269	-0.56445	-5.1013	10.640E-6
	101.18000	18.00000	-5.00000	-2.4160	-5.3269	-0.38183	-4.1816	11.732E-6
	103.07000	18.00000	-5.00000	-2.1405	-5.3269	-0.25080	-3.4172	11.867E-6
	104.96000	18.00000	-5.00000	-1.8950	-5.3269	-0.16403	-2.8048	11.298E-6
	106.85000	18.00000	-5.00000	-1.6786	-5.3269	-0.10870	-2.3220	10.361E-6
	108.74000	18.00000	-5.00000	-1.4884	-5.3269	-0.073638	-1.9420	9.3089E-6
	110.63000	18.00000	-5.00000	-1.3212	-5.3269	-0.051129	-1.6410	8.2796E-6
	112.52000	18.00000	-5.00000	-1.1740	-5.3269	-0.036373	-1.4004	7.3356E-6
	114.41000	18.00000	-5.00000	-1.0440	-5.3269	-0.026468	-1.2058	6.4967E-6
	116.30000	18.00000	-5.00000	-0.92904	-5.3269	-0.019660	-1.0466	5.7627E-6
NorthAccesstunneltopS	97.30000	14.50000	-5.00000	-2.2810	-5.3269	-0.24639	-3.6229	13.308E-6
	99.22000	14.52000	-5.00000	-2.0902	-5.3269	-0.19665	-3.1901	12.474E-6
	101.14000	14.54000	-5.00000	-1.9013	-5.3269	-0.15078	-2.7723	11.589E-6
	103.06000	14.56000	-5.00000	-1.7201	-5.3269	-0.11241	-2.3911	10.653E-6
	104.98000	14.58000	-5.00000	-1.5504	-5.3269	-0.082518	-2.0565	9.6892E-6
	106.90000	14.60000	-5.00000	-1.3940	-5.3269	-0.060317	-1.7701	8.7383E-6
	108.82000	14.62000	-5.00000	-1.2513	-5.3269	-0.044259	-1.5283	7.8356E-6
	110.74000	14.64000	-5.00000	-1.1220	-5.3269	-0.032769	-1.3253	7.0042E-6
	112.66000	14.66000	-5.00000	-1.0053	-5.3269	-0.024545	-1.1552	6.2545E-6
	114.58000	14.68000	-5.00000	-0.90017	-5.3269	-0.018621	-1.0122	5.5876E-6
	116.50000	14.70000	-5.00000	-0.80560	-5.3269	-0.014310	-0.89146	4.9991E-6
NorthAccesstunnelbaseN	97.40000	18.00000	-7.50000	-3.0357	-7.9114	-2.0071	-8.3420	-19.339E-6
	99.29000	18.00000	-7.50000	-2.7281	-7.9114	-1.5020	-7.1362	-9.8046E-6
	101.18000	18.00000	-7.50000	-2.4342	-7.9114	-1.0827	-6.0320	-2.4267E-6
	103.07000	18.00000	-7.50000	-2.1634	-7.9114	-0.76285	-5.0735	2.5943E-6
	104.96000	18.00000	-7.50000	-1.9196	-7.9114	-0.53333	-4.2697	5.5907E-6
	106.85000	18.00000	-7.50000	-1.7028	-7.9114	-0.37448	-3.6086	7.1164E-6
	108.74000	18.00000	-7.50000	-1.5113	-7.9114	-0.26610	-3.0689	7.6945E-6
	110.63000	18.00000	-7.50000	-1.3423	-7.9114	-0.19210	-2.6286	7.7136E-6
	112.52000	18.00000	-7.50000	-1.1931	-7.9114	-0.14108	-2.2678	7.4279E-6
	114.41000	18.00000	-7.50000	-1.0613	-7.9114	-0.10539	-1.9702	6.9918E-6
	116.30000	18.00000	-7.50000	-0.94459	-7.9114	-0.080018	-1.7229	6.4952E-6
NorthAccesstunnelbaseS	97.30000	14.50000	-7.50000	-2.3072	-7.9114	-0.80137	-5.4354	3.2776E-6
	99.22000	14.52000	-7.50000	-2.1163	-7.9114	-0.65105	-4.8384	4.8710E-6
	101.14000	14.54000	-7.50000	-1.9270	-7.9114	-0.51177	-4.2586	6.2088E-6
	103.06000	14.56000	-7.50000	-1.7449	-7.9114	-0.39305	-3.7220	7.1269E-6
	104.98000	14.58000	-7.50000	-1.5739	-7.9114	-0.29780	-3.2423	7.6064E-6
	106.90000	14.60000	-7.50000	-1.4159	-7.9114	-0.22449	-2.8234	7.7161E-6
	108.82000	14.62000	-7.50000	-1.2715	-7.9114	-0.16946	-2.4629	7.5574E-6
	110.74000	14.64000	-7.50000	-1.1404	-7.9114	-0.12868	-2.1550	7.2273E-6
	112.66000	14.66000	-7.50000	-1.0220	-7.9114	-0.098544	-1.8928	6.8018E-6
	114.58000	14.68000	-7.50000	-0.91528	-7.9114	-0.076221	-1.6694	6.3345E-6
	116.50000	14.70000	-7.50000	-0.81927	-7.9114	-0.059575	-1.4787	5.8599E-6
SouthAccesstunneltopN	96.90000	4.60000	-5.00000	-1.1414	-5.3269	-0.025406	-1.2818	7.0084E-6
	97.80000	4.58000	-5.00000	-1.1089	-5.3269	-0.024234	-1.2425	6.8079E-6
	98.70000	4.56000	-5.00000	-1.0762	-5.3269	-0.023024	-1.2027	6.6057E-6
	99.60000	4.54000	-5.00000	-1.0433	-5.3269	-0.021791	-1.1626	6.4028E-6
	100.50000	4.52000	-5.00000	-1.0102	-5.3269	-0.020551	-1.1224	6.2000E-6
	101.40000	4.50000	-5.00000	-0.97725	-5.3269	-0.019316	-1.0825	5.9979E-6
	102.30000	4.48000	-5.00000	-0.94441	-5.3269	-0.018100	-1.0428	5.7974E-6
	103.20000	4.46000	-5.00000	-0.91181	-5.3269	-0.016913	-1.0038	5.5990E-6
	104.10000	4.44000	-5.00000	-0.87953	-5.3269	-0.015764	-0.96535	5.4034E-6
	105.00000	4.42000	-5.00000	-0.84767	-5.3269	-0.014660	-0.92775	5.2113E-6
	105.90000	4.40000	-5.00000	-0.81630	-5.3269	-0.013606	-0.89108	5.0229E-6
SouthAccesstunneltopS	96.70000	1.30000	-5.00000	-0.92174	-5.3269	-0.014773	-0.98879	5.5858E-6
	97.62000	1.28000	-5.00000	-0.89719	-5.3269	-0.014194	-0.96235	5.4433E-6
	98.54000	1.26000	-5.00000	-0.87234	-5.3269	-0.013595	-0.93552	5.2991E-6
	99.46000	1.24000	-5.00000	-0.84727	-5.3269	-0.012981	-0.90841	5.1537E-6
	100.38000	1.22000	-5.00000	-0.82207	-5.3269	-0.012358	-0.88114	5.0077E-6
	101.30000	1.20000	-5.00000	-0.79680	-5.3269	-0.011732	-0.85383	4.8615E-6
	102.22000	1.18000	-5.00000	-0.77156	-5.3269	-0.011108	-0.82660	4.7158E-6
	103.14000	1.16000	-5.00000	-0.74640	-5.3269	-0.010492	-0.79955	4.5709E-6
	104.06000	1.14000	-5.00000	-0.72140	-5.3269	-0.0098873	-0.77279	4.4273E-6
	104.98000	1.12000	-5.00000	-0.69661	-5.3269	-0.0092980	-0.74639	4.2855E-6
	105.90000	1.10000	-5.00000	-0.67211	-5.3269	-0.0087275	-0.72044	4.1457E-6
SouthAccesstunnelbaseN	96.90000	4.60000	-7.50000	-1.1602	-7.9114	-0.10918	-2.1279	7.6970E-6
	97.80000	4.58000	-7.50000	-1.1273	-7.9114	-0.10393	-2.0629	7.5221E-6
	98.70000	4.56000	-7.50000	-1.0940	-7.9114	-0.098593	-1.9974	7.3470E-6
	99.60000	4.54000	-7.50000	-1.0605	-7.9114	-0.093232	-1.9317	7.1716E-6
	100.50000	4.52000	-7.50000	-1.0270	-7.9114	-0.087894	-1.8660	6.9960E-6
	101.40000	4.50000	-7.50000	-0.99351	-7.9114	-0.082625	-1.8008	6.8202E-6
	102.30000	4.48000	-7.50000	-0.96017	-7.9114	-0.077467	-1.7362	6.6445E-6
	103.20000	4.46000	-7.50000	-0.92706	-7.9114	-0.072457	-1.6725	6.4689E-6
	104.10000	4.44000	-7.50000	-0.89430	-7.9114	-0.067624	-1.6100	6.2937E-6
	105.00000	4.42000	-7.50000	-0.86195	-7.9114	-0.062991	-1.5488	6.1191E-6
	105.90000	4.40000	-7.50000	-0.83009	-7.9114	-0.058577	-1.4891	5.9455E-6
SouthAccesstunnelbaseS	96.70000	1.30000	-7.50000	-0.93710	-7.9114	-0.066137	-1.6630	6.6171E-6
	97.62000	1.28000	-7.50000	-0.91218	-7.9114	-0.063383	-1.6184	6.4706E-6
	98.54000	1.26000	-7.50000	-0.88695	-7.9114	-0.060578	-1.5733	6.3229E-6
	99.46000	1.24000	-7.50000	-0.86150	-7.9114	-0.057744	-1.5279	6.1744E-6
	100.38000	1.22000	-7.50000	-0.83590	-7.9114	-0.054903	-1.4823	6.0253E-6
	101.30000	1.20000	-7.50000	-0.81025	-7.9114	-0.052076	-1.4368	5.8760E-6
	102.22000	1.18000	-7.50000	-0.78462	-7.9114	-0.049282	-1.3915	5.7268E-6
	103.14000	1.16000	-7.50000	-0.75908	-7.9114	-0.046539	-1.3465	5.5779E-6
	104.06000	1.14000	-7.50000	-0.73370	-7.9114	-0.043862	-1.3021	5.4295E-6
	104.98000	1.12000	-7.50000	-0.70854	-7.9114	-0.041266	-1.2583	5.2821E-6
	105.90000	1.10000	-7.50000	-0.68367	-7.9114	-0.038760	-1.2153	5.1358E-6

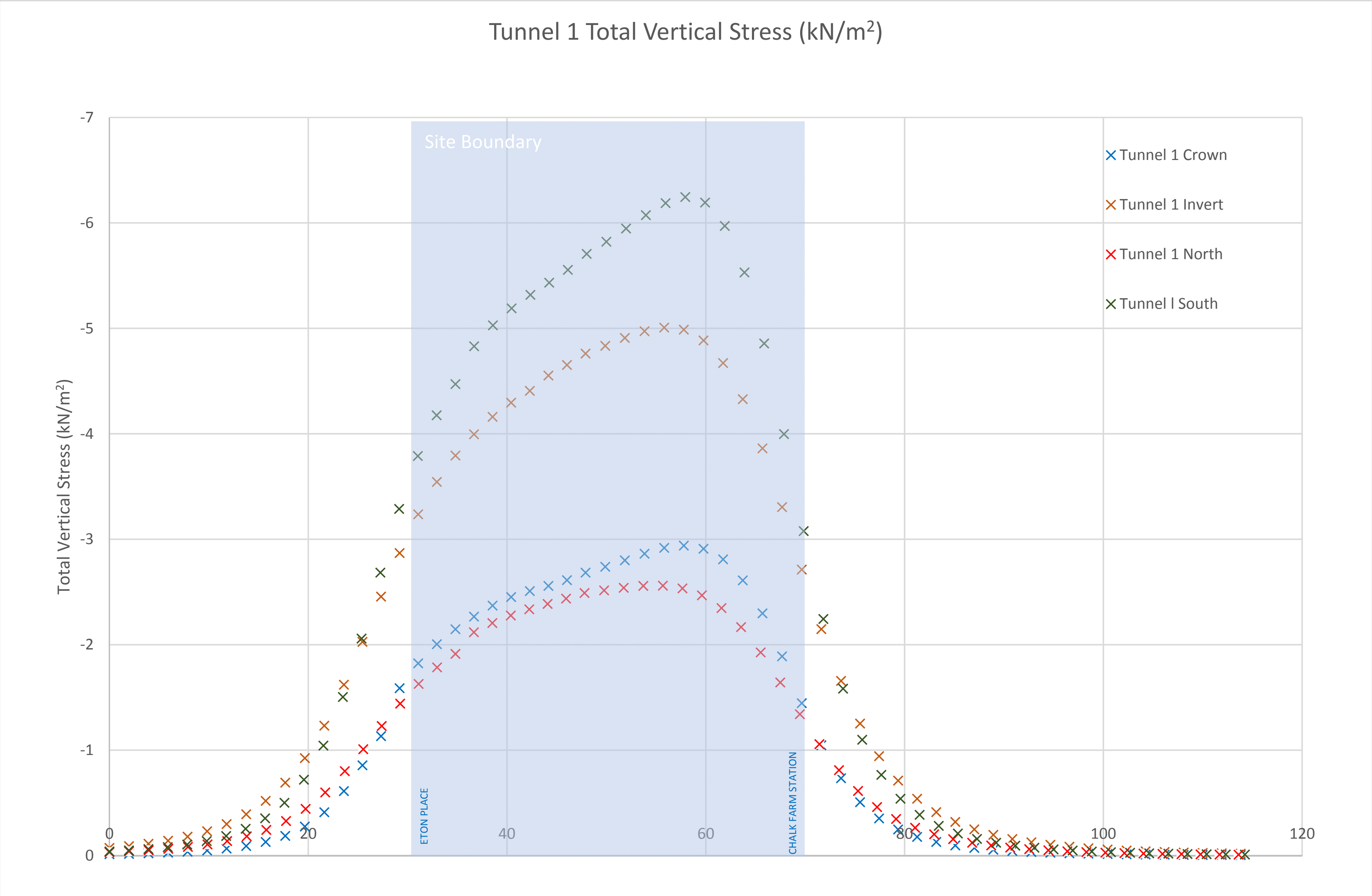


Displacement across Tunnel 1
-6
-5
-4
-3
-2
-1
0
1
0
20
40
60
80
100
120
Tunnel 1 Crown (Short Term)
Tunnel 1 Invert (Short Term)
Tunnel 1 South (Short Term)
Tunnel 1 North (Short Term)
Tunnel 1 Crown (Total)
Tunnel 1 Invert (Total)
Tunnel 1 South (Total)
Tunnel 1 North (Total)
ETON PLACE
CHALK FARM STATION
Site Boundary

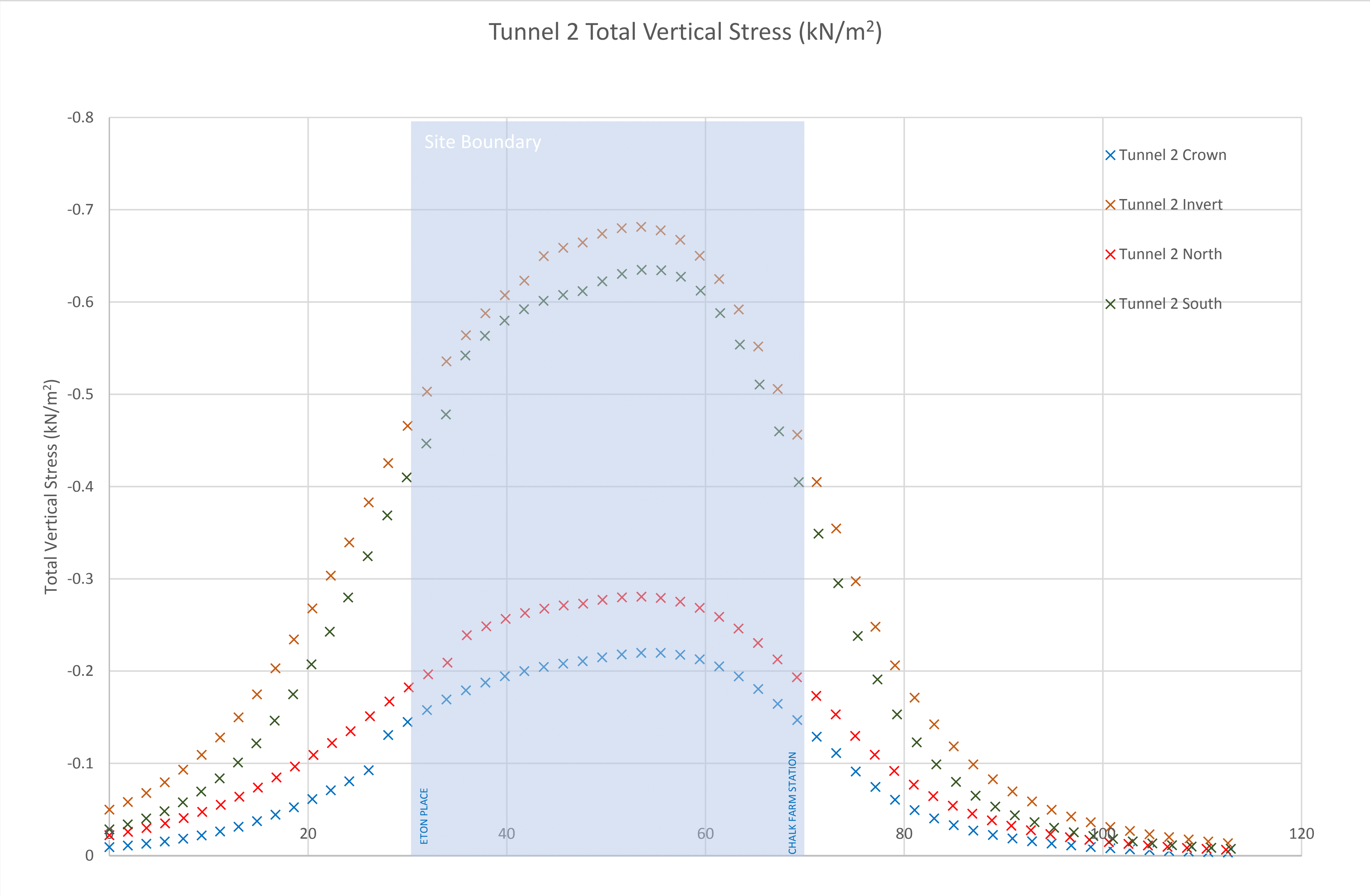

Displacement across Tunnel 2
-2.5
-2
-1.5
-1
-0.5
0
0.5
0
20
40
60
80
100
120
ETON PLACE
CHALK FARM STATION
Site Boundary
Tunnel 2 Crown (Short Term)
Tunnel 2 Invert (Short Term)
Tunnel 2 South (Short Term)
Tunnel 2 North (Short Term)
Tunnel 2 Crown (Total)
Tunnel 2 Invert (Total)
Tunnel 2 South (Total)
Tunnel 2 North (Total)



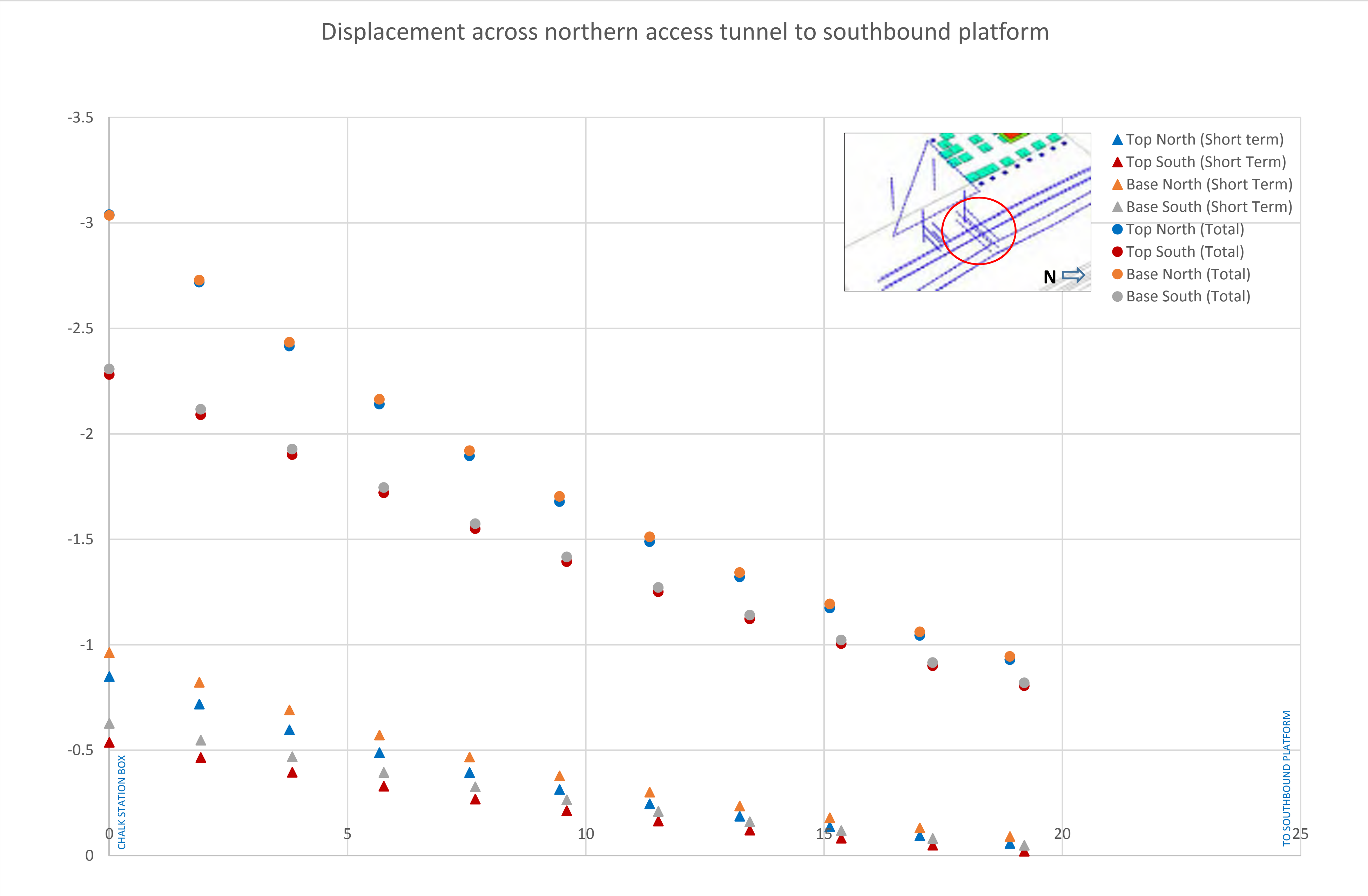
Vertical Strain at Tunnel Crown (%)
Vertical Strain (%)
-4.00E-05
-3.00E-05
-2.00E-05
-1.00E-05
0.00E+00
1.00E-05
2.00E-05
3.00E-05
4.00E-05
5.00E-05
6.00E-05
0
20
40
60
80
100
120
Tunnel 1 Crown (Short Term)
Tunnel 1 Crown (Total)
Tunnel 2 Crown (Short Term)
Tunnel 2 Crown (Total)
ETON PLACE
CHALK FARM STATION



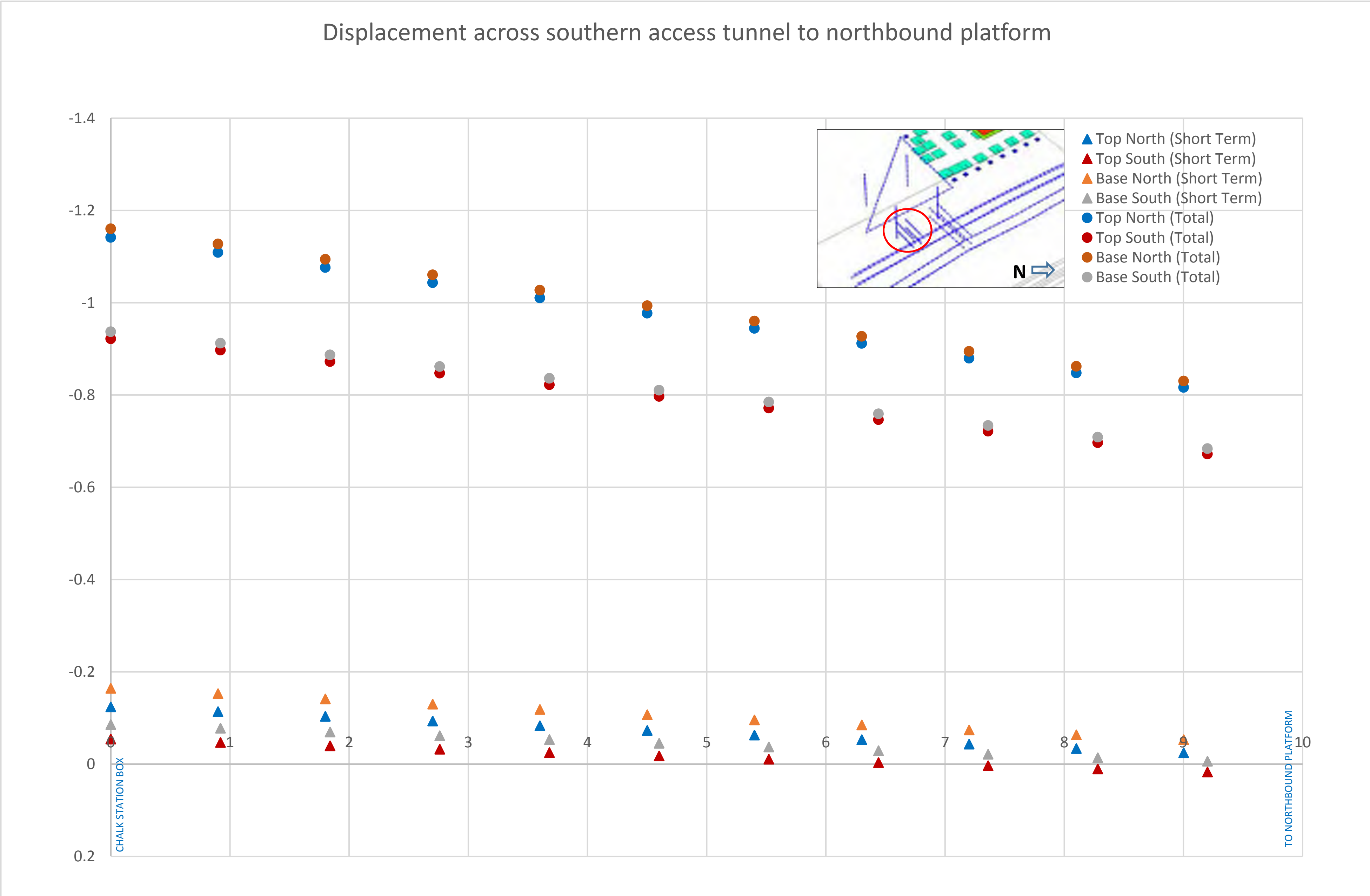
Tunnel 1 Total Vertical Stress (kN/m²)
Site Boundary
Total Vertical Stress (kN/m²)
-7
-6
-5
-4
-3
-2
-1
0
0
20
40
60
80
100
120
ETON PLACE
CHALK FARM STATION
Tunnel 1 Crown
Tunnel 1 Invert
Tunnel 1 North
Tunnel I South



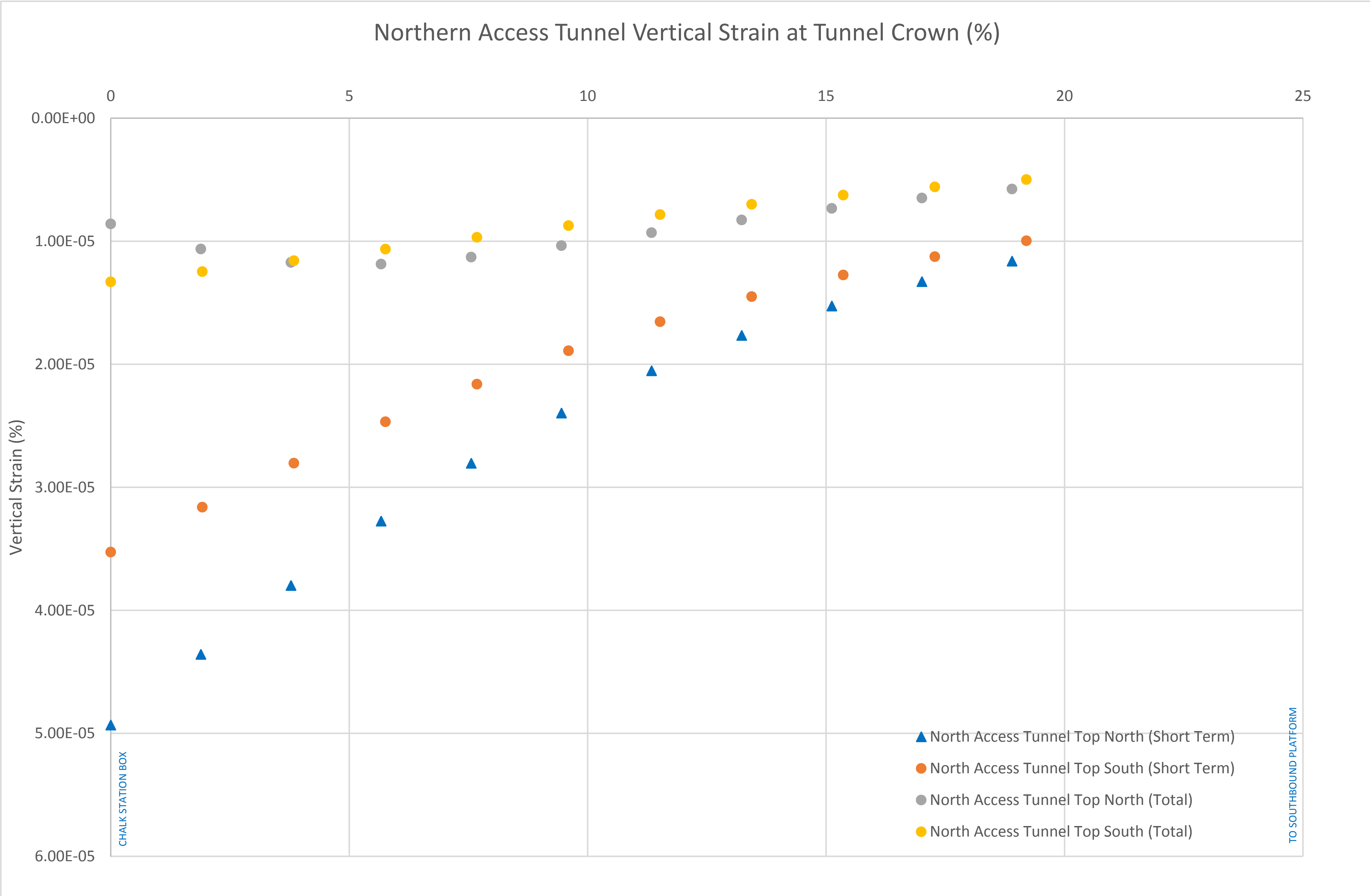
Tunnel 2 Total Vertical Stress (kN/m²)
Total Vertical Stress (kN/m²)
-0.8
-0.7
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0
20
40
60
80
100
120
Site Boundary
ETON PLACE
CHALK FARM STATION
Tunnel 2 Crown
Tunnel 2 Invert
Tunnel 2 North
Tunnel 2 South

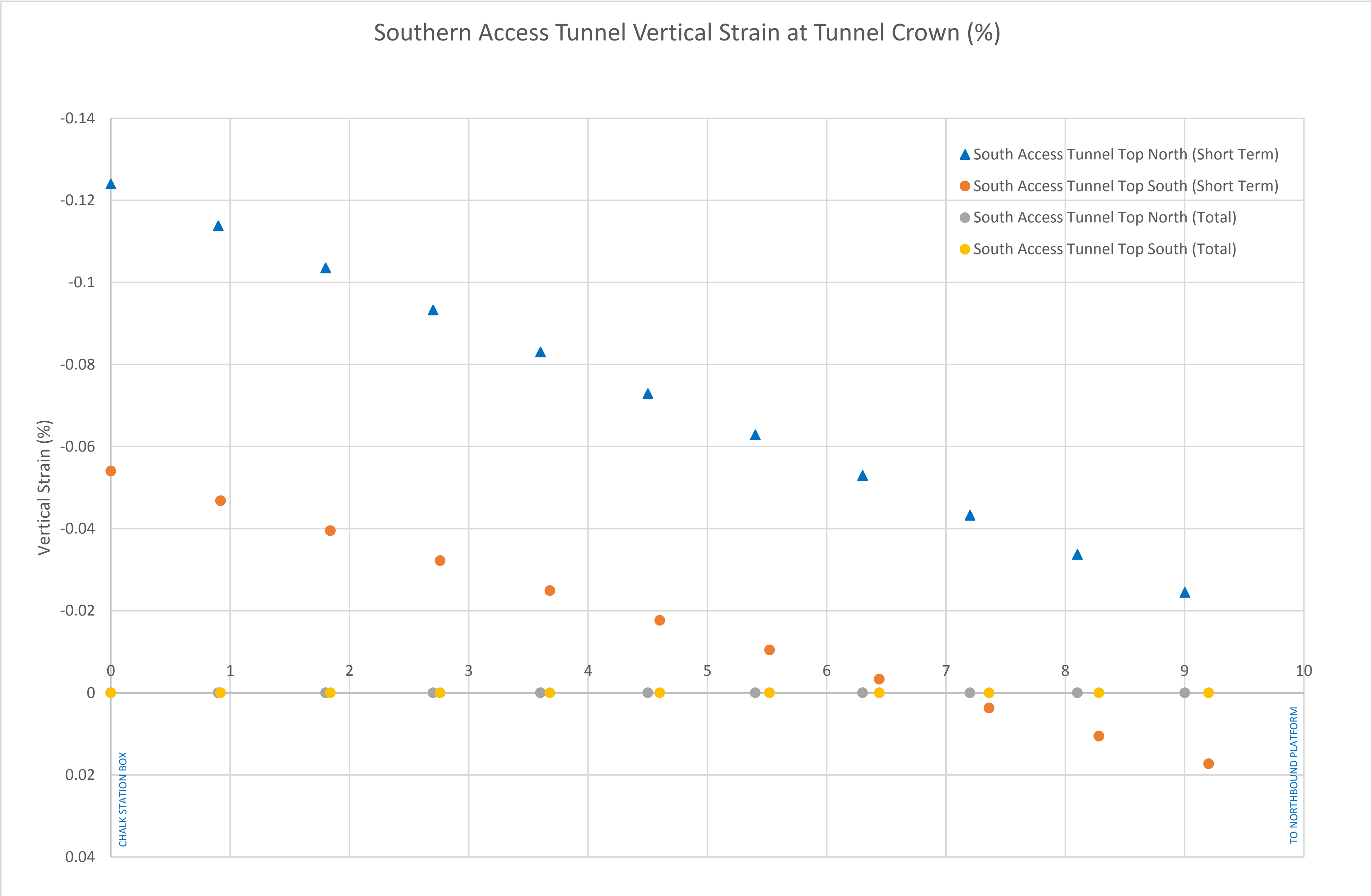


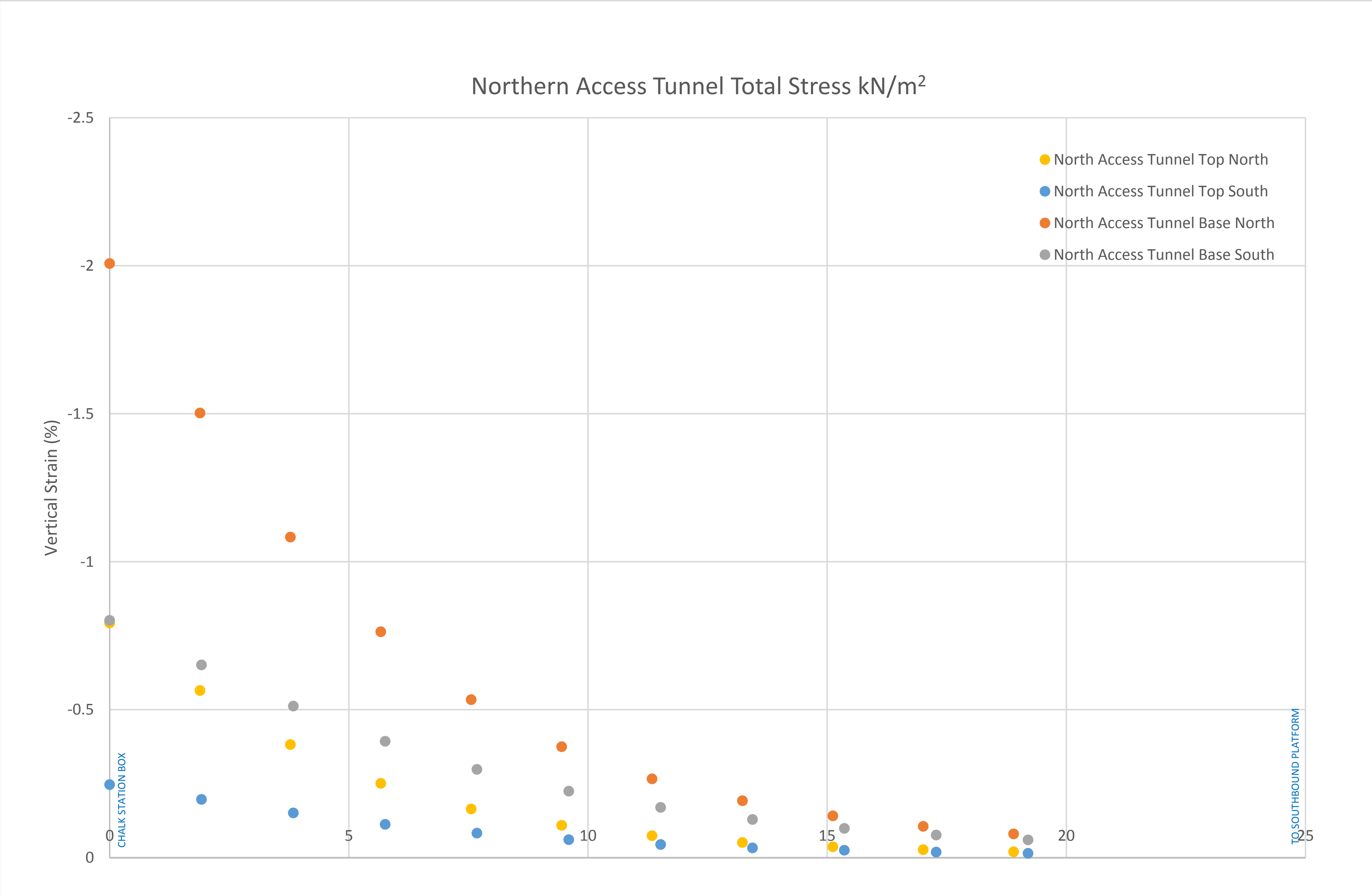
Displacement across northern access tunnel to southbound platform
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
0
0
5
10
15
20
25
CHALK STATION BOX
TO SOUTHBOUND PLATFORM
N
Top North (Short term)
Top South (Short Term)
Base North (Short Term)
Base South (Short Term)
Top North (Total)
Top South (Total)
Base North (Total)
Base South (Total)



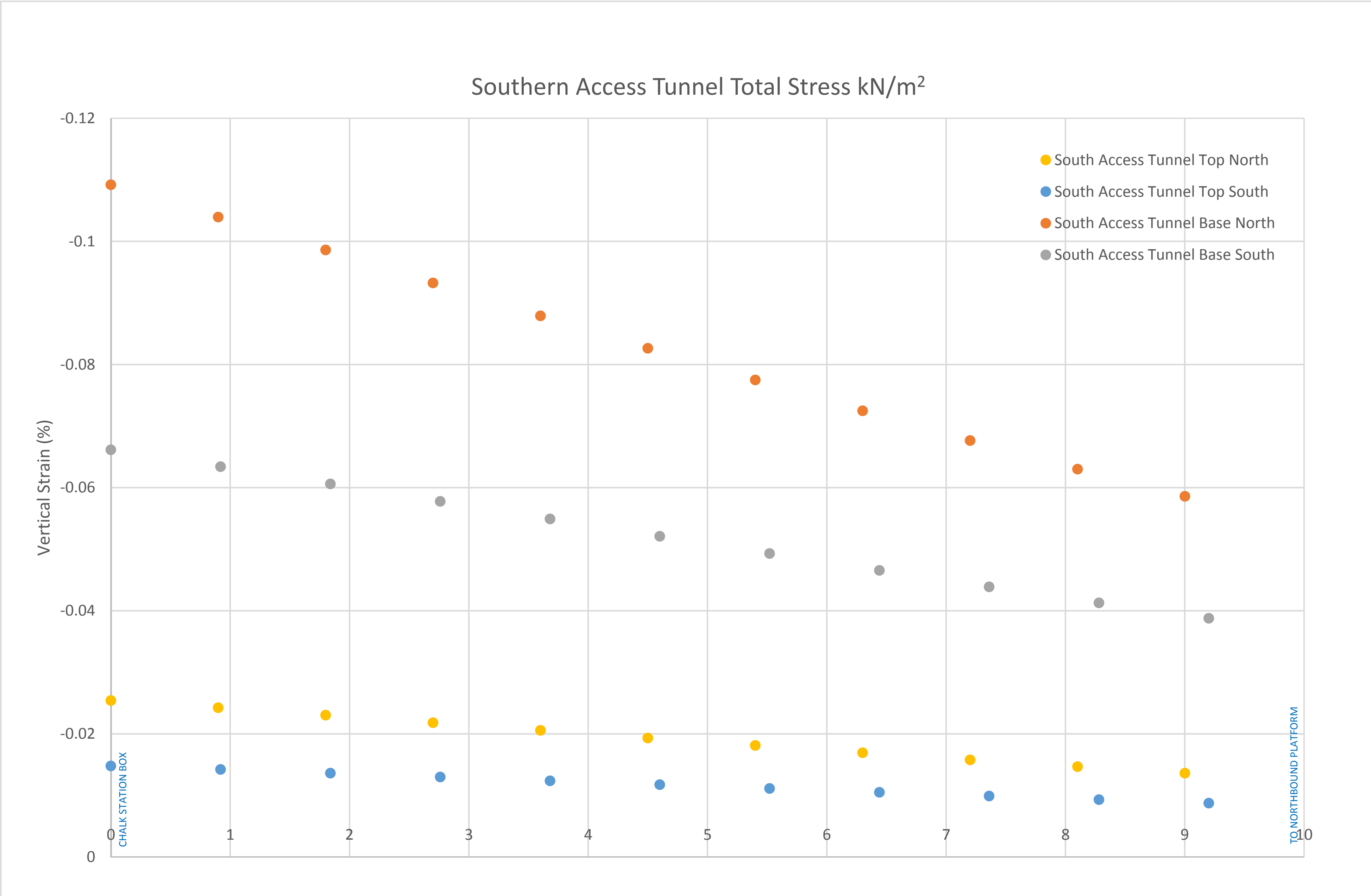
Displacement across southern access tunnel to northbound platform
-1.4
-1.2
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0
1
2
3
4
5
6
7
8
9
10
CHALK STATION BOX
TO NORTHBOUND PLATFORM
N
Top North (Short Term)
Top South (Short Term)
Base North (Short Term)
Base South (Short Term)
Top North (Total)
Top South (Total)
Base North (Total)
Base South (Total)


Northern Access Tunnel Vertical Strain at Tunnel Crown (%)
0
5
10
15
20
25
0.00E+00
1.00E-05
2.00E-05
3.00E-05
4.00E-05
5.00E-05
6.00E-05
Vertical Strain (%)
CHALK STATION BOX
TO SOUTHBOUND PLATFORM
North Access Tunnel Top North (Short Term)
North Access Tunnel Top South (Short Term)
North Access Tunnel Top North (Total)
North Access Tunnel Top South (Total)


Southern Access Tunnel Vertical Strain at Tunnel Crown (%)
Vertical Strain (%)
-0.14
-0.12
-0.1
-0.08
-0.06
-0.04
-0.02
0
0.02
0.04
0
1
2
3
4
5
6
7
8
9
10
South Access Tunnel Top North (Short Term)
South Access Tunnel Top South (Short Term)
South Access Tunnel Top North (Total)
South Access Tunnel Top South (Total)
CHALK STATION BOX
TO NORTHBOUND PLATFORM



Northern Access Tunnel Total Stress kN/m²
Vertical Strain (%)
-2.5
-2
-1.5
-1
-0.5
0
0
5
10
15
20
25
North Access Tunnel Top North
North Access Tunnel Top South
North Access Tunnel Base North
North Access Tunnel Base South
CHALK STATION BOX
TO SOUTHBOUND PLATFORM



Southern Access Tunnel Total Stress kN/m²
Vertical Strain (%)
-0.12
-0.1
-0.08
-0.06
-0.04
-0.02
0
0
1
2
3
4
5
6
7
8
9
10
South Access Tunnel Top North
South Access Tunnel Top South
South Access Tunnel Base North
South Access Tunnel Base South
CHALK STATION BOX
TO NORTHBOUND PLATFORM

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
74513917_1_1

Customer Reference:
J15316

National Grid Reference:
528100, 184430

Slice:
A

Site Area (Ha):
0.11

Search Buffer (m):
1000

Site Details:

5-17 Haverstock Hill
LONDON
NW3 2BP

Client Details:

Mr S Branch
GEA Ltd
Widbury Barn
Widbury Hill
Ware
Herts
SG12 7QE

Contents

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

Report Version v50.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1				4
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 1		1	6	17
Local Authority Pollution Prevention and Control Enforcements	pg 5				1
Nearest Surface Water Feature	pg 5				Yes
Pollution Incidents to Controlled Waters	pg 5			1	2
Prosecutions Relating to Authorised Processes	pg 6				1
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances	pg 6				7
River Quality	pg 7				1
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register	pg 7				1
Water Abstractions	pg 7				13 (*11)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 13	Yes	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 13	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones	pg 13			1	2
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
Detailed River Network Lines					n/a
Detailed River Network Offline Drainage					n/a

Geotechnical & Environmental Associates

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)	pg 15				2
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites	pg 15				3
Registered Waste Treatment or Disposal Sites	pg 16				1
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Geological					
BGS 1:625,000 Solid Geology	pg 17	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 17	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry	pg 18		Yes	Yes	Yes
BGS Urban Soil Chemistry Averages	pg 21	Yes			
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 21	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 21	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards				n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 21	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Industrial Land Use					
Contemporary Trade Directory Entries	pg 22		13	71	207
Fuel Station Entries	pg 46		1	2	2
Sensitive Land Use					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves	pg 47				1
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Discharge Consents** Operator: National Grid Company Plc. Property Type: Production & Distribution Of Electricity Location: Fitzroy Bridge Outlet, Primrosehill, Camden, London Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CTMR.0387 Permit Version: 1 Effective Date: 28th March 1980 Issued Date: 28th March 1980 Revocation Date: Not Supplied Discharge Type: Trade Discharges - Cooling Water Discharge Environment: Canal Receiving Water: Grand Unioncanal **Status: Transferred from Rivers (Prevention of Pollution) Act 1951-1961** Positional Accuracy: Located by supplier to within 100m	A8NE (SE)	553	3	528360 183920
2	**Discharge Consents** Operator: The Jim Henson Studio Property Type: Recreational & Cultural Location: 30 Oval Road, Camden Town, London, Nw1 7de Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: CATM.2853 Permit Version: 1 Effective Date: 1st April 1997 Issued Date: 1st April 1997 Revocation Date: 30th September 2005 Discharge Type: Trade Discharges - Cooling Water Discharge Environment: Canal Receiving Water: Guc - Paddington Arm **Status: Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)** Positional Accuracy: Located by supplier to within 10m	A9NW (SE)	606	3	528600 184050
2	**Discharge Consents** Operator: Rushes Motion Control Property Type: Recreational & Cultural Location: 30 Oval Road, Camden Town, London, Nw1 7de Authority: Environment Agency, Thames Region Catchment Area: Not Given Reference: Cntm.1566 Permit Version: 1 Effective Date: 1st September 1994 Issued Date: 1st September 1994 Revocation Date: 1st October 1996 Discharge Type: Trade Discharges - Cooling Water Discharge Environment: Freshwater Stream/River Receiving Water: Guc - Paddington Arm **Status: Lapsed (under Environment Act 1995, Schedule 23)** Positional Accuracy: Located by supplier to within 100m	A9NW (SE)	606	3	528600 184050
3	**Discharge Consents** Operator: Thames Water Utilities Ltd Property Type: Reservoir/Borehole Site Location: Barrow Hill Authority: Environment Agency, Thames Region Catchment Area: Not Supplied Reference: Temp.0018 Permit Version: 1 Effective Date: 15th September 1989 Issued Date: 15th September 1989 Revocation Date: 5th October 2000 Discharge Type: Trade Effluent Discharge Environment: Freshwater Stream/River Receiving Water: River Thames **Status: Authorisation revokedRevoked** Positional Accuracy: Located by supplier to within 100m	A7SE (SW)	943	3	527600 183600
4	**Local Authority Pollution Prevention and Controls** Name: Texaco Location: 81-85 Chalk Farm Road, LONDON, NW1 8AR Authority: London Borough of Camden, Pollution Projects Team Permit Reference: NOT GIVEN Dated: 24th December 1998 Process Type: Local Authority Air Pollution Control Description: PG1/14 Petrol filling station **Status: Site Closed** Positional Accuracy: Manually positioned to the address or location	A13SE (E)	150	4	528269 184381

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	**Local Authority Pollution Prevention and Controls** Name: Lex Volvo Location: 1 Dumpton Place, Gloucester Avenue, Chalk Farm, LONDON, NW1 8JB Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: 7th January 1994 Process Type: Local Authority Air Pollution Control Description: PG6/34 Respraying of road vehicles **Status:** **Authorised** Positional Accuracy: Manually positioned to the address or location	A13SE (S)	283	4	528165 184138
6	**Local Authority Pollution Prevention and Controls** Name: Primrose Valet Location: 91 Regent'S Park Road, London, Nw1 8ur Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC53 Dated: 28th January 2009 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Manually positioned to the address or location	A13SW (SW)	304	4	527917 184155
7	**Local Authority Pollution Prevention and Controls** Name: The Dry Cleaners Of Hampstead Location: 80 Haverstock Hill, London, Nw3 2be Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC41 Dated: 25th June 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	324	4	527875 184684
8	**Local Authority Pollution Prevention and Controls** Name: Wm Morrisons Supermarkets Plc Location: Chalk Farm Road, London, Nw1 8aa Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC/DC1 Dated: 26th January 2007 Process Type: Local Authority Pollution Prevention and Control Description: PG6/46 Dry cleaning **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A14SW (SE)	421	4	528439 184146
8	**Local Authority Pollution Prevention and Controls** Name: Wm Morrisons Supermarkets Plc Location: Chalk Farm Road, LONDON, NW1 8AA Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC19 Dated: 22nd December 1998 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status:** **Permitted** Positional Accuracy: Located by supplier to within 10m	A14SW (SE)	421	4	528439 184146
9	**Local Authority Pollution Prevention and Controls** Name: Esso Location: 29 Chalk Farm Road, LONDON, NW1 8AG Authority: London Borough of Camden, Pollution Projects Team Permit Reference: PPC15 Dated: 24th December 1998 Process Type: Local Authority Pollution Prevention and Control Description: PG1/14 Petrol filling station **Status:** **Permitted** Positional Accuracy: Manually positioned to the address or location	A14SW (E)	461	4	528567 184291
10	**Local Authority Pollution Prevention and Controls** Name: J T Coachworks Location: 52A Prince Wales Road, LONDON, NW5 3LR Authority: London Borough of Camden, Pollution Projects Team Permit Reference: Not Given Dated: 30th April 1993 Process Type: Local Authority Air Pollution Control Description: PG6/34 Respraying of road vehicles **Status:** **Authorisation revokedRevoked** Positional Accuracy: Automatically positioned to the address	A14NW (NE)	541	4	528594 184700

Map ID	Details		Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Pollution Prevention and Controls					
22	Name:	London Zoo	A8SW (S)	937	5	528016 183480
	Location:	Regents Park, LONDON, NW1 4RY				
	Authority:	Westminster City Council, Environmental Health Department				
	Permit Reference:	Not Given				
	Dated:	1st November 1992				
	Process Type:	Local Authority Air Pollution Control				
	Description:	PG5/1Clinical waste incineration processes under 1 tonne an hour				
	Status:	**Authorisation has expiredExpired**				
	Positional Accuracy:	Automatically positioned to the address				
	Local Authority Pollution Prevention and Controls					
23	Name:	Royal Mail Property Holdings Ltd	A19SE (NE)	996	4	528875 185083
	Location:	1 Regis Road, LONDON, NW5 3EW				
	Authority:	London Borough of Camden, Pollution Projects Team				
	Permit Reference:	Not Given				
	Dated:	Not Supplied				
	Process Type:	Local Authority Air Pollution Control				
	Description:	PG6/10 Coating manufacturing				
	Status:	**Authorisation revokedRevoked**				
	Positional Accuracy:	Manually positioned to the road within the address or location				
	Local Authority Pollution Prevention and Control Enforcements					
24	Location:	3 - 6 Spring Place, London, Nw5 3ba	A19SW (NE)	728	4	528569 185005
	Type:	Air Pollution Control Enforcement Notice				
	Reference:	Not Given				
	Date Issued:	16th November 2001				
	Enforcement Date:	Not Supplied				
	Details:	Failure To Maintain Proper Paperwork For Organic Compounds				
	Positional Accuracy:	Manually positioned to the address or location				
	Nearest Surface Water Feature		A8NE (SE)	529	-	528430 183990
	Pollution Incidents to Controlled Waters					
25	Property Type:	Not Given	A8NW (S)	422	3	528000 184000
	Location:	Hampstead Road Lock, CAMDEN TOWN				
	Authority:	Environment Agency, Thames Region				
	Pollutant:	Oils - Unknown				
	Note:	Not Supplied				
	Incident Date:	17th December 1998				
	Incident Reference:	THNE1998041401				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Not Given				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				
	Pollution Incidents to Controlled Waters					
26	Property Type:	Not Given	A8SE (S)	740	3	528300 183700
	Location:	Prince Albert Road				
	Authority:	Environment Agency, Thames Region				
	Pollutant:	Not Given				
	Note:	Confirmed incident				
	Incident Date:	4th April 1999				
	Incident Reference:	THNE1999043097				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Not Given				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Approximate location provided by supplier				
	Pollution Incidents to Controlled Waters					
27	Property Type:	Not Given	A14SE (E)	990	3	529100 184250
	Location:	LONDON				
	Authority:	Environment Agency, Thames Region				
	Pollutant:	Oils - Unknown				
	Note:	Not Supplied				
	Incident Date:	15th January 1996				
	Incident Reference:	SE960036				
	Catchment Area:	Not Given				
	Receiving Water:	Not Given				
	Cause of Incident:	Not Given				
	Incident Severity:	Category 3 - Minor Incident				
	Positional Accuracy:	Located by supplier to within 100m				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Abbey Lodge Rtm Company Limited Licence Number: 28/39/39/0115 Permit Version: 101 Location: Abbey Lodge, Park Road, London Nw8-Two Boreholes Authority: Environment Agency, Thames Region Abstraction: Household Water Supply: Drinking; Cooking; Sanitary; Washing; (Small Garden) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Abbey Lodge, Park Road, London Nw8 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st June 2006 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1911	3	527420 182620
	Water Abstractions Operator: Wood Management Trustees Ltd Licence Number: 28/39/39/0115 Permit Version: 100 Location: Two Boreholes At Abbey Lodge, Park Road, London Nw8 Authority: Environment Agency, Thames Region Abstraction: Household Water Supply: Drinking; Cooking; Sanitary; Washing; (Small Garden) Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): 100 Yearly Rate (m3): 28640 Details: Abbey Lodge, Park Road, London Nw8 Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 28th November 1991 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	(S)	1911	3	527420 182620
	Groundwater Vulnerability Soil Classification: Not classified Map Sheet: Sheet 39 West London Scale: 1:100,000	A13SW (NW)	0	3	528100 184427
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	A13SW (NW)	0	2	528100 184427
	Superficial Aquifer Designations No Data Available				
35	**Source Protection Zones** Name: Barrow Hill Source: Environment Agency, Head Office Reference: Th405 Type: Zone II (Outer Protection Zone): Either 25% of the source area or a 400 day travel time whichever is greater.	A12SE (SW)	407	3	527741 184182
36	**Source Protection Zones** Name: Barrow Hill Source: Environment Agency, Head Office Reference: Th405 Type: Zone I (Inner Protection Zone): Travel time of 50 days or less to the groundwater source.	A7NE (SW)	612	3	527723 183914
37	**Source Protection Zones** Name: Barrow Hill Source: Environment Agency, Head Office Reference: Th405 Type: Groundwater Source	A7SE (SW)	846	3	527640 183690
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Flood Defences None				
	Detailed River Network Lines None				
	Detailed River Network Offline Drainage None				

Map ID	Details		Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Licensed Waste Management Facilities (Locations)					
38	Licence Number:	80482	A9NW (SE)	668	3	528667 184035
	Location:	28 Jamestown Road , London, NW1 7BY				
	Operator Name:	Camden London Borough Council				
	Operator Location:	Not Supplied				
	Authority:	Environment Agency - Thames Region, North East Area				
	Site Category:	Household Waste Amenity Sites				
	Licence Status:	**Surrendered**				
	Issued:	15th October 1994				
	Last Modified:	Not Supplied				
	Expires:	Not Supplied				
	Suspended:	Not Supplied				
	Revoked:	Not Supplied				
	Surrendered:	25th July 1997				
	IPPC Reference:	Not Supplied				
	Positional Accuracy:	Located by supplier to within 10m				
	Licensed Waste Management Facilities (Locations)					
39	Licence Number:	80349	A19NW (NE)	939	3	528740 185138
	Location:	Recycling Centre, Regis Road, Kentish Town, London, NW5 3EP				
	Operator Name:	LondonWaste Ltd				
	Operator Location:	Not Supplied				
	Authority:	Environment Agency - Thames Region, North East Area				
	Site Category:	Household Waste Amenity Sites				
	Licence Status:	**Transferred**				
	Issued:	10th December 1996				
	Last Modified:	25th January 2002				
	Expires:	Not Supplied				
	Suspended:	Not Supplied				
	Revoked:	Not Supplied				
	Surrendered:	Not Supplied				
	IPPC Reference:	Not Supplied				
	Positional Accuracy:	Located by supplier to within 10m				
	Local Authority Landfill Coverage					
	Name:	London Borough of Camden - Has no landfill data to supply		0	8	528100 184427
	Local Authority Landfill Coverage					
	Name:	Westminster City Council - Has supplied landfill data		739	5	528216 183684
	Registered Waste Transfer Sites					
40	Licence Holder:	L.B. of Camden	A9NW (SE)	696	3	528690 184020
	Licence Reference:	DL251				
	Site Location:	Jamestown Road Recycling Centre, 28 Jamestown Road, CAMDEN, London, NW1				
	Operator Location:	Old Town Hall, Haverstock Hill, CAMDEN, London, NW3 4QP				
	Authority:	Environment Agency - Thames Region, North East Area				
	Site Category:	Transfer				
	Max Input Rate:	Small (Equal to or greater than 10,000 and less than 25,000 tonnes per year)				
	Waste Source Restrictions:	No known restriction on source of waste				
	Licence Status:	Licence has completion certificateSurrendered				
	Dated:	5th October 1994				
	Preceded By Licence:	DL251				
	Superseded By Licence:	Not Given				
	Positional Accuracy:	Manually positioned to the address or location				
	Boundary Quality:	Not Supplied				
	Authorised Waste	Lead/Acid Batteries Lwra Cat. A = Inert Wastes Lwra Cat. Bi Gen.Non-Putresc Mineral Oils Mostlwra Cat. C 'Putresc' Some Lwra Cat Bii Gen. Scrap Metal W. W.For Recyling (Cats A, Bi, C)				
	Prohibited Waste	Clinical - As In Coll/Disp.Regs Of '88 Special Wastes N.O.S. Waste N.O.S.				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Thames Group	A13SW (NW)	0	2	528100 184427
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SW (NW)	0	2	528100 184427
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A13SW (W)	75	2	528000 184427
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NW (S)	415	2	528100 184000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A8NW (S)	422	2	528000 184000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SW (N)	551	2	528100 185000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A18SW (N)	559	2	528000 185000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A14SE (E)	874	2	529000 184427
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: London Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: no data Nickel Concentration: no data	A9NE (SE)	973	2	529000 184000
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528324, 184426 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 14.00 mg/kg Cadmium Measured Concentration: 1.00 mg/kg Chromium Measured Concentration: 71.00 mg/kg Lead Measured Concentration: 1103.00 mg/kg Nickel Measured Concentration: 29.00 mg/kg	A13SE (E)	198	2	528324 184426
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 528240, 184781 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 17.00 mg/kg Cadmium Measured Concentration: 0.30 mg/kg Chromium Measured Concentration: 74.00 mg/kg Lead Measured Concentration: 994.00 mg/kg Nickel Measured Concentration: 26.00 mg/kg	A18SE (N)	361	2	528240 184781
	BGS Measured Urban Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Grid: 527717, 184227 Soil Sample Type: Topsoil Sample Area: London Arsenic Measured Concentration: 21.00 mg/kg Cadmium Measured Concentration: 0.60 mg/kg Chromium Measured Concentration: 77.00 mg/kg Lead Measured Concentration: 2046.00 mg/kg Nickel Measured Concentration: 34.00 mg/kg	A12SE (SW)	405	2	527717 184227

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Urban Soil Chemistry Averages Source: British Geological Survey, National Geoscience Information Service Sample Area: London Count Id: 7189 Arsenic Minimum Concentration: 1.00 mg/kg Arsenic Average Concentration: 17.00 mg/kg Arsenic Maximum Concentration: 161.00 mg/kg Cadmium Minimum Concentration: 0.30 mg/kg Cadmium Average Concentration: 0.90 mg/kg Cadmium Maximum Concentration: 165.20 mg/kg Chromium Minimum Concentration: 13.00 mg/kg Chromium Average Concentration: 79.00 mg/kg Chromium Maximum Concentration: 2094.00 mg/kg Lead Minimum Concentration: 11.00 mg/kg Lead Average Concentration: 280.00 mg/kg Lead Maximum Concentration: 10000.00 mg/kg Nickel Minimum Concentration: 2.00 mg/kg Nickel Average Concentration: 28.00 mg/kg Nickel Maximum Concentration: 506.00 mg/kg	A13SW (NW)	0	2	528100 184427
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SW (SW)	197	2	527922 184290
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13SW (NW)	0	2	528100 184427

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
43	**Contemporary Trade Directory Entries** Name: American Dry Cleaners Location: 4, Chalk Farm Parade, Adelaide Road, LONDON, NW3 2BN Classification: Dry Cleaners **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	5	-	528085 184411
44	**Contemporary Trade Directory Entries** Name: Cleaners Chalk Farm Location: 8, Haverstock Hill, London, NW3 2BL Classification: Cleaning Services - Domestic **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (E)	71	-	528197 184426
44	**Contemporary Trade Directory Entries** Name: Marine Ices Location: 8, Haverstock Hill, London, NW3 2BL Classification: Ice Cream Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	71	-	528197 184426
44	**Contemporary Trade Directory Entries** Name: Marine Ices Location: 8, Haverstock Hill, London, NW3 2BL Classification: Ice Cream Manufacturers & Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	71	-	528197 184426
45	**Contemporary Trade Directory Entries** Name: 1 A Pest Control Location: Call Centre,Regents Pk Rd, London, NW1 8BB Classification: Pest & Vermin Control **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (SE)	72	-	528166 184364
46	**Contemporary Trade Directory Entries** Name: Chalk Farm Ford Location: 74-77, Chalk Farm Road, London, NW1 8AN Classification: Car Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	200	-	528314 184358
46	**Contemporary Trade Directory Entries** Name: Chalk Farm Tyres Location: 66, Chalk Farm Road, London, NW1 8AN Classification: Tyre Dealers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	245	-	528359 184350
47	**Contemporary Trade Directory Entries** Name: Mercantile Radio Services Ltd Location: 134a, Gloucester Avenue, London, NW1 8JA Classification: Telecommunications Equipment & Systems **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	217	-	528056 184199
47	**Contemporary Trade Directory Entries** Name: London Communications Plc Location: 134-136, Gloucester Avenue, London, NW1 8JA Classification: Radio Communication Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	217	-	528056 184199
47	**Contemporary Trade Directory Entries** Name: London Communications Plc Location: 134-136, Gloucester Avenue, London, NW1 8JA Classification: Radio Communication Equipment **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (S)	217	-	528056 184199
48	**Contemporary Trade Directory Entries** Name: S B Z Foods Location: 10a Belmont St, London, NW1 8HH Classification: Food Products - Manufacturers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SE (E)	220	-	528344 184399
48	**Contemporary Trade Directory Entries** Name: Austrian Sausage Centre Location: 10a, Belmont Street, London, NW1 8HH Classification: Meat Product Manufacturers & Wholesalers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	220	-	528344 184399

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
48	**Contemporary Trade Directory Entries** Name: Infectious Distribution Location: 25, Ferdinand Street, London, NW1 8EU Classification: Distribution Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	262	-	528387 184403
49	**Contemporary Trade Directory Entries** Name: Stonegate Cleaning Location: Flat 4, Stonegate, St. Silas Place, London, NW5 3QP Classification: Commercial Cleaning Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NE (NE)	249	-	528235 184657
50	**Contemporary Trade Directory Entries** Name: Ariel Medical Ltd Location: 4, Maitland Park Road, London, NW3 2ES Classification: Medical Equipment Manufacturers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13NW (NW)	251	-	527991 184676
51	**Contemporary Trade Directory Entries** Name: Ireson Associates Location: 110, Gloucester Avenue, London, NW1 8HX Classification: Stained Glass Designers & Producers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (S)	258	-	528106 184158
52	**Contemporary Trade Directory Entries** Name: Marine Ices Location: 61, Chalk Farm Road, London, NW1 8AN Classification: Ice Cream Manufacturers & Suppliers **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (E)	274	-	528386 184337
52	**Contemporary Trade Directory Entries** Name: Select Canvas Location: The Stables Market,Chalk Farm Rd, London, NW1 8AH Classification: Printers **Status: Inactive** Positional Accuracy: Manually positioned to the road within the address or location	A13SE (E)	289	-	528392 184314
52	**Contemporary Trade Directory Entries** Name: Reject Pot Shop Location: 56, Chalk Farm Road, London, NW1 8AN Classification: Catering Equipment **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SE (E)	298	-	528408 184330
52	**Contemporary Trade Directory Entries** Name: Reject Pot Shop Location: 56, Chalk Farm Road, London, NW1 8AN Classification: Tableware **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (E)	298	-	528408 184330
53	**Contemporary Trade Directory Entries** Name: Volvo Cars Regents Park Location: 1, Dumpton Place, London, NW1 8JB Classification: Garage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (S)	282	-	528166 184138
53	**Contemporary Trade Directory Entries** Name: Oven Cleaning Primrose Hill Location: 90, Gloucester Avenue, London, NW1 8HX Classification: Oven cleaning **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SE (S)	292	-	528158 184128
54	**Contemporary Trade Directory Entries** Name: P H Factor Location: 172, Regents Park Road, London, NW1 8XN Classification: Toiletries **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	298	-	527949 184145
54	**Contemporary Trade Directory Entries** Name: The Studio Location: 170, Regents Park Road, London, NW1 8XN Classification: Perfume Suppliers **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	303	-	527946 184141

Industrial Land Use

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
172	**Contemporary Trade Directory Entries** Name: Belsize Park Cleaners Location: 192, Haverstock Hill, London, NW3 2AJ Classification: Cleaning Services - Domestic **Status:** **Inactive** Positional Accuracy: Automatically positioned to the address	A17NW (NW)	997	-	527358 185118
172	**Contemporary Trade Directory Entries** Name: Belsize Park Cleaners Location: 192, Haverstock Hill, London, NW3 2AJ Classification: Cleaning Services - Domestic **Status:** **Inactive** Positional Accuracy: Automatically positioned to the address	A17NW (NW)	997	-	527358 185118
173	**Contemporary Trade Directory Entries** Name: National Tyres And Autocare Location: 107, Parkway, London, NW1 7PP Classification: Tyre Dealers **Status:** **Inactive** Positional Accuracy: Automatically positioned to the address	A9SW (SE)	999	-	528714 183615
174	**Fuel Station Entries** Name: Star Chalk Farm Location: 81-85 Chalk Farm Road, Chalk Farm, LONDON, NW1 8AR Brand: Texaco Premises Type: Not Applicable **Status:** **Obsolete** Positional Accuracy: Approximate location provided by supplier	A13NE (NE)	72	-	528174 184481
175	**Fuel Station Entries** Name: Morrisons Camden Location: Chalk Farm Road, Chalk Farm, London, Greater London, NW1 8AA Brand: Morrisons Premises Type: Hypermarket **Status:** **Open** Positional Accuracy: Manually positioned to the address or location	A13SE (SE)	328	-	528420 184281
176	**Fuel Station Entries** Name: Chalk Farm Service Station Location: 32-33, Chalk Farm Road, London, NW1 8AJ Brand: ESSO Premises Type: Not Applicable **Status:** **Obsolete** Positional Accuracy: Manually positioned to the address or location	A14SW (E)	461	-	528567 184291
177	**Fuel Station Entries** Name: Parkway Filling Station Location: 120 Parkway, Camden Town, LONDON, NW1 7AN Brand: Obsolete Premises Type: Not Applicable **Status:** **Obsolete** Positional Accuracy: Approximate location provided by supplier	A9NW (SE)	703	-	528582 183889
178	**Fuel Station Entries** Name: Court Service Station Location: 160a Malden Road, Kentish Town, LONDON, NW5 4BT Brand: Obsolete Premises Type: Not Applicable **Status:** **Obsolete** Positional Accuracy: Located by supplier to within 100m	A18NW (N)	753	-	528033 185200

Sensitive Land Use

Map ID	Details		Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Nature Reserves					
179	Name:	Belsize Wood	A17NE (NW)	967	6	527528 185230
	Multiple Area:	N				
	Area (m2):	2722.99				
	Source:	Natural England				
	Designation Date:	28th March 2012				

Useful Contacts

Contact	Name and Address	Contact Details
2	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
3	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
4	**London Borough of Camden - Pollution Projects Team** Seventh Floor, Town Hall Extension, Argyle Street, London, WC1H 8EQ	Telephone: 020 7278 4444 Fax: 020 7860 5713 Website: www.camden.gov.uk
5	**Westminster City Council - Environmental Health Department** Council House, Marylebone Road, London, NW1 5PT	Telephone: 020 7641 1317 Fax: 020 7641 1142 Website: www.westminster.gov.uk
6	**Natural England** Suite D, Unex House, Bourges Boulevard, Peterborough, Cambridgeshire, PE1 1NG	Telephone: 0845 600 3078 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
7	**Environment Agency - Head Office** Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
8	**London Borough of Camden** Town Hall, Judd Street, London, WC1H 9JE	Telephone: 020 7974 4444 Fax: 020 7974 6866 Email: info@camden.gov.uk Website: www.camden.gov.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

LONDON FIRE
AND EMERGENCY
PLANNING AUTHORITY

Petroleum Group LFB Headquarters - 2nd Floor
169 Union Street London SE1 0LL
T 020 8555 1200 x30859
F 020 7960 3624
Minicom 020 7960 3629
london-fire.gov.uk

Ms Hannah Dashfield
GEA Ltd
Widbury Barn
Widbury Hill
Ware
Hertfordshire
SG12 7QE

London Fire and Emergency Planning
Authority runs the London Fire Brigade

Date 5 November 2015
Our Ref FSR/PET/02/017530/ms

Dear Madam,

THE ENVIRONMENTAL INFORMATION REGULATIONS 2004 - ENVIRONMENTAL ENQUIRY

Premises: 5-17 Haverstock Hill, London NW3 2BP

As requested, a search has been made for information on the above premises. A thorough search of current and historical files and databases has revealed no petroleum tank information for the site.

Please note that this report is restricted to matters currently known by the London Fire and Emergency Planning Authority. Although we hold extremely comprehensive records, it is possible that we do not hold any records whatsoever for some solid-filled and very old tanks. This will be for one of the following reasons:-

1. The records held by this Authority were passed to it from the Greater London Council in 1986. In 1965 the Greater London Council inherited petroleum related records from the London County Council and the outer London Boroughs / Councils. Some of the outer London records were incomplete.

2. For premises where petroleum tanks have been either removed or permanently made safe, the Authority's records have (in a minority of cases) been destroyed; and for these cases the Authority does not hold any records that indicate that there was ever a 'petroleum' interest at the premises.

As you are aware, a fee is levied for the provision of this information and payment should be made in accordance with the invoice, which will be sent under separate cover.

Any queries regarding this letter should be addressed to the Petroleum Group Admin Manager. If you are dissatisfied in any way with the response given, please ask to speak to the Team Leader quoting our reference.

Yours faithfully,

Maria Sack

for Assistant Commissioner (Fire Safety)
Directorate of Operations
petroleum@london-fire.gov.uk

Reply to Maria Sack
Direct **T** 020 8555 1200 x30859

ENVIRONMENTAL ENQUIRY DETAIL FORM

Premises:
5-17 Haverstock Hill, London NW3 2BP
Our Reference:
FSR/PET/02/017530

Current licence / Petroleum Storage Certificate in force?
YES ☐ NO ☒
Date last licence(s)/storage certificate(s) issued:
N/A

Known leaks or spills at this site:
N/A

Comments:
The Authority holds no record of petroleum storage tanks on this site.

Signed:	*Maria Sack*

Name:	Maria Sack

Position:	Administrative Officer

Date:	5 November 2015

Hannah Dashfield

From:	Arthur, Anona <Anona.Arthur@camden.gov.uk>
Sent:	10 November 2015 16:46
To:	Hannah Dashfield
Subject:	Contaminated Land Enquiry: 5-17 Haverstock Hill
Attachments:	502-LandUseHistoric.csv

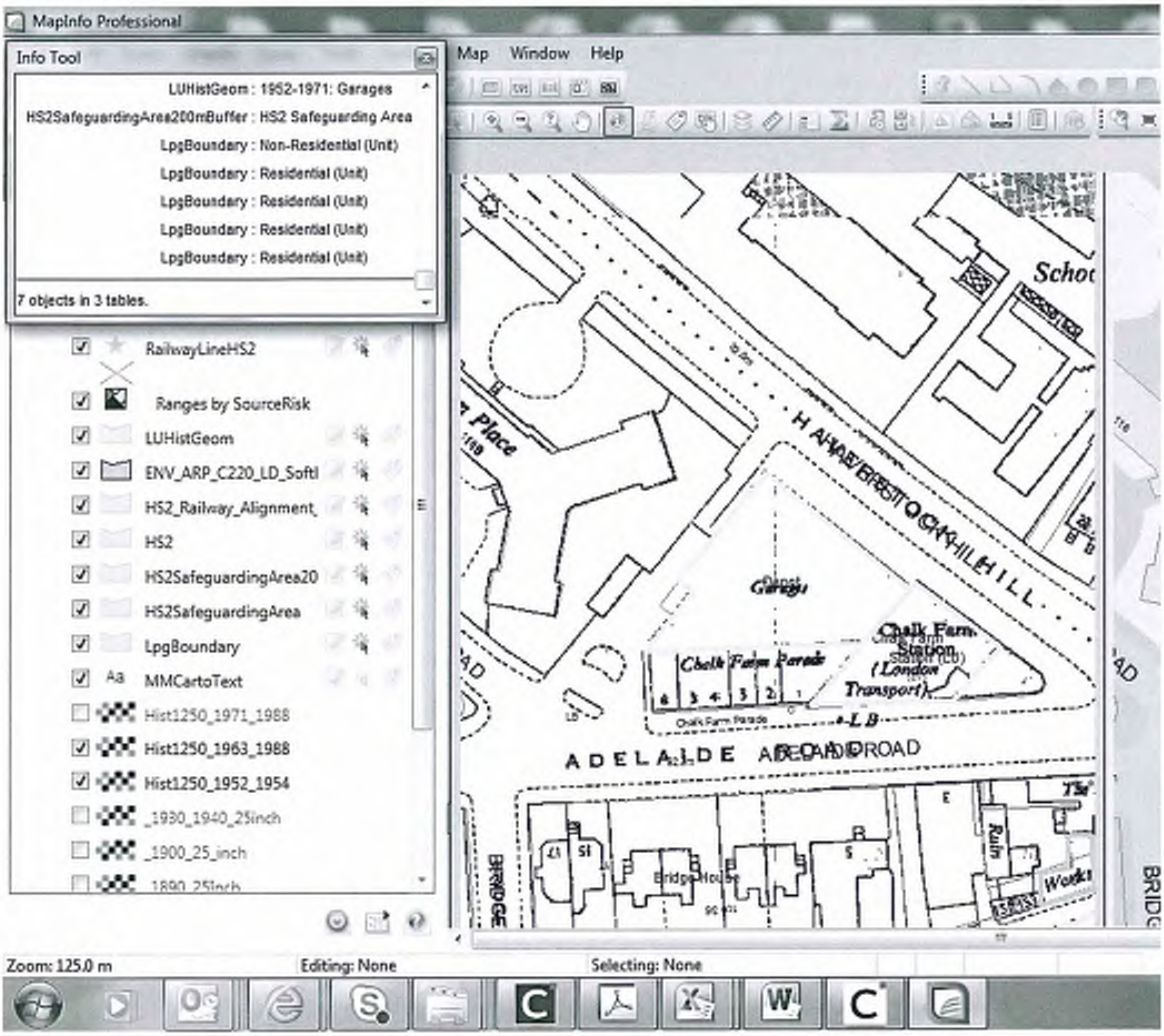
Dear Hannah

Thank you for your enquiry relating to the above I would like to confirm the following.

The historical land use of the site was Garages as indicated in the map below. The Council holds no other records in relation to this site.

Disclaimer:

The above response is provided from such information that is readily available to the Council and in its possession. It is believed to be correct but the Council expressly gives no warranty in this respect nor will the Council accept any liability whatsoever for any error, omission or loss occasioned thereby to any person (whether or not the person requested the information) and in particular the Council gives no warranty that it has researched all its relevant archives in order to respond to the request for information.



Regards

Anona Arthur
Environmental Health Officer / Contaminated Land Officer

Telephone: 020 7974 2990

From: Hannah Dashfield [mailto:Hannah@gea-ltd.co.uk]
Sent: 10 November 2015 14:50
To: Arthur, Anona
Subject: 5-17 Haverstock Hill - enquiry

Anona,

We are currently undertaking a desk study for 5-17 Haverstock Hill, located next to Chalk Farm London Underground Station. We understand that at some in the site's history it was possibly a petrol station and garage. We have undertaken a petroleum search, but they hold no records. Do you have any information relating to this site and its contaminative history?

Please feel free to contact me if you need anymore information.

Kind regards,

Hannah

Hannah Dashfield

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

mob 07808 770439
tel 01727 824666

email hannah@gea-ltd.co.uk
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Express Preliminary UXO Risk Assessment

Client	GEA Ltd.
Project	Haverstock Hill
Site Address	5 – 17, Haverstock Hill, London, NW3 2BP
Report Reference	OPN2876
Date	05/11/2015
Originator	WE

Assessment Objective

This preliminary risk assessment is a qualitative screening exercise to assess the likely potential of encountering unexploded ordnance (UXO) at the Haverstock Hill site. The assessment involves the consideration of the basic factors that affect the potential for UXO to be present at a site as outlined in Stage One of the UXO risk management process.

Background

This assessment uses the sources of information available in-house to 1st Line Defence Limited to enable the placement of a development site in context with events that may have led to the presence of German air-delivered or Allied military UXO. The report will identify any immediate necessity for risk mitigation or additional research in the form of a Detailed UXO Risk Assessment. It makes use of 1st Line Defence's extensive historical archives, library and unique geo-databases as well as internet resources, and is researched and compiled by UXO specialists and graduate researchers.

The assessment directly follows CIRIA C681 guidelines "Unexploded Ordnance, a Guide for the Construction Industry". The document will therefore assess the following factors:

- Basic Site Data
- Previous Military Use
- Indicators of potential aerial delivered UXO threat
- Consideration of any Mitigating Factors
- Extent of Proposed Intrusive Works
- Any requirement for Further Work

It should be noted that the vast majority of construction sites in the UK will have a low or negligible risk of encountering UXO and should be able to be screened out at this preliminary stage. The report is meant as a common sense 'first step' in the UXO risk management process. The content of the report and conclusions drawn are based on basic, preliminary research using the information available to 1st Line Defence at the time this report was produced.

Risk Assessment Considerations	
Site location and description/current use	 The site is located in the urban district of Chalk Farm in the London Borough of Camden. The site is approximately 3.5 Miles from the City of London. The site is occupied by a six storey building of mixed commercial and residential units. The north-eastern boundary faces Haverstock Hill. The eastern boundary of the property is adjacent to Chalk Farm tube station. The southern boundary of the building faces Eton College Road and contains five commercial units and open ground borders the west boundary of the site. The site is centred on the approximate OS grid reference: **TQ 2810984425**
Are there any indicators of current/historical military activity on/close to the site?	1st Line Defence could find no evidence in-house to suggest any current or historical military use on or close to the site of proposed works.
What was the pre- and post-WWII history of the site?	Historical mapping indicates that in 1916 the site was occupied by a row of terraced housing and their accompanying yards and gardens. Pre-WWII mapping indicates that significant development occurred to the northwest of the site, with the construction of the three blocks of flats that exist currently between Eton College Road and Haverstock Hill. However, due to the limitations in detail in this mapping it is unclear precisely as to what existed on the site pre-WWII. Following WWII the site was used for a number of commercial purposes and is recorded as both a garage and a depot. Further research would be needed, including the acquisition of more detailed historical mapping and local records, to learn more about the exact nature of the site during WWII.
Was the area subject to bombing during WWII?	During WWII, the site lay on the boundary of the Metropolitan Boroughs of Hampstead and St Pancras, although the site was entirely within Hampstead. The Metropolitan Borough of Hampstead was subject to a moderate density bombing campaign, with 166 items recorded per thousand acres. A total of 321 High Explosive (HE) bombs, 6 parachute mines, 31 Oil bombs, 5 phosphorous bombs, 10 V1 (Doodlebug) Pilotless Aircraft and 3 V2 Long Range Rockets were recorded. The Metropolitan Borough of St Pancras was subject to a Moderate-High density bombing campaign, with a recorded average of 258.4 items per 1,000 acres. This included 641 high explosive (HE) bombs, 8 parachute mines, 14 oil bombs, 11 phosphorus bombs, 20 V1 pilotless aircrafts, and 2 V2 long range rocket bombs; totalling 696 items across 2,694 acres. The available London ARP bomb census mapping shows evidence of bomb strikes in close proximity to the site, although no strikes have been recorded within the site boundary. Of the recorded strikes proximate to the site, the most significant are the several bombs recorded to have fallen on the school directly to the north, across Haverstock Hill. In addition what is thought to be an unexploded parachute mine is recorded to have fallen within the locality of Eton Hall Flats, 100 metres to the northwest of the site. Furthermore there is evidence to suggest that Eton Place was also struck by an HE. There were several recorded HE strikes recorded to have fallen in the vicinity,

	especially following the railway lines to the south and southeast.
Is there any evidence of bomb damage on/close to the site?	The site and surrounding buildings were recorded to have suffered blast damage. There was no damage recorded in regard to the neighbouring Chalk Farm Station. In addition there were numerous blast damaged buildings to the west The nature of this damage would usually have been limited to shattered windows and damaged roofing, however the acquisition of WWII-era aerial photography would be necessary to confirm this. London County Council bomb damage mapping indicates that the school north of Haverstock Hill was labelled 'completely destroyed' as a result of several recorded HE bombs that fell on the area. There was also considerable damage recorded to the south eastern wing of Eton Place, the closest of the flats to the site.
To what degree would the site have been subject to access?	The site was located within an urban and largely residential area, it is therefore presumable that the area would have been subject to some level of regular access. However, as the precise nature and usage of the buildings within the site boundary is unclear it cannot be said with any degree of certainty what level of access the site would have been subject to. Furthermore Chalk Farm Tube Station is located adjacent to the site, that was apparently undamaged by bombing, it can be assumed that there would have been relatively high level of access to the surrounding area.
To what degree has the site been developed post-WWII?	Development of the site following WWII is unclear. Historical mapping suggests that the site was developed from *Garages* to a *Depot* c.1963. However poor quality mapping renders it difficult to ascertain at which point this depot was demolished and the currently residing structure built. Further research would be required, including the acquisition of more detailed historical mapping and WWII-era aerial photography, in order to learn more about the nature of the site and its subsequent redevelopment post-war. Significant change has occurred in the some of the surrounding area, with the redevelopment of some of the school buildings to the northeast, and the construction of a large residential apartment block to the southwest. Chalk Farm underground station appears to have remained relatively unchanged post-war.
What is the nature and extent of the intrusive works proposed?	The exact scope and nature of intrusive works proposed on site were not made available to 1st Line Defence at the time of writing of this report but are understood to include site investigation works.

Summary and Conclusions

Preliminary research for this report has identified a minimal risk of encountering ordnance on the Haverstock site.

During WWII the site was located in the borough of Hampstead, bordering the borough of St Pancras. The borough of Hampstead was subject to moderate density bombing and the borough of St Pancras high density bombing during the course of WWII. Despite this, available records suggest that no ordnance fell directly on the site.

According to historical mapping, the site was entirely occupied by a Depot/Garage during WWII which appears to have survived the war intact and unchanged (according to available post-war mapping and aerial photography). Serious damage/clearance is noted to the north-east of the site, but this is considered to be too far away to increase the UXO risk to the site itself.

There is evidence to suggest numerous bomb strikes occurred in the surrounding area, although only the strike on the premises directly to the north of the site, across Haverstock Hill, appears to have caused minor damage to the site. This damage was likely limited to shattered windows and damaged roofing.

Although it remains uncertain, the occupation of the site is likely to have remained constant before and after WWII, with the bottom floor used as garages and the upper floors residential property. It is considered likely therefore that checks would have been made post-raid for evidence of UXO and that any such evidence should have been noted and reported on or adjacent to the site.

1st Line Defence could find no evidence in-house to suggest any current or historical military use on or close to the site of proposed works.

Recommendations

Given the findings of this report, it is not considered likely that carrying out additional research would result in a significant change to the assessed level of risk (minimal/low risk) based on the information currently available to 1st Line Defence. It is therefore recommended that **no further action** is taken for this site.

If the client has any anecdotal or empirical evidence of UXO risk on site, please contact 1st Line Defence.

Hannah Dashfield

From: Kaye Nigel <Nigel.Kaye@tube.tfl.gov.uk>
Sent: 20 January 2016 12:34
To: Hannah Dashfield
Subject: RE: 5-17 Haverstock Hill
Attachments: 140870_LUL SURVEY_Section Location.pdf; SSK106.pdf; RE: Proposed development 5-17 Haverstock Hill-LUL Tunnel Location

Hi Hannah,

Happy 2016.

The survey was issued to Francisco / Consibee a while ago. They even came back with some proposals for the building's foundations in a section showing our tunnels. I had some minor comments for him going forward, and I ask for details on the station elevation – but haven't heard back from him since.

Email thread and their drawings attached.

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

INFRASTRUCTURE PROTECTION
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From: Hannah Dashfield [mailto:Hannah@gea-ltd.co.uk]
Sent: 20 January 2016 12:29
To: Kaye Nigel
Subject: 5-17 Haverstock Hill

Nigel,

Happy new year to you.

We are finishing off our report and I just wondered if the correlation survey has been completed to date?

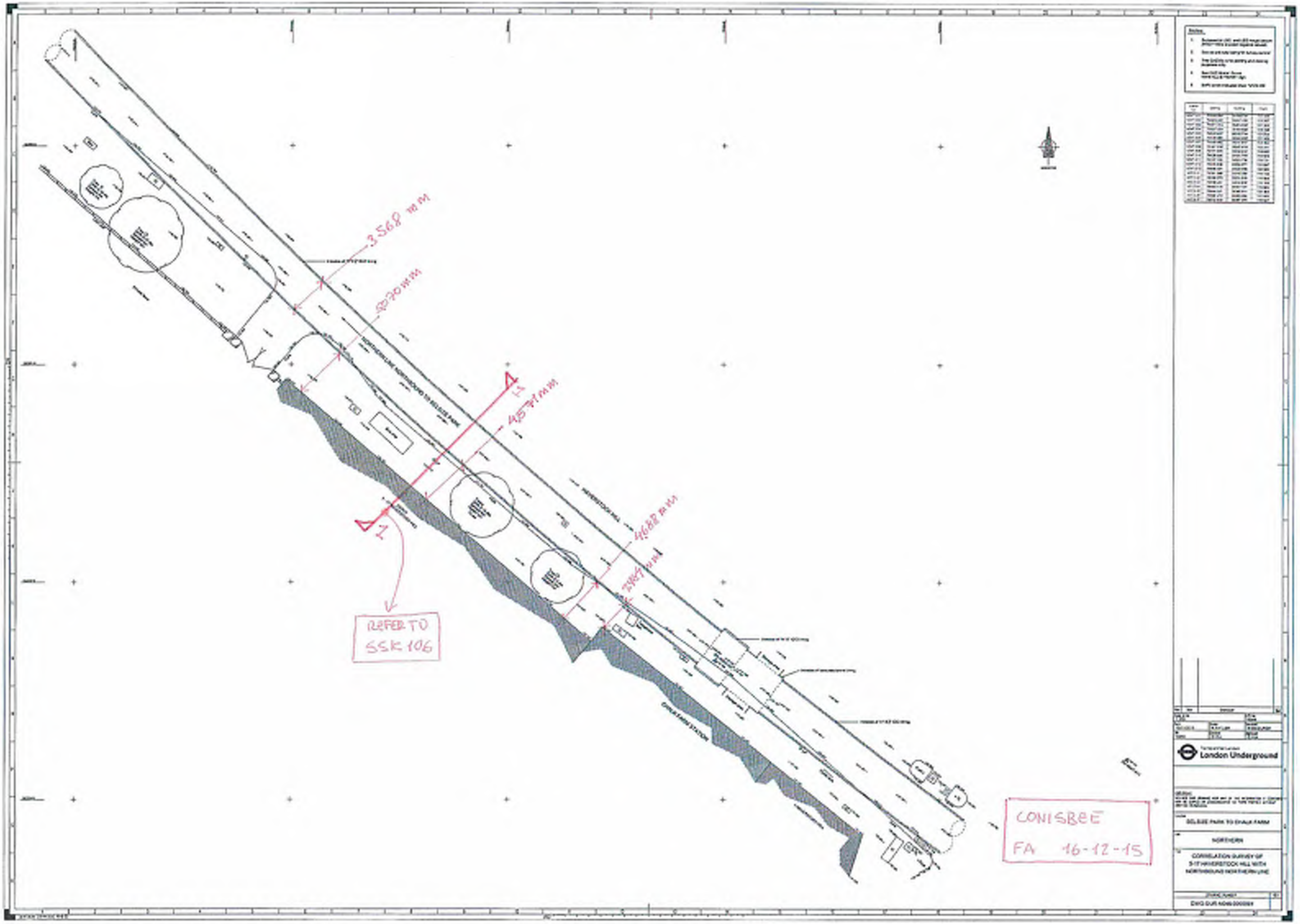
Kind regards,

Hannah

Hannah Dashfield

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

mob 07808 770439
tel 01727 824666


3568 mm
2270 mm
4571 mm
4688 mm
REFER TO SSK 106
CONISBEE
FA 16-12-15
HAVERSTOCK HILL
CHALK FARM STATION
London Underground
BELSIZE PARK TO CHALK FARM
NORTHERN
CORRELATION SURVEY OF 3-17 HAVERSTOCK HILL WITH NORTHBOUND NORTHERN LINE

Hannah Dashfield

From: Hannah Dashfield
Sent: 01 February 2016 12:05
To: Hannah Dashfield
Subject: FW: Proposed development 5-17 Haverstock Hill-LUL Tunnel Location

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From: Kaye Nigel [mailto:Nigel.Kaye@tube.tfl.gov.uk]
Sent: 16 December 2015 11:54
To: 'Francisco Alcazar'
Cc: Cadman John; 'Jess, Paul @ London SMC'; paul.goldstraw@wtpartnership.com; Morris, Laura @ London HH; Benjamin Kee (benjaminkee@piercyandco.com); David Cawston (davidcawston@piercyandco.com); Dave Richards; Hobden, Mark (Mark.Hobden@sdgworld.net); Stoddart, Jonathan @ London HH; Peter Maguire (peter.maguire@wtpartnership.com); Chris Boydell; Ferguson, Rachel @ London HH; Christie, Jack @ London HH
Subject: RE: Proposed development 5-17 Haverstock Hill-LUL Tunnel Location

Hi Francisco,

In terms of our running tunnels, that horizontal clearance is good and unlikely to have any impact on us (our involvement will be minimal). I would, however, still expect to still see;

a) a ground movement assessment (cl 3.24), which I suspect will confirm predicted nil or negligible impact
b) a method statement for the piling works (in due course)
c) it may be prudent for you to carry out a condition survey (as you would any other property) of the tunnels pre/post construction so you can easily demonstrate your works has had no adverse impact.

Our station is still immediately adjacent, and obviously I'm interested in this elevation too! – do you have details for the foundations and any (potential) impact here?

Hope you're well,

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

INFRASTRUCTURE PROTECTION
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From: Francisco Alcazar [mailto:francisco.alcazar@conisbee.co.uk]
Sent: 16 December 2015 11:32
To: Kaye Nigel
Cc: Cadman John; 'Jess, Paul @ London SMC'; paul.goldstraw@wtpartnership.com; Morris, Laura @ London HH; Benjamin Kee (benjaminkee@piercyandco.com); David Cawston (davidcawston@piercyandco.com); Dave Richards; Hobden, Mark (Mark.Hobden@sdgworld.net); Stoddart, Jonathan @ London HH; Peter Maguire (peter.maguire@wtpartnership.com); Chris Boydell; Ferguson, Rachel @ London HH; Christie, Jack @ London HH
Subject: RE: Proposed development 5-17 Haverstock Hill-LUL Tunnel Location

Nigel,

Thank you for sending the results of the correlation survey for the LUL tunnel.

We have interrogated the cad drawing in DWG format and found that our site boundary line is located outside of the 3m horizontal tunnel exclusion zone, as specified in your guidance document G0023 item 3.13.2 . This will allow us to best position our building foundations (proposed piling) inside and adjacent to the site boundary, maximising the basement area.

We have attached pdf files with both, a sketch showing a section through the tunnel and basement foundations, and the survey plan with the section location for your comments.

Could you please confirm that our proposal for the basement and building foundations is acceptable.

Regards

Francisco

From: Kaye Nigel [mailto:Nigel.Kaye@tube.tfl.gov.uk]
Sent: 25 November 2015 10:35
To: Francisco Alcazar
Cc: Cadman John; 'Jess, Paul @ London SMC'
Subject: RE: Proposed development 5-17 Haverstock Hill

Francisco,

Please find the completed correlation survey for 5-17 Haverstock Hill attached in .zip format, as per accepted estimate LUL-EI-Sur-022-15, comprising;

1. *Issue Sheet (M203 Chalk Farm Issue Sheet.xls)*
2. *CAD Drawing (DWG-SUR-N046-0000001.dgn)*
3. *CAD Model (N046-TLL-S-1MA001.dgn)*
4. *CAD Border (MR_Survey-a0.dgn)*
5. *Pdf of CAD Drawing (DWG-SUR-N046-0000001.pdf)*
6. *M203 Chalk Farm Control List.xls*
7. *M203 Chalk Farm Witness Diagrams.pdf*

Please confirm receipt,

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

INFRASTRUCTURE PROTECTION
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From: Kaye Nigel
Sent: 03 November 2015 12:19
To: 'Francisco Alcazar'
Cc: Hui Oliver; Cadman John; Jess, Paul @ London SMC
Subject: RE: Proposed development 5-17 Haverstock Hill

Thanks Francisco,

I've spoken to my colleague Oliver regarding this earlier this morning. We'll be in touch as the correlation survey progresses.

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

INFRASTRUCTURE PROTECTION
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Hannah Dashfield

From: Kaye Nigel <Nigel.Kaye@tube.tfl.gov.uk>
Sent: 19 November 2015 13:57
To: Hannah Dashfield; Caroline Anderson; Steve Branch
Subject: RE: J15316: 5-17 Haverstock Hill - proposed locations and RAMS

Thank you Hannah,

In terms of London Underground (LU)'s interest of whether you use the breaker vs floor saw, you must consider the noise and vibration impact.
If you expect the noise/vibration will be such that it affects station operations (eg: drowns out station announcements – 100dB), then we would have a problem.
Or noise could be loud enough to harm our staff or customers (80dB); or simply be a nuisance that draws concerns from the station team.

This is for your team to assess and decide on what method to use accordingly. I suspect this won't be an issue, and that you could begin breaking and enter the station to check if the noise is even audible ('look and listen' survey). If the noise is of concern to you, or you receive comments from the station team, you would need to revise your methodology.

I have no objections to the ground investigations works described in your email below.
This is on the condition that your trial hole adjacent to the station does not exceed 1.2m without discussing with LU first.

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

INFRASTRUCTURE PROTECTION
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From: Hannah Dashfield [mailto:Hannah@gea-ltd.co.uk]
Sent: 19 November 2015 09:10
To: Kaye Nigel; Caroline Anderson; Steve Branch
Subject: RE: J15316: 5-17 Haverstock Hill - proposed locations and RAMS

Nigel,

Thank you for your prompt response, please find attached our updated method statements following your comments this morning.

During breaking out of the concrete floor, adjacent to Chalk Farm Station, we propose to use an electrical breaker. Will it be a requirement to use a floor saw? If so, I will arrange for this.

Kind regards,

Hannah

Hannah Dashfield

From:	Hannah Dashfield
Sent:	18 November 2015 23:28
To:	Nigel.Kaye@tube.tfl.gov.uk
Cc:	Steve Branch; Caroline Anderson
Subject:	RE: J15316: 5-17 Haverstock Hill - proposed locations and RAMS
Attachments:	J15316 Introduction to site works.pdf

Nigel,

Please find attached a brief description of the works.

We are proposing to undertake the exploratory works Tuesday 24 November to Thursday 26 November (inclusive). I am on leave in the meantime, so please contact my colleagues cc'd in this email who will be happy to confirm any element of the above work.

Kind regards,

Hannah

From: Hannah Dashfield
Sent: 18 November 2015 18:39
To: Nigel.Kaye@tube.tfl.gov.uk
Cc: Steve Branch
Subject: J15316: 5-17 Haverstock Hill - proposed locations and RAMS

Nigel,

Further to our recent discussions, please find attached a plan showing our proposed borehole positions. All boreholes are located outside 15 m from the tunnel. We are starting the boreholes on Tuesday 24th November.

A trial pit is proposed to be excavated by hand adjacent to the chalk farm station. If you have any queries with regards to the pit please contact Francisco at Conisbee.

Please let me know if you have any queries regarding our proposed works. We have attached our RAMs for your review.

Kind regards,

Hannah

Hannah Dashfield

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

mob 07808 770439
tel 01727 824666

email hannah@gea-ltd.co.uk
web www.gea-ltd.co.uk

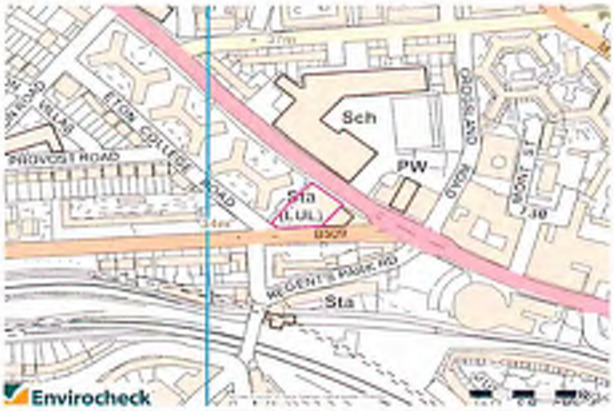
GEA Geotechnical & Environmental Associates	Widbury Barn Widbury Hill Ware Herts SG12 7QE	**Scope of works for Site Investigation**

Site	5-17 Haverstock Hill, London, NW3 2BL	**Job Number** J15316
Client	Mark Steinberg	**Sheet** 1 / 3
Engineer	Conisbee	

Rev 0: 18/11/2015

Site Description

The site is located adjacent to Chalk Farm London Underground Station and fronts onto Haverstock Hill to the northeast and Adelaide Road to the southwest.



The site is located at a level of about 32 m AOD with the current basement located at about 28 m AOD.
The Northern Line is located to the north of the site, beneath Haverstock Hill at approximately 10 m (21.9 m AOD) below ground level.

Scope of site investigation

Please refer to proposed location plan for exploratory work.

It is proposed to undertake the following intrusive works as part of the site investigation:

* *2 x cable percussion boreholes* to confirm ground and groundwater conditions at depth; the boreholes will be drilled in 150 mm diameter, to depths of 25 m (7 m AOD) and 10 m (22 m AOD).

*A 10 m deep borehole will be drilled with a Terrier-rig in the basement to a level of approximately 18 m AOD.

*A further five boreholes will be advanced to depths of up to 5 m with window sampling or windowless rig.

All boreholes will be located in excess of 15 m from the Northern Line tunnels and Chalk Farm Station.

*A trial pit is proposed to be excavated by hand to invesitgate the foundation of the boundary wall shared with Chalk Farm station. It is proposed to break the concrete out with an electrical breaker.

The site work will take place over a number of days. The trial pitting and window sampling works will be supervised by an engineer (Hannah - 07808 770439) from GEA full time.

Please refer to the individual method statements and risk assessments for each piece of equipment.

METHOD STATEMENT FOR CABLE PERCUSSION DRILLING

Project:	5-17 Haverstock Hill, London, NW3 2BP	Ref: J15316	Date: 18 November 2015
Project engineer:	Hannah Dashfield	Supervising engineer: Steve Branch	

1.0 Objective

To form an exploratory borehole for the examination of made ground and natural ground and to permit the taking of samples for physical and mechanical analysis and to carry out insitu tests. Maximum depth of hole nominally 20 m, but varied to suit ground conditions.

2.0 Plant Used

Tripod drilling rig towed using four wheel drive vehicle

3.0 Personnel Involved

Drilling foreman (British Drilling Association registered or GEA approved) and trained second man.

4.0 Access to Position

In its travelling configuration the vehicle and rig require an access corridor approximately 2.0 m wide x 2.5 m high (varies according to towing vehicle). Difficulties can however be found in negotiating tight corners when towing.

All access routes will be checked in advance for width and height obstructions including overhead power lines and other services.

5.0 Working Area at Position

The drilling rig requires a working area of about 3.5 m by 9 m, although a smaller area can be accommodated if specifically agreed.

6.0 Check for Buried Services

The procedure for avoiding damage to underground services will comprise the following four steps:

a) Liaise with relevant authorities to obtain access to all relevant plans of services and examine all plans.

b) Walk over the area of each proposed hole looking for man-hole covers and any other evidence of underground services and attempt to determine their depth and direction.

c) At the actual position of the hole, a cable detector will be systematically used to scan the ground.

d) If there remain any doubts about the locations of services an inspection pit should be excavated by hand prior to commencement of boring, The depth of the pit will vary, but should be not less than 1 m.

e) During the forming of the hole if any warning tape or clean granular backfill material of a suspicious nature is encountered further excavation will immediately cease at that position.

7.0 Drilling

All drilling will be carried out in accordance with the guidelines in the Association of Geotechnical & Geoenvironmental Specialists (AGS) handbook *Safety Awareness on Investigation Sites* and the AGS *Safety Manual for Investigation Sites*. Any variations from the approved methods should be noted below.

9.0 Backfilling and Reinstatement

Backfilling will proceed in accordance with the above guidelines and the Specification for this project.

Any hard surfacing will be reinstated on completion. If a standpipe is installed in the borehole a metal access cover will be fitted flush with the ground surface.

10.0 Specific Requirements for This Project

The Northern Line is located to the north of the site, beneath Haverstock Hill at approximately 10 m (21.9 m AOD) below ground level. All borehole positions must be located at a minimum 15 m from tunnel. To be confirmed with GEA engineer on site. Please refer to J15316 proposed locations for LUL.

Any questions please contact LUL (Nigel Kaye)
Tel: 020 7027 8763 | Mob: 07802 670 411

RISK ASSESSMENT FOR CABLE PERCUSSION DRILLING

GEA Geotechnical & Environmental Associates

Project: 5-17 Haverstock Hill, London, NW3 2BP   Ref: J15316   Date:18/11/2015

Project engineer: Hannah Dashfield   Supervising engineer: Steve Branch

ACTIVITY	HAZARD	TARGET AT RISK	FORM OF HAZARD	PRECAUTIONS / CONTROLS
Moving around site	Traffic accident	Operatives	Physical injury	Use site traffic route if possible and stay within any prescribed areas.
	Overturning of rig			Alternatively walk route prior to rig move; select most appropriate route and avoid excavations, steep slopes and overhead power lines.
Setting up rig / dismantling	Stability	Operatives	Physical injury	Erection of rig to be carried out under the supervision of BDA accredited or GEA approved drilling foreman; comply with manufacturer's erection procedures; use side stays and spreader bars; ensure verticality of rig. Check that ground is firm and provide timbers or level ground to make a safe platform if necessary
	Crushing under A-frame during erection			Non-essential personnel to be removed to safe position; essential personnel to be a safe distance from rig during erection.
	Entrapment in winch drum			Winch drum to be guarded.
	Cables etc out of control			Engine to be switched off if driller to leave controls. Operator to be in full control when the legs are being lowered.
Boring, sampling and testing	Frayed wire rope	Operatives	Physical injury	Daily checks on condition of rope; replace as necessary.
	Rope breaking / winch breaking / rig collapsing			Planned preventative maintenance plus regular inspections of pulleys, drum surfaces and ropes; thorough examination and testing and appropriate.
	Fumes			Sufficient length of exhaust hose to be provided.
	Crushing by drilling tools			All tools to be held above base; gloves and steel toe-caps to be worn
	Failure of rig due to overloading			Rating of drilling equipment not to be exceeded.
	Shearing of tapping bar			Tapping bar to be replaced at first signs of weakening (bending).
	Accidental operation of unmanned rig			Driller must remain on the controls at all times whilst engine is running.
	Buried services			Check services and records and carry out CAT scan.
			Electrocution	
contd.... /				

ACTIVITY	HAZARD	TARGET AT RISK	FORM OF HAZARD	PRECAUTIONS / CONTROLS
Boring, sampling and testing (contd)	Crew member falling off A-frame Falling of suspended tools onto crew member	Operatives	Physical injury	Use three points of contact at all times and use harness if carrying out work on frame. Swing tools away from the borehole; never work below suspended tool.
Soil / Ground water sampling	Contaminated soil or ground water	Operatives and engineer	Chemical ingestion, skin contact	Provide PPE for crew and site engineer. Site engineer experienced and trained in assessment of contaminated soil and water.
General site activities	Slips, trips and falls / falling of tools	All site users	Physical injury	Working area to be kept tidy and access routes kept clear of trip hazards. Tools not being used to be laid down away from the working area and not left upright.

GEA Geotechnical & Environmental Associates

METHOD STATEMENT FOR WINDOWLESS SAMPLING (TERRIER 2002)

Project: 5-17 Haverstock Hill, London, NW3 2BP Ref: J15316 Date: 18/11/2015

Project engineer: Hannah Dashfield Supervising engineer: Steve Branch

1.0 Objective

To form an exploratory borehole for the examination of made ground and natural ground and to permit the taking of samples for physical and mechanical analysis and to carry out insitu tests. Maximum depth of hole nominally 8 m, but varied to suit ground conditions.

2.0 Plant Used

Windowless sampling is carried out by a track mounted rig, known as a Terrier 2002. The rig weighs approximately 1000kg, and is powered by a petrol or diesel engine. The method of sampling comprises a steel tube with an internal PVC liner which is driven into the ground by means of a chain driven drop hammer. The hammer weighs 63.5kg and is dropped from a height of 750 mm. Blow counts can range from 0 to 55 per min. Continuous samples are recovered in transparent PVC liner tubes which are 1.0 m long and 102 mm in diameter, the diameter of the tubes reduces with depth to suit the ground conditions. Simultaneous casing of 128 mm in diameter can be used to prevent borehole collapse. The rig also has a coring attachment. In each borehole successive sampling tubes are driven in a sequence of descending diameters until the required depth is reached. On reaching the required depth the sampling tubes are hydraulically drawn out of the ground. The PVC liners full of soil can be sealed at either end and an undisturbed 1.0 m length of sample can be recovered, or the tubes can be split on site and selected disturbed samples recovered.

3.0 Personnel Involved

Drilling foreman, trained second man and GEA project engineer.

4.0 Access to Position

The rig requires a minimum access width of 0.80 m and, as it is track-mounted the access routes need to be relatively level and without large numbers or steep steps. All access routes will be checked in advance for width and height obstructions including overhead power lines and other services.

5.0 Working Area at Position

The equipment requires a working area of about 3 m by 2 m and a headroom of 2.85 m. A distance of about 0.5 m is required from the nearest wall or similar feature.

6.0 Check for Buried Services

The procedure for avoiding damage to underground services will comprise the following four steps:

a) Liaise with relevant authorities to obtain access to all relevant plans of services and examine all plans.

b) Walk over the area of each proposed hole looking for man-hole covers and any other evidence of underground services and attempt to determine their depth and direction.

c) At the actual position of the hole, a cable detector will be systematically used to scan the ground.

d) If there remain any doubts about the locations of services an inspection pit should be excavated by hand prior to commencement of boring, The depth of the pit will vary, but should be not less than 1 m.

e) During the forming of the hole if any warning tape or clean granular backfill material of a suspicious nature is encountered further excavation will immediately cease at that position.

7.0 Sampling

All drilling will be carried out in accordance with the requirements of the guidelines in the Association of Geotechnical & Geoenvironmental Specialists (AGS) *handbook Safety Awareness on Investigation Sites* and the AGS *Safety Manual for Investigation Sites*. Any variations from the approved methods should be noted below.

8.0 Backfilling and Reinstatement

Backfilling will proceed in accordance with the Specification. The boreholes will be backfilled with arisings, which shall be rammed back into the hole as much as possible. Any special requirements for this site are noted below. The boreholes will be backfilled in such a way that a depression will not form at the surface in the future.

Any hard surfacing will be reinstated on completion. If a standpipe is installed in the borehole a metal access cover will be fitted flush with the ground surface.

9.0 Specific Requirements for This Project

The Northern Line tunnel is located to the north of the site, beneath Haverstock Hill at approximately 10 m (21.9 m AOD) below ground level. All borehole positions must be located at a minimum 15 m from tunnel. To be confirmed with GEA engineer on site. Please refer to J15316 proposed locations for LUL.

Any questions please contact LUL (Nigel Kaye)
Tel: 020 7027 8763 | Mob: 07802 670 411

01/07/2010
File: GEA/QA/health and safety/ method statement for Terrier rig.doc
Revision no: 1

RISK ASSESSMENT FOR WINDOWLESS SAMPLING (TERRIER 2002)

Project: 5-17 Haverstock Hill, London, NW3 2BP Ref: J15316 Date: 18/11/2015

Project engineer: Hannah Dashfield Supervising engineer: Steve Branch

ACTIVITY	HAZARD	TARGET AT RISK	FORM OF HAZARD	PRECAUTIONS / CONTROLS
Setting up and moving onto position	Traffic accident Overturning of rig	Operatives Other site workers	Physical injury	Use site traffic route if possible and stay within any prescribed areas. Liaise with site personnel with regard to working areas. Alternatively walk route prior to rig move; select most appropriate route and avoid excavations, steep slopes and overhead power lines. Check that ground is firm and provide timbers to make a safe platform if necessary Comply with manufacturer's erection procedure and ensure that only essential
Opendrive sampling / dynamic probing	Mechanical injury Vibration Noise and dust	Operatives	Physical injury	Ensure that appropriate PPE is provided and worn and crew are properly trained. Provide vibration-resistant gloves. Regular maintenance and checking of equipment / safety guards on rig.
	Buried services	Operatives	Electrocution	Check services and records and carry out CAT scan.
Soil / ground water sampling	Contaminated soil or ground water	Operatives and engineer	Chemical ingestion, skin contact	Provide PPE for crew and site engineer. Site engineer experienced and trained in assessment of contaminated soil and water.
General site activities	Slips, trips and falls / falling of tools	All site users	Physical injury	Working area to be kept tidy and access routes kept clear of trip hazards. Working area will be cordoned off with safety fencing Tools not being used to be laid down away from the working area and not left upright.

08/07/2003
File: GEA/QA/health and safety/risk assessment for Terrier rig.doc
Revision no: 0

GEA Geotechnical & Environmental Associates

METHOD STATEMENT FOR WINDOW SAMPLING

Project: 5-17 Haverstock Hill, London, NW3 2BP Ref: J15316 Date: 18 November 2015

Project engineer: Hannah Dashfield Supervising engineer: Steve Branch

1.0 Objective
To form an exploratory borehole for the examination of made ground and natural ground and to permit the taking of samples for physical and mechanical analysis and to carry out insitu tests. Maximum depth of hole nominally 6 m, but varied to suit ground conditions.

2.0 Plant Used
The window sampler comprises a series of steel tubes of between 40 mm and 80 mm in diameter and 1 m or 2 m in length, which are driven into the ground using a high frequency petrol, compressed air or electrically driven percussion hammer. The boreholes drilled in the car park will be drilled using petrol equipment and all remaining boreholes will be drilled using electrical equipment. In each borehole successive sampling tubes are driven in a sequence of descending diameters until the required depth is reached. On reaching the required depth the driving hammer is removed and the sampling tube is jacked out. Each tube has a large "window" down one side to allow visual examination of the soil and to allow small disturbed samples to be taken.

3.0 Personnel Involved
Drilling foreman, trained second man and GEA project engineer.

4.0 Access to Position
Provided that a position can be reached on foot it will generally be accessible to the equipment. All access routes will be checked in advance for width and height obstructions including overhead power lines and other services.

5.0 Working Area at Position
The equipment requires a working area of about 2 m by 2 m and a headroom of about 3 m. A distance of about 0.5 m is required from the nearest wall or similar feature.

6.0 Check for Buried Services
The procedure for avoiding damage to underground services will comprise the following four steps:

a) Liaise with relevant authorities to obtain access to all relevant plans of services and examine all plans.

b) Walk over the area of each proposed hole looking for man-hole covers and any other evidence of underground services and attempt to determine their depth and direction.

c) At the actual position of the hole, a cable detector will be systematically used to scan the ground.

d) If there remain any doubts about the locations of services an inspection pit should be excavated by hand prior to commencement of boring. The depth of the pit will vary, but should be not less than 1 m.

e) During the forming of the hole if any warning tape or clean granular backfill material of a suspicious nature is encountered further excavation will immediately cease at that position.

7.0 Sampling
All drilling will be carried out in accordance with the requirements of the guidelines in the Association of Geotechnical & Geoenvironmental Specialists (AGS) *handbook Safety Awareness on Investigation Sites* and the AGS *Safety Manual for Investigation Sites*. Any variations from the approved methods should be noted below.

8.0 Backfilling and Reinstatement
Backfilling will proceed in accordance with the Specification. In general the boreholes will be backfilled with arisings, which shall be rammed back into the hole as much as possible. Any special requirements for this site are noted below. The boreholes will be backfilled in such a way that a depression will not form at the surface in the future.

Any hard surfacing will be reinstated on completion. If a standpipe is installed in the borehole a metal access cover will be fitted flush with the ground surface.

9.0 Specific Requirements for This Project

The Northern Line is located to the north of the site, beneath Haverstock Hill at approximately 10 m (21.9 m AOD) below ground level. All borehole positions must be located at a minimum 15 m from tunnel. To be confirmed with GEA engineer on site. Please refer to J15316 proposed locations for LUL.

Any questions please contact LUL (Nigel Kaye)
Tel: 020 7027 8763 | Mob: 07802 670 411

01/01/2003
File: GEA/QA/health and safety/ method statement for window sampling..doc
Revision no: 0

RISK ASSESSMENT FOR WINDOW SAMPLING

Project: 5-17 Haverstock Hill, London, NW3 2BP | Ref: J15316 | Date: 18/11/2015

Project engineer: Hannah Dashfield | Supervising engineer: Steve Branch

ACTIVITY	HAZARD	TARGET AT RISK	FORM OF HAZARD	PRECAUTIONS / CONTROLS
Setting up and moving onto position	Traffic accident	Operatives	Physical injury	Use site traffic route if possible and stay within any prescribed areas. Alternatively walk route prior to rig move; select most appropriate route and avoid excavations, steep slopes and overhead power lines.
	Overturning of rig			Check that ground is firm and provide timbers to make a safe platform if necessary Comply with manufacturer's erection procedure and ensure that only essential personnel are setting up rig and other personnel are removed from area.
Sampling and testing	Entrapment in mechanism	Operatives	Physical injury	Ensure that guards are properly fitted and cover moving parts of rig in operation. Ensure that crew are properly trained. Regular maintenance and checking of equipment / safety guards on rig.
	Vibration			Provide vibration-resistant gloves
	Noise and dust			Provide appropriate PPE Regular maintenance and checks on equipment.
	Buried services	Operatives	Electrocution	Check services and records and carry out CAT scan.
	Contaminated soil or ground water	Operatives and engineer	Chemical ingestion, skin contact	Provide PPE for crew and site engineer. Site engineer experienced and trained in assessment of contaminated soil and water.
General site activities	Slips, trips and falls / falling of tools	All site users	Physical injury	Working area to be kept tidy and access routes kept clear of trip hazards. Tools not being used to be laid down away from the working area and not left upright. Working areas to be visibly cordoned off to protect members of the public

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METHOD STATEMENT FOR HAND DUG TRIAL PITTING

Project: 5-17 Haverstock Hill, London, NW3 2BP   Ref: J15316   Date: 18/11/2015

Project engineer: Hannah Dashfield   Supervising engineer: Steve Branch

1.0 Objective
To form an exploratory hole for the examination of made ground and natural ground and to determine foundation of building. It will also permit the taking of samples for physical analysis. Maximum depth of hole about 1.2 m without shoring and 4 m if supported.

2.0 Plant Used
Compressed air tools may be used if necessary.

3.0 Personnel Involved
Two person trial pit crew. GEA Project Engineer in full-time attendance.

4.0 Access to Position
Provided that a position can be reached on foot it will generally be accessible to the equipment. All access routes will be checked in advance for width and height obstructions including overhead power lines and other services. For excavations within existing buildings adequate lighting of the working area, access and escape routes will be required. Electrical equipment will be adopted.

5.0 Working Area at Position
The plan area of each trial pit will be in the range from about 0.5 m wide x 1.0 m long up to about 1.0 m wide x 1.5 m long maximum. The main temporary spoil heap from each trial pit will occupy an additional area of about 1.5 m x 1.5 m.

6.0 Check for Buried Services
The procedure for avoiding damage to underground services will comprise the following four steps:

a) Liaise with relevant authorities to obtain access to all relevant plans of services and examine all plans.

b) Walk over the area of each proposed hole looking for man-hole covers and any other evidence of underground services and attempt to determine their depth and direction.

c) At the actual position of the hole, a cable detector will be systematically used to scan the ground.

d) During the forming of the hole if any warning tape or clean granular backfill material of a suspicious nature is encountered further excavation will immediately cease at that position.

7.0 Excavation
If required, existing surfacing will be broken out, over the minimum area possible. Excavation of trial pits will proceed with hand tools or compressed air tools if necessary. No person will enter an excavation unsupervised. No person will enter any excavations greater than 1.2 m depth without proper shoring. Trial pits will not be left unattended whilst open unless specifically agreed and the site is secure.

Where trial pits are excavated in the vicinity of suspected buried services, in particular electricity cables, the use of picks, forks, spikes or breaking bars will be prohibited and digging will be carried out using only using spades and shovels which will not be thrown or spiked into the ground. Where hard ground is encountered in the vicinity of buried services progress will be reviewed.

For trial pits excavated within existing buildings, consideration will be given to the effects of noise and dust on the inhabitants and neighbours. If a skip is required for the disposal of excess spoil, licensing arrangements will be made with the Local Authority where appropriate.

All work will be carried out in accordance with the guidelines in the Association of Geotechnical & Geoenvironmental Specialists (AGS) *handbook Safety Awareness on Investigation Sites* and the AGS *Safety Manual for Investigation Sites*. Any variations from the approved methods should be noted below.

8.0 Backfilling and Reinstatement
Backfilling will proceed immediately logging and sampling is completed, unless specifically agreed. The trial pits will be backfilled with arisings and compacted in layers using a vibrating plate compactor or similar. If surface reinstatement is not required, any small surplus of material will be placed over the trial pit and compacted which may result in the finished surface being proud of the surrounding ground in the short term. Subsequent settlement often reduces this.

9.0 Specific Requirements for This Project
Chalk Farm LUL station is adjacent to the site and the trial pit will be excavated against this wall.

The Northern Line tunnel is located to the north of the site, beneath Haverstock Hill at approximately 10 m (21.9 m AOD) below ground level. All borehole positions must be located at a minimum 15 m from tunnel. To be confirmed with GEA engineer on site. Please refer to J15316 proposed locations for LUL.

Any questions please contact LUL (Nigel Kaye)
Tel: 020 7027 8763 | Mob: 07802 670 411

RISK ASSESSMENT FOR HAND DUG TRIAL PITTING

Project: 5-17 Haverstock Hill, London, NW3 2BP   Ref: J15316   Date: 18/11/2015

Project engineer: Hannah Dashfield   Supervising engineer: Steve Branch

ACTIVITY	HAZARD	TARGET AT RISK	FORM OF HAZARD	PRECAUTIONS / CONTROLS
Moving around site	Traffic accident	Operatives	Physical injury	Use site traffic route if possible and stay within any prescribed areas. Alternatively walk route prior to move; select most appropriate route and avoid excavations, steep slopes and overhead power lines.
Setting up and moving onto position	Overturning of compressor	Operatives	Physical injury	Check that ground is firm and provide timbers to make a safe platform if necessary
Breaking out surfacing	Mechanical injury	Operatives	Physical injury	Ensure that appropriate PPE is provided and worn and crew are properly trained.
	Vibration			Provide vibration-resistant gloves.
	Noise and dust			Regular maintenance and checking of equipment.
	Buried services		Electrocution	Check services and records and carry out CAT scan.
	Buried ordnance	Operatives / engineer	Physical injury	Check records and carry out Magnetometer survey.
Excavating trial pit	Use of tools	Operatives	Physical injury	Ensure that appropriate PPE is provided and worn and crew are properly trained.
	Buried services		Electrocution	Check services and records and carry out CAT scan.
	Collapse of sides	Operatives / engineer	Crushing / suffocation	Operatives shall only enter excavation to a depth of 1.2 m, where soil is stable Shoring to be provided where ground is unstable Operative / engineer never enter an excavation without banks person at surface
	Ingress of ground water		Drowning	Never enter excavation where groundwater is present Use sump pump if excavation is to continue
Soil / ground water sampling	Contaminated soil or ground water	Operatives and engineer	Chemical ingestion, skin contact	Provide PPE for crew and site engineer. Site engineer experienced and trained in assessment of contaminated soil and water.
General site activities	Slips, trips and falls / falling of tools	All site users	Physical injury	Working area to be kept tidy and access routes kept clear of trip hazards. Tools not being used to be laid down away from the working area and not left upright.

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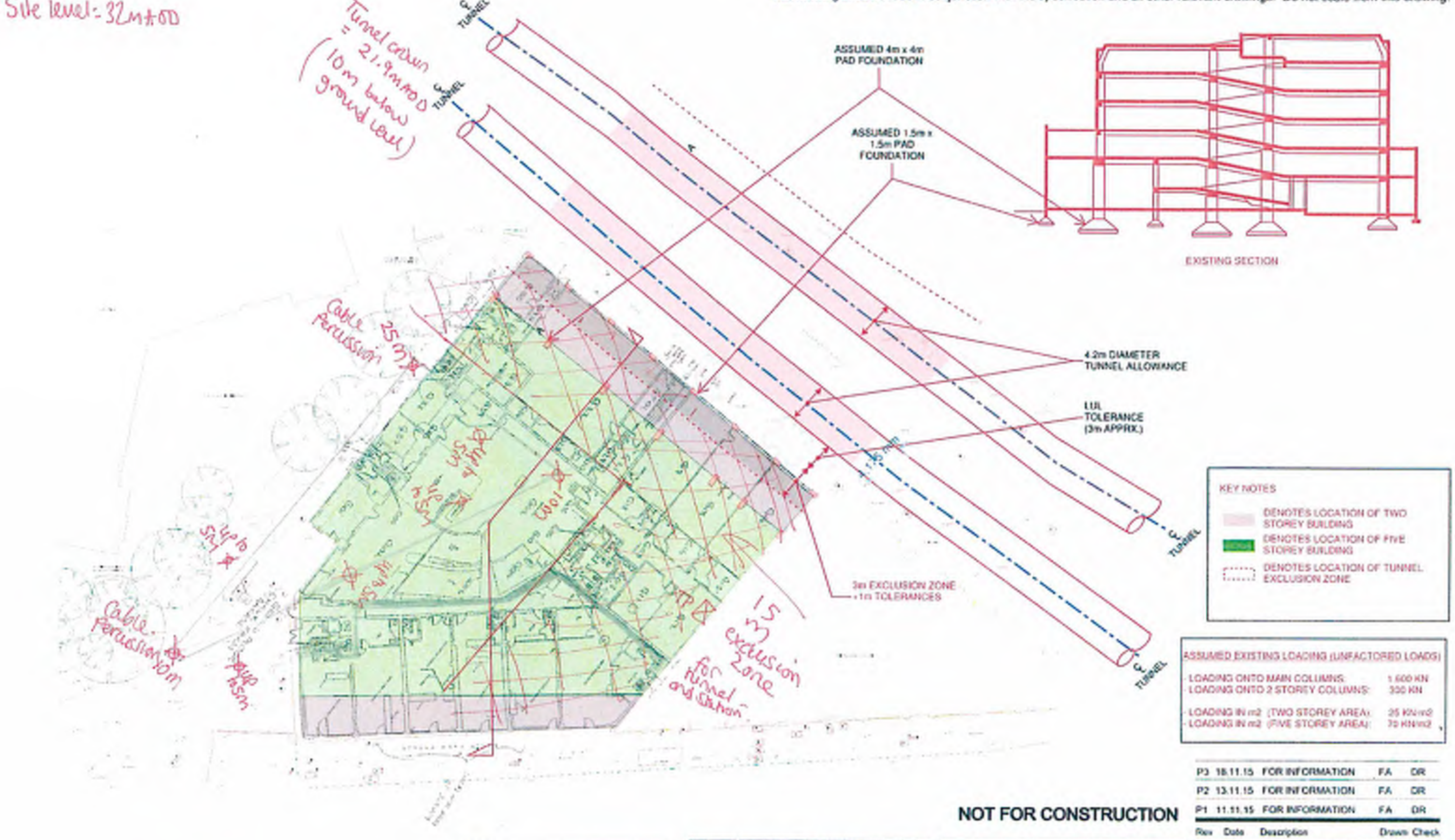
This drawing must be read in conjunction with the specification and all other relevant drawings. Do not scale from this drawing.



Rev	Date	Description	Drawn	Check
P3	18.11.15	FOR INFORMATION	FA	DR
P2	13.11.15	FOR INFORMATION	FA	DR
P1	11.11.15	FOR INFORMATION	FA	DR

NOT FOR CONSTRUCTION

NOTES

- TUNNEL LOCATION BASED ON LUL ARCHIVE DRAWINGS WITH APPROXIMATE TUNNEL CROWN POSITION.

- A SURVEY WILL NEED TO BE UNDERTAKEN TO ACCURATE LOCATE THE TUNNEL CROWN.

conisbee
Consulting Structural Engineers
Consulting Civil Engineers

Project
5-17 Haverstock Hill Sketchbook, NW3 2BL

Title
ASSUMED EXISTING LOADINGS- GROUND FLOOR PLAN

Drawing Status: PRELIMINARY		Project No: 140870
Date: NOV 2015	Drawn: FA	Drawing No: SSK104
Scale: NTS	Engineer: DR	Revision: P3

0 5m 10m 15m

(SCALE BAR NOT FOR CONSTRUCTION PURPOSES)

From: Kaye Nigel [mailto:Nigel.Kaye@tube.tfl.gov.uk]
Sent: 19 November 2015 08:37
To: Hannah Dashfield; Caroline Anderson; Steve Branch
Subject: RE: J15316: 5-17 Haverstock Hill - proposed locations and RAMS

Morning Hannah and colleagues,

Thanks for positions' plan, method statements and risk assessments - I have no problem with any of the proposed positions.
I have only one comment, which goes for all of the method statement / risk assessments – unfortunately, there's no mention of London Underground.

What I would like to see is a) the method statements referring to the plan you've provided *and* b) an LU contact in the event of an emergency ie: LU Infrastructure Protection 020 7027 8763.
This only needs to be one or two lines, perhaps in the '9.0 special requirements for this project'?

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

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From: Hannah Dashfield [mailto:Hannah@gea-ltd.co.uk]
Sent: 18 November 2015 18:39
To: Kaye Nigel
Cc: Steve Branch
Subject: J15316: 5-17 Haverstock Hill - proposed locations and RAMS

Nigel,

Further to our recent discussions, please find attached a plan showing our proposed borehole positions. All boreholes are located outside 15 m from the tunnel. We are starting the boreholes on Tuesday 24th November.

A trial pit is proposed to be excavated by hand adjacent to the chalk farm station. If you have any queries with regards to the pit please contact Francisco at Conisbee.

Please let me know if you have any queries regarding our proposed works. We have attached our RAMs for your review.

Kind regards,

Hannah

Hannah Dashfield

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

mob 07808 770439

Hannah Dashfield

From: Kaye Nigel <Nigel.Kaye@tube.tfl.gov.uk>
Sent: 17 November 2015 08:56
To: Hannah Dashfield
Subject: RE: J15316: 5-17 Haverstock Hill

Thanks Hannah,

That's not of concern to LU – I have no objection to your soil vapour survey,

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

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From: Hannah Dashfield [mailto:Hannah@gea-ltd.co.uk]
Sent: 16 November 2015 18:42
To: Kaye Nigel
Subject: J15316: 5-17 Haverstock Hill

Nigel,

Please find attached RAMs and site plan. The area shown in green is the area where we will be undertaking the soil vapour survey.

Kind regards,

Hannah

Hannah Dashfield

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

mob 07808 770439
tel 01727 824666

email hannah@gea-ltd.co.uk
web www.gea-ltd.co.uk

METHOD STATEMENT FOR SOIL VAPOUR SURVEY

Project: 5-17 Haverstock Hill, London, NW3 2BP Ref: J15316 Date: 16/11/2015

Project engineer: Hannah Dashfield Supervising engineer: Steve Branch

1.0 Objective

To form a series of small diameter 1 m deep probe holes and to carry out soil vapour monitoring by means of a photo-ionisation detector (PID)., within the basement car park of 5-17 Haverstock Hill depot.

2.0 Plant Used

The probe holes will be advanced to a depth of approximately 1 m by an 110 volt or battery operated (SDS) hammer drill using a 20 mm diameter masonry drill bit. The probe holes will be set out on a regular grid by the GEA project engineer, or to target / avoid specific areas. Upon completion of each probe hole it will be plugged or covered to allow any vapours present to accumulate. Upon completion of the initial grid the probe holes will be monitored using a photo-ionisation detector (PID) and the results logged. Once the results have been reviewed additional probe holes may be advanced in the same manner and monitored to delineate any increased vapour concentrations and to target their source.

3.0 Personnel Involved

Trained drill operative and GEA project engineer.

4.0 Access to Position

Provided that a position can be reached on foot it will generally be accessible to the equipment.

5.0 Working Area at Position

The equipment requires a working area of about 1.0 m by 1.0 m and headroom of about 1.5 m.

6.0 Check for Buried Services

The procedure for avoiding damage to underground services will comprise the following four steps:

a) Liaise with relevant authorities to obtain access to all relevant plans of services and examine all plans.

b) Walk over the area of each proposed probe hole location looking for man-hole covers and any other evidence of underground services and attempt to determine their depth and direction.

c) At the actual position of the probe hole, a cable detector will be systematically used to scan the ground.

d) If there remain any doubts about the locations of services the probe hole location will be relocated.

7.0 Backfilling and Reinstatement

Upon completion of the survey the probe holes will be back filled with any arisings and dry mixed concrete.

8.0 Specific Requirements for This Project

The Northern Line is present close to the site and Chalk Farm Station is located adjacent to the site.

RISK ASSESSMENT SOIL VAPOUR SURVEY

Project: 5-17 Haverstock Hill, London, NW3 2BP   Ref: J15316   Date: 16/11/2015

Project engineer: Hannah Dashfield   Supervising engineer: Steve Branch

ACTIVITY	HAZARD	TARGET AT RISK	FORM OF HAZARD	PRECAUTIONS / CONTROLS
Setting up and moving onto position	Traffic accident	Operatives	Physical injury	Use site pedestrian routes where possible and stay within any prescribed areas.
Probe hole drilling	Entanglement in mechanism	Operatives	Physical injury	Ensure that operatives are properly trained. Appropriate clothing to be worn, no dangling drawstrings, jewellery etc. Regular maintenance and checking of equipment.
	Vibration			Limit time drilling. Provide vibration-resistant gloves
	Noise and dust			Provide appropriate PPE Regular maintenance and checks on equipment.
	Buried services	Operatives	Electrocution / gas explosion	Check services and records and carry out CAT scan.
	Vapours / contamination	Operatives and engineer	Inhalation of vapour / contact with contaminated soil /water	Provide PPE for operatives and site engineer. Site engineer experienced and trained in assessment of contaminated soil and water. Where excessive vapours are encountered, adequate venting is to be ensured by engineer.
General site activities	Slips, trips and falls / falling of tools	All site users	Physical injury	Working area to be kept tidy and access routes kept clear of trip hazards. Tools not being used to be laid down away from the working area and not left upright. Working areas to be visibly cordoned off to protect members of the public

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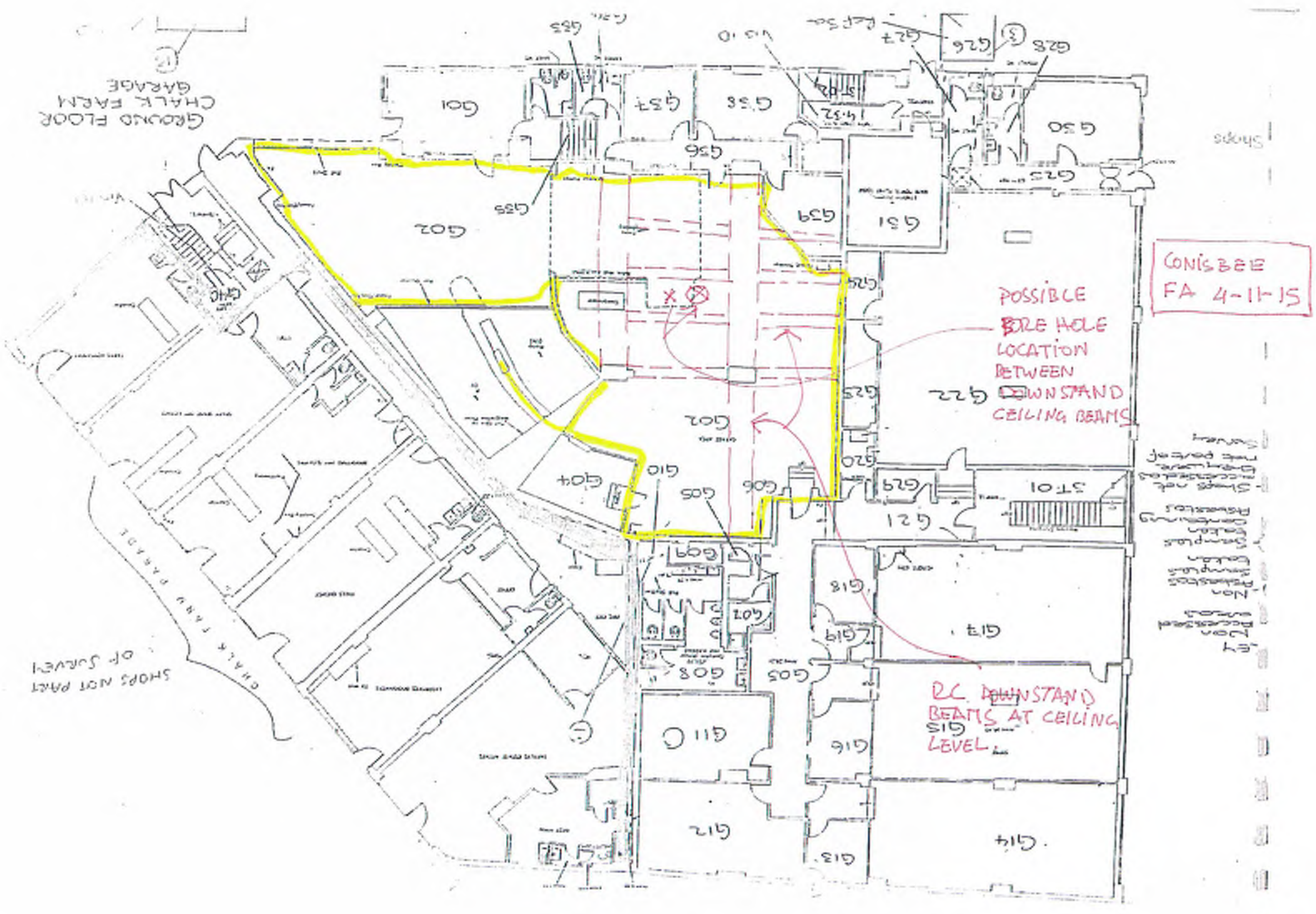
GROUND FLOOR
CHALK FARM
GARAGE
SHOPS NOT PART
OF SURVEY
CHALK FARM PARADE
G01
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ST01
POSSIBLE
BORE HOLE
LOCATION
BETWEEN
DOWNSTAND
CEILING BEAMS
RC DOWNSTAND
BEAMS AT CEILING
LEVEL
CONISBEE
FA 4-11-15
KEY
Non accessed areas
Non Asbestos samples taken
Samples taken containing Asbestos
Shops not accessible because not part of survey
Shops

Hannah Dashfield

From: Kaye Nigel <Nigel.Kaye@tube.tfl.gov.uk>
Sent: 11 November 2015 14:55
To: Hannah Dashfield
Subject: RE: Plan for Haverstock Hill
Attachments: Location Plan 2015-11-11.pdf

Hannah,

Thanks for the chase – apologies for the delay. Please see attached plan – it is for information only, should not be used in design and as with all information we provide: you should assure yourself of its content.

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

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From: Hannah Dashfield [mailto:Hannah@gea-ltd.co.uk]
Sent: 11 November 2015 14:40
To: Kaye Nigel
Subject: Plan for Haverstock Hill

Nigel

I look forward to receiving a more detailed plan for Haverstock Hill.

Kind regards,

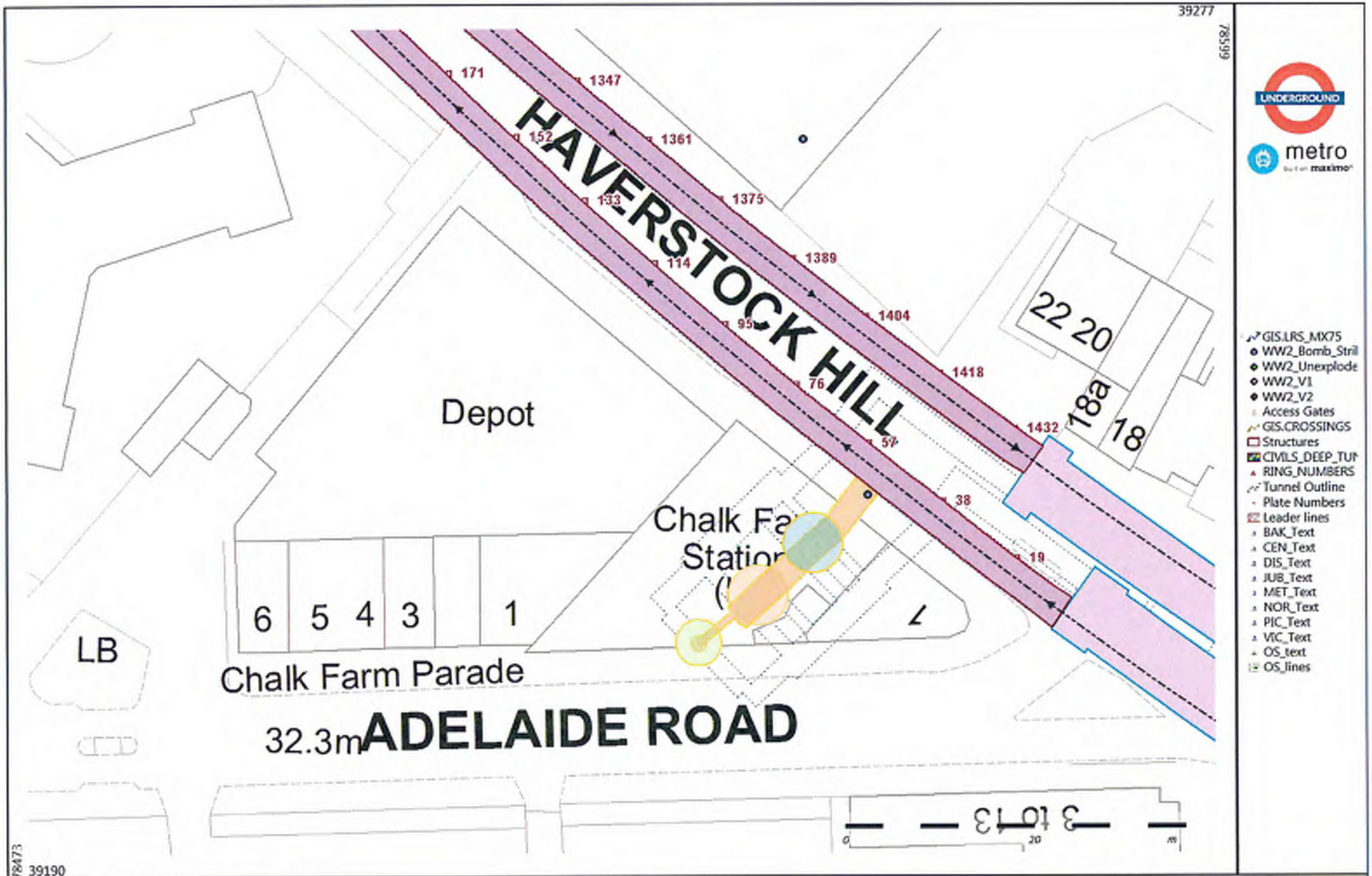
Hannah

Hannah Dashfield

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

mob 07808 770439
tel 01727 824666

email hannah@gea-ltd.co.uk
web www.gea-ltd.co.uk



This plan is suitable for information only

1:500 (Ignore scale if using Diagram view)

Produced by 14:51 11/11/2015

Hannah Dashfield

From: Kaye Nigel <Nigel.Kaye@tube.tfl.gov.uk>
Sent: 04 November 2015 18:06
To: Hannah Dashfield
Subject: RE: 5-17 Haverstock Hill - proposed borehole positions

Hi Hannah,

Thanks for your call earlier. Please accept my apologies, as I had not noticed your email mentioned cable percussion – which is a technique we a slightly more wary of.

We would ask for a 15m distance in this case, whereever possible. That being said, it is also important that your GI is representative so that the design (and impact on us eg: ground movements) are based on good information.
Can I ask you to review if the 15m distance is acceptable? And if not, we will require the minimum 3m – though we need to build suitable error boundaries / factors of safety into this as we do not have the correlation survey yet.

It might be worth talking to Francisco of Conisbee on the trial hole; when I spoke to him it was my understanding the pit was to identify 5 – 17 Haverstock Hill's foundations?
He also has a selection of the archive drawings of our station already, but these will not be relevant to the GI if it is only your own foundations he wishes to explore.

Again, for both the boreholes and the trial pit I will need to the method statement in good time before the GI proceeds.

Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

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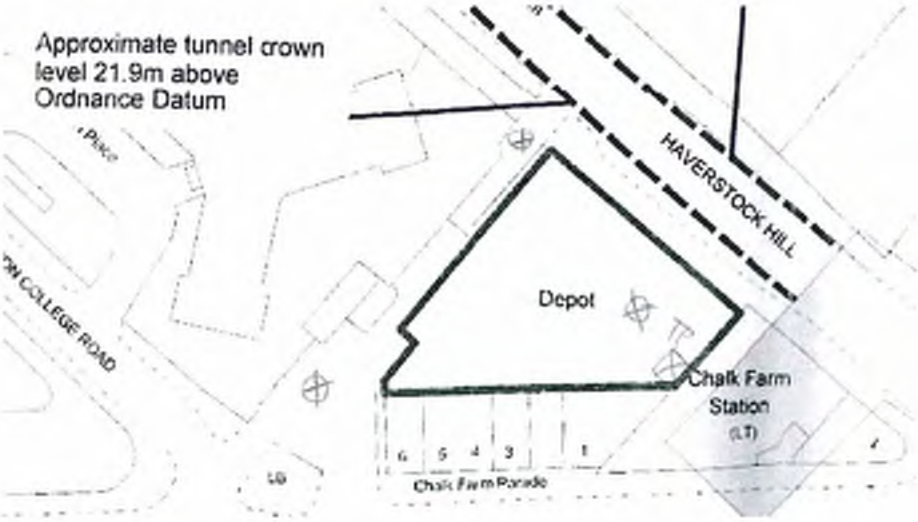
From: Kaye Nigel
Sent: 04 November 2015 15:17
To: 'Hannah Dashfield'
Subject: RE: 5-17 Haverstock Hill - proposed borehole positions

Hi Hannah,

Your client has just commissioned a correlation survey by LU's survey team, the results of which should be available to us both in about 4 to 5 weeks.

Of the GI you'd indicated (as per below), 2no boreholes are of no concern in relation to our infrastructure – but the North borehole looks to be quite near the tunnels and we would be interested in the trial pit if it's purpose is to expose our usually-buried structures. I'd like some certainty that this borehole is a minimum of 3m horizontally from our tunnel and would like to see the method statements for the GI, please.

When would you be looking to undertake these works? And is there any scope to relocate the North borehole slightly further South?



Kind regards,

Nigel Kaye | Infrastructure Protection Engineer
London Underground | 3rd Floor Albany House, London, SW1H OBD
Tel: 020 7027 8763 | Mob: 07802 670 411 nigel.kaye@tube.tfl.gov.uk

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From: Hannah Dashfield [mailto:Hannah@gea-ltd.co.uk]
Sent: 04 November 2015 12:13
To: Kaye Nigel
Subject: 5-17 Haverstock Hill - proposed borehole positions

Nigel,

The structural engineers, Conisbee provided me with your contact details for Haverstock Hill. Please find attached our proposed borehole positions, in relation to the tunnel. I understand that the tunnel crown is 21.9 m OD and our site is at a level of 32 m OD. We proposed to drill two or three boreholes using a cable percussion rig in 150 mm diameter; one borehole to a depth of 25 m and another two to depths of 10 m. Please let me know if the boreholes are located too close to LUL assets. In addition a trial pit is proposed to be excavated by hand to determine the foundations of the station box.

Do you know if a correlation survey of the tunnel and the site is required?

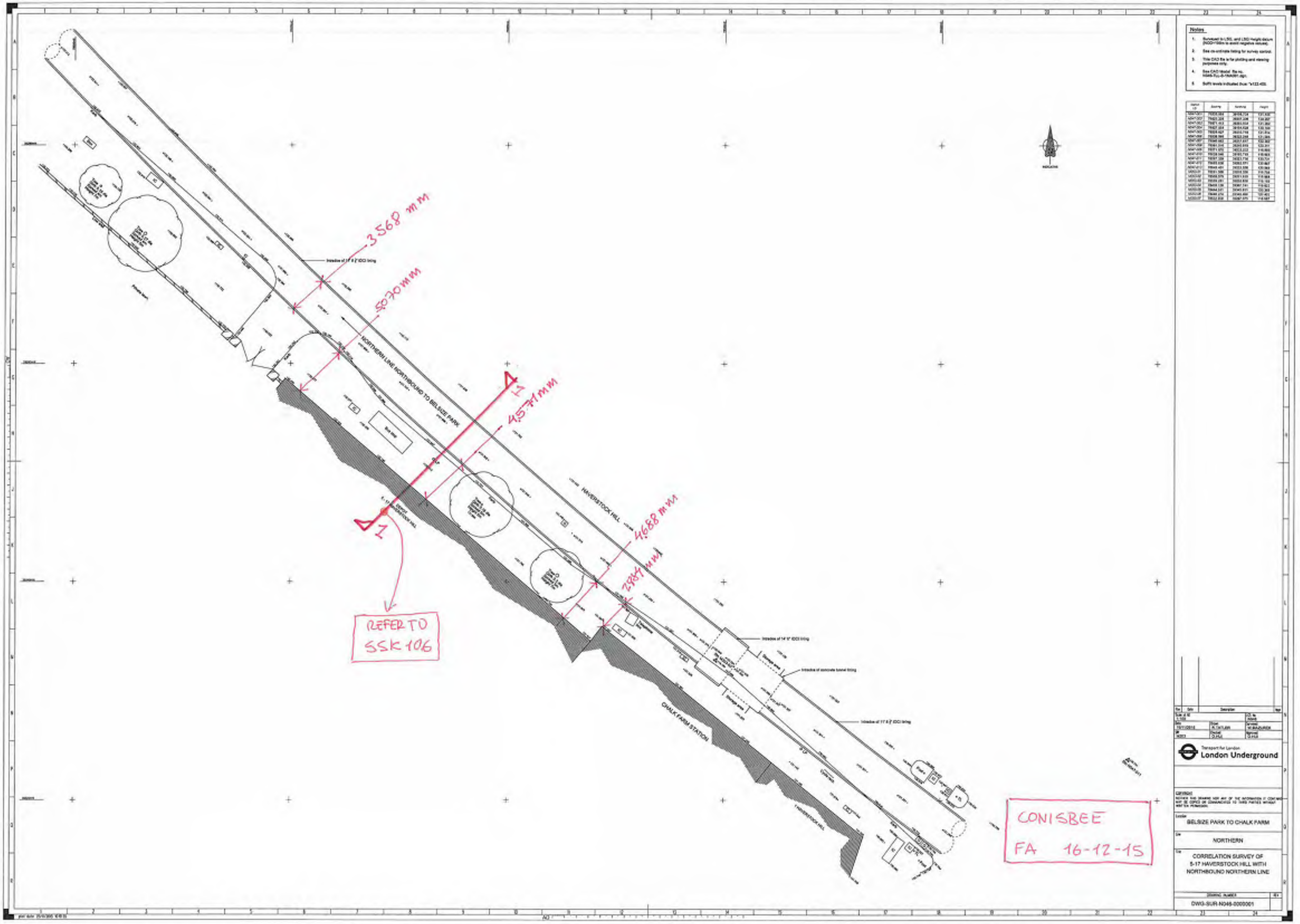
Please feel free to call me on 01727 824 666 to discuss the above.

Kind regards,

Hannah

Hannah Dashfield

Geotechnical & Environmental Associates
Widbury Barn
Widbury Hill


3568 mm
5070mm
4571mm
4688 mm
2884 mm
REFER TO
SSK 106
1
NORTHERN LINE NORTHBOUND TO BELSIZE PARK
HAVERSTOCK HILL
CHALK FARM STATION
CONISBEE
FA 16-12-15
Notes
Transport for London
London Underground
BELSIZE PARK TO CHALK FARM
NORTHERN
CORRELATION SURVEY OF
5-17 HAVERSTOCK HILL WITH
NORTHBOUND NORTHERN LINE
DWG-SUR-N046-0000001

Geotechnical & Environmental Associates

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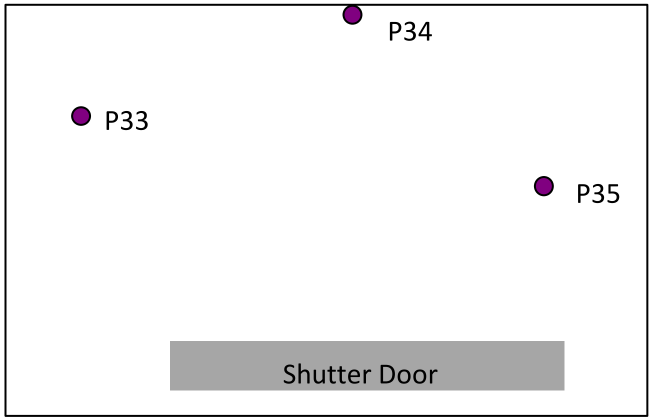
Widbury Hill
Ware
Herts SG12 7QE

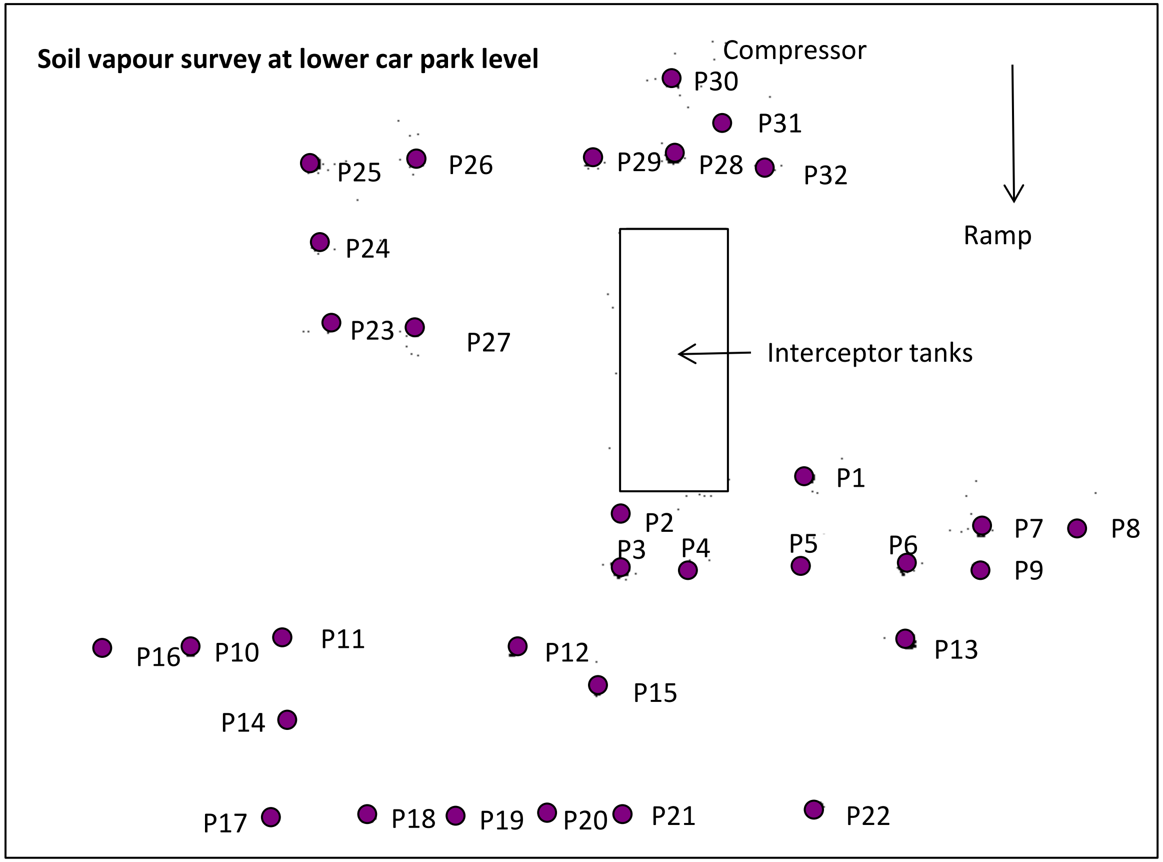
Soil Vapour Survey

Site	5-17 Haverstock Hill, London, NW3 2BP
Client	Mark Steinberg
Engineer	Conisbee
Job Number	J15316
Sheet	1 / 1

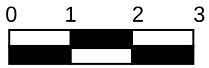
Soil vapour survey at ground level (inside shutter door)



Soil vapour survey at lower car park level



Approximate Scale in metres



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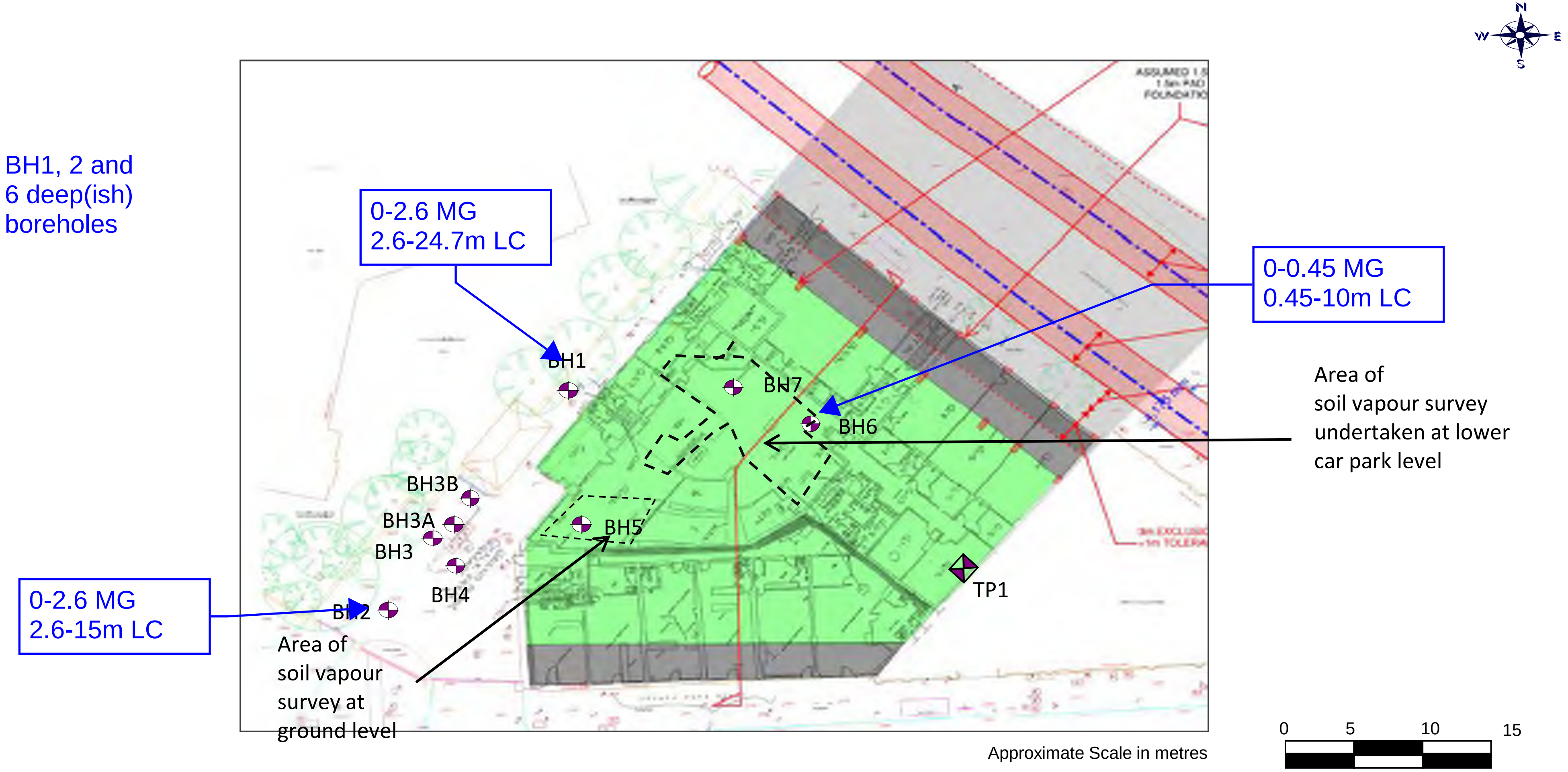
Widbury Hill
Ware
Herts SG12 7QE

Site Plan

Site	5-17 Haverstock Hill, London, NW3 2BL	**Job Number**	J15316
Client	Mark Steinberg	**Sheet**	1 / 1
Engineer	Conisbee		



Geotechnical & Environmental Associates (GEA)
is an engineer-led and client-focused independent specialist providing a complete range of geotechnical and contaminated land investigation, analytical and consultancy services to the property and construction industries.

We have offices at

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midlands@gea-ltd.co.uk

Enquiries can also be made on-line at

www.gea-ltd.co.uk

where information can be found on all of the services that we offer.

GEA Geotechnical & Environmental Associates