GROUND INVESTIGATION, BASEMENT IMPACT ASSESSMENT GROUND MOVEMENT ASSESSMENT REPORT

FOR

138-140 HIGHGATE ROAD **HIGHGATE** LONDON **NW5 1PB**



JOMAS ASSOCIATES LTD



SITE INVESTIGATION & SURVEYS LAND DEVELOPMENT SUPPORT

Tel: 0843-289-2187

www.jomasassociates.com

info@jomasassociates.com



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Prepared by: JOMAS ASSOCIATES LTD For: DESIGN VENTURES HIGHGATE LTD

Prepared by

Shaw Carter BSc (Hons), FGS

Geotechnical Engineer

Reviewed by

Peter Swettenham BSc (Hons)
MSc PgCert CEnv MIEnvSc

Principal Geotechnical Engineer

Approved by

Suneel Law BSc (Hons), MSc, FGS

Principal Geo-environmental

Engineer

Justyna Wieczorek BSc (Hons)

MSc

Geotechnical Engineer

A Nikolic CEng MICE

Associate

Roni Savage BEng (Hons), MSc, SiLC, CGeol, MCIWM, FGS

Technical Director

Should you have any queries relating to this report, please contact

Jomas Associates Ltd

• www.jomasassociates.com

2 0843 289 2187

oxdots info@jomasassociates.com

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EXECUTIVE SUMMARY

Design Ventures Highgate Ltd commissioned Jomas Associates Ltd to undertake a Geo-environmental and Geotechnical ground investigation, Basement Impact Assessment & Ground Movement Assessment, at the site 138-140 Highgate Road, Highgate, London, NW5 1PB.

The principle objectives of the study were as follows:

- To determine the nature and where possible, the extent of contaminants potentially present at the site:
- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within the Environment Agency (EA) report R&D CLR11 and relevant guidance within the National Planning Policy Framework (NPPF);
- To assess whether the site is safe and suitable for the purpose for which it is intended, or can be made so by remedial action; and,
- To obtain geotechnical parameters to inform preliminary foundation design;
- To utilise the information from this investigation and the previously undertaken Desk Study / Preliminary Risk Assessment to carry out a Basement Impact Assessment, and Ground Movement Assessment.

It should be noted that the table below is an executive summary of the findings of this report and is for briefing purposes only. Reference should be made to the main report for detailed information and analysis.

	Site History and Ground Investigation					
Current Site Use	The site is currently utilised as an operational fuel filling station and MOT test centre.					
Proposed Site Use	It is understood that the proposed development will involve the demolition of the existing building and construction of a new three-storey residential development. The new development will include a lower ground floor (half of which is basement due to slope of ground) and a full single-storey basement below.					
Desk Study Overview	A Desk Study report has been produced for the site and issued separately (Jomas – March 2018). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information.					
	Earliest historical maps (1872) indicate that the site consists of an undeveloped agricultural field. Few major changes occur to the site until 1936 when an industrial-style unit was constructed on site, in the NW boundary of the site. By 1952 the industrial-style unit on site was identified as a garage which was demolished by 1970. By 1974 another garage was constructed in the NE of the site. The canopy above the forecourt are also appears to have been constructed at this time. The site appears to have remained in this configuration until present-day.					
	The surrounding area has been utilised predominantly for residential use with limited industrial uses noted including railway, garages, various works and manufactories and an oil processing plant.					
	The British Geological Survey indicates that the site is directly underlain by solid deposits of the London Clay Formation. No artificial deposits are reported within the site.					
	A review of the Envirolnsight Report indicates that there are no source protection zones within 500m of the site.					
	There are no groundwater, surface water or potable water abstractions reported within 500m of the site.					



Site History and Ground Investigation						
	There are 2No. surface water features within 250m of the site, the nearest identified 182m east.					
There is a culvert 271m south-west of the site identified as a detailed river network.						
Intrusive Investigation	The ground investigation was undertaken on 12 th & 13 th February 2018, and consisted of the following:					
	7No. window sampling boreholes, drilled up to 5.45m below ground level (bgl), with associated in situ testing and sampling;					
	2No. cable percussive boreholes, drilled up to 24.95mbgl, with associated in situ testing and sampling;					
	Laboratory analysis for chemical and geotechnical purposes,					
	4No. return visits to monitor ground gas concentrations and groundwater levels have been completed.					
Ground Conditions	The results of the ground investigation revealed a ground profile comprising Made Ground up to 1.20mbgl overlying London Clay Formation to the base of the borehole at 24.95mbgl.					
	Groundwater was not encountered during drilling of any of the exploratory holes, though water was noted to seep into WS2 at 1.1mbgl and WS4 at 4.5mbgl.					
	During return monitoring groundwater was reported at depths of between 1.64m and 4.66m bgl within WS2, WS3, WS4 and WS5. No water was reported within WS1 or BH1 during any monitoring visit. Such variance suggests the water may be surface water ingress as oppose to groundwater.					
Environmental Considerations	Following generic risk assessments, elevated concentrations of lead, naphthalene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenzo(ah)anthracene and C21-C35 aromatic hydrocarbons were detected in soils in excess of generic assessment criteria for the protection of human health within a 'residential with plant uptake' end-use scenario.					
	Asbestos in the form of chrysotile and amosite - loose fibres were detected in 3No. samples analysed in the laboratory. These were quantified to <0.001%, less than the 0.1% fibre content where arisings are considered hazardous for the purpose of disposal.					
	Given the locations of the soil exceedances in relation to the location of suspected underground fuel tanks, it is considered likely that underground tanks are the source of the contamination in soil. Removal of these tanks and associated impacted soil will be required to partly address these risks.					
	A basement is proposed under the majority of the site. As a result, soils will be removed down to approximately 5.0-8.0m bgl. This removal of soil is likely to also remove any contaminated soils too.					
	Due to the presence of asbestos, any areas of proposed soft landscaping should comprise at least 600mm of clean imported soil placed on a marker layer. A 200mm break layer may form part of this cover.					
Groundwater analysis has reported no concentrations of contaminants about laboratory detection limit. Due to several installations reported as 'dry' and the und geology (London Clay - unproductive strata) it is considered that the water encouragements surface water ingress as oppose to groundwater.						
	Of greater concern is the "free product" reported to be floating on the surface of the water within WS2 and WS5. The source of this product is likely to be water migrating though the contaminated Made Ground. Any product encountered during the tank removal works will also have to be removed. Due to the underlying London Clay, identified as unproductive					



Site History and Ground Investigation

strata, the product and contaminants within soil are unlikely to migrate to impact off-site controlled waters receptors.

Calculating the Gas Screening Value using worst case results indicates Characteristic Situation 1. However, concentrations of methane are raised in a single well (WS5) in close proximity to the underground tank locations, with product also reported within the installation. Although raising the site to CS2 must be considered it is possible that following remediation of the site and removal of the underground tanks, future monitoring may be able to reduce the level of gas protection required.

Given the levels of potentially volatile contaminants identified within soil, a vapour resistant membrane may be required within the proposed structures.

A remediation strategy and subsequent verification report will be required.

As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out, and caution must be exercised during construction works. Should any contamination be encountered, a suitably qualified environmental consultant should be informed immediately, so that adequate measures may be recommended.

Geotechnical Considerations

Based upon the information obtained to date, it is considered that a cantilever retaining wall installed may be constructed with an allowable bearing pressure of 120kPa at 5.0mbgl

If a greater allowable bearing capacity is required then a piled foundation solution within the underlying London Clay should be considered.

If a cantilever retaining wall is utilised, then a well reinforced ground bearing floor slab could be used. Such a slab would prop the retaining walls and prevent buckling from the lateral pressures imposed by the cantilever retaining walls. The wall would need to be constructed on a suitable thickness of engineered granular material.

Any groundwater encountered during construction works could be addressed by conventional pumping from a sump.

It is recommended that the stability of all excavations should be assessed during construction. Attention is also drawn to the provisions of the Health and Safety at Work Regulations, which state that the sides of any excavations greater than 1.2m depth, into which personnel are required to enter, should be fully supported or battered back to a safe angle.

Based on the results of chemical testing, the required concrete class for the site is DS-5 assuming an Aggressive Chemical Environment for Concrete classification of AC-4s in accordance with the procedures outlined in BRE Special Digest 1.

Basement Impact Assessment

Impact Assessment

The overall assessment of the site is that the creation of a basement for the existing development will not adversely impact the site or its immediate environs, providing measures are taken to protect surrounding land and properties during construction.

The proposed basement excavation will be within 5m of a public pavement.

Unavoidable lateral ground movements associated with the basement excavations must be controlled during temporary and permanent works so as not to impact adversely on the stability of the surrounding ground and any associated services.

From the studies that have been undertaken so far it is concluded that the construction of the building will not present a problem for ground water. It is concluded that this site can be successfully developed without causing any problems to the subterranean drainage.



1 INTRODUCTION

1.1 Terms of Reference

- 1.1.1 Design Ventures Highgate Ltd ("The Client") has commissioned Jomas Associates Ltd, to assess the risk of contamination posed by the ground conditions at a site referred to as 138-140 Highgate Road, Highgate, London, NW5 1PB and to provide indicative recommendations for foundation design prior to the redevelopment of the site.
- 1.1.2 To this end a Desk Study has been produced for the site and issued separately (Jomas, March 2018), followed by an intrusive investigation (detailed in this report).
- 1.1.3 A full list of previous reports undertaken for the site by Jomas are detailed in Table 1.1:

Table 1.1: Previous Reports - Jomas

Title	Author	Reference	Date
Geo-environmental Desk Study and Basement Impact Assessment (screening & Scoping) Report for 138-140 Highgate Road, Highgate, London, NW5 1PB	Jomas Associates Ltd	P1323J1303, Finalv1.0	March 2018

1.1.4 The intrusive investigation was undertaken in accordance with Jomas proposal dated 10th January 2018.

1.2 Proposed Development

- 1.2.1 The site under consideration and its neighbouring assets are presented in Appendix 1 Figures. The proposed development is bound by Denyer House along the north east boundary, with green areas to the north and south. Highgate Road bounds the site to the west, as indicated in Appendix 1 Figures.
- 1.2.2 Based on topographical data, the site is noted to slope downwards from the east to the west. More specifically, it is observed that the elevation at Denyer House is approximately 103 mOD, falling to around 101 mOD closer to Highgate Road. Moreover, Highgate Road slopes gently downward from north to south.
- 1.2.3 It is understood that the proposed development will involve the demolition of the existing building and construction of a new three-storey residential development. The new development will include a lower ground floor (half of which is below ground due to slope of ground) and a full single -storey basement below. The new building will be located in approximately the same footprint as the existing building, but the basement level will extend out to under most of the site. Proposed plans indicate that private garden will be included.



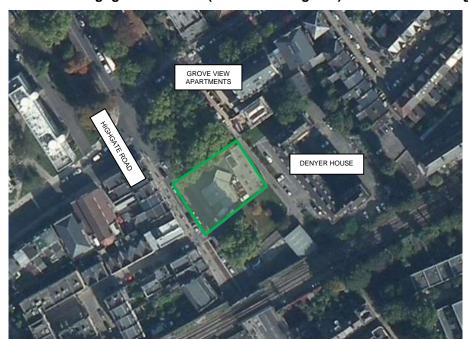


Figure 1.1: 138 – 140 Highgate Road Site (site outline in green) and its surroundings.

- 1.2.4 For the purposes of the contamination risk assessment, the proposed development is classified as 'Residential with plant uptake'.
- 1.2.5 For the purpose of geotechnical assessment, it is considered that the project could be classified as a Geotechnical Category (GC) 2 site in accordance with BS EN 1997. GC 2 projects are defined as involving:
 - Conventional structures.
 - Quantitative investigation and analysis.
 - Normal risk.
 - No difficult soil and site conditions.
 - No difficult loading conditions.
 - Routine design and construction methods.

1.3 Objectives

- 1.3.1 The objectives of Jomas' investigation were as follows:
 - To present a description of the present site status, based upon the published geology, hydrogeology and hydrology of the site and surrounding area;
 - To provide an assessment of the environmental sensitivity at the site and the surrounding area, in relation to any suspected or known contamination which may significantly affect the site and the proposed development;
 - To conduct an intrusive investigation, to determine the nature and extent of contaminants potentially present at the site;



- To establish the presence of significant pollutant linkages, in accordance with the procedures set out within Part IIA of the Environmental Protection Act 1990, associated statutory guidance and current best practice including the EA report R&D CLR 11;
- To obtain geotechnical parameters to inform preliminary foundation design; and
- To assess the potential impacts that the proposal may have on ground stability, the hydrogeology and hydrology on the site and its environs.

1.4 Scope of Works

- 1.4.1 The following tasks were undertaken to achieve the objectives listed above:
 - Intrusive ground investigation to determine shallow ground conditions, and potential for contamination at the site;
 - Undertaking of laboratory chemical and geotechnical testing upon samples obtained:
 - The compilation of this report, which collects and discusses the above data, and presents an assessment of the site conditions, conclusions and recommendations;
 - A basement impact assessment.

1.5 Scope of Basement Impact Assessment (BIA)

- **1.5.1** A Basement Impact Assessment (BIA) is required for all planning applications with basements in Camden.
- 1.5.2 The Jomas' BIA has been undertaken in accordance with "Camden Planning Guidance Basements" (CPGB) dated March 2018.
- 1.5.3 The Jomas BIA covers most items required under CPGB, with the exception of:
 - Plans and sections to show foundation details of adjacent structures;
 - Programme for enabling works, construction and restoration
 - Evidence of consultation with neighbours
 - Construction Sequence Methodology
 - Proposals for monitoring during construction.
 - Drainage Assessment
- 1.5.4 This Jomas BIA also considers the Campbell Reith pro forma BIA produced as guidance for applicants to ensure that all of the required information is provided
- 1.5.5 It should be noted that a Ground Movement Assessment was carried out for the proposed development and is discussed in Section 10 with the calculations provided in Appendix 6.



1.6 Limitations

- Jomas Associates Ltd has prepared this report for the sole use of Design Ventures Highgate Ltd, in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of Jomas Associates Limited. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.
- The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas Associates Limited has actual knowledge to the contrary, information obtained from public sources or provided to Jomas Associates Limited by site personnel and other information sources, have been assumed to be correct. Jomas Associates Limited does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.
- 1.6.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.
- 1.6.4 Any reports provided to Jomas Associates Limited have been reviewed in good faith. Jomas Associates Limited cannot be held liable for any errors or omissions in these reports, or for any incorrect interpretation contained within them.
- 1.6.5 This investigation and report has been carried out in accordance with the relevant standards and guidance in place at the time of the works. Future changes to these may require a re-assessment of the recommendations made within this report.
- 1.6.6 This report is not an engineering design and the figures and calculations contained in the report should be used by the Structural Engineer, taking note that variations may apply, depending on variations in design loading, in techniques used, and in site conditions. Our recommendations should therefore not supersede the Engineer's design.



2 SITE SETTING

2.1 Site Information

2.1.1 The site location plan is appended to this report in Appendix 1.

Table 2.1: Site Information

Name of Site	-		
Address of Site	138-140 Highgate Road, Highgate, London, NW5 1PB		
Approx. National Grid Ref.	E528629, N185800		
Site Area (Approx)	0.07ha (approximately 72 m long and 62 m wide)		
Site Occupation	Petrol station and MOT test centre		
Local Authority	London Borough of Camden		
Proposed Site Use	Residential with plant uptake inclusive of single-storey basement		

2.2 Desk Study Overview

- 2.2.1 A Desk Study report has been produced for the site and issued separately (Jomas March 2018). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information.
- Earliest historical maps (1872) indicate that the site consists of an undeveloped agricultural field. Few major changes occur to the site until 1936 when an industrial-style unit was constructed on site, in the NW boundary of the site. By 1952 the industrial-style unit on site was identified as a garage which was demolished by 1970. By 1974 another garage was constructed in the NE of the site. The canopy above the forecourt are also appears to have been constructed at this time. The site appears to have remained in this configuration until present-day.
- 2.2.3 The surrounding area has been utilised predominantly for residential use with limited industrial uses noted including railway, garages, various works and manufactories and an oil processing plant.
- 2.2.4 The British Geological Survey indicates that the site is directly underlain by solid deposits of the London Clay Formation. No artificial deposits are reported within the site
- 2.2.5 A review of the Envirolnsight Report indicates that there are no source protection zones within 500m of the site.
- 2.2.6 There are no groundwater, surface water or potable water abstractions reported within 500m of the site.
- 2.2.7 There are 2No. surface water features within 250m of the site, the nearest identified 182m east.
- 2.2.8 There is 1No. detailed river network reported within 500m of the site; identified as a culvert 271m south-west of the site.



- 2.2.9 The conceptual site model provided within the report identifies the following potential sources, pathways and receptors. The report indicates the following potential sources of contamination:
 - Potential for hydrocarbon contaminated ground associated with previous site use as fuel station/garage – on site (S1)
 - Potential for Made Ground associated with previous development operations

 on site (S2)
 - Potential buried tanks associated with former use as a fuel station/garage on site (S3)
 - Current and previous industrial use off site (S4)
 - Potential asbestos containing materials within existing buildings on site (S5)
 - Potential asbestos impacted soils from demolition of previous buildings on site (S6)
 - Potential ground gas generation associated with hydrocarbon impacted soils from historic use as fuel station - on site (S7)
- 2.2.10 The conceptual site model identifies the following potential pathways:
 - Ingestion and dermal contact with contaminated soil (P1)
 - Inhalation or contact with potentially contaminated dust and vapours (P2)
 - Leaching through permeable soils, migration within the vadose zone (i.e., unsaturated soil above the water table) and/or lateral migration within surface water, as a result of cracked hard standing or via service pipe/corridors and surface water runoff. (P3)
 - Horizontal and vertical migration of contaminants within groundwater (P4)
 - Accumulation and migration of soil gases (P5)
 - Permeation of water pipes and attack on concrete foundations by aggressive soil conditions (P6)
- 2.2.11 The conceptual site model identifies the following potential receptors:
 - Construction workers (R1)
 - Maintenance workers (R2)
 - Neighbouring site users (R3)
 - Future site users (R4)
 - Building foundations and on site buried services (water mains, electricity and sewer) (R5)
 - Controlled Waters (Culvert) (R6)



3 GROUND INVESTIGATION

3.1 Rationale for Ground Investigation

- 3.1.1 The site investigation has been undertaken generally in accordance with Contaminated Land Report 11, BS10175, NHBC Standards Chapter 4.1, and other associated Statutory Guidance. If required, further targeted investigations and remedial option appraisal would be dependent on the findings of this site investigation.
- 3.1.2 The soil sampling rationale for the site investigation was developed with reference to EA guidance 'Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination' (Technical Report P5-066/TR).
- 3.1.3 The sampling proposal was designed in order to gather data representative of the site conditions; to target identified sources (see Table 3.1) and to aid the preparation of the BIA with reference to the scoping and screening assessment.

3.2 Scope of Ground Investigation

- 3.2.1 The ground investigation was undertaken on 12th & 13th February 2018.
- 3.2.2 The work was undertaken in accordance with BS5930 'Code of Practice for Site Investigation' and BS10175 'Investigation of Potentially Contaminated Sites'. All works were completed without incident.
- 3.2.3 The investigation focused on collecting data on the following:
 - Quality of Made Ground/ natural ground within the site boundaries;
 - Presence of groundwater beneath the site (if any), perched or otherwise;
 - Determination of the presence or absence of hazardous ground gases;
 - Obtaining geotechnical parameters to allow initial design to take place.
 - To aid the preparation of the BIA
- 3.2.4 A summary of the fieldwork carried out at the site, with justifications for exploratory hole positions, are offered in Table 3.1 below.

Table 3.1: Scope of Intrusive Investigation

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
Window Sample Boreholes	7	WS1 - 7	Up to 5.45mbgl	Obtain shallow samples for laboratory contamination and geotechnical testing. To allow in-situ geotechnical testing. WS1 & BH2 - Targeting 2No. abandoned tanks WS2 - Targeting petrol interceptor



Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
				WS3, WS7, & WS8 - Targeting existing buried fuel tanks.
				WS4 & WS6 - Targeting internal area of existing workshop/MOT test centre.
				WS5 - Targeting 2No. former kerosene and diesel tanks.
Cable Percussion Boreholes	2	BH1 - 2	Up to 24.95mbgl	Obtain deeper samples for laboratory contamination and geotechnical testing.
Borenoles			_	To allow in-situ geotechnical testing.
		Combined soil gas ar monitoring wells.	Combined soil gas and groundwater monitoring wells.	
				WS1 - response zone in clay
Monitoring	0	WS1 - WS5,	Up to	WS2 - response zone in Made Ground and clay
Wells	6	BH1	5.00mbgl	WS3 - response zone in clay
				WS4 - response zone in clay
				WS5 - response zone in Made Ground and clay
				BH1 - response zone in clay

- 3.2.5 The exploratory holes were completed to allow soil samples to be taken in the areas of interest identified in Table 3.1 above. In all cases, all holes were logged in accordance with BS:5930 (2015).
- 3.2.6 Exploratory hole positions were located approximately with reference to known features on site as shown in the exploratory hole location plan presented in Appendix 1. The exploratory hole records are included in Appendix 2.
- 3.2.7 Where monitoring well installations were not installed, the exploratory holes were backfilled with the arisings (in the reverse order in which they were drilled) and the ground surface was reinstated so that no depression was left.

3.3 In-situ Geotechnical Testing

3.3.1 In-situ geotechnical testing included Standard Penetration Tests. The determined 'N' values have been used to determine the relative density of granular materials and have been used with standard correlations to infer various other derived geotechnical parameters including the undrained shear strength of the cohesive strata. The results of the individual tests are on the appropriate exploratory hole logs in Appendix 2.

3.4 Sampling Rationale

3.4.1 Our soil sampling rationale for the site investigation was developed with reference to EA guidance 'Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination' (Technical Report P5-066/TR).

SECTION 3 GROUND INVESTIGATION



3.4.2 The exploratory holes were positioned by applying a combined non-targeted sampling strategy, as well as sample locations positioned with reference to sources identified from the desk study. 3.4.3 Soil samples were taken from across the site at various depths as shown in the exploratory hole logs. 3.4.4 Jomas Associates Limited's engineers normally collect samples at appropriate depths based on field observations such as: appearance, colour and odour of the strata and other materials, and changes in these: the presence or otherwise of sub-surface features such as pipework, tanks, foundations and walls; and, areas of obvious damage, e.g. to the building fabric. 3.4.5 A number of the samples were taken from the top 0-1m to aid in the assessment of the pollutant linkages identified at the site. In addition, some deeper samples were taken to aid in the interpretation of fate and transport of any contamination identified. 3.4.6 Soil samples were taken from across the site at various depths as shown in the exploratory hole logs (copies of which are provided in Appendix 2). The methodology used and type of samples taken were chosen to allow the Sampling category to be A or B according to EN ISO 22475-1. This in turn allows suitable geotechnical testing to be carried out. 3.4.7 During return groundwater monitoring visits, where groundwater samples are taken, all boreholes were purged of three well volumes prior to obtaining the sample for testing. This removes stagnant groundwater from the monitoring well. Groundwater strikes noted during drilling, are recorded within the exploratory hole 3.4.8 records in Appendix 2. 3.4.9 Samples were stored in cool boxes (<4°C) and preserved in accordance with laboratory quidance. 3.5 Sampling Limitations 3.5.1 WS1 and BH1 were moved slightly from where initially positioned, due to the presence of parked cars. 3.5.2 WS2 was moved slightly from where initially positioned, to avoid services. WS2 did not recover any material from 1.1m to 4.0m bgl. 3.5.3 WS6 terminated on reinforced concrete at 0.60mbgl. 3.5.4 The remaining boreholes were drilled at the proposed locations and to the proposed depths. 3.6 **Laboratory Analysis** 3.6.1 A programme of laboratory testing, scheduled by Jomas Associates Limited, was carried out on selected samples of Made Ground and natural strata.



Chemical Testing

- 3.6.2 Soil samples were submitted to i2 Analytical (a UKAS and MCerts accredited laboratory), for analysis.
- 3.6.3 The samples were analysed for a wide range of contaminants as shown in Table 3.2 below:

Table 3.2: Chemical Tests Scheduled

	No. of tests		
Test Suite	Made Ground / Topsoil	Natural	
Jomas Suite S3	2	0	
Total Organic Carbon	3	1	
Asbestos Screen & ID	6	1	
Jomas Reduced Suite S5	4	3	
Hydrocarbon Suite	4	3	
VOC Suite	1	0	
WAC	3	0	
Water Soluble Sulphate	6*	9*	

^{*}Including samples tested for as part of Jomas Suites S3 and S5

3.6.4 The determinands contained in the basic suite are as detailed in Table 3.3 below:

Table 3.3: Basic Suite of Determinands

DETERMINAND	LIMIT OF DETECTION (mg/kg)	UKAS ACCREDITATION	TECHNIQUE
Arsenic	1	Y (MCERTS)	ICPMS
Cadmium	0.2	Y (MCERTS)	ICPMS
Chromium	1	Y (MCERTS)	ICPMS
Chromium (Hexavalent)	4	Y (MCERTS)	Colorimetry
Lead	1	Y (MCERTS)	ICPMS
Mercury	0.3	Y (MCERTS)	ICPMS
Nickel	1	Y (MCERTS)	ICPMS
Selenium	1	Y (MCERTS)	ICPMS
Copper	1	Y (MCERTS)	ICPMS
Zinc	1	Y (MCERTS)	ICPMS
Boron (Water Soluble)	0.2	Y (MCERTS)	ICPMS
pH Value	0.1 units	Y (MCERTS)	Electrometric
Sulphate (Water Soluble)	0.0125g/l	Y (MCERTS)	Ion Chromatography
Total Cyanide	1	Y (MCERTS)	Colorimetry
Speciated/Total PAH	0.05/0.80	Y (MCERTS)	GCFID
Phenols	1	Y (MCERTS)	HPLC
Total Petroleum Hydrocarbons (banded)	-	N Y (MCERTS)	Gas Chromatography



- 3.6.5 To support the selection of appropriate tier 1 screening values, 4No. samples were analysed for total organic carbon.
- 3.6.6 Laboratory test results are summarised in Section 6, with raw laboratory data included in Appendix 3.

Geotechnical Laboratory Testing

- 3.6.7 In addition to the contamination assessment, soil samples were submitted to the UKAS Accredited laboratory of i2 Analytical Ltd. for a series of analysis.
- 3.6.8 This testing was specifically designed to:
 - to classify the samples; and
 - to obtain parameters (either directly or sufficient to allow relevant correlations to be used) relevant to the technical objectives of the investigation.
- 3.6.9 The following laboratory geotechnical testing (as summarised in Table 3.4) was carried out:

Table 3.4 Laboratory Geotechnical Analysis

BS 1377 (1990) Test Number	Test Description	Number of tests
Part 2		
3.2	Moisture Content Determination	5
4.3 and 5.3	Liquid and Plastic Limit Determination (Atterberg Limits)	8
Part 7		
8	Determination of the undrained shear strength in triaxial compression with single stage loading and without measurement of pore pressure	8

- 3.6.10 The water soluble sulphate and pH results obtained as part of the chemical analysis was used in combination with BRE Special Digest 1 to allow buried concrete to be designed.
- 3.6.11 The results of the geotechnical laboratory testing are presented as Appendix 4 and discussed in Section 9 of this report.



4 GROUND CONDITIONS

4.1 Soil

4.1.1 Ground conditions were logged in accordance with the requirements of BS: 5930 (2015). Detailed exploratory hole logs are provided in Appendix 2. The ground conditions encountered are summarised in Table 4.1 below, based on the strata observed during the investigation.

Table 4.1: Ground Conditions Encountered

Stratum and Description	Encountered from (m bgl)	Base of strata (m bgl)	Thickness range (m)
Reinforce concrete over dark brown sandy gravelly clay. Gravel consists of fine to coarse sub-angular to sub-rounded flint, brick and concrete. (MADE GROUND)	0.00	0.30 - 1.20	0.30 - 1.20
Brown mottled grey medium increasing to very high strength silty CLAY (LONDON CLAY FORMATION)	0.30 - 1.20	>4.45 - >24.95	>3.45 - >24.65

- 4.1.2 It should be noted that the Made Ground was encountered to base of WS6 (reinforced concrete) and that the exact depth of the Made Ground in WS2 could not be determined as there was no recovery from 1.10mbgl.
- 4.1.3 In the remaining locations materials considered to represent the London Clay Formation was noted to the base of the exploratory holes.
- 4.1.4 Where buried tanks and petrol interceptors are located, the depth of Made ground will be greater.

4.2 Hydrogeology

- 4.2.1 Groundwater was not observed during drilling of the exploratory holes, though water was noted to seep into WS2 at 1.1mbgl and WS4 at 4.5mbgl.
- 4.2.2 Within WS2 this may represent a perched water table at the boundary between the Made Ground and the underlying London Clay Formation.
- 4.2.3 Groundwater strikes and groundwater monitoring are summarised below in Table 4.2, In addition, during groundwater monitoring product was detected in some installations, this was measured using an interface probe. The depths are also shown below.



Table 4.2: Groundwater Monitoring Records

Exploratory Hole ID	Depth to product (m bgl)	Depth to water (m bgl)	Depth to Base of Well (m bgl)	Stratum
WS1	-	Dry	5.00 - 5.02	-
WS2	1.49 - 1.56	2.23 - 3.41	3.42	London Clay Formation
WS3	-	4.66 - Dry	4.86 - 4.89	London Clay Formation
WS4	-	4.37 - Dry	4.93 - 4.94	London Clay Formation
WS5	1.48 - 1.54	1.64 - 1.85	4.92 - 4.95	London Clay Formation
BH1	-	Dry	5.07 - 5.10	-

- 4.2.4 It should be noted that the difference in ground water levels, and the encountered ground conditions suggest that the water encountered may be surface water ingress that has been unable to egress through the London Clay Formation.
- 4.2.5 It should also be noted that significant thickness of product was detected using the interface probe. These noted thickness of product may not be fully representative as the limitations of the equipment mean that it can often measure an emulsion of oil and water (i.e. oily water) as free product. In addition product can "stick" to the probe whilst it is being lowered down the hole, thus making the thickness appear greater.

4.3 Physical and Olfactory Evidence of Contamination

- 4.3.1 Water seepage into WS2 at 1.10mbgl was described as "black" and "oily". Although there was no recovery from 1.10mbgl in WS2, a single vial sample of soil was obtained at approximately 2.50mbgl. A hand-held photo-ionisation detector was used on this sample; giving a VOC reading of 18ppm.
- 4.3.2 Made Ground recovered from WS5 (0.30m 1.20m bgl) had some evidence of black staining and a hydrocarbon odour. Clay recovered from WS5 at 1.50m to 2.00m bgl had black staining and a "strong" hydrocarbon odour.
- 4.3.3 It should be noted that during the groundwater monitoring, an interface probe detected significant thickness of free product at these two locations (see above).
- 4.3.4 Visual or olfactory evidence of contamination was not reported in the other exploratory holes.



5 RISK ASSESSMENT – ANALYTICAL FRAMEWORK

5.1 Context and Objectives

- 5.1.1 This section seeks to evaluate the level of risk pertaining to human health and the environment which may result from both the existing use and proposed future use of the site. It makes use of the site investigation findings, as described in the previous sections, to evaluate further the potential pollutant linkages identified in the desk study. A combination of qualitative and quantitative techniques is used, as described below.
- The purpose of generic quantitative risk assessment is to compare concentrations of contaminants found on site against screening level generic assessment criteria (GAC) to establish whether there are actual or potential unacceptable risks. It also determines whether further detailed assessment is required. The approaches detailed all broadly fit within a tiered assessment structure in line with the framework set out in the Department of Environment, Food and Rural Affairs (DEFRA), EA and Institute for Environment and Health Publication, Guidelines for Environmental Risk Assessment and Management.
- 5.1.3 It should be noted that the statistical tests carried out in this report in accordance with CL:AIRE and CIEH (2008) recommendations, are for guidance purposes only and the conclusions of this report should be approved by the local authority prior to any redevelopment works being undertaken.

5.2 Analytical Framework – Soils

- 5.2.1 There is no single methodology that covers all the various aspects of the assessment of potentially contaminated land and groundwater. Therefore, the analytical framework adopted for this investigation is made up of a number of procedures, which are outlined below. All of these are based on a Risk Assessment methodology centred on the identification and analysis of Source Pathway Receptor linkages.
- The CLEA model provides a methodology for quantitative assessment of the long term risks posed to human health by exposure to contaminated soils. Toxicological data have been used to calculate Soil Guideline Values (SGV) for individual contaminants, based on the proposed site use; these represent minimal risk concentrations and may be used as screening values.
- In the absence of any published SGVs for certain substances, or where the assumptions made in generating the SGVs do not apply to the site, Jomas Associates Limited have obtained Tier 1 screening values for initial assessment of the soil, based on available current UK guidance including the LQM/CIEH S4ULs and DEFRA C4SL. Site-specific assessments are undertaken wherever possible and/or applicable. All assessments are carried out in accordance with the CLEA protocol.
- 5.2.4 CLEA requires a statistical treatment of the test results to take into account the normal variations in concentration of potential contaminants in the soil and allow comparisons to be made with published guidance.
- 5.2.5 The assessment criteria used for the screening of determinands within soils are identified within Table 5.1.



Table 5.1: Selected Assessment Criteria - Contaminants in Soils

Substance Group	Determinand(s)	Assessment Criteria Selected
Organic Substances		
Non-halogenated Hydrocarbons	Total Petroleum Hydrocarbons (TPHCWG banded)	S4UL
	Total Phenols	S4UL
Polycyclic Aromatic Hydrocarbons (PAH-16)	Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(ghi)perylene	S4UL
Volatile Organic Compounds (VOCs/sVOCs).	Toluene, Ethylbenzene, Benzene, Xylenes	S4UL
Inorganic Substances		
Heavy Metals and Metalloids	Arsenic, Cadmium, Chromium, Lead, Mercury, Nickel, Selenium, Copper, Zinc	S4UL
	Copper, Zinc, Nickel	BS: 3882 (2015).
Cyanides	Free Cyanide	CLEA v1.06
Sulphates	Water Soluble Sulphate	BRE Special Digest 1:2005

5.3 BRE

5.3.1 The BRE Special Digest 1:2005, 'Concrete in Aggressive Ground' is used with soluble sulphate and pH results to assess the aggressive chemical environment of future underground concrete structures at the site.

5.4 Analytical Framework – Groundwater and Leachate

- 5.4.1 The requirement to protect groundwater from pollution is outlined in Groundwater protection: Principles and practice (GP3, EA, August 2013, v1.1).
- 5.4.2 Where undertaken, the groundwater quality analysis comprises a Level 1 assessment in accordance with the EA Remedial Targets Methodology Document (EA, 2006).
- 5.4.3 The criteria used by Jomas' in the Level 1 assessment of groundwater and leachate quality are shown in Table 5.2.



Table 5.2: Selected Assessment Criteria – Contaminants in Water

Substance Group	Determinand(s)	Assessment Criteria Selected
Metals	Arsenic, Copper, Cyanide, Mercury, Nickel, Lead, Zinc, Chromium	EQS/DWS
	Selenium	DWS
PAHs	Sum of Four – benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, indeno(1,2,3- c,d)pyrene	DWS
PAHs	Benzo(a)pyrene,	DWS
PAHs	Remainder	LEC
Total Petroleum Hydrocarbons	Aliphatic C5-C6, Aliphatic >C6-C8, Aliphatic >C8-C10. Aliphatic >C10-C12, Aliphatic >C12-C16, Aliphatic >C16-C21, Aromatic C5-C7, Aromatic >C7-C8, Aromatic >C8-C10, Aromatic >C10-C12, Aromatic >C12-C16, Aromatic >C12-C16, Aromatic >C12-C16, Aromatic >C12-C35	DWS/WHO
Benzene	Benzene	DWS
Toluene	Toluene	EQS
Ethylbenzene	Ethylbenzene	EQS
Xylene	Xylene	EQS
Oxygen Demand	Chemical Oxygen Demand and Biological Oxygen Demand	Urban Waste Water Treatment (England and Wales) Regulations

Environmental Quality Standards EQS

Environmental Quality Standards (EQS) have been released by the EA for dangerous substances, as identified by the EC Dangerous Substances Directive. EQS can vary for each substance, for the hardness of the water and can be different for fresh, estuarine or coastal waters.

Lowest Effect Concentration (LEC)

These criteria relate to the concentration of PAHs in groundwater. They are taken from the EA R&D Technical Report P45 – Polycyclic Aromatic Hydrocarbons (PAH): Priorities for Environmental Quality Standard Development (2001).

WHO Health

These screening criteria have been taken from the World Health Organisation Guidelines for Drinking Water Quality (1984). The health value is a guideline value representing the concentration of a contaminant that does not result in any significant risk to the receptor over a lifetime of exposure.

Further criteria have been obtained from 'Petroleum Products in Drinking-water' - Background document for development of WHO Guidelines for Drinking-water Quality (2005).



UK Drinking Water Standards (DWS)

These comprise screening criteria provided by the Drinking Water Inspectorate (DWI) in the Water Supply (Water Quality) Regulations 2006,

<u>Urban Waste Water Treatment (England and Wales) Regulations - UWWT Regs</u> The Urban Waste Water Treatment (England and Wales) Regulations SI/1994/2841 as amended by SI/2003/1788 sets down minimum standards for the discharge of treated effluent from waste water treatment works to inland surface waters, groundwater, estuaries or coastal waters. Standards of (125mg/L) COD and (25mg/L) BOD have been set.

5.5 Site Specific Criteria

5.5.1 The criteria adopted in the selection of correct screening criteria from published reports as previously described, are provided within Tables 5.3.

Table 5.3: Site Specific Data

Input Details	Value
Land Use	Residential with plant uptake
Soil Organic Matter	1%

- 5.5.2 As the published reports only offer the option of selecting an SOM value of 1%, 2.5% or 6%, an SOM value of 1% has been used for the generation of generic assessment criteria, as 1.33% was the mean value obtained from laboratory analysis.
- 5.5.3 It is understood that the existing buildings on site are to be demolished and a new threestorey residential development will be constructed. Private gardens are proposed. As a result, the site has been assessed as residential with plant uptake.



6 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1 Screening of Soil Chemical Analysis Results – Human Health Risk Assessment

6.1.1 To focus on the contaminants of potential concern (COPC), the results have been compared with the respective SGV/GAC. Those contaminants which exceed the SGV/GAC are considered to be the COPC. Those which do not exceed the respective SGV/GAC are not considered to be COPC and as such do not require further assessment in relation to the proposed development of the site.

6.1.2 Laboratory analysis for soils are summarised in Tables 6.1 to 6.4. Raw laboratory data is included in Appendix 3.

Table 6.1: Soil Laboratory Analysis Results - Metals, Metalloids, Phenol, Cyanide

Determinand	Unit	No. samples tested		ening eria	Min	Max	No. Exceeding
Arsenic	mg/kg	8	S4UL	37	9.5	22	0
Cadmium	mg/kg	8	S4UL	11	<0.2	0.4	0
Chromium	mg/kg	8	S4UL	910	25	64	0
Lead	mg/kg	8	C4SL	200	19	760	2No.; WS1 at 0.25mbgl WS7 at 0.40mbgl
Mercury	mg/kg	8	S4UL	40	<0.3	<0.3	0
Nickel	mg/kg	8	S4UL	180	24	51	0
Copper	mg/kg	8	S4UL	2400	22	270	0
Zinc	mg/kg	8	S4UL	3700	78	240	0
Total Cyanide ^A	mg/kg	8	CLEA v 1.06	33	<1	2	0
Selenium	mg/kg	8	S4UL	250	<1.0	<1.0	0
Boron Water Soluble	mg/kg	8	S4UL	290	2.2	16	0
Phenols	mg/kg	8	S4UL	120	<1.0	<1.0	0

Notes: A Generic assessment criteria derived for free inorganic cyanide.

Table 6.2: Soil Laboratory Analysis Results - Polycyclic Aromatic Hydrocarbons (PAHs)

Determinand	Unit	No. Samples Tested	Screening	Criteria	Min	Max	No. Exceeding
Naphthalene	mg/kg	8	S4UL	2.3	<0.05	3.6	1No.; WS2 at 0.50mbgl
Acenaphthylene	mg/kg	8	S4UL	170	<0.05	0.49	0
Acenaphthene	mg/kg	8	S4UL	210	<0.05	2.1	0
Fluorene	mg/kg	8	S4UL	170	<0.05	1.6	0
Phenanthrene	mg/kg	8	S4UL	95	<0.05	18	0



Determinand	Unit	No. Samples Tested	Screening	Criteria	Min	Max	No. Exceeding
Anthracene	mg/kg	8	S4UL	2400	<0.05	4.7	0
Fluoranthene	mg/kg	8	S4UL	280	<0.05	21	0
Pyrene	mg/kg	8	S4UL	620	<0.05	17	0
Benzo(a)anthracene	mg/kg	8	S4UL	7.2	<0.05	13	3No.; WS1 at 0.25mbgl WS2 at 0.50mbgl WS7 at 0.40mbgl
Chrysene	mg/kg	8	S4UL	15	<0.05	8.0	0
Benzo(b)fluoranthene	mg/kg	8	S4UL	2.6	<0.05	10	3No.; WS1 at 0.25mbgl WS2 at 0.50mbgl WS7 at 0.40mbgl
Benzo(k)fluoranthene	mg/kg	8	S4UL	77	<0.05	4.5	0
Benzo(a)pyrene	mg/kg	8	S4UL	2.2	<0.05	10	3No.; WS1 at 0.25mbgl WS2 at 0.50mbgl WS7 at 0.40mbgl
Indeno(123-cd)pyrene	mg/kg	8	S4UL	27	<0.05	4.6	0
Dibenzo(ah)anthracene	mg/kg	8	S4UL	0.24	<0.05	0.94	3No.; WS1 at 0.25mbgl WS2 at 0.50mbgl WS7 at 0.40mbgl
Benzo(ghi)perylene	mg/kg	8	S4UL	320	<0.05	4.2	0
Total PAH	mg/kg	8	-	-	<0.80	124	-

Table 6.3: Soil Laboratory Analysis Results – Total Petroleum Hydrocarbons (TPH)

TPH Band	Unit	No. Samples Tested	Screening	Criteria	Min	Max	No. Exceeding
C ₈ -C ₁₀	mg/kg	2	S4UL	27	<0.1	<0.1	0
>C ₁₀ -C ₁₂	mg/kg	2	S4UL	74	<2.0	6.6	0
>C ₁₂ -C ₁₆	mg/kg	2	S4UL	140	11	27	0
>C ₁₆ -C ₂₁	mg/kg	2	S4UL	260	83	190	0
>C ₂₁ -C ₃₅	mg/kg	2	S4UL	1100	220	690	0
Total TPH	mg/kg	2	-	-	316.1	913.7	-

Note: *The lower value of guidelines for Aromatic/Aliphatics has been selected



Table 6.4: Soil Laboratory Analysis Results - Total Petroleum Hydrocarbons (TPHCWG)

TPH Band	Unit	No. Samples Tested	Screening	Criteria	Min	Max	No. Exceeding
>C ₅ -C ₆ Aliphatic	mg/kg	7	S4UL	42	<0.001	<0.001	0
>C ₆ -C ₈ Aliphatic	mg/kg	7	S4UL	100	<0.001	<0.001	0
>C ₈ -C ₁₀ Aliphatic	mg/kg	7	S4UL	27	<0.001	<0.001	0
>C ₁₀ -C ₁₂ Aliphatic	mg/kg	7	S4UL	130	<1.0	42	0
>C ₁₂ -C ₁₆ Aliphatic	mg/kg	7	S4UL	1100	<2.0	130	0
>C ₁₆ -C ₃₅ Aliphatic	mg/kg	7	S4UL	65000	<16.0	4290	0
>C5-C7 Aromatic	mg/kg	7	S4UL	70	<0.001	<0.001	0
>C7-C8 Aromatic	mg/kg	7	S4UL	130	<0.001	<0.001	0
>C ₈ -C ₁₀ Aromatic	mg/kg	7	S4UL	34	<0.001	<0.001	0
>C ₁₀ -C ₁₂ Aromatic	mg/kg	7	S4UL	74	<1.0	5.8	0
>C ₁₂ -C ₁₆ Aromatic	mg/kg	7	S4UL	140	<2.0	50	0
>C ₁₆ -C ₂₁ Aromatic	mg/kg	7	S4UL	260	<10	160	0
>C ₂₁ -C ₃₅ Aromatic	mg/kg	7	S4UL	1100	<10	2000	1No.; WS5 at 1.60mbgl
Total TPH (Ali/Aro)	mg/kg	7	-	-	<20	6700	-

6.2 Volatile Organic Compounds

6.2.1 In addition to the suites outlined previously, 7No. samples were tested for the presence of volatile organic compounds including BTEX compounds (benzene, toluene, ethylbenzene, xylene). No VOCs were reported above the laboratory detection limit within tested samples.

6.3 Soil Source Vapour Assessment

As outlined in the tables above, a number of compounds have been found in excess of their generic screening criteria for the protection of human health within a 'residential with plant uptake' end-use scenario. The generic screening criteria considers all possible pathways between the source and the receptor. In order to assess potential risks from inhalation of vapour, each compound that has been found in excess of its GAC will be assessed in terms of the contribution to total exposure from vapour inhalation inside a structure as reported within the LQM/CIEH S4UL document. Where a significant proportion of the total exposure is reported from vapour inhalation, there could be a potential risk from vapour inhalation.



Table 6.5: Soil Laboratory Analysis Results – Contribution to Total Exposure from Vapour Inhalation (Indoor)

Compound	Contribution of Vapour Inhalation to Total Exposure (%)	Screening Criteria (mg/kg)	Maximum recorded value (mg/kg)	Potential Vapour Risk?
Naphthalene	64.7	2.3	3.6	✓
Benzo(a)anthracene	0.1	11	13	X
Benzo(b)fluoranthene	<0.1	3.9	10	X
Benzo(a)pyrene	0.0	3.2	10	X
Dibenzo(ah)anthracene	<0.1	0.31	0.94	Х
Aromatic C21-C35	0.0	1900	2000	Х

- 6.3.2 As shown in the table above, naphthalene has significant proportion of its total exposure from vapour inhalation and has been reported in excess of the screening criteria, and therefore a potential vapour risk must be assumed to exist.
- 6.3.3 The well showing the highest levels of these contaminants (WS2) was positioned to target an underground petrol interceptor, and therefore removal of this feature and impacted soils may remove the source of contamination and therefore mitigate the vapour risks described above.

6.4 Asbestos in Soil

6.4.1 7No. samples of the Made Ground were screened in the laboratory for the presence of asbestos. The results of the analysis is summarised below in Table 6.6 below

Table 6.6: Asbestos Analysis - Summary

Sample	Screening result.	Quantification result (%)	Comments
WS1 - 0.25mbgl	None Detected	N/A	N/A
WS2 - 0.50mbgl	Detected	<0.001	Chrysotile, amosite - loose fibres
WS3 - 0.40mbgl	Detected	<0.001	Chrysotile - loose fibres
WS4 - 0.70mbgl	None Detected	N/A	N/A
WS5 - 1.00mbgl	None Detected	N/A	N/A
WS5 - 0.50mbgl	None Detected	N/A	N/A
WS7 - 0.40mbgl	Detected	<0.001	Chrysotile - loose fibres

- The results reported an asbestos content of below 0.1%, the fibre content at which arisings are considered hazardous for the purpose of disposal.
- 6.4.3 It should be noted that for the purposes of human health assessment there is no level of asbestos below which it is deemed the materials are "safe".



6.5 Statistical Analysis

- 6.5.1 Given the likely point sources of contamination, i.e. former and existing buried tanks and petrol interceptors, it is considered that undertaking statistical analysis would be of little benefit for the samples showing elevated hydrocarbons and PAHs.
- 6.5.2 In the case of Lead, as can be seen above asbestos was noted in one of the samples that exhibited elevated lead concentrations. Consequently even if statistical analysis showed that the recorded concentrations were not of concern, some remedial action would be required.

6.6 Screening of Groundwater Chemical Analysis Results

- 6.6.1 A sample of groundwater obtained from the borehole installation WS4 was submitted for chemical analysis. The sample was obtained using "low flow" methodology, which allows for reduced sediment sampling relative to traditional bailers, and produces the most representative samples.
- 6.6.2 Samples could not be obtained from WS1, WS3 or BH1 because no water was reported in the wells.
- The results of the laboratory testing are summarised in Tables 6.7 and 6.8 below, with the raw chemical testing data presented in Appendix 3.

Table 6.7: Groundwater Analysis Results - Polycyclic Aromatic Hydrocarbons (PAHs)

Determinand	Unit	No. samples tested	Screening Criteria		Result	No. of Exceedances
Naphthalene	μg/l	1	EQS	2.4	<0.01	0
Acenaphthylene	μg/l	1	-	-	<0.01	0
Acenaphthene	μg/l	1	-	-	<0.01	0
Fluorene	μg/l	1	-	-	<0.01	0
Phenanthrene	μg/l	1	-	-	<0.01	0
Anthracene	μg/l	1	EQS	0.1	<0.01	0
Fluoranthene	μg/l	1	EQS	0.0063	<0.01	0
Pyrene	μg/l	1	-	-	<0.01	0
Benzo(a)anthracene	μg/l	1	-	-	<0.01	0
Chrysene	μg/l	1	-	-	<0.01	0
Sum of four Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(ghi)perylene Indeno(123-cd)pyrene	μg/l	1	DWS	0.1	<0.04	0
	μg/l	1	DWS	0.01	<0.01	0
Benzo(a)pyrene	μg/l	1	EQS	0.00017	<0.01	0
Dibenzo(ah)anthracene	μg/l	1	-	-	<0.01	0

^{*} Laboratory method detection limit exceeds the EQS.



Table 6.8: Groundwater Analysis Results - TPHCWG & BTEX compounds- Controlled Waters

Determinand	Unit	No. Samples tested	Screenin	ıg Criteria	Result	No. of Exceedances
Benzene	μg/l	1	EQS	10	<1.0	0
benzene	μg/l	1	DWS	1	<1.0	0
Toluene	μg/l	1	DWS	700	<1.0	0
roluerie	μg/l	1	EQS	74	<1.0	0
Ethyl benzene	μg/l	1	DWS	300	<1.0	0
Xylenes	μg/l	1	DWS	500	<2.0	0
MTBE	μg/l	1	DWS	15	<1.0	0
>C5-C6 Aliphatic	μg/l	1	WHO	15000	<1.0	0
>C6-C8 Aliphatic	μg/l	1	WHO	15000	<1.0	0
>C8-C10 Aliphatic	μg/l	1	WHO	300	<1.0	0
>C10-C12 Aliphatic	μg/l	1	WHO	300	<10	0
>C12-C16 Aliphatic	μg/l	1	WHO	300	<10	0
>C16-C21 Aliphatic	μg/l	1	WHO	-	<10	0
>C21-C35 Aliphatic	μg/l	1	WHO	90	<10	0
>C5-C7 Aromatic	μg/l	1	WHO	10	<1.0	0
>C7-C8 Aromatic	μg/l	1	WHO	700	<1.0	0
>C8-C10 Aromatic	μg/l	1	WHO	300	<1.0	0
>C10-C12 Aromatic	μg/l	1	WHO	90	<10	0
>C12-C16 Aromatic	μg/l	1	WHO	90	<10	0
>C16-C21 Aromatic	μg/l	1	WHO	90	<10	0
>C21-C35 Aromatic	μg/l	1	WHO	90	<10	0

6.6.4 In addition to the suites outlined above, the water sample was also analysed for a suite of volatile organic compounds. None of the compounds analysed for were reported above the laboratory method detection limit.

6.7 Light Non-Aqueous Phase Liquid (LNAPL)

- 6.7.1 Water was not obtained from WS2 or WS5 but a sample of Light Non-Aqueous Phase Liquid (LNAPL) was obtained for chemical testing.
- 6.7.2 2No. samples of LNAPL obtained from WS2 and WS5 were submitted to the laboratory for TPH chromatogram and product ID analysis. For both samples tested, the Total Ion Count (TIC) trace shows a carbon range from C10 to >C40 with both aromatic and aliphatic product sources. The traces do not match any standard product profiles but are indicative of lube oil.



6.8 Screening of Soil Chemical Analysis Results – Potential Risks to Plant Growth

- Zinc, copper and nickel are phytotoxins and could therefore inhibit plant growth in soft landscaped areas. Concentrations measured in soil for these determinands have been compared with the pH dependent values given in BS: 3882 (2015).
- Adopting a pH value of greater than 7, as indicated by the results of the laboratory analysis, the following is noted;

Table 6.9: Soil Laboratory Analysis Results - Phytotoxic Determinands

Determinand	Threshold level (mg/kg)	Min (mg/kg)	Max (mg/kg)	No. Exceeding
Zinc	300	78	240	0
Copper	200	22	270	0
Nickel	110	24	51	0

6.9 Screening for Water Pipes

6.9.1 The results of the analysis have been assessed for potential impact upon water supply pipes. Table 6.10 below summarises the findings of the assessment:

Table 6.10: Screening Guide for Water Pipes

Determinand	Threshold adopted for PE (mg/kg)	Min Value for site data (mg/kg)	Max Value from site data (mg/kg)
Total VOCs	0.5	<0.056*	<0.056*
BTEX	0.1	<0.005*	<0.005*
MTBE	0.1	<0.001*	<0.001*
EC5-EC10	1	<0.006*	<0.1*
EC10-EC16	10	<6.0*	227.4
EC16-EC40	500	<36.0*	6420
Naphthalene	5	<0.05*	3.6
Phenols	2	<1.0*	<1.0*

^{*}Laboratory detection limit

- The above results indicate that upgraded pipework will be required.
- 6.9.3 However, it should be noted that following remediation of the site this assessment may change.
- The water supply pipe requirements for this site should be discussed at an early stage with the relevant Utility provider.

6.10 Waste Characterisation and Disposal

6.10.1 The following comments are given as guidance and should be confirmed by the waste disposal facility accepting the waste. The waste disposal facility may have their own classification methodology and are under no obligation to honour the comments given below.

SECTION 6 GENERIC QUANTITATIVE RISK ASSESSMENT



- 6.10.2 3No. soil samples were submitted to a UKAS and MCERTS accredited laboratory for Waste Acceptance Criteria testing. The WAC results indicate that soil arisings from WS4 at 0.70mbgl and WS7 at 0.90mbgl meet the criteria for disposal at an "inert waste landfill". The results indicate that soil arisings from WS5 at 0.50mbgl meet the criteria for disposal as "stable non-reactive hazardous waste in non-hazardous landfill".
- 6.10.3 In addition to the above, the accepting waste disposal facility must be provided with all chemical results (Tables 6.1 6.6 and Appendix 3) for review.



4.93 - 4.94

4.92 - 4.95

5.07 - 5.10

4.37 - Dry

1.64 - 1.85

Dry

7 SOIL GAS RISK ASSESSMENT

7.1 Soil Gas Results

Hole

No.

WS1

WS2

WS3

WS4

WS5

BH1

CH₄

0.0

0.0 - 0.1

0.0

0.0

3.0 - 4.9

0.0

- 7.1.1 Four return monitoring visits have been undertaken from 21st February to 15th March 2018, to monitor wells installed within boreholes at the site for soil gas concentrations and groundwater levels.
- 7.1.2 During these visits atmospheric pressure ranged between 985mb and 1026mb.
- 7.1.3 The results of the monitoring undertaken are summarised in Table 7.1 below, with the monitoring records presented in Appendix 5.

Peak Flow Depth to Depth of Depth to **O**₂ H₂S **VOCs** Rate product water installation (%) (ppm) (ppm) (l/hr) (mbgl) (mbgl) (mbgl) 0.0 - +0.1 18.7 - 20.3 0 - 8 Dry 5.00 - 5.0220.1 - 21.6 0 6 - 21-0.1 - +0.11.49 - 1.562.23 - 3.413.42 20.3 - 20.9 0 - 4 0.0 - +0.14.86 - 4.89 O 4.66 - Dry

1.48 - 1.54

0.0 - +0.4

-0.4 - 0.0

+0.1 - +0.2

Table 7.1: Summary of Gas Monitoring Data

0 - 5

27 - 145

0 - 5

0

0 - 1

O

7.2 Screening of Results

CO₂

(%)

2.1 - 3.5

0.2 - 0.7

0.3 - 1.3

0.5 - 2.3

0.8 - 1.0

1.1 - 1.9

16.4 - 20.3

0.4 - 4.4

18.9 - 19.5

- 7.2.1 As shown in Table 7.1, methane has been reported to a maximum concentration of 4.9% v/v. Carbon dioxide has been reported to a maximum concentration of 3.5% v/v. Screening of the monitoring well headspaces with a photo-ionisation detector (PID) has detected maximum Volatile organic compound (VOC) concentration to a maximum level of 145 ppm. A maximum flow rate of +0.4l/hr has been reported.
- 7.2.2 In the assessment of risks posed by hazardous ground gases and selection of appropriate mitigation measures, BS: 8485 (2015) identifies four types of development, termed Type A to Type D. Type A buildings are defined as

"Private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises."

- 7.2.3 Type A has been adopted as the relevant category for the proposed development.
- 7.2.4 The soil gas assessment method is based on that proposed by Wilson & Card (1999), which was a development of a method proposed in CIRIA publication R149 (CIRIA, 1995). The method uses both gas concentrations and borehole flow rates to define a characteristic situation based on the limiting borehole gas volume flow for methane and carbon dioxide. In both these methods, the limiting borehole gas volume flow is renamed as the Gas Screening Value (GSV).



7.2.5 The Gas Screening Value (litres of gas per hour) is calculated by using the following equation

GSV = (Concentration/100) X Flow rate

Where concentration is measured in percent (%) and flow rate is measured in litres per hour (I/hr)

- 7.2.6 The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.
- 7.2.7 To accord with C665, worst case conditions are used in the calculation of GSVs for the site.
- 7.2.8 A worst case flow rate of 0.4l/hr (maximum reported) will be used in the calculation of GSVs for the site. The Characteristic Situation is then determined from Table 8.5 of CIRIA C665.
- 7.2.9 To accord with C665, worst case conditions are used in the calculation of GSVs for the site. These have been summarised below in Table 7.2

Table 7.2: Summary of Gas Monitoring Data

Gas	Concentration (v/v %)	Peak Flow Rate (I/hr)	GSV (I/hr)	Characteristic Situation (after CIRIA C665)
CO ₂	3.5	0.4	0.014	1
CH ₄	4.9	0.4	0.0196	1

- 7.2.10 The methodology set out in BS 8485 (2015) has been used for determining the required gas protection measures. Although the site is a CS1 based on GSV calculations, concentrations of CH₄ were reported greater than 1.0% v/v, and therefore consideration must be given to increasing this to CS2. Specialist ground gas risk assessments may prove that this is not necessary.
- 7.2.11 Elevated methane was only detected in WS5 which was positioned to target two former kerosene and diesel tanks. Product was also noted within the well. Therefore, it is assumed that the source of ground gas is due to hydrocarbon contamination from these tanks. A course of ground gas monitoring should be undertaken following removal of tanks and any remedial work undertaken at the site to remove the potential source of elevated methane.
- 7.2.12 A CS2 site on a Type A development requires a minimum of 3.5 protection points in accordance with B8485.
- 7.2.13 A basement is to be formed under approximately half of the building due to the topography. Assuming the basement floor and walls conform to BS 8102:2009 Grade 2 waterproofing, then this will provide the site with 2 protection points. If basement floor and walls conform to BS 8102:2009 Grade 3 waterproofing, this will provide 2.5 protection points.
- 7.2.14 This can be achieved in a number of ways, within BS8485 it is recommended that a range of protection measures are utilised with a minimum of two separate methods chosen from the three groupings (Structural, Ventilation and Barrier).



BS 8485

Table 7.3: Recommended Gas Protection Measures

Protection Measures

	Protection Measures	Score				
	Cast in situ monolithic reinforced ground bearing raft or reinforced cast in itu suspended floor slab with minimal penetrations					
fresh air bene across the ce	e pressurization by the creation of a blanket of external eath the building floor slab by pumps supplying air to points entral footprint of the building into a permeable layer, usually nin geocomposite blanket	2.5				
sufficien transmis joints (te method) sufficien the build sufficien placed be sufficien trades u reinforce to workii capable, entry of	thy impervious to the gases with a methane gas ssion rate <40.0 ml/day/m2/atm (average) for sheet and ested in accordance with BS ISO 15105-1 manometric thy durable to remain serviceable for the anticipated life of ding and duration of gas emissions; thy strong to withstand in-service stresses (e.g. settlement if below a floor slab); thy strong to withstand the installation process and following ntil covered (e.g. penetration from steel fibres in fibre ed concrete, penetration of reinforcement ties, tearing dueing above it, dropping tools, etc); after installation, of providing a complete barrier to the the relevant gas; and in accordance with CIRIA C735	2				
	MINIMUM REQUIRED TOTAL	3.5				
7.2.15	During construction where personnel are required to enter e 1.2m the air quality (Carbon Dioxide, Methane and Oxygen regularly checked prior and during person entry. Appropriate not limited to, venting, PPE and gas alarms should be under	as a minimum) precautions, in				
7.2.16	Any permanent excavations such as manholes, inspection spaces formed beneath the sites ground surface are poter precautions, as per above, are considered the minimum entry.	ntial ground gas				
7.2.17	BS 8576:2013 has been used to derived threshold levels Volatile Organic Compounds.	for Carbon Mo				

concentrations.

7.2.18

Given the recorded levels it is not considered that additional protection measures need to be incorporated to protect end users from the recorded Carbon Monoxide

SECTION 7 SOIL GAS RISK ASSESSMENT



7.2.19 PID screening of the monitoring well headspace has revealed maximum concentrations of VOCs of 145ppm. No VOCs were detected in soils or water tested in the laboratory. The likely source of elevated VOCs is the identified LNAPL encountered within WS5. It is considered that the PID screening of monitoring well confirms the assessment that risks to human health receptors via vapour inhalation pathways require further evaluation once remedial works are undertaken.



8 SUMMARY OF RESULTS

8.1 Land Quality Impact Summary

8.1.1 Following the ground investigation, the following is noted:

- It is understood that the proposed development will involve the demolition of the
 existing building and construction of a new three-storey residential development.
 The new development will include a lower ground floor (half of which is below ground
 due to slope of ground) and a full single -storey basement below. The new building
 will be located in approximately the same footprint as the existing building, but the
 basement level will extend out to under most of the site. Proposed plans indicate
 that private garden will be included.
- Following generic risk assessments, elevated concentrations of lead, naphthalene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenzo(ah)anthracene and C21-C35 aromatic hydrocarbons were detected in soils in excess of generic assessment criteria for the protection of human health within a 'residential with plant uptake' end-use scenario.
- Asbestos in the form of chrysotile and amosite loose fibres were detected in 3No. samples analysed in the laboratory. These were quantified to <0.001%, lesser than the 0.1% fibre content where arisings are considered hazardous for the purpose of disposal.
- Given the locations of the soil exceedances in relation to the location of suspected underground fuel tanks, it is considered likely that underground tanks are the source of the hydrocarbon contamination in soil. Removal of these tanks and associated impacted soil will be required to partly address these risks.
- A basement is proposed under the majority of the site. As a result, soils will be removed down to approximately 5.0-8.0m bgl. This removal of soil would also remove significant amounts of (if not all of) the contaminated soils.
- Due to the presence of asbestos, any areas of proposed soft landscaping should comprise at least 600mm of clean imported soil placed on a break layer. Where crush concrete is used as a break layer, a 200mm thick layer may be installed as part of the 600mm cover.
- Groundwater analysis has reported no concentrations of contaminants above the laboratory detection limit. Due to several installations reported as 'dry' and the underlying geology (London Clay unproductive strata) it is considered that the water encountered represents surface water ingress as oppose to groundwater. Of greater concern is the "free product" reported to be floating on the surface of the water within WS2 and WS5. The source of this product is likely to be water migrating though the contaminated Made Ground. Any product encountered during the tank removal works must also removed. Due to the underlying London Clay, identified as unproductive strata, the product and contaminants within soil are unlikely to migrate to impact off-site controlled waters receptors.
- Calculating the Gas Screening Value using worst case results indicates Characteristic Situation 1. However, concentrations of methane are raised at the



site, with corresponding depleted oxygen, meaning raising the site to CS2 must be considered.

- It is noted that the elevated levels were only recorded in a single well (WS5) in close proximity to the underground tank locations, with product also reported within the installation. The other wells on site reported significantly reduced gas readings. It is possible that following remediation of the site, including the removal of the underground tanks and associated contaminated soils and free product, future monitoring may be able to reduce the level of gas protection required. Given the levels of potentially volatile contaminants identified within soil, a vapour resistant membrane may be required within the proposed structures.
- As with any ground investigation, the presence of further hotspots between sampling points cannot be ruled out.
- A remediation strategy and subsequent verification report will be required.
- 8.1.2 The above conclusions are made subject to approval by the statutory regulatory bodies.

8.2 Review of Pollutant Linkages Following Site Investigation

8.2.1 The site CSM has been revised and updated from that suggested in the desk study in view of the ground investigation data, including soil laboratory analysis results. Table 8.1 highlights whether pollutant linkages identified in the original CSM are still relevant following the risk assessment, or whether pollutant linkages, not previously identified, exist.



Table 8.1: Plausible Pollutants Linkages Summary (Pre Remediation)

Potential Source (from desk study)	Pathway	Receptor	Relevant Pollutant Linkage?	Comment
 Potential for hydrocarbon contaminated ground associated with previous site use as fuel station/garage – on site (S1) Potential for Made Ground associated with previous development operations – on site (S2) Potential buried tanks associated with former use 	 Ingestion and dermal contact with contaminated soil (P1) Inhalation or contact with potentially contaminated dust and vapours (P2) Permeation of water pipes and attack on concrete foundations by aggressive soil conditions (P6) 	 Construction workers (R1) Maintenance workers (R2) Neighbouring site users (R3) Future site users (R4) Building foundations and on site buried services (water mains, electricity and sewer) (R5) 	✓	see 8.1 above for remedial measures. A remediation strategy and subsequent verification report will be required. The findings of this report should be included in the construction health and safety file, with adequate measures put in place for the protection of construction and maintenance workers.
as a fuel station/garage – on site (S3) • Current and previous	 Accumulation and migration of soil gases (P5) 		✓	Gas Protection measures are required. However, additional monitoring undertaken post-remediation may reduce this or prove otherwise.
 industrial use – off site (S4) Potential asbestos containing materials within existing buildings – on site (S5) Potential asbestos impacted soils from demolition of previous buildings – on site (S6) Potential ground gas generation associated with hydrocarbon impacted soils from historic use as fuel station - on site (S7) 	 Leaching through permeable soils, migration within the vadose zone (i.e., unsaturated soil above the water table) and/or lateral migration within surface water, as a result of cracked hardstanding or via service pipe/corridors and surface water runoff. (P3) Horizontal and vertical migration of contaminants within groundwater (P4) 	 Neighbouring site users (R3) Building foundations and on site buried services (water mains, electricity and sewer) (R5) Controlled Waters (Culvert) (R6) 	✓	Remedial measures required and set out in Section 8.1. All free product should be removed form site. Contact should be made with relevant utility providers to confirm if upgraded materials are required. It should be noted that remediation may negate the requirement for this.



9 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

9.1 Ground Investigation Summary

- 9.1.1 No detailed structural engineering design information, with respect to the type of construction and associated structural loadings, was provided at the time of preparing this report. Consequently, a detailed discussion of all the problems that may arise during the proposed redevelopment scheme is beyond the scope of this report.
- 9.1.2 Practical solutions to the difficulties encountered, both prior to, and during construction, are frequently decided by structural constraints or economic factors. For these reasons, this discussion is predominantly confined to remarks of a general nature, which are based on site conditions encountered during the intrusive investigations.
- 9.1.3 It is understood that the proposed development will involve the demolition of the existing building and construction of a new three storey residential development. The new development will include a lower ground floor (half of which is below ground due to slope of ground) and a full single -storey basement below. The new building will be located in approximately the same footprint as the existing building, but the basement level will extend out to under most of the site. Proposed plans indicate that private garden will be included.

9.2 Geotechnical Classification

- 9.2.1 At the Desk Study stage this development was deemed to be a GC2 development in accordance with BS: 1997.
- 9.2.2 The findings of the investigation undertaken and discussed previously does not change this assessment.

9.3 Data Summary

- 9.3.1 The results of the ground investigation revealed a ground profile comprising a variable thickness of Made Ground up to 1.20mbgl overlying London Clay Formation to the base of the borehole at 24.95mbgl.
- 9.3.2 A summary of ground conditions obtained from the ground investigation and the derived geotechnical parameters, is provided in Table 9.1 below.



Table 9.1: Ground Conditions and Derived Geotechnical Parameters

Strata	Depth Encountered (from-to) (mbgl)	SPT 'N' Value	Inferred Shear Strength (kPa)	Measured Shear Strength (kPa)	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (corrected plasticity) (%)	NHBC Volume Change Classification
Reinforce concrete over dark brown sandy gravelly clay. Gravel consists of fine to coarse sub-angular to sub-rounded flint, brick and concrete. (MADE GROUND) Encountered to base of WS6. No recovery from 1.10mbgl in WS2.	0.00 to 0.30 - 1.20	-	-	-	-	-	-	-	-
Brown mottled grey CLAY (LONDON CLAY FORMATION) Encountered to the base of WS1, WS3, WS4, WS5, WS7, BH1 & BH2	0.30 - 1.20 to >4.45 - >24.95	0 - 41	0 - 185	72 - 160	26 - 34	72 - 80	26 - 32	44 - 52 (43.56 - 52)	High



9.4 Undrained Shear Strength

9.4.1 Standard Penetration Tests were undertaken at regular intervals throughout the window sampler holes and cable percussive boreholes within the London Clay Formation. Due to the shallow nature of the Made Ground no tests were carried out with those materials.

9.4.2 The N values recorded in the London Clay Formation varies with depth, this infers that the undrained shear strength of the clay similarly varies. Figure 9.1 below shows the undrained shear strength inferred by the correlation suggested by Stroud (1974),

 $c_u = f_1 \times N$ can be applied,

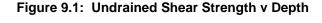
in which

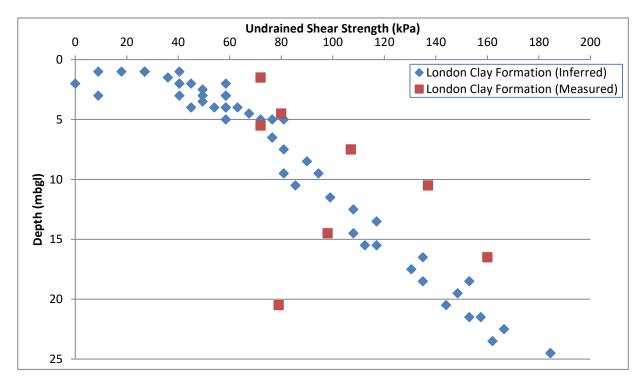
cu= mass shear strength (kN)

 $f_1 = constant$

N= SPT Value achieved during boring operations

- 9.4.3 In the above equation f_1 is dependent on the plasticity of the material that the SPT is being carried out in. As the plasticity indices were shown to be greater than 27% a value for f_1 of 4.5 has been adopted after Tomlinson (2001).
- 9.4.4 The graph below shows the shear strength profile of the London Clay Formation encountered at the site, based on the SPT to shear strength correlation described above, as well as the results of undrained triaxial tests on undisturbed samples taken from the boreholes.







- 9.4.5 As can be seen from above using a f₁ of 4.5 provided a generally good correlation between the inferred undrained shear strengths and the measured results. A f₁ of 5 could be used but due to the conservative nature of using 4.5 this value has been kept.
- 9.4.6 It should be noted that some very low strengths were inferred at 1m 3m in WS5. This location was located in close proximity to a known tank and at 4m the recorded SPT 'N' values (and thus the inferred undrained shear strengths) jump up to levels noted elsewhere. It is possible that the materials noted between 1m and 3m in WS5 are actually materials disturbed to allow the installation of the known tanks.

9.5 Coefficient of Compressibility

9.5.1 Stroud and Butler (1974) developed a relationship between the coefficient of compressibility (m_v) and SPT 'N' value.

 $m_v = 1 / (f_2 \times N)$ can be applied,

in which

 m_v = coefficient of compressibilty (m²/MN) f_2 = constant dependant on the plasticity index N = SPT Value achieved during boring operations

- 9.5.2 Using the plasticity indices obtained (See Table 9.1) and the graphs provided in Tomlinson (2001) a value of f_2 of 0.45 has been taken and used with the SPT 'N' values to infer coefficient of compressibility (m_v).
- 9.5.3 Where the undrained shear strength of the clays was obtained using the quick undrained triaxial methodology the m_{ν} value was used by rearranging the equations for f_1 and f_2 and the measured undrained shear strength.



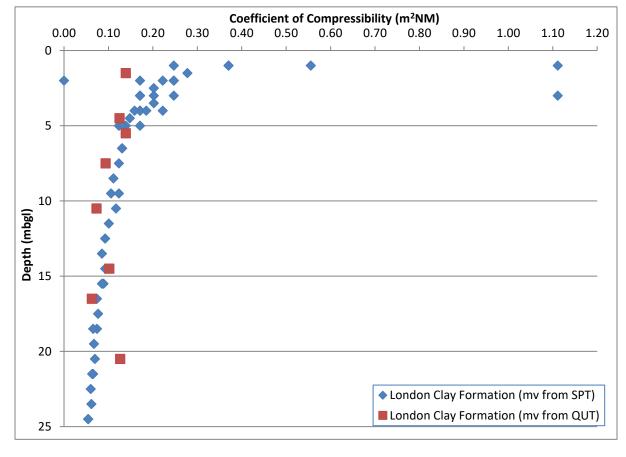


Figure 9.2: of Coefficient of Volume Compressibility (m_v) v Depth

- 9.5.4 As would be expected, the results reduce with depth as the clay increases in strength and the over burden increases, reducing the potential for compressibility.
- 9.5.5 As would be expected the results from of the London Clay are generally of "low" to "medium" compressibility. A number of near surface clays are noted to be of "high" compressibility. However this is considered to be due to the lack of overburden pressure allowing the clays to relax and so compress slightly as well as the potential for these materials to be disturbed / Made Ground.

9.6 Building Near Trees

- 9.6.1 The underlying soil conditions have been shown to be of high volume change potential.
- 9.6.2 Using the geotechnical testing obtained (summarised in Table 9.1) and with reference to NHBC Chapter 4.2 it can be seen that a minimum founding depth of 1.50m will be required. This would allow for restricted new planting.
- 9.6.3 As a basement is proposed, the foundations are likely to be formed at a depth greater than the 1.50m minimum founding depth.
- 9.6.4 Presence of existing and proposed trees may increase this minimum depth. It is recommended that a tree survey that should include: location, species and height of all trees on and near to the proposed development is recommended.



9.6.5 Guidance is also given in relation to other aspects of construction where the shrink / swell potential of the soils may be needed to take into consideration. This guidance is summarised in the appropriate sections below.

9.7 Foundations

- 9.7.1 Foundations should not be formed in either the Made Ground or Topsoil due to the unacceptable risk of total and differential settlement. It should be noted that the demolition and removal of existing structures including, foundations, services, tanks etc may increase the depth of Made Ground on the site.
- 9.7.2 It is considered likely that an excavation circa 5.0m deep, below the ground level at the front of the site, would be required to form the basement.
- 9.7.3 The topography of the site means that the finished floor level would be at significantly different levels below local ground level, increasing towards the rear (north-east) of the site.
- 9.7.4 Based upon the information obtained to date, it is considered that a cantilever retaining wall installed may be constructed with an allowable bearing pressure of 120kPa at 5.0m below the ground level adjacent to Highgate Road.
- 9.7.5 The exact allowable bearing capacity that could be achieved would need to be reviewed on receipt of foundation design details. This would include a check against sliding failure would need to be made to the retaining wall design. This may alter the above recommendations
- 9.7.6 If a greater allowable bearing capacity is required and towards the rear of the site where there could be upto two storeys of basement, then it is considered that conventional foundations would be unsuitable for the proposed development and a piled foundation solution within the underlying London Clay should be considered.
- 9.7.7 The piled foundations will carry their working load in a combination of skin friction along the sides of the pile and end bearing at the base of the pile. The piles should be designed by a suitably qualified and experienced piling specialist using a suitable factor of safety with the settlement at working load specified to meet any structural requirements. Table 9.2 provides some indicative capacities for a single pile for the diameter and depths shown.

Table 9.2: Indicative Piles Capacities (kN)

	Pile diameter (m)						
Pile toe depth (m bgl)	0.30	0.45	0.60	0.75	0.90	1.20	
("3)	Indicative Allowable Pile Capacity (kN)						
10	140	220	315	415	530	785	
12	190	300	425	555	700	1025	
14	250	390	545	715	895	1295	
16	315	490	680	885	1105	1585	
18	385	600	830	1075	1340	1910	
20	465	605	840	1095	1365	1955	



- 9.7.8 The above assumes a bored piling system. Other methods of piling and equipment may provide different results.
- 9.7.9 Should any loading be placed directly on the ground which cause the ground to settle relative to the piles then additional negative skin friction loads could be imposed on the piles.
- 9.7.10 If piling is used then an engineered granular piling mat designed and constructed to BRE 470 would need to be constructed to support the rig to prevent it overturning and / or sinking into the ground.
- 9.7.11 Once structural loads have been fully determined a full design check in accordance with BS EN 1997 should be undertaken to confirm suitability of foundation choice.
- 9.7.12 Alternatively, a fully embedded retaining wall consisting of a contiguous or secant piled box could be utilised to form the basement. Such a retaining wall would also need to be designed to carry structural loadings. The piles should be designed to withstand the earth pressures, and still meet the required structural requirements regarding issues such as deflection, deformation and bending.
- 9.7.13 The above comments are indicative only based on limited ground investigation data. Foundations should be designed by a suitably qualified Engineer. Once structural loads have been fully determined a full design check in accordance with BS EN 1997 should be undertaken to confirm suitability of foundation choice.

9.8 Concrete in the Ground

- 9.8.1 Sulphate attack on building foundations occurs where sulphate solutions react with the various products of hydration in Ordinary Portland Cement (OPC) or converted High-Alumina Cement (HAC). The reaction is expansive, and therefore disruptive, not only due to the formation of minute cracks, but also due to loss of cohesion in the matrix.
- 9.8.2 In accordance with BRE Special Digest 1, as there are less than 10 results in the data set the highest value has been taken.
- 9.8.3 Table 9.3 summarises the analysis of the aggressive nature of the ground for each of the strata encountered within the ground investigation.

Table 9.3: Concrete in the Ground Classes

Stratum	No. Samples	pH range	Highest WS Sulphate (mg/l)	Design Sulphate Class	ACEC Class
Made Ground	5	8.6 - 10.7	1780	DS-3	AC-2s
London Clay Formation	9	6.6 - 9.0	6100	DS-5	AC-4s

- 9.8.4 It should be noted that within the BRE SD-1 where there are results from 10 or more samples from a strata the mean of the top 20% is taken as the design value. The highest value noted and used in the above assessment is approximately twice as high as the next value and is considered likely to be due to the disseminated pyrite noted to exist in the London Clay Formation.
- 9.8.5 Taking the mean of the two highest results obtained would mean that concrete could be designed to designed to design sulphate DS4 and ACEC Class AC-3s.



9.9	Ground Floor Slabs
9.9.1	Given that there is to be a basement formed on the site, it is expected that the finished floor level would be approximately 5m below current ground level.
9.9.2	If a cantilever retaining wall is utilised, then a ground bearing floor slab could be used. Such a slab would need to be constructed on a suitable thickness of engineered granular material.
9.9.3	In this case, formations of the structures should be inspected by a competent person. Any loose or soft material should be removed and replaced with well-graded, properly compacted granular fill or lean mix concrete. The formation should be blinded if left exposed for more than a few hours or if inclement weather is experienced.
9.9.4	Such a floor slab would also need to be suitably reinforced, not only to distribute the structural loading but also to ensure that the floor slab can prop the retaining walls and does not buckle from the lateral pressures imposed by the cantilever retaining walls.
9.9.5	Such a floor slab could also be used for a fully embedded retaining wall (secant or contiguous piled retaining wall) however the floor would need to be independent of the walls. In normal circumstances such a retaining wall would use a suspended floor slab, in which case the piles would need to be designed to carry the floor loads as well as the structural loads. The void beneath such a suspended floor slab would require a clear void or equivalent compressible material to provide an equivalent of 150mm void.
9.9.6	The floor slab (and basement walls) would need to be constructed to conform to BS: 8102 (2009).
9.10	Excavations
9.10 9.10.1	Excavations It is likely that some shallow excavations will be required at the site for services etc, in addition to larger excavations during the remediation and construction works. These are anticipated to remain stable for the short term only.
	It is likely that some shallow excavations will be required at the site for services etc, in addition to larger excavations during the remediation and construction works. These
9.10.1	It is likely that some shallow excavations will be required at the site for services etc, in addition to larger excavations during the remediation and construction works. These are anticipated to remain stable for the short term only. The stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter, should be assessed and
9.10.1 9.10.2	It is likely that some shallow excavations will be required at the site for services etc, in addition to larger excavations during the remediation and construction works. These are anticipated to remain stable for the short term only. The stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter, should be assessed and where necessary fully supported or battered back to a safe angle. Due to the requirement to remove former fuel tanks from the site and the location of these tanks in relation to the site boundary and specifically the highway, it may not be
9.10.19.10.29.10.3	It is likely that some shallow excavations will be required at the site for services etc, in addition to larger excavations during the remediation and construction works. These are anticipated to remain stable for the short term only. The stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter, should be assessed and where necessary fully supported or battered back to a safe angle. Due to the requirement to remove former fuel tanks from the site and the location of these tanks in relation to the site boundary and specifically the highway, it may not be possible to batter back, and additional support will be required. As these excavations need to be undertaken to remediate the site it would make sense to attempt to schedule the remedial and construction works so that retaining walls / foundations etc could be formed directly into the remedial excavations rather than



9.11 Retaining Walls

- 9.11.1 At the current time, it is not known how the retaining walls to the basement will be constructed. It is assumed that the retaining walls will be either of the cast in-situ cantilever type and formed in short sections to help prevent instability issues.
- 9.11.2 These walls would need to be designed to both withstand the earth pressures and to be able to transfer the above loading successfully i.e. the retaining wall should be designed to act as a foundation for the structure.
- 9.11.3 A check against sliding failure would need to be made to the retaining wall design. This may alter the above recommendations regarding allowable bearing capacities.
- 9.11.4 Alternatively a contiguous piled wall could be used, a schematic for such a wall is included as Figure 10.3.
- 9.11.5 At the current time, insufficient structural information is available to allow details of the retaining wall to be determined. Given the obtained information it is considered that a friction angle for the materials could be taken as 0° in its undrained state.
- 9.11.6 Given the proposed depth of the basement, it is considered that heave precautions will not be required at the base of the basement walls. However, where basement walls extend up above 3mbgl, it would be recommended that heave precautions are included. Given the high-volume change potential of the underlying clays these should consist of 35mm void or the equivalent thickness of compressible material adjacent to the foundation.
- 9.11.7 The choice of parameters to allow the design of a retaining wall should be discussed in the Geotechnical Design Report. However, the following suggestions for the London Clay Formation are given based on the findings of this Ground Investigation and undertaking a limited literature review.

Table 9.4: Suggested Retaining Wall Parameters For the London Clay Formation

Parameter	Unit	Range
Unit Weight	kN/m³	18 to 20.5
Effective Stress Cohesion	kPa	0 to 12*
Angle of Shearing Resistance	o	24 to 28
Poisson Ratio		0.25 - 0.5*

^{*}Depending on drainage state

9.12 Groundwater Control

- 9.12.1 Groundwater was not encountered during drilling of any of the exploratory holes, though water was noted to seep into WS2 at 1.1mbgl and WS4 at 4.5mbgl.
- 9.12.2 During return monitoring groundwater was reported at depths of between 1.64m and 4.66m bgl within WS2, WS3, WS4 and WS5. No water was reported within WS1 or BH1 during any monitoring visit. Such variance suggests the ingress of surface water, as opposed to the natural groundwater table.

SECTION 9 GEOTECHNICAL ENGINEERING RECOMMENDATIONS



9.12.3 Subject to seasonal variations, any groundwater encountered during site works could be readily dealt with by conventional pumping from a sump used to collate waters. Surface water or rainfall ingress could be similarly dealt with.



10 GROUND MOVEMENT ASSESSMENT

10.1 Study Aims & Objectives

- 10.1.1 A ground movement assessment has been carried out to assess the potential ground movement field induced by the proposed redevelopment works at 138 140 Highgate Road on the neighbouring properties. The below assessment has been prepared in accordance with Camden Planning Guidance (CPG) Basements (March 2018).
- 10.1.2 The proposed scheme includes the demolition of the existing 138 140 Highgate Road properties followed by the construction of the new residential development. Redevelopment works are also planned to take place around the front of the plot where garden areas are planned.
- 10.1.3 The modelling works carried out and described herein are provided to:
 - Assess the impact of the proposed works on the local ground movements induced by the proposed development in the proximity to adjacent properties.
 - Check the ground movement along Highgate Road to verify the effect of the new development construction on existing road infrastructure.
- 10.1.4 This assessment provides a detailed description of the:
 - Site and proposed development.
 - · Modelling parameters and input.
 - · Analyses and results.

10.2 Proposed Development

- 10.2.1 A diagram showing the proposed development, is presented in Appendix 1. The development will involve the demolition of the existing building and construction of a new three-storey storey residential development. The new development will include a lower ground floor (half of which is below ground due to slope of ground) and a full single-storey basement below. The new building will be located in approximately the same footprint as the existing building, but the basement level will extend out to under most of the site.
- 10.2.2 An indicative section of the proposed development, displaying the elevations of each level is presented as Figure 10.2.. The existing ground level of the site is approximately 100.5mOD.
- The proposed SSL of the lower ground floor level is 98.36mOD, with the additional full basement level extending to a proposed SSL of 95.16mOD. Detailed substructure proposals were not available at the time of carrying out this GMA, for this reason a 500mm thick raft foundation has been assumed for analysis purposes, more specifically for the determination of the representative bulk excavation depth which is assumed to be approximately 6m deep. The proposals indicate that a private garden will be included to the front of the development, adjacent to Highgate Road. The proposed excavation is anticipated to be conducted with the aid of an embedded pile wall (or similar solution see indicative contiguous pile wall provided in Figure 10.3) as indicated by the



drawings available at the time of writing this report (Rev A drawings dated 15th August 2018).

10.3 **Design Assumptions**

- 10.3.1 It has been assumed that the earth retention system (embedded pile / sheet pile wall or suitable alternative) will be adequately propped during temporary works construction, in order to limit deflections during bulk excavation works and prior to permanent works slab installation. This may be achieved by one or a combination of the following (or another suitable alternative):
 - Restraint from a capping beam bending out-of-plane across relatively short spans.
 - Bespoke temporary props/corner bracing/etc.
 - Temporary berm and raking prop arrangements.
- Additionally, it has been assumed that the depth of embedment of the embedded pile wall below the formation level will be equal to the retained height which is considered an upper bound for a propped wall, this assumption was made in light of the limited substructure design data available at the time of carrying out this GMA, in order to provide a robust assessment. A temporary cantilever retaining wall would require an embedded length in the order of 1.5 to 2 times the retained height.

10.4 Indicative Construction Sequence

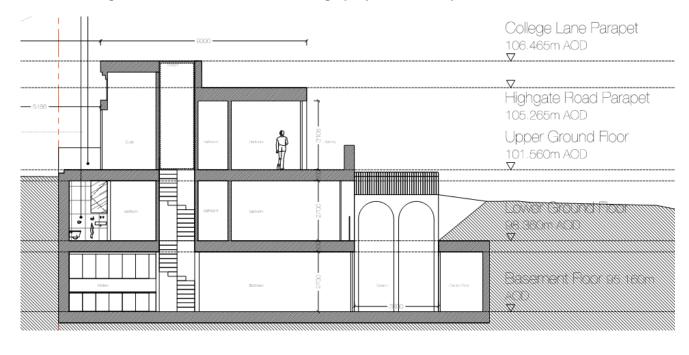
- 10.4.1 The following outline construction sequence has been assumed:
 - Establish site, repair any existing cracks and install monitoring equipment.
 - Demolish existing structure.
 - Install contiguous piled wall (or suitable alternative) from existing ground level along proposed basement perimeter.
 - Excavation works carried out to achieve formation level, with parallel installation of temporary propping as required to maintain stability.
 - Install buried drainage, heave board (if required) and cast basement slab.
 - Remove temporary props when basement slab has gained sufficient strength.
 - · Completion of permanent works construction.
- 10.4.2 The piled wall will be installed from the existing ground level and will be designed by the piling specialist.



Figure 10.1: 3D render of proposed development.



Figure 10.2: Indicative section through proposed development.





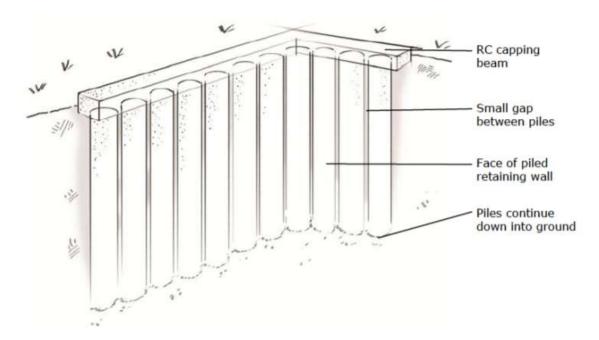


Figure 10.3: Indicative arrangement of a contiguous piles wall.

10.5 Ground Movement Assessment - Overview

10.5.1 Ground movements will arise from a number of different sources as the works progress. These ground movements will extend over a given zone of influence surrounding the building footprint. Neighbouring structures may be adversely affected by ground movements resulting from basement construction. A simplified account of typical sources of ground movement is provided below:

- 1. Demolition and enabling works:
 - Minor stress relief and (typically) small ground movements associated with removal of permanent building loads during demolition.
 - Ground movements arising primarily from contractor workmanship and adopted means and methods to enable the site to progress with basement works. E.g. shoring of temporary excavations to remove obstructions prior to piling, etc.

2. Installation effects:

- Ground movements arising from installation of embedded retaining wall elements, such as contiguous piled walls.
- The development and pattern of ground movements is dependent on the sequence that the works are performed.
- 3. Bulk excavation to formation:



- Ground movements arising from stress relief associated with unloading of the ground mass.
- Ground movements associated with soil-structure interaction between the embedded retaining wall, temporary propping system and retained ground mass.

4. Permanent loading:

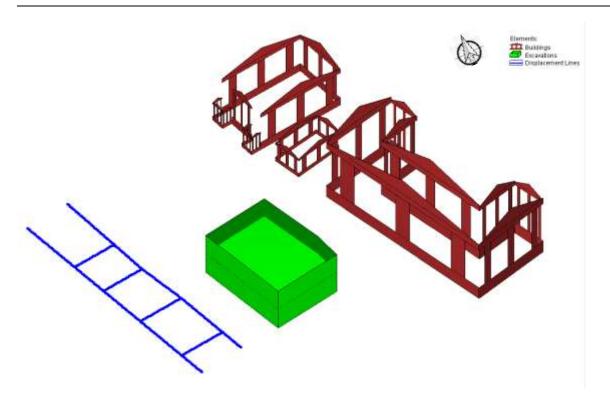
- Ground movements associated with construction of the superstructure.
- Redistribution of load paths from temporary works elements to permanent works elements.
- Long term ground movements associated with soil consolidation and creep.

10.6 Ground Movement Assessment - Means and Methods

- 10.6.1 The GMA has been undertaken using proprietary spreadsheets and the commercially available software Oasys Pdisp and Xdisp, which consider the three-dimensional ground movement field induced by the proposed works in a simplified way.
- Ground movements associated with Items 1, 3 & 4 (as described in the previous section), were evaluated using Oasys Pdisp. In these analyses the soil is assumed to behave as an isotropic, linear elastic medium. Structural forces applied to the foundation and the effects of stress-relief due to excavation are represented by applying pressures on planes at the surface, or within the elastic half-space representing the foundation soils. Ground movements that are primarily due to contractor workmanship cannot be captured within this type of assessment.
- Ground movements associated with Items 2 & 3 were also evaluated using the empirical normalised displacement curves presented in CIRIA C760 for installation and excavation of embedded retaining walls. These curves have been developed from a database of recorded ground movements and they generally represent an upper bound to the data. It is assumed that some effects of workmanship are intrinsically captured within the movement records. Notwithstanding, ground movements due to poor workmanship practices, (e.g. flighting in meta-stable sands and silts) may induce movements significantly higher than those represented by the empirical ground movement curves. It is assumed that the ground works will be carried out by a competent and experienced groundworks contractor.
- A series of three-dimensional models of the proposed scheme have been developed in both software packages outlined previously and have been combined by means of superposition to represent the various ground displacement fields summarised above. An indicative plot of the analytical model with clarification comments is presented below in **Error! Reference source not found.**.

Figure 10.1 Indicative plot of the three-dimensional analytical model produced using the Oasys software suite (soil removed for clarity of presentation). Simplified excavation geometry shown in green and Highgate Road in blue.





10.7 Ground Movement Assessment - Ground Model

- 10.7.1 An idealised ground model has been evaluated based on the site-specific ground investigation which comprised 7no window sample boreholes to 5.45mbgl and 2no cable percussive boreholes, drilled up to 24.95mbgl both with associated in situ testing and sampling.
- The thickness of Made Ground was observed in the boreholes to be typically 1m thick. It is assessed that the buildings adjacent to the proposed development site will be founded at ground surface. The thickness of the London Clay was not proven during the site investigation. Table 10.1 summarises the representative ground model adopted for ground movement assessment purposes.

Table 10.1: Summary of ground model and geotechnical parameters adopted for analysis purposes

Stratum	Top of stratum (mbgl)	Assumed Undrained Strength, S _u (kPa)	Undrained Young's Modulus, E _u (MPa)	Drained Young's Modulus, E' (MPa)
Made Ground	0.0	-	-	15.0
London Clay Formation	1.0	30 + 6.3z ^[1]	15.0 + 3.1z ^[1]	12.0 + 2.5z ^[1]

Notes:

- 1. z is the depth in metres below top of the London Clay, which is assumed to be approx. 1.0m below existing ground level.
- 2. Rigid boundary assumed at 64mOD for analytical purposes (conservative level adopted capturing extensive zone of influence based on development width of around 20m).
- 3. The stiffness data (E_u and E') has been evaluated empirically taking into consideration the nature of the geotechnical/soil-structure interaction mechanisms and level of anticipated strain within the soil mass.



10.8	Ground Movement Assessment - Assessment Scenarios
10.8.1	Two different scenarios have been considered in order to bound the potential ground movements arising from the proposed works.
10.8.2	In the first option (Method 1), the worst-case heave condition was assessed by assuming that no lateral or downward ground movement takes place during the piling operations. Heave movements arising from the proposed basement excavation were assessed using Oasys Pdisp.
10.8.3	The proposed bulk excavation works and associated heave was modelled by applying an upward (unloading) stress at the formation level, which is equivalent to the total stress relief (approx110 kPa) imposed by the proposed depth of excavation beneath the existing buildings.
10.8.4	For the short-term analysis, representing the condition immediately following excavation, the soil mass was modelled using undrained stiffness parameters.
10.8.5	In the long-term (representing the condition some time after the building works are complete and excess pore pressures have dissipated), relaxation of the soil was captured by using drained soil parameters. The effect of long-term new loads from the proposed building were also incorporated in this phase.
10.8.6	Figure 10.2 shows the geometry and intensity of the footing loads as applied in the Pdisp model. The permanent building loads were evaluated on the basis of an indicative load takedown based on the proposed floor arrangements provided.
10.8.7	The second option (Method 2) assesses horizontal movements and ground settlements (as opposed to heave evaluated in Option 1) imposed by the proposed excavation and piling works.
10.8.8	The horizontal and vertical ground movements due to pile installation and mass excavation to formation level were evaluated using the normalised CIRIA C760 curves for ground movement, as implemented in Oasys Xdisp. Installation was modelled by adopting the CIRIA C760 curve for Installation of contiguous piled wall in stiff clay. Bulk excavation was evaluated using the CIRIA C760 curve for Excavation in front of a high stiffness wall in stiff clay.
10.8.9	This option assumes that the piled wall installation imposes a ground movement field (resulting from installation and lateral deflection), leading to lateral and vertical components of movement and displacements at foundation level. This is considered a reasonable and bounds the solution between maximum potential heave, settlements and lateral deformations anticipated for the type of construction presented herein, which are also inherently subject to satisfactory control of workmanship.
10.8.10	As for Method 1, short-term and long-term phases were considered. The proposed building loads were also incorporated.
10.9	Ground Movement Assessment - Impact Assessment
10.9.1	The potential impact/damage induced on primary façade/wall elements of the buildings within the zone of influence of the proposed scheme has been evaluated on the basis of the calculated ground movement field. The walls of concern are shown in Figure 10.2



including the wall nomenclature/reference system adopted. The arrangement is based on the currently available information and presents a reasonable array of primary structures both perpendicular and parallel to the proposed basement (covering the key deformation mechanisms).

10.9.2 Each wall has been assumed to behave as an equivalent beam subject to a bending and extension/compression deformation mechanism, based on the evaluated greenfield ground movement, as outlined previously. The walls under investigation were conservatively considered to be of masonry structure.

10.9.3 Attention was also paid to potential ground movements both parallel and perpendicular to Highgate Road.

Figure 10.2: Long-term phase loading regime model with adjacent properties. The green and blue areas represent the main building loading and bicycle storage area, respectively.

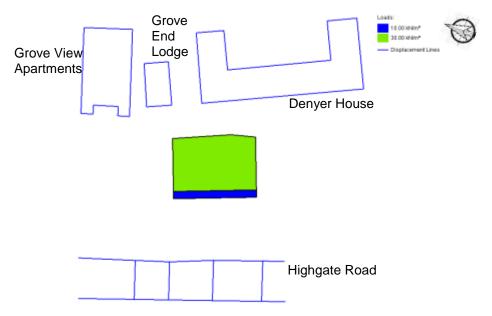
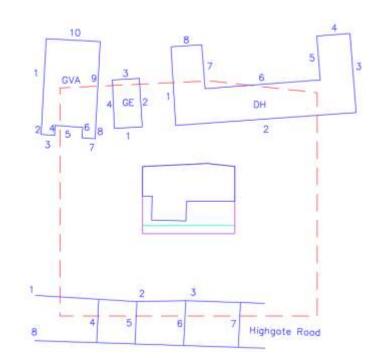


Figure 10.3: Simplified scheme and nomenclature for building façade/masonry wall elements (blue), proposed (magenta) schemes, and excavation zone of influence (dashed red).





- 10.9.4 Tensile strains induced within the building masonry walls have been evaluated based on the deflection ratios Δ/L estimated from the analyses. The assessment considers the well-established Burland (1997) damage classification method, as presented and summarised in Figure 10.4 and Figure 10.5. This method involves a simple but robust means of assessment, which is widely adopted and is considered to comprise an industry standard/best practice basis for impact assessments of this typology.
- 10.9.5 Potential damage categories are directly related to the tensile strains induced by the assessed interim (short-term) and long-term phases of construction, arising from a combination of direct tension and bending induced tension mechanisms, as reported in Table 10.2.

10.10 Ground Movement Assessment - Impact Assessment Outcomes

- 10.10.1 The results from the analysis are presented in Table 10.2 (denoting the evaluated damage categorisation in accordance with the Burland criteria presented herein).
- 10.10.2 The majority of the façades fall within Category 0, representative of a Negligible damage classification. Two façades have been classified as Category 1, representative of Very Slight damage classification. No façades have been classified as Category 2 (slight) or higher.
- 10.10.3 On the basis of the bounding analysis methods, it is assessed that the damage category for the properties adjacent to 138 140 Highgate Road will not exceed Category 1 very slight. Both the vertical and horizontal contour plots from the long-term analysis in Method 2 (giving the most conservative results) are presented below in Figure 10.6 and Figure 10.7.
- 10.10.4 Highgate Road runs immediately to the west of the site under consideration. The impact of piled wall installation and excavation works on this road has also been assessed in terms of maximum vertical and horizontal deflections at a number of locations. Soil



displacements were assessed along the blue lines drawn on the streets (see Figure 10.3). Lines running both parallel (segments 1 & 2) and perpendicular (segments 3-6) to the streets were defined to capture the effects more accurately.

10.10.5 The Thames Water asset search has indicated the presented of the infrastructure within Highgate Road only. The assessment found that the majority of displacements at these locations were between 1-2 mm and as such are considered negligible. Consequently, it is considered that the potential impact on the existing infrastructure is not critical but should be verified if 3rd parties requires any additional assessment.

10.10.6 On the basis of these results, it can be reasonably concluded that the risk of the proposed works resulting in loss of structural integrity to the pavement build-up of Highgate Road is low. Nevertheless, it may be prudent for the contractor to make an allowance for minor making good of pavement surfacing.

Table 10.2: Evaluated damage categories for strip/excavation and long-term condition stages (refer to Figure 10.3 for wall nomenclature).

Method 1

Building	Wall/façade	Damage Category Envelope		
	reference	Excavation	Long-term	
Danyer House	1	0 (Negligible)	0 (Negligible)	
	2	0 (Negligible)	0 (Negligible)	
	3	0 (Negligible)	0 (Negligible)	
	4	0 (Negligible)	0 (Negligible)	
	5	0 (Negligible)	0 (Negligible)	
	6	0 (Negligible)	0 (Negligible)	
	7	0 (Negligible)	0 (Negligible)	
	8	0 (Negligible)	0 (Negligible)	
Grove End Lodge	1	0 (Negligible)	0 (Negligible)	
	2	0 (Negligible)	0 (Negligible)	
	3	0 (Negligible)	0 (Negligible)	
	4	0 (Negligible)	0 (Negligible)	
Grove View Apartments	1	0 (Negligible)	0 (Negligible)	
	2	0 (Negligible)	0 (Negligible)	

SECTION 10 GROUND MOVEMENT ASSESSMENT



Building	Wall/façade	all/façade Damage Category Envelope	
	reference	Excavation	Long-term
	3	0 (Negligible)	0 (Negligible)
	4	0 (Negligible)	0 (Negligible)
	5	0 (Negligible)	0 (Negligible)
	6	0 (Negligible)	0 (Negligible)
	7	0 (Negligible)	0 (Negligible)
	8	0 (Negligible)	0 (Negligible)
	9	0 (Negligible)	0 (Negligible)
	10	0 (Negligible)	0 (Negligible)
Highgate Road	1	0 (Negligible)	0 (Negligible)
	2	0 (Negligible)	0 (Negligible)
	3	0 (Negligible)	0 (Negligible)
	4	0 (Negligible)	0 (Negligible)
	5	0 (Negligible)	0 (Negligible)
	6	0 (Negligible)	0 (Negligible)
	7	0 (Negligible)	0 (Negligible)
	8	0 (Negligible)	0 (Negligible)

SECTION 10 GROUND MOVEMENT ASSESSMENT



Method 2

Building	Wall/façade	Damage Cate	egory Envelope
	reference -	Excavation	Long-term
Danyer House	1	1 (Very Slight)	1 (Very Slight)
	2	0 (Negligible)	0 (Negligible)
	3	0 (Negligible)	0 (Negligible)
	4	0 (Negligible)	0 (Negligible)
	5	0 (Negligible)	0 (Negligible)
	6	0 (Negligible)	0 (Negligible)
	7	0 (Negligible)	0 (Negligible)
	8	0 (Negligible)	0 (Negligible)
Grove End Lodge	1	0 (Negligible)	0 (Negligible)
	2	1 (Very Slight)	1 (Very Slight)
	3	0 (Negligible)	0 (Negligible)
	4	0 (Negligible)	0 (Negligible)
Grove View Apartments	1	0 (Negligible)	0 (Negligible)
	2	0 (Negligible)	0 (Negligible)
	3	0 (Negligible)	0 (Negligible)
	4	0 (Negligible)	0 (Negligible)
	5	0 (Negligible)	0 (Negligible)
	6	0 (Negligible)	0 (Negligible)
	7	0 (Negligible)	0 (Negligible)
	8	0 (Negligible)	0 (Negligible)
	9	0 (Negligible)	0 (Negligible)



	10	0 (Negligible)	0 (Negligible)	
Highgate Road	1	0 (Negligible)	0 (Negligible)	
	2	0 (Negligible)	0 (Negligible)	
	3	0 (Negligible)	0 (Negligible)	
	4	0 (Negligible)	0 (Negligible)	
	5	0 (Negligible)	0 (Negligible)	
	6	0 (Negligible)	0 (Negligible)	
	7	0 (Negligible)	0 (Negligible)	
	8	0 (Negligible)	0 (Negligible)	

Table 10.4: Summary of CIRIA C580 Table 2.5 (after Burland et al (1977), Boscardin and Cording (1989) and Burland (2001)) and limiting strain εlim.

Cate	egory of damage	Description of Typical Damage	Approximate crack width (mm)	Limiting tensile strain (%)
0	Negligible	Hairline cracks of less than about 0.1mm are classes as negligible.	< 0.1	0.0-0.05
1	Very Slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection.	<1	0.05-0.075
2	Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weather tightness. Doors and windows may stick slightly	<5	0.075-0.15
3	Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weather-tightness often impaired.	5-15 or a number of cracks >3	0.15 – 0.3
4	Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floors sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15-25 but also depends on number of cracks	>0.3
5	Very Severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require	Usually >25 but depends	



Category of damage	Description of Typical Damage	Approximate crack width (mm)	Limiting tensile strain (%)
	shoring. Windows broken with distortion. Danger of instability.	on number of cracks	

Figure 10.5: Definition of relative deflection Δ and deflection ratio Δ/L .

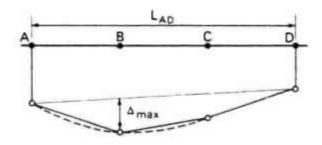


Figure 10.6: Vertical Settlement Contours for Method 2 long-term analysis

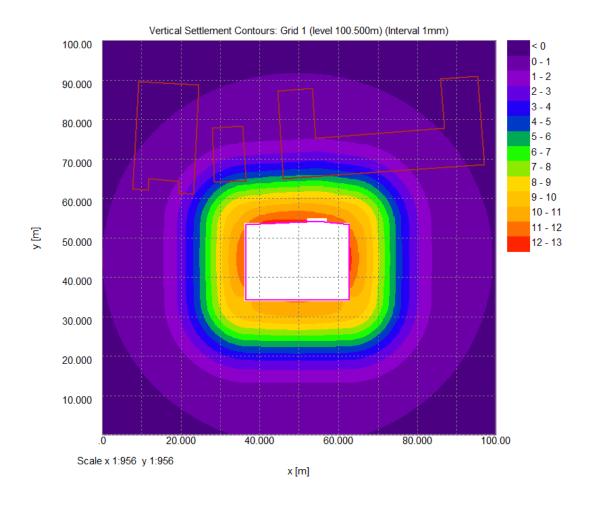
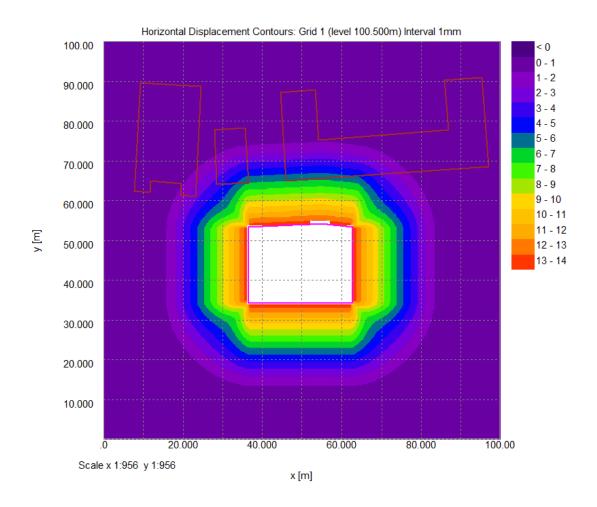




Figure 10.7: Horizontal Settlement Contours for Method 2 long-term analysis





10.11 Ground Movement Assessment - Conclusions & Closing Remarks

- 10.11.1 The interaction between the proposed 138 140 Highgate Road development, Denyer House, Grove End and Grove End Apartments has been reviewed as part of the GMA study presented herein.
- 10.11.2 The proposed development construction operations comprise a series of stages, including demolition of the existing structure, piled wall installation (assumed), basement excavation and construction of the proposed permanent works elements. The impact of construction works has been reviewed on the basis of two alternative methods (i.e. evaluating the effects of unloading/overburden removal using Pdisp (Method 1) and the excavation effect using empirical CIRIA ground movement curves in Xdisp (Method 2)).
- 10.11.3 The two different scenarios have been considered in order to bind the potential ground movements arising from the proposed works (i.e. maximum potential heave and settlement respectively). This strategy ensures a robust evaluation of the potential ground movement field resulting from the proposed works.
- 10.11.4 The results from the analysis are presented in Table 10.2 and 10.3 (denoting the evaluated damage categorisation in accordance with the Burland criteria presented herein). The majority of the facades fall within Category 0, representative of a Negligible damage classification. Two structures / façades have been classified as Category 1, representative of Very Slight damage classification. No damage category higher than this has been assessed.
- In addition to the above, assessments were carried out to quantify the potential impact of the proposed development on the adjacent roadways, respectively. The Thames Water asset search has indicated the presented of the infrastructure within Highgate Road where the ground movements were found to fall generally between 1-2mm. Such movements are considered to represent a low risk of damage to the structural integrity of the road build up and infrastructure. Nevertheless, it may be prudent for the contractor to allow for some localised making good of surface defects if required.
- 10.11.6 It is noted that the predicted ground movements, the associated wall tensile strains and level of damage categorisation are considered to be moderately conservative in view of the relatively cautious ground model assumptions and greenfield nature of the assessment undertaken.
- 10.11.7 It is also noted that the GMA will be supplemented by a project specific monitoring regime and Action Plan, which will delineate lines of responsibility, monitor trigger levels and appropriate mitigation measures. The assessment presented herein is dependent and reliant on the works being undertaken by an experienced contractor, high quality workmanship and appropriate supervision of construction means and methods by experienced personnel.



11 BASEMENT IMPACT ASSESSMENT

11.1 Basement Impact Assessment (BIA)

11.1.1 The BIA uses information produced as part of the Desk Study (Jomas - March 2018). The full report should be referred to in conjunction with the below.

11.2 Flood Resilience

11.2.1 In accordance with general basement flood policy and basement design, the proposed development will utilize the flood resilient techniques recommended in the NPPF Technical Guidance where appropriate and also the recommendations that have previously been issued by various councils.

11.2.2 These include:

- Basement to be fully waterproofed (tanked) and waterproofing to be tied in to the ground floor slab as appropriate: to reduce the turnaround time for returning the property to full operation after a flood event.
- Plasterboards will be installed in horizontal sheets rather than conventional vertical installation methods to minimise the amount of plasterboard that could be damaged in a flood event
- Wall sockets will be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property
- Any wood fixings on basement / ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event
- The basement waterproofing where feasible will be extended to an appropriate level above existing ground levels.
- The concrete sub floor as standard will likely be laid to fall to drains or gullies which
 will remove any build-up of ground water to a sump pump where it will be pumped
 into the mains sewer. This pump will be fitted with a non-return valve to prevent
 water backing up into the property should the mains sewer become full.
- 11.2.3 Insulation to the external walls will be specified as rigid board which has impermeable foil facings that are resistant to the passage of water vapour and double the thermal resistance of the cavity.

11.3 Proposed Changes to Areas of External Hardstanding

- 11.3.1 The proposed basement is beneath an existing building and beneath areas of hard paving.
- 11.3.2 The site has been shown to lie directly on very low permeability London Clay Formation.
- 11.3.3 It is not considered likely that additional areas of hardstanding will be created. Small additional areas of hardstanding are not considered likely to significantly change the ingress of the surface water into the ground.

11.4 Past Flooding

- 11.4.1 The National Planning Policy Framework sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow.
- 11.4.2 When assessing the site-specific flood risk and the potential for historic flooding to reoccur, the above guidance recommends that historic flooding records and any other



relevant and available information including flood datasets (e.g. flood levels, depths and/or velocities) and any other relevant data, which can be acquired are assessed.

- 11.4.3 The BGS does not consider the area to be prone to groundwater flooding based on rock type. Furthermore, groundwater was not reported during intrusive works at the site and water reported during monitoring is considered to represent surface water ingress unable to drain out of the well, rather than groundwater.
- 11.4.4 The SFRA produced by URS for London Borough of Camden includes several maps regarding flood risks within the local authority. The site is not shown to be at risk from groundwater or sewer flooding. The site is shown to be at 'low' risk of surface water flooding and has a 'low' flood hazard rating (<0.75m).

11.5 Geological Impact

- 11.5.1 The published geological maps indicate that the site is directly underlain by solid deposits of the London Clay Formation. This was confirmed by the intrusive investigation.
- At the depths that the basement would be constructed at, the London Clay is unlikely to be prone to seasonal shrinkage and swelling that arises due to changing water content in the soil. This is due to a lack of significant vegetation capable of removing water within the zone of influence; the hard cover minimising the amount of water entering the ground and the lack of proven groundwater. The measured groundwater is considered to represent surface water that has percolated through the near surface soils into the well and then not been able to drain away.

11.6 Hydrology and Hydrogeology Impact

- 11.6.1 Based on the information available at the time of writing, the risk of flooding from groundwater is considered to be low. The proposed basement is unlikely to have a detectable impact on the local groundwater regime. Appropriate water proofing measures should be included within the whole of the proposed basement wall/floor design as a precaution.
- 11.6.2 The proposed dwelling will lie outside of flood risk zones and is therefore assessed as being at a very low probability of fluvial flooding.
- 11.6.3 There are no surface water features on or in the immediate vicinity of the site. It is therefore not anticipated that the site will make any impact upon the hydrology of the area.
- 11.6.4 The information available suggests that the site lies in an area that is not at significant risk of surface water flooding. Flooding via this source is therefore considered to be low.
- 11.6.5 The proposed basement construction is considered unlikely to create a reduction of impermeable area in the post development scenario.
- 11.6.6 No risk of flooding to the site from artificial sources has been identified.

11.7 Impacts of Basement on Adjacent Properties and Pavement

11.7.1 The proposed basement excavation will be within 5m of a public pavement.



- 11.7.2 Unavoidable lateral ground movements associated with the basement excavations must be controlled during temporary and permanent works so as not to impact adversely on the stability of the surrounding ground, any associated services and structures.
- 11.7.3 It is recommended that the site is supported by suitably designed temporary support with cast-in-situ cantilever retaining walls or a fully embedded piled retaining wall that is likely to require propping during construction. This will ensure that the adjacent land is adequately supported in the temporary and permanent construction. Alternatively, the excavation should proceed in a manner that maintains the integrity of the ground on all sides.
- 11.7.4 Careful and regular monitoring of the structure will need to be undertaken during the construction phase to ensure that vertical movements do not adversely affect the above property. If necessary the works may have to be carried out in stages with the above structure suitably propped and supported. It is understood that sacrificial bearing piles will be utilised during construction.
- 11.7.5 It will be necessary to ensure that the basements are designed in accordance with the NHBC Standards and take due cognisance of the potential impacts highlighted above. This may be achieved by ensuring best practice engineering and design of the proposed scheme by competent persons and in full accordance with the Construction (Design and Management) Regulations. This will include:
 - Establishment of the likely ground movements arising from the temporary and permanent works and the mitigation of excessive movements;
 - Assessment of the impact on any adjacent structures (including adjacent properties and the adjacent pavement with potential services);
 - Determination of the most appropriate methods of construction of the proposed basements;
 - Undertake pre-condition surveys of adjacent structures:
 - Monitor any movements and pre-existing cracks during construction;
 - Establishment of contingencies to deal with adverse performance;
 - Ensuring quality of workmanship by competent persons.
- 11.7.6 Full details of the suitable engineering design of the scheme in addition to an appropriate construction method statement should be submitted by the Developer to London Borough of Camden.



12 REFERENCES

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London Borough of Camden (2018); "Camden Planning Guidance Basements" March 2018



APPENDICES

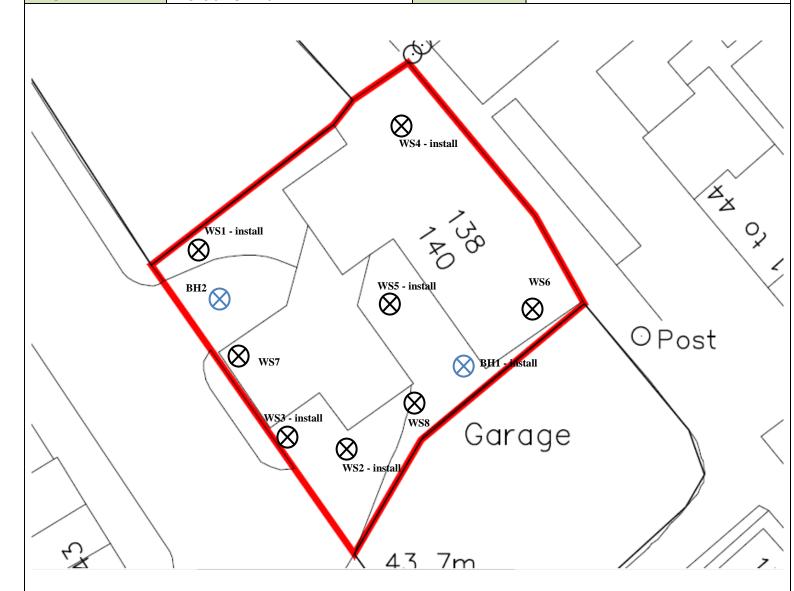


APPENDIX 1 – FIGURES



JOMAS ASSOCIATES LTD T: 0843 289 2187

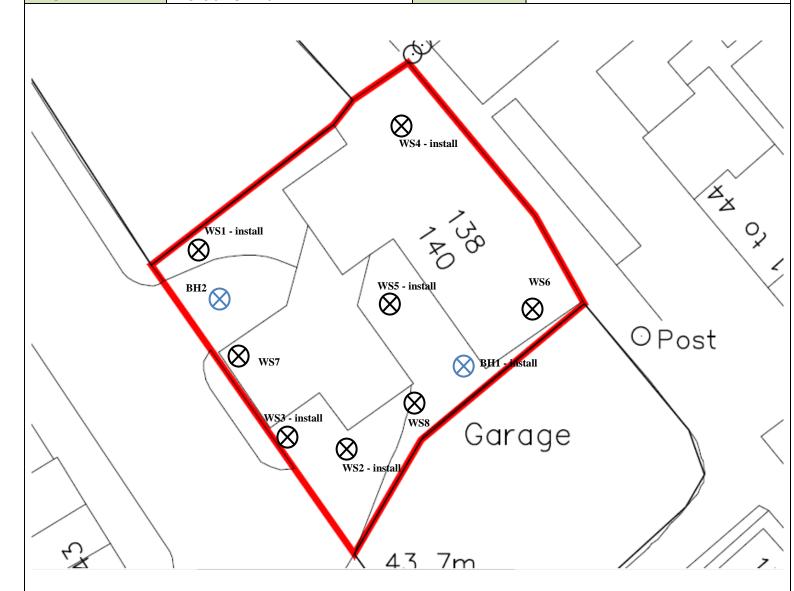
Project Name	140 Highgate Road	Client	Design Ventures Highgate Ltd
Project No.	P1323J1303	Date	15/2/18
Title	Actual GI Plan		





JOMAS ASSOCIATES LTD T: 0843 289 2187

Project Name	140 Highgate Road	Client	Design Ventures Highgate Ltd
Project No.	P1323J1303	Date	15/2/18
Title	Actual GI Plan		





APPENDIX 2 – EXPLORATORY HOLE RECORDS

			WINDOW/WIND	OWLESS S	SAMPLING BO	REHOLE RECORD	
		145	Exploratory Hole No:			WS1	
Site Address:	140 Highgate Road, High	ngate, London, NW5 1PB	Project No:			P1323J1303	
Client:	Design Ventures Highgat	te Ltd	Ground Level:				
Logged By:	JT		Date Commenced:		12/02/2018		
Checked By:			Date Completed:		12/02/2018		
Type and diameter of equipment:	Window Sampler		Sheet No:			1 Of 1	
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
•							

Remarks

- 1: *Field description.
- 2: No water reported.

3:	VOC	readings	of	each	sample	given	ın	ppm

		Sample	e or Ta	oste							Strata			
		Jampie	e 01 16									Water		
Туре	Depth (mbgl)	75	75	75	Result 75	75	75	N		Legend	Depth (mbgl)	Strikes (mbgl)	Strata Description	Installat
									0.00 -	***********			Soft* consistency dark brown sandy gravelly clay.	
													Gravel consists of fine to coarse sub-angular to sub-rounded brick, concrete and flint. Contains	
P+J D	0.25									***************************************			frequent rootlets. No black staining or hydrocarbon	
	0ppm												odour noted. (MADE GROUND).	
P+J D	0.50								0.50 -					
	0ppm									************	0.60		Very stiff* mottled brown-grey CLAY. No black	
													staining or hydrocarbon odour noted. (LONDON	
													CLAY).	
										+=====				
P+J D	1.00								1.00 -	T=====				
SPT	0ppm	1	1	2	3	2	2	9						
JF I		'	'	-	3	_		7		<u> </u>				
										<u> </u>				
									1.50 -	+=====				
										+3-3-3-3				
										T=====				
P+J	2.00								2.00 -					
P+J	Oppm								2.00					
SPT	оррии	1	2	2	3	2	3	10		<u> </u>				
										_======				
										+======				
									2.50 -	+=====				
										1333333				
P+J	3.00								3.00 -	_======				
	0ppm													
SPT		1	2	3	4	3	3	13						
										+=====				
									3.50 -	1				
									3.50 -					
										<u> </u>				
														:::
														::::
P+J	4.00								4.00 -					::::
0.0.7	0ppm		-	-	-	-				#33333				:::
SPT		1	2	3	3	3	4	13						::::
									4.50 -	<u> </u>				
										+333333				::::
														::::
										+======================================	5.00			::::
P+J	5.00								5.00 -		0.00			
	0ppm	2											(U*) Non recovery of Sample	

Sampling Code: U- Undisturbed B- Large Disturbed D- Small Disturbed W- Water (U*) Non recovery of Sample Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

			WINDOW/WIND	OWLESS S	SAMPLING BO	REHOLE RECORD
		145	Exploratory Hole No:			WS2
Site Address:	140 Highgate Road, High	gate, London, NW5 1PB	Project No:			P1323J1303
Client:	Design Ventures Highgat	e Ltd	Ground Level:			
Logged By:	JT		Date Commenced:			13/02/2018
Checked By:			Date Completed:			13/02/2018
Type and diameter of equipment:	Window Sampler		Sheet No:			1 Of 1
Water levels recorded during bor	ing, m					
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						
Remarks						
1: *Field description						

- 2: Metal bar (approx. 15mm in diameter) hit at approx. 1.05m bgl.

 3: Seepage of black oily water at approx. 1.10m bgl.

4: VOC reading											Strata			
Type		T	Sample or Tests											
	Depth (mbgl)				Result	t				Legend	Depth (mbgl)	Water Strikes	Strata Description	Installation
	(mbgi)	75	75	75	75	75	75	N		J	(magi)	(mbgl)		
									0.00 -		0.20		Reinforced concrete. (MADE GROUND).	
									-		0.20		Soft* consistency dark brown sandy gravelly clay. Gravel consists of fine to coarse sub-angular to sub-rounded brick, concrete and flint. No black	
P+J D	0.50								0.50 —				sub-rounded brick, concrete and flint. No black staining or hydrocarbon odour noted. (MADE GROUND).	
	0ppm								-					
									-					
P+J D	1.00 Oppm								1.00 -		1.10			
									-				No recovery from 1.00-4.00m bgl (except one vial from approx. 2.50m bgl).	
									1.50 —					
									-					
									2.00 -					
									-	****				
VIIAL ONLY	0.50								-					
VIAL ONLY	2.50 18ppm								2.50 -					
									-					
									3.00 -					
									-					
									-					
									3.50 -					
									-					
									4.00 -		4.00			
									-					
									-					
									4.50 -	-				
									-					
									5.00 -					

			WINDOW/WIND	OWLESS S	SAMPLING BO	REHOLE RECORD	
			Exploratory Hole No:			WS3	
Site Address:	140 Highgate Road, Hig	hgate, London, NW5 1PB	Project No:			P1323J1303	
Client:	Design Ventures Highga	te Ltd	Ground Level:				
Logged By:	JT		Date Commenced:		12/02/2018		
Checked By:			Date Completed:			12/02/2018	
Type and diameter of equipment:	Window Sampler		Sheet No:			1 Of 1	
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							

Remarks

- 1: *Field description.
- 2: No water reported.

 3: VOC readings of each sample given in ppm

٥.	voc readings	UI	eacii	sample	giveii	1111	ppii	١.

		Sampl	e or Te	ests							Strata			
Туре	Depth (mbgl)	75	7.5		Result		7.5			Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installa
		75	75	75	75	75	75	N	0.00 -				Reinforced concrete. (MADE GROUND).	
									-	***************************************	0.20		Soft* consistency mid to dark brown sandy gravelly	+336
									-	***************************************			clay. Gravel consists of fine to coarse sub-angular	EER
+J D	0.40								-	************			to sub-rounded brick, concrete and flint. No black staining or hydrocarbon odour noted. (MADE	153
	Oppm								0.50 —				GROUND).	FEE
									-	<u> </u>				
+J D	0.80								_					1531
	0ppm								-	************	0.90		Very stiff* mottled brown-grey CLAY. No black	+==1
SPT	1.00	1	1	1	2	2	1	6	1.00 —				staining or hydrocarbon odour noted. (LONDON	
									-				CLAY).	
									_	<u> </u>				
									1.50 —	<u> </u>				
									-					
									-	======				
									-					
+J D	2.00								2.00 -					
+3 D	Oppm								2.00					
SPT		1	1	2	2	2	3	9	-					
									-					
									-					
									2.50 —					
									_					
									-					
P+J	3.00								3.00 —					
	0ppm								-	=====				
SPT		1	1	2	2	2	3	9						
									3.50 —	<u> </u>				
									-					
									-					
									-	1999				
P+J	4.00								4.00 —					
1 +3	Oppm								4.00 -	<u> </u>				
SPT		1	2	2	3	4	4	13	-					
									-					
									-	+=====				
									4.50 —	<u> </u>				
									-	<u> </u>				
									-		F 60			
P+J	5.00								5.00 —		5.00			
	Oppm									1				1

4 3 5 4 6 18
Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD
T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

			WINDOW/WINE	OWLESS S	SAMPLING BO	DREHOLE RECORD
		1A5	Exploratory Hole No:			WS4
Site Address:	140 Highgate Road, High	ngate, London, NW5 1PB	Project No:			P1323J1303
Client:	Design Ventures Highga	te Ltd	Ground Level:			
Logged By:	JT		Date Commenced:			13/02/2018
Checked By:			Date Completed:		13/02/2018	
Type and diameter of equipment:	Window Sampler		Sheet No:			1 Of 1
Water levels recorded during bor	ring, m					
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						
Remarks						

Strata

- 1: Field description.
- 2: Water seepage at approx. 4.50m bgl.
- 3: VOC readings of each sample given in ppm. 4:

4.00

5.00

1 2 3 3 4

1

2

0ppm

P+J

SPT

SPT

Sample or Tests

Туре	Depth (mbgl)				Resul	t				Legend	Depth (mbgl)	Water Strikes	Strata Description	Install	lation
	(Hibgi)	75	75	75	75	75	75	N	1		(mbgi)	(mbgl)			
									0.00 —		0.50		Reinforced concrete. (MADE GROUND).		
P+J D	0.70 Oppm								0.50 —				Very stiff* mottled brown-grey CLAY. No black staining or hydrocarbon odour noted. (LONDON CLAY).		
P+J D	1.00 Oppm								1.00 —						
SPT		1	0	1	0	1	2	4	1.50 —						
P+J D	2.00 Oppm								2.00 —] ::::
SPT	оррт	1	2	2	3	4	4	13	2.50 —						
P+J	3.00 Oppm								3.00 —						
SPT	Оррии	1	2	2	3	4	4	13	- - 3.50 —						

5.00

4.00

4.50

5.00

14

17

4

5

				WINDOW/WIND	OWLESS S	SAMPLING BO	REHOLE RECORD
		15		Exploratory Hole No:			WS5
Site Address:	140 Highgate Road, Highgate,	London, NW5 1PB		Project No:			P1323J1303
Client:	Design Ventures Highgate Ltd			Ground Level:			
Logged By:	JT			Date Commenced:			13/02/2018
Checked By:				Date Completed:			13/02/2018
Type and diameter of equipment:	Window Sampler			Sheet No:			1 Of 1
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:					·		
Water Level after 20mins:	·	·					
Remarks							

- 1: *Field description.

- 2: No water reported.
 3: VOC readings of each sample given in ppm.

1:		Sampl	e or Te	ests							Strata			
Tuno	Depth				Result	t				Legend	Depth	Water Strikes	Strata Description	Installatio
Туре	(mbgl)	75	75	75	75	75	75	N		Legend	(mbgI)	(mbgl)		
									0.00 —		0.08		Concrete. (MADE GROUND).	
													Concrete. (MADE GROUND).	
									-		0.30		Soft* consistency mid to dark brown sandy gravelly	
P+J D	0.50								0.50 -				clay. Gravel consists of fine to coarse sub-angular to sub-rounded brick, concrete and flint. Some	
7.10	2ppm								-				black staining and a moderate hydrocarbon odour noted throughout. (MADE GROUND).	
									-					
									-					
P+J D	1.00								1.00 —					
SPT	8ppm	1	1	0	1	0	1	2			1.20			
351		'	'		'		'		-				Very stiff* mottled brown-grey CLAY. Dark black staining and a strong hydrocarbon odour noted from	
									-				approx. 1.50m-2.00m bgl. Softer consistency and wetter from approx. 2.00m-3.00m bgl. (LONDON	
P+J D	1.60								1.50 —				CLAY).	
	24ppm								-					
									-					
SPT	2.00	0	0	0	0	0	0		2.00 -					
									-					
									-					
									-					
P+J	2.50								2.50 —	133333				
	1ppm													
									-					
SPT	3.00	0	1	0	0	1	1	2	3.00 -					
									-					
									-					
									-					
P+J	3.50								3.50 —					
	Oppm								_	†				
									-					
SPT	4.00	1	2	2	3	2	3	10	4.00 —					
361	4.00	!		2	3	2	3	10	4.00 -					
									-					
P+J	4.50								4.50 —					
	0ppm								-					
									-					
									-		5.00			
SPT	5.00	2	2	2	3	4	4	13	5.00 -	1	5.00	1	I control of the cont	1/2

			WINDOW/WINDOWLE	SS SAMPLING BO	OREHOLE RECORD
	(JOHAS		Exploratory Hole No:		WS6
Site Address:	140 Highgate Road, Highgate, London, NW5 1PB		Project No:		P1323J1303
Client:	Design Ventures Highgate Ltd		Ground Level:		
Logged By:	JT		Date Commenced:		13/02/2018
Checked By:			Date Completed:		13/02/2018
Type and diameter of equipment:	Window Sampler		Sheet No:		1 Of 1
Water levels recorded during bor	ing, m				
Date:					
Hole depth:					
Casing depth:					
Level water on strike:					
Water Level after 20mins:					
Remarks					
1: Concrete corer refused at 0.60m	due to presence of vertical rebar.			•	
2:		·	<u> </u>	•	

3: 4:															
4:			Sampl	e or Te	ests							Strata			
	Туре	Depth (mbgl)	75	75		Result	t 75	75	N		Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
										0.00 — - - - - 0.50 —		0.60		Reinforced concrete. (MADE GROUND).	
										1.00 —					
										1.50 — - -	-				
										2.00 —					
										2.50 — - -	-				
										3.00 -	-				
										3.50 —	-				
										4.00 -	-				
										4.50 — - -	-				
										5.00 —	_				

				WINDOW/WIND	OWLESS S	SAMPLING BO	REHOLE RECORD
				Exploratory Hole No:			WS7
Site Address:	140 Highgate Road, High	ngate, London, NW5 1PB		Project No:			P1323J1303
Client:	Design Ventures Highgat	e Ltd		Ground Level:			
Logged By:	JT			Date Commenced:			12/02/2018
Checked By:				Date Completed:			12/02/2018
Type and diameter of equipment:	Window Sampler			Sheet No:			1 Of 1
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							
Remarks							
4 451 1 1 1 1 1			·			•	·

- 1: *Field description.
- No water reported.
 VOC readings of each sample given in ppm.

٥.	VOC	reauiriys	Oi	eacii	Sample	giveii	1111	ppii	11

	Sample or Tests									Strata				
Туре	Depth (mbgl)	75	75	75	Result	t 75	75	N		Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		73	73	73	73	73	73	- 14	0.00 —		0.25		Reinforced concrete. (MADE GROUND).	
'+J D	0.40 Oppm								0.50 —				Soft* consistency mid brown sandy gravelly clay. Gravel consists of fine to coarse sub-angular to sub-rounded brick, concrete and flint. No black staining or hydrocarbon odour noted. (MADE GROUND).	
+J D SPT	0.90 Oppm00	1	1	1	2	1	2	6	1.00 —		1.00			
									- - -				Very stiff* mottled brown-grey CLAY. No black staining or hydrocarbon odour noted. (LONDON CLAY).	
+J D	1.50 Oppm								1.50 —					
	оррін								-					
SPT	2.00	1	2	2	2	3	2	9	2.00 —					
									2.50 —					
P+J	3.00								3.00 —					
SPT	0ppm	1	2	3	2	3	3	11	-					
571		'	2	3	2	3	3	11	3.50 —					
P+J	4.00								4.00 —		4.00			
SPT	Oppm	1	2	3	3	3	3	12	-					
									4.50 —					

			CABLE P	ERCUSSIC	N BOREHOLE	RECORD
		1/45	Exploratory Hole No:			BH1
Site Address:	140 Highgate Road, High	igate, London, NW5 1PB	Project No:			P1323J1303
Client:	Design Ventures Highgat	e Ltd	Ground Level:			
Logged By:	RD		Date Commenced:			13/02/2018
Checked By:			Date Completed:			13/02/2018
Type and diameter of equipment:	Dando 4000		Sheet No:			1 Of 5
Water levels recorded during bor	ing, m					
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						
Remarks						
1: No water reported						

Remarks	

4:														
		Sampl	e or T	ests							Strata			
T	Depth				Result	t				Language	Depth	Water Strikes	Strata Description	Installation
Туре	(mbgl)	75	75	75	75	75	75	N	-	Legend	(mbgl)	(mbgl)		
									0.00 —	*******			Concrete. (MADE GROUND)	-5-316-5-3
									-		0.30		Brown medium to high strength silty CLAY.	
D	0.40								-				brown median to high strength sitty cent.	
									0.50 —					
									-					
									-	+=====				
D	1.00								1.00 —					
									-					
									-					
									-					
U	1.50								1.50 —					
									_					
									-					
									2.00 —					
									-					
									-					
									-					
D	2.50							1.1	2.50 —					
S		2	2	2	3	3	3	11	_					
									-					
									3.00 —					
									-					
									-					
									-					
D	3.50								3.50 —					
									-					
									-					
									4.00 —					
									-					
									-					
U	4.50								4.50 —					
	45 blows for	100%	recov	ery					-					
									-	<u> </u>				
									-					
									5.00 —					
-	1		1				1		1	1		1	l .	

			CABLE P	ERCUSSIC	N BOREHOLE	RECORD
		1/45	Exploratory Hole No:			BH1
Site Address:	140 Highgate Road, High	igate, London, NW5 1PB	Project No:			P1323J1303
Client:	Design Ventures Highgat	e Ltd	Ground Level:			
Logged By:	RD		Date Commenced:			13/02/2018
Checked By:			Date Completed:			13/02/2018
Type and diameter of equipment:	Dando 4000		Sheet No:			2 Of 5
Water levels recorded during bor	ing, m					
Date:						
Hole depth:						
Casing depth:						
Level water on strike:						
Water Level after 20mins:						
Remarks						
1: No water reported						

	Sampl	e or Te	ests							Strata			
Depth				Result	t				Legend	Depth	Water Strikes	Strata Description	Installation
(HbgI)	75	75	75	75	75	75	N			(Hibgi)	(mbgl)		
5.50	2	4	4	4	4	4	16	5.00 —				Brown medium to high strength silty CLAY.	
6.50	2	4	4	4	4	5	17	6.00 —					
7.50 60 blows for	<mark>·</mark> 100%	recov	<mark>e</mark> ry					- - 7.50 — -					
8.50	3	4	4	5	5	6	20	8.00 — - - - 8.50 — - - -					
9.50	3	4	5	5	5	6	21	9.00 — - - - 9.50 — - - - 10.00—					
	Depth (mbgl) 5.50 6.50 7.50 60 blows for	Depth (mbgl) 75 5.50 2 6.50 2 7.50 60 blows for 100% 8.50 3	Depth (mbgl) 75 75 5.50 2 4 6.50 2 4 7.50 60 blows for 100% recov.	7.50 2 4 4 6.50 2 4 4 7.50 60 blows for 100% recovery 8.50 3 4 4	Depth (mbgl) 75 75 75 75 75	Depth (mbgl) 75 75 75 75 75 75	Depth (mbgl)	Depth (mbgl) 75 75 75 75 75 N N	Depth (mbgl)	Depth (mbgl) 75 75 75 75 75 N	Depth (mbgl)	Depth (mbgl) Result Result Regend Rege	Depth (ribg) To To To To To To To T

	CABLE PERCUSSION BOREHOLE RECORD					
	Exploratory Hole No:			BH1		
140 Highgate Road, High	gate, London, NW5 1PB		Project No:		I	P1323J1303
Design Ventures Highgat	e Ltd		Ground Level:			
RD			Date Commenced:			13/02/2018
			Date Completed:		13/02/2018	
Dando 4000			Sheet No:			3 Of 5
ing, m						
	140 Highgate Road, High Design Ventures Highgat RD Dando 4000	Dando 4000	140 Highgate Road, Highgate, London, NW5 1PB Design Ventures Highgate Ltd RD Dando 4000	Exploratory Hole No: 140 Highgate Road, Highgate, London, NW5 1PB Project No: Design Ventures Highgate Ltd RD Date Commenced: Date Completed: Dando 4000 Sheet No:	Exploratory Hole No: 140 Highgate Road, Highgate, London, NW5 1PB Project No: Design Ventures Highgate Ltd RD Date Commenced: Date Completed: Dando 4000 Sheet No:	Exploratory Hole No: 140 Highgate Road, Highgate, London, NW5 1PB Project No: Ground Level: RD Date Commenced: Date Completed: Dando 4000 Sheet No:

k	ema	arks	

1			

4:														
4:		Sampl	e or T	ests							Strata			
		Jampi	e ur Ti						-			Water		
Туре	Depth				Result	t				Legend	Depth	Strikes	Strata Description	Installation
.,,,,,	(mbgl)	75	75	75	75	75	75	N	1	Logona	(mbgl)	(mbgl)		
									10.00				Brown medium to high strength silty CLAY.	******
									-				Brown medium to high strength sirty CLAT.	
									-					**********
									-					***************************************
									-					***************************************
U	10.50								10.50—					**********
	80 blows for	100%	recov	ery					-					

									_					***********
									11.00—					
									_					**********
									-					**********
									-					
									-					**********
D	11.50								11.50					************
S		4	5	5	5	6	6	22	_					**********

									12.00—					**********
									_					***************************************
									-					**********
									-					
									-		12.40		Grey high to very high strength CLAY. (LONDON	
D	12.50								12.50—				Grey high to very high strength CLAY. (LONDON CLAY)	***********
S		3	4	5	6	6	7	24	-					***********
									_					**********
									13.00					***********
									_					***************************************
									_					**********
									-					***********
									-					**********
U	13.50								13.50—					
	80 blows for	100%	recov	ery					-	1333333				
									-					
									14.00					
										<u> </u>				
									_	<u> </u>				
									-					
									-					
D	14.50								14.50—					
S		3	4	5	6	6	7	24	-					
									-	-2-2-2-3				
									-	======				
									15.00					
									15.00					

		CABLE PERCUSSION BOREHOLE RECORD					
		Exploratory Hole No:			BH1		
Site Address:	140 Highgate Road, High	gate, London, NW5 1PB		Project No:			P1323J1303
Client:	Design Ventures Highgat	e Ltd		Ground Level:			
Logged By:	RD			Date Commenced:			13/02/2018
Checked By:				Date Completed:		13/02/2018	
Type and diameter of equipment:	Dando 4000			Sheet No:			4 Of 5
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							
Remarks							
1: No water reported							

3:														
4:	: Sample or Tests									Strata				
	Depth				Result						Depth	Water	Strata Description	Installation
Туре	(mbgl)	75	75	75	75	75	75	N		Legend	(mbgl)	Strikes (mbgl)	Strata Description	Installation
		75	7.5	75	75	73	7.5	- 1	15.00				Grey high to very high strength CLAY (LONDON	********
									-				Grey high to very high strength CLAY. (LONDON CLAY)	
									-					
D	15.50								15.50—					
S		3	4	5	6	7	7	25	-					
									_					
									-					
									16.00-					
									-					
									-					*********
U	16.50								16.50—					
	70 blows for	100%	recov	ery					-					
									-					
									17.00—					
									-					
									-					
									_					
D S	17.50	4	5	6	7	7	9	29	17.50—					
		4	3		′	,	7	27	-					
									_					
									18.00					
									-					
									_					
	10.50								-					
D S	18.50	4	5	6	7	8	9	30	18.50— -					
									-					
									_					
									19.00—					
									_					
									-					
U	19.50								19.50—					
, and the second	80 blows for	100%	recov	ery					-					
									-					
									_					
									20.00					

		CABLE PERCUSSION BOREHOLE RECORD					
		Exploratory Hole No:			BH1		
Site Address:	140 Highgate Road, High	igate, London, NW5 1PB		Project No:			P1323J1303
Client:	Design Ventures Highgat	e Ltd		Ground Level:			
Logged By:	RD			Date Commenced:			13/02/2018
Checked By:				Date Completed:		13/02/2018	
Type and diameter of equipment:	Dando 4000			Sheet No:			5 Of 5
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							
Remarks							
1: No water reported							

4:														
		Sampl	e or Te	ests							Strata			
Туре	Depth (mbgl)				Result	t			Le	egend	Depth (mbgl)	Water Strikes	Strata Description	Installation
	(9.)	75	75	75	75	75	75	N			(*****9**/	(mbgl)		
D S	20.50	4	5	7	7	8	10	32	20.00				Grey high to very high strength CLAY. (LONDON CLAY)	
D S	21.50	5	7	8	8	9	9	34	21.00					
U	22.50								22.50					
	150 blows fo	r 55%	recov	ery										*********
D S	23.50	4	7	8	8	9	11	36	23.50					
D	24.00								24.00					
S	24.50	7	8	9	10	10	12	41	24.50————————————————————————————————————		24.95			
			Compli											

	CABLE PERCUSSION BOREHOLE RECORD					
	Exploratory Hole No:			BH2		
140 Highgate Road, High	gate, London, NW5 1PB		Project No:		I	P1323J1303
Design Ventures Highgat	e Ltd		Ground Level:			
RS			Date Commenced:			13/02/2018
			Date Completed:		13/02/2018	
Dando 4000			Sheet No:			1 Of 5
ing, m						
	140 Highgate Road, High Design Ventures Highgat RS Dando 4000	Dando 4000	140 Highgate Road, Highgate, London, NW5 1PB Design Ventures Highgate Ltd RS Dando 4000	Exploratory Hole No: 140 Highgate Road, Highgate, London, NW5 1PB Project No: Design Ventures Highgate Ltd RS Date Commenced: Date Completed: Dando 4000 Sheet No:	Exploratory Hole No: 140 Highgate Road, Highgate, London, NW5 1PB Project No: Design Ventures Highgate Ltd RS Date Commenced: Date Completed: Dando 4000 Sheet No:	Exploratory Hole No: 140 Highgate Road, Highgate, London, NW5 1PB Project No: Ground Level: RS Date Commenced: Date Completed: Dando 4000 Sheet No:

k	ema	arks	

3:														
4:		Sampl	e or T	ests					Strata					
Туре	Depth	-a.ripi	5 51 11		Resul	t				Legend	Depth	Water Strikes	Strata Description	Installation
.542	(mbgl)	75	75	75	75	75	75	N			(mbgl)	(mbgl)		
									0.00 -	**********			Concrete. (MADE GROUND)	********
											0.30		Brown medium to high strength silty CLAY.	
D	0.40								0.50 -					
									0.00					
										+33333				
D	1.00								1.00 -					
										<u> </u>				
_			_	_		_	_	_						
S	1.50	2	2	2	2	2	2	8	1.50 -					
D	2.00								2.00 -					
										-5555				
U	2.50	1000/							2.50 -					
	60 blows for	100%	recov	ery										
									3.00 -					
									0.00					
D	3.50								3.50 -					
S		2	3	2	3	3	3	11						
									4.00 -					
										+33333				
D	4.50								4.50 -					
S		2	3	3	4	4	4	15						
										+				
									5.00 -	<u> </u>				*********
1														

			CABLE PE	RCUSSIO	N BOREHOLE	RECORD	
		Exploratory Hole No:			BH2		
Site Address:	140 Highgate Road, Highg	gate, London, NW5 1PB		Project No:		ı	P1323J1303
Client:	Design Ventures Highgate	Ltd		Ground Level:			
Logged By:	RS			Date Commenced:			13/02/2018
Checked By:				Date Completed:		13/02/2018	
Type and diameter of equipment:	Dando 4000			Sheet No:			2 Of 5
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							
Remarks							
1: No water reported							
2:					•	·	

Remar	<s .<="" th=""></s>

3:														
4:														
		Sampl	e or T	ests							Strata			
Туре	Depth (mbgl)	75	75	75	Result	75	75	N		Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		/5	/5	/5	/5	/5	75	IN	5.00 —					
U	5.50								5.50 - - - 5.50 -				Brown medium to high strength silty CLAY.	
	60 blows for	100%	recov	ery					=					***************************************
D S	6.50	3	3	4	4	4	5	17	6.00 — 6.50 — 6.50 —					
D S	7.50 8.50	3	3	4	4	5	5	18	7.50 — 7.50 — 7.50 — - 8.00 — - 8.50 —					
	70 blows for	100%	recov	ery					-					**************************************
D S	9.50	2	3	4	4	4	6	18	9.00 — 9.00 — - - - 9.50 — - - - - - - - - - - - - -					
														-

				CABLE P	ERCUSSIC	N BOREHOLE	RECORD
		Exploratory Hole No:			BH2		
Site Address:	140 Highgate Road, High	gate, London, NW5 1PB		Project No:			P1323J1303
Client:	Design Ventures Highgat	e Ltd		Ground Level:			
Logged By:	RS			Date Commenced:			13/02/2018
Checked By:				Date Completed:		13/02/2018	
Type and diameter of equipment:	Dando 4000			Sheet No:			3 Of 5
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							
Remarks							
1: No water reported							

Re	marks	s

1.	NIO	wotor	roporto

4:														
4.		Sampl	e or T	ests							Strata			
Туре	Depth (mbgl)	,			Result	t				Legend	Depth (mbgl)	Water Strikes	Strata Description	Installation
	(IIIbgI)	75	75	75	75	75	75	N			(Hibgi)	(mbgl)		
D S	10.50	3	4	4	4	5	6	19	10.00—				Brown medium to high strength silty CLAY.	
U	11.50								- 11.50—					
S S	70 blows for	100%	recov	ery					-		11.60		Grey high to very high strength CLAV (LONDON	
D S	12.50								12.00— - 12.50— - 12.50— - 13.00—				Grey high to very high strength CLAY. (LONDON CLAY)	
D S	13.50	3	4	6	6	7	7	26	13.50—					
U	14.50	1000							14.50—					
	65 blows for	100%	ecov Pecov	егу					- - - 15.00-					
	1		1		1		1		L			1	I	1

				CABLE P	ERCUSSIC	N BOREHOLE	RECORD
		Exploratory Hole No:			BH2		
Site Address:	140 Highgate Road, High	igate, London, NW5 1PB		Project No:			P1323J1303
Client:	Design Ventures Highgat	e Ltd		Ground Level:			
Logged By:	RS			Date Commenced:			13/02/2018
Checked By:				Date Completed:		13/02/2018	
Type and diameter of equipment:	Dando 4000			Sheet No:			4 Of 5
Water levels recorded during bor	ing, m						
Date:							
Hole depth:							
Casing depth:							
Level water on strike:							
Water Level after 20mins:							
Remarks							
1: No water reported							

Remarks	
---------	--

4:														
7.		Sampl	e or Te	ests							Strata			
Туре	Depth (mbgl)				Result					Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
		75	75	75	75	75	75	N	15.00-			(HbgI)		
D S	15.50	4	4	5	6	7	8	26	15.50—				Grey high to very high strength CLAY. (LONDON CLAY)	
D S	16.50	4	5	6	7	8	9	30	16.00—					
U	17.50	4000							17.50—					
D S	70 blows for	100 %	7	ery 7	8	8	11	34	18.00— - 18.50— - 18.50— - - 19.00—					
D S	19.50	4	5	6	8	9	10	33	19.50— - - - - - 20.00—					
			1		1		1		I			I.	1	

			CABLE PE	RCUSSIO	N BOREHOLE	RECORD
	Exploratory Hole No:			BH2		
140 Highgate Road, High	gate, London, NW5 1PB		Project No:		I	P1323J1303
Design Ventures Highgat	e Ltd		Ground Level:			
RS			Date Commenced:			13/02/2018
			Date Completed:		13/02/2018	
Dando 4000			Sheet No:			5 Of 5
ing, m						
	140 Highgate Road, High Design Ventures Highgat RS Dando 4000	Dando 4000	140 Highgate Road, Highgate, London, NW5 1PB Design Ventures Highgate Ltd RS Dando 4000	Exploratory Hole No: 140 Highgate Road, Highgate, London, NW5 1PB Project No: Design Ventures Highgate Ltd RS Date Commenced: Date Completed: Dando 4000 Sheet No:	Exploratory Hole No: 140 Highgate Road, Highgate, London, NW5 1PB Project No: Design Ventures Highgate Ltd RS Date Commenced: Date Completed: Dando 4000 Sheet No:	140 Highgate Road, Highgate, London, NW5 1PB Design Ventures Highgate Ltd RS Date Commenced: Date Completed: Dando 4000 Sheet No:

Ren	narks	

3:														
4:														
		Sampl	e or T	ests							Strata			
Туре	Depth (mbgl)	75	75	75	Result	t 75	75	N		Legend	Depth (mbgl)	Water Strikes (mbgl)	Strata Description	Installation
									20.00				Grey high to very high strength CLAY (LONDON	*******
									-				Grey high to very high strength CLAY. (LONDON CLAY)	
U	20.50								- 20.50—	 				
	70 blows for	100%	recov	ery					-	-1-1-1-1				
									-					
									-					
									21.00-					
									-					
									-					
D	21.50								21.50					
S		4	7	8	8	9	10	35	-					
									-					
									-					
									22.00	+=====				
									-					
									-					
D	22.50								22.50-					
S		4	8	8	9	10	10	37	-					
									-					
									_					
									23.00-					
									_					********
									-					********
U	23.50								23.50					
U	80 blows for	100%	recov	ery					23.50					
									-					*********
									-	-				
									24.00-					
									-					
									_					
									-		24.50			
D S	24.50	4	8	9	10	11	11	41	24.50-		24.50			-
3		4	8	9	10	''	11	41	-					
									-					
									25.00	1				**********
									20.00					
	_												1	



APPENDIX 3 – CHEMICAL LABORATORY TEST RESULTS





Emma Hucker

e: Jomas Group

Jomas Associates Ltd

Lakeside House 1 Furzeground Way Stockley Park **UB11 1BD**

i2 Analytical Ltd. 7 Woodshots Meadow, Croxley Green Business Park, Watford, Herts, **WD18 8YS**

t: 01923 225404 **f:** 01923 237404

e: reception@i2analytical.com

Analytical Report Number: 18-77141

Project / Site name: 138-140 Highgate Road, Highgate, Samples received on: 22/02/2018

London, NW5 1PB

Your job number: JJ1303 Samples instructed on: 23/02/2018

Your order number: P1323JJ1303.14 **Analysis completed by:** 02/03/2018

Report Issue Number: 1 Report issued on: 02/03/2018

Samples Analysed: 3 water samples

Signed:

Jordan Hill Reporting Manager

For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are: soils - 4 weeks from reporting

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

Excel copies of reports are only valid when accompanied by this PDF certificate.





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Your Order No: P1323JJ1303.14								
Lab Sample Number				914716	914717	914718		
Sample Reference				WS2	WS5	WS4		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				None Supplied	None Supplied	None Supplied		
Date Sampled				21/02/2018	21/02/2018	21/02/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					
Total Phenois								
Total Phenols (monohydric)	μg/l	10	ISO 17025	-	-	< 10		
Speciated PAHs Naphthalene	ua/l	0.01	ISO 17025	_		< 0.01	I I	
Acenaphthylene	μg/l	0.01	ISO 17025	-	_	< 0.01		
Acenaphthene	μg/l	0.01	ISO 17025	_	_	< 0.01		
Fluorene	μg/l	0.01	ISO 17025	_	_	< 0.01		
Phenanthrene	μg/l	0.01	ISO 17025	_	_	< 0.01		
Anthracene	μq/l	0.01	ISO 17025	_	_	< 0.01		
Fluoranthene	μg/l	0.01	ISO 17025	-	-	< 0.01		
Pyrene	μg/l	0.01	ISO 17025	-	-	< 0.01		
Benzo(a)anthracene	μq/l	0.01	ISO 17025	-	_	< 0.01		
Chrysene	μg/l	0.01	ISO 17025	-	-	< 0.01		
Benzo(b)fluoranthene	μg/l	0.01	ISO 17025	-	-	< 0.01		
Benzo(k)fluoranthene	μg/l	0.01	ISO 17025	_	_	< 0.01		
Benzo(a)pyrene	μg/l	0.01	ISO 17025	-	-	< 0.01		
Indeno(1,2,3-cd)pyrene	μg/l	0.01	ISO 17025	-	-	< 0.01		
Dibenz(a,h)anthracene	μg/l	0.01	ISO 17025	-	-	< 0.01		
Benzo(ghi)perylene	μg/l	0.01	ISO 17025	-	-	< 0.01		
Total PAH								
Total EPA-16 PAHs	μg/l	0.16	ISO 17025	-	-	< 0.16		





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Your Order No: P1323JJ1303.14

Tour Order NO: P1323JJ1503.14										
Lab Sample Number				914716	914717	914718				
Sample Reference				WS2	WS5	WS4]			
Sample Number				None Supplied	None Supplied	None Supplied				
Depth (m)				None Supplied	None Supplied	None Supplied				
Date Sampled	21/02/2018	21/02/2018	21/02/2018							
Time Taken				None Supplied	None Supplied	None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status							
Monoaromatics										
Benzene	μg/l	1	ISO 17025	-	-	< 1.0				
Toluene	μg/l	1	ISO 17025	-	-	< 1.0				
Ethylbenzene	μg/l	1	ISO 17025	-	-	< 1.0				
p & m-xylene	μg/l	1	ISO 17025	-	-	< 1.0				
o-xylene	μg/l	1	ISO 17025	-	-	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	μg/l	1	ISO 17025	-	-	< 1.0				
Petroleum Hydrocarbons			.							
TPH-CWG - Aliphatic >C5 - C6	μg/l	1	ISO 17025	-	-	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	μg/l	1	ISO 17025	-	-	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	μg/l	1	ISO 17025	-	-	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aliphatic >C12 - C16	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aliphatic >C16 - C21	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aliphatic >C21 - C35	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aliphatic (C5 - C35)	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aromatic >C5 - C7	μg/l	1	ISO 17025	-	-	< 1.0				
TPH-CWG - Aromatic >C7 - C8	μg/l	1	ISO 17025	-	-	< 1.0				
TPH-CWG - Aromatic >C8 - C10	μg/l	1	ISO 17025	-	-	< 1.0				
TPH-CWG - Aromatic >C10 - C12	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aromatic >C12 - C16	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aromatic >C16 - C21	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aromatic >C21 - C35	μg/l	10	NONE	-	-	< 10				
TPH-CWG - Aromatic (C5 - C35)	μg/l	10	NONE	-	-	< 10				





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Lab Sample Number	Your Order No: P1323JJ1303.14							
None Supplied None Supplied None Supplied None Supplied None Supplied 21/02/2018 None Supplied None Suppl	•				914716		914718	
Depth (m) Date Sampled 21/0/2018								
Date Sampled 21/02/2018 21/02/2018 21/02/2018								
None Supplied None Supplie								
Voca								
VOCs	Time Taken		I		None Supplied	None Supplied	None Supplied	
December December		Units	Limit of detection	Accreditati Status				
Disconethane			_	9				
Solitoperane	VOCs		•	•		•		
Bromomethane	Chloromethane	μg/l	1	ISO 17025	-	-	< 1.0	
Variety Chloride	Chloroethane	μg/l	1		-	-	< 1.0	
Trichlorofucomethane µg/I 1 NONE - < 1.0 I.1.2-Infloroethene µg/I 1 ISD 17025 - < 1.0	Bromomethane	μg/l	1	ISO 17025	-	-	< 1.0	
1.1-Dichloroethene								
1.1.2-Trichloro-1,2,2-trifluoroethane						-		
Signature Sig	,							
MTBE (Methyl Tertiany Butyl Ether)								
1.1-Dichloroethane								
1 150 17025 -								
Introduce Intr								
1,1,1-Trichloroethane µg/l 1 ISO 17025 - - < 1.0								
1,2-Dichloroethane µg/l 1 ISO 17025 - - < 1.0								
1,1-1bichioropropene µg/l 1 ISO 17025 - < < 1.0	· ·				-	-		
Eenzene	1,1-Dichloropropene	μg/l	1	ISO 17025	-	-	< 1.0	
Tetrachloromethane µg/l 1 ISO 17025 - - < 1.0 1,2-Dichloropropane µg/l 1 ISO 17025 - - < 1.0 Trichloroethene µg/l 1 ISO 17025 - - < 1.0 Dibromomethane µg/l 1 ISO 17025 - - < 1.0 Bromodichloromethane µg/l 1 ISO 17025 - - < 1.0 GS-1,3-dichloropropene µg/l 1 ISO 17025 - - < 1.0 Trans-1,3-dichloropropene µg/l 1 ISO 17025 - - < 1.0 Toluene µg/l 1 ISO 17025 - - < 1.0 Toluene µg/l 1 ISO 17025 - - < 1.0 1,1,2-Trichloroethane µg/l 1 ISO 17025 - - < 1.0 1,3-Dichloropropane µg/l 1 ISO 17025 - - < 1.0 1,1,2-Tic	Trans-1,2-dichloroethene	μg/l	1		-	-	< 1.0	
1,2-Dichloropropane		μg/l			-	-	< 1.0	
Trichloroethene						-		
Dibromomethane μg/l 1 ISO 17025 - - < 1.0								
Bromodichloromethane µg/l 1 ISO 17025 - - < 1.0 Gis-1,3-dichloropropene µg/l 1 ISO 17025 - - < 1.0								
Cis-1,3-dichloropropene µg/l 1 ISO 17025 -								
Trans-1,3-dichloropropene µg/l 1 ISO 17025 - - < 1.0 Toluene µg/l 1 ISO 17025 - - < 1.0								
Toluene								
1,1,2-Trichloroethane µg/l 1 ISO 17025 - - < 1.0								
1,3-Dichloropropane μg/l 1 ISO 17025 - - < 1.0								
Dibromochloromethane μg/l 1 ISO 17025 - - < 1.0 Tetrachloroethene μg/l 1 ISO 17025 - - < 1.0					-	-		
1,2-Dibromoethane μg/l 1 ISO 17025 - < 1.0 Chlorobenzene μg/l 1 ISO 17025 - - < 1.0			1	ISO 17025	-	-		
Chlorobenzene μg/l 1 ISO 17025 - - < 1.0 1,1,1,2-Tetrachloroethane μg/l 1 ISO 17025 - - < 1.0	Tetrachloroethene	μg/l	1		-	-	< 1.0	
1,1,1,2-Tetrachloroethane μg/l 1 ISO 17025 - - < 1.0 Ethylbenzene μg/l 1 ISO 17025 - - < 1.0	1,2-Dibromoethane	μg/l	1		-	-	< 1.0	
Ethylbenzene μg/l 1 ISO 17025 - - < 1.0		μg/l	1		-	-		
p & m-Xylene μg/l 1 ISO 17025 - - < 1.0 Styrene μg/l 1 ISO 17025 - - < 1.0						-		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$,							
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$								
o-Xylene µg/l 1 ISO 17025 - - < 1.0								
1,1,2,2-Tetrachloroethane μg/l 1 ISO 17025 - - < 1.0								
Isopropylbenzene μg/l 1 ISO 17025 - - < 1.0 Bromobenzene μg/l 1 ISO 17025 - - < 1.0	,					-		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			_		-	-		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$								
2-Chlorotoluene µg/l 1 ISO 17025 < 1.0			1	ISO 17025	-	_		
4-Chlorotoluene µq/l 1 ISO 17025 < 1.0	2-Chlorotoluene	μg/l	1			-	< 1.0	
	4-Chlorotoluene	μg/l		ISO 17025	-	-	< 1.0	
1,3,5-Trimethylbenzene µg/I 1 ISO 17025 < 1.0								
tert-Butylbenzene µg/l 1 ISO 17025 < 1.0								
1,2,4-Trimethylbenzene								
sec-Butylbenzene μg/l 1 ISO 17025 - < 1.0 1,3-Dichlorobenzene μg/l 1 ISO 17025 - - < 1.0								
1,3-Dichlorobenzene μg/l 1 ISO 17025 < 1.0 p-Isopropyltoluene μg/l 1 ISO 17025 < 1.0								
1,2-Dichlorobenzene µg/l 1 ISO 17025 < 1.0								
1,4-Dichlorobenzene								
Butylbenzene µg/l 1 ISO 17025 - < 1.0	,							
1,2-Dibromo-3-chloropropane								
1,2,4-Trichlorobenzene μg/l 1 ISO 17025 < 1.0			1	ISO 17025	-			
Hexachlorobutadiene μg/l 1 ISO 17025 < 1.0		μg/l	1		-	-		
1,2,3-Trichlorobenzene μg/l 1 ISO 17025 < 1.0	1,2,3-Trichlorobenzene	μg/l	1	ISO 17025	-	-	< 1.0	





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Your Order No: P1323JJ1303.14

Lab Sample Number					914718		
Sample Reference				WS5	WS4		
			None Supplied	None Supplied	None Supplied		
			None Supplied	None Supplied	None Supplied		
			21/02/2018	21/02/2018	21/02/2018		
			None Supplied	None Supplied	None Supplied		
Units	Limit of detection	Accreditation Status					
	N/A	NONE	See Attached	See Attached	-		
	Units	tection Units	itatus imit of tection	None Supplied 21/02/2018 None Supplied Accreditation Status Units	WS2 WS5 None Supplied None Supplied None Supplied None Supplied 21/02/2018 21/02/2018 None Supplied Control Supplied None Supplied	WS2 WS5 WS4 None Supplied 21/02/2018 21/02/2018 21/02/2018 None Supplied	WS2 WS5 WS4 None Supplied None Supplied None Supplied None Supplied Supplied None Supplied None Supplied None Supplied None Supplied Supplied Supplied Supplied Supplied Supplied Supplied None Supplied Supplied None Supplied No

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





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

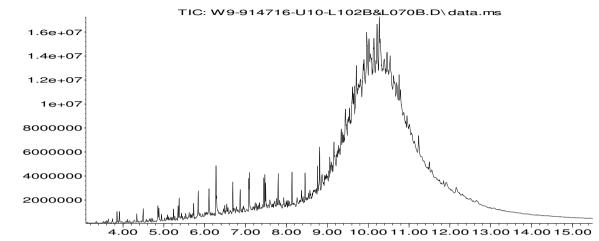
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Product ID	Determination of product ID by interpretation against standard chromatograms - Water.	In-house method	L070-PL/UK	W	NONE
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
TPH Chromatogram	TPH Chromatogram.	In-house method	L070-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

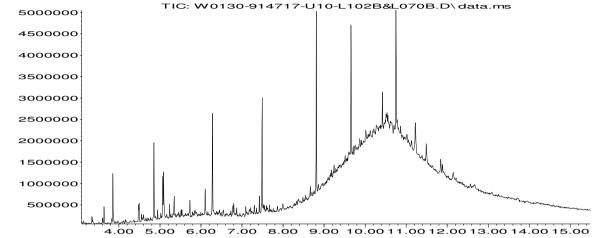
Abundance



Time-->

The total ion count (TIC trace) shows a carbon range from C10 to greater than C40 The sample TIC trace is complex, showing aromatic and aliphatic product sources. The trace does not match the standard product profiles but is suggestive of lube oil.

Abundance



Time-->

The total ion count (TIC trace) shows a carbon range from C10 to greater than C40 The sample TIC trace is complex, showing aromatic and aliphatic product sources. The trace does not match the standard product profiles but is suggestive of lube oil.





Emma Hucker

Jomas Associates Ltd Lakeside House 1 Furzeground Way Stockley Park UB11 1BD

e: Jomas Group

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404 **f:** 01923 237404

e: reception@i2analytical.com

Analytical Report Number: 18-76460

Project / Site name: 138-140 Highgate Road, Highgate, Samples received on: 15/02/2018

London

Your job number: JJ1303 Samples instructed on: 16/02/2018

Your order number: P1323JJ1303.13 Analysis completed by: 26/02/2018

Report Issue Number: 1 **Report issued on:** 26/02/2018

Samples Analysed: 4 soil samples

Signed:

Jordan Hill Reporting Manager

For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are : soils - 4 weeks from reporting

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

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Project / Site name: 138-140 Highgate Road, Highgate, London

Your Order No: P1323JJ1303.13

Lab Sample Number	910620	910621	910622	910623				
Sample Reference				BH1	BH1	BH2	BH2	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				5.50	15.00	7.50	24.50	
Date Sampled				14/02/2018	14/02/2018	14/02/2018	14/02/2018	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	20	18	19	18	
Total mass of sample received	kg	0.001	NONE	1.0	0.75	0.85	1.0	

General Inorganics

General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	6.6	8.1	7.5	8.9	
Water Soluble SO4 16hr extraction (2:1 Leachate								
Equivalent)	a/l	0.00125	MCFRTS	3.2	0.84	6.1	0.43	





Project / Site name: 138-140 Highgate Road, Highgate, London

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
910620	BH1	None Supplied	5.50	Brown clay.
910621	BH1	None Supplied	15.00	Brown clay.
910622	BH2	None Supplied	7.50	Light brown clay.
910623	BH2	None Supplied	24.50	Brown clay.





Project / Site name: 138-140 Highgate Road, Highgate, London

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP- OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.





Emma Hucker

Jomas Associates Ltd Lakeside House 1 Furzeground Way Stockley Park UB11 1BD

e: Jomas Group

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404 **f:** 01923 237404

e: reception@i2analytical.com

Analytical Report Number: 18-76323

Project / Site name: 138-140 Highgate Road, Highgate,

London, NW5 1PB

Your job number: JJ1303

Your order number: P1323JJ1303.11

Report Issue Number: 1

Samples Analysed: 3 WAC 10:1 Samples

Samples received on: 14/02/2018

Samples instructed on: 16/02/2018

Analysis completed by: 23/02/2018

Report issued on: 23/02/2018

Signed:

Jordan Hill Reporting Manager

For & on behalf of i2 Analytical Ltd.

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

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

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

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

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i2 Analytical

7 Woodshots Meadow Croxley Green Business Park Watford, WD18 8YS

Telephone: 01923 225404 Fax: 01923 237404 email:reception@i2analytical.com

Waste Acceptance Criteria Analytical	Results						
Report No:		18-7632	3				
					Client:	JOMASASSO	С
Location	120-140	lighgate Road, Highg	nato London NW	E 1DD			
	138-1401	ngngate Roau, mgng	gate, London, NW	3 IPB	L andfill	Waste Acceptanc	e Criteria
Lab Reference (Sample Number)		909812 / 909		Lunum	Limits	e criteria	
Sampling Date		12/02/201	18			Stable Non-	
Sample ID Depth (m)		WS5 tjv 0.50	Inert Waste Landfill	reactive HAZARDOUS waste in non- hazardous Landfill	Hazardous Waste Landfill		
Solid Waste Analysis							
TOC (%)**	0.4				3%	5%	6%
Loss on Ignition (%) **	1.8						10%
BTEX (μg/kg) **	< 10				6000		
Sum of PCBs (mg/kg) **	< 0.007				1		
Mineral Oil (mg/kg)	370				500		
Total PAH (WAC-17) (mg/kg)	4.6				100		
pH (units)**	10.1	 				>6	
Acid Neutralisation Capacity (mol / kg)	39					To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit valu	es for compliance le	eaching test
-	10.1			10.1	using BC EN	1 124E7 2 at 1 /C 10	1/ka (ma/ka)
(BS EN 12457 - 2 preparation utilising end over end leaching	ma/l			ma/lea	using bs Er	I 12457-2 at L/S 10	i/kg (ilig/kg)
procedure)	mg/l			mg/kg			
Arsenic *	0.0119			0.0814	0.5	2	25
Barium *	0.0239			0.164	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0004			< 0.0040	0.5	10	70
Copper *	0.0038			0.026	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0123			0.0844	0.5	10	30
Nickel *	0.0019			0.013	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0094			0.065	4	50	200
Chloride *	95			650	800	4000	25000
Fluoride	0.41			2.8	10	150	500
Sulphate *	430			3000	1000	20000	50000
TDS	230			1600	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.60			52.1	500	800	1000
Leach Test Information							
Stone Content (%)	26						
Sample Mass (kg)	1.4						
Dry Matter (%)	82						
Moisture (%)	18			-			
		<u> </u>					
		 					
Doculte are expressed on a day unisht hasis after something for	ichura content !-	ara applicable			*= 11VAC ====: -1"	od (liquid alvata	alucic aplu)
Results are expressed on a dry weight basis, after correction for mo Stated limits are for guidance only and i2 cannot be held responsible			tion			ed (liquid eluate and	aiyaa Uiliy)
Stated infines are for guidance office and 12 carmot be field responsible	c ror arry discrepar	icies with current legislat	JOH		** = MCERTS acc	rearted	

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.

This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be

hazardous or non-hazardous.





i2 Analytical

7 Woodshots Meadow Croxley Green Business Park Watford, WD18 8YS Telephone: 01923 225404 Fax: 01923 237404 email:reception@i2analytical.com

Report No:		18-7	6323				
					Client:	JOMASASSO	
					Circiici	JOHASASSO	<u> </u>
Location	138-140 H	lighgate Road, H	ighgate, London	, NW5 1PB			
Lab Reference (Sample Number)		909814	/ 909815	Landfill Waste Acceptance Criteria Limits			
Sampling Date		12/02	/2018			Stable Non-	
Sample ID		WS	4 tjv		To out Waste	reactive HAZARDOUS	Hazardous
Depth (m)		0.	70		Inert Waste Landfill	waste in non- hazardous Landfill	Waste Landfill
Solid Waste Analysis							
TOC (%)**	0.3				3%	5%	6%
Loss on Ignition (%) **	1.9						10%
BTEX (μg/kg) **	< 10				6000		
Sum of PCBs (mg/kg) **	< 0.007				1		
Mineral Oil (mg/kg)	60				500		
Total PAH (WAC-17) (mg/kg)	< 0.9				100		
pH (units)**	8.9					>6	
Acid Neutralisation Capacity (mol / kg)	8.7					To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit valu	es for compliance le	eaching test
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EI	N 12457-2 at L/S 10	l/kg (mg/kg)
Arsenic *	0.0024			0.0167	0.5	2	25
Barium *	0.0024			0.0107	20	100	300
Cadmium *				< 0.0008	0.04	1	5
	< 0.0001			< 0.0008	0.04	10	70
Connect *	< 0.0004 0.0097			0.066	2	50	100
Copper *				< 0.0050	0.01	0.2	2
Mercury *	< 0.0005						
Molybdenum *	0.0023			0.0155	0.5	10	30
Nickel *	0.0003			< 0.0030	0.4	10	40
Lead *	0.0021			0.014	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0055			0.038	4	50	200
Chloride *	6.4			43	800	4000	25000
Fluoride	0.29			2.0	10	150	500
Sulphate *	91			620	1000	20000	50000
TDS	150			1000	4000	60000	100000
Phenol Index (Monhydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	4.52			30.8	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.6						
Dry Matter (%)	76						
Moisture (%)	24						
Results are expressed on a dry weight basis, after correction for mo	oisture content whe	ere applicable.			*= UKAS accredit	ted (liquid eluate an	alysis only)

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.

This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.





i2 Analytical

7 Woodshots Meadow Croxley Green Business Park Watford, WD18 8YS

Telephone: 01923 225404 Fax: 01923 237404 email:reception@i2analytical.com

Report No:		18-76323					
				Client:	JOMASASSO	С	
Location	138-140 High	gate Road, Highgate, Lo	ondon, NW5 1PB				
Lab Reference (Sample Number)		909816 / 909817		Landfill Waste Acceptance Criteria			
					Limits		
Sampling Date		12/02/2018			Stable Non- reactive		
Sample ID Depth (m)		WS7 tjv 0.90	Inert Waste Landfill	HAZARDOUS waste in non- hazardous Landfill	Hazardous Waste Landf		
Solid Waste Analysis							
OC (%)**	0.9			3%	5%	6%	
oss on Ignition (%) **	3.1					10%	
BTEX (μg/kg) **	< 10			6000			
Sum of PCBs (mg/kg) **	< 0.007			1			
Mineral Oil (mg/kg)	190			500			
otal PAH (WAC-17) (mg/kg)	3.1			100			
oH (units)**	8.2				>6		
acid Neutralisation Capacity (mol / kg)	14				To be evaluated	To be evaluate	
iluate Analysis	10:1		10:1	Limit valu	es for compliance le	eaching test	
DC EN 12457 2 annuality william and account large in				using BS EN	N 12457-2 at L/S 10	I/kg (mg/kg)	
BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg			. 5 (5, 5,	
rsenic *	< 0.0011		< 0.0110	0.5	2	25	
Barium *	0.0126		0.0845	20	100	300	
Cadmium *	< 0.0001		< 0.0008	0.04	1	5	
Chromium *	0.0008		0.0056	0.5	10	70	
Copper *	0.0056		0.038	2	50	100	
1ercury *	< 0.0005		< 0.0050	0.01	0.2	2	
1olybdenum *	0.0221		0.148	0.5	10	30	
lickel *	0.0003		< 0.0030	0.4	10	40	
ead *	< 0.0010		< 0.010	0.5	10	50	
Antimony *	< 0.0017		< 0.017	0.06	0.7	5	
Selenium *	< 0.0040		< 0.040	0.1	0.5	7	
inc *	0.0033		0.022	4	50	200	
Chloride *	13		86	800	4000	25000	
·luoride	1.5		9.9	10	150	500	
Sulphate *	48		320	1000	20000	50000	
TDS .	120		830	4000	60000	100000	
Phenol Index (Monhydric Phenols) *	< 0.010		< 0.10	1	-	-	
ooc	10.5		70.2	500	800	1000	
each Test Information							
itone Content (%)	< 0.1						
ample Mass (kg)	1.1						
Ory Matter (%)	83						
loisture (%)	17						
			1				

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.

This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
909812	WS5	tjv	0.50	Light brown clay and sand with stones.
909814	WS4	tjv	0.70	Brown clay.
909816	WS7	tjv	0.90	Light brown clay and sand with gravel.





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-UK	W	NONE
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	in-house method	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	MCERTS





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.		L009-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



Sample ID)	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS4		tjv	S	18-76323	909814	b	BTEX in soil (Monoaromatics)	L073B-PL	b
WS4		tjv	S	18-76323	909814	b	Total BTEX in soil (Poland)		b





Emma Hucker

Jomas Associates Ltd Lakeside House 1 Furzeground Way Stockley Park UB11 1BD

e: Jomas Associates

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404 **f:** 01923 237404

e: reception@i2analytical.com

Analytical Report Number: 18-76317

Replaces Analytical Report Number: 18-76317, issue no. 1

Project / Site name: 138-140 Highgate Road, Highgate, Samples received on: 14/02/2018

London, NW5 1PB

Your job number: JJ1303 Samples instructed on: 16/02/2018

Your order number: P1323JJ1303.10 Analysis completed by: 16/03/2018

Report Issue Number: 2 **Report issued on:** 16/03/2018

Samples Analysed: 12 soil samples

Signed:

Nicole Fay Quality Assistant

For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are: soils - 4 weeks from reporting

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

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Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Lab Canada Namban			1	000726	000727	000720	000720	000740
Lab Sample Number				909736	909737	909738	909739	909740
Sample Reference				WS1	WS2	WS2	WS3	WS3
Sample Number				tjv	tjv	tjv	tjv	tjv
Depth (m)				0.25	2.50	0.50	0.40	2.00
Date Sampled				12/02/2018	13/02/2018	13/02/2018	12/02/2018	12/02/2018
Time Taken		1		None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	16	16	12	16	21
Total mass of sample received	kg	0.001	NONE	1.2	-	1.4	1.2	1.4
					1	1	1	1
Asbestos in Soil Screen / Identification Name	Туре	N/A	ISO 17025	-	-	Chrysotile & Amosite	Chrysotile	-
Asbestos in Soil	Туре	N/A	ISO 17025	Not-detected	-	Detected	Detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	< 0.001	< 0.001	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	< 0.001	< 0.001	-
General Inorganics	m1111-2	NI/A	MCERTC	0.0	<u> </u>	9.2	10.1	0.2
pH - Automated	pH Units	N/A 1	MCERTS	8.6 < 1	-	9.2 < 1	10.1	8.3 2
Total Cyanide Total Sulphate as SO ₄	mg/kg mg/kg	50	MCERTS MCERTS	1300	-	11000	2000	1800
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.067	_	1.8	0.32	0.85
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	67.2	_	1780	318	851
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.6	-	1.2	-	-
Total Phenois								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Cussisted PAUs								
Speciated PAHs Naphthalene	mg/kg	0.05	MCERTS	< 0.05	<u>-</u>	3.6	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.49		0.25	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.45	_	2.1	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.42	-	1.6	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	6.1	-	18	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	1.3	-	4.7	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	15	-	21	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	13	-	17	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	9.5	-	13	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	5.7	-	8.0	< 0.05	< 0.05
Benzo(b)fluoranthene Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	7.7	<u>-</u>	10	< 0.05	< 0.05
Benzo(k)fluorantnene Benzo(a)pyrene	mg/kg mg/kg	0.05	MCERTS MCERTS	3.8 8.0	-	4.5 10	< 0.05 < 0.05	< 0.05 < 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.8	-	4.6	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.71	-	0.94	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.4		4.2	< 0.05	< 0.05
			'					
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	79.6	-	124	< 0.80	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	-	15	10	10
Boron (water soluble)	mg/kg	0.2	MCERTS	3.9	-	7.2	4.2	3.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	-	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable) Copper (aqua regia extractable)	mg/kg	1	MCERTS MCERTS	25 35	<u>-</u>	28 37	53 32	64 29
Lead (aqua regia extractable)	mg/kg mg/kg	1	MCERTS	280	-	160	90	69
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	_	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	-	24	40	51
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
						190		91





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Your Order No: P1323JJ1303.10

Lab Sample Number				909736	909737	909738	909739	909740
Sample Reference				WS1	WS2	WS2	WS3	WS3
Sample Number				tjv	tjv	tjv	tjv	tjv
Depth (m)				0.25	2,50	0.50	0.40	2.00
Date Sampled				12/02/2018	13/02/2018	13/02/2018	12/02/2018	12/02/2018
Time Taken				None Supplied				
Time Taken				Hone Supplied	Hone Supplied	Hone Supplied	Hone Supplied	Horic Supplica
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Toluene	μg/kg	11	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Ethylbenzene	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
p & m-xylene	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
o-xylene	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	7.6	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	29	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg mg/kg	8 10	MCERTS MCERTS	-	-	150 190	< 8.0 < 10	< 8.0 < 10
TPH-CWG - Aliphatic (ECS - ECSS)	mg/kg	10	MCERTS	-	-	190	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	_	I -	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	_	_	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC10 - EC12	mg/kg	1	MCERTS	-	_	5.8	< 1.0	< 1.0
TPH-CWG - Aromatic > EC12 - EC16	mg/kg	2	MCERTS	-	-	20	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	160	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	440	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	620	< 10	< 10
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	-	6.6	-	-
TPH (C12 - C16)	mg/kg	4	MCERTS	11	-	27	-	-
TPH (C16 - C21) TPH (C21 - C40)	mg/kg mg/kg	1 10	MCERTS MCERTS	83 220	-	190 690	-	-





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Lab Sample Number				909736	909737	909738	909739	909740
Sample Reference								
'				WS1	WS2	WS2	WS3	WS3
Sample Number				tjv 0.25	tjv 2.50	tjv 0.50	tjv	tjv 2.00
Depth (m) Date Sampled				12/02/2018	13/02/2018	13/02/2018	0.40 12/02/2018	12/02/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs	<u>. </u>		<u>. </u>					
Chloromethane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane 2,2-Dichloropropane	μg/kg μg/kg	1	MCERTS	-	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
Z,Z-Dichlorophopane Trichloromethane	µg/kg	1	MCERTS		< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	_	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Toluene 1,1,2-Trichloroethane	μg/kg	1	MCERTS MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	μg/kg μg/kg	1	ISO 17025	_	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	<u>-</u>	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	μg/kg	1	NONE	_	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	μg/kg	1	MCERTS	-	5.7	< 1.0	< 1.0	< 1.0
p & m-Xylene	μg/kg	1	MCERTS	-	42	< 1.0	< 1.0	< 1.0
Styrene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	μg/kg	1	MCERTS	-	20	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
<u>Isopropylbenzene</u>	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene n-Propylbenzene	μg/kg μg/kg	1	MCERTS ISO 17025	-	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
2-Chlorotoluene	μg/kg μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	μg/kg μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	μg/kg μg/kg	1	ISO 17025	-	15	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	μg/kg μg/kg	1	MCERTS	-	4.6	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	μg/kg	1	ISO 17025	-	35	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene Hexachlorobutadiene	μg/kg	1	MCERTS MCERTS	-	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
1,2,3-Trichlorobenzene	μg/kg μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
1/2/3 THE HOLODEHZEHE	μg/Kg		130 1/023		\ 1.U	< 1.U	< 1.0	\ 1.0





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number				909741	909742	909743	909744	909745
Sample Reference								
• • • • • • • • • • • • • • • • • • • •				WS4	WS5	WS5	WS5	WS7
Sample Number				tjv 0.70	tjv	tjv	tjv	tjv
Depth (m) Date Sampled				13/02/2018	1.00 13/02/2018	0.50 13/02/2018	1.60 13/02/2018	0.40 12/02/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	-	< 0.1	< 0.1
Moisture Content Total mass of sample received	%	N/A 0.001	NONE NONE	24 1.6	23 1.2	-	23 1.2	12 1.3
Total mass of sample received	kg	0.001	NONE	1.0	1.2	-	1.2	1.3
Asbestos in Soil Screen / Identification Name	Туре	N/A	ISO 17025	-	-	-	-	Chrysotile
Asbestos in Soil	Туре	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	< 0.001
General Inorganics	m11.11-2	NI/A	MCERTC	0.0	10.7		0.7	0.5
pH - Automated	pH Units	N/A	MCERTS	9.0	10.7	-	8.7	9.5
Total Cyanide Total Sulphate as SO ₄	mg/kg mg/kg	50	MCERTS MCERTS	1300	< 1 3400	-	< 1 1200	< 1 4100
Water Soluble SO4 16hr extraction (2:1 Leachate	ilig/kg	30	PICERTS	1500	3100		1200	1100
Equivalent)	g/l	0.00125	MCERTS	0.57	0.93	-	0.54	0.99
Water Soluble SO4 16hr extraction (2:1 Leachate		1.25	MOERTO	F74	021		520	007
Equivalent) Total Organic Carbon (TOC)	mg/l %	1.25 0.1	MCERTS MCERTS	574 0.4	931	-	538	987 1.1
Total Organic Carbon (TOC)	70	0.1	MCER 13	0.4		-	<u> </u>	1.1
Total Phenols (monohydric) Speciated PAHs	mg/kg	1	MCERTS	< 1.0	< 1.0		< 1.0	< 1.0
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05 0.05	MCERTS	< 0.05	< 0.05 < 0.05	-	0.23	0.80
Fluorene Phenanthrene	mg/kg mg/kg	0.05	MCERTS MCERTS	< 0.05 < 0.05	< 0.05	-	1.2 0.42	0.49 6.4
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.42	2.2
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.42	_	1.4	15
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.69	-	3.1	13
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.78	8.1
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.69	6.1
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.45	8.2
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.27	2.7
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.38	7.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.25	3.6
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS MCERTS	< 0.05	< 0.05	-	< 0.05 0.74	0.63
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	U./ 4	3.4
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	1.11	_	10.4	78.7
Heavy Metals / Metalloids	9,9	0.0	HOLINIO	* 0.00	2122		2011	7 0.7
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.7	12	-	9.5	22
Boron (water soluble)	mg/kg	0.2	MCERTS	3.3	16	_	2.2	4.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	< 0.2	0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	-	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	58	52	-	43	31
Copper (aqua regia extractable)	mg/kg	1	MCERTS	130	38	-	22	270
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19	68	-	140	760
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	49	40	-	35	41
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	83	81	-	85	240





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number							909744	
Sample Reference				WS4	WS5	WS5	WS5	WS7
Sample Number				tiv	tiv	tiv	tjv	tiv
Depth (m)				0.70	1.00	0.50	1.60	0.40
Date Sampled				13/02/2018	13/02/2018	13/02/2018	13/02/2018	12/02/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics	<u> </u>							
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Toluene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Ethylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
p & m-xylene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
o-xylene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Petroleum Hydrocarbons				1 2.0				
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	- 0.001	-	- 0.001	- 0.001
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS MCERTS	< 0.001	< 0.001	-	< 0.001	< 0.001
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8	mg/kg mg/kg mg/kg	0.001	MCERTS MCERTS MCERTS	< 0.001 < 0.001	< 0.001 < 0.001	-	< 0.001 < 0.001	< 0.001 < 0.001
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10	mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001	MCERTS MCERTS MCERTS MCERTS	< 0.001 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001	-	< 0.001 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12	mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1	MCERTS MCERTS MCERTS MCERTS MCERTS	< 0.001 < 0.001 < 0.001 < 1.0	< 0.001 < 0.001 < 0.001 7.8	- - -	< 0.001 < 0.001 < 0.001 42	< 0.001 < 0.001 < 0.001 1.0
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0	< 0.001 < 0.001 < 0.001	- - -	< 0.001 < 0.001 < 0.001 42 130	< 0.001 < 0.001 < 0.001 1.0 9.6
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12	mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1	MCERTS MCERTS MCERTS MCERTS MCERTS	< 0.001 < 0.001 < 0.001 < 1.0	< 0.001 < 0.001 < 0.001 7.8 13		< 0.001 < 0.001 < 0.001 42	< 0.001 < 0.001 < 0.001 1.0
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2 8	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0	< 0.001 < 0.001 < 0.001 7.8 13 40	- - - - -	< 0.001 < 0.001 < 0.001 42 130 190	< 0.001 < 0.001 < 0.001 1.0 9.6 15
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2 8	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46	< 0.001 < 0.001 < 0.001 7.8 13 40 980		< 0.001 < 0.001 < 0.001 42 130 190 4100	< 0.001 < 0.001 < 0.001 1.0 9.6 15
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC12 - EC35 TPH-CWG - Aliphatic >EC25 - EC35 TPH-CWG - Aliphatic >EC55 - EC7	mg/kg	0.001 0.001 0.001 1 2 8 8 10	MCERTS	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000	- - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001	< 0.001 < 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001 0.001 1 2 8 8 10 0.001	MCERTS	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001	- - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 0.001
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC25 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001	MCERTS	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 < 0.001	- - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 0.001 < 0.001
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1	MCERTS	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001 < 1.0	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 < 0.001 < 1.2	- - - - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 < 0.001 5.4	< 0.001 < 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 0.001 < 1.0
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2	MCERTS	 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001 < 2.0 	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 4.2 11	- - - - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 5.4 50	< 0.001 < 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 0.001 < 1.0 9.6
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC35 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC16 TPH-CWG - Aromatic >EC16 - EC21	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2 10	MCERTS	 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 10 	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 4.2 11 36	- - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 5.4 50 130	< 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 1.0 9.6 47
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC2 - EC35 TPH-CWG - Aliphatic >EC2 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC12 - EC16 TPH-CWG - Aromatic >EC12 - EC16 TPH-CWG - Aromatic >EC12 - EC16 TPH-CWG - Aromatic >EC10 - EC21 TPH-CWG - Aromatic >EC10 - EC21	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2 10	MCERTS	 - 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 10 	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 4.2 11 36 580	- - - - - - - - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 5.4 50 130 2000	< 0.001 < 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 0.001 < 1.0 9.6 47 94
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC35 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC16 TPH-CWG - Aromatic >EC16 - EC21	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2 10	MCERTS	 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 10 	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 4.2 11 36	- - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 5.4 50 130	< 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 1.0 9.6 47
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC35 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC16 - EC21 TPH-CWG - Aromatic >EC16 - EC21 TPH-CWG - Aromatic >EC16 - EC21 TPH-CWG - Aromatic >EC21 - EC35 TPH-CWG - Aromatic >EC21 - EC35	mg/kg	0.001 0.001 1 2 8 10 0.001 0.001 0.001 0.001 1 2 10 10	MCERTS	 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 10 < 10 	< 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 < 1.2 11 36 580 630	- - - - - - - - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 5.4 50 130 2000 2200	< 0.001 < 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 0.001 < 1.0 9.6 47 94
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC12 - EC35 TPH-CWG - Aliphatic >EC15 - EC35 TPH-CWG - Aliphatic >EC25 - EC35 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC16 - EC21 TPH-CWG - Aromatic >EC16 - EC21 TPH-CWG - Aromatic >EC21 - EC35 TPH-CWG - Aromatic >EC25 - EC35 TPH-CWG - Aromatic >EC21 - EC35 TPH-CWG - Aromatic >EC21 - EC35 TPH-CWG - Aromatic >EC21 - EC35 TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2 10 10 10	MCERTS	 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001 < 1.0 < 10 < 10 	< 0.001 < 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 < 1.2 11 36 580 630	- - - - - - - - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 5.4 50 130 2000 2200	< 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 0.001 < 1.0 9.6 47 94 150
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC35 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC16 - EC21 TPH-CWG - Aromatic >EC16 - EC21 TPH-CWG - Aromatic >EC16 - EC21 TPH-CWG - Aromatic >EC21 - EC35 TPH-CWG - Aromatic >EC21 - EC35	mg/kg	0.001 0.001 1 2 8 10 0.001 0.001 0.001 0.001 1 2 10 10	MCERTS	 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 46 48 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 10 < 10 	< 0.001 < 0.001 7.8 13 40 980 1000 < 0.001 < 0.001 < 0.001 < 1.2 11 36 580 630	- - - - - - - - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 42 130 190 4100 4500 < 0.001 < 0.001 < 0.001 5.4 50 130 2000 2200	< 0.001 < 0.001 < 0.001 1.0 9.6 15 120 140 < 0.001 < 0.001 < 0.001 < 1.0 9.6 47 94 150





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number				909741	909742	909743	909744	909745
Sample Reference								
'				WS4	WS5	WS5	WS5	WS7
Sample Number				tjv 0.70	tjv 1.00	tjv 0.50	tjv 1.60	tjv 0.40
Depth (m) Date Sampled				13/02/2018	13/02/2018	13/02/2018	13/02/2018	12/02/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	жене очережен	топе заррже	жене очерение	ос заррява	поне одружен
VOCs					<u> </u>		<u>l</u>	
Chloromethane	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Chloroethane	μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
Bromomethane	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Vinyl Chloride	μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
Trichlorofluoromethane	μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1-Dichloroethene	μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Cis-1,2-dichloroethene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1-Dichloroethane	μg/kg	1	MCERTS MCERTS	< 1.0 < 1.0	< 1.0	-	< 1.0	< 1.0
2,2-Dichloropropane Trichloromethane	μg/kg μg/kg	1	MCERTS	< 1.0 < 1.0	< 1.0 < 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
1.1.1-Trichloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0 < 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
1,2-Dichloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0		< 1.0	< 1.0
1,1-Dichloropropene	μg/kg	1	MCERTS	< 1.0	< 1.0	_	< 1.0	< 1.0
Trans-1,2-dichloroethene	μg/kg	1	NONE	< 1.0	< 1.0	_	< 1.0	< 1.0
Benzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Tetrachloromethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2-Dichloropropane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Trichloroethene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Dibromomethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Bromodichloromethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Cis-1,3-dichloropropene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Trans-1,3-dichloropropene	μg/kg 	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Toluene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1,2-Trichloroethane	μg/kg	1	MCERTS ISO 17025	< 1.0 < 1.0	< 1.0	-	< 1.0	< 1.0
1,3-Dichloropropane Dibromochloromethane	μg/kg μg/kg	1	ISO 17025	< 1.0	< 1.0 < 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
Tetrachloroethene	μg/kg μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2-Dibromoethane	μg/kg	1	ISO 17025	< 1.0	< 1.0	_	< 1.0	< 1.0
Chlorobenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	_	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Ethylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
p & m-Xylene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Styrene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Tribromomethane	μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
o-Xylene	μg/kg 	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Isopropylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Bromobenzene n-Propylbenzene	μg/kg μg/kg	1	MCERTS ISO 17025	< 1.0 < 1.0	< 1.0 < 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
2-Chlorotoluene	μg/kg μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
4-Chlorotoluene	μg/kg μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,3,5-Trimethylbenzene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
tert-Butylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2,4-Trimethylbenzene	μg/kg	1	ISO 17025	< 1.0	< 1.0	1	< 1.0	< 1.0
sec-Butylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,3-Dichlorobenzene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
p-Isopropyltoluene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2-Dichlorobenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,4-Dichlorobenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Butylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2,4-Trichlorobenzene Hexachlorobutadiene	μg/kg	1	MCERTS MCERTS	< 1.0 < 1.0	< 1.0 < 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
1,2,3-Trichlorobenzene	μg/kg μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
TICHUIODENZENE	µy/Kÿ		130 1/023	V 1.0	< 1.0	<u>-</u>	< 1.∪	< 1.0





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number				909748	909749			
Sample Reference				WS4	WS5			
Sample Number				tjv	tjv		1	
Depth (m)				2.00	4.50			
Date Sampled				13/02/2018	13/02/2018			
Time Taken				None Supplied	None Supplied			
			Ac					
Analytical Parameter	⊆	Limit of detection	St					
(Soil Analysis)	Units	or it	dita					
		9 %	Accreditation Status					
St	-	0.4		2.1	0.1			
Stone Content	%	0.1 N/A	NONE	< 0.1 23	< 0.1 20			
Moisture Content Total mass of sample received	% kg	0.001	NONE NONE	1.4	0.90			
Total mass of sample received	ky	0.001	NONE	1.7	0.90		<u>I</u>	
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-			
Asbestos in Soil	Type	N/A	ISO 17025	-	-			
Asbestos Quantification (Stage 2) Asbestos Quantification Total	%	0.001 0.001	ISO 17025 ISO 17025	-	-		 	
Pancaroa Anguruncarion Tofgi	70	0.001	130 1/025	-	-		<u> </u>	
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.9	7.9		1	
Total Cyanide	mg/kg	1	MCERTS	-	-			
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-			
Water Soluble SO4 16hr extraction (2:1 Leachate								
Equivalent) Water Soluble SO4 16hr extraction (2:1 Leachate	g/l	0.00125	MCERTS	1.8	2.3		1	
Equivalent)	mg/l	1.25	MCERTS	-	_			
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-			
`		•	•		-		•	
Total Phenois								
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	-			
Acenaphthone	mg/kg	0.05	MCERTS	-	-			
Acenaphthene Fluorene	mg/kg mg/kg	0.05 0.05	MCERTS MCERTS	-	-			
Phenanthrene	mg/kg	0.05	MCERTS	_	_		1	
Anthracene	mg/kg	0.05	MCERTS	-	-			
Fluoranthene	mg/kg	0.05	MCERTS	-	-			
Pyrene	mg/kg	0.05	MCERTS	-	-			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-			
Chrysene	mg/kg	0.05	MCERTS	-	-			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-		.	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-		 	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	<u>-</u>		-	
Dibenz(a,h)anthracene Benzo(ghi)perylene	mg/kg mg/kg	0.05 0.05	MCERTS MCERTS	-	-		 	
penzo(grii)pei yierie	пу/ку	0.03	PICERTS				<u> </u>	
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-			
-	, .,				-	-	-	-
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-			
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-		.	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-		 	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-		-	
Lead (aqua regia extractable) Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS MCERTS	-	-		 	
Mercury (aqua regia extractable) Nickel (aqua regia extractable)	mg/kg mg/kg	0.3	MCERTS MCERTS	-	-		 	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	_	-		1	
·3								





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Your Order No: P1323JJ1303.10

Lab Sample Number				909748	909749		
Sample Reference		WS4	WS5				
Sample Number				tjv	tjv		
Depth (m)				2.00	4.50		
Date Sampled				13/02/2018	13/02/2018		
Time Taken				None Supplied	None Supplied		
			A				
Analytical Parameter	_	Limit of detection	Accreditation Status				
(Soil Analysis)	Units	nit ecti	dit				
(Soli Allalysis)	vi	of of	atio				
			Š				
Monoaromatics						1	
Benzene	ug/kg	1	MCERTS	-	-		
Toluene	μg/kg	1	MCERTS	-	-		
Ethylbenzene	μg/kg	1	MCERTS	-	-		
p & m-xylene	μg/kg	1	MCERTS	-	-		
o-xylene	μg/kg	1	MCERTS	-	-		
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	-	-		
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	-		
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-		
					1	1	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-		
TPH-CWG - Aromatic > EC7 - EC8	mg/kg	0.001	MCERTS	-	-		
TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12	mg/kg	0.001	MCERTS MCERTS	-	<u>-</u>		
TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC12 - EC16	mg/kg mg/kg	2	MCERTS	-	-		
TPH-CWG - Aromatic >EC12 - EC16 TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-			
TPH-CWG - Aromatic >EC10 - EC21 TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-		
	<u> </u>				•	-	
TPH (C10 - C12)	mg/kg	2	MCERTS	-	-		
TPH (C12 - C16)	mg/kg	4	MCERTS	-	-		
TPH (C16 - C21)	mg/kg	1	MCERTS	-	-		
TPH (C21 - C40)	mg/kg	10	MCERTS	-	-		





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number				909748	909749		
Sample Reference				WS4	WS5		
Sample Number				tjv	tjv		
Depth (m)				2.00	4.50		
Date Sampled				13/02/2018	13/02/2018		
Time Taken				None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
VOCs							
Chloromethane	μg/kg	1	ISO 17025	-	-		
Chloroethane	μg/kg	1	NONE	-	-		
Bromomethane	μg/kg	1	ISO 17025	-	-		
Vinyl Chloride	μg/kg	1	NONE	-	-		
Trichlorofluoromethane	μg/kg	1	NONE	1	-		
1,1-Dichloroethene	μg/kg	1	NONE	-	-		
1,1,2-Trichloro 1,2,2-Trifluoroethane	μg/kg	1	ISO 17025	-	-		
Cis-1,2-dichloroethene	μg/kg	1	MCERTS	-	-		
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	-	-		
1,1-Dichloroethane	μg/kg	1	MCERTS	-	-		
2,2-Dichloropropane	μg/kg	1	MCERTS MCERTS	-	-		
Trichloromethane 1.1.1-Trichloroethane	μg/kg	1	MCERTS	-	-		
1,2-Dichloroethane	μg/kg μg/kg	1	MCERTS		-		
1,1-Dichloropropene	μg/kg μg/kg	1	MCERTS	-			
Trans-1,2-dichloroethene	μg/kg μg/kg	1	NONE	_	-		
Benzene	μg/kg	1	MCERTS	-	-		
Tetrachloromethane	μg/kg	1	MCERTS	-	-		
1,2-Dichloropropane	μg/kg	1	MCERTS	-	-		
Trichloroethene	μg/kg	1	MCERTS	-	-		
Dibromomethane	μg/kg	1	MCERTS	-	-		
Bromodichloromethane	μg/kg	1	MCERTS	-	-		
Cis-1,3-dichloropropene	μg/kg	1	ISO 17025	-	-		
Trans-1,3-dichloropropene	μg/kg	1	ISO 17025	-	-		
Toluene 1,1,2-Trichloroethane	μg/kg	1	MCERTS MCERTS	-	-		
1,3-Dichloropropane	μg/kg μg/kg	1	ISO 17025	-	-		
Dibromochloromethane	μg/kg μg/kg	1	ISO 17025	-	-		
Tetrachloroethene	μg/kg	1	NONE	_	-		
1,2-Dibromoethane	μg/kg	1	ISO 17025	-	-		
Chlorobenzene	μg/kg	1	MCERTS	-	-		
1,1,1,2-Tetrachloroethane	μg/kg	1	MCERTS	-	-		
Ethylbenzene	μg/kg	1	MCERTS	-	-		
p & m-Xylene	μg/kg	1	MCERTS	-	-		
Styrene	μg/kg	1	MCERTS	-	-		
Tribromomethane	μg/kg	1	NONE	-	-		
o-Xylene	μg/kg	1	MCERTS	-	-		
1,1,2,2-Tetrachloroethane	μg/kg	1	MCERTS MCERTS	-	-		
Isopropylbenzene Bromobenzene	μg/kg μg/kg	1	MCERTS	-	-		
n-Propylbenzene	μg/kg μg/kg	1	ISO 17025	-	-		
2-Chlorotoluene	μg/kg	1	MCERTS	_	-		
4-Chlorotoluene	μg/kg	1	MCERTS	-	-		
1,3,5-Trimethylbenzene	μg/kg	1	ISO 17025	-	-		
tert-Butylbenzene	μg/kg	1	MCERTS	-	-		
1,2,4-Trimethylbenzene	μg/kg	1	ISO 17025	-	-		
sec-Butylbenzene	μg/kg	1	MCERTS	-	-		
1,3-Dichlorobenzene	μg/kg	1	ISO 17025	-	-		
p-Isopropyltoluene	μg/kg	1	ISO 17025	-	-		
1,2-Dichlorobenzene	μg/kg	1	MCERTS	-	-		
1,4-Dichlorobenzene	μg/kg	1	MCERTS	-	-		
Butylbenzene	μg/kg μg/kg	1	MCERTS ISO 17025	-	-		
1,2-Dibromo-3-chloropropane 1,2,4-Trichlorobenzene	μg/kg μg/kg	1	MCERTS	-	-		
Hexachlorobutadiene	μg/kg μg/kg	1	MCERTS		-		
1,2,3-Trichlorobenzene	μg/kg μg/kg	1	ISO 17025	-	-		
, ,	F3/119					•	





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Your Order No: P1323JJ1303.10

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
909738	WS2	0.50	178	Loose Fibres	Chrysotile & Amosite	< 0.001	< 0.001
909739	WS3	0.40	161	Loose Fibres	Chrysotile	< 0.001	< 0.001
909745	WS7	0.40	170	Loose Fibres	Chrysotile	< 0.001	< 0.001

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
909736	WS1	tjv	0.25	Brown loam and clay with gravel and vegetation.
909737	WS2	tjv	2.50	Light brown clay and sand with gravel.
909738	WS2	tjv	0.50	Brown sand with rubble and brick.
909739	WS3	tjv	0.40	Grey clay and sand with rubble and brick.
909740	WS3	tjv	2.00	Brown clay.
909741	WS4	tjv	0.70	Brown clay.
909742	WS5	tjv	1.00	Brown clay.
909743	WS5	tjv	0.50	-
909744	WS5	tjv	1.60	Grey clay and sand.
909745	WS7	tjv	0.40	Brown sand with gravel and rubble.
909748	WS4	tjv	2.00	Brown clay.
909749	WS5	tjv	4.50	Brown clay.





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP- OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton(Skalar)	L080-PL	W	MCERTS





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS4	tjv	S	18-76317	909741	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
WS4	tjv	S	18-76317	909741	b	TPHCWG (Soil)	L088/76-PL	b
WS4	tjv	S	18-76317	909741	b	Volatile organic compounds in soil	L073B-PL	b





Emma Hucker

Jomas Associates Ltd Lakeside House 1 Furzeground Way Stockley Park UB11 1BD

e: Jomas Group

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404 **f:** 01923 237404

e: reception@i2analytical.com

Analytical Report Number: 18-76317

Project / Site name: 138-140 Highgate Road, Highgate, Samples received on: 14/02/2018

London, NW5 1PB

Your job number: JJ1303 Samples instructed on: 16/02/2018

Your order number: P1323JJ1303.10 Analysis completed by: 26/02/2018

Report Issue Number: 1 **Report issued on:** 26/02/2018

Samples Analysed: 12 soil samples

Signed:

Jordan Hill Reporting Manager

For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are : soils - 4 weeks from reporting

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

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Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Lab Sample Number				909736	909737	909738	909739	909740
				303730	303737	303730	303733	3037 10
Sample Reference				WS1	WS2	WS2	WS3	WS3
Sample Number				tjv	tjv	tjv	tjv	tjv
Depth (m)				0.25	2.50	0.50	0.40	2.00
Date Sampled				12/02/2018	13/02/2018	13/02/2018	12/02/2018	12/02/2018
Time Taken	1	ı	1	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	16	16	12	16	21
Total mass of sample received	kg	0.001	NONE	1.2	-	1.4	1.2	1.4
Asbestos in Soil Screen / Identification Name	Туре	N/A	ISO 17025	-	-	Chrysotile, Amosite- Loose Fibres	Chrysotile- Loose Fibres	-
Asbestos in Soil	Туре	N/A	ISO 17025	Not-detected	-	Detected	Detected	-
General Inorganics pH - Automated Total Cyanide	pH Units mg/kg	N/A 1	MCERTS MCERTS	8.6 < 1	-	9.2	10.1	8.3
Total Sulphate as SO ₄ Water Soluble SO4 16hr extraction (2:1 Leachate	mg/kg	50	MCERTS	1300	-	11000	2000	1800
Equivalent) Water Soluble SO4 16hr extraction (2:1 Leachate	g/l	0.00125	MCERTS	0.067	-	1.8	0.32	0.85
Equivalent)	mg/l	1.25	MCERTS	67.2	-	1780	318	851
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.6	-	1.2	-	-
Total Phenols Total Phenols (monohydric) Speciated PAHs	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	3.6	< 0.05	< 0.05
Acenaphthone	mg/kg	0.05	MCERTS	0.49	<u>-</u>	0.25	< 0.05	< 0.05
Acenaphthene Fluorene	mg/kg mg/kg	0.05	MCERTS MCERTS	0.45 0.42	-	2.1 1.6	< 0.05 < 0.05	< 0.05 < 0.05
Phenanthrene	mg/kg	0.05	MCERTS	6.1	_	18	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	1.3	_	4.7	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	15	-	21	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	13	-	17	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	9.5	-	13	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	5.7	-	8.0	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	7.7	-	10	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.8	-	4.5	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	8.0	-	10	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene	mg/kg mg/kg	0.05	MCERTS MCERTS	3.8 0.71	-	4.6 0.94	< 0.05 < 0.05	< 0.05 < 0.05
Benzo(ghi)perylene	mg/kg mg/kg	0.05	MCERTS	3.4	-	4.2	< 0.05	< 0.05
Total PAH Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	79.6	-	124	< 0.80	< 0.80
Heavy Metals / Metalloids	T		·		1	45	40	10
Arsenic (aqua regia extractable) Boron (water soluble)	mg/kg mg/kg	0.2	MCERTS MCERTS	11 3.9	-	15 7.2	10 4.2	10 3.3
Cadmium (aqua regia extractable)	mg/kg mg/kg	0.2	MCERTS	0.4	-	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25	-	28	53	64
Copper (aqua regia extractable)	mg/kg	1	MCERTS	35	-	37	32	29
Lead (aqua regia extractable)	mg/kg	1	MCERTS	280	-	160	90	69
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	-	24	40	51
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	210	-	190	78	91





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Lab Sample Number				222726	000707	000730	000700	000740
				909736	909737	909738	909739	909740
Sample Reference				WS1	WS2	WS2	WS3	WS3
Sample Number				tiv	tiv	tjv	tiv	tjv
Depth (m)				0.25	2.50	0.50	0.40	2.00
Date Sampled				12/02/2018	13/02/2018	13/02/2018	12/02/2018	12/02/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time taken	ı			None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics	-	-	-					
Benzene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Toluene	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Ethylbenzene	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
p & m-xylene	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
o-xylene	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8		0.001	MCERTS MCERTS	-		< 0.001 < 0.001	< 0.001 < 0.001	< 0.001 < 0.001
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS MCERTS MCERTS	-	-	< 0.001 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12	mg/kg mg/kg	0.001 0.001 0.001 1	MCERTS MCERTS MCERTS MCERTS	-	-	< 0.001 < 0.001 < 0.001 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16	mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2	MCERTS MCERTS MCERTS		- - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21	mg/kg mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2 8	MCERTS MCERTS MCERTS MCERTS	-	- - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0	< 0.001 < 0.001 < 0.001 < 1.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2 8	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS		- - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21	mg/kg mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2 8	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS			< 0.001 < 0.001 < 0.001 < 1.0 7.6 29	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC21 - EC35	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2 8 8	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS		- - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aromatic >EC5 - EC7	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.001 0.001 0.001 1 2 8 8 10	MCERTS		- - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC5 - EC35 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001 0.001 0.001 1 2 8 8 10	MCERTS	- - - - - - -	- - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic (EC5 - EC35) TPH-CWG - Aliphatic (EC5 - EC35) TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001	MCERTS		- - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 0.001	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 0.001
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC8 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic (EC5 - EC35) TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1	MCERTS		- - - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001 < 0.001 5.8	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC6 - EC10 TPH-CWG - Aliphatic >EC10 TPH-CWG - Aliphatic >EC10 TPH-CWG - Aliphatic >EC12 TPH-CWG - Aliphatic >EC12 TPH-CWG - Aliphatic >EC15 TPH-CWG - Aliphatic >EC15 TPH-CWG - Aliphatic >EC21 TPH-CWG - Aliphatic >EC21 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC12 - EC16	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2	MCERTS	- - - - - - - - - -	- - - - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001 5.8 20	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC6 - EC10 TPH-CWG - Aliphatic >EC10 TPH-CWG - Aliphatic >EC10 TPH-CWG - Aliphatic >EC10 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic (EC5 - EC35) TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC8 TPH-CWG - Aromatic >EC8 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC11	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 1 2	MCERTS		- - - - - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001 5.8 20 160	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 2.0 < 1.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC6 - EC10 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic >EC5 - EC3 TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC6 - EC8 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC11 TPH-CWG - Aromatic >EC10 - EC21	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2 10 10	MCERTS		- - - - - - - - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001 5.8 20 160 440	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0 < 1.0 < 1.0 < 2.0 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC6 - EC10 TPH-CWG - Aliphatic >EC10 TPH-CWG - Aliphatic >EC10 TPH-CWG - Aliphatic >EC10 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC16 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic (EC5 - EC35) TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC8 TPH-CWG - Aromatic >EC8 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC11	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 1 2	MCERTS		- - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001 5.8 20 160	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 2.0 < 1.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic (EC5 - EC35) TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC21 TPH-CWG - Aromatic >EC10 - EC21 TPH-CWG - Aromatic >EC21 - EC35 TPH-CWG - Aromatic >EC21 - EC35	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2 10 10	MCERTS	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001 < 0.001 5.8 20 160 440 620	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0 < 1.0 < 1.0 < 2.0 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 10 < 1.0 < 1.0 < 1.0 < 2.0 < 1.0 < 1.0 < 1.0 < 1.0
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic > EC5 - EC6 TPH-CWG - Aliphatic > EC8 - EC8 TPH-CWG - Aliphatic > EC10 - EC12 TPH-CWG - Aliphatic > EC10 - EC12 TPH-CWG - Aliphatic > EC16 - EC21 TPH-CWG - Aliphatic > EC16 - EC21 TPH-CWG - Aliphatic > EC16 - EC21 TPH-CWG - Aliphatic > EC21 - EC35 TPH-CWG - Aliphatic (EC5 - EC35) TPH-CWG - Aromatic > EC5 - EC7 TPH-CWG - Aromatic > EC7 - EC8 TPH-CWG - Aromatic > EC10 - EC12 TPH-CWG - Aromatic > EC10 - EC12 TPH-CWG - Aromatic > EC10 - EC12 TPH-CWG - Aromatic > EC10 - EC11 TPH-CWG - Aromatic > EC10 - EC11 TPH-CWG - Aromatic > EC10 - EC21 TPH-CWG - Aromatic > EC10 - EC35 TPH-CWG - Aromatic > EC10 - EC35 TPH-CWG - Aromatic > EC10 - EC35 TPH-CWG - Aromatic > EC21 - EC35 TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2 10 10	MCERTS	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001 5.8 20 160 440 620	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 0.001 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 1
Petroleum Range Organics (C6 - C10) TPH-CWG - Aliphatic >EC5 - EC6 TPH-CWG - Aliphatic >EC6 - EC8 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC10 - EC12 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC21 - EC35 TPH-CWG - Aliphatic (EC5 - EC35) TPH-CWG - Aromatic >EC5 - EC7 TPH-CWG - Aromatic >EC7 - EC8 TPH-CWG - Aromatic >EC8 - EC10 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC12 TPH-CWG - Aromatic >EC10 - EC21 TPH-CWG - Aromatic >EC10 - EC21 TPH-CWG - Aromatic >EC21 - EC35 TPH-CWG - Aromatic >EC21 - EC35	mg/kg	0.001 0.001 1 2 8 8 10 0.001 0.001 0.001 1 2 10 10 10	MCERTS	- - - - - - - - - - - - - - - - - - -	- - - - - - - - - - - - - - - - - - -	< 0.001 < 0.001 < 0.001 < 1.0 7.6 29 150 190 < 0.001 < 0.001 < 0.001 < 0.001 5.8 20 160 440 620	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0 < 1.0	< 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 8.0 < 8.0 < 10 < 0.001 < 0.001 < 0.001 < 0.001 < 1.0 < 2.0 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

Lab Sample Number				909736	909737	909738	909739	909740
Sample Reference								
•				WS1	WS2	WS2	WS3	WS3
Sample Number Depth (m)				tjv 0.25	tjv 2.50	tjv 0.50	tjv 0.40	tjv 2.00
Date Sampled				12/02/2018	13/02/2018	13/02/2018	12/02/2018	12/02/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane 1,1-Dichloroethene	μg/kg	1	NONE NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	μg/kg	1	ISO 17025	-	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
Cis-1,2-dichloroethene	μg/kg μg/kg	1	MCERTS	<u>-</u>	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene Benzene	μg/kg μg/kg	1	NONE MCERTS	-	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
Tetrachloromethane	μg/kg	1	MCERTS		< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	_	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane 1,3-Dichloropropane	μg/kg	1	MCERTS ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	μg/kg μg/kg	1	ISO 17025	-	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
Tetrachloroethene	μg/kg μg/kg	1	NONE	_	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	μg/kg	1	MCERTS	-	5.7	< 1.0	< 1.0	< 1.0
p & m-Xylene	μg/kg	1	MCERTS	-	42	< 1.0	< 1.0	< 1.0
Styrene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	μg/kg	1	NONE	-	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene 1,1,2,2-Tetrachloroethane	μg/kg μg/kg	1	MCERTS MCERTS	-	20 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
Isopropylbenzene	μg/kg μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	μg/kg μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	μg/kg	1	MCERTS	_	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	μg/kg	1	ISO 17025	-	15	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	μg/kg	1	MCERTS	-	4.6	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	μg/kg	1	ISO 17025	-	35	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene p-Isopropyltoluene	μg/kg	1	ISO 17025 ISO 17025	-	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0	< 1.0
p-isopropyitoluene 1.2-Dichlorobenzene	μg/kg μg/kg	1	MCERTS	-	< 1.0	< 1.0 < 1.0	< 1.0 < 1.0	< 1.0 < 1.0
1,4-Dichlorobenzene	μg/kg μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	μg/kg μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	μg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	μg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0	< 1.0





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number				909741	909742	909743	909744	909745
Sample Reference								
<u>'</u>				WS4	WS5	WS5	WS5	WS7
Sample Number Depth (m)				tjv 0.70	tjv 1.00	tjv 0.50	tjv 1.60	tjv 0.40
Date Sampled				13/02/2018	13/02/2018	13/02/2018	13/02/2018	12/02/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
			D			1 1 1 1 1		
	_	Limit of detection	Accreditation Status					
Analytical Parameter	Units	mit ect	edit					
(Soil Analysis)	(v)	할 역	atic					
			Š					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	-	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	24	23	-	23	12
Total mass of sample received	kg	0.001	NONE	1.6	1.2	-	1.2	1.3
		Ī						Chrysotile- Loose
Asbestos in Soil Screen / Identification Name	Туре	N/A	ISO 17025	-	-	-	-	Fibres
Asbestos in Soil	Туре	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-	Detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.0	10.7	-	8.7	9.5
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1300	3400	-	1200	4100
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	q/l	0.00125	MCERTS	0.57	0.93	_	0.54	0.99
Water Soluble SO4 16hr extraction (2:1 Leachate	g/i	0.00125	MCERTS	0.57	0.93	-	0.54	0.99
Equivalent)	mg/l	1.25	MCERTS	574	931	-	538	987
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.4	-	-	-	1.1
Total Phenois								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Speciated PAHs			ı			T		
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthone	mg/kg	0.05 0.05	MCERTS	< 0.05 < 0.05	< 0.05 < 0.05	-	< 0.05 0.23	< 0.05 0.80
Acenaphthene Fluorene	mg/kg mg/kg	0.05	MCERTS MCERTS	< 0.05	< 0.05	-	1.2	0.80
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	_	0.42	6.4
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.47	2.2
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.42	-	1.4	15
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.69	-	3.1	13
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.78	8.1
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.69	6.1
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.45	8.2
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.27	2.7
Benzo(a)pyrene	mg/kg	0.05 0.05	MCERTS	< 0.05 < 0.05	< 0.05	-	0.38	7.7
Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene	mg/kg mg/kg	0.05	MCERTS MCERTS	< 0.05 < 0.05	< 0.05 < 0.05	-	0.25 < 0.05	3.6 0.63
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	0.74	3.4
		_	-					
Total PAH				. 0.00			10.4	70.7
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	1.11	-	10.4	78.7
Heavy Metals / Metalloids				0.7	12	-	9.5	22
-	mg/kg	1	MCERTS	9.7				
Heavy Metals / Metalloids Arsenic (aqua regia extractable) Boron (water soluble)	mg/kg	0.2	MCERTS	3.3	16	-	2.2	4.0
Heavy Metals / Metalloids Arsenic (aqua regia extractable) Boron (water soluble) Cadmium (aqua regia extractable)	mg/kg mg/kg	0.2	MCERTS MCERTS	3.3 < 0.2	16 < 0.2	-	2.2 < 0.2	4.0 0.2
Heavy Metals / Metalloids Arsenic (aqua regia extractable) Boron (water soluble) Cadmium (aqua regia extractable) Chromium (hexavalent)	mg/kg mg/kg mg/kg	0.2 0.2 4	MCERTS MCERTS MCERTS	3.3 < 0.2 < 4.0	16 < 0.2 < 4.0	- - -	2.2 < 0.2 < 4.0	4.0 0.2 < 4.0
Heavy Metals / Metalloids Arsenic (aqua regia extractable) Boron (water soluble) Cadmium (aqua regia extractable) Chromium (hexavalent) Chromium (aqua regia extractable)	mg/kg mg/kg mg/kg mg/kg	0.2 0.2 4 1	MCERTS MCERTS MCERTS MCERTS	3.3 < 0.2 < 4.0 58	16 < 0.2 < 4.0 52	- - -	2.2 < 0.2 < 4.0 43	4.0 0.2 < 4.0 31
Heavy Metals / Metalloids Arsenic (aqua regia extractable) Boron (water soluble) Cadmium (agua regia extractable) Chromium (hexavalent) Chromium (aqua regia extractable) Copper (aqua regia extractable)	mg/kg mg/kg mg/kg mg/kg mg/kg	0.2 0.2 4 1	MCERTS MCERTS MCERTS MCERTS MCERTS	3.3 < 0.2 < 4.0 58	16 < 0.2 < 4.0 52 38	- - - -	2.2 < 0.2 < 4.0 43	4.0 0.2 < 4.0 31 270
Heavy Metals / Metalloids Arsenic (aqua regia extractable) Boron (water soluble) Cadmium (aqua regia extractable) Chromium (hexavalent) Chromium (aqua regia extractable) Copper (aqua regia extractable) Lead (aqua regia extractable)	mg/kg mg/kg mg/kg mg/kg mg/kg	0.2 0.2 4 1 1	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS	3.3 < 0.2 < 4.0 58 130	16 < 0.2 < 4.0 52 38 68		2.2 < 0.2 < 4.0 43 22 140	4.0 0.2 < 4.0 31 270 760
Heavy Metals / Metalloids Arsenic (aqua regia extractable) Boron (water soluble) Cadmium (aqua regia extractable) Chromium (hexavalent) Chromium (aqua regia extractable) Copper (aqua regia extractable) Lead (aqua regia extractable) Mercury (aqua regia extractable)	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	0.2 0.2 4 1 1 0.3	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS	3.3 < 0.2 < 4.0 58 130 19 < 0.3	16 < 0.2 < 4.0 52 38 68 < 0.3		2.2 < 0.2 < 4.0 43 22 140 < 0.3	4.0 0.2 < 4.0 31 270 760 < 0.3
Heavy Metals / Metalloids Arsenic (aqua regia extractable) Boron (water soluble) Cadmium (aqua regia extractable) Chromium (hexavalent) Chromium (aqua regia extractable) Copper (aqua regia extractable) Lead (aqua regia extractable)	mg/kg mg/kg mg/kg mg/kg mg/kg	0.2 0.2 4 1 1	MCERTS MCERTS MCERTS MCERTS MCERTS MCERTS	3.3 < 0.2 < 4.0 58 130	16 < 0.2 < 4.0 52 38 68		2.2 < 0.2 < 4.0 43 22 140	4.0 0.2 < 4.0 31 270 760





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number				909741	909742	909743	909744	909745
				909/41	909/42	909/43	909/ 44	909/43
Sample Reference	WS4	WS5	WS5	WS5	WS7			
Sample Number	tjv	tjv	tjv	tjv	tjv			
Depth (m)	0.70	1.00	0.50	1.60	0.40			
Date Sampled				13/02/2018	13/02/2018	13/02/2018	13/02/2018	12/02/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Toluene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Ethylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
p & m-xylene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
o-xylene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Alighatic > EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001 7.8	-	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC10 - EC12	mg/kg	2	MCERTS	< 1.0 < 2.0	13	-	42 130	1.0 9.6
TPH-CWG - Aliphatic >EC12 - EC16 TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS MCERTS	< 8.0	40	-	190	9.6
TPH-CWG - Aliphatic >EC16 - EC21 TPH-CWG - Aliphatic >EC16 - EC35	mg/kg mg/kg	8	MCERTS	46	980		4100	120
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg mg/kg	10	MCERTS	48	1000	-	4500	140
cite Ampirade (200 2000)	mg/itg	10	. ICLINIS	10	1000		1500	110
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	_	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	4.2	-	5.4	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	11	-	50	9.6
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	36	-	130	47
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	580	-	2000	94
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	630	-	2200	150
TPH (C10 - C12)	mg/kg	2	MCERTS	-	-	-	-	-
TPH (C12 - C16)	mg/kg	4	MCERTS	-	-	-	-	-
TPH (C16 - C21)	mg/kg	1	MCERTS	-	-	-	-	-
TPH (C21 - C40)	mg/kg	10	MCERTS	-	-	-	-	-





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

-				909741	909742	909743	909744	909745
Sample Reference	14/64	WCF	WCF	MCE	VVC7			
Sample Number		WS4 tjv	WS5 tjv	WS5 tjv	WS5 tjv	WS7 tjv		
Depth (m)				0.70	1.00	0.50	1.60	0.40
Date Sampled		13/02/2018	13/02/2018	13/02/2018	13/02/2018	12/02/2018		
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Chloroethane	μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
Bromomethane	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Vinyl Chloride	μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
Trichlorofluoromethane 1,1-Dichloroethene	μg/kg μg/kg	1	NONE NONE	< 1.0 < 1.0	< 1.0 < 1.0	-	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	μg/kg μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
Cis-1,2-dichloroethene	μg/kg μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1-Dichloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
2,2-Dichloropropane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Trichloromethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1,1-Trichloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2-Dichloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1-Dichloropropene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Trans-1,2-dichloroethene Benzene	μg/kg μg/kg	1	NONE MCERTS	< 1.0 < 1.0	< 1.0 < 1.0	-	< 1.0	< 1.0 < 1.0
Tetrachloromethane	μg/kg μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0 < 1.0	< 1.0
1,2-Dichloropropane	μg/kg μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Trichloroethene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Dibromomethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Bromodichloromethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Cis-1,3-dichloropropene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Trans-1,3-dichloropropene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Toluene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1,2-Trichloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,3-Dichloropropane Dibromochloromethane	μg/kg μg/kg	1	ISO 17025 ISO 17025	< 1.0 < 1.0	< 1.0	-	< 1.0	< 1.0
Tetrachloroethene	μg/kg μg/kg	1	NONE	< 1.0	< 1.0 < 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
1,2-Dibromoethane	μg/kg μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
Chlorobenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Ethylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
p & m-Xylene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Styrene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Tribromomethane	μg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
o-Xylene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane Isopropylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
<u>Isopropyibenzene</u> Bromobenzene	μg/kg μg/kg	1	MCERTS MCERTS	< 1.0 < 1.0	< 1.0 < 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
n-Propylbenzene	μg/kg μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
2-Chlorotoluene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
4-Chlorotoluene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,3,5-Trimethylbenzene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
tert-Butylbenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2,4-Trimethylbenzene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
sec-Butylbenzene	μg/kg 	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,3-Dichlorobenzene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
p-Isopropyltoluene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2-Dichlorobenzene 1,4-Dichlorobenzene	μg/kg μg/kg	1	MCERTS MCERTS	< 1.0 < 1.0	< 1.0 < 1.0	-	< 1.0 < 1.0	< 1.0 < 1.0
Butylbenzene	μg/kg μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	μg/kg μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2,4-Trichlorobenzene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
Hexachlorobutadiene	μg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
1,2,3-Trichlorobenzene	μg/kg	1	ISO 17025	< 1.0	< 1.0	-	< 1.0	< 1.0





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number				909748	909749			
Sample Reference				WS4	WS5			
Sample Number			tjv	tjv				
Depth (m)				2.00	4.50		1	
Date Sampled				13/02/2018	13/02/2018			
Time Taken				None Supplied	None Supplied			
			A					
Analytical Dayameter	_	Limit of detection	Accreditation Status					
Analytical Parameter (Soil Analysis)	Units	ect	edit					
(Soli Alialysis)	v	ig of	atic					
			š					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	23	20			
Total mass of sample received	kg	0.001	NONE	1.4	0.90			
T							1	
Asbestos in Soil Screen / Identification Name	Туре	N/A	ISO 17025	_	_			
	71: -	,						
Asbestos in Soil	Туре	N/A	ISO 17025	-	-			
			·		·	·	·	
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.9	7.9		.	
Total Cyanide	mg/kg	1 50	MCERTS	-	-		 	
Total Sulphate as SO ₄ Water Soluble SO4 16hr extraction (2:1 Leachate	mg/kg	50	MCERTS	-	-		-	
Equivalent)	g/l	0.00125	MCERTS	1.8	2.3			
Water Soluble SO4 16hr extraction (2:1 Leachate	311.							
Equivalent)	mg/l	1.25	MCERTS	-	-			
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-			
Total Discosts								
Total Phenois			MOEDTO				1	
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-		1	
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	-			
Acenaphthylene	mg/kg	0.05	MCERTS	-	-			
Acenaphthene	mg/kg	0.05	MCERTS	-	-			
Fluorene	mg/kg	0.05	MCERTS	-	-			
Phenanthrene	mg/kg	0.05	MCERTS	-	-			
Anthracene	mg/kg	0.05	MCERTS	-	-			
Fluoranthene	mg/kg	0.05	MCERTS	-	-		1	
Pyrene	mg/kg	0.05	MCERTS	-	-			
Benzo(a)anthracene Chrysene	mg/kg	0.05 0.05	MCERTS	-	-		1	
Benzo(b)fluoranthene	mg/kg mg/kg	0.05	MCERTS MCERTS	-	<u> </u>			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-		1	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-		1	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	_			
	_	_	_					
Total PAH			1					
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-			<u> </u>	
Harris Martin / M. C. W. C.								
Heavy Metals / Metalloids			MOEDTO				1	<u> </u>
Arsenic (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-		-	
Boron (water soluble) Cadmium (aqua regia extractable)	mg/kg mg/kg	0.2	MCERTS MCERTS	-	-		 	
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-		1	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-		1	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-			
Selenium (aqua regia extractable) Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-			





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

						1	ı	I
Lab Sample Number		909748	909749					
Sample Reference	WS4	WS5						
Sample Number				tjv	tjv			
Depth (m)				2.00	4.50			
Date Sampled				13/02/2018	13/02/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-			
Toluene	μg/kg	1	MCERTS	-	-			
Ethylbenzene	μg/kg	1	MCERTS	-	-			
p & m-xylene	μg/kg	1	MCERTS	-	-			
o-xylene	μg/kg	1	MCERTS	-	-			
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	-	-			
Petroleum Hydrocarbons Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	-	-			
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-			
TDU 6W6 A F05 F07	.	0.004			1		1	1
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic > EC7 - EC8	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic > EC8 - EC10	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic > EC10 - EC12	mg/kg	1	MCERTS	-	-			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-			
TPH-CWG - Aromatic > EC16 - EC21	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10 10	MCERTS	-	-			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	_		<u> </u>	<u> </u>
TPH (C10 - C12)	mg/kg	2	MCERTS	_	I -			
TPH (C12 - C16)	mg/kg	4	MCERTS					
TPH (C16 - C21)	mg/kg	1	MCERTS	_	_			
TPH (C10 - C21)	mg/kg	10	MCERTS		_			
1111 (021 070)	mg/kg	10	MCLKIS					





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1F

Lab Sample Number				909748	909749	l	
				2021.10	2001.10		
Sample Reference				WS4	WS5		
Sample Number	tjv	tjv					
Depth (m)		2.00	4.50				
Date Sampled		13/02/2018	13/02/2018				
Time Taken		1		None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
VOCs						l	
Chloromethane	μg/kg	1	ISO 17025	-	_		
Chloroethane	μg/kg	1	NONE	-	_		
Bromomethane	μg/kg	1	ISO 17025	-	-		
Vinyl Chloride	μg/kg	1	NONE	-	-		
Trichlorofluoromethane	μg/kg	1	NONE	1	-		
1,1-Dichloroethene	μg/kg	1	NONE	-	-		
1,1,2-Trichloro 1,2,2-Trifluoroethane	μg/kg	1	ISO 17025	-	-		
Cis-1,2-dichloroethene	μg/kg	1	MCERTS	-	-		
MTBE (Methyl Tertiary Butyl Ether)	μg/kg	1	MCERTS	-	-		
1,1-Dichloroethane	μg/kg	1	MCERTS	-	-		
2,2-Dichloropropane	μg/kg	1	MCERTS MCERTS	-	-		
Trichloromethane 1,1,1-Trichloroethane	μg/kg μg/kg	1	MCERTS	-	-		
1,2-Dichloroethane	μg/kg μg/kg	1	MCERTS	-	-		
1,1-Dichloropropene	μg/kg	1	MCERTS	_	-		
Trans-1,2-dichloroethene	μg/kg	1	NONE	_	_		
Benzene	μg/kg	1	MCERTS	-	-		
Tetrachloromethane	μg/kg	1	MCERTS	-	-		
1,2-Dichloropropane	μg/kg	1	MCERTS	-	-		
Trichloroethene	μg/kg	1	MCERTS	-	-		
Dibromomethane	μg/kg	1	MCERTS	-	-		
Bromodichloromethane	μg/kg	1	MCERTS	-	-		
Cis-1,3-dichloropropene	μg/kg	1	ISO 17025	-	-		
Trans-1,3-dichloropropene	μg/kg	1	ISO 17025	-	-		
Toluene 1,1,2-Trichloroethane	μg/kg	1	MCERTS MCERTS	-	-		
1,3-Dichloropropane	μg/kg μg/kg	1	ISO 17025	-	-		
Dibromochloromethane	μg/kg μg/kg	1	ISO 17025	-	-		
Tetrachloroethene	μg/kg	1	NONE	_	_		
1,2-Dibromoethane	μg/kg	1	ISO 17025	-	_		
Chlorobenzene	μg/kg	1	MCERTS	-	-		
1,1,1,2-Tetrachloroethane	μg/kg	1	MCERTS	-	-		
Ethylbenzene	μg/kg	1	MCERTS	-	-		
p & m-Xylene	μg/kg	1	MCERTS	-	-		
Styrene	μg/kg	1	MCERTS	-	-		
Tribromomethane	μg/kg 	1	NONE	-	-		
o-Xylene	μg/kg	1	MCERTS	-	-		
1,1,2,2-Tetrachloroethane	μg/kg	1	MCERTS	-	-		
Isopropylbenzene Bromobenzene	μg/kg μg/kg	1 1	MCERTS MCERTS	-	-		
n-Propylbenzene	μg/kg μg/kg	1	ISO 17025	-	-		
2-Chlorotoluene	μg/kg μg/kg	1	MCERTS	_	_		
4-Chlorotoluene	μg/kg μg/kg	1	MCERTS	-	-		
1,3,5-Trimethylbenzene	μg/kg	1	ISO 17025	-	-	 	
tert-Butylbenzene	μg/kg	1	MCERTS	-	-	 	
1,2,4-Trimethylbenzene	μg/kg	1	ISO 17025	-	-		
sec-Butylbenzene	μg/kg	1	MCERTS	-	-		
1,3-Dichlorobenzene	μg/kg	1	ISO 17025	-	-		
p-Isopropyltoluene	μg/kg "	1	ISO 17025	-	-		
1,2-Dichlorobenzene	μg/kg	1	MCERTS	-	-		
1,4-Dichlorobenzene Butylbenzene	μg/kg μg/kg	1	MCERTS MCERTS	-	-		
1,2-Dibromo-3-chloropropane	μg/kg μg/kg	1	ISO 17025	-	-		
1,2,4-Trichlorobenzene	μg/kg μg/kg	1	MCERTS	-	-		
Hexachlorobutadiene	μg/kg μg/kg	1	MCERTS	-	-		
1,2,3-Trichlorobenzene	μg/kg	1	ISO 17025	-	-		
, ,-	פיי וכח						





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
909736	WS1	tjv	0.25	Brown loam and clay with gravel and vegetation.
909737	WS2	tjv	2.50	Light brown clay and sand with gravel.
909738	WS2	tjv	0.50	Brown sand with rubble and brick.
909739	WS3	tjv	0.40	Grey clay and sand with rubble and brick.
909740	WS3	tjv	2.00	Brown clay.
909741	WS4	tjv	0.70	Brown clay.
909742	WS5	tjv	1.00	Brown clay.
909743	WS5	tjv	0.50	-
909744	WS5	tjv	1.60	Grey clay and sand.
909745	WS7	tjv	0.40	Brown sand with gravel and rubble.
909748	WS4	tjv	2.00	Brown clay.
909749	WS5	tjv	4.50	Brown clay.





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP- OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS





Project / Site name: 138-140 Highgate Road, Highgate, London, NW5 1PB

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS4	tjv	S	18-76317	909741	b	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	b
WS4	tjv	S	18-76317	909741	b	TPHCWG (Soil)	L088/76-PL	b
WS4	tjv	S	18-76317	909741	b	Volatile organic compounds in soil	L073B-PL	b



APPENDIX 4 – GEOTECHNICAL LABORATORY TEST RESULTS



Determination of Liquid and Plastic Limits

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

Client Reference: JJ1303

Job Number: 18-76333

Date Sampled: Not Given

Date Received: 15/02/2018

Date Tested: 23/02/2018

Sampled By: Not Given



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Jomas Associates Ltd Client: Client Address: Lakeside House

> 1 Furzeground Way Stockley Park **UB11 1BD**

Contact: Emma Hucker

138-140 Highgate Road, Highgate, London NW5 1PB Site Name:

Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

> Laboratory Reference: 909874

Sample Reference:

Brown CLAY Description:

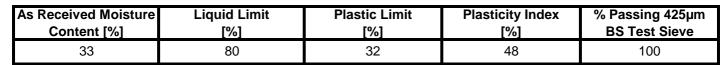
Location: BH1 Sample Preparation:

TEST RESULTS

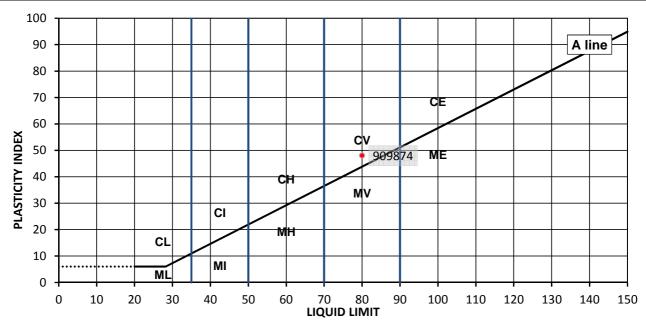
Tested in natural condition

Sample Type: B Depth Top [m]: 2.50

Depth Base [m]: Not Given



Not Given



Legend, based on BS 5930:2015 Code of practice for site investigations

Liquid Limit Plasticity С below 35 Clay Low Μ Silt Medium 35 to 50 Н High 50 to 70 Very high 70 to 90 Е exceeding 90 Extremely high

0 Organic append to classification for organic material (eg CHO)

Remarks

Signed: Approved:

Dariusz Piotrowski PL Laboratory

Manager Geotechnical Section

01/03/2018 Date Reported:

Darren Berrill Geotechnical General Manager

for and on behalf of i2 Analytical Ltd



Determination of Liquid and Plastic Limits

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

Client Reference: JJ1303

Job Number: 18-76333

Date Sampled: Not Given

Date Received: 15/02/2018

Date Tested: 23/02/2018

Sampled By: Not Given



TEST RESULTS

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Jomas Associates Ltd Client: Client Address: Lakeside House

> 1 Furzeground Way Stockley Park **UB11 1BD**

Contact: Emma Hucker

138-140 Highgate Road, Highgate, London NW5 1PB Site Name:

Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

> Laboratory Reference: 909876

Sample Reference: Not Given

Yellowish brown CLAY Description:

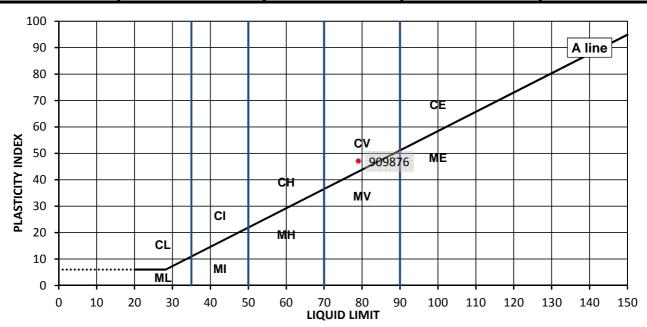
Location: BH1 Sample Preparation:

Tested in natural condition

Sample Type: B Depth Top [m]: 3.50

Depth Base [m]: Not Given

As Received Moisture	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
Content [%]	[%]	[%]	[%]	BS Test Sieve
32	79	32	47	100



Legend, based on BS 5930:2015 Code of practice for site investigations

0

Liquid Limit Plasticity С below 35 Clay Low Μ Silt Medium 35 to 50 Н High 50 to 70 Very high 70 to 90 Е exceeding 90 Extremely high

Remarks

Signed: Approved:

Organic

Dariusz Piotrowski PL Laboratory

Manager Geotechnical Section

01/03/2018 Date Reported:

Darren Berrill Geotechnical General

Manager

append to classification for organic material (eg CHO)

for and on behalf of i2 Analytical Ltd

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Contact:

TEST RESULTS

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

Client Reference: JJ1303

Job Number: 18-76333

Date Sampled: Not Given

Date Received: 15/02/2018

Date Tested: 26/02/2018

Sampled By: Not Given



Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Jomas Associates Ltd Client: Client Address: Lakeside House

> 1 Furzeground Way Stockley Park **UB11 1BD**

Emma Hucker

138-140 Highgate Road, Highgate, London NW5 1PB Site Name:

Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

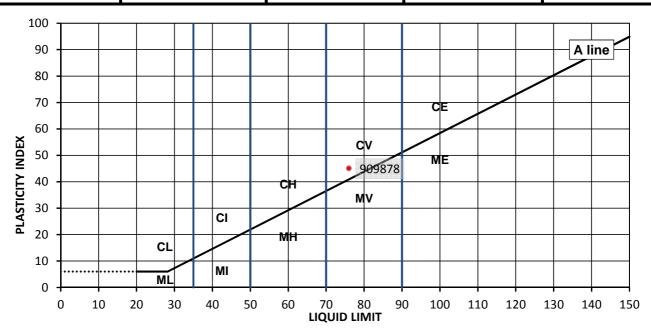
> Laboratory Reference: 909878

Sample Reference: Not Given

Dark brown CLAY Sample Type: U Description: Location: BH1 Depth Top [m]: 10.50

Sample Preparation: Depth Base [m]: 10.95 Tested in natural condition

As Received Moisture Content [%]	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
	[%]	[%]	[%]	BS Test Sieve
27	76	31	45	100



Legend, based on BS 5930:2015 Code of practice for site investigations

Liquid Limit Plasticity С below 35 Clay Low Μ Silt Medium 35 to 50 Н High 50 to 70 Very high 70 to 90 Е exceeding 90 Extremely high

0 Organic append to classification for organic material (eg CHO)

Remarks

Signed: Approved:

Dariusz Piotrowski PL Laboratory

Manager Geotechnical Section

01/03/2018 Date Reported:

Darren Berrill Geotechnical General

Manager

for and on behalf of i2 Analytical Ltd



Determination of Liquid and Plastic Limits

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

Client Reference: JJ1303

Job Number: 18-76333

Date Sampled: Not Given

Date Received: 15/02/2018

Date Tested: 23/02/2018

Sampled By: Not Given



TEST RESULTS

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Jomas Associates Ltd Client: Client Address: Lakeside House

> 1 Furzeground Way Stockley Park **UB11 1BD**

Contact: Emma Hucker

Site Name: 138-140 Highgate Road, Highgate, London NW5 1PB

Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

> Laboratory Reference: 909879

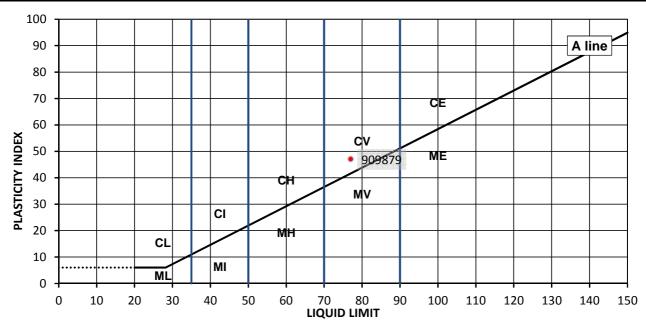
Sample Reference: Dark brown CLAY Description:

Sample Type: D Location: BH1 Depth Top [m]: 12.50

Depth Base [m]: Not Given Sample Preparation: Tested in natural condition

Not Given

As Received Moisture	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
Content [%]	[%]	[%]	[%]	BS Test Sieve
26	77	30	47	100



Legend, based on BS 5930:2015 Code of practice for site investigations

Liquid Limit Plasticity С below 35 Clay Low Μ Silt Medium 35 to 50 Н High 50 to 70 Very high 70 to 90 Е Extremely high exceeding 90

0 Organic append to classification for organic material (eg CHO)

Remarks

Signed: Approved:

Dariusz Piotrowski PL Laboratory

Manager Geotechnical Section

01/03/2018 Date Reported:

Darren Berrill Geotechnical General

Manager

for and on behalf of i2 Analytical Ltd

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Determination of Liquid and Plastic Limits

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

Client Reference: JJ1303

Job Number: 18-76333

Date Sampled: Not Given

Date Received: 15/02/2018

Date Tested: 26/02/2018

Sampled By: Not Given



Contact:

Location:

TEST RESULTS

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Jomas Associates Ltd Client: Client Address: Lakeside House

> 1 Furzeground Way Stockley Park **UB11 1BD**

Emma Hucker

138-140 Highgate Road, Highgate, London NW5 1PB Site Name:

Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

> Laboratory Reference: 909881

Sample Reference: Not Given

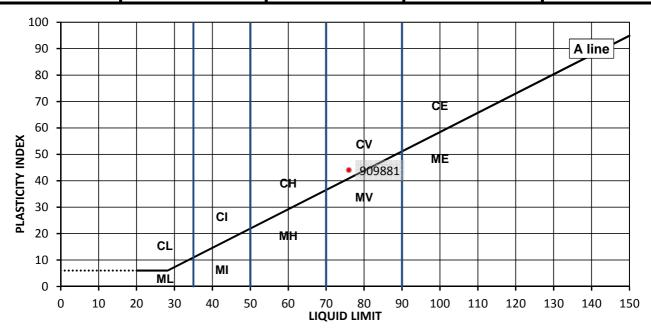
Dark brown slightly gravelly CLAY Description:

Sample Preparation: Tested after >425um removed by hand

Sample Type: U Depth Top [m]: 23.50

Depth Base [m]: 23.95

As Received Moisture	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
Content [%]	[%]	[%]	[%]	BS Test Sieve
27	76	32	44	99



Legend, based on BS 5930:2015 Code of practice for site investigations

Liquid Limit Plasticity С below 35 Clay Low Μ Silt Medium 35 to 50 Н High 50 to 70 Very high 70 to 90 Е exceeding 90 Extremely high

0 Organic append to classification for organic material (eg CHO)

Remarks

Signed: Approved:

Dariusz Piotrowski PL Laboratory

Manager Geotechnical Section

01/03/2018 Date Reported:

Darren Berrill Geotechnical General

Manager

for and on behalf of i2 Analytical Ltd

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Determination of Liquid and Plastic Limits

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

Client Reference: JJ1303

Job Number: 18-76333

Date Sampled: Not Given

Date Received: 15/02/2018

Date Tested: 23/02/2018

Sampled By: Not Given

Sample Type: B



Contact:

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Jomas Associates Ltd Client: Client Address: Lakeside House

> 1 Furzeground Way Stockley Park **UB11 1BD**

Emma Hucker

138-140 Highgate Road, Highgate, London NW5 1PB Site Name:

Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

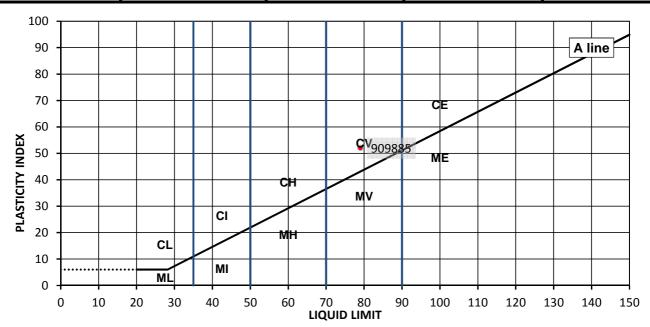
TEST RESULTS Laboratory Reference: 909885

> Sample Reference: Not Given

Dark brown CLAY Description:

Location: BH₂ Depth Top [m]: 18.50 Depth Base [m]: Not Given Sample Preparation: Tested in natural condition

As Received Moisture	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
Content [%]	[%]	[%]	[%]	BS Test Sieve
26	79	27	52	100



Legend, based on BS 5930:2015 Code of practice for site investigations

Liquid Limit Plasticity С below 35 Clay Low Μ Silt Medium 35 to 50 Н High 50 to 70 Very high 70 to 90 Е exceeding 90 Extremely high

0 Organic append to classification for organic material (eg CHO)

Remarks

Signed: Approved:

Dariusz Piotrowski

PL Laboratory Manager Geotechnical

Section

01/03/2018 Date Reported:

Darren Berrill Geotechnical General

Manager

for and on behalf of i2 Analytical Ltd

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Determination of Liquid and Plastic Limits

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

Client Reference: JJ1303

Job Number: 18-76333

Date Sampled: Not Given

Date Received: 15/02/2018

Date Tested: 23/02/2018

Sampled By: Not Given



Contact:

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Jomas Associates Ltd Client: Client Address: Lakeside House

> 1 Furzeground Way Stockley Park **UB11 1BD**

Emma Hucker

138-140 Highgate Road, Highgate, London NW5 1PB Site Name:

Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

> Laboratory Reference: 909886

Sample Reference: Not Given

Dark brown CLAY Description:

Location: BH₂ Sample Preparation:

TEST RESULTS

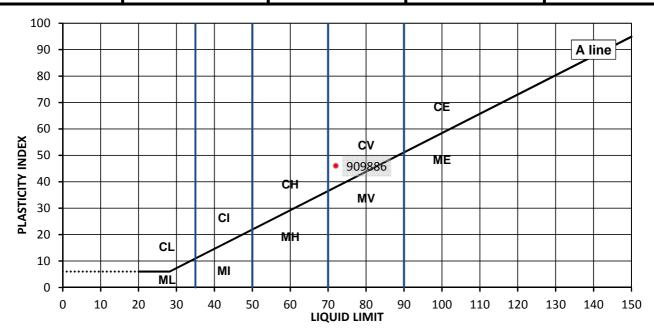
Tested in natural condition

Sample Type: D

Depth Top [m]: 9.50

Depth Base [m]: Not Given

As Received Moisture	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
Content [%]	[%]	[%]	[%]	BS Test Sieve
27	72	26	46	100



Legend, based on BS 5930:2015 Code of practice for site investigations

0

Liquid Limit Plasticity С below 35 Clay Low Μ Silt Medium 35 to 50 Н High 50 to 70 Very high 70 to 90 Е exceeding 90 Extremely high

Remarks

Signed: Approved:

Organic

Dariusz Piotrowski PL Laboratory

Manager Geotechnical Section

01/03/2018 Date Reported:

Darren Berrill Geotechnical General

Manager

append to classification for organic material (eg CHO)

for and on behalf of i2 Analytical Ltd

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Determination of Liquid and Plastic Limits

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

Client Reference: JJ1303

Job Number: 18-76333

Date Sampled: Not Given

Date Received: 15/02/2018

Date Tested: 23/02/2018

Sampled By: Not Given



Contact:

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Jomas Associates Ltd Client: Client Address: Lakeside House

> 1 Furzeground Way Stockley Park **UB11 1BD**

Emma Hucker

138-140 Highgate Road, Highgate, London NW5 1PB Site Name:

Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

> Laboratory Reference: 909887

Sample Reference: Not Given

Brown CLAY Description:

Location: BH₂ Sample Preparation:

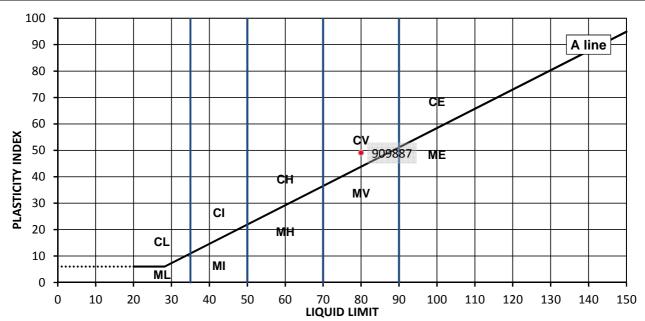
TEST RESULTS

Tested in natural condition

Sample Type: D

Depth Top [m]: 2.00 Depth Base [m]: Not Given

As Received Moisture	Liquid Limit	Plastic Limit	Plasticity Index	% Passing 425µm
Content [%]	[%]	[%]	[%]	BS Test Sieve
34	80	31	49	100



Legend, based on BS 5930:2015 Code of practice for site investigations

Liquid Limit Plasticity С below 35 Clay Low Μ Silt Medium 35 to 50 Н High 50 to 70 Very high 70 to 90 Е exceeding 90 Extremely high

0 Organic append to classification for organic material (eg CHO)

Remarks

Signed: Approved:

Dariusz Piotrowski PL Laboratory

Manager Geotechnical Section

01/03/2018 Date Reported:

Darren Berrill Geotechnical General

Manager

for and on behalf of i2 Analytical Ltd

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Summary of Classification Test Results

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS



Client: Jomas Associates Ltd
Client Address: Lakeside House

Client Address: Lakeside House 1 Furzeground Way

Stockley Park UB11 1BD

Contact: Emma Hucker

Site Name: 138-140 Highgate Road, Highgate, London NW5 1PB
Site Address: 138-140 Highgate Road, Highgate, London NW5 1PB

Client Reference: JJ1303

Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018

Date Tested: 23/02 - 26/02/2018

Sampled By: Not Given

Test results

_			Sar	mple			Der	nsity	M/C		Atte	rberg		PD
Laboratory Reference	Hole No.	Reference	Top depth [m]	Base depth [m]	Туре	Soil Description	bulk	dry	IVI/C	% Passing 425um	LL	PL	PI	10
							Mg/m3	Mg/m3	%	%	%	%	%	Mg/m3
909874	BH1	Not Given	2.50	Not Given	В	Brown CLAY			33	100	80	32	48	
909876	BH1	Not Given	3.50	Not Given	В	Yellowish brown CLAY			32	100	79	32	47	
909878	BH1	Not Given	10.50	10.95	U	Dark brown CLAY			27	100	76	31	45	
909879	BH1	Not Given	12.50	Not Given	D	Dark brown CLAY			26	100	77	30	47	
909881	BH1	Not Given	23.50	23.95	U	Dark brown slightly gravelly CLAY			27	99	76	32	44	
909887	BH2	Not Given	2.00	Not Given	D	Brown CLAY			34	100	80	31	49	
909886	BH2	Not Given	9.50	Not Given	D	Dark brown CLAY			27	100	72	26	46	
909885	BH2	Not Given	18.50	Not Given	В	Dark brown CLAY			26	100	79	27	52	

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018

Signed:

Darren Berrill

Geotechnical General Manager



for and on behalf of i2 Analytical Ltd

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Page 1 of 1 GF 159.4

Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS



Contact:

Jomas Associates Ltd Client:

Lakeside House Client Address:

1 Furzeground Way Stockley Park **UB11 1BD**

Emma Hucker

138-140 Highgate Road, Highgate, London NW5 Site Name:

138-140 Highgate Road, Highgate, London NW5

1PB

Client Reference: JJ1303 Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018 Date Tested: 26/02/2018

Sampled By: Not Given

Test Result

Site Address:

Laboratory Reference: 909873 Hole No.: Sample Reference: Not Given

Sample Description: Yellowish brown CLAY

Test Number 193.07 Length mm Diameter 101.23 mm **Bulk Density** 1.88 Mg/m3 Moisture Content 30 %

Dry Density 1.44 Mg/m3

Depth Base [m]: 1.95 Sample Type: U Rate of Strain Cell Pressure

Axial Strain at failure Deviator Stress, ($\sigma1 - \sigma3$)f Undrained Shear Strength, cu

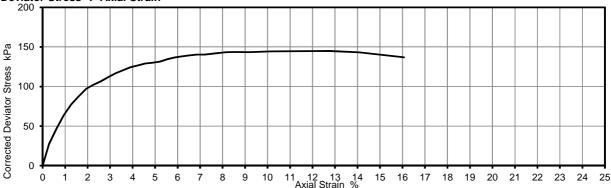
Mode of Failure Membrane thickness

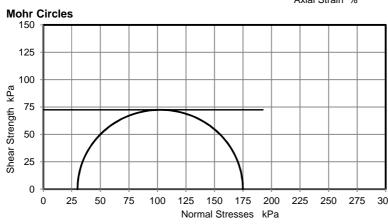
2.00	%/min
30	kPa
12.8	%
145	kPa

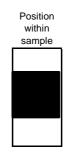
Depth Top [m]: 1.50

72 kPa ½(σ1 - σ3)f Brittle 0.30 mm

Deviator Stress v Axial Strain









Notes: Remarks:

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.

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018 Signed:

Darren Berrill Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS



Jomas Associates Ltd Client:

Lakeside House Client Address:

1 Furzeground Way Stockley Park **UB11 1BD**

Contact: Emma Hucker

138-140 Highgate Road, Highgate, London NW5 Site Name:

138-140 Highgate Road, Highgate, London NW5 Site Address:

1PB

Client Reference: JJ1303 Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018

Date Tested: 26/02/2018

Sampled By: Not Given

Test Result

Laboratory Reference: 909875 Hole No .: Not Given Sample Reference: Sample Description Brown CLAY

Test Number 206.42 Length mm Diameter 100.86 mm **Bulk Density** 1.98 Moisture Content 32

Mg/m3 % 1.50 Dry Density Mg/m3

Rate of Strain Cell Pressure Axial Strain at failure Deviator Stress, (σ 1 - σ 3)f Undrained Shear Strength, cu

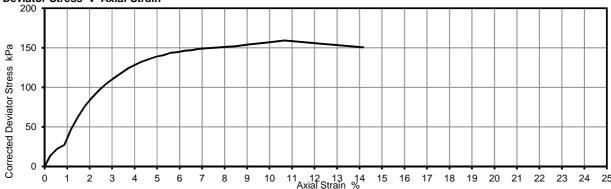
Mode of Failure Membrane thickness

Depth Top [m]: 4.50 Depth Base [m]: 4.95 Sample Type: U

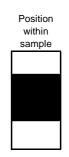
1.94	%/min
90	kPa
10.7	%
159	kPa
80	kPa ½(σ1 - σ3)f

Brittle 0.29 mm

Deviator Stress v Axial Strain



Mohr Circles 125 100 ĸРа 75 Shear Strength 50 25 0 0 25 75 100 150 175 225 250 Normal Stresses kPa





Notes: Remarks:

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.

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018 Signed:

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Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS



Jomas Associates Ltd Client:

Lakeside House Client Address:

1 Furzeground Way Stockley Park **UB11 1BD**

Contact: Emma Hucker

138-140 Highgate Road, Highgate, London NW5 Site Name:

138-140 Highgate Road, Highgate, London NW5 Site Address:

1PB

Client Reference: JJ1303 Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018 Date Tested: 26/02/2018

Sampled By: Not Given

Test Result

Laboratory Reference: 909877 Hole No.: Sample Reference: Not Given Sample Description: Brown CLAY

Test Number 198.66 Length mm Diameter 102.32 mm **Bulk Density** 1.90 Mg/m3 Moisture Content 29 %

Dry Density 1.47 Mg/m3 Depth Base [m]: 7.95 Sample Type: U

Rate of Strain Cell Pressure Axial Strain at failure Deviator Stress, ($\sigma1 - \sigma3$)f Undrained Shear Strength, cu

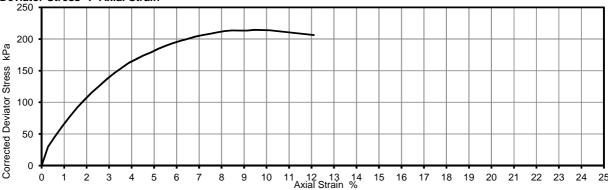
Mode of Failure Membrane thickness

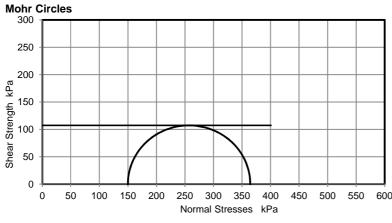
2.00	%/min
150	kPa
9.5	%
214	kPa

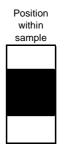
Depth Top [m]: 7.50

107 kPa ½(σ1 - σ3)f Brittle 0.29 mm

Deviator Stress v Axial Strain









Notes: Remarks:

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.

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018 Signed:

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Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS



Contact:

Jomas Associates Ltd Client:

Lakeside House Client Address:

1 Furzeground Way Stockley Park **UB11 1BD**

Emma Hucker

138-140 Highgate Road, Highgate, London NW5 Site Name:

138-140 Highgate Road, Highgate, London NW5

1PB

Client Reference: JJ1303 Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018

> Date Tested: 26/02/2018 Sampled By: Not Given

Test Result

Site Address:

Laboratory Reference: 909878 Hole No.: BH1 Sample Reference: Not Given Sample Description: Dark brown CLAY

Test Number 184.76 Length mm Diameter 102.83 mm **Bulk Density** 1.93 Mg/m3 Moisture Content 27 %

Dry Density 1.52 Mg/m3 Depth Base [m]: 10.95 Sample Type: U 2.00 %/min

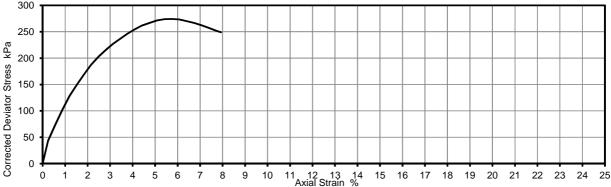
Rate of Strain Cell Pressure Axial Strain at failure Deviator Stress, ($\sigma1 - \sigma3$)f Undrained Shear Strength, cu

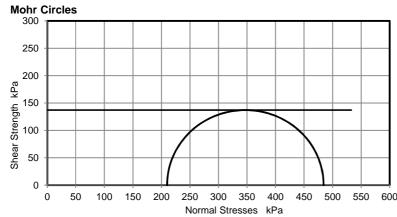
Mode of Failure Membrane thickness 210 kPa 5.8 % 274 kPa

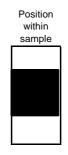
Depth Top [m]: 10.50

137 kPa ½(σ1 - σ3)f Brittle 0.28 mm

Deviator Stress v Axial Strain









Notes: Remarks:

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.

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018 Signed:

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Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS



Jomas Associates Ltd Client:

Lakeside House Client Address:

1 Furzeground Way Stockley Park **UB11 1BD**

Contact: Emma Hucker

138-140 Highgate Road, Highgate, London NW5 Site Name:

138-140 Highgate Road, Highgate, London NW5 Site Address:

1PB

Client Reference: JJ1303 Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018

> Date Tested: 26/02/2018 Sampled By: Not Given

Test Result

Laboratory Reference: 909880 Hole No.: Sample Reference: Not Given Dark grey CLAY Sample Description:

Test Number Length 202.53 mm Diameter 103.13 mm **Bulk Density** 1.96 Mg/m3 Moisture Content 26 %

Dry Density 1.55 Mg/m3

Depth Top [m]: 16.50 Depth Base [m]: Not Given Sample Type: U

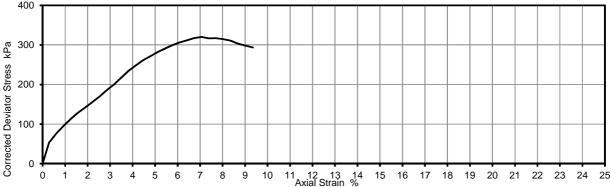
Rate of Strain Cell Pressure Axial Strain at failure Deviator Stress, ($\sigma1 - \sigma3$)f

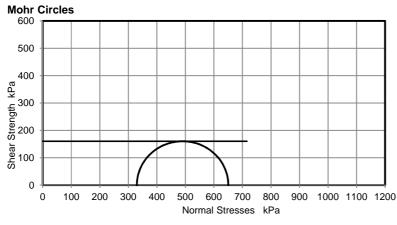
Undrained Shear Strength, cu Mode of Failure Membrane thickness

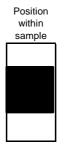
%/min
kPa
%
kPa
c

160 kPa ½(σ1 - σ3)f Brittle 0.29 mm

Deviator Stress v Axial Strain









Notes: Remarks:

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.

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018 Signed:

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for and on behalf of i2 Analytical Ltd

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Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS



Jomas Associates Ltd Client:

Lakeside House Client Address:

1 Furzeground Way Stockley Park **UB11 1BD**

Contact: Emma Hucker

138-140 Highgate Road, Highgate, London NW5 Site Name:

138-140 Highgate Road, Highgate, London NW5 Site Address:

1PB

Client Reference: JJ1303 Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018

> Date Tested: 26/02/2018 Sampled By: Not Given

Test Result

Laboratory Reference: 909882 Hole No.: BH₂ Sample Reference: Not Given Dark grey CLAY Sample Description:

Test Number Length Diameter

Bulk Density Moisture Content Dry Density

212.21 mm 102.31 mm 1.81 Mg/m3 29 %

1.40 Mg/m3 Rate of Strain Cell Pressure Axial Strain at failure Deviator Stress, ($\sigma1 - \sigma3$)f

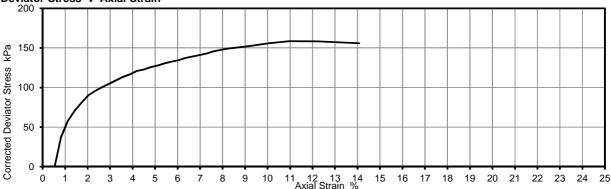
Undrained Shear Strength, cu Mode of Failure Membrane thickness

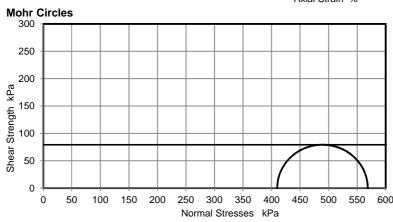
Depth Top [m]: 20.50 Depth Base [m]: 20.95 Sample Type: U

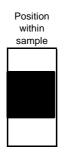
	_
1.88	%/min
410	kPa
11.0	%
159	kPa
70	7.5.4

79 kPa ½(σ1 - σ3)f Brittle 0.28 mm

Deviator Stress v Axial Strain









Notes: Remarks:

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.

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018 Signed:

Darren Berrill Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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Determination of Unconsolidated Undrained Triaxial Compression Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS

i2 Analytical Ltd



Jomas Associates Ltd Client:

Lakeside House Client Address:

1 Furzeground Way Stockley Park **UB11 1BD**

Contact: Emma Hucker

138-140 Highgate Road, Highgate, London NW5 Site Name:

138-140 Highgate Road, Highgate, London NW5 Site Address:

1PB

Client Reference: JJ1303 Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018 Date Tested: 26/02/2018

Sampled By: Not Given

Test Result

Laboratory Reference: 909883 Hole No.: Sample Reference: Not Given Dark grey CLAY Sample Description:

Test Number 217.26 Length mm Diameter 102.28 mm **Bulk Density** 1.99 Mg/m3 Moisture Content 26 %

Dry Density 1.58 Mg/m3

Depth Base [m]: 14.95 Sample Type: U Rate of Strain Cell Pressure

Axial Strain at failure Deviator Stress, ($\sigma1 - \sigma3$)f Undrained Shear Strength, cu

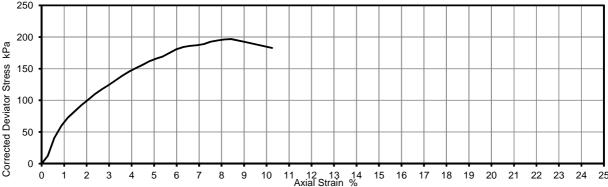
Mode of Failure Membrane thickness

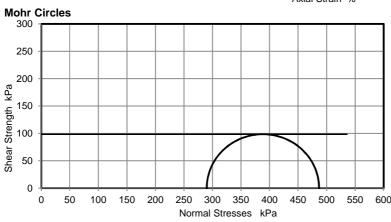
1.84	%/min
290	kPa
8.4	%
197	kPa
00	LDo 1//

Depth Top [m]: 14.50

½(σ1 - σ3)f Brittle 0.27

Deviator Stress v Axial Strain









Notes: Remarks:

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.

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018 Signed:

Darren Berrill Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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Determination of Unconsolidated Undrained Triaxial Compression

Tested in Accordance with BS1377: Part 7: 1990, clause 8, single specimen

i2 Analytical Ltd 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS



Contact:

Jomas Associates Ltd Client:

Lakeside House Client Address:

1 Furzeground Way Stockley Park

UB11 1BD Emma Hucker

138-140 Highgate Road, Highgate, London NW5 Site Name:

138-140 Highgate Road, Highgate, London NW5 Site Address:

1PB

Client Reference: JJ1303 Job Number: 18-76333 Date Sampled: Not Given Date Received: 15/02/2018

> Date Tested: 26/02/2018 Sampled By: Not Given

Test Result

Laboratory Reference: 909884 Hole No.: BH₂ Sample Reference: Not Given

Sample Description: Yellowish brown CLAY

Test Number 210.47 Length mm Diameter 103.15 mm **Bulk Density** 1.86 Mg/m3 Moisture Content 33 %

Dry Density 1.39 Mg/m3

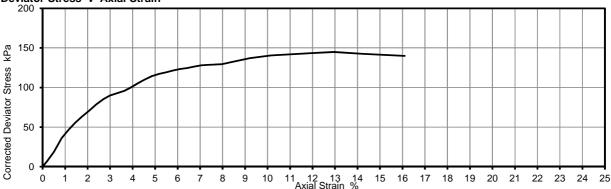
Depth Top [m]: 5.50 Depth Base [m]: 5.95 Sample Type: U

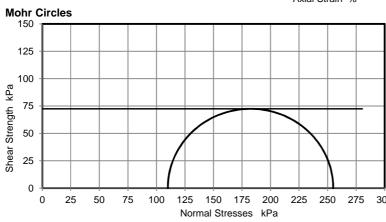
Rate of Strain Cell Pressure Axial Strain at failure Deviator Stress, ($\sigma1 - \sigma3$)f Undrained Shear Strength, cu

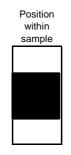
Mode of Failure Membrane thickness 1.90 %/min 110 kPa 13.0 % 145 kPa

72 kPa ½(σ1 - σ3)f Brittle 0.27 mm

Deviator Stress v Axial Strain









Notes: Remarks:

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.

Comments:

Approved:

Dariusz Piotrowski PL Laboratory Manager Geotechnical Section

Date Reported: 01/03/2018 Signed:

Darren Berrill Geotechnical General Manager

for and on behalf of i2 Analytical Ltd

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APPENDIX 5 – SOIL GAS MONITORING TEST RESULTS

	GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET											
Site: Highgate Road	Operative(s): AJH		Time:	09:00	Round: 1	Page:						
MONITORING EQUIPMENT												
Instrument Type Instrument Make Serial No. Date Last Calibrated												
Analox	GA5000			G501805		10/01/2018						
PID	Phocheck tiger			T-106448		03/10/2017						
Dip Meter	GeoTech											
		MONITOR	ING CON	NDITIONS								
Weather Conditions: Overcast		Ground Conditions: Dry			Tempe	Temperature: 7°C						
Barometric Pressure (mbar):	1023	Barometric Pressure Tren	ometric Pressure Trend (24hr): Steady			Ambient Concentration: 0.0 %CH ₄ , 0.2 %CO ₂ , 21.0%O ₂						

	MONITORING RESULTS													
Monitoring	F	low	Atmospheric		OU 0/			voc	(ppm)		00	Depth to	Depth to	Depth to
Point Location	Peak	Steady	Pressure (mbar)	CH₄ %	CH ₄ % LEL	CO ₂ %	O ₂ %	Peak	steady	H₂S (ppm)	CO (ppm)	product (mbgl)	water (mbgl)	Base of well (mbgl)
BH1	+0.1	+0.1	1023	0.0	/	1.1	19.5	5	5	0	17	/	Dry	5.10
WS1	0.0	0.0	1023	0.0	/	2.1	20.3	0	0	0	0	/	Dry	5.00
WS2**	0.0	0.0	1024	0.0	/	0.2	21.6	6	6	0	0	1.56	3.41	3.42
WS3*	0.0	0.0	1024	0.0	/	0.6	20.9	1	1	0	0	/	4.88	4.88
WS4	+0.2	+0.2	1024	0.0	/	0.5	20.3	0	0	0	4	/	4.67	4.93
WS5**	0.0	0.0	1023	4.9	/	0.8	4.4	54	54	0	8	1.52	1.77	4.95

^{*} Open tap
** Oil layer, HC odour noted

	GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET										
Site: Highgate Road	Operative(s): AJH	Date: 26/02/18	Time:	12:00	Round: 2	Page:					
MONITORING EQUIPMENT											
Instrument Type Instrument Make Serial No. Date Last Calibrated											
Analox	GA5000		G501805		10/01/2018						
PID	Phocheck tiger		T-106448		03/10/2017						
Dip Meter	GeoTech										
		MONITORING CO	NDITIONS		-						
Weather Conditions: Clear		Ground Conditions: Dry		Temper	Temperature: 1°C						
Barometric Pressure (mbar):	1026	Barometric Pressure Trend (24hr): Steady then falling			Ambient Concentration: 0.0 %CH ₄ , 0.3 %CO ₂ , 20.7%O ₂						

	MONITORING RESULTS													
Monitoring		Flow	Atmospheric		OU 0/			voc	(ppm)		00	Depth to	Depth to	Depth to
Point Location	Peak	Steady	Pressure (mbar)	CH ₄ %	CH ₄ % LEL	CO ₂ %	O ₂ %	Peak	steady	H₂S (ppm)	CO (ppm)	product (mbgl)	water (mbgl)	Base of well (mbgl)
BH1	+0.1	+0.1	1026	0.0	/	1.9	18.9	2	2	0	7	/	Dry	5.07
WS1	+0.1	+0.1	1027	0.0	/	3.4	19.2	0	0	0	0	/	Dry	5.02
WS2*	0.0	0.0	1027	0.0	/	0.2	21.0	18	18	0	0	1.55	2.23	3.42
WS3	+0.1	+0.1	1027	0.0	/	1.1	20.3	0	0	0	0	/	4.86	4.89
WS4	0.0	0.0	1026	0.0	/	1.1	19.0	1	1	0	0	/	4.90	4.94
WS5*	-0.1	-0.1	1026	3.5	/	1.0	4.1	145	145	0	1	1.54	1.85	4.95

^{*} Oil layer, HC odour noted

	GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET										
Site: Highgate Road	Operative(s): JWT	Operative(s): JWT Date: 26/02/18				Round: 3	Page:				
MONITORING EQUIPMENT											
Instrument Type Instrument Make Serial No. Date Last Calibrated											
Analox	GA5000			G501805		10/01/2018					
PID	Phocheck tiger			T-106448		03/10/2017					
Dip Meter	GeoTech										
			MONITORING CO	NDITIONS		•					
Weather Conditions: Sunny		Ground Cor	nditions: Wet		Tempe	Temperature: 6°C					
Barometric Pressure (mbar):	986	Barometric falling	Barometric Pressure Trend (24hr): Steady then falling			Ambient Concentration: 0.0 %CH ₄ , 0.2 %CO ₂ , 21.0%O ₂					

	MONITORING RESULTS													
Monitoring		Flow	Atmospheric		OU 0/			voc	(ppm)		00	Depth to	Depth to	Depth to
Point Location	Peak	Steady	Pressure (mbar)	CH ₄ %	CH ₄ % LEL	CO ₂ %	O ₂ %	Peak	steady	H₂S (ppm)	CO (ppm)	product (mbgl)	water (mbgl)	Base of well (mbgl)
BH1	+0.2	+0.2	987	0.0	/	1.6	19.2	0	0	0	0	/	Dry	5.07
WS1	0.0	0.0	987	0.0	/	3.4	19.2	0	0	0	0	/	Dry	5.02
WS2*	-0.1	-0.1	987	0.0	/	0.3	20.7	16	16	0	1	1.52	2.62	3.42
WS3	+0.1	+0.1	987	0.0	/	0.3	20.9	2	1	0	0	/	4.81	4.89
WS4	+0.2	+0.2	987	0.0	/	1.6	18.4	3	3	0	0	/	Dry	4.94
WS5*	-0.4	-0.4	987	3.0	/	0.9	0.4	27	27	1	2	1.49	1.64	4.95

^{*} Oil layer, HC odour noted

	GAS AND GROUNDWATER MONITORING BOREHOLE RECORD SHEET										
Site: Highgate Road	Operative(s): JWT	Date: 15/03/18	Time:	09:40	Round: 4	Page:					
MONITORING EQUIPMENT											
Instrument Type Instrument Make Serial No. Date Last Calibrated											
Analox	GA5000		G501805		10/01/2018						
PID	Phocheck tiger		T-106448		03/10/2017						
Dip Meter	GeoTech										
		MONITORING CO	NDITIONS		-						
Weather Conditions: Overcast		Ground Conditions: Wet	Conditions: Wet Temp			Temperature: 10°C					
Barometric Pressure (mbar):	985	Barometric Pressure Trend (24hr): Steady then falling			Ambient Concentration: 0.0 %CH ₄ , 0.2 %CO ₂ , 20.8%O ₂						

	MONITORING RESULTS													
Monitoring	F	low	Atmospheric		CU 0/			voc	(ppm)		60	Depth to	Depth to	Depth to
Point Location	Peak	Steady	Pressure (mbar)	CH ₄ %	CH ₄ % LEL	CO ₂ %	O ₂ %	Peak	steady	H₂S (ppm)	CO (ppm)	product (mbgl)	water (mbgl)	Base of well (mbgl)
BH1*	/	/	/	/	/	/	/	/	/	/	/	/	/	/
WS1	0.0	0.0	985	0.0	/	3.5	18.7	8	8	0	0	/	Dry	5.01
WS2**	+0.1	+0.1	986	0.1	/	0.7	20.1	21	21	0	2	1.49	**	3.42
WS3	0.0	0.0	986	0.0	/	1.3	20.3	4	2	0	0	/	4.66	4.86
WS4	+0.4	+0.4	986	0.0	/	2.3	16.4	5	4	0	0	/	4.37	4.93
WS5**	-0.3	-0.3	985	4.3	/	0.9	1.2	76	76	1	2	1.48	**	4.92

^{*}Could not be accessed due to parked vehicle
**No interface probe to measure difference in product/water. Dip-meter used to measure depth to product.

	LOW FLOW GROUNDWATER MONITORING BOREHOLE RECORD SHEET											
Site: Highgate Road	Operative(s): AJH	Date: 21/02/18	Time: 09:00	Round: 1	Page: 1 of							
MONITORING EQUIPMENT												
Instrument Type Instrument Make Serial No. Date Last Calibrated												
SmarTROLL MP	In-Situ											
Dip Meter	In-Situ											
MONITORING CONDITIONS												
Weather Conditions: Over	rcast	Ground Conditions: Dry		Temperature: 7°C								

Hole ID	Temperature (°C)	Specific Conductivity (µS/cm)	рН	(ORP) Oxidation- Reduction Potential (mV)	(RDO) Rugged Dissolved Oxygen Concentration (mg/L)	Water Level (Start of testing)	Water Level (End of testing)	Hole Depth	Comments
WS2	-	-	-	-	-	-	-	-	Clear with layer of oil, sheen, strong H/C odour. Oil sticking to sample piping
WS4	10.39	6101.3	6.93	214.9	2.95	4.80	Full Purge	4.95	Turbid, no odour, no sheen, did not stabilise, no recharge rate.
WS5	-	-	-	-	-	-	-	-	Clear with droplets of oil, sheen, strong H/C odour. Oil sticking to sample piping

Specific Conductivity (µS/cm)

This is a measure of the capability of a solution such as water in a stream to pass an electric current. This is an indicator of the concentration of dissolved electrolyte ions in the water. It doesn't identify the specific ions in the water. However, significant increases in conductivity may be an indicator that polluting discharges have entered the water.

Every creek will have a baseline conductivity depending on the local geology and soils. Higher conductivity will result from the presence of various ions including nitrate, phosphate, and sodium.

The basic unit of measurement for conductivity is micromhos per centimeter (µmhos/cm) or microsiemens per centimeter (µS/cm). Either can be used, they are the same. It is a measure of the inverse of the amount of resistance an electric charge meets in traveling through the water. Distilled water has a conductivity ranging from 0.5 to 3 µS/cm, while most streams range between 50 to 1500 µS/cm. Freshwater streams ideally should have a conductivity between 150 to 500 µS/cm to support diverse aquatic life.

Hq

A measure of a solution's acidity. In water, small numbers of water molecules (H2O) will break apart or disassociate into hydrogen ions (H+) and hydroxide ions (OH-). Other compounds entering the water may react with these, leaving an imbalance in the numbers of hydrogen and hydroxide ions. When more hydrogen ions react, more hydroxide ions are left in solution and the water is basic; when more hydroxide ions react, more hydrogen ions are left and the water is acidic. pH is a measure of the number of hydrogen ions and thus a measure of acidity.

pH is measured on a logarithmic scale between 1 and 14 with 1 being extremely acid, 7 neutral, and 14 extremely basic. Because it is a logarithmic scale there is a ten fold increase in acidity for a change of one unit of pH, e.g. 5 is 100 times more acid than 7 on the pH scale. The largest variety of freshwater aquatic organisms prefer a pH range between 6.5 to 8.0.

(RDO) Rugged Dissolved Oxygen Concentration (mg/L)

Dissolved oxygen is oxygen gas molecules (O2) present in the water. Plants and animals cannot directly use the oxygen that is part of the water molecule (H2O), instead depending on dissolved oxygen for respiration. Oxygen enters streams from the surrounding air and as a product of photosynthesis from aquatic plants. Consistently high levels of dissolved oxygen are best for a healthy ecosystem.

Levels of dissolved oxygen vary depending on factors including water temperature, time of day, season, depth, altitude, and rate of flow. Water at higher temperatures and altitudes will have less dissolved oxygen. Dissolved oxygen reaches its peak during the day. At night, it decreases as photosynthesis has stopped while oxygen consuming processes such as respiration, oxidation, and respiration continue, until shortly before dawn.

Human factors that affect dissolved oxygen in streams include addition of oxygen consuming organic wastes such as sewage, addition of nutrients, changing the flow of water, raising the water temperature, and the addition of chemicals.

Dissolved oxygen is measured in mg/L.

0-2 mg/L: not enough oxygen to support life.2-4 mg/L: only a few fish and aquatic insects can survive.4-7 mg/L: good for many aquatic animals, low for cold water fish

7-11 mg/L: very good for most stream fish

(ORP) Oxidation- Reduction Potential (mV)

ORP is a measure of the cleanliness of thewater & its ability to break down contaminants". It has a range of -2,000 to + 2,000 and units are in "mV" (millivolts).



APPENDIX 6 - OASYS GMA CALCULATIONS



GMA calcs

Demolition + Excavation ST

Job No.	Sheet No.	Rev.
Drg. Ref.	•	
Made by	Date 14-Aug-2018	Checked

Utility Strain Calculation Options Neglect beneficial contribution of axial strains : No Specific Building Damage Results - Horizontal Displacements Structure: GVA-1 | Sub-structure: GVA-1 Displacements x y Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] [mm] [mm] [mm] Coordinates x y z Dist. 12.149 8.61550 77.39100 100.50000 13.121 8.56458 76.42044 100.50000 13.121 8.56458 76.42044 100.50000 13.121 8.596458 76.42044 100.50000 14.178 8.53912 75.93516 100.50000 14.178 8.53912 75.93516 100.50000 14.178 8.53912 75.944460 100.50000 15.550 8.43728 73.99404 100.50000 15.550 8.43728 73.99404 100.50000 16.522 8.38636 73.02348 100.50000 16.522 8.38636 73.02348 100.50000 17.494 8.33544 72.05292 100.50000 17.494 8.33544 72.05292 100.50000 17.494 8.33544 72.05292 100.50000 18.466 8.28452 71.08236 100.50000 18.466 8.28452 71.08236 100.50000 19.438 8.23360 70.11180 100.50000 19.438 8.23360 70.11180 100.50000 19.438 8.235014 65.62552 100.50000 20.410 8.18268 66.14124 100.50000 20.410 8.18268 66.14124 100.50000 20.895 8.15722 86.65596 100.50000 Structure: GVA-2 | Sub-structure: GVA-2 Displacements Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] [mm] Dist. Coordinates x y z x y Structure: GVA-3 | Sub-structure: GVA-3 | [m] | [m] | [m] | [m] | [mm] Structure: GVA-4 | Sub-structure: GVA-4 Displacements Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] Dist. Coordinates x y z Structure: GVA-5 | Sub-structure: GVA-5 Displacements Horizontal displacement displacement along the perpendicular Line to Line [mm] [mm] [mm] 0.0 0.0 Dist. Coordinates x y z

0.0 0.0 d



GMA calcs

Job No.	Sheet No.	Rev.
Drg. Ref.		
2.g		
Made by	Date 14-Aug-2018	Checked

1 0527 12	x	Coordinate Y	z	x	у	Displacement Horizontal	
1 0527 12		•			•	displacement	displacement perpendicular
1.3337 13.	.77150	64.79325	100.50000	0.0	0.0	0.0	0.0 d
	.74575	64.72187	100.50000	0.0	0.0	0.0	0.0 d
3.4190 15 3.9074 15	72000	64.68619	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
4.3959 16	.20713	64.61481	100.50000	0.0			0.0 d 0.0 d
5.3727 17	.18138	64.54344	100.50000	0.0	0.0	0.0	0.0 d
5.8612 17 6.3496 18	.66850	64.50775 64.47206	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
6.8380 18 7.3265 19	.64275	64.43637	100.50000	0.0	0.0	0.0	0.0 d
7.8149 19	.61700	64.36500	100.50000	0.0	0.0	0.0	
d - Displac	Jement	s include	Imported (iisbie	rcemer	ics.	
Structure:	GVA-6	Sub-st	ructure: GV	√A-6			
Dist.		Coordinate	es			Displacement	s
	x	У	z	x	Y	Horizontal	Horizontal
							displacement perpendicular
[m]	[m]	[m]	[m]	[mm]	[mm]	Line [mm]	to Line
	.61700	64.36500	100.50000	0.0	0.0	0.0	0.0 d
0.98497 19	.54500	63.38267	100.50000	0.0	0.0	0.0	0.0 d
1.9699 19	47300	62.40033	100.50000	0.0	0.0	0.0	0.0 d
2.4624 19.	.43700	61.90917	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
i - Displac	cement	s include	imported o	lispla	cemer	nts.	
Structure:	GVA-7	Sub-st	ructure: GV	/A-7			
Dist.		Coordinate				Displacement	s T/
	x	У	z	x	У	displacement	Horizontal displacement
						along the Line	perpendicular to Line
[m]	[m]	[m]	[m] 100.50000	[mm] 0.0	[mm] 0.0	[mm] 0.0	[mm] 0.0 d
.46449 19	.86425	61.38412	100.50000	0.0	0.0	0.0	0.0 d
1.3935 20	.79075	61.31638	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
1.8579 21	.25400	61.28250	100.50000 100.50000	0.0	0.0	0.0	0.0 d
2.7869 22	.18050	61.21475	100.50000	0.0	0.0	0.0	0.0 d
3.7159 23	.10700	61.14700	100.50000	0.0	0.0	0.0	0.0 d
i - Displac	zement:	s include	imported o	lispla	ıcemer	nts.	
Structure:	8-4VD	Sub-ata	ructure: GV	72 – R			
				,,,			
Dist.	x	Coordinate Y	es z	x	У	Displacement Horizontal	s Horizontal
							displacement perpendicular
						Line	to Line
0.0 23	[m] .10700	[m] 61.14700	[m] 100.50000	[mm] 0.0	0.0	[mm] 0.0	[mm] 0.0 d
.49250 23.	.13267	61.63883	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
1.4775 23	.18400	62.62250	100.50000	0.0	0.0	0.0	0.0 d
2.4625 23	.23533	63.11433 63.60617	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
			100.50000 imported o	0.0 displa	0.0 acemer	0.0 nts.	0.0 d
Structure:	GVA-9	Sub-st	ructure: GV	/A-9			
Dist.	(Coordinate	es			Displacement	
	x	У	z	x	У		Horizontal displacement
						along the Line	perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
.49313 23	.28670	64.59046	100.50000	0.0	0.0		0.0 d
1.4794 23	.31240				0.0	0.0	0.0 d
	33810	65.08292	100.50000	0.0	0.0	0.0	0.0 d
1.9725 23	.33810	65.57538	100.50000	0.0	0.0	0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23	.33810 .36380 .38950 .41520	65.57538 66.06784 66.56030 67.05276	100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.9450 23	.33810 .36380 .38950 .41520 .44090 .46660	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.9450 23 4.4382 23	.33810 .36380 .38950 .41520 .44090 .46660 .49230	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.9450 23 4.4382 23 4.9313 23 5.4244 23	.33810 .36380 .38950 .41520 .44090 .46660 .49230 .51800	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.9450 23 4.4382 23 4.9313 23 5.4244 23 5.9176 23 6.4107 23	.33810 .36380 .38950 .41520 .44090 .46660 .49230 .51800 .54370 .56940	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.49998	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.9450 23 4.4382 23 4.9313 23 5.4244 23 5.9176 23 6.4107 23	.33810 .36380 .38950 .41520 .44090 .46660 .49230 .51800 .54370 .56940	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.49998	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.9450 23 4.4382 23 4.9313 23 5.9176 23 6.9038 23 7.3970 23 7.8901 23	.33810 .36380 .38950 .41520 .44090 .46660 .49230 .51800 .54370 .56940 .59510 .62080 .64650 .67220	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.49998 70.99244 71.48490 71.97736	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.4519 23 4.4382 23 4.9313 23 5.9176 23 6.4107 23 6.9038 23 7.3970 23 7.3970 23 8.3832 23	.33810 .36380 .38950 .41520 .44090 .46660 .49230 .51800 .54370 .56940 .62080 .64650 .67220 .69790 .72360	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.49998 70.99244 71.48490 71.97736 72.46982 72.96228	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.4519 23 4.4382 23 4.9313 23 5.4244 23 5.4244 23 5.9176 23 6.4107 23 6.9138 23 7.3970 23 7.3970 23 7.8901 23 8.8763 23 9.8626 23	.33810 .36380 .38950 .44520 .44660 .49230 .51800 .54370 .56940 .59510 .62080 .64650 .67220 .69790 .72360 .74930	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.49998 70.99244 71.48490 71.97736 72.46982 72.96228 73.45474	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 4.4382 23 4.9313 23 5.4224 23 5.9176 23 6.4107 23 7.3970 23 7.3970 23 7.3970 23 8.8763 23 9.3652 23 9.3656 23 10.356 23	.33810 .36380 .38950 .44520 .44690 .46660 .5930 .554370 .56940 .59510 .62080 .64650 .67220 .69790 .72360 .74930 .77500 .80070 .80070	65.57538 66.06784 66.56030 67.54522 68.03768 69.02260 69.51506 69.51506 69.51506 70.00752 70.49998 70.99244 71.48490 71.97736 72.46982 72.96228 73.45474 74.43966 74.93212	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.4519 23 4.4382 23 4.4382 23 5.9176 23 6.91038 23 7.3970 23 8.3832 23 8.8763 23 9.3695 23 9.3695 23 10.356 23 10.356 23	.33810 .36380 .38950 .41520 .44090 .46660 .49230 .51800 .54370 .56940 .59510 .62080 .64650 .67220 .67720 .77360 .77500 .80070 .82640	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.49998 70.99244 71.48490 72.46982 72.96282 73.45474 73.94720 74.43966 74.43966 74.93212	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1,9725 23 2,9588 23 3,4519 23 3,4519 23 3,4519 23 4,4382 23 4,4382 23 5,4244 23 5,9176 23 6,4107 23 7,8901 23 8,88763 23 9,3695 23 9,3695 23 9,8626 23 10,849 23 11,842 23 11,842 23 11,842 23	.33810 .36380 .38950 .41520 .44660 .49230 .51800 .559510 .62080 .64650 .67220 .69790 .77360 .74930 .77500 .80070 .80070 .82640 .85210 .87780	65.57538 66.06784 66.06784 67.05276 67.05276 68.03768 68.53014 69.02260 69.51506 70.00752 70.49998 70.49998 71.9736 72.46982 72.46982 73.45474 74.93212 74.43966 75.51506 75.51506 76.9244 76.9257 77.9274 77.	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.4657 23 2.9588 23 3.4519 23 3.4519 23 3.4950 23 4.4382 23 4.4382 23 5.4244 23 5.9176 23 6.4107 23 6.4107 23 6.4107 23 6.8301 23 8.8763 23 9.8626 23 10.356 23 10.356 23 11.342 23 11.342 23 11.382 23 12.382 23	.33810 .36380 .38950 .41520 .44660 .49230 .51800 .54370 .56940 .59510 .64650 .67720 .72360 .74930 .77500 .80070 .82640 .8780 .90350 .90350	65.57538 66.06784 66.16784 66.16784 67.05276 68.53014 69.02260 69.51506 70.00752 70.49998 70.99244 71.48490 71.97736 72.46982 72.96228 73.45474 74.93212 75.42458 75.91704 76.90196	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.9588 23 3.9580 23 3.9450 23 4.9313 23 5.9176 23 6.9019 23 7.3970 23 7.3970 23 7.3970 23 7.8901 23 9.8655 23 9.8655 23 9.8655 23 9.8656 23 11.342 23 11.342 23 11.345 23 12.2821 23 13.315 23 13.380 23	.33810 .36380 .38950 .41520 .44690 .446660 .49230 .51800 .54370 .56940 .62080 .64650 .67220 .69790 .72360 .77500 .80070 .82640 .87780	65.57538 66.06784 66.56030 67.05276 68.03768 68.53014 69.02260 67.5452 69.51506 70.00752 70.49998 70.99244 71.48490 71.97736 72.46982 72.96228 73.45474 74.394720 74.43967 75.9174 76.90196 77.39482 77.88688	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.9588 23 3.9588 23 3.9459 23 4.9313 23 5.9176 23 6.9176 23	.33810 .36380 .36380 .41520 .41520 .44690 .46660 .51800 .56940 .59510 .62080 .64650 .67790 .72360 .74930 .77500 .80070 .82640 .87780 .99780 .92920 .95490 .98490 .998060 .00630 .00630	65.57538 66.06794 66.56030 67.05276 67.5426 67.5426 68.03768 68.03768 68.53014 69.51506 69.51506 70.00752 70.00752 70.40	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.4657 23 2.9588 23 3.9588 23 3.9450 23 4.4382 23 5.9176 23 6.4072 23 5.9176 23 6.4107 23 6.4107 23 6.8103 23 7.8901 23 8.8763 23 9.8626 23 10.849 23 11.835 23 12.821 23 13.315 23 12.328 23 13.315 23 12.328 23 13.315 23 13.315 23 13.315 23 14.301 24 14.301 24 15.301 24 16.301 25 16.301 25	.33810 .36380 .36380 .41520 .44090 .46660 .51800 .55510 .62080 .64650 .67220 .69790 .72360 .74930 .77500 .880070 .880070 .82640 .89780 .90350	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.49924 71.48490 72.46582 73.45474 73.94729 74.43966 75.9159 76.9244 77.84682 77.9592 77.95	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1,9725 23, 2,9588 23, 3,9450 23, 4,519, 23, 3,9450 23, 4,9313, 23,56,444 23, 24,9313, 23,56,410,23,64,10,23,64,10,23,64,10,23,64,10,23,10,36,23,10,36,23,11,34,23,11,34,24,24,24,24,24,24,24,24,24,24,24,24,24	33810 36380 36380 341520 444090 46660 49230 51800 555940 62080 64650 647220 67720 774930 77500 880770 82640 85210 85780 90350 90350 90450 90630 00630 00630 005770 008340 10910	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.49924 71.48490 72.46582 73.45474 73.94729 74.43366 75.9572 76.9934 77.9572 77.957	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.9558 23 3.9558 23 3.9550 23 4.9313 23 5.4246 23 6.4107 23	.33810 .33820 .36380 .3	65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 70.00752 70.499244 71.48790 72.46582 72.46582 73.4547 74.43966 75.45682 77.45682 77.45682 77.45682 77.45682 77.45682 77.45682 77.45682 77.45682 77.45682 77.356868 77.35688 77.	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.9588 23 3.9480 23 4.4882 23 3.9480 23 4.4882 23 5.9162 23 5.9162 23 6.4107 23	.33810 .36950 .38950 .41520 .44520 .45620 .51800 .554370 .56940 .5720 .62080 .64550 .67220 .80070 .826400 .826400 .826	65.57538 66.06794 66.56030 67.05276 67.54526 68.53762 68.53762 68.53104 69.51506 70.00752 70.00752 70.40992 72.96228 72.96228 72.46982 72.46982 72.46982 72.46982 72.46982 72.762628 73.45474 73.94720 74.43966 74.93212 75.42458 75.91704 76.40950 76.40950 77.39442	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.9588 23 3.9450 23 4.4857 23 3.9450 23 4.4882 23 5.9160 23 6.4107 23	3.3810 3.6930 3.8950 4.46600 4.46600 4.46600 5.51800 5.54370 5.56940 6.7220 6.7230 8.77490 8.77490 8.77490 9.90350 9.9220 9.9220 9.9350	65.57538 66.06784 66.56030 67.05276 67.5452 68.03768 68.53014 69.02260 69.51506 70.00752 70.40952 70.40952 72.46936 72.46736 72.46736 72.46736 72.46736 72.46736 72.46736 72.46736 72.46736 74.4396 75.42458 75.91704 76.40950 76.40950 77.39442 77.39	100.50000 100.50000		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.4657 23 2.9588 23 3.9450 23 4.4382 23 5.9582 24 5.9582 24 5.9582 25 6.4107 23 6.4107 23	3.3810, 3.6380, 3.6580	65.57538 66.06784 66.56030 67.05276 67.54526 68.53768 68.53014 69.02260 69.51506 70.00752 70.40952 70.40952 72.46982 72.46982 72.46982 72.46982 72.46982 72.46982 72.7628 73.45474 73.94720 74.43962 74.43962 75.42458 75.91704 76.40950 76.90196 77.39442 77.39442 77.39442 78.37934 78.37934 78.37934 79.36662 80.34916 80.3	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1,9725 23 2,9588 23 3,9540 23 4,4382 23 5,916 23 4,9313 23 5,916 23 6,400 23 4,9313 23 5,916 23 6,400 23 8,382 23 8,382 23 8,385 23 9,3695 23 9,3695 23 9,3695 23 9,3695 23 9,3695 23 11,342 23 11,342 23 11,342 23 11,342 23 11,342 23 11,342 23 11,342 23 11,342 23 11,345 23 11,345 23 11,345 24 11,785 24 11,7	3.38810 3.6830 3.88950 4.44090 4.49230 5.54370 6.5220 6.72200 6.72200 6.72200 6.72200 6.72200 6.72200 6.72200 6.72200 6.7	65.57538 66.06794 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.10160 69.10160 69.10160 70.49998 70.99244 71.48490 71.97736 72.46982 72.96228 73.45474 73.94720 74.43966 74.9326 74.9326 77.34547 77.88682 78.87180 79.3626 77.39448 79.3626 79.362	100.50000 100.50000		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1,9725 23 2,9588 23 3,9540 23 4,4382 23 5,916 23 4,9313 23 5,916 23 6,409 23 6,409 23 6,409 23 6,409 23 6,409 23 6,409 23 6,409 23 6,409 23 6,409 23 8,3822 23 8,3822 23 8,3822 23 8,3822 23 8,3852 23 10,366 23 11,342 23 11,342 23 11,345 23 11,345 23 11,345 23 11,345 23 11,345 23 11,345 23 11,346 23 11,347 24 11,787	3.38810 3.6830 3.88950 4.44090 4.49230 5.54370 6.62020 6.67220 6.67220 6.67220 7.75500 8.26400 8.26400 8.2	65.57538 66.06793 67.05276 67.54522 68.03768 68.53014 69.02260 69.102260 69.10160 69.10160 69.10160 69.10160 69.10160 69.10160 69.10160 69.10160 69.10160 69.10160 69.10160 69.10160 69.10160 79.3457 79.3457 79.3457 79.3457 79.3457 88.3410 79.36426 79.36426 79.36426 79.36426 79.36426 79.36426 79.36426 79.36426 79.36426 88.31340	100.50000 100.50000		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.9588 23 3.9588 23 3.9580 23 3.9450 23 4.9313 23 5.6446 23 6.4107 23 6.9018 23 6.4107 23	3.3810 3.6630 3.8850 4.44990 4.44920 5.54370 6.20200 6.20200 6.2	65.57584 66.5630 67.05276 67.54526 68.53014 69.02260 69.51506 70.09274 71.48490 71.97490 71.9	100.50000 100.50000		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.9588 23 3.9588 23 3.9580 23 3.9450 23 4.9313 23 5.6446 23 6.4107 23 6.9018 23 6.4107 23	3.3810 3.6630 3.8850 4.44990 4.44920 5.54370 6.20200 6.20200 6.2	65.57584 66.5630 67.05276 67.54526 68.53014 69.02260 69.51506 70.09274 71.48490 71.97490 71.9	100.50000 100.50000		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1. 9725 23 2. 9588 23 3. 9450 23 4. 4931 33 5. 9176 23 6. 41072 23 5. 9176 23 6. 41072 23 7. 8901 24 7. 8	3.3810 3.6630 3.	65.575.84 66.56030 67.05276 67.54522 68.03768 68.53014 69.02260 69.15106 69	100.50000 100.50000		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1. 9725 23 2. 9588 23 3. 9588 23 3. 9450 23 4. 49812 33 9. 450 23 4. 9313 23 5. 44913 23 6. 4107 23 6. 4107 23 6. 4107 23 6. 4107 23 6. 4107 23 7. 3970 24 7. 39	3.3810 3.4810 3.4850 4.44090 4.46660 4.9230 5.56940 5.56940 6.7220 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.7	65.57538 66.06794 66.56630 67.05276 67.54522 68.03768 68.53014 69.01500 70.01752 70.49998 70.99244 71.4849 71.4849 72.46982 72.96228 73.45474 73.94720 74.43966 77.3942 77.8628 78.37944 77.39442 77.8628 78.37944 77.8628 78.37944 78.37944 78.3794 7	100.50000 100.50000		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.9588 23 3.9580 23 3.9580 23 3.9450 23 4.9313 23 5.6446 23 6.960 23 6.9018 23 6	3.3810 3.4810 3.4850 4.44090 4.46660 4.9230 5.56940 5.56940 6.7220 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.72300 6.7	65.57538 66.06794 66.56630 67.05276 67.54522 68.03768 68.53014 69.01500 70.01752 70.49998 70.99244 71.4849 71.4849 72.46982 72.96228 73.45474 73.94720 74.43966 77.3942 77.8628 78.37944 77.39442 77.8628 78.37944 77.8628 78.37944 78.37944 78.3794 7	100.50000 100.50000		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.4657 23 2.9588 23 3.9450 23 4.4682 23 3.9450 23 4.4822 24 5.9166 23 6.4107 23 8.3832 23 8.3832 23 8.3852 23	3.3810, 3.3810, 3.3850, 3.36380, 3.38950, 3.36380, 3.3895	65.57538 66.06793 67.54524 66.56030 67.05276 67.54522 68.03768 68.53014 69.51506 77.007752 77.007752 77.007752 77.007752 77.00752	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
1.9725 23 2.4657 23 2.9588 23 3.9480 23 4.4382 23 4.9242 23 5.9166 23 6.4107 23	3.3810 3.38190 4.1520 4.1520 4.46660 4.49230 5.54370 6.7250 6.7220 6.725	65.57538 66.06793 67.54524 66.56030 67.05276 67.54522 68.03768 68.53014 69.51506 77.007752 77.007752 77.007752 77.007752 77.00752	100.50000 100.500000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d d 0.0 d



GMA calcs

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

0.47859 0.47859 1.91440 2.3930 2.3930 3.2502 3.2288 4.3073 4.7859 5.2645 5.7431 6.2217 6.7003 7.6579 1.1789 10.500 10.	24.06806 23.59013 23.11219 22.63425 22.159213 23.15921 23.15921 23.15921 23.15921 23.15921 23.15921 24.15921 24.15921 24.15921 25	88.74606 88.77112 88.79619 88.79619 88.821215 88.896431 88.894458 88.896448 88.99659 89.02150 88.99659 89.02175 89.04681 89.07188 89.05868 89.14706 89.14706 89.14706 89.14706 89.14706 89.32250 89.34756 89.42275 89.4275 89.4275 89.4275 89.4275 89.4275 89.4275 89.4275	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 d 0.0 d
Dist.	x	Coordinate y	es z	×	y	Displacement Horizontal displacement	Horizontal displacement
[m]	[m]	[m]	[m]	[mm]		along the Line	perpendicular to Line
0.49454 0.98907 1.4836 1.9781 2.4727 3.96672 3.4617 3.9563 4.4508 4.9454 5.4399 6.9235 7.4180 7.9126	28.56700 29.06094 29.55487 30.04881 30.54275 31.03669 31.53063 32.02456 32.51850 33.01244 33.50637 34.00031 34.49425 34.98819 35.48212 35.97606 36.47000	64.13431 64.15863 64.18294 64.20725 64.23156 64.25588 64.28019 64.30450 64.32881 64.37744 64.40175 64.42606 64.45037 64.47469 64.47469	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d
Structur	e: GE-2	Sub-str	ucture: GE-	-2			
Dist.	x	Coordinate y	es z	x	у	Displacement Horizontal	Horizontal
	x	У	z			Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m] 0.0 0.49291 1.4787 1.9716 2.4645 2.9574 3.4503 3.9432 4.4361 4.9291 5.9149 6.4078 6.9007 7.3936 8.3794 8.8722 9.3652 9.3652 9.8581 10.351 11.351 11.351 11.351 12.323 12.323 12.323 12.323 12.323 13.301 14.301 15.301 16.301 17.301	[m] 36.47000 36.44014 36.41019 36.35057 36.32071 36.32071 36.32071 36.29086 36.26100 36.0214 36.20129 36.17114 36.08186 36.17114 36.08200 36.02214 36.102214	Y [m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.94300 68.92700 69.91100 70.49300 71.38700 72.37100 72.86300 77.335500 73.35500 74.832000 75.32000 77.29100 77.78300 77.78300 77.78300 77.78300 77.78300 78.27500	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement along the Line [mm]	Norizontal Morizontal Mor
[m] 0.0 0.49291 1.4787 1.9716 2.4645 2.9574 3.4503 3.9432 4.4361 4.9291 5.9149 6.4078 6.9007 7.3936 8.3794 8.8722 9.3652 9.3652 9.8581 10.351 11.351 11.351 11.351 12.323 12.323 12.323 12.323 12.323 13.301 14.301 15.301 16.301 17.301	[m] 36. 47000 36. 44014 36. 41029 36. 38043 36. 35057 36. 32071 36. 32071 36. 29086 36. 26100 36. 0214 36. 20129 36. 17114 36. 08186 36. 17143 36. 11171 36. 08186 37. 08200 36. 02214 37. 08186 37. 08200 37. 08186 37. 08200 38. 08200 38. 08200 38. 08200 38. 98209 38.	Y [m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.94300 68.92700 69.91100 70.49300 71.38700 72.37100 72.86300 77.335500 73.35500 74.832000 75.32000 77.29100 77.78300 77.78300 77.78300 77.78300 77.78300 78.27500	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Rorizontal Gorizontal Gorizontal Gisplacement Gisplacement Gisplacement Gisplacement Gisplacement Gisplacement Gisplacement Gisplacement Gorizontal Gisplacement Gorizontal Gisplacement Gisplacement Gisplacement Gisplacement Gorizontal Gisplacement Gisplacement Gisplacement Gisplacement Gorizontal Gisplacement Gorizontal Gisplacement Gispl	Norizontal Nor
[m] 0.0 0.49291 1.4787 1.9716 2.4645 2.9574 3.4503 3.9433 4.3611 5.4929 6.907 7.9936 6.907 7.9936 6.8794 8.8723 9.3652 9.8581 10.844 11.8303 11.8303 11.8303 12.308 13.801 13.801 13.801 13.801 13.801	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.32071 36.29086 36.23114 36.20129 36.23114 36.20129 36.23114 36.20129 36.14157 36.11171 36.87286 36.02214 35.99229 35.76327 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300 35.84300	y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.92700 68.92700 68.43500 70.4300 70.4300 71.38700 71.38700 72.37100 72.37100 73.35500 74.33900 74.33900 74.33900 75.32300 77.78300 77.78300 8 include	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Along the Line [mm] 0.0 0.	Horizontal displacement Horizontal displ
[m] 0.0 0.49291 0.9581 1.4787 1.9716 2.4645 2.9573 3.4932 4.4961 5.4220 5.9149 6.4078 6.9007 7.3936 6.9007 7.3936 6.8729 9.3652 9.3652 10.351 1.330 12.323 12.816 13.308 13.308 13.308 14.309 Structur Dist. [m] 0.0 0.47806	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.20129 36.17143 36.20129 36.17143 36.20124 36.90229 36.17143 36.90229 36.14157 36.14157 36.14157 36.14157 36.14157 36.63636 36.884300 35.84300 35.85363636 35.87346 35.75343 35.75343 35.75343	Y [m] 64.49900 64.99100 65.97500 66.95900 66.95900 66.95900 66.95900 67.45100	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gisplacement Horizontal Gisplacement Horizontal	Horizontal displacement
[m] 0.0 0.49291 1.4787 1.9716 2.4645 2.9574 3.4503 3.9432 4.4361 4.9291 5.4229 5.9149 6.6079 7.8865 8.2794 8.8723 9.3652 9.8581 10.844 11.830 12.323 12.816 13.308 13.801 d - Disp Structur Dist. [m] 0.0 0.47806 0.95613 1.4342 1.9123	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.29086 36.26100 36.21117 36.02214 36.20129 36.11171 36.08216 36.21171 36.08216 36.20313 36.11713 36.02214 35.96243 35.96243 35.96243 35.96243 35.96243	y [m] 64.49900 64.99100 65.48300 65.97500 66.548300 67.94300 68.92700 66.95900 67.94300 68.92700 69.91100 771.88700 72.37100 72.37100 72.37500 73.35500 74.33900 74.33900 77.79300 77.78300 77.78300 [m] Sub-str Coordinate y 18.27500 78.275	[m] 100.50000	[mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	[mm1] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Horizontal Horizontal Horizontal Line [mm]	Norizontal displacement Norizontal displ
[m] 0.0 0.49291 1.4787 1.9716 2.4645 3.4502 3.9432 4.3291 5.2957 6.9007 7.3936 7.8865 8.3794 8.8723 9.3652 9.8581 10.351	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.32071 36.62908 36.23114 36.02129 36.6360 36.14157 36.11171 36.67200 37.78237 36.1314 37.99229 37.9627 37.9627 37.9627 37.9627 37.9627 37.9627 38.84300 38.8430	y [m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.94300 66.95910 07.49300 07.49300 07.49300 07.39500 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.78300	[m] 100.50000	[mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Hor	Norizontal displacement Norizontal Norizontal displacement Norizontal displacement Norizontal displacement Norizontal Norizontal displacement Norizontal Nor
[m] 0.0 0.49291 1.4787 1.9716 2.4645 3.4502 3.9432 4.3291 5.9149 6.4078 6.9007 7.3936 6.907 7.3936 7.8865 8.3794 8.8723 9.3652 9.8581 10.351 1	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.32071 36.62908 36.23014 36.02124 36.02124 36.03124 37.03124	y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 66.95910 07.94300 66.991100 07.40300 07.43900 07.335500 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38700 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.38900 07.78300	[m] 100.50000	[mm1] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Along the Line [mm] 0.0 0.	Horizontal displacement Horizontal displ
[m] 0.0 0.49291 1.4787 1.9716 2.4645 2.9573 3.4932 4.43291 5.9149 6.4078 6.9007 7.3936 6.9007 7.3936 6.9007 7.3936 6.901 1.337 11.338 12.8166 13.308 13.3464 13.3464 13.3464 13.3464 13.3464 13.3466	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.20129 36.17143 36.20129 36.17143 36.20129 36.17143 36.20129 36.17143 36.08186 36.02214 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.96243 35.75343	y [m] 64.49900 64.99100 65.97500 66.5.48300 65.97500 66.95900 67.45100 70.40300 70.40300 70.40300 72.37100 72.37100 72.37100 72.37100 72.37100 72.37100 73.35500 77.29100 8 include [sub-strict of the control of the co	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Gisplaceme	Horizontal Graphacement Horizontal Horizonta
[m] 0.0 0.49291 1.4787 1.9716 2.4645 2.9573 3.4323 4.4321 5.4220 5.9149 6.4078 6.9007 7.3936 6.9007 7.3936 6.9007 7.3936 6.9007 7.3936 6.9007 7.3936 6.9007 7.3936 6.9007 7.3936 6.9007 7.3936 6.9007 7.3936 6.9007 8.8722 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.3652 9.36684 1.3308 1.33464 1.322 1.9123 2.3903 2.8684 3.32466 4.3266 6.22887 5.7368 6.2148 6.6929	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.20129 36.17143 36.20129 36.17143 36.20129 36.17143 36.20129 36.14157 36.11171 36.63636 36.02214 35.96223 35.96223 35.96233 35.96233 35.96233 35.96233 35.96233 35.96233 35.96233 35.96233 35.75343	Y [m] 64.49900 64.99100 65.97500 66.955900 66.959100 66.959100 67.48100 67	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Gisplaceme	Norizontal displacement Norizontal displ
[m] 0.0 0.49291 1.4787 1.9716 2.4645 2.9573 3.4502 4.43291 5.9149 6.4078 6.9007 7.3936 6.907 7.3936 6.907 1.337 1.	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.32071 36.23071 36.23071 36.23071 36.23071 36.23071 36.23071 36.23071 36.32071	y [m] 64.49900 64.99100 65.97500 66.95900 67.94300 66.95900 67.94300 67.94300 67.94300 67.94300 67.94300 67.94300 67.94300 67.9500	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Gisplaceme	Horizontal displacement Horizontal displ
[m] 0.0 0.49291 1.4787 1.9716 2.4645 2.9574 3.4503 3.9432 4.4361 4.9291 5.4220 6.4077 7.1936 6.7.8865 8.3794 8.8723 9.8652 9.8581 10.844 11.830 12.323 12.816 13.3003 13.801a d - Disp [m] 0.0 0.47806 0.47806 0.95613 1.4342 1.9123 2.3903 2.38464 3.3464 3.3464 3.32464 3.3266 6.2297 7.7710 7.6490 d - Disp	[m] 36.47000 36.44014 36.41029 36.38043 36.35057 36.32071 36.32071 36.32071 36.29086 36.26100 36.23114 36.02121 36.18136 36.18136 36.18136 36.18218 35.96243 35.96243 35.96243 35.96243 35.96273 35.663860 35.78329 35.75343 35.78329 35.75343 35.78329 36.78329 36.78329 37.7835 36.663860 36.62214 37.7836 37.7837 37.7836 38.78329	y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.92700 66.95900 67.94300 68.92700 69.91100 77.4300 71.38700 71.38700 72.37100 72.37100 72.37100 72.37100 72.37100 72.37100 73.35500 74.33900 74.33900 74.33900 74.32300 77.29100 77.29100 77.29100 77.29100 77.281500 78.27500 8 include [m] 78.27500 78.24666 78.21713 78.18819 78.15925 78.13031 78.15925 78.13031 78.16987 77.98562 77.98562 77.98562 77.98562 77.985697 77.98879 77.88100 8 include	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Gisplaceme	Horizontal displacement Horizontal displ



GMA calcs

Demolition + Excavation ST

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

						along the	displacement perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	27.99900	77.81200	100.50000	0.0	0.0	0.0	0.0	
0.48978			100.50000	0.0	0.0	0.0	0.0	
0.97955	28.03957		100.50000	0.0	0.0	0.0	0.0	
	28.05986		100.50000	0.0	0.0	0.0	0.0	
	28.08014		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
2.9387			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	28.16129		100.50000	0.0	0.0	0.0	0.0	
	28.18157		100.50000	0.0	0.0	0.0	0.0	
4.8978			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
8.8160	28.36414	69.00357	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
10.285	28.42500	67.53550	100.50000	0.0	0.0	0.0	0.0	d
10.775			100.50000	0.0	0.0	0.0	0.0	d
11.265	28.46557	66.55679	100.50000	0.0	0.0	0.0	0.0	d
11.755	28.48586	66.06743	100.50000	0.0	0.0	0.0	0.0	d
12.244	28.50614	65.57807	100.50000	0.0	0.0	0.0	0.0	d
12.734	28.52643	65.08871	100.50000	0.0	0.0	0.0	0.0	d
13.224	28.54671	64.59936	100.50000	0.0	0.0	0.0	0.0	d
13.714	28.56700	64.11000	100.50000	0.0	0.0	0.0	0.0	d
d - Disp	placements	s include	imported o	displa	cemer	nts.		

Structure: DH-1 | Sub-structure: DH-1

Structur	re: DH-1	Sub-stru	ucture: DH-	-1				
Dist.		Coordinate	es			Displacement	ts	
	x	У	z	x	У	Horizontal	Horizontal	
		-			-		displacement	
						along the	perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	[mm]	f mm 1	ſmm1	ſmm1	
0.0	44.60300	87.23400	100.50000	0.0	0.0	0.0	0.0	d
0.48563	44.63204	86.74924	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	d
8.7413	45.12578	78.50830	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
9.7126	45.18387	77.53878	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
16.997	45.61952	70.26737	100.50000	0.0	0.0	0.0	0.0	d
17.483	45.64857	69.78261	100.50000	0.0	0.0	0.0	0.0	d
17.968	45.67761	69.29785	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			imported o				0.0	u
a - bisi	pracement	- INCIUDE	ruborred (TTRPI	acemer	ico.		

Structure: DH-2 | Sub-structure: DH-2

Dist.	,	Coordinate				Displacement		
Dist.	×	y y	es z	x	У	Horizontal	Horizontal	
	_	,	_	^	y		displacement	
						along the	perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	f mm 1	[mm]	ſmm1	ſmm1	
0.0	45.93900	64.93500	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
11.329	57.23930	65.74111	100.50000	0.0	0.0	0.0	0.0	d
11.822	57.73062	65.77615	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
16.255 16.747 17.240 17.732	62.15247 62.64379 63.13511 63.62642	66.09159 66.12663 66.16168 66.19673	100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	d d d



GMA calcs

Job No.	Sheet No.	Rev.
Drg. Ref.	•	
Made by	Date 14-Aug-2018	Checked

Dist.	×	Coordinate Y	es z	x	У	Displacement Horizontal	Horizontal
						displacement	displacement
18.718	64.60906	66.26683	100.50000	0.0	0.0	0.0	perpendicular 0.0 d
19.210	65.10038 65.59169	66.30187 66.33692	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
20.195	66.08301	66.37197	100.50000	0.0	0.0	0.0	0.0 d
20.688	66.57433	66.40702 66.44207	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
21.673	67.55696	66.47712	100.50000	0.0	0.0	0.0	0.0 d
22 658	68 53960	66 54721	100 50000	0 0	0 0	0.0	0 0 d
23.151	69.03091 69.52223	66.58226 66.61731	100.50000	0.0		0.0	0.0 d 0.0 d
24.136 24.628	70.01355 70.50487	66.65236 66.68740	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
25 121	70 99618	66 72245	100 50000	0 0	0.0	0.0	0.0 d
25.613	71.48750 71.97882	66.75750	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
26.599	72.47013	66.82760	100.50000	0.0	0.0	0.0	0.0 d
27.584	73.45277	66.89769	100.50000	0.0	0.0	0.0	0.0 d
28.076	73.94409	66.93274	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
29.061 29.554	74.92672 75.41804	67.00284	100.50000	0.0	0.0		0.0 d 0.0 d
30.047	75.90936	67.07293	100.50000	0.0	0.0	0.0	0.0 d
30.539	76.40067 76.89199	67.10798 67.14303	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
31.524	77.38331	67.17808	100.50000 100.50000	0.0	0.0	0.0	0.0 d
32.509	78.36594	67.24817	100.50000	0.0	0 0	0.0	0 0 d
33.002 33.494	78.85726 79.34858	67.28322 67.31827	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
33.987	79.83989	67.35332	100.50000	0.0	0.0	0.0	0.0 d
34.480 34.972	80.33121 80.82253	67.42341	100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d
35.465 35.957	81.31385 81.80516	67.45846 67.49351	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
36.450	82.29648	67.52856	100.50000	0.0	0.0	0.0	0.0 d
37 435	83 27912	67 59865	100.50000 100.50000	0 0	0.0	0.0	0.0 d 0.0 d
37.928 38.420	83.77043 84.26175	67.63370 67.66875	100.50000	0.0		0.0	0.0 d 0.0 d
38.913	84.75307	67.70380	100.50000	0.0	0.0	0.0	0.0 d
39.405	85.24438	67.77389	100.50000 100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d
40.390	86.22702 86.71834	67.80894 67.84399	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
41.376	87.20965	67.87904	100.50000	0.0	0.0	0.0	0.0 d
42.361	88.19229	67.94913	100.50000	0.0	0.0	0.0	0.0 d
42.853	88.68361 89.17492	67.98418 68.01923	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
43.838	89.66624	68.05428	100.50000		0.0		0.0 d
44.823	90.15756	68.12438	100.50000 100.50000	0.0	0.0	0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
45.316	91.14019	68.15942	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
46.301	92.12283	68.22952	100.50000	0.0	0.0	0.0	0.0 d
47.286	93.10546	68.29962	100.50000	0 0	0 0	0.0	0.0 d
47.779 48.271	93.59678	68.33466 68.36971	100.50000		0.0		0.0 d 0.0 d
48.764	94.57941	68.40476	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
49.749	95.56205	68.47486	100.50000 100.50000	0.0	0.0	0.0	0.0 d
50.242 50.734	96.05337	68.50990 68.54495	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
51.227	97.03600	68.58000	100.50000 imported o	0.0	0.0	0.0	0.0 d
u - Disp		o morade	Imported t				
			ucture: DH-				
Structur	re: DH-3	Sub-str	ucture: DH-				-a
	re: DH-3		ucture: DH-	-3	у	Displacement Horizontal	Horizontal
Structur	e: DH-3	Sub-str	ucture: DH-	-3		Displacement Horizontal displacement	Horizontal displacement
Structur Dist.	re: DH-3	Sub-stra Coordinate Y	ucture: DH- es z	-3 x	У	Displacement Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
Structur Dist. [m] 0.0	m [m]	Sub-stru Coordinate y [m] 68.58000	[m] 100.50000	-3 x [mm]	Υ [mm]	Displacement Horizontal displacement along the Line	Horizontal displacement perpendicular to Line [mm]
Structur Dist. [m] 0.0 0.48909 0.97817	m] 97.03600 96.99859	[m] 68.58000 69.06765 69.55530	[m] 100.50000 100.50000 100.50000	-3 x [mm] 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0 d
Structur Dist. [m] 0.0 0.48909 0.97817	m] 97.03600 96.99859	[m] 68.58000 69.06765 69.55530	[m] 100.50000 100.50000 100.50000	-3 x [mm] 0.0 0.0 0.0 0.0	[mm] 0.0 0.0 0.0	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d
[m] 0.0 0.48909 0.97817 1.4673 1.9563 2.4454	[m] 97.03600 96.99859 96.96117 96.92376 96.88635 96.84893	[m] 68.58000 69.06765 69.55530 70.04296 70.53061 71.01826	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	-3 [mm] 0.0 0.0 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Displacement Horrizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm] 0.0 d
[m] 0.0 0.48909 0.97817 1.4673 1.9563 2.4454 2.9345 3.4236	[m] 97.03600 96.99859 96.96117 96.92376 96.88635 96.84893 96.81152 96.77411	[m] 68.58000 69.06765 69.55530 70.04296 70.53061 71.01826 71.50591 71.99357	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	-3 [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	[mm] 0.0 0.0 0.0 0.0 0.0 0.0	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm] 0.0 d d 0.0 d
[m] 0.0 0.48909 0.97817 1.4673 1.9563 2.4454 2.9345 3.4236	[m] 97.03600 96.99859 96.96117 96.92376 96.88635 96.84893 96.81152 96.77411	[m] 68.58000 69.06765 69.55530 70.04296 70.53061 71.01826 71.50591 71.99357	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	-3 [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm] 0.0 d d 0.0 d
Structur Dist. [m] 0.0 0.48909 0.97817 1.4673 1.9563 2.4454 2.9345 3.4236 3.9127 4.4018 4.8909	[m] 97.03600 96.99859 96.96177 96.92376 96.84893 96.81152 96.77411 96.73670 96.6928 96.66187	[m] 68.58000 69.06765 69.55530 70.04296 71.50591 71.01826 71.799357 72.48122 72.96887 73.45652	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	-3 [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d
Structur Dist. [m] 0.0 0.48909 0.97817 1.9653 2.4454 2.9345 3.4263 3.9127 4.4018 4.8309 5.3799 5.8690	m] 97.03600 96.99859 96.96117 96.88635 96.8152 96.73670 96.6928 96.66187	[m] 68.58000 69.06765 69.5530 70.04296 70.53061 71.50591 71.01826 71.50591 72.96887 72.48122 72.96887 73.45652 73.94417 74.43183	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	-3 x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d
Dist. [m] 0.0 0.48899 0.97817 1.4673 1.9563 2.4454 2.9345 3.9227 4.4018 4.8099 5.3799 5.8690 6.3581	[m] 97.0360 98.99859 96.99276 96.81852 96.77411 96.73670 96.6928 96.66187 96.68687 96.68687 96.68768 96.6876 96.58968 96.58968	[m] 68.58000 69.06765 69.55530 70.04296 71.50591 71.01826 71.79357 72.48122 72.96887 73.45652 73.94417 74.43183	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	-3 x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d
Dist. [m] 0.0 0.48909 0.97817 1.4673 1.9563 2.4454 2.9345 3.4236 3.9127 4.4018 4.8909 5.3799 5.8690 6.3581 6.8472 7.3363	e: DH-3 x [m] 97.03600 96.99859 96.96117 96.92376 96.88635 96.84893 96.68152 96.77411 96.73670 96.69248 96.66187 96.69248 96.654963 96.54963 96.54963	[m] 68.58000 69.06765 69.55530 70.04296 70.53061 71.01826 71.50591 71.99357 72.48122 73.45552 73.45552 74.43183 75.40713 75.89478	Iml 100.55000 100.55000 100.55000 100.55000 100.55000 100.5000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.00.00 0.00 0.00 0.00 0.00 0.00 0.0	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
Dist. [m] 0.0 0.48809 0.97817 1.4673 1.9563 2.4454 2.9345 3.4236 3.9127 4.4018 4.8909 5.8799 5.8690 6.3581 6.8472 7.3363 7.8254 8.3144	[m] 97.03600 96.99859 96.96117 96.92376 96.88635 96.84893 96.66187 96.73670 96.69928 96.67441 96.5993 96.6547 96.54963	[m] 68.580.00 69.0676.9.05530 70.04296 70.53061 71.01826 71.50591 71.99357 72.48122 73.45652 73.394417 74.43183 75.40713 75.89478 76.38243 76.38243	Iml 100.550000 100.550000 100.550000 100.550000 100.550000 100.50000	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
[m] 0.0 0.48909 0.97817 1.9563 2.4454 2.9345 3.4236 3.9127 4.4018 4.8909 5.8690 6.3881 6.33144 8.83144 8.83144 8.83144	[m] 97.03600 96.99859 96.96117 96.92376 96.88635 96.884893 96.8152 96.77411 96.62446 96.58904 96.58904 96.58904 96.58904	[m] 68.58000 69.06765 69.55530 70.04296 71.50591 71.99357 72.48122 72.96887 73.45652 73.94417 74.43183 75.89478 76.87099 77.35774	[m] [m] 1 100.50000 100.5000 100.50000 100.5000 100.5000 100.5000 100.5000 100.5000 100.5000 100.5000 100.	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [nmm] 0.0 d 0.
[m] 0.0 0.48909 0.97817 1.9563 2.4454 4.2 9.345 4.2 9.345 6.3 9.2 9.2 6.8 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2	re: DH-3 x [m] 97.03600 96.99859 96.96117 96.92376 96.8152 96.73670 96.6928 96.73670 96.6928 96.73670 96.6922 96.47480 96.58704 96.58704 96.58704 96.5963627 96.32515	[m] 68.58000 68.58000 68.58000 67.0.04296 70.5530 71.01826 71.50591 77.4.43183 74.91948 74.43183 76.87009 77.35774 77.84539 78.33304 77.84539 78.33304 77.84539 78.33304 77.8573	[m] [m] 1 [m	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [nmm] 0.0 d 0.
Structur pist. [m] 0.0 0.48909 0.97817 1.4673 1.9563 2.4454 2.9345 3.4236 3.9127 4.4018 4.8309 5.8690 6.3389 6.3383 7.8254 8.3144 8.3144 8.3149 9.7817 10.771	[m] 97.0360 98.59 96.92176 96.8493 96.8415 96.69217 96.5870 96.59216 96.6870 96.6870 96.69216	[m] 68.5800; 69.06765 69.55530 70.04296 70.53061 71.01826 71.50591 72.48122 73.45652 73.49417 74.43183 75.89478 75.89478 76.8743 76.8749 77.84539 77.87493 78.82070 77.88539	[m] 100.50000	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
Structur pist. [m] 0.0 0.48909 0.97817 1.4673 1.9563 2.4454 2.9345 3.4236 3.9127 4.4018 4.8309 5.8690 6.3389 6.3383 7.8254 8.3144 8.3144 8.3149 9.7817 10.771	[m] 97.0360 98.59 96.92176 96.8493 96.8415 96.69217 96.5870 96.59216 96.6870 96.6870 96.69216	[m] 68.5800; 69.06765 69.55530 70.04296 70.53061 71.01826 71.50591 72.48122 73.45652 73.49417 74.43183 75.89478 75.89478 76.8743 76.8749 77.84539 77.87493 78.82070 77.88539	m	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
[m] 0.0 0.48809 0.97817 12.88809 12.227 10.271 10.2	x [m] 97.03600 96.99859 99.996.92376 96.92876 96.81196 96.8196.73670 96.69928 96.7376 96.58704 96.558704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.32516 96.32516 96.32516 96.32516	[m] 68.58000 69.06765 69.5530 79.04289 71.5059	[m] [0] [0] [0] [0] [0] [0] [0] [0] [0] [0	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
[m] 0.0.0.48809 0.97817 1.9882.29454 2.9454 2.9454 2.9454 2.9454 2.9454 2.9454 8.3912 7.3363 7.8254 8.3014 8.3014 9.2921 1.728 9.2921 1	m] [m] 96.99859 96.96117 96.99859 96.96276 96.81152 96.79670 96.6928 96.7817 96.62446 96.58704 96.58704 96.5829 96.3928 96.3928 96.3928 96.3928 96.3928	[m] 68,58000 69,06765 69,55530 70,04296 77,501826 77,501826 77,501826 77,501826 77,501826 77,501826 77,34565 73,45652 73,94417 74,43183 74,91948 75,40713 75,89478 76,87009 77,35774 78,84339 77,35774 78,84339 77,35774 78,84339 77,35774 78,33308 81,25596 81,74661	[m] 100.50000	x [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
[m] 0. 0. 48809 0.97817 1.4673 1.98644 2.2436 2.2436 6.3811 6.8472 7.3363 7.8254 8.31344 8.3035 9.2926 9.7817 1.738 11.73	re: DH-3 x [m] 96.99859 96.96117 96.89859 96.866127 96.8662928 96.77411 96.62446 96.58704 96.58704 96.5829 96.3625 96.43739 96.3928 96.3625 96.43739 96.3625 96.43739	[m] 69.06765 69.55530 70.04296 77.53066 77.53066 77.53066 77.53066 77.5306 77.5306 77.5306 77.5306 77.5306 77.5306 77.5306 77.5307 77.443183 74.91948 75.40713 75.89478 76.38243 76.87009 77.35774 77.84539 77.35774 77.84539 77.35774 77.8573 80.77130 80.28365 80.77130 81.25896 81.74661 82.23426	[m] 100.50000	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
Structur Dist. [m] 0.00 0.48099 0.97817 1.9673 2.4454 2.9345 3.4236 3.9127 4.4018 4.8018 6.8017 7.3563 7.362 7.362 9.7917 10.271 10.760 11.738 11.738 11.738 11.738 11.738 11.738	x [m] 97.93600 96.9617 96.96217 96.86152 96.7411 96.73670 96.66187 96.73670 96.66187 96.73670 96.66187 96.66187 96.66187 96.66187 96.66187 96.66187 96.66187 96.66187 96.66187 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.6787 96.3951 96.2503	Sub-str Coordinate y [m] 68.58000 69.057530 70.04296 70.53061 71.10937 71.50991 71.99357 72.48122 72.96887 73.45652 73.45652 73.45687 74.43188 75.89478 76.87009 77.35774 77.85539 78.82070 79.30835 79.79600 80.78366 80.783	Interest DH-	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement Line [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Horizontal displacement perpendicular to Line [mm]
Structur Dist. [m] 0.00 0.48909 0.4873 1.9653 1.9653 1.9653 1.9653 3.9127 4.4018 4.8018 4.8018 6.8373 7.3264 8.8035 9.7817 10.271 10.760 11.249 11.738 11.738 11.738 11.738 11.738 11.738	x [m] 97.03600 99.819 97.03600 99.819 97.03600 99.819 97.03600 99.819 99.819 96.88635 96.84693 96.73670 96.66187 96.56246 96.58704 96.5526 96.47850 96.47850 96.47850 96.51226 96.47850 96.51226 96.47850 96.51226 96.47850 96.17850	[m] 68.58000 69.0674E, 70.53061 71.01826 71.50591 71.99357 72.48122 72.96887 74.91948 74.93194 74.93194 76.8309 77.3574 77.8574 77.8574 78.8207 79.30835 79.99630 80.28365 80.27339 81.25896 81.74661 82.22291 83.69722	March Marc	mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
Structur Dist. [m] 0.00 0.489099 0.3817 1.9653 1.9653 2.9454 2.9454 3.4236 3.9127 4.4018 4.8018 6.8373 7.3254 8.8035 9.7817 10.271 10.760 11.249 11.738 11.738 11.738 11.738 11.738 11.738 11.738 11.738	x [m] 97.03600 99.839 9	[m] 68.58000 69.0674E, 70.53061 71.01826 71.50591 71.99357 72.48122 72.96887 74.91948 74.93194 74.93194 76.88243 74.93194 78.8237 78.96887 79.96887 79.96887 78.38243 74.93188 82.27291 83.3304 88.8207 97.35574 79.36887 83.3304 88.8207 97.35574 88.8207 97.35574 88.8207 97.35574 88.8207 97.35578 88.8207 97.35578 88.8207 97.35578 88.8207 97.35578 88.8207 97.35578 88.8207 97.355896 88.320957 88.320957 88.320957 88.320957 88.320957 88.320957 88.320957 88.320957 88.320957 88.320957 88.320957 88.320957	teture: DH- 28 2 [m] 100.50000	x [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Y [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Displacement Horizontal displacement along the Line [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
Structur pist. [m] 0.00 0.48809 0.97817 1.4673 1.9563 2.4454 2.9326 3.4327 4.4018 4.8018 6.8472 7.3363 7.8254 8.3144 8.8035 9.2926 9.7817 10.271 10.760 11.249 11.738 12.226 11.249 11.3694 14.183 14.673 15.162 15.651 16.140 16.629 17.118	re: DH-3 x [m] 96.99859 96.96117 96.89859 96.91617 96.88635 96.91216 96.73670 96.6928 96.73670 96.6928 96.73670 96.65870 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.96870 96.36257 96.36257 96.36257 96.36257 96.36257 96.36257 96.36257 96.38878 96.98843 96.98843 96.98843 96.98843 96.98843 96.98843 96.98843 96.98843 96.98843 96.98843	[m] 68,06765 69,55530 70.04296 70.53061 71.50826 71.508397 71.99357 71.99357 73.45652 73.94417 74.43183 74.91948 75.40713 75.89478 76.38243 76.87009 77.35774 77.84539 79.79600 88.27299 80.77130 81.27394 81.27394 81.27394 82.27291 83.20957 83.369722 84.18487 84.67252 85.64783	[m] 100.50000	[mm] 0.0	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
[m] 0.0 0.48909 0.97817 1.4673 1.9563 2.4454 4.8018 4.8019 6.3799 6.3891 6.8472 7.3363 7.8254 8.3144 8.8035 9.2926 9.7817 10.271 10.760 11.249 11.738 12.227 12.716 6.529 11.738 12.227 11.5651 16.5651 11.5651 16.5651 11.5651 16.5651 11.5651 16.5651 11.5651 16.5651 17.118 17.607 18.096	re: DH-3 x [m] 96.99859 96.96117 96.88835 96.81152 96.77411 96.78928 96.79417 96.62464 96.54963 96.62179 96.6247 96.62596 96.62696	[m] 6.58000 6.9.06765 6.9.55530 70.04296 70.53061 71.50891 71.50891 71.99352 73.9417 74.94318 75.89478 76.38243 76.87009 77.35774 77.84539 77.35778 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.77730 81.2588 80.777330 81.2588 80.777330 81.2588 80.3888 80.3888 80.3888 80.3888 80.3888 80.3888 80.3888 80.38888 80.38888 80.38888 80.38888 80.388888 80.38888888888	[m]	x [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
[m] 0.0.48909 0.97817 1.4673 1.9563 2.4454 4.8018 4.8019 6.3891 6.8472 7.3363 7.8254 8.3144 8.8035 9.2926 9.7817 10.760 11.249 11.0760 11.249 11.03.204 11.1	re: DH-3 x [m] 96.99859 96.96117 96.88835 96.81152 96.77411 96.78928 96.79417 96.62464 96.54963 96.62179 96.6247 96.62596 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62696 96.62697 96.32515	[m] 69,06765 69,55530 70,04296 70,53061 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,50891 71,35714 71,84539 71,3574 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714 71,84539 71,35714	[m]	x [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
Structur Dist. [m] 0.048809 0.978173 1.2454 2.9445 2.945 2.	m] 96.99859 96.962176 97.03600 96.99859 96.962176 96.81152 96.81152 96.73670 96.6928 96.66187 96.652446 96.58704	[m] 68.58000 69.06765 69.05765 69.05530 70.04289 71.1826 71.1826 71.1826 71.3826 71.3.45652 73.94417 74.43183 74.91948 75.40713 75.89478 76.38243 76.87009 77.30835 76.87009 80.28365 80.77130 80.28365 80.77130 81.25896 81.44618 82.23426 82.72191 83.20957 88.3207	[m] [100.50000 100.50000	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
[m] 0.0.48809 0.978173 1.9838 1.4673 1.8694 1.4188 1.4286	m] [m] 96.99859 96.96117 96.99859 96.96117 96.69889 96.81989 96.73670 96.6928 96.73670 96.6928 96.38259 96.73670 96.6928 96.38259 96.58259	[m] 69.06765 69.55530 70.04296 71.103936 71.103936 71.103937 71.99357 72.48122 72.96887 73.45652 73.94417 74.43183 74.91948 75.40713 75.89478 76.38243 76.87009 77.35774 83.30948 77.35774 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.30957 83.70957 83.30957 83.70958 83.70958 85.70968 87.59843 88.666788 87.59843 88.66788 87.59843 88.08609 88.57374	[m] [m] 100.50000	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
[m] 0.0.48809 0.97817 1.9886 4.8019 5.8690 6.3881 6.8472 7.3363 7.8254 8.3014 4.8019 1.738 1.456 1.276	re: DH-3 x [m] 96.99859 96.96117 96.99859 96.9816939 96.981989 96.98199 96.98199 96.73670 96.6928 96.73670 96.6928 96.73670 96.6928 96.73670 96.6928 96.38251 96.38251 96.51222 96.43739 96.38251 96.51232 96.43739 96.38251 96.51232 96.96180 96.18809 96.38808 96.36257 96.36269 96.18809 96.18959 96.58959 96.58959 96.58959 96.58959 96.58959 96.58959	[m] 68,58000 69,06765 69,55530 77,53096 77,53096 77,53096 77,53096 71,99357 71,99357 72,48122 72,96887 73,45652 73,94417 74,43183 74,91948 75,40713 75,89478 76,87009 77,35774 78,84539 77,35774 78,84539 77,35774 78,84539 79,91035	[m] 100.50000	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
Structur Dist. [m] 0.00 0.48999 0.97817 1.4673 1.4673 1.4673 2.9445 3.4236 3.9127 4.4018 4.8018 4.8018 9.7817 10.271 10.760 11.2499 11.738 12.250 11.2491 11.738	x [m] 97.03600 96.99859 96.99859 96.88635 96.88635 96.88639 96.87630 96.68177 96.92376 96.73670 96.6928 96.73670 96.662446 96.47480 96.54466 96.47480 96.47480 96.39998 96.36257 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.39998 96.36557 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874 96.39555 96.3874	Sub-str Coordinate y [m] 68.58000 69.05753 70.04296 70.53061 71.101826 71.50591 71.99357 72.48122 72.96887 73.45652 73.94417 74.43183 74.91941 76.87009 77.35774 77.84539 78.3304 78.3304 78.8207 79.30835 79.79500 80.28365 82.72191 83.20957 83.69722 84.18487 84.67252 85.16017 85.64783 86.62313 87.10748 86.62313 87.10748 87.10748 88.66138 88.587374 89.56139 89.54904 90.03670 90.05243	teture: DH- 28 2 [m] 100.50000	x [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
[m] 0.0.0.48809 0.97817 1.4673 1.9564 2.4216 1.4673 1.956 1.4673 1.956 1.4673 1.956 1.4673 1.956 1.4673 1.956 1.4673 1.956 1.4673 1.956 1.4673 1.956 1.4673 1.956	E: DH-3 x [m] 96.99859 96.96117 96.89869 98.846987 96.87698 96.9276 96.73670 96.6928 96.73670 96.6928 96.73670 96.6928 96.73670 96.6928 96.73670 96.6928 96.36257	[m] 69.06765 69.55530 70.04296 70.53082 71.9382 72.48122 72.96887 71.938334 74.91948 75.40713 75.89478 76.38243 76.87009 77.35774 78.84539 78.33046 80.77130 80.28365 80.77130 81.25896 81.74661 82.23426 82.72191 83.20957 83.69722 84.18487 84.67252 85.16017 85.64783 86.13348 86.13348 86.13348 86.13348 86.13348 86.13348 86.62213 87.15043 88.715043 88.715043 88.715043	[m] 100.50000	x [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 d 0.0
[m] 0.00 0.48909 0.9817 1.9613	x	[m] 68.58000 69.067018 68.58000 69.067018 69.0	Include: DH-	x [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
[m] 0.00 0.48909 0.9817 1.9613	x	[m] 68.58000 69.067018 68.58000 69.067018 69.0	[m] 100.50000	x [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
[m] 0.00 0.48909 0.9817 1.9663 1.9127 4.4018 4.8909 5.3799 5.3799 5.3799 5.3799 5.3799 5.3799 5.3799 1.7364 4.8314 4.8314 4.8314 4.8314 4.8314 6.8472 1.756	E: DH-3 x [m] 96.99859 96.996117 96.89869 98.849932 96.97216 96.73670 96.69928 96.73670 96.69928 96.73670 96.6928 96.73670 96.6928 96.73670 96.65870 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.688913 96.32877 96.76366 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102	[m] 69.06765 69.55530 70.04296 70.53061 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 78.33040 81.25896 81.74661 82.23426 82.72191 83.20957 83.69722 84.18487 84.67252 85.16017 85.64783 86.13348 86.13348 86.13348 86.62313 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078	[m] 100.50000	[mm] 0.0	Y [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Displacement Horizontal displacement Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm]
Structur Dist. [m] 0.0 0.48809 0.9747 1.9663 2.4454 2.4454 2.4454 2.4454 2.456 2.977 4.4018 4.8909 5.3799 5.8690 6.3581 6.8472 7.3363 7.3663 9.7817 10.771 10.760 11.249 11.738 12.227 12.716 13.205 13.694 14.183 14.622 17.622 17.188 17.607 18.965 19.074 19.563 20.052 20.592 21.5361 21.5361 21.5361 20.052 21.5361 21.5361 21.5361 21.5361 21.5361 22.5362 22.542	x [m] 97.03600 98.039859 96.39859 96.88635 96.88635 96.88635 96.88635 96.88635 96.88635 96.78670 96.6928 96.78670 96.65870 96.5870 96.5870 96.5870 96.5870 96.5870 96.5870 96.3951 96.	[m] 68.58000 69.06765 69.06765 69.06765 69.06265 69.06265 69.06265 69.06265 69.06265 69.06265 69.06265 69.06265 69.06265 71.01826 71.0091 71.99357 72.48122 72.96887 73.45652 73.94417 75.40713 75.89478 77.35744 77.84539 77.35744 77.84539 77.35744 77.84539 77.35744 77.84539 77.35747 79.30835 77.3676 88.2070 89.208365 88.759843 88.66.3548	m	[mm] 0.0	Y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
Structur Dist. [m] 0.0 0.48809 0.9747 1.9663 2.4454 2.4454 2.4454 2.4454 2.456 2.977 4.4018 4.8909 5.3799 5.8690 6.3581 6.8472 7.3363 7.3663 9.7817 10.771 10.760 11.249 11.738 12.227 12.716 13.205 13.694 14.183 14.622 17.622 17.188 17.607 18.965 19.074 19.563 20.052 20.592 21.5361 21.5361 21.5361 20.052 21.5361 21.5361 21.5361 21.5361 21.5361 22.5362 22.542	E: DH-3 x [m] 96.99859 96.996117 96.89869 98.849932 96.97216 96.73670 96.69928 96.73670 96.69928 96.73670 96.6928 96.73670 96.6928 96.73670 96.65870 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.688913 96.32877 96.76366 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102 95.95102	[m] 69.06765 69.55530 70.04296 70.53061 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.150361 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 77.35774 78.84539 78.33040 81.25896 81.74661 82.23426 82.72191 83.20957 83.69722 84.18487 84.67252 85.16017 85.64783 86.13348 86.13348 86.13348 86.62313 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078 87.11078	[m] 100.50000	[mm] 0.0	Y [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Displacement Horizontal displacement Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
[m] 0.0 0.48809 0.978173 1.2454 2.9545 2.9554 2.9554 2.9554 2.9554 2.9554 2.9554 2.9554 2.9554 2.9554 2.9554 2.9554 2.9555 2.955	x [m] 97.03600 96.99859 99.992176 96.92176 96.81939 96.92176 96.6928 96.7411 96.73670 96.6928 96.73670 96.6928 96.393997 96.62446 96.58704 96.5870	[m] [8.8000 69.06765 69.5530 70.04280 7	[m] [m] [m] [m] [0.50000 100.50000	x [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Y [mm1] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Displacement Horizontal displacement Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
Structur Dist. [m] 0.0 0.48809 0.97873 1.96873 1.9	x [m] 97.03600 96.99859 96.96376 96.82376 96.82376 96.8296 96.8152 96.77411 96.73670 96.6928 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58704 96.58705 96.32515	[m] 68.58000 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 69.06765 71.099357 72.48122 72.96887 73.45652 73.94417 74.43183 75.89478 76.38243 77.855,40713 80.77130 80.28365 80.77130 81.25896 81.74661 82.23426 82.72191 83.2057 88.174661 82.23426 88.75984 88.662313 87.59843 88.662313 87.59843 88.759843	[m] 100.50000	x [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	y [mm1] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Displacement Horizontal displacement Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm]
Structur Dist. [m] 0.00 0.48999 0.97817 1.4673 1.4673 1.4673 2.9445 3.4236 3.9127 4.4018 4.8018 4.8018 9.7817 10.271 10.760 11.2499 11.738 12.250 11.2498 11.738 12.251 16.6129 17.118 17.607 18.086 18.5864 19.7817 10.271 10.761 11.295 11.295 11.295 11.295 11.295 11.295 11.295 11.295 11.295 11.295 11.295 11.295 11.295 11.295 11.295 12.205 12.2	x [m] 97.03600 96.99859 96.9869 96.9869 96.88152 96.88163 96.88163 96.88163 96.88163 96.88163 96.88163 96.73670 96.6627 96.62363 96.627462 96.39998 96.36257 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.21291 96.25033 96.25033 96.21291 96.25033 96.25033 96.25033 96.25033 96.21291	Sub-str Coordinate y [m] 68.58000 69.06785 70.04296 70.53061 71.01826 71.50991 71.99357 72.48122 72.96887 73.45652 73.94417 74.43183 76.87099 77.35774 77.84539 78.3304 78.8207 79.30835 79.79500 80.28365 80.28365 81.73466 82.72191 83.20957 83.69722 84.18487 85.64783 86.62313 87.79672 87.79600 80.28365 81.79466 82.72191 83.20957 83.69722 84.18487 85.66139 86.13548 86.62313 87.1948 87.1948 88.57374 89.06139 89.54904 90.03670 90.52435 91.01200 91.01200 90.97595	Intiture: DH-	mm 0.00 0.	Y [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Displacement Horizontal displacement Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm]



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Dist.		Coordinate	es			Displacement	ts
	×	Y	z	x	y	Horizontal displacement	Horizontal displacement
1 0047	03 43590	00 06700	100 50000	0 0	0.0		perpendicular
			100.50000			0.0	0.0 d
3.2983	92.02640	90.75965	100.50000	0.0			
4.2406	91.08680	90.68755	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
	90.14720		100.50000	0.0	0.0	0.0	0.0 d 0.0 d
5.6542 6.1254	89.20760	90.54335	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
6.5965 7.0677	88.73780 88.26800	90.50730	100.50000		0.0		0.0 d 0.0 d
7.5389 8.0101	87.79820 87.32840	90.43520 90.39915	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
8.4813	86.85860	90.36310		0.0	0.0	0.0	
9.4236	85.91900	90.29100	100.50000 imported o	0.0	0.0	0.0	0.0 d
Structur	re: DH-5	Sub-str	ucture: DH-	-5			
Dist.	×	Coordinate	es z	x		Displacement	
		У	z		Y	displacement	Horizontal displacement
						Line	perpendicular to Line
[m] 0.0	[m] 85.91900	[m] 90.29100	[m] 100.50000	[mm] 0.0	0.0	[mm] 0.0	[mm] 0.0 d
0.48006	85.95573 85.99246	89.81235 89.33369	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
1.4402	86.02919 86.06592	88.85504 88.37638	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
2.4003	86.10265	87.89773 87.41908	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
3.3604	86.17612 86.21285	86.94042 86.46177	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
4.3205	86.24958	85.98312	100.50000	0.0		0.0	0.0 d 0.0 d
5.2807	86.28631	85.02581	100.50000	0.0	0.0	0.0	0.0 d
5.7607 6.2408	86.35977 86.39650	84.06850	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
6.7209 7.2009	86.46996	83.58985 83.11119	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
8.1610	86.54342	82.63254	100.50000	0.0	0.0	0.0	0.0 d
8.6411 9.1212	86.58015 86.61688	81.67523 81.19658	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
9.6012	86.65362	80.71792	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
10.561	86.72708	79.76062	100.50000	0.0	0.0	0.0	0.0 d
11.521	86.80054	78.80331	100.50000	0.0	0.0	0.0	0.0 d
12.482	86.87400	77.84600	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
d - Dist	pracement	s include	imported o	ııspıa	cemer	its.	
Structur	re: DH-6	Sub-str	ucture: DH-	-6			
Dist.		Coordinate				Displacement	
	x	Y	z	x	У	displacement	Horizontal displacement
						along the Line	perpendicular to Line
[m]	[m] 86 87400	[m] 77 84600	[m] 100.50000	[mm] 0.0	[mm] 0.0	[mm] 0.0	[mm] 0.0 d
0.49556	86.37989	77.80809	100.50000	0.0	0.0	0.0	0.0 d
1.4867	85.39168	77.73227	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
2.4778	84.89758 84.40347	77.65645	100.50000		0.0		0.0 d 0.0 d
3.4689	83.90936 83.41526	77.61855 77.58064	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
3.9645 4.4600	82.92115 82.42705	77.54273 77.50482	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
4.9556	81.93294	77.46691	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
5.9467	80.94473	77.39109	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
6.9378	79.95652	77.31527	100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
7.9289	78.96830	77.23945	100.50000	0.0	0.0	0.0	0.0 d
8.9200	77.98009	77.16364		0.0	0.0	0.0	0.0 d 0.0 d
9.4156	77.48598	77.12573	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
10.902	76.00367	77.01200	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
11.893	75.50956 75.01545	76.93618	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
12.389	74.52135	76.89827	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
	73.53314 73.03903	76.82245 76.78455	100.50000 100.50000		0.0	0.0	0.0 d 0.0 d
14.371	72.54492	76.74664	100.50000	0.0	0.0	0.0	0.0 d
	72.05082	76.67082	100.50000	0.0	0.0	0.0	
	70.56850	76.59500	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
16.849 17.345	70.07439 69.58029		100.50000	0.0	0.0	0.0	0.0 d 0.0 d
18.336	69.08618 68.59208	76.48127 76.44336	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
18.831 19.327	68.09797 67.60386	76.40545 76.36755	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
19.822	67.10976 66.61565	76.32964 76.29173	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
20.813	66.12155	76.25382 76.21591	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
21.805	65.13333	76.17800	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
22.796	64.14512	76.10218	100.50000	0.0	0.0	0.0	0.0 d
23.787	63.15691	76.02636	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
24.282	62.66280 62.16870 61.67459	75.98845 75.95055	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
25.769	61.18048	75.87473	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
26.265 26.760	60.68638	75.83682 75.79891	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
27.256 27.751	59.69817 59.20406	75.76100	100.50000 100.50000		0.0	0.0	
	58.70995 58.21585	75.68518 75.64727	100.50000		0.0	0.0	0.0 d 0.0 d
29.238	57.72174	75.60936	100.50000	0.0	0.0	0.0	0.0 d
30.229	56.73353	75.53355	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
31.220	56.23942	75.45773	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
31.716 32.211	55.25121 54.75711	75.41982 75.38191	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
32.707 d - Disp	54.26300 placement	75.34400 s include	100.50000 imported o	0.0	0.0	0.0	0.0 d
			ucture: DH-	-7			
Dist.	×	Coordinate Y	es z	x	У	Displacement Horizontal	



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[m]	[m]	[m]	[m]	[mm]	[mm]		displacement perpendicular to Line
0.0 54	1.26300	75.34400 75.82362	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
0.96205 54 1.4431 54 1.9241 54	1.11577	77.26246	100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d
2.4051 54 2.8862 54 3.3672 54	1.07896 1.04215 1.00535	77.74208 78.22169 78.70131	100.50000 100.50000 100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d
3.8482 53 4.3292 53	3.96854 3.93173	79.18092	100.50000	0.0	0.0	0.0	0.0 d
4.8103 53 5.2913 53 5.7723 53	3.85812 3.82131	80.61977 81.09938	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
	3.78450 3.74769 3.71088	81.57900 82.05862 82.53823	100.50000 100.50000 100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d
8.1774 53	3.67408 3.63727 3.60046	83.49746	100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d
9.1395 53 9.6205 53 10.102 53	3.56365	84.45669	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
10.583 53	3.45323 3.41642	85.89554 86.37515	100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d
12.026 53	3.34281	87.33438 87.81400	100.50000 100.50000 100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
d - Displa	acement	s include	imported	displa	cemer	nts.	
Structure:		Sub-stru		-8		Displacement	-s
Disc.	x	У	z	x	Y	Horizontal displacement	Horizontal displacement
[m]	[m]	[m]	[m]	[mm]	[mm]	Line [mm]	perpendicular to Line [mm]
0.0 53 0.48457 52 0.96915 52	3.30600	87.81400	100.50000			0.0	0.0 d 0.0 d 0.0 d
1.4537 51 1.9383 51 2.4229 50	L.85550	87.71733	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
2.9074 50 3.3920 49	0.40500 9.92150	87.62067 87.58844	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
3.8766 49 4.3612 48 4.8457 48	9.43800 3.95450 8.47100	87.55622 87.52400 87.49178	100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
5.3303 47 5.8149 47 6.2994 47	7.98750	87.45956 87.42733	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
6.7840 46 7.2686 46	5.53700 5.05350	87.36289 87.33067	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
7.7532 45 8.2377 45 8.7223 44	1.60300	87.23400	100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
d - Displa	acement	s include	imported	displa	cemer	its.	
Specific Bu	ıilding l	Damage Re	sults - Verti	ical Dis	place	ments	
Structure:							
Dist.	x [m]	oordinate: Y [m]		z [mm]	sprac	cements	
Vertical 0	25200	89.52300	100.50000	0.1810	17 d		
0.48595 9. 0.97189 9. 1.4578 9.	.20108	88.55244	100.50000	0.1849	19 d		
1.9438 9.	15016	87.58188	100.50000	0.1889	15 d		
2.9157 9. 3.4016 9. 3.8876 9. 4.3735 9.	07378	86.12604 85.64076	100.50000	0.1949	0 d		
4.8595 8. 5.3454 8.	99740	84.67020 : 84.18492 :	100.50000	0.2008	16 d 15 d		
5.8314 8. 6.3173 8.	94648	83.69964 : 83.21436 :	100.50000	0.2048	14 d 12 d		
7.2892 8. 7.7752 8. 8.2611 8.	87010	82.24380	100.50000	0.2107	6 d		
9.2330 8.	76826	80.78796	100.50000	0.2166	2 d		
	71734	79.33212 : 78.84684 :	100.50000	0.2223	18 d 17 d		
11.177 8. 11.663 8. 12.149 8.	64096	77.87628	100.50000	0.2280	11 d		
12.635 8. 13.121 8.	.59004 .56458	76.90572 : 76.42044 :	100.50000	0.2316 0.2334 0.2352	7 d 7 d		
14.092 8.	.51366	75.44988 : 74.96460 :	100.50000	0.2370	11 d		
15.064 8. 15.550 8. 16.036 8.	43728	73.99404 : 73.50876 :	100.50000	0.2421	.1 d		
16.522 8.	38636	73.02348 : 72.53820 :	100.50000	0.2453	17 d 16 d		
17.494 8. 17.980 8. 18.466 8. 18.952 8.	.30998 .28452	71.08236	100.50000	0.2515	l d		
19.438 8. 19.924 8.	23360	70.11180 : 69.62652 :	100.50000	0.2543 0.2557	17 d 14 d		
20.410 8. 20.896 8. 21.382 8.	15722	68.65596 : 68.17068 :	100.50000	0.2596	7 d		
21.868 8. 22.354 8. 22.840 8.	.08084	67.20012 : 66.71484 :	100.50000	0.2608 0.2620 0.2631	15 d 12 d .6 d		
23.325 8.	.02992	66.22956	100.50000	0.2642	15 d		
d - Displa	acement	s include	imported	displa	cemer	nts.	
Structure:							
Dist.	x [m]	coordinates y [m]	z [m]	Di z [mm]	splac	cements	
Vertical C	Offset	1 65.25900	100.50000	0.2663	1 d		
	95067	64 77022	100.50000	0 2672	6 3		



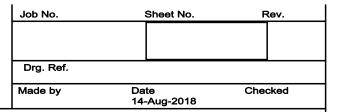
GMA calcs

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Dist.	x [m]	Coordinates Y [m]	z [m]	Displacements z [mm]
2.4025	7.83733		.00.50000	0.27061 d
d - Disp	lacemen	ts include	imported	displacements.
Structur Dist.	e: GVA-	3 Sub-str		VA-3 Displacements
[m]	x [m]	y [m]		z [mm]
Vertical 0.0 0.47715	Offset 7.8090 8.2848	1 0 62.38100 7 62.34613 5 62.31125	100.50000	0.27136 d 0.27326 d
1.4315	9.2366	3 62.27638	100.50000	0.27662 d
2.3858 2.8629 3.3401	10.1883 10.6642 11.1401	8 62.20662 5 62.17175 2 62.13687	100.50000 100.50000 100.50000	0.27926 d 0.28028 d 0.28106 d
3.8172	11.6160	0 62.10200	100.50000	0.28158 d displacements.
Structur	e: GVA-	4 Sub-str	ucture: G	VA-4
Dist.	×	Coordinate	z	Displacements
[m] Vertical	[m] Offset	[m] 1	[m]	[mm]
0 47250	11 6505	0 62.10200 0 62.57433 0 63.04667 0 63.51900	100 50000	0 20146 4
2.3680	11.7885	0 64.46367	100.50000	0.28079 d 0.28045 d
2.8415 d - Disp	11.8230 lacemen	0 64.93600 ts include	100.50000 imported	0.28006 d displacements.
Structur	e: GVA-	5 Sub-str	ucture: G	VA-5
Dist.	x [m]	Coordinate Y [m]	z [m]	Displacements z [mm]
Vertical	Offset			
0.48843	12.3101 12.7972	5 64.86463 8 64.82894	100.50000	0.28100 d 0.28171 d
1.9537	13.7715	0 64.79325 3 64.75756 5 64.72187	100.50000	0.28234 d
3.4190 3.9074	15.2328 15.7200	8 64.68619 0 64.65050	100.50000	0.28097 d 0.27980 d
4.8843 5.3727	16.6942 17.1813	3 64.61481 5 64.57913 8 64.54344	100.50000	0.27621 d 0.27373 d
6.3496	18.1556 18.6427	0 64.50775 3 64.47206 5 64.43637	100.50000	0.26723 d 0.26314 d
7.8149	19.6170	8 64.40069 0 64.36500 ts include	100.50000	0.25843 d 0.25306 d displacements.
		6 Sub-str		
Dist.	x	Coordinate		Displacements z
[m]	[m]	[m]	[m]	[mm]
0.49248	19.6170 19.5810	0 64.36500 0 63.87383	100.50000	0.24915 d
1.4775	19.5090 19.4730	0 63.38267 0 62.89150 0 62.40033	100.50000	0.24071 d 0.23620 d
2.9549	19.4010	0 61.90917 0 61.41800 ts include	100.50000	
		7 Sub-str		
Dist.	x	Coordinate		Displacements
[m]	[m]	[m]	z [m]	[mm]
0.46449	19.4010 19.8642	0 61.41800 5 61.38412	100.50000	0.21746 d
1.3935	20.7907 21.2540	0 61.35025 5 61.31638 0 61.28250	100.50000	0.19604 d 0.18367 d
2.7869 3.2514	22.1805 22.6437	5 61.24862 0 61.21475 5 61.18088	100.50000	0.15523 d 0.13899 d
3.7159	23.1070	0 61.14700	100.50000	
Structur	e: GVA-	8 Sub-str	ucture: G	VA-8
Dist.	x [m]	Coordinate Y [m]	es z [m]	Displacements z [mm]
Vertical	Offset	1		
0.49250 0.98501	23.1326 23.1583	3 62.13067	100.50000	0.13346 d 0.14519 d
1.9700 2.4625	23.2096 23.2353	0 62.62250 7 63.11433 3 63.60617	100.50000	0.16727 d 0.17758 d
2.9550 d - Disp	23.2610 lacemen	0 64.09800 ts include	100.50000 imported	0.18739 d displacements.
Structur	e: GVA-	9 Sub-str	ucture: G	VA-9
Dist.	x [m]	Coordinate Y [m]	z [m]	Displacements z [mm]
Vertical	Offset	1		
0.49313	23.2867 23.3124	0 64.09800 0 64.59046 0 65.08292	100.50000	0.19670 d 0.20551 d
1.9725 2.4657	23.3638 23.3895	0 65.57538 0 66.06784 0 66.56030	100.50000	0.22161 d 0.22890 d
3.4519 3.9450	23.4409 23.4666	0 67.05276 0 67.54522 0 68.03768	100.50000	0.24200 d 0.24783 d
4.4382	23.4923	0 68.53014 0 69.02260	100.50000	0.25320 d



GMA calcs



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Ī	Dist.	x	oordinate y	z	Displacements z		
	[m]	[m]	[m]	[m]	[mm]		
	5.9176 6.4107	23.56940 23.59510	70.00752 70.49998	100.50000 100.50000 100.50000	0.26663 d 0.27026 d		
	6.9038 7.3970	23.62080 23.64650	70.99244 71.48490	100.50000	0.27350 d 0.27635 d		
	8.3832	23.69790	72.46982	100.50000 100.50000 100.50000	0.28097 d		
	9.3695 9.8626	23.74930 23.77500	73.45474 73.94720	100.50000	0.28424 d 0.28542 d		
	10.849	23.82640	74.93212	100.50000 100.50000 100.50000	0.28690 d		
	11.835 12.328	23.87780 23.90350	75.91704 76.40950	100.50000	0.28735 d 0.28721 d		
	13.315	23.95490 23.98060	77.39442 77.88688	100.50000 100.50000 100.50000	0.28629 d 0.28554 d		
	14.794	24.03200	78.87180	100.50000 100.50000 100.50000	0.28349 d		
	15.780 16.273	24.08340 24.10910	79.85672 80.34918	100.50000	0.28081 d 0.27926 d		
	17.260	24.16050	81.33410	100.50000 100.50000 100.50000	0.27578 d		
	18.246 18.739	24.21190 24.23760	82.31902 82.81148	100.50000	0.27186 d 0.26976 d		
	19.725	24.28900	83.79640	100.50000 100.50000 100.50000	0.26532 d		
	20.711	24.34040 24.36610	84.78132 85.27378	100.50000 100.50000 100.50000	0.26059 d 0.25814 d		
	22.191 22.684	24.41750 24.44320	86.25870 86.75116	100.50000	0.25309 d 0.25050 d		
	23.670	24.49460	87.73608	100.50000 100.50000 100.50000	0.24523 d		
	24.657	24.54600	88.72100	100.50000			
	Structur	e: GVA-10	Sub-st	ructure: 0	SVA-10		
	Dist.	d	oordinate	s	Displacements		
	[m]	x [m]	y [m]	z [m]	z [mm]		
	0.0		88.72100	100.50000			
	0.95719 1.4358	23.59013 23.11219	88.77112 88.79619	100.50000	0.23651 d 0.23480 d		
	2.3930	22.15631	88.84631	100.50000 100.50000 100.50000	0.23134 d		
	3.3502	21.20044	88.89644 88.92150	100.50000	0.22781 d 0.22602 d		
	5.2645	19.28869	88.99669	100.50000 100.50000 100.50000	0.22058 d		
	6.2217	18.33281	89.04681	100.50000 100.50000 100.50000	0.21690 d		
	7.1789	17.37694 16.89900	89.09694 89.12200	100.50000	0.21318 d 0.21131 d		
	8.6147	15.94313	89.17212	100.50000 100.50000 100.50000 100.50000	0.20755 d		
	10.050	14.50931	89.24731	100.50000 100.50000 100.50000	0.20187 d		
	11.008	13.55344	89.29744 89.32250	100.50000	0.19808 d 0.19618 d		
	12.443	12.11963	89.37262	100.50000 100.50000 100.50000	0.19239 d		
	13.401	11.16375 10.68581	89.42275 89.44781	100.50000 100.50000 100.50000	0.18860 d 0.18671 d		
	14.836 15.315	9.72994 9.25200	89.49794 89.52300	100.50000	0.18294 d 0.18107 d		
	d - Disp	olacements	include	imported d	lisplacements.		
				cture: GE-		_	
	Dist.	x [m]	oordinate y [m]	z [m]	Displacement z [mm]	s	
	Vertical	Offset 1	64 11000	100 50000	-0.0017025 d		
	0.49454	29.06094 29.55487	64.13431 64.15863	100.50000	-0.025004 d -0.049350 d		
	1.4836 1.9781 2.4727	30.04881 30.54275 31.03669	64.18294 64.20725 64.23156	100.50000	-0.074714 d -0.10106 d -0.12834 d		
	2.9672 3.4617	31.53063 32.02456	64.25588 64.28019	100.50000	-0.15649 d -0.18545 d		
	4.4508	33.01244	64.32881 64.35312	100.50000	-0.21514 d -0.24546 d -0.27632 d		
	5.4399	34.00031	64.37744	100.50000	-0.30761 d -0.33920 d -0.37098 d		
	6.9235 7.4180	35.48212 35.97606	64.45037 64.47469	100.50000	-0.40281 d -0.43455 d		
	7.9126 d - Disp	36.47000 lacements	64.49900 include	100.50000 imported o	-0.46607 d Hisplacements.		
	Structur	e: GE-2	Sub-stru	cture: GE-	-2		
	Dist.	x C	oordinate Y	es z	Displacement:		
	[m]	[m] Offset 1	[m]	[m]	[mm]		
	0.0	36.47000 36.44014	64.49900 64.99100	100.50000	-0.46607 d -0.39171 d		
	1.4787	36.38043 36.35057	65.97500 66.46700	100.50000	-0.32393 d -0.26215 d -0.20582 d		
	2.4645	36.32071	66.95900 67.45100	100.50000	-0.15448 d -0.10769 d		
	3.9432 4.4361	36.23114 36.20129	68.43500 68.92700	100.50000	-0.065080 d -0.026287 d 0.0090015 d		
	4.9291 5.4220	36.17143	69.41900	100.50000	0.041075 d 0.070196 d 0.096606 d		
	6.4078	36.08186 36.05200	70.89500 71.38700	100.50000	0.12052 d 0.14215 d		
	7.8865 8.3794	35.99229 35.96243	72.37100 72.86300	100.50000	0.16166 d 0.17924 d 0.19503 d		
	8.8723 9.3652	35.93257 35.90271	73.35500 73.84700	100.50000	0.20917 d 0.22181 d		
- 1							



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Job No.	Sheet No.	Rev.		
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Made by	Date 14-Aug-2018	Checked		

	14-Aug-2018
Dist. Coordinates Displacements x y z z [m] [m] [m] [mm] [mm]	•
9.8581 35.87286 74.33900 100.50000 0.23306 d 10.351 35.84300 74.83100 100.50000 0.24302 d 10.844 35.81314 75.32300 100.50000 0.25181 d	
11.337 35.78329 75.81500 100.50000 0.25952 d 11.830 35.75343 76.30700 100.50000 0.26623 d 12.323 35.72357 76.79900 100.50000 0.27202 d	
12.816 35.69371 77.29100 100.50000 0.27697 d 13.308 35.66386 77.78300 100.50000 0.28116 d 13.801 35.63400 78.27500 100.50000 0.28463 d d - Displacements include imported displacements.	
Structure: GE-3 Sub-structure: GE-3	
Dist. Coordinates	
Vertical Offset 1 0.0 35.63400 78.27500 100.50000 0.28463 d 0.47806 35.15681 78.24606 100.50000 0.28520 d	
0.95613 34.67963 78.21713 100.50000 0.28576 d 1.4342 34.20244 78.18819 100.50000 0.28629 d 1.9123 33.72525 78.15925 100.50000 0.28680 d	
2.3903 33.24806 78.13031 100.50000 0.28728 d 2.8684 32.77087 78.10138 100.50000 0.28772 d 3.3464 32.29369 78.07244 100.50000 0.28813 d 3.8245 31.81650 78.04350 100.50000 0.28849 d	
4.3026 31.33931 78.01456 100.50000 0.28881 d 4.7806 30.86212 77.98562 100.50000 0.28908 d 5.2587 30.38494 77.95669 100.50000 0.28930 d 5.7368 29.90775 77.92775 100.50000 0.28946 d	
6.2148 29.43056 77.89881 100.50000 0.28957 d 6.6929 28.9538 77.86987 100.50000 0.28962 d 7.1710 28.47619 77.84094 100.50000 0.28960 d 7.6490 27.99900 77.81200 100.50000 0.28952 d	
d - Displacements include imported displacements. Structure: GE-4 Sub-structure: GE-4	
Dist. Coordinates Displacements x y z z	
Vertical Offset 1	
0.48978 28.01929 77.32264 100.50000 0.28901 d 0.97955 28.03957 76.83329 100.50000 0.28815 d 1.4693 28.05986 76.34393 100.50000 0.28615 d 1.9591 28.08014 75.85457 100.50000 0.28521 d	
2.4489 28.10043 75.36521 100.50000 0.28308 d 2.9387 28.12071 74.87586 100.50000 0.28046 d 3.4284 28.14100 74.38650 100.50000 0.27731 d 3.9182 28.16129 73.89714 100.50000 0.27360 d	
4.4080 28.18157 73.40779 100.50000 0.26929 d 4.8978 28.20186 72.91843 100.50000 0.26433 d 5.3876 28.22214 72.42907 100.50000 0.25867 d 5.8773 28.24243 71.93971 100.50000 0.25228 d 6.3671 28.26271 71.45036 100.50000 0.24509 d	
6.8569 28.28300 70.96100 100.50000 0.23705 d 7.3467 28.30329 70.47164 100.50000 0.22811 d	
8.3262 28.34336 69.49293 100.50000 0.20727 d 8.8160 28.36414 69.00357 100.50000 0.19525 d 9.3058 28.38443 68.51421 100.50000 0.18206 d 9.7955 28.40471 68.02486 100.50000 0.18764 d	
10.285 28.4250 67.53550 100.50000 0.15192 d 10.775 28.44529 67.04614 100.50000 0.13490 d 11.265 28.46557 66.55679 100.50000 0.11622 d 11.755 28.48586 66.06743 100.50000 0.096092 d	
12,244 28.50614 65.57807 100.50000 0.074323 d 12,734 28.52643 65.08871 100.50000 0.05928 d 13,224 28.54671 64.59936 100.50000 0.025516 d 13,714 28.56700 64.10000 100.50000 0.0027025 d	
d - Displacements include imported displacements. Structure: DH-1 Sub-structure: DH-1	
Dist. Coordinates Displacements	
[m] [m] [m] [mm] Vertical Offset 1 0.0 44.60300 87.23400 100.50000 0.28623 d	
0.48563 44.63204 86.74924 100.50000 0.28833 d 0.97126 44.66109 86.26448 100.50000 0.29022 d 1.4569 44.69013 85.77972 100.50000 0.29195 d 1.9425 44.71917 85.29496 100.50000 0.29342 d	
2.4282 44.74822 84.81020 100.50000 0.29465 d 2.9138 44.77726 84.25243 100.50000 0.29555 d 3.3994 44.80630 83.84067 100.50000 0.29622 d 3.8850 44.83505 83.35591 100.50000 0.29651 d	
4.3707 44.86439 82.87115 100.50000 0.29643 d 4.8563 44.8943 82.38639 100.50000 0.29593 d 5.3419 44.99248 81.90163 100.50000 0.29497 d 5.8276 44.95152 81.41687 100.50000 0.29352 d	
6.3132 44.98057 80.93211 100.50000 0.29152 d 6.7998 45.00961 80.44735 100.50000 0.28892 d 7.2845 45.03865 79.96259 100.50000 0.28566 d 7.7701 45.06770 79.47783 100.50000 0.28169 d	
8.2557 45.09674 78.99307 100.50000 0.27693 d 8.7413 45.12578 79.50303 100.50000 0.27132 d 9.2270 45.15483 78.02354 100.50000 0.26477 d 9.7126 45.18387 77.53678 100.50000 0.25720 d	
10.198 45.21291 77.05402 100.50000 0.24852 d 10.684 45.24196 76.56926 100.50000 0.23862 d 11.169 45.27100 76.08450 100.50000 0.22740 d	
12.141 45.32909 75.11498 100.50000 0.20050 d 12.626 45.35813 74.63022 100.50000 0.18455 d 13.112 45.38717 74.14546 100.50000 0.16673 d	
13.598 45.41622 73.66070 100.50000 0.14687 d 14.083 45.44526 73.17593 100.50000 0.12480 d 14.569 45.47430 72.69117 100.50000 0.10030 d 15.055 45.50335 72.20641 100.50000 0.73170 d	
15.540 45.53239 71.72165 100.50000 0.043162 d 16.026 45.56143 71.23689 100.50000 0.101017 d 16.511 45.59048 70.75213 100.50000 -0.026551 d 16.597 45.61952 70.26737 100.50000 -0.066815 d	
17.483 45.64857 69.78261 100.50000 -0.11124 d 17.968 45.67761 69.29785 100.50000 -0.16009 d 18.454 45.70665 68.81309 100.50000 -0.21382 d 18.940 45.73570 68.28283 100.50000 -0.27288 d	
19,425 45.76474 67.84357 100.50000 -0.33778 d 19,911 45.79378 67.35880 100.50000 -0.40990 d 20.396 45.82283 66.87404 100.50000 -0.48743 d 20.882 45.85187 66.38928 100.50000 -0.57344 d	
21.368 45.88091 65.90452 100.50000 -0.66803 d 21.883 45.9096 65.41976 100.50000 -0.77193 d 22.339 45.93900 64.93500 100.50000 -0.88614 d d - Displacements include imported displacements.	
Structure: DH-2 Sub-structure: DH-2	
Dist. Coordinates Displacements x y z z [m] [m] [m] [mm] [mm]	



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Drg. Ref.		
Made by	Date	Checked
Made by	Date	Checked

	l Offset 1	ı			
0.0	45.93900 46.43032	64.93500 64.97005	100.50000	-0.88614 -0.89016	d d
0.98513	46.92163 47.41295	65.00510 65.04014	100.50000	-0.89250 -0.89314	d d
1.9703	47.90427 48.39559	65.07519 65.11024	100.50000 100.50000	-0.89210 -0.88939	d d
2.9554 3.4480	48.88690 49.37822	65.14529 65.18034	100.50000	-0.88504 -0.87905	d d
3.9405 4.4331	49.86954 50.36086	65.21538 65.25043	100.50000	-0.87145 -0.86228	d d
4.9257 5.4182	50.85217 51.34349	65.28548 65.32053	100.50000	-0.85154 -0.83928	d d
5.9108 6.4034	51.83481 52.32612	65.35558 65.39063	100.50000	-0.82553 -0.81034	d d
6.8959 7.3885	52.81744 53.30876	65.42567	100.50000 100.50000	-0.79373 -0.77575	d d
7.8811 8.3736	53.80008	65.46072 65.49577 65.53082	100.50000 100.50000	-0.75647	d d
8.8662 9.3588	54.78271	65.56587 65.60091	100.50000 100.50000	-0.73592 -0.71418 -0.69130	d d
9.8513 10.344	55.76535 56.25666	65.63596 65.67101	100.50000	-0.66735 -0.64240	d d
10.836 11.329	56.74798 57.23930	65.70606 65.74111 65.77615	100.50000	-0.61654 -0.58985	d d
11.822 12.314	57.73062 58.22193	65.77615 65.81120	100.50000 100.50000	-0.56241 -0.53432	d d
12.807	58.71325 59.20457	65.84625 65.88130	100.50000	-0.50568 -0.47657	d d
14.284	59.69588 60.18720	65.91635 65.95139	100.50000	-0.44712 -0.41741	d d
14.777	60.67852 61.16984	65.98644 66.02149	100.50000	-0.38756 -0.35767	d d
15.762	61.66115	66.05654 66.09159	100.50000	-0.32784 -0.29817	d d
16.747 17.240	62.64379 63.13511	66.12663 66.16168	100.50000 100.50000	-0.26876 -0.23972	d d
17.732 18.225	63.62642	66.19673 66.23178	100.50000	-0.21111 -0.18304	d d
19.210	64.60906	66.26683	100.50000	-0.15558	d d
19.703 20.195	65.59169 66.08301	66.33692 66.37197	100.50000	-0.10274	d d
20.688	66.57433 67.06564	66.40702 66.44207	100.50000	-0.053072 -0.029542	d d
21.673 22.165	67.55696 68.04828	66.47712 66.51216	100.50000 100.50000	-0.0069256 0.014752	d d
22.658	68.53960 69.03091	66.54721	100.50000	0.035473	d d
23.643	70.01355	66.65236	100.50000	0.074005	d d
24.628 25.121	70.50487	66.68740 66.72245	100.50000	0.10865 0.12453	d d
25.613 26.106	71.48750 71.97882	66.75750 66.79255	100.50000	0.13947	d d
26.599 27.091	72.47013 72.96145	66.82760 66.86264	100.50000 100.50000	0.16659 0.17882	d d
27.584 28.076	73.45277 73.94409 74.43540	66.89769	100.50000	0.19018	d d
28.569	74.92672	66.96779	100.50000	0.21046 0.21942	d d
29.554 30.047	75.41804 75.90936	67.03788 67.07293	100.50000	0.22764 0.23515	d d
30.539 31.032 31.524	76.40067 76.89199 77.38331	67.10798 67.14303 67.17808	100.50000	0.24198 0.24816 0.25371	d d
31.524 32.017	77.87463	67.21313	100.50000	0.25371 0.25868	d d
32.509	78.36594 78.85726	67.24817 67.28322	100.50000	0.26309	d d
33.494	79.34858 79.83989	67.31827 67.35332	100.50000 100.50000	0.27033	d
34.480	80.33121	67.38837	100.50000	0.27568	d d
35.465 35.957	81.31385 81.80516	67.45846 67.49351 67.52856	100.50000	0.27933 0.28059 0.28149	d d
36.450	82.29648 82.78780	67.56361	100.50000	0.28207	d
37.435 37.928	83.27912 83.77043	67.59865	100.50000	0.28234	d
38.420	84.26175 84.75307	67.66875	100.50000 100.50000	0.28204	d
38.913	84.75307	07.70300	100.50000	0.28152	d
38.420 38.913 39.405 39.898	85.24438 85.73570	67.73885 67.77389	100.50000	0.28204 0.28152 0.28076 0.27979	d d
39.405 39.898 40.390	85.24438 85.73570 86.22702 86.71834	67.66875 67.70380 67.73885 67.77389 67.80894 67.84399	100.50000 100.50000 100.50000	0.28076 0.27979 0.27862	d d d d
39.405 39.898 40.390 40.883 41.376 41.868	85.24438 85.73570 86.22702 86.71834 87.20965 87.70097	67.84399 67.87904 67.91409	100.50000 100.50000 100.50000 100.50000 100.50000	0.28076 0.27979 0.27862 0.27727 0.27575 0.27408	d d d d d d
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39.405 39.898 40.390 40.883 41.376 41.868 42.3634 42.3634 43.3134 44.331 44.331 44.331 44.331 45.316 45.899 46.301 46.779 48.271 48.764 49.257 4 - Disp Structur Dist. [m] Vertica Vertica Vertica 2.4454 2.4545 2.4454 2.4454 2.4256 2.4454 2.4454 2.4256 2.4454 2.4	85.24438 85.73570 86.22702 86.71834 87.2036 86.71834 87.2036 88.19327 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 88.19227 99.15756 90.64888 91.14019 91.63151 92.12283 92.61414 93.59678 94.08810 94.57941 97.13600 94.57941 97.03600 94.57941 97.03600 96.65337 96.54468 97.03600 96.69889 96.84893 96.84893 96.84893 96.84893 96.73670 96.6928 96.66187	67.80894 67.84399 67.87904 67.84399 67.87904 67.91609 67.94913 67.94913 68.01428 69.01428 69.	100.50000 100.50000	0.28076 0.27979 0.27862 0.27757 0.27575 0.27408 0.27202 0.27620 0.26610 0.26610 0.26634 0.26148 0.25960 0.25556 0.25400 0.25138 0.24051 0.232491 0.232491 0.22324 0.22640 0.252540 0.252540 0.252540 0.252540 0.252540 0.252540 0.252556 0.25400 0.25393 0.24051 0.23272 0.23491 0.232640 0.225540 0.225540 0.225540 0.2255540 0.2255540 0.2255540 0.2255540 0.2255540 0.2255540 0.2255540 0.2255540 0.2255540 0.2255540 0.2255540 0.22555540 0.22555540 0.22555540 0.22555540 0.22555540 0.22555540 0.22555540 0.22555540 0.22555540	ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ
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39.405 39.898 40.390 40.886 40.886 41.868 42.361 42.853 43.346 43.838 44.331 44.823 44.331 44.823 45.316 45.809 47.297 47.297 49.50.242 50.734 51.227 d - Disp Structu Dist. [m] Vertica 0.0 0.48099 0.97817 1.4673 1.9563 2.4454 2.9345 3.4236 3.127 4.209 4.3090 6.3871 6.3871	85.24438 85.73570 86.22702 86.22702 86.71634 87.70036 87.	67.80394 67.84394 67.84394 67.84394 67.84394 67.87306 67.87306 67.	100.50000 100.50000	0.28076 0.27779 0.27862 0.27727 0.277862 0.27862 0.27862 0.268610 0.27202 0.27862 0.26610 0.26634 0.26614 0.26640 0.25732 0.22640 0.22640 0.22640 0.22517 0.22640 0.22513 0.22732 0.22640 0.22640 0.2138 0.22913	ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ
39,405 39,808 40,390 40,886 41,868 41,2868 41,2868 42,361 42,853 43,346 46,301 46,794 47,286 47,286 47,286 47,287 46,301 51,227 47 47,287 47,287 50,734 51,227 47 50,734 51,227 5	85.24438 85.73570 86.22702 86.71834 87.2056 87.70057 88.10837 88.1	67.80894 67.84399 67.87304 67.84399 67.87304 67.91409 67.97304 67.	100.50000 100.50000	0.28076 0.27779 0.277862 0.277872 0.277872 0.277827 0.277827 0.27826 0.26610 0.27627 0.27826 0.26610 0.26634 0.26618 0.25656 0.25650 0.25656 0.25650 0.22652 0.24602 0.22627 0.22772 0.22792 0.22640 0.22640 0.22517 a 0.22636 0.21735 a 0.22138 a	ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ
39.405 39.898 40.390 40.8886 40.3861 41.3868 42.381 44.331 44.823 44.331 44.823 45.316 45.809 46.301 46.794 47.286 47.286 47.287 4 - Disp Structu: Dist. [m] Vertica: 0.0 0.48999 0.97817 1.4673 2.4454 2.9345 3.4236 3.9127 4.4018 4.8909 5.37899 5.38690 6.63144 8.8035	85.24438 85.73570 86.22702 86.71634 87.70367	67.80394 67.84394 67.84399 67.84399 67.84399 67.84399 67.843909 67.843909 67.843909 67.843909 67.843909 67.843909 67.843909 67.843909 68.15942 68.19447 68.22952 68.26457 68.23952 68.26457 68.24386 68.54990 68.363466 68.54995 68.58090 68.54996 68.54995 68.54995 68.54995 68.54997 70.7499	100.50000 100.50000	0.28076 0.27779 0.27862 0.27872 0.277802 0.277827 0.27782 0.27826 0.26610 0.27027 0.27826 0.26610 0.26148 0.26148 0.25936 0.25656 0.25450 0.225138 0.24672 0.22460 0.225172 0.24602 0.225173 0.22640 0.21736 0.22547 0.22549 0.22549 0.225138 0.22928	ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ
39.495 39.495 39.898 40.390 40.886 41.366 41.366 42.853 43.346 43.838 44.331 44.823 45.316 45.809 46.301 46.794 47.286 47.286 47.277 4 - Display Structu: Dist. [m] Vertica: 0.0 0.48999 0.97817 1.9563 2.4454 2.9345 3.4236 3.9127 4.4018 4.8906 5.3799 5.38690 6.63144 8.3344 8.33445 8.33445 8.33444 8.33444 8.33444 8.33445	85.24438 85.73570 86.22702 86.71634 87.2086 87.70870 88.68361 88.70870 88.68361 89.17492 88.68361 99.16436 90.64888 97.03600 91.63151 95.56205 96.05347 96.54468 97.03600 91acements re: DH-3 **Cffset 1 97.03600 91acements **Cell DH-3 **Cell	67.80894 67.84399 67.87309	100.50000 100.50000	0.28076 0.27779 0.27862 0.27979 0.27862 0.27862 0.27862 0.26800 0.27207 0.27920 0.27920 0.26810 0.26814 0.26148 0.25960 0.25656 0.25400 0.25138 0.24872 0.22462 0.22640 0.21736 0.22517 0.224640 0.22517 0.224640 0.22517 0.224640 0.22517 0.224640 0.22517 0.224610 0.22517 0.224610 0.22517 0.224610 0.22517 0.224610 0.22517 0.224610 0.22517 0.224610 0.22517 0.224610 0.22517 0.2	ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ
39.405 39.898 40.390 40	85.24438 85.73570 86.22702 86.71834 87.2086 87.73097 88.19237 89.19237 89.1	67.80894 67.84399 67.87304 67.84399 67.87304 67.94309 67.94318 67.94318 67.94318 68.94318 68.15942 68.15942 68.15942 68.15942 68.16943 68.25952 68.26457 68.40476 68.43981 68.47381 68.47386 68.36971 68.40476 68.43981 68.47386 68.58000 69.06765 69.55530 69.06765 69.55530 70.04296 77.50617 71.9037	100.50000 100.50000	0.28076 0.27979 0.27862 0.27757 0.27750 0.27750 0.27575 0.27408 0.27232 0.28610 0.26610 0.26634 0.26610 0.25586 0.25590 0.25680 0.22680	ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ



GMA calcs

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				14-Aug-2018
Dist. x [m]	Coordinate Y [m]	z [m]	Displacements z [mm]	
11.738 96.138 12.227 96.062 13.205 96.062 13.205 96.022 13.694 95.988 14.183 95.951 15.162 95.878 16.140 95.801 16.629 95.762 17.118 95.722 17.607 95.681 18.096 95.651 18.585 95.651	167 80.77130 126 81.25896 185 81.74661 143 82.23426 102 82.72191 101 83.20957 102 83.69722 178 84.18487 178 46.7252 196 85.16017 154 85.64783	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.19024 d 0.18864 d 0.188702 d 0.18540 d 0.18378 d 0.18216 d 0.18033 d 0.17037 d 0.17037 d	
19.563 95.535 20.052 95.502 20.542 95.466 21.031 95.427 21.520 95.385 22.009 95.352 22.498 95.315 d - Displaceme Structure: DH-	148 88.08609 207 88.57374 165 89.06139 124 89.54904 183 90.03670 141 90.52435 100 91.01200 1015 include	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 imported d	0.16586 d 0.16424 d 0.16262 d 0.16101 d 0.15940 d 0.15780 d 0.15780 d 0.15620 d displacements.	
Dist. x [m]	Coordinate Y [m]		Displacements	
Vertical Office 0.0 95.316 0.0 91.318 94.847 0.0 95.316 0.47118 94.847 1.4135 93.907 1.4135 93.907 1.4135 93.907 2.3271 92.867 2.3271 92.867 2.3271 92.867 1.51830 93.147 5.6542 89.677 6.1254 89.677 6.1254 89.677 6.1254 89.677 6.1254 89.677 6.1254 89.677 6.1254 89.677 6.1254 89.677 6.1254 89.873 8.9524 86.388 8.9524 86.388 8.9524 86.388 8.9524 86.388 8.9524 86.388	100 91.01200 90.97595 140 90.93990 90.86780 90.86780 90.87580 90.7556 140 90.7556 140 90.7556 140 90.7556 140 90.7556 140 90.7596 140 90.7594 140 90.7594 140 90.7594 140 90.5794 140 90.5794 140 90.5794 140 90.5794 140 90.5794 140 90.5793 140 90.39915 140 90.39915 140 90.33915 140 90.33915 140 90.32705 1	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.15793 d 0.15966 d 0.16141 d 0.16141 d 0.16439 d 0.16489 d 0.16489 d 0.17030 d 0.17030 d 0.17030 d 0.17731 d 0.17734 d 0.17734 d 0.17734 d 0.17734 d 0.17940 d 0.17940 d 0.18124 d 0.18169 d	
Structure: DH- Dist.	Coordinate y [m]	·e	Displacements	
[m] [m] Vertical Offsee 0.0 85.915 0.48006 85.955 0.96012 85.995 1.4402 86.025 2.4002 86.065 2.4004 86.13 3.8004 86.13 3.8004 86.13 3.8004 86.32 5.7607 86.355 6.2408 86.32 5.7607 86.355 6.2408 86.36 7.6910 86.50 8.645 8.610 86.50 8.6	te 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	100.50000 100.50000	0.19238 d 0.19448 d 0.19448 d 0.19489 d 0.19869 d 0.20081 d 0.20292 d 0.20716 d 0.20716 d 0.20727 d 0.21139 d 0.21139 d 0.21128 d 0.21128 d 0.2118 d	
Structure: DH- Dist. [m] [m]	Coordinate	s z	Displacements z [mm]	
Vertical Offse	tt 1 100 77.84600 100 77.84600 1010 77.84600 17.97.7018 189 77.80809 17.97.77018 168 77.73227 158 77.69436 136 77.69436 136 77.58064 136 77.54273 137.7327 138.87 139.74 139.74 139.74 139.74 139.74 139.74 139.74 139.74 139.74 139.74 139.74 139.74 139.74 139.77 139.73 139.74 139.77 139.73 139.79 139.77 139.73 139.79 1	100.50000 100.50000	0. 24553 d 0. 24794 d 0. 25032 d 0. 25266 d 0. 25497 d 0. 25266 d 0. 25497 d 0. 25973 d 0. 25974 d 0. 25975 d 0. 27975 d 0. 26977 d 0. 26977 d 0. 26977 d 0. 27975 d 0. 28974 d	



GMA calcs

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Dist.	×	Coordinates	Displacements z z		
[m]	[m]		[m] [mm]		
19.327	67.60386	76.36755 100.	.50000 0.27877 d .50000 0.27709 d		
20.318	66.61565	76.29173 100.	.50000 0.27529 d		
21.309	65.62744	76.25382 100.	.50000 0.27334 d .50000 0.27127 d		
21.805	65.13333	76.17800 100.	.50000 0.26908 d .50000 0.26677 d		
22.796	64.14512	76.10218 100.	.50000 0.26434 d		
			.50000 0.26182 d .50000 0.25920 d		
24.282	62.66280	75.98845 100.	.50000 0.25649 d		
25.273	61.67459	75.91264 100.	.50000 0.25371 d .50000 0.25085 d		
			.50000 0.24794 d .50000 0.24497 d		
26.760	60.19227	75.79891 100.	.50000 0.24197 d .50000 0.23894 d		
27.751	59.20406	75.72309 100.	.50000 0.23590 d		
28.247	58.70995	75.68518 100. 75.64727 100.	.50000 0.23285 d .50000 0.22980 d		
29.238	57.72174	75.60936 100.	.50000 0.22677 d .50000 0.22377 d		
30.229	56.73353	75.53355 100.	.50000 0.22081 d .50000 0.21790 d		
			.50000 0.21790 d		
31.716	55.25121	75.41982 100. 75.38191 100.	.50000 0.21228 d .50000 0.20960 d		
32.707	54.26300	75.34400 100.	.50000 0.20700 d orted displacements.		
u - Disp)Iacements	s include impo	orted displacements.		
Structur	e: DH-7	Sub-structur	ce: DH-7		
Dist.		Coordinates	Displacements		
	x	У	z z		
[m]	[m]	[m] [[m] [mm]		
Vertical	Offset 1	L 75 34400 100	.50000 0.20700 d		
0.48103	54.22619	75.82362 100.	.50000 0.22019 d .50000 0.23194 d		
1.4431	54.18938	76.78285 100.	.50000 0.23194 d .50000 0.24236 d		
1.9241	54.11577	77.26246 100.	.50000 0.25157 d .50000 0.25966 d		
2.8862	54.04215	78.22169 100.	.50000 0.23500 d .50000 0.26672 d .50000 0.27284 d		
3.8482	53.96854	79.18092 100.	.50000 0.27809 d		
4.3292 4.8103	53.93173 53.89492	79.66054 100. 80.14015 100.	.50000 0.28254 d .50000 0.28626 d		
5.2913	53.85812	80.61977 100.	.50000 0.28931 d .50000 0.29174 d		
6.2533	53.78450	81.57900 100.	.50000 0.29361 d		
7.2154	53.71088	82.53823 100.	.50000 0.29496 d .50000 0.29584 d		
7.6964 8.1774	53.67408	83.01785 100. 83.49746 100.	.50000 0.29629 d .50000 0.29635 d		
8.6585	53.60046	83.97708 100.	.50000 0.29605 d .50000 0.29542 d		
9.6205	53.52685	84.93631 100.	.50000 0.29449 d		
10.583	53.45323	85.89554 100.	.50000 0.29330 d .50000 0.29186 d		
11.064	53.41642	86.37515 100. 86.85477 100.	.50000 0.29020 d .50000 0.28835 d		
12.026	53.34281	87.33438 100.	.50000 0.28631 d .50000 0.28411 d		
			orted displacements.		
Structur	e: DH-8	Sub-structur	re: DH-8		
Dist.		Coordinates	Displacements		
[m]	x [m]	y [m] [z z [m] [mm]		
Vertical	Offset 1	L			
0.0	53.30600	87.81400 100.	.50000 0.28411 d .50000 0.28447 d		
0.96915	52.33900	87.74956 100.	.50000 0.28480 d		
1.9383	51.37200	87.68511 100.	.50000 0.28510 d .50000 0.28537 d		
2.4229	50.88850	87.65289 100.	.50000 0.28562 d .50000 0.28583 d		
3.3920	49.92150	87.58844 100.	.50000 0.28602 d		
4.3612	48.95450	87.52400 100.	.50000 0.28618 d .50000 0.28631 d		
			.50000 0.28641 d .50000 0.28648 d		
5.8149	47.50400	87.42733 100.	.50000 0.28653 d .50000 0.28655 d		
6.7840	46.53700	87.36289 100.	.50000 0.28654 d		
7.7532	45.57000	87.29844 100.	.50000 0.28650 d .50000 0.28644 d		
			.50000 0.28635 d .50000 0.28623 d		
d - Disp	lacements	include impo	orted displacements.		
	5		4# 0		
Specific	building D	arnage Results	- All Segments		
Structur	e: GVA-1	Sub-structu	ıre: GVA-1		
Vertical		Segment		re Deflection Average Max Max Gradient Max Grad	ient Min Damage
from Li	ne for	segment	Scarc Bengun Curvatu	Ratio Horizontal Tensile of of Vertice	cal Radius of Category
Verti Movem				Strain Strain Horizontal Displace Displacement Curve	
Calcula	tions		[m] [m]	Curve	[m]
0.			1 0.0 4.0544 Hogging		6E-6 36.149E+6 0
			2 4.0544 20.243 Sagging	27.185E-6 0.0 40.805E-6 0.0 -4.092	(Negligible) 6E-6 5.6202E+6 0
Tensile	horizonta	al strains are	+ve, compressive horiz	ontal strains are -ve.	(Negligible)
Structur	e: GVA-2	Sub-structu	ire: GVA-2		
Vertical		Segment	Start Length Curvatur	e Deflection Average Max Max Gradient Max Gradie	
from Li Verti					al Radius of Category
Movem	nent			Displacement Curve	
Calcula [m	n]		[m] [m]	Curve [%]	[m]
0.	. 0		1 0.0 2.8830 Sagging	6.2208E-6 0.0 5.9009E-6 0.0 -1.9600	E-6 5.6920E+6 0 (Negligible)
Tensile	horizonta	al strains are	+ve, compressive horiz	ontal strains are -ve.	(
		Lau			
		Sub-structu			
Vertical from Li		Segment	Start Length Curvatur	e Deflection Average Max Max Gradient Max Gradie Ratio Horizontal Tensile of of Vertice	ent Min Damage al Radius of Category
Verti	cal			Strain Strain Horizontal Displaceme	
Movem Calcula				Displacement Curve Curve	
m] . 0	n]		[m] [m] 1 0.0 3.8170 Sagging	[%] [%] [%] 41.030E-6 0.0 37.158E-6 0.0 -3.9926	[m] E-6 877300. 0
					(Negligible)
16118116	TOT I ZOUÇ	octains are	+ve, compressive horiz	Ontal Strains are -ve.	



GMA calcs

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		tion S I									14-Aug-2018	
Vertical Offset from Line for Vertical Movement	Segment	Start L	Length Curvature		Average Horizontal Strain		of	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
Structure: GVA-4	Sub-structu	ıre: GVA-4	1									
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start L	Length Curvature		Average Horizontal Strain	Tensile Strain	of	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
[m] 0.0		[m] 1 0.0 2	[m] 2.8410 Sagging	[%] 8.4318E-6	[%]	[%] 7.9751E-6		0.0	[m] 3.9566E+6	0		
Tensile horizontal	strains are	+ve, com	pressive horizon	ntal strain	s are -ve.					(Negligible)		
Structure: GVA-5	Sub-structu	ıre: GVA-5	i									
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start L	Length Curvature		Average Horizontal Strain	Tensile Strain	of	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
[m] 0.0		[m] 1 0.0 7	[m] 7.8140 Sagging	[%] 170.63E-6	[%]	[%] 154.17E-6		10.986E-6	[m] 357220.	0		
ensile horizontal	strains are	+ve, com	pressive horizon	ntal strain	s are -ve.					(Negligible)		
Structure: GVA-6	Sub-structu	ıre: GVA-6	i									
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start L	Length Curvature	Deflection Ratio	Average Horizontal Strain	Tensile Strain	of	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
[m] 0.0		[m] 1 0.0 2	[m] 2.9540 Sagging	[%] 29.042E-6	[%]	[%] 27.359E-6		9.8734E-6	[m] 1.1438E+6	0		
ensile horizontal	strains are	+ve, com	apressive horizon	ntal strain	s are -ve.					(Negligible)		
tructure: GVA-7	Sub-structu	ıre: GVA-7	7									
Vertical Offset from Line for Vertical Movement	Segment	Start L	Length Curvature		Average Horizontal Strain		of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
Calculations [m] 0.0		[m] 1 0.0 3	[m] 3.7150 Sagging	[%] 260.84E-6	[%]	[%] 237.50E-6	Curve 0.0	38.120E-6	[m] 144940.	0 (Negligible)		
ensile horizontal	strains are	+ve, com	pressive horizon	ntal strain	s are -ve.					(Negligible)		
tructure: GVA-8	Sub-structu	ıre: GVA-8	3									
ertical Offset from Line for Vertical Movement Calculations	Segment	Start L	Length Curvature		Average Horizontal Strain	Tensile Strain	of	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
[m]		[m]		[%]	[%]	[%]			[m]			
0.0 ensile horizontal			2.9550 Sagging	72.021E-6	0.0	67.770E-6	0.0	-24.723E-6		(Negligible)		
ensile horizontal	strains are	e +ve, com	2.9550 Sagging	72.021E-6	0.0		0.0	-24.723E-6				
ensile horizontal structure: GVA-9 Pertical Offset from Line for Vertical Movement	strains are	e +ve, com	2.9550 Sagging	72.021E-6 ntal strains Deflection	0.0 s are -ve.	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement	484110. Min Radius of	(Negligible)		
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Tensile horizontal Structure: GVA-9 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Tensile horizontal Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-1 S Tertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 S Tertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 S Tertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal	strains are Sub-structu Segment strains are Sub-structur Segment strains are Sub-structur Segment strains are	E +ve, com E +ve, com E +ve, com E E E E E E E E E	2.9550 Sagging appressive horizon and the control of the control o	72.021E-6 ntal strain Deflection Ratio [%] 312.32E-6 ntal strain 6.4865E- 0. ntal strain E Deflection Ratio [%] 13.08E-1 11.956E- ntal strain Deflection Ratio	Average Horizontal Strain [%] 0.0 S are -ve. n Average Horizonta Strain [%] 0.0 S are -ve. n Average Horizonta Strain [%] 0.0 S are -ve. Average Horizonta Strain [%] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Max Tensile Strain Max 1 Tensile Strain Max 1 Tensile Strain [%] 0 7.6890E-0 0 0.0 Max 1 Tensile Strain [%] 0 137.22E-0 0 11.909E-0	Max Gradient of Horizontal Displacement Curve 0.0 Max Gradient of Horizontal Displacement Curve 0.0 Max Gradient of Horizontal Displacement Curve 0.0 Max Gradient of Horizontal Displacement Curve 10 Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve -18.894E-6 t Max Gradien of Vertical Displacemen Curve 3.9661E- 3.9661E- t Max Gradien of Vertical Displacement Curve 64.358E- Max Gradient of Vertical Displacement Curve	### Min Radius of Curvature [m]	Damage Category (Negligible) Damage Category (Negligible) (Negligible) Damage Category (Negligible) Damage Category (Negligible) Damage Category		
Tensile horizontal Structure: GVA-9 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Tensile horizontal Structure: GVA-10 Tensile horizontal Structure: GE-1 S Tertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 S Tertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 S Tertical Offset from Line for Vertical Movement Structure: GE-3 S Tertical Offset from Line for Vertical Offset	strains are Sub-structu Segment strains are Sub-structur Segment strains are Sub-structur Segment strains are	E +ve, com E +ve, com E +ve, com E E E E E E E E E	2.9550 Sagging appressive horizon and the control of the control o	72.021E-6 ntal strain Deflection Ratio [%] 312.32E-6 ntal strain 6.4865E-1 0.1 ntal strain e Deflection Ratio [%] 133.08E-1 11.956E-ntal strain Deflection Ratio [%] 0.0017487 ntal strain	Average Horizontal Strain [%] 0.0 s are -ve. n Average Horizonta Strain [%] 0.0 s are -ve. n Average Horizonta Strain [%] 0.0 s are -ve. Average Horizontal Strain [%] 0.0 s are -ve.	Max Tensile Strain Max 1 Tensile Strain [%] 0 7.6890E-0 Max 1 Tensile Strain [%] 0 137.22E-0 1 1.909E-0 Max Tensile Strain	Max Gradient of Horizontal Displacement Curve 0.0 Max Gradient of Horizontal Displacement Curve 0.0	Max Gradient of Vertical Displacement Curve -18.894E-6 t Max Gradien of Vertical Displacement Curve 3.9661E- 3.9661E- t Max Gradien of Vertical Displacement Curve 0.64.358E- 0	Min Radius of Curvature [m] 6 11.318E+6 43.020E+6 t Min Radius of t Curvature [m] 6 262770.	Damage Category (Negligible) Damage Category (Negligible) (Negligible) Damage Category (Negligible) Damage Category (Negligible) (Negligible) (Negligible) Damage Category		
rensile horizontal tructure: GVA-9 retrical Offset from Line for Vertical Movement Calculations [m] 0.0 rensile horizontal retrical Offset from Line for Vertical Movement Calculations [m] 0.0 resile horizontal retrical Offset from Line for Vertical Movement Calculations [m] 0.0 rensile horizontal retructure: GE-1 S retrical Offset from Line for Vertical Movement Calculations [m] 0.0 rensile horizontal retructure: GE-2 S retrical Offset from Line for Vertical Movement Calculations [m] 0.0 rensile horizontal retructure: GE-3 S retrical Offset from Line for Vertical Movement Calculations [m] 0.0 rensile horizontal retructure: GE-3 S retrical Offset from Line for Vertical retructure: GE-3 S retrical Offset from Line for Vertical retructure: GE-3 S retrical Offset from Line for Vertical	strains are Sub-structur Segment strains are Sub-structur Segment strains are Sub-structur Segment strains are Sub-structur Segment	E +ve, com Start L [m] 1 0.0 2 E +ve, com cure: GVA-9 Start 1 0.0 2 11.314 E +ve, com ce: GE-1 Start [m] 1 1.9781 2 6.6148 E +ve, com ce: GE-2 Start L [m] 1 0.0 1 E +ve, com	2.9550 Sagging appressive horizon of the curvature of the	72.021E-6 ntal strain Deflection Ratio [%] 312.32E-6 ntal strain 6.4865E-1 0.1 ntal strain e Deflection Ratio [%] 133.08E-1 11.956E-ntal strain Deflection Ratio [%] 0.0017487 ntal strain	Average Horizontal Strain Average Horizonta Strain Average Horizonta Strain Average Horizonta Strain Average Horizonta Strain [%] 0.0 Average Horizontal Strain [%]	Max Tensile Strain Max 1 Tensile Strain Max Tensile Strain	Max Gradient Of Horizontal Displacement Curve 0.0	Max Gradient of Vertical Displacement Curve -18.894E-6 t Max Gradien of Vertical Displacement Curve 3.9661E- 3.9661E- t Max Gradien of Vertical Displacement Curve 0.64.358E- 0	Min Radius of Curvature [m] 6 11.318E+6 43.020E+6 43.02	Damage Category (Negligible) Damage Category (Negligible) (Negligible) Damage Category (Negligible) Damage Category (Negligible) (Negligible) (Negligible) Damage Category		



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Vertical Offset from Line for Vertical Movement	Segment	Start	Length Curvatur		Average Horizontal Strain	Max Tensile Strain		of Vertical Displacement	Radius of	Damage Category		
Yertical Offset from Line for Vertical Movement	Segment	Start	Length Curvatur	re Deflection Ratio	Average Horizontal Strain	Max Tensile Strain		of Vertical Displacement	Radius of	Damage Category		
Calculations [m] 0.0 Censile horizontal		1 0.0	[m] 11.265 Sagging	[%] 475.03E-6 zontal strain		[%] 720.73E-6	Curve 0.0	41.104E-6	[m] 5 154580.	0 (Negligible)		
Structure: DH-1 S	Sub-structur	e: DH-1										
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length Curvatur	re Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
[m] 0.0		[m] 1 0.0	[m] 22.338 Sagging	[%] 0.0025888	[%]	[%] 0.0035433		235.18E-6	[m] 22321.	0 (Negligible)		
Tensile horizontal	strains are	+ve, co	ompressive hori:	zontal strain	s are -ve.					(,		
Structure: DH-2 S					_					_		
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length Curvat	Ratio	Horizonta Strain	Strain	of	Displacemen	L Radius of it Curvature			
[m] 0.0		[m] 1 0.0	[m]) 14.974 Hoggins	[%] 952.79E-	[%] 6 0.	[%] 0 912.34E-	6 0.0	-60.689E-	[m] -6 142790.	0 (Negligible)		
			1 36.252 Sagging			0 0.001512	9 0.0	-60.689E-	-6 249690.	(Negligible)		
ensile horizontal			ompressive nori:	zontai strain	s are -ve.							
Structure: DH-3 S Vertical Offset from Line for Vertical Movement	Sub-structure Segment		Length Curvatu	ure Deflectio Ratio		Max l Tensile Strain	of	Displacemen	Radius of			
Calculations [m]		[m] 1 0.0	[m]	[%]	[%]	[%]	Curve		[m]	. 0		
0.0			0 16.739 Sagging 9 5.7584 Hogging			0 12.982E- 0 1.0371E-			-6 10.086E+6	(Negligible)		
Censile horizontal	strains are	+ve, co	ompressive hori:	zontal strain	s are -ve.					(Negligible)		
Structure: DH-4 S	Sub-structur	e: DH-4										
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length Curvatur	re Deflection Ratio	Average Horizontal Strain	Max Tensile Strain		Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
[m] 0.0		[m] 1 0.0	[m] 9.4230 Hogging	[%] 4.0064E-6	[%]	[%] 3.9697E-6	0.0	-3.9565E-6	[m] 5 19.461E+6	0 (Negligible)		
Tensile horizontal Structure: DH-5 S			Supressive Hoir	contai stiain	are -ve.							
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length Curvatu	ure Deflectio Ratio	n Average Horizonta Strain	Max l Tensile Strain	of	Displacemen	L Radius of			
[m] 0.0		[m] 1 0.0	[m]) 2.8530 Hoggins	[%] g 0.	0 [%]	0 [%]	0 0.0	-4.4104E-	[m] -6 41.857E+6	(Negligible)		
			9.6280 Sagging			0 7.1168E-	6 0.0	-4.4104E-	-6 7.7146E+6	(Negligible)		
Pensile horizontal			Supressive nort:	zoncai scrain	s are -ve.							
Vertical Offset from Line for Vertical Movement	Segment		Length Curvatu	ure Deflectio Ratio	n Average Horizonta Strain	Max l Tensile Strain	of	Displacemen	L Radius of			
Calculations [m] 0.0		[m] 1 0.0	[m] 27.993 Sagging	[%] 170.16E-	[%] 6 0.	[%] 0 251.31E-	Curve 6 0.0) 6.1573E-	[m] -6 1.6460E+6	. 0		
			3 4.7130 Hoggins			0 13.125E-			-6 2.5316E+6	(Negligible)		
Censile horizontal	strains are	+ve, co	ompressive hori:	zontal strain	s are -ve.					(Negrigible)		
Structure: DH-7 S Vertical Offset from Line for Vertical	Sub-structur		Length Curvatur	re Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Horizontal	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category		
Movement Calculations [m] 0.0		[m] 1 0.0	[m] 12.506 Sagging	[%] 397.11E-6	[%]	[%] 377.69E-6	Displacement Curve	-27.414E-6	[m] 5 157750.	0		
ensile horizontal						377.032 0	0.0	27.1112	237730.	(Negligible)		
Structure: DH-8 S	Sub-structur	e: DH-8										
Vertical Offset from Line for Vertical Movement	Segment	Start	Length Curvatur	re Deflection Ratio	Average Horizontal Strain	Max Tensile Strain		of Vertical Displacement	Radius of	Damage Category		
Calculations [m] 0.0 Censile horizontal			[m] 8.7220 Sagging ompressive hori:	[%] 12.978E-6 zontal strain		[%] 12.267E-6	Curve 0.0	0.0	[m]) 7.9026E+6	0 (Negligible)		
						ructuro						
Specific Building Dan	=			yments Within	∟acıı əuD-Sti	uciure						
Offset from Rati	ction Avera	ge Maz ntal	s Slope Max	Max ment Tensile Strain	of Horizont	al Displa	tical Radius cement Curvatı	re Curvature	9	ategory		
Vertical Movement Calculations] [4.7		Far] [0.1	Displacem Curve	ent Cur		ng) (Sagging)	,			
[m] [%] [%]		[mm] [%]			[m]	[m]				



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Vertical Offset from	Deflection Ratio	Average Horizontal	Max Slope	Max Settlement	Max Tensile	Max Gradient	t Max Gradien	t Min Radius of	Min Radius of	Damage Category		
Line for Vertical 0.0	27.185E-6	Strain	0 -4.0926E-6	0.26631	Strain 40.805E-6	of Horizontal Displacement	Displacement Curve	t Curvature (Hogging)	Curvature (Sagging) 5.6202E+6	0 (Negligible)		
Structure: G				0.20031	40.005E-0	0.1	-4.0920E-	0 30.149210	3.0202510	o (Negligible)		
				May	May	Max Gradien	t May Gradien	+ Min	Min	Damage Category		
Offset from Line for Vertical Movement	Ratio	Horizonta: Strain	1	Settlement	Tensile Strain	of Horizontal	of Vertical Displacement Curve	Radius of t Curvature	Radius of Curvature			
[m] 0.0	[%] 6.2208E-6	0.0		[mm] 0.27136	[%] 5.9009E-6	6 0.1	0 -1.9600E-	[m] 6 -	[m] 5.6920E+6	0 (Negligible)		
Structure: G												
Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizonta Strain	Max Slope 1	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	t Max Gradien of Vertical Displacemen t Curve	t Min Radius of t Curvature (Hogging)	Min Radius of Curvature (Sagging)			
Calculations [m] 0.0		[%]	0 -3.9926E-6	[mm] 0.28158	[%] 37.158E-6	6 0.0	0 -3.9926E-	[m] 6 -	[m] 877300.	0 (Negligible)		
Structure: G	VA-4 Sub-	structure:	GVA-4									
				Iax M	ax Max	Gradient Max	Gradient 1	Min M	in Da	mage Category		
Vertical Movement		Horizonta Strain	l Slope Sett	lement Ten Str	Disp	of of vrizontal Dispolacement (Vertical Rad placement Cur Curve (Ho	ius of Radi vature Curv gging) (Sag	us of ature ging)	mage Category		
Calculations [m] 0.0		[%]	0.0 0	mm] [0.28158 7.97	%] 51E-6	0.0	0.0	[m] [- 3.95	m] 66E+6 0 (N	egligible)		
Structure: G	VA-5 Sub-	structure:	GVA-5									
Vertical Offset from Line for Vertical	Ratio	Average Horizontal Strain	1	Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement	of Vertical Displacement	Radius of Curvature	Radius of Curvature	Damage Category		
Movement Calculations [m] 0.0	[%] 170.63E-6	[%]	0 10.986E-6	[mm] 0.28233		Curve				0 (Negligible)		
Structure: G												
Vertical Offset from	Deflection Ratio	Average Horizonta	Max Slope	Max Settlement	Max Tensile	Max Gradient of	Max Gradient of Vertical	Min Radius of	Min Radius of	Damage Category		
Vertical Movement Calculations	ı	Strain			Strain	Horizontal Displacement Curve	Displacement	Curvature	Curvature			
[m] 0.0	[%] 29.042E-6	[%]	0 9.8734E-6	[mm] 0.25306	[%] 27.359E-6	0.0	9.8734E-6	[m] -	[m] 1.1438E+6	0 (Negligible)		
Structure: G												
Offset from Line for Vertical Movement	Ratio	Average Horizonta Strain	Max Slope 1	Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement Curve	of Vertical Displacement	Radius of Curvature	Radius of Curvature	Damage Category		
[m] 0.0	[%] 260.84E-6	[%]	0 38.120E-6	[mm] 0.22664	[%] 237.50E-6	0.0	38.120E-6	[m] -	[m] 144940.	0 (Negligible)		
Structure: G	VA-8 Sub-	structure:	GVA-8									
Vertical Offset from			Max Slope			Max Gradien			Min Radius of	Damage Category		
Line for Vertical Movement Calculations	ı	Strain	-		Strain	Horizontal		t Curvature (Hogging)	Curvature (Sagging)			
[m] 0.0	[%] 72.021E-6		0 -24.723E-6	[mm] 0.18739	[%] 67.770E-6	6 0.0	0 -24.723E-	[m] 6 -	[m] 484110.	0 (Negligible)		
Structure: G												
Offset from Line for Vertical Movement	Ratio	Horizontal Strain	Max Slope	Max Settlement		Horizontal	of Vertical Displacement Curve	Radius of t Curvature	Curvature			
Calculations [m] 0.0	[%] 312.32E-6	[%]	0 -18.894E-6	[mm] 0.28732	[%] 474.04E-6	6 0.0	0 -18.894E-	[m] 6 -	[m] 477970.	0 (Negligible)		
Structure: G	VA-10 Sub	-structure	: GVA-10									
Vertical Offset from			Max Slope			Max Gradient of			Min Radius of	Damage Category		
Line for Vertical Movement Calculations		Strain	-	secciement	Strain		Displacement	Curvature	Curvature			
[m] 0.0	[%] 6.4865E-6	[%]	0 3.9661E-6	[mm] 0.23986	[%] 7.6890E-6	0.0	3.9661E-6	[m] 43.020E+6	[m] 11.318E+6	0 (Negligible)		
Structure: G												
Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizonta Strain	Max Slope 1	Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement Curve	of Vertical Displacement	Radius of Curvature	Curvature	Damage Category		
Calculations [m] 0.0	[%] 133.08E-6	[%]	0 64.358E-6	[mm] 0.46604	[%] 137.22E-6	0.0	64.358E-6	[m] 963580.	[m] 262770.	0 (Negligible)		
Structure: G	E-2 Sub-s	tructure: (GE-2									
Vertical Offset from	Deflection	Average	Max Slope	Max Settlement	Max		t Max Gradien		Min Padius of	Damage Category		
Offset from Line for Vertical Movement Calculations		Horizontal Strain	•	settlement	Tensile Strain	Horizontal	of Vertical Displacement Curve	t Curvature	Curvature			
[m] 0.0	[%] 0.0017487	[%]	0 -150.87E-6	[mm] 0.46607	[%] 0.0026258	в 0.0	0 -150.87E-	[m] 6 -	[m] 36090.	0 (Negligible)		
Structure: G	E-3 Sub-s	tructure: 0	GE-3									



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Vertical Offset from Line for Vertical	Ratio				Tensile	Max Gradient of Horizontal Displacement	of Vertical Displacement	Radius of	Curvatur	e		
Vertical Offset from Line for Vertical Movement Calculations	Ratio	Average Horizonta Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Radius of Curvature	Min Radius of Curvature (Sagging	f e		
[m] 0.0	[%] 18.675E-6	[%]	.0 -1.1997E-6	[mm] 0.28962	[%] 25.856E-6	0.0	-1.1997E-6	[m] 5 -	[m] - 3.5037E+	6 0 (Negligible)		
Structure: G												
Vertical Offset from Line for Vertical Movement Calculations	Ratio	Average Horizonta Strain	Max Slope	Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement Curve	of Vertical Displacement	Radius of Curvature	Radius of Curvature	Damage Category		
[m] 0.0	[%] 475.03E-6	[%]	.0 41.104E-6	[mm] 0.28952	[%] 720.73E-6	0.0	41.104E-6	[m] -	[m] 154580.	0 (Negligible)		
Structure: D												
Offset from Line for Vertical Movement	Ratio	Average Horizonta Strain	Max Slope	Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement Curve	of Vertical Displacement	Radius of Curvature	Radius of Curvature			
Calculations [m] 0.0		[%]	.0 235.18E-6	[mm] 0.88590	[%] 0.0035433	0.0	235.18E-6	[m] -	[m] 22321.	0 (Negligible)		
Structure: D												
Offset from Line for Vertical Movement	Ratio	Average Horizonta Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Radius of Curvature	Radius o	f e		
Calculations [m] 0.0		[%]	.0 -60.689E-6	[mm] 0.89306	[%] 0.0015129	0.0	-60.689E-6	[m] 5 142790.	[m] 249690	. 0 (Negligible)		
Structure: D												
Offset from Line for Vertical Movement	Ratio	Average Horizonta Strain	Max Slope	Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement Curve	of Vertical Displacement	Radius of Curvature		Damage Category		
Calculations [m] 0.0		[%]	.0 3.3382E-6	[mm] 0.22640	[%] 12.982E-6	0.0	3.3382E-6	[m] 40.240E+6	[m] 10.086E+6	0 (Negligible)		
Structure: D												
Offset from Line for Vertical Movement	Ratio	Average Horizonta Strain	Max Slope	Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement Curve	of Vertical Displacement	Radius of Curvature	Min Radius on Curvature (Sagging	f e		
Calculations [m] 0.0		[%]	.0 -3.9565E-6	[mm] 0.19237	[%] 3.9697E-6	5 0.0	-3.9565E-6	[m] 5 19.461E+6	[m]	- 0 (Negligible)		
Structure: D												
Offset from Line for Vertical Movement	Ratio			Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement Curve	of Vertical Displacement	Radius of	Curvatur	e		
Calculations [m] 0.0		[%]	.0 -4.4104E-6	[mm] 0.24553	[%] 7.1168E-6	5 0.0	-4.4104E-6	[m] 5 41.857E+6	[m] 5 7.7146E+	6 0 (Negligible)		
Structure: D												
Offset from Line for Vertical Movement	Ratio	Horizonta Strain		Max Settlement	Tensile Strain		of Vertical Displacement	Radius of	Curvature			
Calculations [m] 0.0	[%] 170.16E-6	[%]	.0 6.1573E-6	[mm] 0.28751	[%] 251.31E-6	0.0	6.1573E-6	[m] 2.5316E+6	[m] 1.6460E+6	0 (Negligible)		
Structure: D												
Vertical Offset from Line for Vertical Movement	Ratio	Horizonta Strain		Max Settlement	Max Tensile Strain	of	Displacement	Radius of	Curvatur	e		
Calculations [m] 0.0	[%] 397.11E-6	[%]	.0 -27.414E-6	[mm] 0.29634	[%] 377.69E-6	5 0.0	-27.414E-6	[m] 5 -	[m] - 157750	. 0 (Negligible)		
Structure: Di												
Offset from Line for Vertical Movement	Deflection Ratio		al Slope Sett	lement Ten	sile ain Hor Disp	izontal Disp	Vertical Radi	ius of Radi	us of vature	amage Category		
Calculations [m] 0.0	[%] 12.978E-6	[%]		mm] [0.28655 12.2	%] 67E-6	0.0	0.0	[m] [- 7.90	m])26E+6 0 (I	Negligible)		
			ritical Segmen									
Structure Na	me Para	meter	Critical Sub-Structur			End Curvatur			Strain	Min Min Radius of Radius of Curvature Curvature (Hogging) (Sagging)	Damage Category	
GVA-1	Max Slo Max Set Max Ten Strain	tlement (GVA-1 GVA-1 GVA-1		4.0544 24	m] .0544 Hogging 1.297 Sagging 1.297 Sagging	4.0926E-6 4.0926E-6 4.0926E-6		[%] 0.0 40.805E-6 40.805E-6	- 5.6202E+6	0 (Negligible) 0 (Negligible) 0 (Negligible)	
	Min Rad Curvatu	re	GVA-1	1	0.0 4.	0544 Hogging	4.0926E-6	0.19757	0.0	36.149E+6 -	0 (Negligible)	
	(Hoggin Min Rad Curvatu (Saggin	lius of (GVA-1	2	4.0544 24	1.297 Sagging	4.0926E-6	0.26631	40.805E-6	- 5.6202E+6	0 (Negligible)	



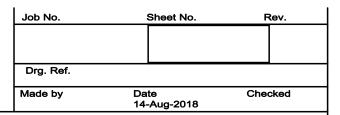
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Structure Name	Parameter	Critical Sub-Structure	Critical Start En Segment	d Curvatur	e Max Slope		Max Tensile Strain	Min Radius of Curvature (Hogging)	Curvature	Damage Ca	tegory
GVA-2	Max Slope Max Settlement	GVA-2 GVA-2	1 0.0 2.8	1830 Sagging	1.9600E-6	0.27136	5.9009E-6		5.6920E+6 ((Negligible) (Negligible)	
	Max Tensile Strain Min Radius of Curvature	GVA-2	1 0.0 2.8	1830 Sagging	1.9600E-6	0.27136	5.9009E-6		5.6920E+6 ((Negligible)	
	(Hogging) Min Radius of	GVA-2	1 0.0 2.8	830 Sagging	1.9600E-6	0.27136	5.9009E-6	_	5.6920E+6 () (Negligible)	
	Curvature (Sagging)	011. 2	1 0.0 2.0	oso bagging	1.70002 0	0.2/130	3.30032 0		310320210	, (Negligible)	
GVA-3	Max Slope Max Settlement	GVA-3 GVA-3	1 0.0 3.8	170 Sagging 170 Sagging	3.9926E-6 3.9926E-6	0.28158 0.28158	37.158E-6 37.158E-6			(Negligible) (Negligible)	
	Max Tensile Strain	GVA-3	1 0.0 3.8	170 Sagging	3.9926E-6	0.28158	37.158E-6	-	877300. 0	(Negligible)	
	Min Radius of Curvature				-	-	-	-		-	
	(Hogging) Min Radius of Curvature	GVA-3	1 0.0 3.8	170 Sagging	3.9926E-6	0.28158	37.158E-6	-	877300.	(Negligible)	
SVA-4	(Sagging) Max Slope	GVA-4	1 0.0 2.8	410 Sagging	0.0	0.28158	7.9751E-6	-	3.9566E+6 () (Negligible)	
	Max Settlement Max Tensile		1 0.0 2.8	410 Sagging 410 Sagging	0.0	0.28158	7.9751E-6	-	3.9566E+6 ((Negligible) (Negligible)	
	Strain Min Radius of				-	-	-	-			
	Curvature (Hogging) Min Radius of	GVA-4	1 0020	410 Sagging	0.0	0 20150	7 07F1F 6		3 0E66E16 () (Negligible)	
	Curvature (Sagging)	GVA-4	1 0.0 2.0	9410 Sagging	0.0	0.20130	7.97516-0		3.93002+0	(Negligible)	
GVA-5	Max Slope Max Settlement	GVA-5 GVA-5	1 0.0 7.8 1 0.0 7.8	1140 Sagging 1140 Sagging	10.986E-6 10.986E-6	0.28233 0.28233	154.17E-6 154.17E-6	-	357220. 0 357220. 0	(Negligible) (Negligible)	
	Max Tensile Strain	GVA-5	1 0.0 7.8	140 Sagging	10.986E-6	0.28233	154.17E-6	-		(Negligible)	
	Min Radius of Curvature				-	-	-	-			
	(Hogging) Min Radius of Curvature	GVA-5	1 0.0 7.8	140 Sagging	10.986E-6	0.28233	154.17E-6	-	357220.	(Negligible)	
GVA-6	(Sagging) Max Slope	GVA-6	1 0.0 2.9	540 Sagging	9.8734E-6	0.25306	27.359E-6	-	1.1438E+6 () (Negligible)	
	Max Settlement Max Tensile	GVA-6 GVA-6	1 0.0 2.9	540 Sagging 540 Sagging	9.8734E-6	0.25306	27.359E-6 27.359E-6	-	1.1438E+6 ((Negligible) (Negligible)	
	Strain Min Radius of				-	-	-	-			
	Curvature (Hogging) Min Radius of	CM3-6	1 0020	540 Sagging	0 07245-6	0 25206	27.359E-6	_	1 14390+6 () (Negligible)	
	Curvature (Sagging)	GVA-0	1 0.0 2.9	Jio Sagging	J.0754E-0	0.23300	27.3336-0		1.14502+0	(Negligible)	
GVA-7	Max Slope Max Settlement	GVA-7 GVA-7	1 0.0 3.7 1 0.0 3.7	150 Sagging 150 Sagging	38.120E-6 38.120E-6		237.50E-6 237.50E-6			(Negligible) (Negligible)	
	Max Tensile Strain	GVA-7		150 Sagging	38.120E-6		237.50E-6	-	144940. ((Negligible)	
	Min Radius of Curvature				-	-	-	-			
	(Hogging) Min Radius of Curvature	GVA-7	1 0.0 3.7	150 Sagging	38.120E-6	0.22664	237.50E-6	-	144940.	(Negligible)	
SVA-8	(Sagging) Max Slope	GVA-8	1 0.0 2.9	550 Sagging	24.723E-6	0.18739	67.770E-6	-	484110. ((Negligible)	
	Max Settlement Max Tensile		1 0.0 2.9	550 Sagging 550 Sagging	24.723E-6	0.18739	67.770E-6	-	484110. ((Negligible) (Negligible)	
	Strain Min Radius of Curvature				-	-	-	-			
	(Hogging) Min Radius of	GVA-8	1 0029	550 Sagging	24 723E-6	0 18739	67 770E-6	_	484110 () (Negligible)	
	Curvature (Sagging)	0111 0	1 0.0 2.0	JJU Dagging	21.7232 0	0.10733	07.7702 0		1011101	, (Negligible)	
GVA-9	Max Slope Max Settlement		1 0.0 24.	656 Sagging		0.28732	474.04E-6	-	477970. 0) (Negligible)) (Negligible)	
	Max Tensile Strain Min Radius of	GVA-9	1 0.0 24.		18.894E-6	0.28732	474.04E-6	-	477970. () (Negligible)	
	Curvature (Hogging)				-	-	-	-			
	Min Radius of Curvature	GVA-9	1 0.0 24.	656 Sagging	18.894E-6	0.28732	474.04E-6	-	477970. ((Negligible)	
GVA-10	(Sagging) Max Slope	GVA-10	1 0.0 11.	314 Sagging			7.6890E-6			(Negligible)	
	Max Settlement Max Tensile Strain	GVA-10 GVA-10		314 Sagging 314 Sagging	3.9661E-6 3.9661E-6		7.6890E-6) (Negligible)) (Negligible)	
	Min Radius of Curvature	GVA-10	2 11.314 15.	315 Hogging	3.9661E-6	0.19686	0.0	43.020E+6	- ((Negligible)	
	(Hogging) Min Radius of	GVA-10	1 0.0 11.	314 Sagging	3.9661E-6	0.23986	7.6890E-6	-	11.318E+6 () (Negligible)	
	Curvature (Sagging)										
3E-1	Max Slope Max Settlement Max Tensile	GE-1 GE-1 GE-1	1 1.9781 6.6 2 6.6148 7.9 1 1.9781 6.6	148 Sagging	64.358E-6 64.358E-6 64.358E-6	0.46604	137.22E-6 11.909E-6 137.22E-6	963580.	- () (Negligible)) (Negligible)) (Negligible)	
	Strain Min Radius of		2 6.6148 7.9							(Negligible)	
	Curvature (Hogging)										
	Min Radius of Curvature	GE-1	1 1.9781 6.6	148 Sagging	64.358E-6	0.38294	137.22E-6	-	262770. () (Negligible)	
SE-2	(Sagging) Max Slope Max Settlement	GE-2		801 Sagging 801 Sagging	150.87E-6 150.87E-6		0.0026258			(Negligible) (Negligible)	
	Max Tensile Strain	GE-2		801 Sagging			0.0026258		36090.	(Negligible)	
	Min Radius of Curvature				-	-	-	-			
	(Hogging) Min Radius of	GE-2	1 0.0 13.	801 Sagging	150.87E-6	0.46607	0.0026258	-	36090.	(Negligible)	
E-3	Curvature (Sagging) Max Slope	GE-3	1 0.0 7.6	490 Sagging	1.1997E-6	0 20062	25.856E-6	_	2 5027F±6 () (Negligible)	
	Max Settlement Max Tensile	GE-3 GE-3	1 0.0 7.6	490 Sagging		0.28962	25.856E-6	-	3.5037E+6 ((Negligible) (Negligible)	
	Strain Min Radius of				-		-	-			
	Curvature (Hogging)	an a	1 0076	400 7	1 10075 (0 00000	05 0565 6		2 50255.6 () (N11-11-1-1	
	Min Radius of Curvature (Sagging)	GE-3	1 0.0 7.6	490 Sagging	1.1997E-6	∪.∠8962	25.856E-6	-	J.303/E+6 () (Negligible)	
SE-4	Max Slope Max Settlement	GE-4 GE-4	1 0.0 11. 1 0.0 11.	265 Sagging 265 Sagging	41.104E-6 41.104E-6	0.28952	720.73E-6 720.73E-6	-	154580. 0	(Negligible) (Negligible)	
	Max Tensile Strain	GE-4		265 Sagging			720.73E-6		154580. ((Negligible)	
	Min Radius of Curvature				-	-	-	-			
	(Hogging) Min Radius of Curvature	GE-4	1 0.0 11.	265 Sagging	41.104E-6	0.28952	720.73E-6	-	154580. ((Negligible)	
DH-1	(Sagging) Max Slope	DH-1	1 0.0 22.	338 Sagging	235.18E-6	0.88590	0.0035433	_	22321. () (Negligible)	
-	Max Settlement Max Tensile		1 0.0 22.	338 Sagging 338 Sagging	235.18E-6 235.18E-6	0.88590	0.0035433	-	22321. ((Negligible) (Negligible) (Negligible)	
	Strain Min Radius of				-	-	-	-			
	Curvature										



GMA calcs



Structure Name	Parameter	Critical Sub-Structure	Critical Start Segment	End	Curvature	Max Slope	Max Settlement		Min Radius of Curvature (Hogging)	Curvature	Damage Category
	Min Radius of Curvature (Sagging)	DH-1	1 0.0 2	2.338	Sagging	235.18E-6	0.88590	0.0035433			(Negligible)
DH-2	Max Slope	DH-2	1 0.0 1	4.974	Hogging	60.689E-6	0.89306	912.34E-6	142790.	- 0	(Negligible)
	Max Settlement				Hogging	60.689E-6		912.34E-6			(Negligible)
	Max Tensile Strain	DH-2	2 14.974 5	1.226	Sagging	60.689E-6	0.37560	0.0015129	-	249690. 0	(Negligible)
	Min Radius of Curvature (Hogging)	DH-2	1 0.0 1	4.974	Hogging	60.689E-6	0.89306	912.34E-6	142790.	- 0	(Negligible)
	Min Radius of Curvature	DH-2	2 14.974 5	1.226	Sagging	60.689E-6	0.37560	0.0015129	-	249690. 0	(Negligible)
	(Sagging)										
DH-3	Max Slope	DH-3				3.3382E-6		12.982E-6			(Negligible)
	Max Settlement					3.3382E-6		12.982E-6			(Negligible)
	Max Tensile Strain	DH-3			Sagging	3.3382E-6		12.982E-6			(Negligible)
	Min Radius of Curvature	DH-3	2 16.739 2	2.497	Hogging	3.3382E-6	0.17527	1.0371E-6	40.240E+6	- 0	(Negligible)
	(Hogging) Min Radius of	DH-3	1 0.0 1	6 720	Cagging	3.3382E-6	0.22640	12.982E-6	_	10 0968+6 0	(Negligible)
	Curvature (Sagging)	DII-3	1 0.0 1	.0.733	Sagging	J.JJ02E-0	0.22040	12.9026-0		10.0008+0 0	(Negligible)
DH-4	Max Slope	DH-4	1 0.0 9	.4230	Hogging	3.9565E-6	0.19237	3.9697E-6	19.461E+6	- 0	(Negligible)
	Max Settlement				Hogging	3.9565E-6			19.461E+6		(Negligible)
	Max Tensile Strain	DH-4	1 0.0 9	.4230	Hogging	3.9565E-6	0.19237	3.9697E-6	19.461E+6	- 0	(Negligible)
	Min Radius of Curvature (Hogging)	DH-4	1 0.0 9	.4230	Hogging	3.9565E-6	0.19237	3.9697E-6	19.461E+6	- 0	(Negligible)
	Min Radius of Curvature			-	-	-	-	-	-		
DH-5	(Sagging) Max Slope	DH-5	1 002	8530	Hogging	4.4104E-6	0.20492	0.0	41.857E+6	- 0	(Negligible)
D.11 3	Max Settlement	DH-5				4.4104E-6		7.1168E-6			(Negligible)
	Max Tensile Strain	DH-5	2 2.8530 1			4.4104E-6		7.1168E-6			(Negligible)
	Min Radius of	DH-5	1 0.0 2	.8530	Hogging	4.4104E-6	0.20492	0.0	41.857E+6	- 0	(Negligible)
	Curvature (Hogging)										
	Min Radius of Curvature (Sagging)	DH-5	2 2.8530 1	2.481	Sagging	4.4104E-6	0.24553	7.1168E-6	-	7.7146E+6 0	(Negligible)
DH-6	Max Slope	DH-6	1 0.0 2	7.993	Sagging	6.1573E-6	0.28751	251.31E-6	-	1.6460E+6 0	(Negligible)
	Max Settlement	DH-6	1 0.0 2	7.993	Sagging	6.1573E-6	0.28751	251.31E-6	-	1.6460E+6 0	(Negligible)
	Max Tensile Strain	DH-6	1 0.0 2	7.993	Sagging	6.1573E-6	0.28751	251.31E-6	-	1.6460E+6 0	(Negligible)
	Min Radius of Curvature (Hogging)	DH-6	2 27.993 3	2.706	Hogging	6.1573E-6	0.23441	13.125E-6	2.5316E+6	- 0	(Negligible)
	Min Radius of	DH-6	1 0.0 2	7.993	Sagging	6.1573E-6	0.28751	251.31E-6	-	1.6460E+6 0	(Negligible)
	Curvature (Sagging)										
DH-7	Max Slope	DH-7			Sagging	27.414E-6		377.69E-6			(Negligible)
	Max Settlement Max Tensile	DH-7 DH-7			Sagging	27.414E-6		377.69E-6			(Negligible)
	Strain Min Radius of	DH-7	1 0.0 1	2.506	Sagging	27.414E-6	0.29634	377.69E-6	-	157750. 0	(Negligible)
	Curvature (Hogging)										
	Min Radius of Curvature (Sagging)	DH-7	1 0.0 1	2.506	Sagging	27.414E-6	0.29634	377.69E-6	-	157750. 0	(Negligible)
DH-8	Max Slope	DH-8	1 0.08	.7220	Sagging	0.0	0.28655	12.267E-6	-	7.9026E+6 0	(Negligible)
-	Max Settlement	DH-8	1 0.0 8	.7220	Sagging	0.0	0.28655	12.267E-6	-	7.9026E+6 0	(Negligible)
	Max Tensile Strain	DH-8			Sagging	0.0		12.267E-6			(Negligible)
	Min Radius of Curvature (Hogging)			-	-	-	-	-	-		
	(Hogging) Min Radius of	DH-8	1 0.0 8	.7220	Sagging	0.0	0.28655	12.267F-6	_	7.9026E+6 0	(Negligible)
	Curvature (Sagging)	0	2 0.0 0		~~33***3	0.0	0.20033			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,,,
	(Sagging)										



Demolition + Excavation + Proposed loading LT

Job No.	Sheet No.	Rev.
Drg. Ref.	•	
Made by	Date 14-Aug-2018	Checked

Utility Strain Calculation Options Neglect beneficial contribution of axial strains : No Specific Building Damage Results - Horizontal Displacements Structure: GVA-1 | Sub-structure: GVA-1 Displacements x y Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] [mm] [mm] [mm] Coordinates x y z Dist. 12.149 8.61550 77.39100 100.50000 13.121 8.56458 76.42044 100.50000 13.121 8.56458 76.42044 100.50000 13.121 8.56458 76.42044 100.50000 14.178 8.53912 75.393516 100.50000 14.178 8.53912 75.393516 100.50000 14.178 8.53912 75.39488 100.50000 15.555 8.43728 73.99404 100.50000 15.555 8.43728 73.99404 100.50000 16.522 8.38636 73.02348 100.50000 17.494 8.33644 72.05292 100.50000 17.494 8.33544 72.05292 100.50000 17.494 8.33544 72.05292 100.50000 17.494 8.33547 72.05292 100.50000 18.466 8.28452 71.08236 100.50000 18.466 8.28452 71.08236 100.50000 19.438 8.23360 70.11180 100.50000 19.438 8.23360 70.11180 100.50000 19.438 8.23586 85559 100.50000 20.410 8.18268 69.14124 100.50000 20.410 8.18268 69.14124 100.50000 20.410 8.18268 69.14124 100.50000 Structure: GVA-2 | Sub-structure: GVA-2 Dist. Coordinates x y z x y Displacements Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] [mm] 0.0 d Structure: GVA-3 | Sub-structure: GVA-3 Dist. Coordinates x y z x y Horizontal Horizontal displacement along the perpendicular Line to Line to Line [mm] [mm] [mm] [mm] [mm] 0.0 0.0 0.0 | [m] | [m] | [m] | [m] | [mm] Structure: GVA-4 | Sub-structure: GVA-4 Displacements Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] Coordinates x y z Dist. Structure: GVA-5 | Sub-structure: GVA-5 Displacements Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] [mm] [mm] 0.0 0.0 Dist. Coordinates x y z $\begin{bmatrix} m \end{bmatrix} & [m] & [m] & [m] & [mm] & [mmn] & [mmn] \\ 0.0 & 11.82300 & 64.93600 & 100.50000 & 0.0 & 0.0 \\ 0.48843 & 12.31013 & 64.90031 & 100.50000 & 0.0 & 0.0 \\ 0.97686 & 12.79725 & 64.86463 & 100.50000 & 0.0 & 0.0 \\ 1.4653 & 13.28438 & 64.82894 & 100.50000 & 0.0 & 0.0 \\ \end{bmatrix}$ 0.0 0.0 d



Job No.	Sheet No.	Rev.
Drg. Ref.	L	
Made by	Date 14-Aug-2018	Checked

Dist.		Coordinat	es				Displacemen	
	x	y		z	x	Y		Horizontal
								displacement
1.9537 13	.77150	64.79325	100	50000	0.0	0.0	along the	perpendicular 0.0 d
2.4422 14	.25863	64.75756	100	50000			0.0	0.0 d
2.9306 14	.74575	64.72187	100	.50000	0.0	0.0	0.0	0.0 d
3.4190 15	.23288	64.68619	100	50000		0.0		0.0 d
3.9074 15 4.3959 16	.20713	64.61481	100	50000	0.0	0.0	0.0	0.0 d 0.0 d
4.8843 16	.69425	64.57913	100	.50000	0.0	0.0	0.0	0.0 d
5.3727 17	.18138	64.54344	100	50000		0.0		
5.8612 17 6.3496 18					0.0	0.0	0.0	0.0 d 0.0 d
6.8380 18	.64275	64.43637	100	.50000	0.0	0.0	0.0	0.0 d
7.3265 19	.12988	64.40069	100	50000	0.0	0.0	0.0	0.0 d
7.8149 19 d - Displa	.61700	64.36500	100.	.50000	0.0	0.0	0.0	0.0 d
u - Dispia	cement	a incidde	TIME	or cea a	rapra	cemer	ica.	
Structure:	GVA-6	Sub-st	ructi	ıre: GV	A-6			
Dist.		Coordinat	es				Displacemen	ts
	x	Y		z	x	y		Horizontal
								displacement
							along the	perpendicular
[m]	[m]	[m]		[m]	[mm]	[mm]	Line [mm]	to Line
0.0 19	.61700	64.36500	100	.50000	0.0	0.0	0.0	0.0 d
0.49248 19	.58100	63.87383	100	50000	0.0	0.0	0.0	0.0 d
0.98497 19 1.4775 19	50000	63.38267	100	50000	0.0	0.0	0.0	0.0 d 0.0 d
1.9699 19	.47300	62.40033	100	50000	0.0	0.0	0.0	0.0 d
1.9699 19 2.4624 19	.43700	61.90917	100	50000	0.0	0.0	0.0	0.0 d 0.0 d
2.9549 19	.40100	61.41800	100	.50000	0.0	0.0	0.0	0.0 d
d - Displa	cement	s include	ımpo	ortea a	ıspıa	cemer	its.	
I								
Structure:	GVA-7	Sub-st	ructi	ıre: GV	A-7			
							n/ *	
Dist.	×	Coordinat y	es	z	x	у	Displacement	ts Horizontal
1	^	1		-	^	r	displacement	displacement
I								perpendicular
1 .							Line	to Line
	[m]	[m]		[m]	[mm]	[mm]	[mm] 0.0	[mm]
0.0 19 0.46449 19	.86425	61.38412	100	50000	0.0	0.0	0.0	0.0 d 0.0 d
0.92897 20	.32750	61.35025	100	.50000	0.0	0.0	0.0	0.0 d
1.3935 20	.79075	61.31638	100	.50000	0.0	0.0	0.0	
1.8579 21 2.3224 21	71725	61.28250	100	50000	0.0	0.0	0.0	0.0 d 0.0 d
2.7869 22	.18050	61.21475	100	50000	0.0	0.0	0.0	0.0 d
3.2514 22	.64375	61.18088	100	.50000	0.0	0.0	0.0	0.0 d
3.7159 23 d - Displac	.10700	61.14700	100	.50000	0.0	0.0	0.0	0.0 d
u - Displa	cement	o incinde	тшро	rred d	±sp1a	cemer	ica.	
1								
Structure:	GVA-8	Sub-st	ructi	ıre: GV	A-8			
Dist.		Coordinat					Displacemen	t-e
	x	У		z	x	У	Horizontal	Horizontal
							displacement	displacement
								perpendicular
[1	Em. ³	f 1		[m]	Frem 1	[mm 1	Line	to Line
	[m] .10700	[m] 61.14700		[m] .50000	[mm] 0.0	0.0	[mm] 0.0	[mm] 0.0 d
0.49250 23	.13267	61.63883	100	50000	0.0	0.0	0.0	0.0 d
0.98501 23 1.4775 23	.15833	62.13067	100	50000	0.0	0.0	0.0	0.0 d
1.4775 23	.18400	02.02250		UUUUc.	0.0	0.0	0.0	U.U a
1.9700 23	.20967	63.11433	100	50000	0.0	0.0	0.0	0.0 A
1.9700 23 2.4625 23	.20967	63.11433	100	.50000	0.0	0.0	0.0	0.0 d
2.9550 23	.20967 .23533 .26100	63.11433 63.60617 64.09800	100	.50000 .50000 .50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
1.9700 23 2.4625 23 2.9550 23 d - Displac	.20967 .23533 .26100	63.11433 63.60617 64.09800	100	.50000 .50000	0.0	0.0	0.0 0.0 0.0	0.0 d
2.9550 23 d - Displa	.20967 .23533 .26100 cement	63.11433 63.60617 64.09800 s include	100 100 100 impo	.50000 .50000 .50000 orted d	0.0 0.0 0.0 ispla	0.0	0.0 0.0 0.0	0.0 d
2.9550 23	.20967 .23533 .26100 cement	63.11433 63.60617 64.09800 s include	100 100 100 impo	.50000 .50000 .50000 orted d	0.0 0.0 0.0 ispla	0.0	0.0 0.0 0.0	0.0 d
2.9550 23 d - Displa	.20967 .23533 .26100 cement	63.11433 63.60617 64.09800 s include	100 100 100 impo	.50000 .50000 .50000 orted d	0.0 0.0 0.0 ispla	0.0	0.0 0.0 0.0	0.0 d 0.0 d
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2.9550 23 d - Displac Structure:	.20967 .23533 .26100 cement	63.11433 63.60617 64.09800 s include	100 100 100 impo	.50000 .50000 .50000 orted d	0.0 0.0 0.0 ispla	0.0 0.0 0.0 cemer	0.0 0.0 0.0 nts. Displacement Horizontal displacement	0.0 d 0.0 d ts Horizontal displacement
2.9550 23 d - Displac Structure:	.20967 .23533 .26100 cement	63.11433 63.60617 64.09800 s include	100 100 100 impo	.50000 .50000 .50000 orted d	0.0 0.0 0.0 ispla	0.0 0.0 0.0 cemer	0.0 0.0 0.0 0.0 Displacement Horizontal displacement along the	0.0 d 0.0 d ts Horizontal displacement perpendicular
2.9550 23 d - Displac Structure: Dist.	.20967 .23533 .26100 cement	63.11433 63.60617 64.09800 s include Sub-st Coordinat	100 100 100 impo	.50000 .50000 .50000 orted d	0.0 0.0 0.0 ispla A-9	0.0 0.0 0.0 cemer	0.0 0.0 0.0 0.0 0.0 displacement Horizontal displacement along the Line	0.0 d 0.0 d ts Horizontal displacement perpendicular to Line
2.9550 23 d - Displac Structure: Dist.	.20967 .23533 .26100 cement GVA-9	63.11433 63.60617 64.09800 s include Sub-st Coordinat y	100. 100. 100. impo	.50000 .50000 .50000 orted d ure: GV z	0.0 0.0 0.0 ispla A-9 x [mm]	0.0 0.0 0.0 cemer	Displacement Horizontal displacement along the Line [mm]	0.0 d 0.0 d ts Horizontal displacement perpendicular to Line [mm] 0.0 d
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2,9550 23 d - Displan Structure: Dist. [m] 0.0 23 0.98626 23 1.4794 23 2.9582 23 2.4657 23 2.4557 23 2.9582 23 3.4519 23 3.9450 23 3.9450 23 3.9450 23 7.8901 23 8.8763 23 9.8655 23 9.8655 23 9.8655 23 9.8655 23 9.8656 23	Z39533 226100 cement GVA-9 x [m] 226100 228670 331240 331240 331240 331240 44050 44152	63.11433 63.60617 64.09800 s include s include (10.00000000000000000000000000000000000	1000 1000 1000 1000 1000 1000 1000 100	.50000 .5	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d
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2,9550 23 d - Displace Structure: Dist. [m]	Z23533 2.26100 2.8670 2.8670 2.8670 2.8670 3.3810 3.38950 3.6380 3.44090 4.9230 6.7420	63.11433 63.60617 64.09800 s include [m] 64.09800 64.59046 65.90292 65.57538 66.06784 66.56030 67.54522 66.06786 68.53708 68.53014 67.05276 70.09724 71.48490 72.466982 72.46982 73.45474 71.48490 72.46982 73.45474 71.39422 77.88688 75.91704 76.40950 76.90166 77.99244 78.87874 78.8788688	1000 impc ructu es s s s s s s s s s s s s s s s s s s	.50000 .5	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0 cemer y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal displacemen Horizontal displacemen [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 d
2,9550 23 d - Displan Structure: Dist. [m] 0.0 23 0.9813 23 0.98626 23 1.9962 23 1.9962 23 2.9558 22 2.9558 23 3.4519 23 5.4244 23 5.4244 23 7.3970 23 8.3872 23 8.3832 23 9.3655 23 9.3655 23 9.3655 23 9.3655 23 10.494 23 10.494 23 11.342 24 11.5287 24 15.780 24 15.780 24 15.780 24 15.780 24 15.780 24 15.780 24	Z32533 261000 cement GVA-9 x [m] 226100 228670 33810 34810 34810 36380 34920 44090 49230 44090 54370 77500 69790 67720 885210 88	63.11433 63.60617 64.09800 s include [m] 64.09800 64.59946 65.59202 65.57538 66.06784 66.56030 67.54522 68.33768 68.53014 67.05276 77.443966 77.443966 77.443966 77.49247 78.88688 73.45474 77.39422 77.88688 73.45474 77.39422 77.88688	1000 impc es ses ses ses ses ses ses ses ses ses	.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Displacemen Horizontal displacemen [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d
2,9550 23 d - Displand	x [ml] 2235233 2.26100 2.28570 2.28570 2.28570 2.28570 2.28570 2.28570 2.28570 2.28570 2.28570 2.28570 2.28570 2.28570 2.28570 2.2850 2.28570 2.2850 2.28570 2.2850	63.11433 63.10437 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.06784 66.56030 67.54522 68.53704 66.56030 67.54522 67	1000 imperson imperso	.50000 .50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal Line Line	## Company of Company
2,9550 23 d - Displan Structure: Dist. [m] 0.0 23 0.9813 23 0.98626 23 1.9962 23 1.9962 23 2.9558 22 2.9558 22 3.4519 23 4.4382 23 5.4244 23 5.4244 23 7.3970 23 8.3876 23 9.3655 23 9.3655 23 9.3655 23 9.3655 23 10.362 23 11.342 23 11.342 23 11.342 23 11.342 23 11.342 24 11.362 24 11.3	Z3523 Z6100 GVA-9 x [m] 26100 28670 31820 3	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.06794 66.56030 67.030762 68.03769 68.53014 69.02200 67.03769 68.53014 69.02200 67.03769 68.53014 69.02200 67.03769 68.53014 69.02200 67.39422 77.4493212 75.42458 77.39472 77.4978 77.9479	1000 impo	500000 55000000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal Line Line Line Line Line Line Line Line	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to line [mm] 0.0 d
2,9550 23 d - Displand	Z3523 Z6100 GVA-9 x [m] 26100 28670 31820 3	63.11433 63.10617 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.56930 66.56930 66.56930 66.56930 67.04998 70.99244 71.48490 71.9736 77.39422 72.46982 77.39427 77.483966 77.39428 77.39427 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 77.39442 77.88688 88.37934 77.88688	1000 impc es ses ses ses ses ses ses ses ses ses	500000 550000 550000 550000 550000 550000 550000 550000 5500000 550000 550000 550000 550000 550000 550000 550000 550000 5500000 550000 550000 550000 550000 550000 550000 550000 550000 5500000 550000 550000 550000 550000 550000 550000 550000 550000 5500000 550000 550000 550000 550000 550000 550000 550000 550000 5500000 550000 550000 550000 550000 550000 550000 5500000 5500000 5500	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d
2,9550 23 d - Displand	Z35533 .26100 cement GVA-9 x	63.11433 63.10437 64.09800 s include y [m] 64.9800 64.59046 65.08292 65.57538 66.06784 66.56030 67.5527 67.54522 68.33768 68.53014 69.02260 69.51506 67.05276 67.54522 67.545	1000 impro cost of the cost of	.500000 .5000000 .500000 .500000 .500000 .500000 .500000 .500000 .500000 .5000000 .5000000 .5000000 .5000000 .500000000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement Horizontal displacement Eline [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to Line [mm] 0.0 d
2,9550 23 d - Displand	z (ml) 226530 (WA-9 (WA-	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.06784 66.56030 67.05276 67.54526 67.54526 67.05276 67.	1000 1000 1000 1000 1000 1000 1000 100	.500000 .5000000 .500000 .500000 .500000 .500000 .500000 .500000 .500000 .5000000 .5000000 .5000000 .5000000 .500000000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Displacement Horizontal displacement Eline [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.0 d
2,9550 23 d - Displand	z (ml) 2.235233 (26100	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.06784 66.56030 67.59266 67.05276 67.59276 67	1000 1000 1000 1000 1000 1000 1000 100	.500000 .5000000 .500000000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal Displacemen Horizontal ine [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d
2,9550 23 d - Displand	Z35533 2.26100 cement GVA-9 x [m1] 226100 2.28670 3.3810 4.40920 3.38950 6.46520 4.41520 4.41520 4.41520 4.41520 4.41520 4.40520 6	63.11433 63.10431 64.09800 s include y [m] 64.9800 64.59046 65.08292 65.57538 66.06784 66.56030 67.55276 67.54522 68.33768 68.53014 69.02260 69.51506 67.05276 67.05276 67.54522 67.05277 67.09244 67.05276 67.05	1000 1000 1000 1000 1000 1000 1000 100	.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement Horizontal displacement	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d displacement perpendicular to Line [mm] 0.0 d
2,9550 23 d - Displand	z (ml) 223523 (26100 (WA-9) 23520 (WA-9) 226100 (WA-9) 28670 (WA-9) 28	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.06784 66.56030 67.54522 66.06784 66.56030 67.05276 67.54522 67.05276 67.54522 67.05276 67.54522 67.05276 67	1000 1000 1000 1000 1000 1000 1000 100	.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal Line Line Line Line Line Line Line Line	0.0 d
2,9550 23 d - Displand	Z39573 Z26100 Cement GVA-9 X	63.11433 63.10437 64.09800 s include y [m] 64.99800 64.59046 65.08292 65.57538 66.06784 66.56030 67.55276 67.54522 68.33768 68.53014 69.02260 69.51506 67.05276 70.09724 71.484900 71.484900 71.484900 71.484900 71.484900 71.484900 71.484900 71.484900 71.7973845 71.7973845 71.79738688 75.91704 77.39442 77.88688 75.91704 77.39442 77.88688 75.91704 77.39442 77.88688 79.85672 80.34918 80.84164 81.330344 83.39344 83.39344 83.39344 83.39344 83.39348 83.39344 83.39344 83.39344 83.39344 83.39344 83.39344 83.39344 83.39344 83.39344 83.39344 83.39344 83.39344 83.39348	1000 1000 1000 1000 1000 1000 1000 100	.500000 .5000000 .50000000 .500000 .500000 .500000 .500000 .500000 .500000 .5000000 .5	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal displacement Horizontal displacement Eline [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to Line [mm]
2,9550 23 d - Displand	239543 236100 28670 28670 31820	63.11433 63.10617 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.56030 66.50670 66.50670 66.50630 66.50630 66.50630 67.34562 68.33143 69.0220 68.53146 69.0220 68.53146 69.0220 69.51506 70.0952 70.49998 70.99244 71.97736 71.9736 71.9736 77.39422 77.46930 77.39472 77.46930 77.39472 77.88688 77.3942 77.88688 77.3942 77.88688 80.84164 81.33410 81.82656 82.31902 82.81148 80.84164 81.33410 81.82656 82.31902 82.81188 80.84164 81.33410	1000 1000 1000 1000 1000 1000 1000 100	.500000 .5000000 .500000 .500000 .500000 .500000 .500000 .500000 .500000 .500000 .500000 .500000 .500000 .500000 .5000000 .5000000 .5000000 .500000000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal Displacemen Horizontal (splacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 d
2,9550 23 d - Displand	x (ml 223553 226100 2875	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.9800 64.59046 65.08292 65.57538 66.06784 66.56030 67.54522 66.06784 66.56030 67.54522 67.05276 67.54522 67.05276 67.54522 68.33768 68.53014 66.56030 67.05276 67.54522 67.54522 67.54522 67.54522 67.5538 68.53014 66.56030 67.5277 67.9942 67.5276 67.5276 68.33768 68.53104 68.55116 68.55116	1000 1000 1000 1000 1000 1000 1000 100	.50000 .50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0 remer y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal Line Line	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to Line [mm] 0.0 d
2,9550 23 d - Displand	zysement (ml) (ml) (ml) (ml) (ml) (ml) (ml) (ml)	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.06794 66.56030 67.04592 66.3756 67.04592 67.39402 71.9736 72.4699.2200 67.04593 70.99944 71.9736 77.3942 77.48488 70.99244 71.788688 70.99244 71.788688 70.99248 71.788688 71.788688 71.788688 71.788688 71.788688 71.788688 71.788688 71.788688 71.788688 71.788688 71.788688 71.7886888	1000 1000 1000 1000 1000 1000 1000 100	500000 5000000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to line [mm] 0.0 d
2,9550 23 d - Displand Structure: Dist. [Im]	z (ml 2.23523 2.26100 2.28570	63.11433 63.10437 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.56930 66.56930 66.56930 66.56930 66.56930 67.049938 70.99244 71.48490 71.9736 77.3942 72.46982 72.46982 72.79.6238 70.99	1000 1000 1000 1000 1000 1000 1000 100	.500000 .500000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to line [mm] 0.0 d
2,9550 23 d - Displand	z (ml 2.23523 2.26100 2.28570	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.56930 66.56930 66.56930 66.56930 66.56930 67.04998 70.99244 71.48490 71.9736 77.3942 72.46982 72.46982 72.79.6238 70.99	1000 1000 1000 1000 1000 1000 1000 100	.500000 .500000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to Line [mm] 0.0 d
2,9550 23 d - Displand Structure: Dist. [Im]	z (ml 2.23523 2.26100 2.28570	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.56930 66.56930 66.56930 66.56930 66.56930 67.04998 70.99244 71.48490 71.9736 77.3942 72.46982 72.46982 72.79.6238 70.99	1000 1000 1000 1000 1000 1000 1000 100	.500000 .500000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to Line [mm] 0.0 d
2,9550 23 d - Displand Structure: Dist. [Im]	Z35533 .26100 cement W	63.11433 63.10437 64.09800 s include s include s include s include for the state of	1000 1000 1000 1000 1000 1000 1000 100	.500000 .5000000 .500000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to Line [mm] 0.0 d
2,9550 23 d - Displand	Z35533 .26100 cement W	63.11433 63.10437 64.09800 s include y [m] 64.9800 64.59046 65.08292 65.57538 66.06784 66.56030 67.05276 67.54522 68.03768 68.53014 66.96030 67.05276 67.54522 67.05276 67.54522 67.05276 67.54522 68.03768 68.53014 69.02260 69.51506 67.05276 67.95276 67.95276 67.95276 67.95276 67.95276 67.95276 67.95276 67.95276 67.95276 67.95276 67.95276 68.33794 68.37934 68.23818 68.33934 68.33934 68.33934 68.33934 68.33934 68.33934 68.33934 68.33934 68.33934 68.33934 68.33934 68.33934 68.33934 68.35870 68.75116 68.75116 68.75126	1000 1000 1000 1000 1000 1000 1000 100	.500000 .5000000 .500000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacement Horizontal Line Line Line Line Line Line Line Line	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d displacement perpendicular to Line [mm] 0.0 d
2,9550 23 d - Displand	Z35533 .26100 cement W	63.11433 63.10437 64.09800 s include s include s include s include for the state of	1000 1000 1000 1000 1000 1000 1000 100	.500000 .5000000 .500000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen Horizontal Displacemen Horizontal ine [um] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d displacement perpendicular to Line [mm] 0.0 d
2,9550 23 d - Displand	Z35233 2.66100 2.8670 2	63.11433 63.10431 64.09800 s include Sub-st Coordinat y [m] 64.09800 64.59046 65.08292 65.57538 66.06744 66.56030 67.05276 67.542458 67.05276 6	1000 1000 1000 1000 1000 1000 1000 100	.500000 .5000000 .5000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	y [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Displacemen	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d d displacement perpendicular to Line [mm] 0.0 d



Job No.	Sheet No.	Rev.
Drg. Ref.		-
Made by	Date 14-Aug-2018	Checked

						along the Line	perpendicular to Line	
	[m] 1.54600	[m] 88.72100	[m] 100.50000	[mm] 0.0	[mm] 0.0	[mm] 0.0	[mm] 0.0	d
0.95719 23	3.59013	88.77112	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0	d
1.9144 22	2.63425	88.82125	100.50000	0.0	0.0	0.0	0.0	d
2.8716 21	67837	88.87138	100.50000	0.0	0.0	0.0	0.0	d
3.8288 20	.72250	88.92150	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0	d
4.7859 19	7.76662 0.28869	88.97163 88.99669	100.50000	0.0	0.0	0.0	0.0	d
5.7431 18	3.81075	89.02175	100.50000	0.0	0.0	0.0	0.0	d
6.7003 17 7.1789 17	.85488 .37694	89.07188 89.09694	100.50000	0.0	0.0	0.0	0.0	d
7.6575 16 8.1361 16	.89900	89.12200 89.14706	100.50000	0.0	0.0	0.0	0.0	d
8.6147 15 9.0933 15	.46519	89.17212 89.19719	100.50000 100.50000	0.0	0.0	0.0	0.0	d
10.050 14	1.50931	89.22225	100.50000 100.50000 100.50000	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	
11.008 13	3.55344	89.29744	100.50000	0.0	0.0	0.0	0.0	d
11.965 12	2.59756	89.34756	100.50000	0.0	0.0	0.0	0.0	
12.922 11 13.401 11	.64169	89.39769 89.42275	100.50000 100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0	d
14.358 10	.20788	89.47288	100.50000	0.0	0.0	0.0	0.0	d
15.315 9	25200	89.52300	100.50000 100.50000	0.0	0.0	0.0	0.0	d
d - Displa	cement:	s include	imported o	iispla	cemer	its.		
Structure:	GE-1	Sub-stru	ucture: GE-	-1				
Dist.	x	Coordinate y		x	у	Displacement Horizontal		
		4	-	-	1	displacement	displacement perpendicular	
[m]	[m]	[m]	[m]	[mm]	[mm]	Line [mm]	to Line	
0.0 28 0.49454 29	3.56700 0.06094	64.11000 64.13431	100.50000	0.0	0.0	0.0	0.0	d
0.98907 29	.55487	64.15863	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0	d
2.4727 31	03669	64.23156	100.50000	0.0	0.0	0.0		d
3.4617 32	.53063	64.28019	100.50000	0.0	0.0	0.0 0.0	0.0	
4.4508 33 4.9454 33	3.01244	64.32881	100.50000	0.0	0.0	0.0	0.0	d
5.4399 34	1.00031	64.37744	100.50000 100.50000 100.50000	0.0	0.0		0.0	
6.4290 34	.98819	64.42606 64.45037	100.50000	0.0			0.0	d
7.4180 35	.97606	64.47469	100.50000 100.50000 imported o	0.0	0.0	0.0		d
d - Displa	cement	s include	imported o	lispla	cemer	nts.		
Structure:	GE-2	Sub-stru	ucture: GE-	-2				
m/								
Dist.		Coordinate			v	Displacement		
Dist.	x	Coordinate y	es z	x	У	Horizontal displacement	Horizontal displacement	
			z			Horizontal displacement	Horizontal displacement perpendicular to Line	
[m] 0.0 36	[m] 5.47000	[m] 64.49900	[m] 100.50000	[mm] 0.0	[mm] 0.0	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mm]	
[m] 0.0 36	[m] 5.47000	[m] 64.49900	[m] 100.50000	[mm] 0.0	[mm] 0.0	Horizontal displacement along the Line [mm]	Horizontal displacement perpendicular to Line [mmm] 0.0 0.0 0.0 0.0	d d d
[m] 0.0 36 0.49291 36 0.98581 36 1.4787 36 1.9716 36	[m] 5.47000 5.44014 5.41029 5.38043 5.35057 5.32071	[m] 64.49900 64.99100 65.48300 65.97500 66.46700 66.95900	[m] 100.50000 100.50000 100.50000 100.50000 100.50000	[mm] 0.0 0.0 0.0 0.0	[mm] 0.0 0.0 0.0 0.0	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement perpendicular to Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0	d d d d
[m] 0.0 36 0.49291 36 0.98581 36 1.4787 36 2.4645 36 2.9574 33 3.4503 36	[m] 5.47000 5.44014 5.41029 5.38043 5.35057 5.32071 5.29086 5.26100	[m] 64.49900 64.99100 65.48300 65.97500 66.46700 66.95900 67.45100 67.94300	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0	[mm] 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	d d d d d
[m] 0.0 36 0.49291 36 0.98581 36 1.4787 36 1.9716 36 2.4645 36 3.4503 36 3.4503 36 4.4361 36	[m] 5.47000 6.44014 6.44014 5.38043 6.35057 6.29086 6.26100 6.26100 6.23114 6.20129	[m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.45100 67.45100 68.43500 68.43500	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d d d d d d d d d
[m] 0.0 36 0.49291 36 0.98581 36 1.4787 36 1.9716 36 2.4645 36 3.4503 36 4.4361 36 4.9291 36 5.4220 36	[m] 3.47000 3.44014 3.41029 3.38043 3.35057 3.2071 3.29086 2.26100 3.23114 3.20129 3.17143 3.14157	[m] 64.49900 64.99100 65.48300 66.97500 66.46700 67.45100 67.45100 68.43500 68.43500 68.92700 69.91100	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement perpendicular to Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.98581 36 1.4787 36 1.9716 36 2.4645 36 3.4503 36 4.4361 36 4.9291 36 5.4220 36 6.4078 36 6.4078 36	[m] .47000 .44014 .41029 .38043 .35057 .29086 .26100 .23114 .20129 .17143 .14157 .11171	[m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.45100 67.45100 68.43500 68.43500 69.41900 69.91100 70.40300 70.89500	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Norizontal displacement perpendicular to Line [mm]	d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.98581 36 1.4787 36 1.4787 36 1.9716 36 3.4503 36 3.4503 36 4.4361 36 4.220 36 5.9129 36 6.4078 36 6.4078 36 6.73936 36	[m] .47000 .44014 .41029 .38043 .35057 .32071 .29086 .26100 .23114 .20129 .17143 .14157 .11171 .08186 .05200 .05200	[m] 64.49910 65.48300 65.97500 66.46700 66.95900 67.94300 68.92700 69.91100 70.40300 70.40300 70.89500 71.38700 71.38700	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Perpendicular To Line [mm]	d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.98561 36 1.4787 36 1.9716 36 3.4503 36 3.4503 36 3.9431 36 4.4920 36 5.9119 36 6.907 36 6.907 36 6.907 38 65 38 3794 35 8 3794 35 8 3794 35 8 3794 35	[m] 5.47000 6.44014 6.41029 6.38043 6.38043 6.32071 6.26100 6.23114 6.20129 6.17143 6.11171 6.05200 6.02214 6.02214 6.99229 9.96243	[m] 64.49900 65.48300 65.97500 66.46700 66.597500 66.46700 67.45100 67.94300 68.922700 69.91100 70.89500 71.87900 71.87900 72.86300 72.37100	[m] 10.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Misplacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Perpendicular to Line [mm] 0.0 0	d d d d d d d d d d d d d d
[m] 0.0 3 6.0 49291 36 0.0 4929	[m] .47000 .44014 .41014 .38043 .35057 .32071 .29086 .26100 .23114 .20129 .11171 .08186 .05200 .0214 .99229 .90271 .90271 .87286	[m] 64.49900 65.48300 65.97500 66.97500 66.95900 67.45100 68.927700 68.927700 69.91100 70.89500 71.83700 71.837900 72.86300 73.85900 73.83900 74.83900	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Monigonal Monig	Horizontal Gorizontal Gor	d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.49291 36 0.49291 36 0.98581 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 37 1	[m] .47000 .44014 .41029 .38043 .35057 .32071 .29086 .26100 .23114 .20129 .17143 .14157 .11171 .08186 .05200 .02214 .99229 .96243 .99229 .90271 .87286 .84300 .84310	y [m] 64.49900 64.99100 65.48390 66.597500 66.69750 66.97500 67.95	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Misplacement along the Line [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Horizontal Gorizontal Gor	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.49291 36 0.98581 36 2.4645 36 2.4645 36 2.4645 36 2.9574 36 3.4503 36 3.4503 36 3.9432 36 5.4220 36 5.4220 36 5.9149 36 36 36 9007 38 36 39 9.8581 39 9.8581 31 10.381 37 38 31 10.381 31 31 31 31 31 31 31 31 31	[m] .47000 .44014 .41029 .38043 .35057 .32071 .22102 .23114 .20129 .17143 .11171 .08186 .05200 .02214 .99229 .96243 .99271 .87286 .84300 .84314	Y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.92700 69.91100 70.40300 71.87900 72.37100 72.37100 72.37100 74.33900 74.433900 74.433900 74.831900 75.32300 75.81500	[m] 100.55000 100.55000 100.55000 100.55000 100.55000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Morizontal Morizontal Morizontal Misplacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Perpendicular To Line Colling Coll	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.99291 36 0.99291 36 0.98581 36 1.4787 36 1.4787 36 1.9716 36 34 550 38 34 550 38 36 59149 36 6.9007 36 7.8865 35 8.8723 35 9.8581 35 10.844 33 11.327 39 11.327 33 31 11.327 33 33 11.327 33 33 31 11.327 33 33 31 11.327 33 33 31 2.816 37 33 33	[m] . 47000 . 44014 . 44014 . 41029 . 38043 . 35057 . 32071 . 29086 . 26100 . 26110 . 23114 . 20129 . 17143 . 14157 . 11171 . 08186 . 05200 . 02214 . 99229 . 96243 . 93257 . 87286 . 84300 . 81314 . 78329 . 75343 . 72357 . 75343 . 72357 . 769371	y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.43500 67.94300 68.93200 70.89500 71.38700 71.38700 72.37100 72.37100 72.37300 74.33900 74.33900 74.33900 74.33900 75.32500 76.99900 77.99900	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Perpendicular To Line Coline Co	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.99291 36 0.99291 36 0.98581 36 1.4787 36 1.4787 36 1.9716 36 36 36 36 36 36 36 36 36 36 36 36 36	[m] . 47000 . 44014 . 41029 . 38043 . 35057 . 32071 . 29086 . 23114 . 20129 . 17143 . 14157 . 11171 . 05200 . 02214 . 99229 . 96243 . 99229 . 96243 . 93257 . 90271 . 87286 . 84300 . 81314 . 78329 . 75343 . 72357 . 69371 . 663400	y [m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.94300 66.95900 67.94300 69.92100 70.40300 70.40300 72.37100 72.37100 72.37100 74.339	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Perpendicular To Line Coline Co	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.49291 36 0.98581 36 2.4645 36 2.4645 36 2.9574 36 3.4503 36 3.4503 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 37 3.9432 36 3.9432 37 3.	x [m]	Y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.92700 69.91100 70.40300 71.87900 72.37100 72.37100 72.37100 72.37100 73.35500 74.38700 75.23200 75.23200 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300	[m] 100.55000 100.55000 100.55000 100.55000 100.55000 100.55000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Perpendicular to Line [mm]	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.049291 36 0.98581 36 2.4645 36 2.4645 36 2.9574 36 3.4503 36 3.4503 36 3.9432 36 36 5.4220 36 5.4220 36 5.9149 36 36 36 36 36 36 36 36 36 36 36 36 36	x [m]	Y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.92700 69.91100 70.40300 71.38700 72.37100 72.37100 73.35500 74.33700 75.22300 75.22300 77.92100 77.78300	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Misplacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gorizontal Gorizontal Gisplacement Perpendicular to Line [mm]	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.49291 36 0.98581 36 2.4645 36 2.4645 36 2.9574 36 3.4503 36 3.4503 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 36 3.9432 37 3.9432 36 3.9432 37 3.	x [m]	Y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.92700 69.91100 70.40300 71.87900 72.37100 72.37100 72.37100 72.37100 73.35500 74.38700 75.23200 75.23200 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Horizontal Horizontal Borison Horizontal Horizontal Horizontal Hisplacement Horizontal	Horizontal Hor	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.049291 36 0.98581 36 2.4645 36 2.4645 36 2.9574 36 3.4503 36 3.4503 36 3.9432 36 36 5.4220 36 5.4220 36 5.9149 36 36 36 36 36 36 36 36 36 36 36 36 36	x (m) . 47000 . 47010 . 47000 . 47010 . 47010 . 47010 . 47010 . 47010 . 41012 . 38043	y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.43500 67.94300 68.93200 70.40300 70.40300 70.89500 71.38700 71.38700 72.37100 72.37100 72.37300 74.33900 74.33900 74.33900 75.32500 76.79900 77.729100 s include	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement Horizontal displacement Horizontal displacement Horizontal displacement Horizontal aliapthe	Horizontal Gisplacement Horizontal Gisplacement Perpendicular To Line Colon Co	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.49291 36 0.49291 36 0.49291 36 0.49291 36 1.4787 36 1.4787 36 1.4787 36 1.9716 36 36 36 36 36 36 36 36 36 36 36 36 36	x [m] .47000 .44014 .41029 .42014 .41029 .42014 .41029 .42014 .41029 .42014 .41029 .42014 .41029 .42014 .41029 .42014 .41029 .42014 .41020 .42014 .41020 .41020 .42014 .41020 .41	y [m] 64.49900 64.99100 65.97500 66.95900 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 67.45100 70.49500 71.38700 71.38700 72.37100 72.37100 73.35500 74.83100 75.81500 76.30700 77.729100 77.729100 8 include	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gisplacement Horizontal Gisplacement Horizontal	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36	x [m] .47000 .44014 .41029 .38043 .59029 .38043 .38043 .35057 .32071 .35057 .32071 .32071 .32071 .32071 .32072 .32	y [m] 64.49900 64.99100 65.97500 66.95900 67.45100	[m] 100.50000	[mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement along the Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal displacement Horizontal displ	d d d d d d d d d d d d d d d d d d d
[m] 0.0 36 0.49291 36 0.98581 36 1.4787 36 1.9716 36 2.4645 36 2.9574 36 3.4503 36 3.4503 36 3.4503 36 3.4220 36 5.4220 36 5.4	x [m] .47000 .44014 .54700 .44014 .54700 .44014 .5400 .44014 .55057 .38043 .41029 .38043 .41029 .29086 .26100 .2014 .20129 .2014 .20129 .2014 .20129 .2014 .560386 .3014157 .69371 .69371 .69371 .69371 .69371 .69371 .69371 .69371 .69371 .69371 .72387 .69371 .69371 .69371 .72387 .69371 .69371 .69371 .69371 .69371 .69371 .69371 .69371 .69371 .72387 .69371 .72387 .69371 .72387 .69371 .72387 .69371 .72387 .69371 .72387 .69371 .72387 .69371 .72387 .69371 .72387 .69371 .72387 .72387 .72387 .72387 .72387 .72387 .69371 .72387 .7238	y [m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.94300 68.92700 68.92700 69.91100 77.49300 78.27500 77.33900 77.237100 77.33900 77.33900 77.29100 77.78300 77.78300 77.78300 78.27500 78.27500 78.24606 78.27500	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gisplacement Horizontal Gisplacement Horizontal	Horizontal displacement Horizontal displ	<u>a a a a a a a a a a a a a a a a a a a </u>
[m] 0.0 36 0.49291 36 0.98581 36 1.4787 36 1.9716 36 2.4645 36 2.9574 36 3.4503 36 3.4503 36 3.4503 36 3.4220 38 5.4220 38 5.4	x [m] . 47000 . 44014	y [m] 64.49900 64.99100 65.48300 65.97500 66.548300 67.94300 68.92700 68.92700 69.91100 77.49300 78.27500 77.83900 77.29100 77.83900 77.29100 77.78300 78.27500 88.27500 88.27500 89.91100 78.87500 89.91100 78.87500 89.91100 78.87500 89.91100 78.87500 89.91100 77.29100 77.78300 78.27500 89.28666 89.28	m 100.50000	[mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	[mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	Horizontal Hor	Horizontal displacement Horizontal displ	<u> </u>
[m] 0.0 36 0.49291 36 0.49291 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.9714 36 3.5914 36 6.9007 36 7.8865 33 6.9007 36 7.8865 33 10.351 35 10.351 35 10.351 35 10.351 35 11.337 35 11.337 35 11.337 35 11.337 35 11.337 35 11.337 35 11.330 35 12.323 35 12.323 36 0.95613 34 1.9123 33 0.95613 34 1.9123 33 0.95613 34 1.9123 33 0.95613 34 1.9123 33 0.95613 34 1.9123 33 2.3464 32 3.3464 3	x [m] .47000 .44014 .41029 .42014 .41029 .42014 .41029 .41029 .41024 .41029 .41024 .41029 .41024 .41029 .41024 .41029 .41024 .41	(m] 64.49900 64.99100 66.99100 66.95500 66.95500 66.95500 66.95500 66.95100 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.79300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.78300 77.783100 77.78300 77.78300 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 77.783100 78.27500	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Gisplacement Horizontal Gisplacement Horizontal	Horizontal displacement	<u> </u>
[m] 0.0 36 0.49291 36 0.49291 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.4787 36 1.9714 36 3.5943 36 3.5943 36 5.9149 36 6.9007 36 7.8865 33 6.4078 36 6.9007 36 7.8865 33 10.351 38 10.351 38 11.337 35 11.337 35 11.337 35 11.337 35 11.330 33 12.323 38 12.323 38 12.313 38 36 - Displa Structure: [m] 0.0 0.78866 38 0.95613 34 1.9123 33 2.3464 31 1.4342 32 3.8443 31 1.4342 32 3.8443 31 1.4342 33 3.8445 31 1.4302 33 3.8445 31 1.4302 33 3.8445 31 1.4302 33 3.8445 31 1.4302 33	x [m] .47000 .44014 .41029 .42014 .41029 .42014 .41029 .41029 .41024 .41029 .41024 .41029 .41024 .41029 .41024 .41029 .41024 .41029 .41024 .41029 .41024 .41	(m] 64.49900 64.99100 66.99100 66.95500 66.95500 66.95500 66.95500 66.95100 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.49500 67.798300 77.78300 78.18130	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm1] 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Horizontal Grant Horizontal Horizont	Horizontal displacement	<u> </u>
[m] 0.0 36 0.49291 37 0.49291 37	x [m] .47000 .44014 .41029 .38043 .59021 .41029 .38043 .38043 .38043 .3805 .3806 .38	(m] 64.49900 64.99100 65.97500 66.95500 66.95500 66.95500 66.95500 66.95500 67.45100 68.92700 69.41900 69.41900 69.41900 69.41900 69.41900 69.71.83700 71.83700 71.83700 72.37100 72.37100 72.37100 72.37100 73.35500 74.83100 75.81500 76.79900 77.78300 78.27500 s include Sub-stru Coordinate y [m] 78.27500 s include Sub-stru Coordinate y [m] 78.27500 8 1.81801 78.27501 81.81817 81.81817 81.81817 81.81817 81.81817 81.81817 81.81817 81.818181 81.81818	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Grant Horizontal Grant Horizontal	Horizontal displacement	<u> </u>
[m] 0.0 36 0.49291 36 0.49291 36 1.4787 36 1.4787 36 1.4787 36 1.9716 36 2.4645 38 2.4645 38 2.4645 38 2.4921 36 5.9149 36 6.9007 36 7.8865 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 33 9.0365 38 8.8723 38 9.0365 38 9.0	x [m] .47000 .44014 .41029 .38043 .30271 .35057 .35057 .32071 .30056 .35057 .32071 .30056 .35057 .32071 .30056 .35057 .30	y [m] 64.49900 64.99100 65.97500 66.95900 67.45100 66.95900 67.45100 69.41900 69.41900 69.41900 69.41900 69.41900 67.2.37100 72.37100 72.37100 72.37100 72.37100 72.37100 72.37100 72.37100 73.35500 77.29100 8 include [sub-structure] 8.25600 8 include [sub-structure] 8.25600 8 include [sub-structure] 78.27500 8 include [sub-structure] 79.2750 8 include [sub-structure] 79.2750 8 include [sub-structure] 79.2750 8 include [sub-structure] 79.2750 9 include [sub-structure] 79.	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Grant Horizontal Horizont	Horizontal displacement Horizontal displ	<u> </u>
[m] 0.0 36 0.49291 36 0.98291 36	x [m] .47000 .44014 .41029 .38043 .59027 .39046 .39027 .39046 .39027 .39046 .39027 .39046 .39027 .39	y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.92700 66.95900 67.94300 68.92700 67.94300 68.92700 67.94300 68.93700 67.94300 68.93700 67.94300 68.93700 67.94300 68.93700 71.38700 71.38700 71.38700 72.37100 72.37100 72.37100 72.37100 73.35500 73.35500 73.35500 74.33900 74.33900 74.33900 74.37100 75.32300 77.29100 77.29100 77.29100 77.28100 78.24666 78.24713 78.18819 78.27500	[m] 100.50000	[mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Grigatement along the Line [mm] 0.0	Horizontal displacement Horizontal displ	<u>a a a a a a a a a a a a a a a a a a a </u>
[m] 0.0 36 0.49291 36 0.98291 36	x [m] .47000 .44014 .41029 .38043 .59027 .39046 .39027 .39046 .39027 .39046 .39027 .39046 .39027 .39	y [m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 68.92700 66.95900 67.94300 68.92700 67.94300 68.92700 67.94300 68.93700 67.94300 68.93700 67.94300 68.93700 67.94300 68.93700 71.38700 71.38700 71.38700 72.37100 72.37100 72.37100 72.37100 73.35500 73.35500 73.35500 74.33900 74.33900 74.33900 74.37100 75.32300 77.29100 77.29100 77.29100 77.28100 78.24666 78.24713 78.18819 78.27500	[m] 100.50000	[mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Grigatement along the Line [mm] 0.0	Horizontal displacement Horizontal displ	<u>a a a a a a a a a a a a a a a a a a a </u>
[m] 0.0 36 0.49291 36 0.98291 36	x [m] .47000 .44014 .41029 .38043 .59027 .3903 .39037 .32071 .32071 .32071 .32073 .32071 .32073 .320	y [m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.94300 68.92700 66.95900 67.94300 68.92700 67.94300 68.93700 67.9500 67.	[m] 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm1] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Grigatement along the Line [mm] 0.0	Horizontal displacement Horizontal displ	<u>a a a a a a a a a a a a a a a a a a a </u>
[m] 0.0 36 0.49291 36 0.98291 36	x [m] .47010 .44014 .41029 .38043 .41029 .38043 .41029 .38043 .41029 .38043 .41029 .38043 .41029 .41	y [m] 64.49900 64.99100 65.48300 65.97500 66.95900 67.94300 68.92700 66.95900 67.94300 68.92700 67.94300 68.93700 67.9500 67.	m 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Horizontal Grigatement along the Line [mm] 0.0	Horizontal displacement Horizontal displ	<u>a a a a a a a a a a a a a a a a a a a </u>



Demolition + Excavation + Proposed loading LT

Job No.	Sheet No.	Rev.
Drg. Ref.		<u>. </u>
Made by	Date 14-Aug-2018	Checked

						along the Line	displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	27.99900	77.81200	100.50000	0.0	0.0	0.0	0.0	
0.48978	28.01929	77.32264	100.50000	0.0	0.0	0.0	0.0	
0.97955	28.03957	76.83329	100.50000	0.0	0.0	0.0	0.0	
1.4693	28.05986	76.34393	100.50000	0.0	0.0	0.0	0.0	
1.9591	28.08014	75.85457	100.50000	0.0	0.0	0.0	0.0	
2.4489		75.36521	100.50000	0.0	0.0	0.0	0.0	
2.9387	28.12071	74.87586	100.50000	0.0	0.0	0.0	0.0	
3.4284	28.14100	74.38650	100.50000	0.0	0.0	0.0	0.0	
3.9182	28.16129	73.89714	100.50000	0.0	0.0	0.0	0.0	
	28.18157	73.40779	100.50000	0.0	0.0	0.0	0.0	
4.8978		72.91843	100.50000	0.0	0.0	0.0	0.0	
5.3876		72.42907	100.50000	0.0	0.0	0.0	0.0	
5.8773	28.24243	71.93971	100.50000	0.0	0.0	0.0	0.0	
6.3671	28.26271	71.45036	100.50000	0.0	0.0	0.0	0.0	
6.8569	28.28300		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
7.8364	28.32357	69.98229	100.50000	0.0	0.0	0.0	0.0	
	28.34386		100.50000	0.0	0.0	0.0	0.0	
	28.36414		100.50000	0.0	0.0	0.0	0.0	
	28.38443		100.50000	0.0	0.0	0.0	0.0	
9.7955	28.40471	68.02486	100.50000	0.0	0.0	0.0	0.0	
10.285	28.42500	67.53550	100.50000	0.0	0.0	0.0	0.0	
10.775	28.44529	67.04614	100.50000	0.0	0.0	0.0	0.0	
11.265	28.46557	66.55679	100.50000	0.0	0.0	0.0	0.0	
11.755	28.48586	66.06743	100.50000	0.0	0.0	0.0	0.0	
12.244			100.50000	0.0	0.0	0.0	0.0	
12.734	28.52643	65.08871	100.50000	0.0	0.0	0.0	0.0	
13.224			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	d
d - Disp	placement	s include	imported o	displa	acemer	nts.		

Structure: DH-1 | Sub-structure: DH-1

Dist.		Coordinate	es			Displacement	ts	
	x	y	z	×	У	Horizontal	Horizontal	
						displacement	displacement	
						along the	perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	[mm]		[mm]	[mm]	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
3.8850	44.83535	83.35591	100.50000	0.0	0.0	0.0	0.0	d
4.3707	44.86439	82.87115	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
10.684	45.24196	76.56926	100.50000	0.0	0.0	0.0	0.0	d
11.169	45.27100	76.08450	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
16.997	45.61952	70.26737	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			imported o					

Structure: DH-2 | Sub-structure: DH-2

Dist.		Coordinate	es.			Displacement	ts.	
	x	У	z	x	y	Horizontal	Horizontal	
							displacement	
						along the	perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	46.92163		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	47.90427		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	49.37822		100.50000	0.0	0.0		0.0	
			100.50000	0.0	0.0	0.0	0.0	
	50.85217		100.50000	0.0	0.0	0.0	0.0	
	51.34349		100.50000	0.0	0.0	0.0	0.0	
	51.34349		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	53.30876		100.50000	0.0	0.0	0.0	0.0	
	53.80008		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	54.78271		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	55.76535		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
12.807	58.71325	65.84625	100.50000	0.0	0.0	0.0	0.0	d
13.299	59.20457	65.88130	100.50000	0.0	0.0	0.0	0.0	d
13.792	59.69588	65.91635	100.50000	0.0	0.0	0.0	0.0	d
14.284	60.18720	65.95139	100.50000	0.0	0.0	0.0	0.0	d
14.777	60.67852	65.98644	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	62.15247		100.50000	0.0	0.0	0.0	0.0	
16.747	62.64379	66.12663	100.50000	0.0	0.0	0.0	0.0	
	63.13511		100.50000	0.0	0.0	0.0	0.0	
	63.62642		100.50000	0.0	0.0	0.0	0.0	
18.225	64.11774	66.23178	100.50000	0.0	0.0	0.0	0.0	d



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Made by	Date 14-Aug-2018	Checked

Coordinates y z
683 100.5000 187 100.5000
92 100.5000 97 100.5000
5000
0 0.0 0 0 0.0 0 0 0.0 0
0 0.0 0.0 0.0
0 0.0 0.0 0.0 0.0 0.0 d 0 0.0 0.0 0.0 0.0 d 0 0.0 0.0 0.0 0.0 d 0 0.0 0.0 0.0 0.0 d
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0 0.0 0.0 0.0 0.0 0 0 0.0 0.0 0.0 0.0 d
displacements.
H-3
Displacements x y Horizontal Horizontal displacement displacement
along the perpendicular Line to Line
[mm] [mm] [mm] [mm] 0.0 d 0 0.0 0.0 0.0 0.0 0.0 d
0 0.0 0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0.0 0.0 0.0 0.0 d
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0 0.0 0.0 0.0 0.0 d 0 0.0 0.0 0.0 0.0 d 0 0.0 0.0 0.0 0.0 d
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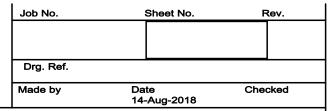
	uon -	+ Exca	valion		Opt	Jood load	9 = .
Dist.	x	Coordinate	es z	x	у	Displacemen	ts Horizontal
	*	У	2		y	displacement	displacement perpendicular
1.8847 9	3.43580	90.86780	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
2.8271 9:	2.49620	90.79570	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d
			100.50000			0.0	0.0 d 0.0 d
4.7118 9	0.61700	90.65150	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
5.6542 89	9.67740	90.57940	100.50000	0.0	0.0	0.0	0.0 d
6.5965 8	3.73780	90.50730	100.50000	0.0	0.0	0.0	0.0 d
8.0101 8	7.32840	90.39915	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d
8.4813 86	5.85860	90.36310	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
9.4236 8 d - Displa	5.91900 acement	90.29100 s include	100.50000 imported d	0.0 lispla	0.0 cemer	0.0 nts.	0.0 d
			ucture: DH-	5			
Dist.	×	Coordinate y	z	x	У		Horizontal
							displacement perpendicular to Line
[m]	[m]	[m]	[m] 100.50000	[mm] 0.0	[mm]	[mm] 0.0	[mm] 0.0 d
0.48006 8	5.95573	89.81235	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
1.4402 8	5.02919 5.06592	88.85504 88.37638	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
2.4003 8 2.8804 8	5.10265 5.13938	87.89773 87.41908	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
3.3604 8	5.17612	86.94042	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
4.3205 8 4.8006 8	5.24958 5.28631	85.98312 85.50446	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
5.2807 8	5.32304	85.02581 84.54715	100.50000 100.50000 100.50000	0.0	0.0	0.0	
6.2408 8	5.43323	84.06850 83.58985	100.50000	0.0	0.0	0.0	0.0 d
7.6810 8	5.50669	82.63254	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d 0.0 d
8.6411 8	5.58015	81.67523	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d
9.6012 8	5.65362 5.69035	80.71792	100.50000	0.0	0.0	0.0	0.0 d
10.561 8	5.72708 5.76381	79.76062 79.28196	100.50000	0.0	0.0	0.0	0.0 d
11.521 8	5.80054 5.83727	78.80331 78.32465	100.50000	0.0	0.0	0.0	0.0 d
12.482.8	5.87400	77.84600	100.50000 imported d	0.0	0.0	0.0	0.0 d
			ucture: DH-	6			
Dist.	x	Coordinate y		x	у	Displacement Horizontal	Horizontal
						along the	displacement perpendicular
[m]	[m]	[m]	[m]	[mm]	[mm]	Line [mm]	to Line [mm]
0.49556 86	5.37989	77.80809	100.50000	0.0	0.0		0.0 d 0.0 d
0.99112 8 1.4867 8	5.88579	77.77018	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
2.4778 84	4.40347	77.65645	100.50000	0.0	0.0	0.0	0.0 d 0.0 d 0.0 d
3 4689 8	3 41526	77 58064	100 50000	0 0	0 0	0.0	0.04
4.4600 8: 4.9556 8:	2.42705	77.50482 77.46691	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
5.9467 8	1.94473	77.39109	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
6.4423 81	0.45062 9.95652	77.35318 77.31527	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
7.9289 7	3.96830	77.23945	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
8.4245 71 8.9200 7	7.98009	77.20155 77.16364	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
9.9112 7	5.99188	77.08782	100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
10 902 7	5 00267	77 01200	100 50000	0.0	0.0	0.0	0.0 d 0.0 d
11.893 7	5.01545	76.93618	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d
12.885 7	4.02724	76.86036 76.82245	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
13.876 7	3.03903 2.54492	76.78455 76.74664	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
14.867 7:	2.05082 1.55671	76.70873 76.67082	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
15.858 7: 16.353 7	1.06261	76.63291 76.59500	100.50000 100.50000 100.50000	0.0	0.0		0.0 d 0.0 d
17.345 69	9.58029	76.51918	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
18.336 68	9.08618	76.44336	100.50000	0.0		0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
18.831 6 19.327 6 19.822 6	7.60386 7.10076	76.36755	100.50000	0.0	0.0	0.0	0.0 d
20.318 6	7.10976 5.61565 5.12155	76.29173	100.50000 100.50000 100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
21.309 6	5.62744 5.13333	76.21591	100.50000		0.0	0.0	0.0 d 0.0 d
22.300 6	4.63923	76.14009 76.10218	100.50000	0.0	0.0		0.0 d 0.0 d
23.291 63	3.65102	76.06427	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
24.282 6:	2.66280 2.16870	75.98845 75.95055	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
25.273 6: 25.769 6:	1.67459 1.18048	75.91264 75.87473	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
26.760 6	J.19227	75.79891	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
27.751 59	9.20406	75.72309	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
28.247 51	8.21585	75.64727	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0 d 0.0 d
29.733 5	7.22764	75.57145	100.50000	0.0	0.0	0.0 0.0 0.0	0.0 d 0.0 d 0.0 d
	5 23942	75 49564	100 50000	0.0	0.0	0.0	0.0 d 0.0 d
30 725 5	5.74532			5.0	0.0	0.0	0.0 u
30.725 56 31.220 59 31.716 59 32.211 56	4.75711	75.38191	100.50000	0.0	0.0	0.0	0.0 d 0.0 d
30.725 56 31.220 59 31.716 59 32.211 56	4.75711	75.38191	100.50000	0.0	0.0	0.0	
30.725 56 31.220 55 31.716 55 32.211 56 32.707 56 d - Displa	4.75711 4.26300 acement	75.38191 75.34400 s include	100.50000 100.50000 imported d	0.0 0.0 ispla	0.0	0.0	0.0 d
30.725 56 31.220 55 31.716 55 32.211 55 32.707 56 d - Displa	4.75711 4.26300 acement : DH-7	75.38191 75.34400 s include	100.50000 100.50000 imported d	0.0 0.0 ispla	0.0	0.0 0.0	0.0 d 0.0 d
30.725 56 31.220 55 31.716 55 32.211 56 32.707 56 d - Displa	4.75711 4.26300 acement : DH-7	75.38191 75.34400 s include	100.50000 100.50000 imported d	0.0 0.0 ispla	0.0	0.0	0.0 d 0.0 d



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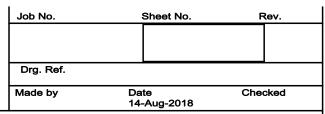
							displacement perpendicular
[m]	[m]	[m]	[m]	[mm]	[mm]	Line	to Line
0.0	54.26300	75.34400	100.5000	0.0	0.0	0.0	0.0 d
0.96205	54.18938	3 76.30323	100.5000	0.0	0.0	0.0	0.0 d
1.9241	54.11577	77.26246	100.5000 100.5000 100.5000	0.0	0.0	0.0	0.0 d
2.8862	54.04215	78.22169	100.5000	0.0	0.0	0.0	0.0 d
3.8482	53.96854	1 79.18092	100.5000	0.0	0.0	0.0	0.0 d
			100.5000		0.0	0.0	0.0 d
5.7723	53.82131	81.09938	100.5000 100.5000 100.5000	0.0	0.0	0.0	0.0 d
6.7344	53.74769	82.05862	100.5000	0.0	0.0	0.0 0.0 0.0	0.0 d
7.6964	53.67408	83.01785	100.5000	0.0	0.0		0.0 d
8.6585	53.60046	83.97708	100.5000	0.0	0.0	0.0	0.0 d
			100.5000				0.0 d
10.583	53.45323	85.89554	100.5000	0.0	0.0	0.0	0.0 d
11.064	53.41642	86.85477	100.5000 100.5000 100.5000	0.0	0.0	0.0	0.0 d
12.507	53.30600	87.81400	100.5000	0.0	0.0	0.0	
a - Disp	piacement	s include	mported	dispia	cemer	nts.	
Structur	re: DH-8	Sub-str	ructure: Di	H-8			
Dist.	x	Coordinat y	es z	x	у	Displacemen	ts Horizontal
	-	,	-	-	,	displacement	displacement
						Line	perpendicular to Line
[m] 0.0	[m] 53.30600	[m] 87.81400	[m] 100.5000	[mm] 0.0	0.0	[mm]	[mm] 0.0 d
0.48457	52.82250	87.78178	100.5000 100.5000 100.5000	0.0	0.0	0.0	0.0 d
1.9383	51.37200	87.68511	100.5000	0.0	0.0	0.0	0.0 d
2.9074	50.40500	87.62067	100.5000	0.0	0.0	0.0	0.0 d
3.3920	49.92150	87.58844	100.5000	0.0	0.0	0.0	0.0 d
4.3612	48.95450	87.52400 87.49178	100.5000 100.5000 100.5000	0.0		0.0	0.0 d
5.3303 5.8149	47.98750 47.50400	87.45956 87.42733	100.5000 100.5000 100.5000	0.0	0.0	0.0	0.0 d
6.7840	46.53700	87.36289	100.5000	0.0	0.0	0.0	0.0 d
7.7532	45.57000	87.29844	100.5000	0.0	0.0	0.0	0.0 d
8.2377 8.7223	45.08650	87.26622 87.23400	100.5000	0.0	0.0	0.0	0.0 d
d - Disp	placement	s include	imported	displa	cemer	nts.	
Specific	Building	Damage R	esults - Ver	tical Dis	place	ements	
Structu	re: GVA-1	Sub-st	ructure: (GVA-1			
Dist.	x [m]	Coordinate Y [m]	es z	z	Disp	lacements	
[ttt]		[m]	[m]		.1		
Vertical		[111]	[m]	[mn	1]		
0.0	1 Offset 9.25200 9.22654	1 89.52300 89.03772	100.50000	0.03 0.03	1887	d	
0.0 0.48595 0.97189 1.4578	1 Offset 9.25200 9.22654 9.20108 9.17562	1 89.52300 89.03772 88.55244 88.06716	100.50000 100.50000 100.50000 100.50000	0.03 0.03 0.03	1887 1630 1349 1043	d d	
0.0 0.48595 0.97189 1.4578 1.9438 2.4297	9.25200 9.22654 9.20108 9.17562 9.15016 9.12470	1 89.52300 89.03772 88.55244 88.06716 87.58188 87.09660	100.50000 100.50000 100.50000 100.50000 100.50000	0.03 0.03 0.03 0.03 0.03	1887 1630 1349 1043 10712 10355	d d d d	
0.0 0.48595 0.97189 1.4578 1.9438 2.4297	1 Offset 9.25200 9.22654 9.20108 9.17562 9.15016 9.12470 9.09924	1 89.52300 89.03772 88.55244 88.06716 87.58188 87.09660 86.61132	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.03 0.03 0.03 0.03 0.03	11887 11630 11349 11043 10712 10355 19970	d d d d d d d d d d	
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0.0 0.48595 0.97189 1.4578 1.9438 2.4227 2.91576 3.4016 3.3735 4.3735 4.3735 4.3735 4.3735 4.3735 4.3737 10.2330 9.2330 9.214.578 11.177 11.663 12.149 12.635 13.121 13.607 14.092 14.578 15.500 16.650 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 17.980 18.4666 18.952 19.438 19.924 20.886 22.884 22.884 22.884 22.884	1 Offset 9.25200 9.22654 9.22654 9.20654 9.20654 9.17562 9.15016 9.12470 9.09924 9.12562 9.15016 8.99740 8.997194 8.992102 8.997194 8.992102 8.997194 8.992102 8.997194 8.992102 8.79372 8.79620 8.87010 8.870	89, 52300 89, 03772 88, 55244 87, 58188 87, 09660 86, 61132 88, 16976 86, 12604 88, 14674 88, 14674 88, 147020 84, 18492 81, 147020 84, 18492 81, 147020 84, 18492 81, 147020 84, 18492 81, 147020 81, 1470	100. 550000 100. 50000	0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.03	11887 1187 11887 1	ଷ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ	
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0.0 0.48595 0.97189 1.4578 1.9438 2.4227 2.91576 3.4616 3.3735 4.3735 4.3735 4.3735 4.3735 4.3737 1.1663 1.107 1.1.663 1.1.177 1.1.663 1.2.149 1.2.635 1.3.121 1.3.607 1.4.092 1.4.578 1.5.004 1.7.980 1.7.7752 1.5.500 1.6.650 1.7.980 1.8.466 1.8.952 1.8.868 1.9.924 1.9.381 1.9.924 1.9.381 1.9.924 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.924 1.9.938 1.9.93	1 Offset 9.25200 9.22654 9.22654 9.20654 9.20654 9.17562 9.15016 9.12470 9.09922 9.15016 9.09922 9.02286 8.99740 8.997194 8.992102 8.99740 8.997194 8.992102 8.79372 8.76820 8.87910 8.87910 8.87910 8.87910 8.79372 8.76820 8.87910 8.79372 8.76820 8.79372 8	89, 52300 89, 03772 88, 55244 88, 06716 87, 58188 87, 09660 86, 61132 88, 16916 88, 16916	100.50000 100.50000	[mm] 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.0	11887 1187 11887 1	d d d d d d d d d d d d d d d d d d d	
0.0 0.48595 0.97189 1.4578 1.9438 2.4297 2.9157 3.3076 4.8295 5.3454 5.8314 6.3173 6.373 6.2892 7.7752 8.2611 8.7471 9.2330 9.7189 10.205 11.1767 11.1	1 Offset 9 .25200 9 .22654 9 .22654 9 .20108 9 .2054 9 .20108 9 .17562 9 .15016 9 .09924 9 .10108 9 .09924 9 .1037 9 .09924 8 .99740 8 .97194 8 .992102 8 .99740 8 .97194 8 .992102 8 .99740 8 .97194 8 .992102 8 .89556 8 .89556 8 .89556 8 .89556 8 .89556 8 .89556 8 .89556 8 .89556 8 .89556 8 .89556 8 .89588 8 .99372 8 .76826 8 .874280 8 .71288 8 .66636 8 .74280 8	1 1 9.52300 89.03772 88.55244 89.03772 88.55244 87.09660 86.61132 88.06716 85.61132 88.06716 85.61132 88.06716 85.61132 88.06716 85.15546	100.50000 100.50000	[mm] 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.	11887 1187 1187 1187 1187 1187 1187 1187 1187 1187 1187 1187 1187 1187 1187 11	d d d d d d d d d d d d d d d d d d d	
0.0 0.48595 0.97189 1.4578 1.9438 2.4297 2.9157 3.8016 3.8026 4.8295 4.8295 4.8295 4.8295 4.8295 4.8295 4.8295 4.8295 4.8295 4.8295 4.8295 4.8296 4.8295 4.8296 4.8	1 Offset 9.25200 9.2654 9.225200 9.2654 9.20108 9.2756 9.2	1 1 9.52300 89.03772 88.55240 88.06714 87.58188 87.09660 86.61132 88.06714 85.64076 88.15548 81.6562 8	100.55000 100.55000	[mm] 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.	11887 11887	d d d d d d d d d d d d d d d d d d d	
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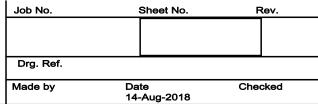
					147/dg-2010
Dist.	x	ordinates	z	Displacements z	
	[m] 83733 6	[m] 52.86067 10	[m] 10.50000 -	[mm] 0.032695 d	
2.8830 7.	80900 €	52.38100 10	0.50000 -	0.034670 d displacements.	
Structure:	GVA-3	Sub-stru	cture: GV	A-3	
Dist.	x	Coordinates	z	Displacements z	
[m]	[m]	[m]	[m]	[mm]	
0.0 7 0.47715 8	.80900	62.38100 1	.00.50000	-0.034670 d -0.039893 d -0.045461 d	
1.4315 9 1.9086 9	.71250	62.27638 1 62.24150 1	00.50000	-0.051394 d -0.057715 d	
2.8629 10 3.3401 11	.66425	62.17175 1 62.13687 1	00.50000	-0.064448 d -0.071616 d -0.079248 d	
				-0.087371 d displacements.	
Structure:	GVA-4	Sub-stru	cture: GV	A-4	
Dist.	x	Coordinates	z	Displacements z	
Vertical O	[m] effset 1	[m] L	[m]	[mm]	
0.47359 11	.65050	62.57433 1	.00.50000	-0.087371 d -0.083943 d -0.080518 d	
1.4208 11	.71950	63.51900 1 63.99133 1	.00.50000	-0.077101 d -0.073699 d -0.070316 d	
2.8415 11	.82300	64.93600 1	.00.50000	-0.066957 d displacements.	
Structure:	GVA-5	Sub-stru	cture: GV	A-5	
Dist.	x	Coordinates	z	Displacements z	
[m]	[m]	[m]	[m]	[mm]	
0.0 11 0.48843 12	.82300	64.93600 1 64.90031 1	.00.50000	-0.066957 d -0.074207 d -0.081912 d	
1.4653 13 1.9537 13	.28438	64.82894 1 64.79325 1	00.50000	-0.090098 d -0.098792 d	
3.4190 15	.23288	64.68619 1	.00.50000	-0.10802 d -0.11782 d -0.12822 d	
3.9074 15 4.3959 16	.72000	64.65050 1 64.61481 1	.00.50000	-0.13926 d -0.15096 d	
5.8612 17	.66850	64.50775 1	.00.50000	-0.16337 d -0.17652 d -0.19046 d -0.20522 d	
6.8380 18 7.3265 19	.64275	64.43637 1 64.40069 1	00.50000	-0.22086 d -0.23741 d	
d - Displa	cements	include i	mported o	-0.25494 d isplacements.	
Structure:					
Dist.	x [m]	Coordinates Y [m]		Displacements z [mm]	
Vertical O	ffset 1	L		-0.25494 d	
0.49248 19 0.98497 19	.58100	63.87383 1	00.50000	-0.26641 d -0.27807 d -0.28991 d	
1.9699 19 2.4624 19	.47300	62.40033 1	.00.50000	-0.30191 d -0.31405 d	
2.9549 19 d - Displa	.40100 cements	61.41800 l include i	.00.50000 .mported o	-0.32630 d lisplacements.	
Structure:	GVA-7	Sub-stru			
Dist.	x	Coordinates Y [m]		Displacements z [mm]	
Vertical O	ffset 1	L			
0.46449 19 0.92897 20	.86425	61.38412 1	.00.50000	-0.32630 d -0.34928 d -0.37363 d	
1.8579 21 2.3224 21	.71725	61.28250 1	.00.50000	-0.39944 d -0.42679 d -0.45576 d	
2.7869 22 3.2514 22	.18050	61.21475 1	.00.50000	-0.48645 d -0.51896 d -0.55338 d	
				isplacements.	
Structure:					
	x [m]	Coordinates Y [m]	z [m]	Displacements z [mm]	
Vertical 0 0.0 23	ffset 1	L 61.14700 1	.00.50000	-0.55338 d	
0.98501 23	.15833	62.13067 1	.00.50000	-0.53030 d -0.50764 d -0.48546 d	
1.9700 23 2.4625 23	.20967	63.11433 1 63.60617 1	.00.50000	-0.46378 d -0.44263 d -0.42203 d	
d - Displa	cements	include i	mported o	isplacements.	
Structure:					
Dist.	x [m]	Coordinates y [m]	z [m]	Displacements z [mm]	
Vertical O	ffset 1	L		-0.42203 d	
0.49313 23	.28670	64.59046 1	00.50000	-0.40197 d -0.38249 d	
1.9725 23 2.4657 23	.36380	66.06784 1 66.56030 1	00.50000	-0.36360 d -0.34530 d -0.32761 d	
3.4519 23 3.4510 23	.44090	67.54522 1	.00.50000	-0.31051 d -0.29402 d -0.27811 d	
4.4382 23 4.9313 23	.49230	68.53014 1 69.02260 1	00.50000	-0.26280 d -0.24806 d	
				*	





						147/dg 2010	
Dist.	x	oordinates y	z	Displacements z			
[m]	[m]	[m]	[m]	[mm]			
5.9176	23.56940	70.00752 10	00.50000	-0.22029 d			
6.9038	23.62080	70.49998 10 70.99244 10 71.48490 10	00.50000	-0.20724 d -0.19472 d -0.18273 d			
7.8901 8.3832	23.67220	71.97736 10 72.46982 10	00.50000	-0.17125 d -0.16026 d			
9.3695	23.74930	72.96228 10 73.45474 10	00.50000	-0.14976 d -0.13973 d -0.13014 d			
10.356	23.80070	73.94720 10 74.43966 10 74.93212 10	00.50000	-0.13014 d -0.12100 d -0.11227 d			
11.342 11.835	23.85210 23.87780	75.42458 10 75.91704 10	00.50000 00.50000 -	-0.10396 d 0.096039 d			
12.821	23.92920	76.40950 10 76.90196 10	00.50000 -).088497 d).081320 d).074494 d			
13.808	23.98060	77.39442 10 77.88688 10 78.37934 10	00.50000 -	0.068004 d 0.061839 d			
14.794 15.287	24.03200 24.05770	78.87180 10 79.36426 10	00.50000 - 00.50000 -				
16.273	24.10910	79.85672 10 80.34918 10 80.84164 10	00.50000 -).045154 d).040154 d).035417 d			
17.260 17.753	24.16050 24.18620	81.33410 10 81.82656 10	00.50000 - 00.50000 -	0.030930 d 0.026681 d			
18.739	24.23760	82.81148 10	00.50000 - 00.50000 -	0.018861 d			
19.725	24.28900	83.79640 10	00.50000 - 00.50000 - 00.50000 -0	0.011875 d			
20.711	24.34040 24.36610	84.78132 10 85.27378 10	00.50000 -0 00.50000 -0	0056485 d 0027986 d			
22.191	24.41750	86.25870 10	00.50000 -1 00.50000 0 00.50000 0	.0024152 d			
23.177	24.46890	87.24362 10	00.50000 0 00.50000 0	.0070314 d			
24.657	24.54600	88.72100 10	00.50000	0.012957 d			
a - Disp	placements	include in	mported dis	placements.			
			ucture: GVA				
Dist.	x	oordinates	z	Displacements z			
[m]	[m] l Offset 1	[m]	[m]	mm]			
0.0 0.47859	24.54600 24.06806	88.72100 10 88.74606 10	00.50000 0. 00.50000 0.	013953 d			
0.95719 1.4358	23.59013 23.11219	88.77112 10 88.79619 10	00.50000 0. 00.50000 0.	014924 d 015868 d			
2.3930	22.15631	88.84631 10	00.50000 0. 00.50000 0. 00.50000 0.	017676 d			
3.3502	21.20044 20.72250	88.89644 10 88.92150 10	00.50000 0. 00.50000 0.	019376 d 020185 d			
4.7859	19.76662	88.97163 10	00.50000 0. 00.50000 0. 00.50000 0.	021722 d			
5.7431 6.2217	18.81075 18.33281	89.02175 10 89.04681 10	00.50000 0. 00.50000 0.	023149 d 023822 d			
7.1789	17.37694	89.09694 10	00.50000 0. 00.50000 0.	025088 d			
8.1361	16.42106	89.14706 10	00.50000 0. 00.50000 0. 00.50000 0.	026248 d			
9.0933 9.5719	15.46519 14.98725	89.19719 10 89.22225 10	00.50000 0. 00.50000 0.	027305 d 027796 d			
10.529	14.03138	89.27237 10	00.50000 0. 00.50000 0. 00.50000 0.	028704 d			
11.486	13.07550	89.32250 10	00.50000 0. 00.50000 0.	029517 d			
12.922	11.64169	89.39769 10	00.50000 0. 00.50000 0.	030564 d			
13.879	10.68581	89.44781 10	00.50000 0. 00.50000 0. 00.50000 0.	031154 d			
15.315	9.25200	89.52300 10	00.50000 0. 00.50000 0.	031887 d			
a - Disp	placements	include in	mported dis	placements.			
		Sub-struct					
Dist.	x	oordinates	z	Displacements z			
[m]	[m] l Offset 1	[m]	[m]	mm]			
0.0	28.56700 29.06094	64.11000 10 64.13431 10	00.50000 -0 00.50000 -0	.82023 d			
1.4836	30.04881	64.18294 10	00.50000 -0 00.50000 -0 00.50000 -0	.90335 d			
2.4727	31.03669	64.23156 10 64.25588 10	00.50000 -0 00.50000 -	.99087 d			
3.4617	32.02456 32.51850	64.28019 10 64.30450 10	00.50000 - 00.50000 -	1.0822 d 1.1290 d			
4.9454	33.50637	64.35312 10	00.50000 - 00.50000 - 00.50000 -	1.2244 d			
5.9344 6.4290	34.49425 34.98819	64.40175 10 64.42606 10	00.50000 - 00.50000 -	1.3212 d 1.3697 d			
7.4180	35.97606	64.47469 10	00.50000 - 00.50000 - 00.50000 -	1.4662 d			
d - Disp	placements	include in	mported dis	lacements.			
Structur	re: GE-2	Sub-struct	ture: GE-2				
Dist.	x c	oordinates y	z	Displacements z			
[m]	[m]	[m]	[m]	mm]			
0.0	36.47000 36.44014	64.49900 10	00.50000 - 00.50000 -	1.5138 d			
0.98581	36.41029	65.48300 10	00.50000 - 00.50000 -	1.3085 d			
1.9716	36.35057 36.32071	66.46700 10 66.95900 10	00.50000 - 00.50000 -	1.1319 d 1.0529 d			
3.4503	36.26100	67.94300 10	00.50000 -0 00.50000 -0 00.50000 -0	.91128 d			
4.4361	36.20129 36.17143	68.92700 10 69.41900 10	00.50000 -0 00.50000 -0	.78861 d			
5.4220	36.14157	69.91100 10	00.50000 -0 00.50000 -0 00.50000 -0	68218 d 63432 d			
6.9007 7.3936	36.05200 36.02214	71.38700 10 71.87900 10	00.50000 -0 00.50000 -0	.54804 d .50918 d			
7.8865 8.3794	35.99229 35.96243	72.37100 10 72.86300 10	00.50000 -0 00.50000 -0	47290 d 43903 d			
			00.50000 -0 00.50000 -0				
1							





		Coordinat		Displacements
[m]	x [m]	y [m]	z [m]	z [mm]
10.351	35.8430	0 74.83100	100.50000	-0.35025 d -0.32445 d
11.337	35.7832	9 75.81500 3 76.30700	100.50000	-0.30034 d -0.27781 d -0.25674 d
12.323 12.816	35.7235 35.6937	7 76.79900 1 77.29100	100.50000	-0.23705 d -0.21864 d -0.20142 d
13.801	35.6340	0 78.27500	100.50000	-0.18532 d displacements.
Structur	re: GE-3	Sub-str	ucture: GE-	-3
Dist.		Coordinat	es	Displacements
[m]	x [m]	y [m]	z [m]	z [mm]
Vertical 0.0 0.47806	35.6340	0 78.27500	100.50000	-0.18532 d -0.18092 d
0.95613	34.6796	3 78.21713	100.50000	-0.17643 d -0.17187 d -0.16724 d
2.3903	33.2480	6 78.13031 7 78.10138	100.50000	-0.15784 d
3.8245	31.8165	0 78.04350	100.50000	-0.15307 d -0.14828 d
5.2587	30.3849	4 77.95669	100.50000	-0.14347 d -0.13865 d -0.13382 d
6.2148 6.6929	29.4305 28.9533	5 77.92775 6 77.89881 8 77.86987	100.50000	-0.12900 d -0.12419 d -0.11941 d
7.1710	28.4761 27.9990	9 77.84094 0 77.81200	100.50000	-0.11465 d -0.10992 d displacements.
Structur Dist.	re: GE-4	Sub-str	ucture: GE- es	Displacements
[m]	x [m]	y [m]	z [m]	z [mm]
Vertical	27.9990	0 77.81200	100.50000	-0.10992 d
0 40070	29 0192	0 77 22264	100 50000	-0.11986 d -0.13041 d -0.14160 d
2.4489	28.0801	4 75.85457 3 75.36521	100.50000	-0.15347 d -0.16606 d
3.4284 3.9182	28.1410 28.1612	0 74.38650 9 73.89714	100.50000	-0.17942 d -0.19358 d -0.20859 d
4.4080	28.1815 28.2018	7 73.40779 6 72.91843	100.50000	-0.22450 d -0.24136 d -0.25921 d
5.8773 6.3671	28.2424 28.2627	3 71.93971 1 71.45036	100.50000	-0.27813 d -0.29816 d
7.3467	28.3032	9 70.47164 7 69.98229	100.50000	-0.31936 d -0.34180 d -0.36555 d
8.3262 8.8160	28.3438 28.3641	6 69.49293 4 69.00357	100.50000	-0.39067 d -0.41724 d
9.7955 10.285	28.4047 28.4250	1 68.02486 0 67.53550	100.50000	-0.44533 d -0.47502 d -0.50639 d
10.775 11.265	28.4452 28.4655	9 67.04614 7 66.55679	100.50000	-0.53953 d -0.57452 d
12.244 12.734	28.5061	4 65.57807	100.50000	-0.61145 d -0.65042 d
13.224	28.5264	3 65.08871	100.50000	-0.69151 d
	28.5467 28.5670	3 65.08871 1 64.59936 0 64.11000	100.50000 100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d
d - Disp	28.5467 28.5670 placemen	3 65.08871 1 64.59936 0 64.11000 ts include	100.50000 100.50000 100.50000 imported o	-0.69151 d -0.73482 d -0.78045 d displacements.
d - Disp	28.5467 28.5670 placemen	3 65.08871 1 64.59936 0 64.11000 ts include	100.50000 100.50000 100.50000 imported o	-0.69151 d -0.73482 d -0.78045 d displacements.
d - Disp	28.5467 28.5670 placemen	3 65.08871 1 64.59936 0 64.11000 ts include	100.50000 100.50000 100.50000 imported o	-0.69151 d -0.73482 d -0.78045 d displacements.
d - Disp Structur Dist. [m] Vertical	28.5467 28.5670 clacemen re: DH-1 x [m] L Offset 44.6030	3 65.08871 1 64.59936 0 64.11000 ts include Sub-str Coordinat Y [m] 1 0 87.23400	100.50000 100.50000 100.50000 imported c ucture: DH- es 	-0.69151 d -0.73482 d -0.78045 d displacements. -1 Displacements _z [mm]
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.4569	28.5467 28.5670 clacemen ce: DH-1 x [m] l Offset 44.6030 44.6320 44.6610 44.66901	3 65.08871 64.59936 0 64.11000 ts include Sub-str Coordinat y [m] 1 0 87.23400 4 86.74924 9 86.26448 3 85.77972	100.50000 100.50000 100.50000 imported of ucture: DH- es z [m] 100.50000 100.50000 100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements. -1 Displacements z [mm] -0.042364 d -0.048601 d -0.05287 d -0.0525187 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.4569 1.9425 2.4282	28.5467 28.5670 placemen re: DH-1 x [m] l Offset 44.6320 44.6610 44.6901 44.7191 44.7191 44.7482	3 65.08871 64.59936 0 64.11000 ts include Sub-str Coordinat y [m] 1 0 87.23400 4 86.74924 9 86.26448 3 85.77972 7 85.29496 2 84.81020	100.50000 100.550000 100.550000 imported c ucture: DH- es	-0.69151 d -0.73482 d -0.78045 d iisplacements. -1 Displacements z [mm] -0.042364 d -0.05287 d -0.052451 d -0.070129 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.4569 1.9425 2.4282 2.9138 3.3994 3.8850	28.5467 28.5670 placemen x [m] 1 Offset 44.6030 44.6320 44.6901 44.7191 44.7772 44.7772 44.8063 44.8363	3 65.08871 64.59936 0 64.11000 ts include Sub-str Coordinat y [m] 1 0 87.23400 4 86.74924 9 86.26448 3 85.77977 7 85.29496 2 84.81020 6 84.32543 0 83.84067 5 83.35591 8 83.35591	100.50000 100.50000 100.50000 imported c ucture: DH- es	-0.69151 d -0.73482 d -0.78045 d iisplacements. 1 Displacements z [mm] -0.042364 d -0.048601 d -0.046861 d -0.055287 d -0.062451 d -0.070129 d -0.070129 d -0.07017 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.4569 1.9425 2.4282 2.9138 3.3994 4.8707 4.8563	28.5467 28.5670 placemen re: DH-1 x [m] l Offset 44.6030 44.6320 44.6901 44.7191 44.7772 44.7772 44.8063 344.8353 44.8643 44.8353	3 65.088711 64.5993 64.110000ts include sinclude y [m] 20 87.234000 48.727972 78.234000 83.885079 86.234800 83.885079 82.87115 33.23450 98.23450 98.23450 98.23450 98.23450 98.23450 98.23450 83.23450 98	100.50000 imported c ucture: DH- es	-0.69151 d -0.73482 d -0.78045 d iisplacements. -1 Displacements z [mm] -0.042364 d -0.048601 d -0.0525287 d -0.070129 d -0.070129 d -0.070154 d -0.070155 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48853 0.97126 1.4859 1.9425 2.2,4282 2.9138 3.3394 4.3707 4.8853 5.3419 5.8276 6.3132	28.5467 28.5570 placemen re: DH-1 x [m] l Offset 44.6030 44.6610 44.6911 44.7482 44.7712 44.8063 44.7482 44.772 44.8063 44.833 44.833 44.834 44.9324 44.934	3 65.08871 1 64.5993 0 64.11000 ts include Sub-str Coordinat y [m] 1 0 87.23400 4 86.74924 9 86.26444 3 85.74926 6 84.32543 6 84.81026 6 84.33543 9 82.87118 3 82.3853 8 81.9916 3 82.87118 3 82.38633 8 81.9916 3 81.9916	100.50000 100.50000 100.50000 imported c ucture: DH- es z [m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042264 d -0.048601 d -0.055287 d -0.055287 d -0.055287 d -0.06715 d -0.070354 d
d - Disg Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.44569 1.9425 2.4282 2.9138 3.3894 3.8850 4.3707 4.8563 5.3419 5.8276 6.3132 6.7988 7.2845 7.7701	28.5467 28.5670 placemen re: DH-1 x [m] l Offset 44.6320 44.6510 44.7482 44.7772 44.7782 44.7843 44.8863 44.8833 44.8934 44.9515 44.9805 44.9516 45.0386 45.0386	3 65.088717 64.5993 0 64.11000 ts include Sub-str Sub-st	100.50000 100.550000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.048601 d -0.05287 d -0.062451 d -0.070129 d -0.070154 d -0.070154 d -0.070154 d -0.070154 d -0.070154 d -0.070155 d -0.070156 d -0.070157 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.9425 2.4282 2.2,9138 3.3394 4.8563 5.3416 5.6312 6.7326 6.7326 6.7326 7.2845	28.5467 28.5670 placemen x m [m] L Offset 44.6030 44.6320 44.66901 44.6901 44.7191 44.7482 44.8063 44.8134 44.9215 44.9805 44.9515 44.963	3 65.08871 64.5993 0 64.11000 ts include Sub-str Coordinat y 10 87.230 4 86.74924 9 86.26444 9 86.26449 3 85.77972 7 85.29496 2 84.81020 6 84.32543 8 83.8355 9 82.8711 8 81.9016 8 81.9016 8 81.9016 9 82.8711 8 81.9016 9 80.9321 8 81.9016 9 80.9321 8 81.9016 9 80.9321 8 81.9016 9 80.9321 8 9 9 8 9 8 8 8 8 9 9 8 9 8 8 8 8 9 9 8 9 8 8 8 8 9 9 9 8 9 8 8 8 9 9 9 8 9 9 9 9 9 8 9	100.50000 100.50000 100.50000 imported c ucture: DH- es z [m1] 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.042364 d -0.048601 d -0.055287 d -0.055287 d -0.055287 d -0.067156 d -0.078354 d -0.078355 d
d - Disp Structur Dist. [m] Vertical 0.97126 1.9425 2.4282 2.9138 3.3994 3.8850 4.3707 4.8563 5.3419 5.8276 6.3332 7.7701 8.7707 8.77701 9.7126	28.5467 28.5670 clacemen e: DH-1 x [m] l Offset 44.6030 44.6610 44.782 44.7791 44.782 44.7772 44.8063 44.8863 44.8934 44.9805 45.0386 45.0386 45.0386 45.0386 45.0386 45.1257 45.1257	3 65.08871 64.5993 0 64.11000 ts include ts include	100.50000 100.50000 100.50000 imported c ucture: DH- es z [m] 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.042364 d -0.048601 d -0.048601 d -0.045287 d -0.052887 d -0.052887 d -0.062451 d -0.070129 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.4569 1.9425 2.4282 2.9138 3.3394 4.3707 4.8563 5.8468 6.3132 6.73845 6.3132 6.73845 6.3132 9.7126 6.3132 9.7126 10.198 10.198 10.198 10.198 10.198 11.159	28.5467 28.5670 placemen re: DH-1 x [m] 1 Offset 44.6030 44.6610 44.7482 44.7791 44.7813 44.8353 44.8353 44.8353 44.9304 44.9305 45.0366 45.0366 45.0366 45.0366 45.0366 45.1558 45.15	3 65.08871 64.5993 0 64.11000 ts include ts include ts include ty [m] 10 87.240 48.6.74924 9 86.2644 89.86.2644 89.86.2644 89.86.2644 89.86.2644 89.86.2644 89.86.2644 89.86.2644 89.86.2644 89.86.2644 89.86.264 84.8102 88.881.9016 88.88406 79.882.87111 80.8326 9 82.87111 80.8326 9 82.87111 7 80.93211 7 80.93211 7 80.93211 7 80.93211 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 7 8 80.9321 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.062451 d -0.052451 d -0.070129 d -0.052451 d -0.070129 d -0.070154 d -0.107154 d -0.11754 d -0.11754 d -0.12914 d -0.12914 d -0.12914 d -0.12915 d -0.12915 d -0.12915 d -0.12915 d -0.12915 d -0.12916 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.4569 1.4569 1.4563 3.3394 4.3707 4.8563 5.6276 6.7326 6	28.5467 28.5670 placemen re: DH-1 x [m] 1 Offset 44.6630 44.6630 44.6901 44.791 44.7719 44.8353 44.8934 44.935 44.935 45.384 46.536 47.791 48.536 48.	3 65.08871 64.5993 0 64.11000 ts include ts include ts include ts include ts include the ts include the ts include ts include ts include the ts include ts	100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.082601 d -0.05287 d -0.05287 d -0.05287 d -0.078254 d -0.078254 d -0.078254 d -0.07825 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 11.48563 2.4282 2.4282 2.4383 3.8850 4.3707 6.3132 6.7988 7.2845 7.7701 8.2557 8.270 9.7126 10.198 11.655 10.198 11.655 12.211 12.226 13.112 12.226	28.5467 28.5670 clacemen re: DH-1 x [m] l Offset 44.6030 44.6610 44.6611 44.7482 44.8712 44.8733 44.8643 44.9515 44.9805 44.9515 44.9805 45.0096 45.0386 45.0386 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257 45.1548 45.1257	3 65.08871 64.5993 0 64.1100 1 64.5993 0 64.1100 1 64.5993 1 80.872 1 80.87	100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements [mm] -0.042364 d -0.048601 d -0.048601 d -0.05281 d -0.062451 d -0.070129 d -0.062451 d -0.070129 d
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.97126 1.48563 1.48569 1.58569 1.48569 1.58569 1.48569 1.48569 1.58569 1.48569 1.5869 1.58569 1.5869 1.58569 1.5	28.5467 28.5670 placemen re: DH-1 x [m] l Offset 44.6030 44.6610 44.6611 44.7482 44.8712 44.8915 54.9805 44.9815 45.00967 45.1838 45.2129 45.3811 45.4852 45.4852 45.4852 45.4853	3 65.08871 64.5993 0 64.1100 1 64.5993 0 64.1100 1 64.5993 1 80.872 2 60.872 1 60.872 2 60.87	100.50000 100.55000 100.55000 100.55000 100.55000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.048601 d -0.05287 d -0.05281 d -0.070129 d -0.062451 d -0.070129 d -0.070154 d -0.070154 d -0.070155 d -0.070155 d -0.070155 d -0.11755 d -0.11951 d -0.1
d - Disp Structur Dist. [m] Vertical 0.0.4.8553 0.97525 1.9425	28.5467 28.5670 placemen re: DH-1 x [m] 1 Offset 44.6320 44.6510 44.6591 44.7911 44.7482 44.8063 44.7915 54.9805 44.9815 44.9815 44.9815 44.9816 45.0096 45	3 65.08871 64.5993 0 64.1100 1 64.5993 0 64.11100 1 Sub-str Coordinat Sub-str (100.50000 100.55000 100.55000 100.55000 100.55000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042264 d -0.048601 d -0.05287 d -0.05288 d -0.05288 d -0.14157 d -0.15913 d -0.14157 d -0.15913 d -0.14157 d -0.15913 d -
d - Disp Structur Dist. [m] Vertical 0.0.48553 0.97525 1.9425	28.5467 28.5670 c)lacemen re: DH-1 x [m] 1 Offset 44.6320 44.6510 44.6911 44.7419 44.7419 44.7419 44.7419 44.7419 45.5023 44.8553 44.8553 45.5614 45.5033 45.55033 45.55033	3 65.08871 64.5993 0 64.1100 1 64.5993 0 64.1100 1 70.000 1 80.700	100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.062451 d -0.052451 d -0.052451 d -0.070129 d -0.062451 d -0.070129 d -0.070129 d -0.070125 d
d - Disp Structur Dist. [m] Vertical 0.94852 0.97126 1.4659 1.9425 2.4128 2.9138 3.3994 4.3707 4.3707 4.3707 4.3707 4.3707 8.7126 6.3132 6.7988 7.2845 7.7701 8.2557 8.7126 10.198 9.2126 10.198 11.659 11.659 11.659 11.699 11	28.5467 28.5670 clacemen Te: DH-1 X [m] 1 Offset 44.6030 44.6630 44.6630 44.6901 44.7911 44.7482 44.8063 44.814 47.921 44.8353 44.8643 44.8915 45.0366 45.0677 45.1257 45.1257 45.1257 45.1257 45.1257 45.1257 45.1548 45.1388 45.3861 45.3861 45.3861 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.3871 45.4685 45.4743 45.5823 45.5614 45.5757	3 65.08871 64.5993 0 64.11000 ts include Sub-str Coordinat	100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d ilisplacements. 1 Displacements z [mm] -0.042364 d -0.048601 d -0.052451 d -0.052451 d -0.052451 d -0.070129 d -0.052451 d -0.070129 d -0.070125 d
d - Disp Structur Dist. [m] Vertical 0.49563 0.9756 1.4559 1.5559 1.5	28.5467 28.5670 placemen Te: DH-1 X [m] 44.6320 44.6320 44.6910 44.6911 44.7491 44.7791 44.7782 44.8063 44.8793 44.8953 44.8953 45.8643 44.9515 45.9676 45.323 46.8534 47.8534 48.9534 48.9534 48.9534 48.9534 48.9534 48.9534 48.9534 48.9534 48.9534 48.9634 48.9534 48.9534 48.9534 48.9534 48.9534 48.9534 48.9534 48.9648 49.9534 49.9	3 65.08871 64.5993 0 64.1100 1 64.5993 0 64.11100 1 64.5993 1 64.5993 1 64.5993 1 64.5993 1 64.5993 1 64.5993 1 64.5993 1 64.5993 1 64.5993 1 65.6933 1 66.8740 1 74.14546 1 77.41.6546 1 77.4166 1 77.4166 1 77.4166 1 77.4166 1 77.4166 1 77.4166 1 77.4166 1 77.4166 1 77.4166 1 77	100.50000 100.550000 100.550000 100.550000 100.550000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.048601 d -0.05287 d -0.062451 d -0.070129 d -0.062451 d -0.070129 d -0.0
d - Disp Structur Dist. [m] Vertical 0.0 0.48563 0.9726 1.9459	28.5467 28.5670 placemen Te: DH-1 X [m] Coffset 44.6920 44.6920 44.6921 44.7712 44.8063 44.7712 44.8713 44.8713 44.8713 44.8713 45.0096 45.0386 45.0386 45.0386 45.1258 45.	3 65.08871 64.5993 0 64.11000 1 64.5993 0 64.11100 1 64.5993 0 64.11000 1 70.8723400 1 87.23400 1 86.74292 1 86.24483 1 86.74292 1 86.24483 1 86.74292 1 86.24883 1 87.7528 1 88.83866 1 88	100.50000 100.550000 100.550000 100.550000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements. 1 Displacements z [mm] -0.042364 d -0.08265 d -0.048801 d -0.05251 d -0.076251 d -0.070129 d -0.052451 d -0.070129 d -0.070125 d -0.07
d - Disp Structur Dist. [m] Vertical 0.0 0.48553 0.971269 1.14269	28.5467 28.5670 placemen Te: DH-1 X [m] LOffset 44.6030 44.6931 44.6931 44.7812 44.8911 44.7812 44.8901 44.7812 44.8903 44.8915 54.9805 45.9806 45.9806 45.9806 45.9806 45.9806 45.9806 45.9866	3 65.08871 64.5993 0 64.1100 1 64.5993 0 64.1100 1 64.5993 1 70.872 2 70.873 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 86.793 2 87.79	100.50000 100.550000 100.550000 100.550000 100.550000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements z [mm] -0.042364 d -0.048601 d -0.05281 d -0.05281 d -0.070129 d -0.062451 d -0.070129 d
d - Disp Structur Dist. [m] Vertical 0.0.4.8553 0.97126 1.9425	28.5467 28.5670 c)lacemen Te: DH-1 X [m] 1 Offset 44.6320 44.6510 44.6591 44.7191 44.7482 44.8063 44.47915 54.7866 54.7866 55.0677 45.1558 45.818 45.818 45.818 45.5233 45.56195 45.56485 45.56485 45.7066 45.7066 45.7066 45.7076 45.15581 46.8188	3 65.08871 64.5993 0 64.1100 1 64.5993 0 64.1100 1 64.5993 1 64.5993 0 72.2340 0 74.1246 0 75.2340 0 74.23	100.50000 100.550000 100.550000 100.550000 100.550000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements [mm] -0.042364 d -0.048601 d -0.048601 d -0.05281 d -0.062451 d -0.0762451 d -0.076245 d -0.0762451 d -0.0762451 d -0.0762451 d -0.0762451 d -0.076245 d -0.07625 d -
d - Disp Structur Dist. [m] Vertical 0.0.4.8553 0.97126 1.9425	28.5467 28.5670 c)lacemen Te: DH-1 X [m] 1 Offset 44.6320 44.6510 44.6591 44.7191 44.7482 44.8063 44.47915 54.7866 54.7866 55.0677 45.1558 45.818 45.818 45.818 45.5233 45.56195 45.56485 45.56485 45.7066 45.7066 45.7066 45.7076 45.15581 46.8188	3 65.08871 64.5993 0 64.1100 1 64.5993 0 64.1100 1 64.5993 1 64.5993 0 72.2340 0 74.1246 0 75.2340 0 74.23	100.50000 100.500000 100.50000 100.50000 100.50000 100.50000 100.50000	-0.69151 d -0.73482 d -0.78045 d iisplacements1 Displacements [mm] -0.042364 d -0.048601 d -0.048601 d -0.05281 d -0.062451 d -0.0762451 d -0.076245 d -0.0762451 d -0.0762451 d -0.0762451 d -0.0762451 d -0.076245 d -0.07625 d -



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**					
Vertica:	45.93900	64.93500	100.50000	-2.148	6 d
0.49257 0.98513	46.43032 46.92163	65.00510	100.50000	-2.160	3 d
1.4777	47.41295 47.90427	65.04014 65.07519	100.50000	-2.162 -2.161	9 d
2.4628 2.9554 3.4480	48.39559 48.88690	65.11024 65.14529	100.50000 100.50000 100.50000	-2.159 -2.153 -2.145	0 d 5 d
3.4480	49.37822 49.86954	65.14529 65.18034 65.21538	100.50000	-2.145 -2.135	6 d 2 d
4.4331	50.36086 50.85217	65.25043 65.28548	100.50000 100.50000 100.50000	-2.122 -2.107	5 d
5.4182 5.9108	51.34349 51.83481	65.32053 65.35558	100.50000	-2.089 -2.070	8 d
6.4034	52.32612 52.81744	65.39063 65.42567	100.50000	-2.048 -2.023	0 d
7.3885	53.30876	65.46072	100.50000	-1.997	5 d
7.8811 8.3736	53.80008 54.29139	65.49577 65.53082 65.56587	100.50000	-1.969 -1.938	9 d
8.8662 9.3588	54.29139 54.78271 55.27403	65.60091	100.50000 100.50000 100.50000	-1.906 -1.872	7 d
9.8513 10.344	55.76535 56.25666	65.63596 65.67101	100.50000	-1.837 -1.799	8 d
10.836 11.329	56.74798 57.23930	65.70606 65.74111	100.50000	-1.761 -1.721	0 d
11.822 12.314	57.73062 58.22193	65.81120	100.50000 100.50000	-1.679 -1.637	3 d
12.807 13.299 13.792	58.71325 59.20457	65.84625 65.88130	100.50000 100.50000	-1.593 -1.549	
14.284	59.69588	65.91635 65.95139	100.50000 100.50000 100.50000	-1.549 -1.504 -1.459	2 a
14.777 15.270	60.67852 61.16984	65.98644 66.02149	100.50000	-1.413 -1.367	3 d 1 d
15.762 16.255	61.66115 62.15247	66.05654 66.09159	100.50000	-1.320 -1.274	7 d
16.747 17.240	62.64379 63.13511	66.12663	100.50000 100.50000	-1.228	2 d
17.732	63.62642 64.11774	66.19673 66.23178	100 50000	-1 136	7 d 7 d
18.225 18.718 19.210	64.60906 65.10038	66.26683 66.30187	100.50000 100.50000 100.50000	-1.047 -1.003	2 d 5 d
19.703	65.59169 66.08301	66.33692 66.37197	100.50000	-0.9605	2 d
20.688	66.57433 67.06564	66.40702 66.44207	100.50000	-0.8773 -0.8371	0 d
21.673	67.55696	66.47712	100.50000	-0.7981	0 d
22.165	68.04828 68.53960	66.51216 66.54721 66.58226 66.61731	100.50000	-0.7232	7 a
23.151	69.03091 69.52223	66.61731	100.50000 100.50000 100.50000	-0.6875 -0.6530	7 d
24.136 24.628	70.01355 70.50487	66.68740	100.50000	-0.5876	4 d 0 d
25.121 25.613	70.99618 71.48750	66.72245 66.75750 66.79255	100.50000 100.50000	-0 5268	8 d
26.106 26.599	71.97882 72.47013	66.82760	100.50000	-0.4708	4 d
27.091 27.584	72.96145 73.45277	66.89769	100.50000 100.50000	-0.4193	4 d
28.076 28.569	73.94409	66.93274	100.50000 100.50000 100.50000	-0.3952 -0.3722	4 d 0 d
29.061 29.554	74.92672 75.41804	67.00284	100.50000	-0.3291	9 d 9 d
30.047 30.539	75.90936 76.40067	67.07293 67.10798	100.50000	-0.3091 -0.2900	6 d
31.032 31.524	76.89199 77.38331	67.14303 67.17808	100.50000	-0.2718 -0.2545	9 d
32.017 32.509	77.87463	67.21313	100.50000	-0.2381 -0.2225	4 d
33.002 33.494	78.36594 78.85726 79.34858	67.24817 67.28322 67.31827	100.50000 100.50000 100.50000	-0.2076	4 d
33.987 34.480	79.83989 80.33121	67.35332 67.38837	100.50000	-0.1935 -0.1801 -0.1674	4 d 3 d
34.972	80.82253	67.42341	100.50000	-0.1553	9 d
35.465 35.957	81.31385 81.80516	67.45846 67.49351	100.50000	-0.1439 -0.1331	7 d
36.450 36.942	82.29648 82.78780	67.52856 67.56361	100.50000	-0.1229 -0.1132	4 d
37.435 37.928	83.27912 83.77043	67.59865 67.63370	100.50000 100.50000	-0.1040 -0.09541	6 d
38.420 38.913	84.26175 84.75307	67.66875 67.70380	100.50000	-0.08722 -0.07948	8 d
39.405 39.898	85.24438 85.73570	67.73885 67.77389	100.50000	-0.07218 -0.06528	2 d
40.390	86.22702 86.71834	67.80894 67.84399	100.50000	-0.05877 -0.05263	2 d
41.376 41.868	87.20965 87.70097	67.87904 67.91409	100.50000 100.50000	-0.04684 -0.04138	7 d
42.361 42.853	88.19229 88.68361	67.94913 67.98418	100.50000 100.50000	-0.03624 -0.03140	8 d 9 d
43.346	89.17492 89.66624	68.01923 68.05428	100.50000	-0.02685 -0.02257	5 d 1 d
	90.15756 90.64888	68.12438	100.50000	-0.01854 -0.01475	
45.316 45.809	91.14019	68.15942	100.50000 100.50000	-0.01120	2 d
46.301 46.794	92.12283	68.22952	100.50000	-0.004733	9 d
47.286 47.779	93.10546	68.29962	100.50000	952.46E- 0.003528	6 d
48.271 48.764	94.08810 94.57941	68.36971 68.40476	100.50000	0.005938	2 d
49.257	95.07073	68.43981	100.50000	0.01029	7 d
50.242	96.05337 96.54468	68.50990	100.50000	0.01409	4 d
51.227	97.03600	68.58000	100.50000 100.50000 imported o	0.01739	1 d
a - Dis	yzacementi	, incidae	rumorred (opiaceme	
Structu	re: DH-3	Sub-stru	ucture: DH-	-3	
Dist.	x	Coordinate	es z	Disp	lacements
[m]	[m]	[m]	[m]	[mm]	
Vertica:	1 Offset 3		100.50000	0.017391	d
0.48909	96.99859 96.96117	69.06765	100.50000	0.018060	
1.4673	96.92376 96.88635	70.04296	100.50000	0.019371	d d
2.4454	96.84893	71.01826 71.50591	100.50000	0.020639	d d
3.4236	96.77411 96.73670	71.99357	100.50000	0.021857	d d
3.9127 4.4018 4.8909	96.69928 96.66187	72.48122 72.96887 73.45652	100.50000	0.023023	d d
5.3799	96.62446 96.58704	73.94417	100.50000	0.024130	d d
5.8690 6.3581	96.58704 96.54963 96.51222	74.91948		0.025177	d
7.3363	96.47480	75.89478	100.50000	0.026161	d d
7.8254 8.3144	96.43739	76.38243	100.50000	0.027080	d d
8.8035 9.2926	96.36257 96.32515	77.35774	100.50000	0.027932	d d
9.7817	96.28774	78.33304	100.50000	0.028333	d
10 000	96.25033	78.82070	100.50000	0.028717	d
10.760 11.249	96.25033	78.82070	100.50000 100.50000 100.50000	0.029717 0.029084 0.029435	d d d



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[m]	x [m]	y [m]	z [m]	z [mm]
12.227	96.10067	80.77130	100.50000	0.029768 d 0.030086 d
13.205 13.694	96.02585 95.98843	81.74661 82.23426	100.50000	0.030386 d 0.030670 d 0.030938 d
14.673 15.162	95.91361 95.87620	83.20957 83.69722	100.50000	0.031190 d 0.031426 d 0.031646 d 0.031851 d
16.140 16.629	95.80137 95.76396	84.67252 85.16017	100.50000	0.032041 d 0.032216 d
17.607 18.096	95.68913 95.65172	86.13548 86.62313	100.50000	0.032376 d 0.032522 d 0.032653 d
19.074 19.563	95.57689 95.53948	87.59843 88.08609	100.50000	0.032771 d 0.032876 d 0.032967 d
20.542 21.031	95.46465 95.42724	89.06139 89.54904	100.50000	0.033045 d 0.033111 d 0.033164 d
22.009 22.498	95.35241 95.31500	90.52435	100.50000	0.033206 d 0.033236 d 0.033255 d
			-	displacements.
Dist.		Coordinate		Displacem
[m]	m [m]	y [m]	z [m]	z [mm]
0.0 0.47118	94.84520	91.01200	100.50000	0.033255 d 0.033244 d
1.4135 1.8847	93.90560 93.43580	90.90385	100.50000	0.033221 d 0.033186 d 0.033137 d
2.8271 3.2983	92.49620 92.02640	90.79570	100.50000	0.033075 d 0.032998 d 0.032907 d
4.2406 4.7118	91.08680	90.68755	100.50000	0.032801 d 0.032680 d 0.032542 d
5.1830 5.6542	90.14720 89.67740	90.61545	100.50000	0.032388 d 0.032217 d 0.032028 d
6.5965 7.0677	88.73780 88.26800	90.50730	100.50000	0.031822 d 0.031597 d 0.031353 d
8.0101 8.4813	87.32840 86.85860	90.39915	100.50000	0.031089 d 0.030806 d 0.030502 d
9.4236	85.91900	90.29100	100.50000	0.030177 d displacements.
Structu	re: DH-5	Sub-str	ucture: DH	-5
Dist.	x [m]	Coordinate Y [m]	es z [m]	Displacem z [mm]
Vertical	l Offset	1		0.030177 d
0.48006 0.96012	85.95573 85.99246	89.81235 89.33369	100.50000	0.029754 d 0.029299 d 0.028811 d
1.9202	86.06592 86.10265	88.37638 87.89773	100.50000	0.028287 d 0.027728 d
3.3604	86.17612 86.21285	86.94042 86.46177	100.50000	0.026496 d 0.025822 d
4.8006 5.2807	86.28631 86.32304	85.50446 85.02581	100.50000	0.023547 d
5.7607 6.2408 6.7209	86.35977 86.39650 86.43323	84.54715 84.06850 83.58985	100.50000 100.50000 100.50000	0.022700 d 0.021808 d 0.020868 d
7.2009 7.6810	86.46996 86.50669	83.11119 82.63254	100.50000	0.019879 d
8.6411 9.1212	86.58015 86.61688	81.67523 81.19658	100.50000	0.016607 d 0.015411 d
10.081	86.69035 86.72708	80.23927 79.76062	100.50000	0.012852 d 0.011487 d
11.521	86.80054 86.83727	78.80331 78.32465	100.50000	0.010064 d 0.0085813 d 0.0070385 d
				0.0054345 d displacements.
			ucture: DH	
Dist.	x [m]	Coordinate Y [m]	es z [m]	Displace z [mm]
0.0	1 Offset 86.87400	77.84600	100.50000	0.0054345 d
0.49556 0.99112 1.4867	86.37989 85.88579 85.39168	77.80809 77.77018 77.73227	100.50000 100.50000 100.50000	0.0033393 d 0.0011298 d -0.0011985 d
2.4778	84.40347 83.90936	77.65645	100.50000	-0.0036496 d -0.0062280 d -0.0089380 d
3.9645 4.4600	82.92115 82.42705	77.54273	100.50000	-0.017902 d
4.9556 5.4511 5.9467	81.93294 81.43883 80.94473	77.46691 77.42900 77.39109	100.50000 100.50000 100.50000	-0.021182 d -0.024617 d -0.028209 d
6.4423 6.9378 7.4334	80.45062 79.95652 79.46241	77.35318 77.31527 77.27736	100.50000 100.50000 100.50000	-0.031963 d -0.035884 d -0.039975 d
7.9289 8.4245	78.96830 78.47420	77.23945	100.50000 100.50000 100.50000	-0.044240 d -0.048684 d
9.4156 9.9112	77.48598 76.99188	77.12573	100.50000 100.50000 100.50000	-0.058119 d -0.063117 d
10.902 11.398	76.00367 75.50956	77.01200	100.50000 100.50000 100.50000	-0.073689 d -0.079267 d
12.389 12.885	74.52135	76.89827 76.86036	100.50000	-0.091017 d -0.097190 d
13.876 14.371	73.03903 72.54492	76.78455 76.74664	100.50000 100.50000 100.50000	-0.11014 d -0.11691 d
15.362 15.858	71.55671 71.06261	76.67082 76.63291	100.50000 100.50000 100.50000	-0.13104 d -0.13839 d
16.849 17.345	70.07439 69.58029	76.55709 76.51918	100.50000 100.50000 100.50000	-0.15366 d -0.16157 d
17.840	69.08618	76.48127 76.44336	100.50000	-0.16965 d



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												 7 tag 20	
Dist.	x	ordinates Y 2	z	Displacem	ents								
[m]	[m]	[m] [n		[mm] -0.19486 d									
19.822	67.10976 7	6.36755 100.5 6.32964 100.5 6.29173 100.5	50000	-0.19486 d -0.20355 d -0.21238 d									
21.309	65.62744 7	6.25382 100.5 6.21591 100.5 6.17800 100.5	50000	-0.22132 d -0.23037 d -0.23951 d									
22.300	64.63923 7 64.14512 7	6.14009 100.5 6.10218 100.5	50000	-0.24873 d -0.25801 d									
23.787	63.15691 7	6.06427 100.5 6.02636 100.5 5.98845 100.5	50000	-0.26734 d -0.27671 d -0.28609 d									
24.778 25.273	62.16870 7 61.67459 7	5.95055 100.5 5.91264 100.5	50000	-0.29546 d -0.30481 d									
25.769 26.265 26.760	61.18048 7 60.68638 7 60.19227 7	5.87473 100.5 5.83682 100.5 5.79891 100.5	50000	-0.31413 d -0.32338 d -0.33255 d									
27.256 27.751	59.69817 7 59.20406 7	5.76100 100.5 5.72309 100.5	50000	-0.34162 d -0.35057 d									
28.742	58.21585 7	5.68518 100.5 5.64727 100.5 5.60936 100.5	50000	-0.35938 d -0.36802 d -0.37649 d									
29.733	57.22764 7 56.73353 7	5.57145 100.5 5.53355 100.5	50000	-0.38475 d -0.39278 d									
31.220	55.74532 7	5.49564 100.5 5.45773 100.5 5.41982 100.5	50000	-0.40058 d -0.40811 d -0.41535 d									
32.211	54.75711 7 54.26300 7	5.38191 100.5 5.34400 100.5	50000	-0.42230 d -0.42892 d									
d - Disp	otacements	include impor	rtea ai	spiacements.									
		Sub-structure ordinates	e: DH-7										
Dist.	x [m]	ordinates y z [m] [m		Displaceme z [mm]	nts								
Vertical	Offset 1												
0.0 0.48103 0.96205	54.26300 7 54.22619 7 54.18938 7	5.34400 100.5 5.82362 100.5 6.30323 100.5	50000 50000	-0.42892 d -0.39799 d -0.36910 d									
1.4431	54.15258 7 54.11577 7	6.78285 100.5 7.26246 100.5	50000	-0.34211 d -0.31690 d									
2.8862	54.04215 7	7.74208 100.5 8.22169 100.5 8.70131 100.5	50000	-0.29333 d -0.27130 d -0.25072 d									
3.8482 4.3292	53.96854 7 53.93173 7	9.18092 100.5 9.66054 100.5	50000	-0.23147 d -0.21348 d									
5.2913 5.7723	53.85812 8 53.82131 8	0.14015 100.5 0.61977 100.5 1.09938 100.5	50000	-0.19665 d -0.18092 d -0.16620 d									
6.7344	53.74769 8	1.57900 100.5 2.05862 100.5 2.53823 100.5	50000	-0.15244 d -0.13957 d									
7.6964 8.1774	53.67408 8 53.63727 8	3.01785 100.5 3.49746 100.5	50000	-0.11628 d -0.10576 d									
9.1395	53.56365 8	3.97708 100.5 4.45669 100.5 4.93631 100.5	50000 -	0.086711 d									
10.102	53.49004 8 53.45323 8	5.41592 100.5 5.89554 100.5	50000 - 50000 -	0.070057 d 0.062534 d									
11.545	53.37962 8	6.37515 100.5 6.85477 100.5 7.33438 100.5	50000 -	0.048931 d									
12.507	53.30600 8	7.81400 100.5 include impor	50000 -	0.037052 d									
Structur	e: DH-8	Sub-structure	⇒: DH-8										
Dist.	Co	ordinates		Displaceme	ents								
[m]	x [m]	y 2 [m] [n		z [mm]									
0.0	Offset 1 53.30600 8	7.81400 100.5	50000 -	0.037052 d									
0.96915	52.33900 8	7.78178 100.5 7.74956 100.5 7.71733 100.5	50000 -	0.038518 d									
1.9383	51.37200 8 50.88850 8	7.68511 100.5 7.65289 100.5	50000 - 50000 -	0.039784 d 0.040338 d									
3.3920	49.92150 8	7.62067 100.5 7.58844 100.5 7.55622 100.5	50000 -	0.041285 d									
4.3612	48.95450 8 48.47100 8	7.52400 100.5 7.49178 100.5 7.45956 100.5	50000 - 50000 -	0.042008 d 0.042283 d									
5.8149 6.2994	47.50400 8 47.02050 8	7.42733 100.5 7.39511 100.5	50000 - 50000 -	0.042659 d 0.042758 d									
7.2686	46.05350 8	7.36289 100.5 7.33067 100.5 7.29844 100.5	50000 -	0.042779 d									
8.2377	45.08650 8 44.60300 8	7.26622 100.5 7.23400 100.5	50000 - 50000 -	0.042561 d 0.042364 d									
		include impor											
Specific I	Building Da	mage Results -	All Se	gments									
Structur	e: GVA-1	Sub-structur	re: GVA	-1									
Vertical from Li	ne for	Segment	Start	Length Curvat	ure Deflection Ratio	Horizontal		of	Max Gradient of Vertical	Radius of	Damage Category		
Verti Movem	nent					Strain	Strain	Displacement	Displacement Curve	Curvature			
Calcula [m 0.	n] 0 Al	l settlements	[m] s are]	[m] ess than the S	[%] Settlement Troug	[%] h Limit Sen	[%] sitivity.	Curve		[m]			
Tensile	horizontal	strains are	+ve, c	compressive hor	izontal strains	are -ve.							
		Sub-structur											
Vertical from Li Verti	ne for	Segment	Start	Length Curvat	ure Deflection Ratio	Horizontal		of	Max Gradient of Vertical	Radius of	Damage Category		
Movem Calcula	nent					Strain	Strain	Displacement Curve	Displacement Curve	curvature			
[m	n] 0 Al	l settlements	[m] s are l	[m] ess than the S	[%] Settlement Troug	[%] h Limit Sen	[%] sitivity.			[m]			
					izontal strains	are -ve.							
Structur		Sub-structur Segment			ure Deflection	Averson	Max	May Gradia	: Max Gradient	Min	Damage		
from Li Verti	ne for	seyment	scart	. mengun curvat		Average Horizontal Strain		of	of Vertical Displacement	Radius of			
Movem	tions		r	[]	r a 3			Displacement Curve					
[m 0. Tensile	0 Al	l settlements	[m] s are l +ve, c	[m] ess than the S compressive hor	[%] Settlement Troug Sizontal strains	[%] h Limit Sen are -ve.	[%] sitivity.			[m]			
						. = .							
Vertical		Sub-structur Segment			ure Deflection	Average	Max	Max Gradient	: Max Gradient	Min	Damage		



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from Line for Vertical Movement			Ratio	Horizontal Strain	Tensile Strain	of Horizontal Displacement		Radius of Curvature	Category
Calculations [m] 0.0 Al Tensile horizontal	l settlements strains are	[m] [m] s are less than the Sett +ve, compressive horizo	[%] lement Trou ntal strair	[%] igh Limit Ser is are -ve.	[%] nsitivity.			[m]	
Structure: GVA-5	Sub-structur	re: GVA-5							
Vertical Offset from Line for Vertical Movement	Segment	Start Length Curvatur		Horizontal	Max Tensile Strain	of	Displacement	Radius of	
Calculations [m] 0.0	1	[m] [m] 1 2.4422 5.3718 Sagging	[%] 216.59E-	-6 (%)	[%] 0 206.03E-	Curve 0.		[m] 5 243460.	0 (Negligible)
Tensile horizontal	strains are	+ve, compressive horizo	ntal strair	ns are -ve.					(Negligible)
Structure: GVA-6	Sub-structur	re: GVA-6							
Vertical Offset from Line for Vertical Movement Calculations		Start Length Curvature	Deflection Ratio	Average Horizontal Strain	Tensile	Max Gradient of Horizontal Displacement Curve	of Vertical Displacement	Radius of	Damage Category
[m] 0.0	1	[m] [m] 1 0.0 2.9540 Sagging	[%] 23.924E-6	[%]	[%] 22.495E-6		24.879E-6	[m] 1.2152E+6	0
		+ve, compressive horizo							(Negligible)
Structure: GVA-7 Vertical Offset	Sub-structur Segment		D-61		Max	Mana Gara Adams	W	Min	Damage
from Line for Vertical Movement Calculations	segment	Start Length Curvature		Horizontal Strain	Tensile		of Vertical Displacement	Radius of	
[m] 0.0	1	[m] [m] 1 0.0 3.7150 Sagging	[%] 350.64E-6	[%]	[%] 319.25E-6	0.0	74.110E-6	[m] 111010.	0
	strains are	+ve, compressive horizo							(Negligible)
Structure: GVA-8	Cub atmosphin	wa: (372 0							
Vertical Offset from Line for Vertical	Segment	Start Length Curvature		n Average Horizontal Strain		of Horizontal	Max Gradient of Vertical Displacement	Radius of	Damage Category
Movement Calculations [m] 0.0	1	[m] [m] 1 0.0 2.9550 Sagging	[%] 75.781E-6	[%]	[%] 71.347E-6	Displacement Curve	-46.882E-6		0
Tensile horizontal	strains are	+ve, compressive horizo	ntal strair	ıs are -ve.					(Negligible)
Structure: GVA-9	Sub-structur	re: GVA-9							
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start Length Curvature		n Average Horizontal Strain	Tensile		of Vertical Displacement	Radius of	Damage Category
[m] 0.0	1	[m] [m] 1 0.0 11.342 Sagging	[%] 317.27E-6	[%]	[%] 375.33E-6		-40.681E-6	[m] 405830.	0
Tensile horizontal		+ve, compressive horizo							(Negligible)
aturnatura and 10	I dub about the								
Structure: GVA-10 Vertical Offset from Line for	Segment	Start Length Curvature		Average Horizontal	Max Tensile		Max Gradient of Vertical		Damage Category
Vertical Movement Calculations [m]		[m] [m]	[%]	Strain [%]	[%]	Displacement Curve	Displacement Curve	Curvature [m]	
Tensile horizontal	strains are	s are less than the Sett +ve, compressive horizo			nsitivity.				
Structure: GE-1 Vertical Offset	Sub-structure Segment	e: GE-1 Start Length Curvatur	e Deflect!	n Averses	Max	May Gradie	t Max Gradient	. Min	Damage
from Line for Vertical Movement Calculations	segment	Start bength Curvatur		Horizontal		of	of Vertical Displacement	Radius of	Category
[m] 0.0	1	[m] [m] 1 0.0 6.0345 Sagging	[%] 251.18E-	·6 [%]	[%] 308.60E-	6 0.	0 98.120E-6	[m] 5 201000.	0
	1	2 6.0345 1.8775 Hogging	30.306E-	-6 0.0	30.148E-	6 0.	0 98.120E-6	468760.	(Negligible) 0 (Negligible)
Tensile horizontal	strains are	+ve, compressive horizo	ntal strair	s are -ve.					(wearrainie)
Structure: GE-2	Sub-structure	e: GE-2							
Vertical Offset from Line for Vertical Movement	Segment	Start Length Curvature		Average Horizontal Strain	Max Tensile Strain	of	Max Gradient of Vertical Displacement	Radius of	Damage Category
Calculations [m] 0.0	1	[m] [m] 1 0.0 13.801 Sagging	[%] 0.0022466	[%]	[%] 0.0033736	Curve		[m] 30395.	0 (Negligible)
Tensile horizontal	strains are	+ve, compressive horizo	ntal strair	ıs are -ve.					(**eAttAtDIG)
Structure: GE-3	Sub-structure	e: GE-3							
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start Length Curvatur	e Deflectio Ratio	on Average Horizontal Strain	Tensile		of Vertical Displacement	Radius of	
[m] 0.0	1	[m] [m] 1 0.0 4.9430 Hogging	[%] 12.423E-	[%] -6 0.0	[%] 11.909E-		0 -10.094E-6	[m] 5 2.6721E+6	
-	2	2 4.9430 2.7060 Sagging							(Negligible)
Tensile horizontal		+ve, compressive horizo							(Negligible)
Structure: GE-4	Sub-structure	e: GE-4							
Vertical Offset from Line for Vertical Movement	Segment	Start Length Curvature		Average Horizontal Strain	Max Tensile Strain	of	Max Gradient of Vertical Displacement Curve	Radius of	Damage Category
Calculations [m]		[m] [m]	[%]	[%]	[%]	Curve		[m]	
December Velice		40.40.40. Comum					_		



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The content of the	Demolition +	Excavat	ion +	Prop	osed lo	oading l	_T					Made b	У	Date 14-Aug-2018	Che
Transition for the control of the co	from Line for Vertical Movement					Ratio	Horizontal Strain	Tensile Strain	of Horizont Displacem	of Ve al Displ ent Cu	ertical lacement urve	Radius of Curvature	Category		
Companies Comp								0.0013973	3	0.0 93	3.153E-6				
The column															
Calculations	Vertical Offset from Line for Vertical			Length	Curvature		Horizonta	l Tensile	of Horizon	of V	Vertical placemen	L Radius of	Category		
Transition for the properties of the control of the	[m]		[m] 1 3.885	[m] 0 18.453	Sagging		5 [%]	[%] 0 0.004330	Curve		325.16E-		0 (Negligible)		
The control of the	Tensile horizontal	l strains are	+ve, c	ompressi	ve horizor	ntal strain:	s are -ve.								
The content															
1	from Line for Vertical Movement Calculations	Segment			Curvature	Ratio	Horizonta Strain	l Tensile Strain	of Horizon Displace	of V tal Disp ment C	Vertical	l Radius of it Curvature	Category		
Comparison Com					Hogging	[%] 0.001505	[%] 6 0.	[%] 0 0.001435	51	0.0 -9	94.067E-				
Procedure Col.	m							0 0.001506	51	0.0 -9	94.067E-	-6 204190.	0		
Marche March Mar					ve norizor	ntal strain	s are -ve.								
Section Sect					Curvature	Deflection	Average	May	May Gradi	ent May G	radient	- Min	Damage		
Table 1	from Line for Vertical Movement Calculations	begmene				Ratio	Horizontal Strain	Tensile Strain	of Horizont Displacem	of Ve al Displ	ertical Lacement	Radius of Curvature			
Name	0.0 Al Tensile horizontal	l strains are	s are le +ve, c	ess than ompressi	the Settl	lement Troud	gh Limit Se					,			
The continue of the continue	Vertical Offset from Line for Vertical Movement				Curvature		Horizontal	Tensile	of Horizont Displacem	of Ve	ertical Lacement	Radius of			
Vertical Offset Segment Park Length Curvature Deficition Park Section Park	[m] 0.0 A	ll settlement l strains are	s are 1	ess than	the Settl	lement Troug	gh Limit Se					[m]			
Part Second Part		Sub-structur													
The part Section Sec	from Line for Vertical Movement Calculations	Segment			Curvature	Ratio	Horizontal Strain	Tensile Strain	of Horizont Displacem	of Ve al Displ	ertical Lacement	Radius of Curvature			
## Strains for	Tensile horizontal Structure: DH-6	l strains are	e +ve, c	ompressi	ve horizor	ntal strains	s are -ve.			ient Max	Gradien	nt. Min	Damage		
1 13,300 10,800 13,9354-6 0.0 78,2378-6 0.0 78,2378-6 0.0 18,2358-6 757010 (Regligible)	from Line for Vertical Movement Calculations		[m]	[m]		Ratio	Horizonta Strain	I Tensile Strain	Horizon Displace Curve	of V tal Disp ment C	Vertical placemen Curve	Radius of t Curvature	Category		
Structure: DH-7 Sub-structure: DH-8 Sub-	0.0												(Negligible)		
Vertical Offset Segment Segmen	Tensile horizontal								-				(Negligible)		
Ratio Borisontal Novement Color State Stat	Structure: DH-7	Sub-structur	e: DH-7												
[m]	from Line for Vertical Movement	Segment	Start	Length	Curvature		Horizontal	Tensile	of Horizont Displacem	of Ve	ertical Lacement	Radius of			
Vertical Offset Segment Start Length Curvature Deflection Average From Line for Vertical Novement Calculations [m] [n]	[m] 0.0		1 0.0	8.1774		554.59E-6	0.0	[%] 526.68E-6		0.0 -64	4.303E-6	[m] 5 111450.			
Vertical offset from Line for Vertical Novement Calculations [m] [m] [k] [k] [k] [k] [m] [m] [m] [m] [m] [m] [m] [m] [m] [m															
[m]	Vertical Offset from Line for Vertical				Curvature		Horizontal	Tensile	of Horizont	of Ve al Displ	ertical Lacement	Radius of			
Vertical Offset from Line for Vertical Max Gradient Max G	Calculations [m] 0.0 A	ll settlement l strains are	s are l	ess than	the Settl	lement Troug	gh Limit Se	[%] ensitivity.	Curve			[m]			
Vertical Offset from Calculations [m] Structure: GVA-2 Sub-structure: GVA-2 Sub-structu	Specific Building Da	amage Results	- Critical	Values f	or All Segm	nents within	Each Sub-St	tructure							
Offset from Vertical Movement Calculations [m] Strain S						Vay Va ~	radiont V	· Gradian-	wi-	w:-	Don -	ogo Catono			
[m] [%] [m] [m] [m] Structure: GVA-2 Sub-structure: GVA-2 Vertical Deflection Average Max Max Max Gradient Max Gradient Min Min Damage Category Offset from Ratio Horizontal Slope Settlement Tensile of of Vertical Radius of Radius of Strain Horizontal Displacement Curve (Hogging) (Sagging) Movement Calculations [m] [%] [mm] [%] [mm] [%] [mm] [m]	Offset from Rat Line for Vertical Movement	tio Horizo	ntal Sl		lement Ter	nsile o rain Hori: Displa	of of zontal Dis acement	Vertical placement	Radius of Curvature	Radius of Curvature	E e	age Category	•		
Vertical Deflection Average Max Max Max Max Gradient Max Gradient Min Min Damage Category Offset from Ratio Horizontal Slope Settlement Tensile of of Vertical Radius of Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Curvature Curvature Curvature Curvature Curvature Strain For Curve Movement Calculations [m] [%] [mm] [%] [mm] [m] [m] [m]	Calculations [m]	%] [%]		[mm] [[%]			[m]	[m]					
Offset from Ratio Horizontal Slope Settlement Tensile of of Vertical Radius of Radius of Radius of Line for Strain Strain Horizontal Displacement Curvature Curvature Curvature Vertical Displacement Curva (Hogging) (Sagging) Movement Calculations [m] [%] [%] [mm] [%] [m] [m] [m]	Structure: GVA-2	Sub-structu	ıre: GVA	-2											
Calculations [m] [%] [%] [mm] [%] [m] [m]	Offset from Rat Line for Vertical	tio Horizo	ntal Sl		lement Ter	nsile o rain Hori: Displa	of of zontal Dis acement	Vertical placement	Radius of Curvature	Radius of Curvature	E e	age Category			
Structure: GVA-3 Sub-structure: GVA-3	Calculations	%] [%]		[mm] [[m]	[m]					
	Structure: GVA-3	Sub-structu	ıre: GVA	-3											



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Offset from Line for Vertical	Deflection Ratio		Max Slope Set	tlement Tens	ile in Hori Displ	zontal Displacement Cu	radient Mirtical Radiu acement Curva rve (Hogg	s of Radius	of	e Category
Movement Calculations	[%]	[%]		[mm] [%		rve	ſm	1 [m]		
Structure: G				[mm] [e	1		į iii	1 []		
Vertical Offset from Line for	Deflection	Average	Max	tlement Tens	ile in Hori	zontal Displ	rtical Radiu acement Curva	s of Radius ture Curvat	of	e Category
Vertical Movement Calculations [m]	[%]	[8]		[mm] [%	Cu	acement Cu rve	rve (Hogg	ing) (Saggi		
Structure: G				[mm] [*	1		į iii	1 [111]		
	Deflection		Max Slope	Max Settlement		of	Max Gradient of Vertical Displacement Curve	Radius of	Radius of Curvature	Damage Category
Calculations [m] 0.0		[%]	35.875E-6	[mm] 0.25491	[%] 206.03E-6	0.0	35.875E-6	[m]	[m] 243460. 0	(Negligible)
Structure: G	VA-6 Sub-	structure:	GVA-6							
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Max Slope	Max Settlement		of	Max Gradient of Vertical Displacement Curve	Radius of Curvature	Radius of Curvature	Damage Category
[m] 0.0	[%] 23.924E-6	[%]	24.879E-6	[mm] 0.32628	[%] 22.495E-6	0.0	24.879E-6	[m]	[m] 1.2152E+6 0	(Negligible)
Structure: G										
Vertical Offset from Line for Vertical Movement Calculations						of Horizontal	Max Gradient of Vertical Displacement Curve	Radius of Curvature	Radius of Curvature	Damage Category
[m] 0.0	[%] 350.64E-6	[%]	74.110E-6	[mm] 0.55332	[%] 319.25E-6	0.0	74.110E-6	[m] -	[m] 111010. 0	(Negligible)
Structure: G										
Vertical Offset from Line for Vertical Movement Calculations				Max Settlement	Max Tensile Strain	of Horizontal	t Max Gradien of Vertical Displacemen t Curve	Radius of t Curvature	Curvature	Damage Category
[m] 0.0	[%] 75.781E-6	[%]	-46.882E-	[mm] 6 0.55338	[%] 71.347E-	6 0.	0 -46.882E-	[m] 5 -	[m] 437660.) (Negligible)
Structure: G	VA-9 Sub-	structure:	GVA-9							
Vertical Offset from Line for Vertical Movement Calculations				Max Settlement	Max Tensile Strain	of Horizontal	t Max Gradien of Vertical Displacemen t Curve	Radius of Curvature	Curvature	Damage Category
[m] 0.0	[%] 317.27E-6	[%]	-40.681E-	[mm] 6 0.42203	[%] 375.33E-	6 0.	0 -40.681E-	[m] -	[m] 405830.) (Negligible)
Structure: G	VA-10 Sub	-structure:	GVA-10							
Vertical Offset from Line for Vertical Movement				tlement Tens	ile in Hori	zontal Displacement Cu	radient Mirtical Radius acement Curva rve (Hogg	s of Radius ture Curvat	of ure	e Category
Calculations [m]	[%]	[%]		[mm] [%	1		[m] [m]		
Structure: G										
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Max Slope	Max Settlement	Tensile Strain	of Horizontal	Max Gradient of Vertical Displacement Curve	Radius of Curvature	Radius of Curvature	Damage Category
[m] 0.0		[%]	98.120E-6	[mm] 1.5137	[%] 308.60E-6	0.0	98.120E-6	[m] 468760.	[m] 201000. 0	(Negligible)
Structure: G										
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	of Horizontal	t Max Gradien of Vertical Displacemen t Curve	Radius of	Curvature	Damage Category
[m] 0.0	[%] 0.0022466	[%]	-216.22E-	[mm] 6 1.5138	[%] 0.003373	6 0.	0 -216.22E-	[m] 5 -	[m] 30395.) (Negligible)
Structure: G	E-3 Sub-s	tructure: G	E-3							
Offset from Line for Vertical Movement		Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	of Horizontal	t Max Gradien of Vertical Displacement Curve	Radius of Curvature	Curvature	Damage Category
Calculations [m] 0.0	[%] 12.423E-6	[%]	-10.094E-	[mm] 6 0.18532	[%] 11.909E-	6 0.	0 -10.094E-	[m] 5 2.6721E+6	[m] 6.2823E+6) (Negligible)
Structure: G										
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Max Slope	Max Settlement		of Horizontal	Max Gradient of Vertical Displacement Curve	Radius of Curvature	Radius of Curvature	Damage Category



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[m] 0.0	[%] 929.64E-6	[%]	93.153E-6	[mm] 0.78038	[%] 0.0013973		0.0 93.	153E-6	[m] -	[m] 102540.	0 (Neglig	ible)		
Structure: I	DH-1 Sub-st	ructure: D	H-1											
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Max Slope	Max Settlement	Tensile Strain	Max Gradi of Horizont Displacem Curve	of Ver al Displa ent Cur	tical F cement (Radius of Curvature	Radius of Curvature	Damage	Category		
[m] 0.0	[%] 0.0034855	[%]	325.16E-6	[mm] 2.1483	[%] 0.0043303		0.0 325	.16E-6	[m] -	[m] 18681.	0 (Neglig	ible)		
Structure: I	DH-2 Sub-st	ructure: D)H-2											
Vertical	Deflection Ratio	Average	Max Slope	Max Settlement	Max Tensile Strain	Max Grad of Horizon Displace Curve	of Ve tal Displ ment Cu	rtical acement	Radius of Curvature	Min Radius of Curvature (Sagging)	E 9	Category		
[m] 0.0	[%] 0.0015056	[%]	-94.067E-	[mm] 6 2.1623	[%] 0.001506	1	0.0 -94	.067E-6	[m] 96017.	[m] . 204190.	. 0 (Negli	gible)		
Structure: I	DH-3 Sub-st	ructure: D	DH-3											
Offset from Line for Vertical Movement Calculations	s	Horizontal Strain	. Slope Set	tlement Tens Stra	ile in Hori Displ Cu	radient Ma of of zontal Di acement rve	Vertical splacement	Radius Curvatu (Hoggir	of Radius ure Curvat ng) (Saggi	s of cure ing)	age Catego	ry		
[m]	[%]	[%]		[mm] [%	:]			[m]	[m]	I				
Structure: I	DH-4 Sub-st	ructure: D	H-4											
Vertical Offset from Line for Vertical Movement Calculations	s	Average Horizontal Strain	. Slope Set	tlement Tens	ile in Hori Displ Cu	radient Ma of of zontal Di acement rve	Vertical splacement	Radius Curvatu	of Radius ure Curvat ng) (Saggi	of cure ing)	age Catego	гу		
	DH-5 Sub-st			[mm] [*	.1			[111]	Į tu.					
Offset from Line for Vertical Movement Calculations	5	Average Horizontal Strain	Slope Set	tlement Tens	sile sin Hori Displ	radient Ma of of zontal Di acement rve	Vertical splacement	Radius Curvatu	of Radius re Curvat	of cure	age Catego	ry		
[m]	[%]	[%]		[mm] [%	:1			[m]	[m]	I				
Structure: I	DH-6 Sub-st	ructure: D	0H-6											
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Max Slope	Max Settlement	Tensile Strain	Max Gradi of Horizont Displacem Curve	of Ver al Displa ent Cur	tical F	Radius of Curvature	Curvature	Damage	Category		
[m] 0.0		[%]	18.925E-6	[mm] 0.42891	[%] 74.637E-6		0.0 18.	925E-6	[m] 757010.	[m] 1.2323E+6	0 (Neglig	ible)		
Structure: I	DH-7 Sub-st	ructure: D	DH-7											
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Max Slope	Max Settlement	Tensile	Horizon	of Ve tal Displ ment Cu	rtical acement	Radius of Curvature	Min Radius of Curvature (Sagging)	E 9	Category		
[m] 0.0		[%]	-64.303E-	[mm] 6 0.42892	[%] 526.68E-	6	0.0 -64	.303E-6	[m]	[m] - 111450	. 0 (Negli	gible)		
Structure: I	DH-8 Sub-st	ructure: D	H-8											
	Deflection	Average	Max	Max Ma tlement Tens Stra	ile in Hori Displ	radient Ma of of zontal Di acement rve	Vertical splacement	Radius Curvatu	of Radius	of ure	age Catego	ry		
[m]	[%]	[%]		[mm] [%	:]			[m]	[m]	I				
Specific Ruile	ding Damage I	Posults - Cri	tical Soumo	nte within Far	h Structur	0								
Structure Na		neter	Critical			End Curv	ature Max		Max ettlement		Curvature	Min Radius of Curvature	Damage Category	
						[m]			[mm]	[%]	(Hogging)	(Sagging) [m]		
GVA-1	All sett	lements ar	e less that e less that	n the Settle n the Settle n the Settle n the Settle	ment Trou ment Trou	gh Limit S gh Limit S	ensitivity ensitivity							
GVA-2	All sett All sett All sett All sett	lements ar lements ar lements ar lements ar	e less that e less that e less that e less that	n the Settle n the Settle n the Settle n the Settle	ement Trou ement Trou ement Trou ement Trou	gh Limit S gh Limit S gh Limit S gh Limit S	ensitivity ensitivity ensitivity ensitivity							
GVA-3	All sett All sett All sett	lements ar lements ar lements ar	e less that e less that e less that	n the Settle	ment Trou ment Trou ment Trou	gh Limit S gh Limit S gh Limit S	ensitivity ensitivity ensitivity							
GVA-4	All sett All sett All sett All sett	lements ar lements ar lements ar lements ar	e less that e less that e less that e less that	n the Settle n the Settle n the Settle n the Settle n the Settle	ement Trou ement Trou ement Trou ement Trou	gh Limit S gh Limit S gh Limit S gh Limit S	ensitivity ensitivity ensitivity ensitivity							
GVA-5	All sett Max Slop	lements ar	e less tha A-5	n the Settle n the Settle 1	ment Trou		ensitivity	75E-6		206.03E-6			(Negligible)	
	Max Tens Strain		7A-5 7A-5	1	2.4422 7	.8140 Sagg .8140 Sagg	ing 35.8	75E-6		206.03E-6 206.03E-6		243460. 0	(Negligible) (Negligible)	
	Min Rad: Curvatur (Hogging Min Rad:	re g) lus of GV	7A-5	1	2.4422 7	 .8140 Sagg	ing 35.8	- 75E-6	0.25491	- 206.03E-6	-	243460. 0	(Negligible)	
arn (Curvatur (Sagging	g)				0540 =		70T -	0.2000	22 4655		1 0150- 6	(27-11/11/22)	
GVA-6	Max Slop Max Sett Max Tens	:lement GV		1	0.0 2	.9540 Sagg .9540 Sagg .9540 Sagg	ing 24.8	79E-6	0.32628	22.495E-6	-	1.2152E+6 0	(Negligible) (Negligible) (Negligible)	



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Structure Name	Parameter	Critical	Critical St	ar+	End	Curvatura	Max glone	Max	Max	Min	Min	14-Aug-20
ouructure Name	rarameter	Critical Sub-Structure		art	snd	curvature	max slope	Max Settlement			Radius of Curvature	Damage Category
	Strain Min Radius of Curvature		-	-	-	-	-	-	-	(nogging)	(payging)	-
	(Hogging) Min Radius of Curvature	GVA-6	1	0.0	2.9540	Sagging	24.879E-6	0.32628	22.495E-6	-	1.2152E+6) (Negligible)
VA-7	(Sagging) Max Slope Max Settlement	GVA-7 GVA-7	1 1			Sagging Sagging	74.110E-6 74.110E-6		319.25E-6 319.25E-6			(Negligible) (Negligible)
	Max Tensile Strain	GVA-7	1			Sagging	74.110E-6		319.25E-6			(Negligible)
	Min Radius of Curvature		-	-	-	-	-	-	-	-		-
	(Hogging) Min Radius of Curvature (Sagging)	GVA-7	1	0.0	3.7150	Sagging	74.110E-6	0.55332	319.25E-6	-	111010.	(Negligible)
SVA-8	(Sagging) Max Slope Max Settlement	GVA-8 GVA-8	1			Sagging Sagging	46.882E-6 46.882E-6		71.347E-6 71.347E-6) (Negligible)) (Negligible)
	Max Tensile Strain	GVA-8	1			Sagging	46.882E-6		71.347E-6) (Negligible)
	Min Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-		-
	Min Radius of Curvature	GVA-8	1	0.0	2.9550	Sagging	46.882E-6	0.55338	71.347E-6	-	437660.	(Negligible)
VA-9	(Sagging) Max Slope Max Settlement	GVA-9	1			Sagging	40.681E-6 40.681E-6		375.33E-6 375.33E-6		405830.	O (Negligible) O (Negligible)
	Max Tensile Strain	GVA-9	1			Sagging	40.681E-6		375.33E-6			(Negligible)
	Min Radius of Curvature (Hogging)		-	-	-	-	-	-	-	-		
	Min Radius of Curvature	GVA-9	1	0.0	11.342	Sagging	40.681E-6	0.42203	375.33E-6	-	405830.	(Negligible)
VA-10	(Sagging) All settlements All settlements	are less than	the Settlemen	t Tro	ugh Li	mit Sensit	ivity.					
	All settlements All settlements	are less than	the Settlemen the Settlemen	t Tro	ugh Li ugh Li	mit Sensit mit Sensit	ivity. ivity.					
SE-1	All settlements Max Slope	are less than GE-1	the Settlemen	t Tro	ugh Li 6.0345	mit Sensit Sagging	ivity. 98.120E-6		308.60E-6			(Negligible)
	Max Settlement Max Tensile	GE-1 GE-1	2 6.			Hogging Sagging	98.120E-6 98.120E-6		30.148E-6 308.60E-6	468760.) (Negligible)) (Negligible)
	Strain Min Radius of Curvature	GE-1	2 6.	0345	7.9120	Hogging	98.120E-6	1.5137	30.148E-6	468760.	- 1) (Negligible)
	(Hogging) Min Radius of Curvature	GE-1	1	0.0	6.0345	Sagging	98.120E-6	1.3310	308.60E-6	-	201000.	(Negligible)
E-2	(Sagging) Max Slope	GE-2 GE-2	1			Sagging	216.22E-6 216.22E-6		0.0033736		30395.	O (Negligible) O (Negligible)
	Max Settlement Max Tensile Strain	GE-2 GE-2	1			Sagging Sagging	216.22E-6 216.22E-6		0.0033736) (Negligible)
	Min Radius of Curvature		-	-	-	-	-	-	-	-		-
	(Hogging) Min Radius of Curvature	GE-2	1	0.0	13.801	Sagging	216.22E-6	1.5138	0.0033736	-	30395.	(Negligible)
3-3	(Sagging) Max Slope	GE-3	1			Hogging	10.094E-6			2.6721E+6) (Negligible)
	Max Settlement Max Tensile	GE-3 GE-3	1			Hogging Hogging	10.094E-6 10.094E-6			2.6721E+6 2.6721E+6) (Negligible)) (Negligible)
	Strain Min Radius of Curvature	GE-3	1	0.0	4.9430	Hogging	10.094E-6	0.18532	11.909E-6	2.6721E+6	- 1	(Negligible)
	(Hogging) Min Radius of Curvature	GE-3	2 4.	9430	7.6490	Sagging	10.094E-6	0.13701	3.0398E-6	-	6.2823E+6	(Negligible)
E-4	(Sagging) Max Slope	GE-4	1			Sagging	93.153E-6		0.0013973) (Negligible)
	Max Settlement Max Tensile Strain	GE-4 GE-4	1	0.0	13.713	Sagging Sagging	93.153E-6 93.153E-6		0.0013973 0.0013973		102540.) (Negligible)) (Negligible)
	Min Radius of Curvature		-	-	-	-	-	-	-	-		-
	(Hogging) Min Radius of Curvature	GE-4	1	0.0	13.713	Sagging	93.153E-6	0.78038	0.0013973	-	102540.	(Negligible)
H-1	(Sagging) Max Slope	DH-1	1 3.	8850	22.338	Sagging	325.16E-6		0.0043303) (Negligible)
	Max Tensile	DH-1 DH-1	1 3. 1 3.	8850 8850	22.338 22.338	Sagging Sagging	325.16E-6 325.16E-6		0.0043303 0.0043303) (Negligible)) (Negligible)
	Strain Min Radius of Curvature		-	-	-	-	-	-	-	-		
	(Hogging) Min Radius of Curvature	DH-1	1 3.	8850	22.338	Sagging	325.16E-6	2.1483	0.0043303	-	18681.) (Negligible)
H-2	(Sagging) Max Slope	DH-2	1			Hogging	94.067E-6		0.0014351	96017.) (Negligible)
	Max Tensile	DH-2 DH-2	1 2 15			Hogging Sagging	94.067E-6 94.067E-6		0.0014351 0.0015061) (Negligible)) (Negligible)
	Strain Min Radius of Curvature	DH-2	1	0.0	15.761	Hogging	94.067E-6	2.1623	0.0014351	96017.	-	(Negligible)
	(Hogging) Min Radius of	DH-2	2 15	.761	37.435	Sagging	94.067E-6	1.3208	0.0015061	-	204190.	(Negligible)
DH-3	Curvature (Sagging) All settlements											
	All settlements All settlements	are less than	the Settlemen	t Tro	ugh Li ugh Li	mit Sensit mit Sensit	ivity. ivity.					
I-4	All settlements All settlements All settlements	are less than	the Settlemen	t Tro	ugh Li	mit Sensit	ivity.					
	All settlements All settlements	are less than are less than	the Settlemen the Settlemen	t Tro	ugh Li ugh Li	mit Sensit mit Sensit	ivity. ivity.					
-	All settlements All settlements	are less than	the Settlemen	t Tro	ugh Li ugh Li	mit Sensit mit Sensit	ivity. ivity.					
I-5	All settlements All settlements All settlements	are less than	the Settlemen	t Tro	ugh Li	mit Sensit	ivity.					
	All settlements All settlements	are less than	the Settlemen	t Tro	ugh Li ugh Li	mit Sensit mit Sensit	ivity. ivity.					
I-6	Max Slope Max Settlement	DH-6 DH-6	1 13 2 24	.380	24.183 32.706	Sagging Hogging	18.925E-6 18.925E-6	0.42891	72.277E-6 74.637E-6	757010.	- 1	O (Negligible) O (Negligible)
	Max Tensile Strain Min Radius of	DH-6				Hogging Hogging	18.925E-6 18.925E-6		74.637E-6) (Negligible)) (Negligible)
	Curvature (Hogging)											
	Min Radius of Curvature (Sagging)	DH-6	1 13	.380	24.183	Sagging	18.925E-6	0.28421	/2.277E-6			(Negligible)
DH-7	Max Slope Max Settlement		1 1	0.0	8.1774	Sagging Sagging	64.303E-6 64.303E-6	0.42892	526.68E-6 526.68E-6	-	111450.) (Negligible)) (Negligible)
	Max Tensile Strain Min Radius of	DH-7	1		8.1774	Sagging -	64.303E-6	0.42892	526.68E-6) (Negligible)
	Curvature (Hogging) Min Radius of						64.303E-6		526.68E-6			(Negligible)



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Structure Name		Critical Sub-Structure			Settlement	Max Tensile Strain	Min Min Radius of Radius of Curvature Curvature (Hogging) (Sagging)	Damage Category	
DH-8	All settlements	are less than th	ne Settlement Trou	gh Limit Sensitivity. Igh Limit Sensitivity.					



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Utility Strain Calculation Options

Neglect beneficial contribution of axial strains : No

Specific Building Damage Results - Horizontal Displacements

Structure: GVA-1 | Sub-structure: GVA-1

Dist.		Coordinate				Displacemen	
	x	y	z	x	Y	Horizontal	Horizontal
							displacement
						along the	perpendicular
						Line	to Line
[m]	[m]	[m]	[m]	[mm]		[mm]	[mm]
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
17.494	8.33544	72.05292	100.50000	0.0	0.0	0.0	0.0
17.980	8.30998	71.56764	100.50000	0.0	0.0	0.0	0.0
18.466	8.28452	71.08236	100.50000	0.0	0.0	0.0	0.0
18.952	8.25906	70.59708	100.50000	0.0	0.0	0.0	0.0
19.438	8.23360	70.11180	100.50000	0.0	0.0	0.0	0.0
19.924	8.20814	69.62652	100.50000	0.0	0.0	0.0	0.0
20.410	8.18268	69.14124	100.50000	0.0	0.0	0.0	0.0
20.896	8.15722	68.65596	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
24.297	7.97900	65.25900	100.50000	0.0	0.0	0.0	0.0

Structure: GVA-2 | Sub-structure: GVA-2

Dist.	x	Coordinate y	es z	x	У	Displacement Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	7.97900	65.25900	100.50000	0.0	0.0	0.0	0.0
0.48050	7.95067	64.77933	100.50000	0.0	0.0	0.0	0.0
0.96101	7.92233	64.29967	100.50000	0.0	0.0	0.0	0.0
1.4415	7.89400	63.82000	100.50000	0.0	0.0	0.0	0.0
1.9220	7.86567	63.34033	100.50000	0.0	0.0	0.0	0.0
2.4025	7.83733	62.86067	100.50000	0.0	0.0	0.0	0.0
2.8830	7.80900	62.38100	100.50000	0.0	0.0	0.0	0.0

Structure: GVA-3 | Sub-structure: GVA-3

Dist.	Coordinates			Displacements				
	x	У	z	x	У	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	7.80900	62.38100	100.50000	0.0	0.0	0.0	0.0	
0.47715	8.28487	62.34613	100.50000	0.0	0.0	0.0	0.0	
0.95430	8.76075	62.31125	100.50000	0.0	0.0	0.0	0.0	
1.4315	9.23663	62.27638	100.50000	0.0	0.0	0.0	0.0	
1.9086	9.71250	62.24150	100.50000	0.0	0.0	0.0	0.0	
2.3858	10.18838	62.20662	100.50000	0.0	0.0	0.0	0.0	
2.8629	10.66425	62.17175	100.50000	0.0	0.0	0.0	0.0	
3.3401	11.14012	62.13687	100.50000	0.0	0.0	0.0	0.0	
3.8172	11.61600	62.10200	100.50000	0.0	0.0	0.0	0.0	

Structure: GVA-4 | Sub-structure: GVA-4

	Dist.	(Coordinate	es			Displacement	s
		x	У	z	x	У	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
	[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
		11.61600		100.50000	0.0	0.0	0.0	0.0
C	.47359	11.65050	62.57433	100.50000	0.0	0.0	0.0	0.0
C	.94718			100.50000	0.0	0.0	0.0	0.0
				100.50000	0.0	0.0	0.0	0.0
	1.8944	11.75400	63.99133	100.50000	0.0	0.0	0.0	0.0
	2.3680	11.78850	64.46367	100.50000	0.0	0.0	0.0	0.0
	2.8415	11.82300	64.93600	100.50000	0.0	0.0	0.0	0.0

Structure: GVA-5 | Sub-structure: GVA-5

Dist.		Coordinate	es		Dis	placements	
	x	У	z	x	У	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]
0.0	11.82300	64.93600	100.50000	0.0	0.0	0.0	0.0
0.48843	12.31013	64.90031	100.50000	0.0	0.0	0.0	0.0
0.97686	12.79725	64.86463	100.50000	0.0	0.0	0.0	0.0
1.4653	13.28438	64.82894	100.50000	0.0	0.0	0.0	0.0
1.9537	13.77150	64.79325	100.50000	0.0	0.0	0.0	0.0
2.4422	14.25863	64.75756	100.50000	0.0	0.0	0.0	0.0
2.9306	14.74575	64.72187	100.50000	0.0	0.0	0.0	0.0
3.4190	15.23288	64.68619	100.50000	0.0	0.0	0.0	0.0



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OIIVIA	intanc	4.1011	CACAV	411011			
Dist.	x	Coordinate y	es z	x	Dis Y		Horizontal displacement perpendicular
4.3959 4.8843 5.3727 5.8612 6.3496 6.8380 7.3265	16.20713 16.69425 17.18138 17.66850 18.15563 18.64275 19.12988	64.61481 64.57913 64.54344 64.50775 64.47206 64.43637 64.40069	100.50000 100.50000 100.50000 100.50000	0.020812 0.13261 0.24197 0.34875 0.45282 0.55403	0.0 -0.010191 -0.066638 -0.12488 -0.18501 -0.24713 -0.31134 -0.37776 -0.44649	0.0 0.021501 0.13712 0.25044 0.36134 0.46967 0.57530	0.0 -0.086432 -0.056771 -0.10687 -0.15904 -0.21338 -0.27003 -0.32909
Struatus	-a: CWA-6	Sub-et	ructure: G	17h - 6			
Dist.		Coordinate		VA-0	Dier	olacements	
[m] 0.0 0.49248 0.98497 1.4775 1.9699	[m] 19.61700 19.58100 19.54500 19.50900 19.47300	[m] 64.36500 63.87383 63.38267 62.89150 62.40033	[m] 100.50000 100.50000 100.50000 100.50000 100.50000	0.82023 - 0.89368 - 0.96741 - 1.0412 -	y di di [mm] 0.44649 0.46218 0.47369 0.48106 0.48433	Incrizontal isplacement dalong the Line [mm] 0.39068 0.40099 0.40710 0.40905 0.40692	erpendicular to Line [mm] 0.77784 0.85182 0.92592 0.99999 1.0739
			100.50000	1.1150 - 1.1885 -	0.48357 0.47889	0.40078 0.39073	1.1474
				_			
			ructure: G	VA-7	B4 3		
Dist.	×	Coordinat y	es z	x	у Но		orizontal
						splacement di Long the pe	rpendicular
0.46449 0.92897 1.3935 1.8579 2.3224 2.7869 3.2514 3.7159	19.86425 20.32750 20.79075 21.25400 21.71725 22.18050 22.64375 23.10700	61.38412 61.35025 61.31638 61.28250 61.24862 61.21475 61.18088 61.14700	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	1.1885 -0 1.3011 -0 1.4589 -0 1.6127 -0 1.7622 -0 1.9072 -0 2.0474 -0 2.1825 - 2.3123 -	.53927 .62254 .70922 .79957 .89389 .99250	Line [mm] 1.2202 1.3370 1.5005 1.6601 1.8158 1.9673 2.1143 2.2566 2.3939	to Line [mm] -0.39094 -0.44294 -0.51449 -0.58972 -0.66893 -0.75242 -0.84054 -1.0321
			ructure: G	VA-8			
Dist.	x	Coordinate y	es z	×	у Ног		rizontal
					alo	placement dis ong the per	pendicular
0.49250 0.98501 1.4775 1.9700 2.4625	23.13267 23.15833 23.18400 23.20967 23.23533	61.63883 62.13067 62.62250 63.11433 63.60617	100.50000	2.3123 -1 2.1678 -1 2.0256 -1 1.8857 -1 1.7486 -1 1.6144 -1	mm] .2040 .2192 .2256 .2231 .2119 .1920	Line [mm] -1.0818 -1.1046 -1.1184 -1.1232 -1.1191 -1.1062 -1.0846	to Line [mm] -2.3719 -2.2284 -2.0867 -1.9469 -1.8094 -1.6743 -1.5418
Structur	e: GVA-9	Sub-st	ructure: G	VA-9			
Dist.	x	Coordinat	es z	×		splacements Horizontal	Horizontal
	×	У	z	x	У	displacement	displacement
0.49313 0.98626 1.4794 1.9725 2.4657 2.9588 3.4519	23, 28670 23, 31240 23, 33810 23, 38820 23, 38930 23, 38950 23, 49520 23, 44920 23, 49520 23, 49520 23, 49520 23, 49520 23, 49520 23, 59510 23, 62690 23, 62720 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 7240 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 23, 72490 24, 724900 24, 724900 24, 724900 24, 724900 24, 724900	64.59046 65.08292 65.57528 66.06784 66.56030 67.05276 67.	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	1.2300 1.1083 0.98984 0.88411 0.80108 0.64283 0.42045 0.42155 0.35247 0.28554 0.20270 0.15790 0.000 0.00 0.00 0.00 0.00 0.00 0.00	-1.0812 -1.0279 -0.96659 -0.90734 -0.86249 -0.81244 -0.769738 -0.81244 -0.769738 -0.81244 -0.769738 -0.49032 -0.4126 -0.15634 -0.063366 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 -0	Line [mm] -1.0846 -1.0543 -1.0543 -1.0157 -0.96871 -0.91369 -0.86603 -0.72378 -0.66702 -0.66702 -0.66702 -0.66702 -0.65103 -0.73378 -0.39725 -0.31910 -0.26692 -0.54103 -0.73578 -0.39725 -0.31910 -0.36692 -0.54003 -0.000000000000000000000000000000000	-1.4119 -1.2847 -1.1604 -1.0389 -0.93020 -0.84494 -0.76183 -0.60035 -0.60135 -0.60135 -0.37754 -0.330666 -0.23765 -0.30666 -0.17048 -0.10508 -0.041401 -0.00
Dist.		Coordinate	es		Displace		
	x	У	z	х у	Horizont displaces along th	al Horizon ment displace me perpendi	ment cular
[m]	[m] 24.54600	[m] 88.72100	[m] 100.50000	[mm] [mm]	Line [mm]		
0.47859 0.95719 1.4358 1.9144	24.06806 23.59013 23.11219 22.63425	88.74606 88.77112 88.79619 88.82125	100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0		0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0



CIRIA intallation + excavation

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CIRIA	ınıalı	alion +	excava	alion		
Dist.	x	Coordinate y	z	-	Displacements Horizontal displacement	Horizontal
3.8288 4.3073 4.7859 5.2645 5.7431 6.2217 6.7003 7.1789 7.6575 8.1361 8.6147 9.0933 9.5719 10.050 10.529 11.486 11.486 11.965 12.443 12.922 13.401 13.879 14.358	20.72250 20.24456 19.76662 19.28669 18.81075 18.33281 17.85488 17.37694 16.89900 16.42106 15.94313 14.98725 14.98725 14.50313 14.03138 13.07550 12.59756 12.11963 11.16375 10.68581 10.20788 9.72994	88.94656 88.97163 88.99669 89.902175 89.04681 89.07188 89.09694 99.12210 89.14706 89.14706 89.17212 89.19719 89.22255 89.24731 89.29744 89.37250 89.34756 89.37269 89.34756 89.37269 89.42751 89.47288 89.44731 89.477288	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	along the 1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	perpendicular 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0
Structur Dist.		Sub-stru	ucture: GE	-1	Displaceme	
[m] 0.0 0.49454 0.98907 1.4836 1.9781 2.4727 3.4617 3.9563 4.4508 4.9454 5.4399 5.9344 6.4290 6.9235 7.4180	[m] 28.56700 29.06094 29.55487 30.04881 30.54275 31.03669 31.53063 32.51850 33.01244 33.50637 34.00031 34.49425 34.98819 35.48212 35.97606	[m] 64.11000 64.13431 64.15863 64.18294 64.20725 64.23156 64.25588 64.28019 64.30450 64.32881 64.32881 64.35312 64.37744 64.40175 64.40175 64.45037 64.45037	z	[mm] 1.926-1.8957-1.8554-1.7964-1.7277-1.6466-1.7551-1.4479-1.2045-1.0681-0.92344-0.77172-0.51443-0.45315-0.28952-0.27903-	y Horizon displace along t [mm] 2.8596 3.0521 3.3.2503 1.3.4537 1.3.4537 1.3.4538 1.4.9389 1.4.9389 1.4.9389 1.4.9389 1.4.9389 1.5.9389 1.	heal Horizontal mement displacement perpendicular to Line [mm] 1.7836 -2.9508 1.7434 -3.1416 1.6903 -3.3374 1.6244 -3.5378 1.5456 -3.7423 1.5512 -4.1603 1.2344 -4.3720 1.1074 -4.5840 1.074 -4.5840 1.074 -4.5840 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.074 -5.0032 1.075 -5.0036 1.075 -5.0036 1.076 -5.0036 1.076 -5.0036 1.076 -5.0036 1.076 -5.0036 1.076 -5.0036 1.076 -5.0036
Structur Dist.		Coordinate			Displace	ements
[m] 0.0 0.49291 0.0 9.5811 1.4787 1.9716 2.4645 4.3503 3.9432 1.4920 5.920 5.920 5.920 5.920 5.920 5.920 6.4078 6.9007 7.3936 7.8865 8.723 9.3652 9.8851 10.351 10.	(m] 36.47000 36.44014 36.49014 36.38043 36.35057 36.32071 36.32071 36.32071 36.29016 36.29116 36.29116 36.29116 36.29116 36.29117 36.311171 36.11171 36.11171 36.11171 36.11171 36.11171 36.11171 36.98186 36.05200 37.78237 36.1314 35.99229 37.78239 35.78239 35.78239 35.78239	(m] 64.49900 64.99100 65.98300 65.97500 66.95900 67.94300 66.95900 67.94300 68.931000 70.40300 70.89500 71.38700 71.38700 72.37100 72.37100 72.37100 73.35500 74.33900 74.33900 75.32300 75.32300 776.379900 777.29100 777.78300 78.27500	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.25179 0.23836 0.22504 0.21181 0.19868 0.18554 0.17266 0.15975 0.14690 0.12131 0.10856 0.095835 0.096313408 0.057375 0.104096 0.0054403 0.0054403 0.0054403 0.0054403	y Horizanto Harman Harm	Horizontal Hor
Dist.		Coordinate Y		-3 x y	Displacements Horizontal	s Horizontal
0.47806 0.95613 1.4342 1.9123 2.3903 2.8684 3.3464 4.3026 4.7806 5.2587 5.7368 6.2148 6.6929 7.1710 7.6490	35.15681 34.67963 34.20244 33.72525 33.24806 32.77087 32.29369 31.33931 30.86212 30.38494 29.90775 29.43056 28.95338 28.47619 27.99900	78.24606 78.21713 78.18819 78.15925 78.13031 78.10138 78.07244 78.04350 77.95669 77.92775 77.89881 77.86987 77.84094 77.81200	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0	Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	displacement perpendicular to Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Dist.	x	Coordinate y	es z	x		ements izontal Horizontal lacement displacement
0.48978 0.97955 1.4693 1.9591 2.4489 2.9387 3.4284	28.01929 28.03957 28.05986 28.08014 28.10043 28.12071 28.14100	77.32264 76.83329 76.34393 75.85457 75.36521 74.87586 74.38650	[m] 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.016142 0.060523	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	The perpendicular The



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Dist.		Coordinate	es		Di	splacements	
2250.	x	у	z	x	У	Horizontal	Horizontal displacement perpendicular
4.4080	28.18157	73.40779	100.50000	0.15381	-0.45081	0.45679	0.13500
4.8978	28.20186	72.91843	100.50000	0.20289	-0.57980	0.58770	0.17870
5.3876	28.22214	72.42907	100.50000	0.25374	-0.70640	0.71630	0.22426
5.8773	28.24243	71.93971	100.50000	0.30645	-0.83045	0.84243	0.27179
6.3671	28.26271	71.45036	100.50000	0.36115	-0.95180	0.96594	0.32142
6.8569	28.28300	70.96100	100.50000	0.41797	-1.0703	1.0867	0.37328
7.3467	28.30329	70.47164	100.50000	0.47704	-1.1856	1.2044	0.42752
7.8364	28.32357	69.98229	100.50000	0.53851	-1.2978	1.3189	0.48430
8.3262	28.34386	69.49293	100.50000	0.62504	-1.4589	1.4835	0.56408
			100.50000	0.71721	-1.6194	1.6477	0.64952
			100.50000	0.81344	-1.7744	1.8066	0.73925
	28.40471		100.50000	0.91408	-1.9238	1.9600	0.83361
			100.50000	1.0195	-2.0671	2.1076	0.93298
10.775			100.50000	1.1300	-2.2040	2.2489	1.0377
			100.50000	1.2461	-2.3339	2.3835	1.1483
			100.50000	1.3682	-2.4564	2.5110	1.2652
			100.50000	1.4967	-2.5709	2.6307	1.3889
			100.50000	1.6322	-2.6768	2.7421	1.5200
			100.50000	1.7753	-2.7733	2.8444	1.6589
13.714	28.56700	64.11000	100.50000	1.9265	-2.8596	2.9369	1.8064
Structure: DH-1 Sub-structure: DH-1							
Dist.		Coordinate	es		D:	isplacements	

DIDC.	,	coor armac.			DID	Padementes	
	x	У	z	x	У	Horizontal displacement along the	Horizontal displacement perpendicular
						Line	to Line
[m]	[m]	[m]	[m]	f mm 1	[mm]	[mm]	[mm]
0.0	44.60300	87.23400	100.50000	0.0	0.0	0.0	0.0
0.48563	44.63204	86.74924	100.50000	0.0	0.0	0.0	0.0
0.97126	44.66109	86.26448	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
1.9425	44.71917	85.29496	100.50000	0.0	0.0	0.0	0.0
2.4282	44.74822	84.81020	100.50000	0.0	0.0	0.0	0.0
2.9138	44.77726	84.32543	100.50000	0.0	0.0	0.0	0.0
3.3994	44.80630	83.84067	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
					-0.0024660	0.0024685	-32.071E-6
			100.50000	0.0086437	-0.18436 -0.36626	0.18455	-0.0023977 -0.0047633
			100.50000	0.017172	-0.54815	0.54871	-0.0047633
			100.50000	0.025700	-0.73005	0.54871	-0.0071289
			100.50000	0.034228	-0.91195	0.73079	-0.0094946
			100.50000	0.051284	-1.0938	1.0950	-0.011000
			100.50000	0.059812	-1.2757	1.2770	-0.014220
			100.50000	0.068340	-1.4576	1.4591	-0.018957
			100.50000	0.076868	-1.6395	1.6412	-0.021323
			100.50000	0.086132	-1.8371	1.8390	-0.023892
			100.50000	0.098667	-2.1045	2.1066	-0.027370
			100.50000	0.11121	-2.3721	2.3745	-0.030849
			100.50000	0.12378	-2.6400	2.6427	-0.034335
16.997	45.61952	70.26737	100.50000	0.13637	-2.9086	2.9116	-0.037827
			100.50000	0.14900	-3.1779	3.1812	-0.041330
17.968	45.67761	69.29785	100.50000	0.16167	-3.4483	3.4518	-0.044846
18.454	45.70665	68.81309	100.50000	0.17440	-3.7197	3.7235	-0.048377
			100.50000	0.18719	-3.9926	3.9966	-0.051925
			100.50000	0.20005	-4.2669	4.2713	-0.055493
			100.50000	0.21300	-4.5430	4.5477	-0.059084
			100.50000	0.22603	-4.8211	4.8260	-0.062700
			100.50000	0.23917	-5.1012	5.1064	-0.066343
			100.50000	0.25241	-5.3836	5.3891	-0.070016
			100.50000	0.26577	-5.6686	5.6743	-0.073722
22.339	45.93900	64.93500	100.50000	0.27925	-5.9562	5.9622	-0.077462

Structure: DH-2 | Sub-structure: DH-2

Dist.	(Coordinate	es		Disp	Displacements			
	x	y	z	x	Y	Horizontal	Horizontal		
							displacement		
						along the Line	perpendicular		
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	to Line		
			100.50000	0.27925	-5.9562	-0.14526	-5.9610		
			100.50000	0.27892	-5.9491	-0.14529	-5.9538		
			100.50000	0.27858	-5.9419	-0.14492	-5.9467		
			100.50000	0.27825	-5.9348	-0.14474	-5.9395		
	47.90427		100.50000	0.27791	-5.9276	-0.14457	-5.9324		
2.4628	48.39559	65.11024	100.50000	0.27758	-5.9205	-0.14439	-5.9253		
2.9554	48.88690	65.14529	100.50000	0.27724	-5.9134	-0.14422	-5.9181		
3.4480	49.37822	65.18034	100.50000	0.27691	-5.9062	-0.14405	-5.9110		
			100.50000	0.27658	-5.8991	-0.14387	-5.9038		
4.4331	50.36086	65.25043	100.50000	0.27624	-5.8920	-0.14370	-5.8967		
			100.50000	0.27591	-5.8849	-0.14352	-5.8896		
			100.50000	0.27557	-5.8777	-0.14335	-5.8824		
			100.50000	0.27524	-5.8706	-0.14318	-5.8753		
			100.50000	0.27491	-5.8635	-0.14300	-5.8682		
			100.50000	0.27457	-5.8564	-0.14283	-5.8611		
	53.30876		100.50000	0.27424	-5.8493	-0.14266	-5.8539		
			100.50000	0.27391	-5.8421 -5.8350	-0.14248 -0.14231	-5.8468 -5.8397		
			100.50000	0.080389	-5.8181	-0.33380	-5.8091		
			100.50000	-0.16851	-5.7873	-0.57987	-5.7607		
			100.50000	-0.41244	-5.7443	-0.82012	-5.7004		
			100.50000	-0.62792	-5.6902	-1.0312	-5.6311		
			100.50000	-0.62217	-5.6381	-1.0218	-5.5795		
			100.50000	-0.61643	-5.5861	-1.0123	-5.5281		
11.822	57.73062	65.77615	100.50000	-0.61070	-5.5342	-1.0029	-5.4767		
12.314	58.22193	65.81120	100.50000	-0.60498	-5.4824	-0.99354	-5.4254		
12.807	58.71325	65.84625	100.50000	-0.59927	-5.4306	-0.98417	-5.3742		
			100.50000	-0.59357	-5.3790	-0.97481	-5.3231		
			100.50000	-0.58788	-5.3274	-0.96546	-5.2721		
			100.50000	-0.58220	-5.2759	-0.95613	-5.2211		
			100.50000	-0.57653	-5.2245	-0.94681	-5.1702		
			100.50000	-0.57087	-5.1732	-0.93751	-5.1195		
16.255			100.50000	-0.56521 -0.55957	-5.1219 -5.0708	-0.92823 -0.91895	-5.0687		
			100.50000	-0.55393	-5.0708	-0.91895	-5.0181 -4.9675		
			100.50000	-0.54830	-4.9687	-0.90945	-4.9171		
	63.62642			-0.54268	-4.9177	-0.89122	-4.8666		
18.225			100.50000	-0.53708	-4.8668	-0.88201	-4.8163		
	64.60906			-0.63976	-4.6894	-0.97181	-4.6320		
			100.50000	-0.73664	-4.5072	-1.0555	-4.4434		
19.703	65.59169	66.33692	100.50000	-0.82694	-4.3216	-1.1323	-4.2518		
20.195	66.08301	66.37197	100.50000	-0.91000	-4.1335	-1.2018	-4.0583		
20.688	66.57433	66.40702	100.50000	-0.98526	-3.9441	-1.2634	-3.8640		
21.180	67.06564	66.44207	100.50000	-1.0523	-3.7544	-1.3167	-3.6700		
			100.50000	-1.1106	-3.5650	-1.3615	-3.4770		
			100.50000	-1.1601	-3.3769	-1.3974	-3.2858		
			100.50000	-1.2004	-3.1907	-1.4244	-3.0972		
			100.50000	-1.2316	-3.0068	-1.4424	-2.9116		
	69.52223			-1.2536	-2.8259	-1.4515	-2.7295		
			100.50000	-1.2663 -1.2700	-2.6482	-1.4515	-2.5513		
			100.50000	-1.2700	-2.4740 -2.3037	-1.4428 -1.4254	-2.3774 -2.2078		
			100.50000	-1.2547	-2.3037	-1.4254	-2.2078		
25.613	/1.48/50	00.75750	100.50000	-1.2506	-2.13/3	-1.3995	-2.0429		



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Made by	Date 14-Aug-2018	Checked

Dist.		Coordinate			Dia	placements	
Dist.	х `	y	z	×	У	Horizontal	Horizontal
		Y	2		Y		displacement
				4 0000		along the	perpendicular -1.8827
			100.50000	-1.2278 -1.1967	-1.9750 -1.8169	-1.3653	-1.8827
			100.50000	-1.1574	-1.8169	-1.3230	-1.72/1
			100.50000	-1.1574	-1.5131	-1.2728	-1.5764
			100.50000	-1.1102	-1.3675	-1.2150	-1.4303
			100.50000	-0.99291	-1.2259	-1.0776	-1.1521
			100.50000	-0.92335	-1.0882	-0.99844	-1.0198
			100.50000	-0.86087	-0.97025	-0.92772	-0.90654
			100.50000	-0.81038	-0.87493	-0.87058	-0.81505
			100.50000	-0.75527	-0.78237	-0.80903	-0.72664
			100.50000	-0.69573	-0.69249	-0.74324	-0.64123
31.524	77.38331	67.17808	100.50000	-0.63194	-0.60523	-0.67340	-0.55873
32.017	77.87463	67.21313	100.50000	-0.56407	-0.52050	-0.59968	-0.47905
32,509	78.36594	67.24817	100.50000	-0.49229	-0.43823	-0.52223	-0.40209
33.002	78.85726	67.28322	100.50000	-0.41678	-0.35833	-0.44122	-0.32776
33.494	79.34858	67.31827	100.50000	-0.33769	-0.28071	-0.35681	-0.25597
			100.50000	-0.25517	-0.20531	-0.26913	-0.18663
			100.50000	-0.16937	-0.13204	-0.17834	-0.11965
				-0.080442	-0.060815	-0.084565	-0.054937
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
45.809	91.63151	68.19447	100.50000	0.0	0.0	0.0	0.0
46.301	92.12283	68.22952	100.50000	0.0	0.0	0.0	0.0
46.794	92.61414	68.26457	100.50000	0.0	0.0	0.0	0.0
47.286	93.10546	68.29962	100.50000	0.0	0.0	0.0	0.0
47.779	93.59678	68.33466	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
51.227	97.03600	68.58000	100.50000	0.0	0.0	0.0	0.0

Structure: DH-3 | Sub-structure: DH-3

Dist.		Coordinate				Displacement	
	×	y	z	x	Y	Horizontal	Horizontal
						displacement	
						along the	perpendicular
						Line	to Line
[m]	[m]	[m]	[m]	[mm]		[mm]	[mm]
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
4.4018	96.69928	72.96887	100.50000	0.0	0.0	0.0	0.0
4.8909	96.66187	73.45652	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
12.227	96.10067	80.77130	100.50000	0.0	0.0	0.0	0.0
12.716	96.06326	81.25896	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
20.542	95.46465	89.06139	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
22.498	95.31500	91.01200	100.50000	0.0	0.0	0.0	0.0

Structure: DH-4 | Sub-structure: DH-4

beracear	beraceare. Bit 1 bab beraceare. Bit 1						
Dist.	Coordinates					Displacemen	
	×	y	z	x	Y	Horizontal	Horizontal
							displacement
						along the	perpendicular
f 1	f 1	F 3	f 1	r 1	r 1	Line	to Line
[m] 0.0	[m] 95.31500	[m] 91.01200	[m]	[mm]	[mm]	[mm]	[mm]
			100.50000	0.0	0.0	0.0	0.0
	94.84520	90.97595	100.50000	0.0	0.0	0.0	0.0
	93.90560	90.93990	100.50000	0.0	0.0	0.0	0.0
1.8847		90.90385	100.50000	0.0	0.0		0.0
	93.43580		100.50000	0.0	0.0	0.0	0.0
	92.49620		100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
	91.55660	90.72360	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
	90.61700			0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
	89.67740	90.57940	100.50000	0.0	0.0	0.0	0.0
	89.20760	90.54335	100.50000	0.0	0.0	0.0	0.0
	88.73780	90.54333	100.50000	0.0	0.0	0.0	0.0
7.0677			100.50000	0.0	0.0	0.0	0.0
7.5389			100.50000	0.0	0.0	0.0	0.0
	87.32840	90.39915	100.50000	0.0	0.0	0.0	0.0
8.4813		90.36310	100.50000	0.0	0.0	0.0	0.0
			100.50000	0.0	0.0	0.0	0.0
	85.91900		100.50000	0.0	0.0	0.0	0.0
9.4230	00.91900	90.29100	100.50000	0.0	0.0	0.0	0.0



CIRIA intallation + excavation

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CIRIA	ıntalla	ation +	excava	ation				
Dist.	x	Coordinate y		x	У	displacement	Horizontal displacement perpendicular	
Structu	re: DH-5	Sub-stru	ucture: DH-	-5				
Dist.		Coordinate				Displacement	ts	
[m]	x [m]	y [m]		x [mm] [Horizontal displacement along the Line [mm]	displacement perpendicular to Line [mm]	
0.0 0.48006	85.91900 85.95573	90.29100 89.81235	100.50000	0.0	0.0	0.0	0.0	
1.4402	86.02919	88.85504	100.50000 100.50000 100.50000	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	
2.4003	86.10265	87.89773 87.41908	100.50000	0.0	0.0	0.0	0.0	
4.3205	86.21285	85.46177	100.50000	0.0	0.0	0.0 0.0 0.0	0.0	
5.2807	86.32304	85.50446	100.50000	0.0	0.0	0.0	0.0	
6.2408 6.7209	86.35977 86.39650 86.43323	84.54715 84.06850 83.58985	100.50000	0.0	0.0	0.0	0.0 0.0 0.0	
7.2009	86.46996	83.11119	100.50000	0.0	0.0	0.0	0.0	
8.6411 9.1212	86.58015 86.61688	81.67523 81.19658	100.50000	0.0	0.0	0.0 0.0 0.0	0.0	
10.081	86.69035 86.72708	80.23927	100.50000	0.0	0.0	0.0	0.0	
11.041	86.76381	79.28196	100.50000 100.50000 100.50000 100.50000	0.0	0.0	0.0 0.0 0.0	0.0	
			icture: DH-	-6		P4 1		
Dist.	x	Coordinate y		x		У	acements Horizontal F displacement di	splacement
[m]	[m]	[m]	[m]	ſ mm	ıl		along the pe	to Line
0.0 0.49556 0.99112	86.87400 86.37989 85.88579	77.84600 77.80809 77.77019	[m] 100.50000 100.50000			[mm] 0.0 0.0 0.0	0.0	0.0
1.4867	85.39168 84.89758	77.73227 77.69436	100.50000 100.50000 100.50000		0.0	0.0	0.0	0.0
2.4778 2.9733 3.4689	83.90936 83.41526	77.65645 77.61855 77.58064	100.50000 100.50000 100.50000		0.0	0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0
4.4600	82.42705	77.50482	100.50000		0.0	0.0	0.0 0.0 0.0	0.0
5.4511 5.9467	81.43883 80.94473	77.42900 77.39109	100.50000		0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0
6.9378 7.4334	79.95652 79.46241	77.31527 77.27736	100.50000		0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
7 9289	78 96830	77 23945	100.50000 100.50000 100.50000		0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
9.4156	77.48598	77.12573	100.50000 100.50000 100.50000		0.0	0.0 0.0 0.0	0.0 0.0 0.0	
11.398	75.50956	76.97409	100.50000		0.0	0.0	0.0	0.0
			100.50000 100.50000 100.50000				0.0 0.0 0.0	0.0
13.380 13.876 14.371	72.54492	76.74664	100.50000 100.50000 100.50000		0.0	0.0	0.0 0.0 0.0	0.0
14.867 15.362 15.858	71.55671	76.67082	100.50000 100.50000 100.50000		0.0	0.0	0.0	0.0
16.353 16.849	70.56850	76.59500 76.55709	100.50000 100.50000 100.50000		0.0	0.0	0.0 0.0 0.0	0.0
17.840	69.08618	76.48127	100.50000 100.50000 100.50000		0.0	0.0	0.0	0.0
19.327	68.09797 67.60386 67.10976	76.36755	100.50000 100.50000 100.50000		0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
20.318	66.61565	76.29173	100.50000	-631.0	8E-6	-0.0041307	945.22E-6 0.0098513 0.017016	0.0040703
21.805	65.13333	76.17800	100.50000	-0.01	.3490 .7269	-0.12224 -0.15649	0.022802 0.029189	0.084579 0.12085 0.15471
22.796 23.291 23.787	64.14512 63.65102 63.15691	76.10218 76.06427 76.02636	100.50000 100.50000 100.50000	-0.02 -0.02 -0.02	4827	-0.22498	0.035577 0.041965 0.048353	0.18857 0.22242 0.25628
24.282	62.66280	75.98845 75.95055	100.50000	-0.03	2385 6164	-0.29347 -0.32772	0.054740	0.29014
25.769 26.265	61.18048 60.68638	75.87473 75.83682	100.50000 100.50000 100.50000	-0.04	3722 7501	-0.39621 -0.43046	0.067516 0.073904 0.080291	0.39171 0.42556
27.256	59.69817	75.76100	100.50000 100.50000 100.50000	-0.05	5060	-0.46470 -0.49895 -0.53319	0.086679 0.093067 0.099454	0.45942
28.247 28.742	58.70995 58.21585	75.68518 75.64727	100.50000	-0.06	2618 6397	-0.56744 -0.60169	0.10584 0.11223	0.56099 0.59484
29.733 30.229	57.22764 56.73353	75.57145 75.53355	100.50000 100.50000 100.50000	-0.07	1518 8890	-0.67020 -0.70224	0.11862 0.12258 0.11244	0.62870 0.66277 0.69568
30.725 31.220	56.23942 55.74532	75.49564 75.45773	100.50000	-0.04	4447 8479	-0.73017 -0.75393	0.10017 0.086069 0.070419	0.72463 0.74954 0.77036
32.707	54.26300	75.34400	100.50000 100.50000 100.50000	0.02	8366	-0.78879	0.053524	0.78701
Structur Dist.		Coordinate				Displac		
	x	У	z	x		di: a:	splacement disp long the perp Line t	endicular
[m] 0.0 0.48103	[m] 54.26300 54.22619	[m] 75.34400 75.82362	[m] 100.50000 100.50000	[mm] 0.025 0.020	562 1425	[mm] -0.79982 -0.61991	[mm] -0.79943 -0.61966	[mm] 0.035715 0.027070
0.96205 1.4431	54.18938	76.30323	100.50000	0.014	1913 1496	-0.43999 -0.26004	-0.43984 -0.25997	0.018798 0.010875 0.0032797
2.8862	54.04215	78.22169	100.50000		0.0	-0.080081 0.0 0.0	0.0	0.0
3.8482 4.3292	53.96854 53.93173	79.18092 79.66054	100.50000 100.50000 100.50000		0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0
4.8103 5.2913	53.89492 53.85812	80.14015 80.61977	100.50000 100.50000 100.50000		0.0	0.0	0.0 0.0 0.0	0.0
6.2533	53.78450	81.57900 82.05862	100.50000		0.0	0.0	0.0	0.0
7.2154	53.71088	82.53823	100.50000		0.0	0.0	0.0	0.0



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CIKIA	ınıan	auon +	excav	aliOi	11			
Dist.	_	Coordinat				Displac	cements	
	x	У	z	2	c	dis	orizontal Hori splacement disp	Lacement
7.6964	53.67408	83.01785	100.50000		0.0	0.0	long the perpe	0.0
8.1774 8.6585	53.63727	7 83.49746 5 83.97708	100.50000		0.0	0.0 0.0 0.0	0.0	0.0
9.1395 9.6205	53.56365	84.45669 84.93631	100.50000		0.0	0.0	0.0	0.0
10.102	53.49004	85.41592 85.89554	100.50000 100.50000 100.50000		0.0	0.0 0.0 0.0	0.0	0.0
11.064 11.545	53.41642	2 86.37515 2 86.85477	100.50000		0.0	0.0	0.0	0.0
12.026	53.34281	87.33438	100.50000		0.0	0.0	0.0	0.0
	0							
			ucture: DH	-8		P/ 1	_	
Dist.	×	Coordinat y		x	y	Displacement Horizontal	Horizontal	
						along the	perpendicular	
[m]	[m]	[m]	[m]	[mm]	[mm]	Line [mm]	to Line [mm]	
0.0 0.48457	53.30600	87.81400 87.78178	100.50000	0.0	0.0	[mm] 0.0 0.0	0.0	
0.96915 1.4537	52.33900	87.74956 87.71733	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0	
1.9383 2.4229	50.88850	87.68511 87.65289	100.50000 100.50000 100.50000	0.0	0.0	0.0	0.0	
3.3920	49.92150	87.58844	100.50000	0.0	0.0	0.0	0.0	
4.3612	49.43800	87.55622	100.50000	0.0	0.0	0.0	0.0	
4.8457 5.3303	48.47100	87.49178 87.45956	100.50000	0.0	0.0	0.0	0.0	
5.8149 6.2994	47.50400	87.42733 87.39511	100.50000	0.0	0.0	0.0	0.0	
6.7840	40.53/00	J 87.36289	100.50000	0.0	0.0	0.0	0.0	
7.7532	45.57000	87.29844	100.50000	0.0	0.0	0.0	0.0	
8.7223	44.60300	87.23400	100.50000	0.0	0.0	0.0	0.0	
Specific	Buildina	Damage Re	esults - Verti	ical Dis	splace	ments		
Structu			ructure: G					
Dist.	x	Coordinate y	s z [m]	Dis	splace	ements		
[m]	[m]	[m]	[m]	[mm]				
0.0	9.25200	89.52300	100.50000	0.0				
0.48595	9.22654	89.03772 88.55244	100.50000	0.0				
1.4578	9.17562		100.50000					
2.4297	9.12470	87.09660	100.50000	0.0				
3.4016	9.07378	86.12604	100.50000	0.0				
4.3735	9.02286	85.15548	100.50000	0.0				
5.3454	8.97194	84.67020 84.18492	100.50000	0.0				
6.3173	8.92102	83.69964 83.21436	100.50000	0.0				
7.2892	8.87010	82.72908 82.24380	100.50000	0.0				
7.7752 8.2611	8.84464	81.75852 81.27324	100.50000	0.0				
8.7471 9.2330	8.79372 8.76826	80.78796	100.50000 100.50000	0.0				
9.7189	8.74280 8.71734	79.81740 79.33212	100.50000 100.50000 100.50000	0.0				
10.691 11.177	8.69188 8.66642	78.84684 78.36156	100.50000	0.0				
11.663	8.64096	77.87628	100.50000	0.0				
12.635 13.121	8.59004 8.56458	76.90572 76.42044	100.50000	0.0				
13.607 14.092	8.53912 8.51366	75.93516 75.44988	100.50000	0.0				
14.578	8.48820	74.96460	100.50000	0.0				
15.550 16.036	8.43728	73.99404	100.50000 100.50000	0.0				
16.522 17.008	8.38636 8.36090	73.50876 73.02348 72.53820	100.50000	0.0				
17 /0/	0 22544	72 05202	100.50000	0 0				
18.466 18.952	8.28452	71.08236 70.59708 70.11180	100.50000	0.0				
19.438	8.23360 8.20814	70.11180 69.62652	100.50000	0.0				
20.410	8.18268	69.14124	100.50000	0.0				
21.382	8.13176	68.17068 67.68540	100.50000	0.0				
22.354	8.08084	67.20012	100.50000	0.0				
23.325	8.02992	66.22956 65.74428	100.50000	0.0				
24.297	7.97900	65.25900	100.50000	0.0				
Structu	re: GVA-2	2 Sub-st	ructure: G	VA-2				
Dist.		Coordinate			splace	ements		
[m]	x [m]	y [m]	z [m]	z [mm]				
Vertica	l Offset	1	100.50000					
0.48050	7.95067	64.77933	100.50000	0.0				
0.96101 1.4415	7.92233	64.29967	100.50000	0 0				
1.9220 2.4025	7.86567 7.83733	63.34033 62.86067	100.50000	0.0				
2.8830	7.80900	62.38100	100.50000	0.0				
Structu	re: GVA-3	3 Sub-st	ructure: G	VA-3				
Dist.		Coordinat	es	Di	isplac	cements		
[m]	x [m]	y [m]	z [m]	z [mm]				
Vertica	1 Offset	1						
0.0	7.80900 8.28487	62.38100 62.34613	100.50000	0.0				
0.95430 1.4315	9.23663	62.31125 62.27638	100.50000	0.0				
1.9086 2.3858	9.71250	62.24150 62.20662	100.50000	0.0				
2.8629 3.3401	10.66425	5 62.17175 2 62.13687	100.50000	0.0				
3.8172	11.61600	62.10200	100.50000	0.0				

Structure: GVA-4 | Sub-structure: GVA-4



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Drg. Ref.			
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CIRIA Intaliation + excavation	14-Aug-2018
Dist. Coordinates Displacements x y z z [m] [m] [m] [mm]	•
Dist. Coordinates Displacements x y z z [m] [m] [m] [m] [mm]	
Vertical Offset 1 0.0 11.61600 62.10200 100.50000 0.0 0.47359 11.65050 62.57433 100.50000 0.0 0.94718 11.68500 63.04667 100.50000 0.0	
1.4208 11.71950 63.51900 100.50000 0.0 1.8944 11.75400 63.99133 100.50000 0.0 2.3680 11.78850 64.46367 100.50000 0.0 2.8415 11.82300 64.93600 100.50000 0.0	
Structure: GVA-5 Sub-structure: GVA-5 Dist.	
[m] [m] [m] [m] [mm] Vertical Offset 1 0.0 11.82300 64.93600 100.50000 0.0 0.48843 12.31013 64.90031 100.50000 0.0	
0.97686 12.79725 64.86463 100.50000 0.0 1.4653 13.28438 64.82894 100.50000 0.0 1.5537 13.77150 64.79325 100.50000 0.0 2.4422 14.25863 64.75756 100.50000 0.0 2.3006 14.74575 64.72187 100.50000 0.0	
3.4190 15,23288 64.68619 100.50000 0.11849 3.9074 15.72000 64.65050 100.50000 0.20756 4.3959 16.20713 64.61481 100.50000 0.30755 4.8843 16.69425 64.57913 100.50000 0.42542 5.3372 17.18138 64.54344 100.50000 0.53663	
5.8612 17.66850 64.50775 100.50000 0.64367 6.3496 18.15563 64.47206 100.50000 0.74769 6.8380 18.64275 64.43637 100.50000 0.85046 7.3265 19.12988 64.40069 100.50000 0.95341 7.8149 19.61700 64.36500 100.50000 0.95341	
Structure: GVA-6 Sub-structure: GVA-6 Dist. Coordinates Displacements	
Dist. Coordinates Displacements x y z z [m] [m] [m] [m] [mm] Vertical Offset 1 0.0 19.61700 64.36500 100.50000 1.0578	
0. 49248 19.58100 63.87383 100.50000 1.1163 0.98497 19.54500 63.82627 100.50000 1.1735 1.4775 19.50900 62.89150 100.50000 1.2293 1.5699 19.47300 62.40033 100.50000 1.2837 2.4624 19.43700 61.90917 100.50000 1.3644 2.5549 19.40100 61.41800 100.50000 1.3873	
Structure: GVA-7 Sub-structure: GVA-7	
Dist. Coordinates Displacements x y z z [m] [m] [m] [m] [mm] Vertical Offset 1 0.0 19.40100 61.41800 100.50000 1.3873	
0.46449 19.86425 61.38412 100.50000 1.5113 0.92897 20.32750 61.35025 100.50000 1.6118 1.3935 20.79075 61.31638 100.50000 1.7792 1.8579 21.25400 61.28250 100.50000 1.9242 2.3224 21.71725 61.24662 100.50000 2.0767 2.7869 22.18050 61.21475 100.50000 2.2372 3.2514 22.64375 61.18088 100.50000 2.4054 3.7159 23.10700 61.14700 100.50000 2.5814	
Structure: GVA-8 Sub-structure: GVA-8 Dist. Coordinates Displacements x y z z [m] [m] [m] [m] [mm]	
Vertical Offset 1 0.023.10700 61.14700 100.50000 2.5814 0.49250 23.13267 61.63883 100.50000 2.4823 0.98501 23.15833 62.13067 100.50000 2.4823 1.4775 23.18400 62.62250 100.50000 2.2785 1.9700 23.20967 63.11433 100.50000 2.1750 2.4625 23.23533 63.60617 100.50000 2.0712 2.9550 23.2610 64.09800 100.50000 1.9676	
Structure: GVA-9 Sub-structure: GVA-9 Dist. Coordinates Displacements	
Dist. Coordinates Displacements x y z z [m] [m] [m] [m] [m] [mm] Vertical Offset 1 0.0 23.26100 64.09800 100.50000 1.9676 0.49313 23.26670 64.59046 100.50000 1.8646	
0.98626 23.31240 65.08292 100.50000 1.7627 1.4794 23.33810 65.57538 100.50000 1.6622 1.9725 23.36380 66.06784 100.50000 1.5634 2.4657 23.38950 65.56030 100.50000 1.4664	
2.9588 23.41520 67.05276 100.50000 1.3714 3.4519 23.44909 67.54522 100.50000 1.2781 3.9450 23.46660 68.03768 100.50000 1.1866 4.4382 23.49230 68.53014 100.50000 1.0966 4.9313 23.51800 69.02260 100.50000 1.0077	
5.4244 23.54370 69.51506 100.50000 0.91934 5.9176 23.56940 70.0752 100.50000 0.83096 6.4107 23.59510 70.49998 100.50000 0.74178 6.9038 23.62080 70.99244 100.50000 0.55091 7.3970 23.64650 71.48490 100.50000 0.555729	
7.8901 23.67220 71.97736 100.50000 0.45976 8.8382 23.6990 72.46982 100.50000 0.35697 8.8763 23.72360 72.96228 100.50000 0.25330 9.3695 23.774930 73.45474 100.50000 0.17318 9.8626 23.77500 73.94720 100.50000 0.052387	
10.356 23.80070 74.43966 100.50000 0.010945 10.849 23.8260 74.93212 100.50000 0.0 11.342 23.85210 75.42458 100.50000 0.0 11.835 23.8780 75.91704 100.50000 0.0 12.328 23.90350 76.40950 100.50000 0.0 12.328 23.90350 76.40950 100.50000 0.0	
12.821 23.92920 76.90196 100.50000 0.0 13.315 23.95490 77.39442 100.50000 0.0 13.808 23.98060 77.88688 100.50000 0.0 14.301 24.00630 78.37934 100.50000 0.0 14.734 24.03200 78.87180 100.50000 0.0	
15.287 24.05770 79.36426 100.50000 0.0 15.780 24.08340 79.5672 100.50000 0.0 16.273 24.10910 80.34918 100.50000 0.0 16.766 24.13480 80.84164 100.50000 0.0 17.260 24.16508 81.33410 100.50000 0.0	
17.753 24.18620 81.82656 100.50000 0.0 18.246 24.21190 82.31902 100.50000 0.0 18.739 24.23760 82.81148 100.50000 0.0 19.232 24.26330 83.30394 100.50000 0.0 19.725 24.28900 83.79640 100.50000 0.0	
20.218 24.31470 84.28886 100.50000 0.0	



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CIRIA intallation + excavation	Made by	14-Aug-2018	Спескеа
Dist. Coordinates Displacements	•		
20.711 24.34040 84.78132 100.50000 0.0 21.205 24.36610 85.727378 100.50000 0.0 21.698 24.3910 85.76624 100.50000 0.0 22.191 24.41750 86.25870 100.50000 0.0 22.191 24.41750 86.75116 100.50000 0.0 23.177 24.46890 87.24362 100.50000 0.0 23.177 24.46890 87.24362 100.50000 0.0 23.173 24.3450 87.358 100.50000 0.0 24.163 24.52030 88.22854 100.50000 0.0 24.163 24.52030 88.22854 100.50000 0.0 24.1657 24.54600 88.72100 100.50000 0.0			
Structure: GVA-10 Sub-structure: GVA-10			
Dist. Coordinates Displacements x y z z [m] [m] [m] [m] [mm]			
Vertical Offset 1 0.42 4.5460 88.72100 100.50000 0.0 0.47859 24.08600 88.74601 100.50000 0.0 0.47859 24.08600 88.74601 100.50000 0.0 1.37859 24.08600 88.74601 100.50000 0.0 1.3458 23.11219 88.79619 100.50000 0.0 1.3142 22.61425 88.78619 100.50000 0.0 2.8716 21.67827 88.81252 100.50000 0.0 2.8716 21.67827 88.812152 100.50000 0.0 3.5202 21.20044 88.89641 100.50000 0.0 3.5202 21.20044 88.89644 100.50000 0.0 4.3073 20.24556 88.94656 100.50000 0.0 4.3073 20.24556 88.94656 100.50000 0.0 5.2645 19.28869 88.99669 100.50000 0.0 5.2645 19.28869 88.99669 100.50000 0.0 6.2217 18.33281 89.04681 100.50000 0.0 6.7037 17.5575 16.89900 89.07185 100.50000 0.0 7.5575 16.89900 89.12200 100.50000 0.0 8.1361 16.42106 89.12706 100.50000 0.0 8.1361 15.94318 39.1721 210.50000 0.0 8.1361 15.94318 39.1721 210.50000 0.0 9.95719 14.98725 89.2225 100.50000 0.0 10.529 14.03138 89.32250 100.50000 0.0 11.1486 13.07550 89.32255 100.50000 0.0 11.1486 13.07550 89.32255 100.50000 0.0 11.1486 13.07550 89.32255 100.50000 0.0 11.1486 13.07550 89.32255 100.50000 0.0 11.1486 13.07550 89.32255 100.50000 0.0 11.1486 13.07550 89.32255 100.50000 0.0 11.1486 13.07550 89.32255 100.50000 0.0 11.1486 13.07550 89.33762 100.50000 0.0 11.1486 13.07550 89.33765 100.50000 0.0 11.1486 13.07550 89.33765 100.50000 0.0 11.1486 13.07550 89.33765 100.50000 0.0 11.1486 13.07550 89.33765 100.50000 0.0 11.1486 13.07550 89.33765 100.50000 0.0 11.1486 13.07550 89.337650 100.50000 0.0			
13.879 10.68581 89.44781 100.50000 0.0 14.358 10.20788 89.4728 100.50000 0.0 14.836 9.72994 89.49794 100.50000 0.0 15.315 9.25200 89.52300 100.50000 0.0			
Structure: GE-1 Sub-structure: GE-1			
Dist. Coordinates Displacements x y z [m] [m] [m] [m] [mm] Vertical Offset 1			
0.0 28.56700 64.11000 100.50000 3.6013 0.49454 29.6094 64.13431 100.50000 3.7641 0.99907 29.55487 64.13683 100.50000 3.8824 1.4836 30.04881 64.18294 100.50000 4.0151 1.9781 30.54275 64.20725 100.50000 4.1413 2.4727 31.03696 64.23156 100.50000 4.2600 2.9672 31.53063 64.23558 100.50000 4.3704 3.4617 32.02456 64.28019 100.50000 4.3704 3.4617 32.02456 64.28019 100.50000 4.3704 3.4517 33.0546 44.28019 100.50000 4.5628 4.4508 33.01244 64.28019 100.50000 4.5628 4.4508 33.01244 64.32881 100.50000 4.5628 4.4508 33.01246 64.32881 100.50000 4.7126 5.4399 34.00031 64.32881 100.50000 4.7126 5.4399 34.00031 64.37744 100.50000 4.7700 5.9344 34.49425 64.40175 100.50000 4.8152 6.4290 34.98819 64.42606 100.50000 4.8152 6.4290 34.98819 64.42606 100.50000 4.8177 6.9235 35.48212 64.47569 100.50000 4.8674 7.4180 35.97606 64.47469 100.50000 4.8741 7.9126 36.47000 64.49900 100.50000 4.8734			
Structure: GE-2 Sub-structure: GE-2 Dist. Coordinates Displacements			
x y z z [m] [m] [m] [mm]			
Vertical Offset 1 0.0 36.47000 64.49900 100.50000 4.8734 0.49291 36.44014 64.99100 100.50000 4.5801 0.98581 36.41029 65.48300 100.50000 4.2927 1.4787 36.38043 65.97500 100.50000 4.0126 1.9716 36.35057 66.45700 100.50000 3.4792 2.4645 36.32071 66.98590 100.50000 3.4792 2.9577 36.2906 67.45100 100.50000 3.4792 2.9577 36.2906 67.45100 100.50000 3.4792 3.4503 36.26100 67.94500 100.50000 2.9877 3.4363 36.26116 68.2700 100.50000 2.9877 3.4363 36.26116 69.94500 100.50000 2.9877 3.4363 36.26117 69.9100 100.50000 2.9877 4.4291 36.17143 69.4190 100.50000 2.3427 4.4291 36.17143 69.4190 100.50000 2.3427 6.5007 36.6203 36.4157 69.9100 100.50000 2.3833 5.4203 36.62147 17.04030 100.50000 1.9655 6.4078 36.0816 70.89500 100.50000 1.9655 6.4078 36.0816 70.89500 100.50000 1.9655 6.5078 36.08214 71.87900 100.50000 1.2977 7.936 36.02214 71.87900 100.50000 1.2977 8.8723 35.93227 72.37100 100.50000 1.3496 8.3794 35.96243 72.86300 100.50000 1.3496 8.3794 35.96243 72.86300 100.50000 1.9710 9.8581 35.8726 74.33900 100.50000 1.9920 9.8581 35.8726 74.33900 100.50000 0.85316 10.351 35.84300 74.83100 100.50000 0.85316 10.351 35.84300 74.83100 100.50000 0.85316 10.351 35.84300 74.83100 100.50000 0.7624 11.337 35.84300 77.79300 100.50000 0.24338 12.816 35.69317 77.93100 100.50000 0.24338 12.816 35.69317 77.93100 100.50000 0.24338 12.816 35.69317 77.93100 100.50000 0.046239 13.801 35.66386 77.78300 100.50000 0.046239			
Structure: GE-3 Sub-structure: GE-3 Dist. Coordinates Displacements x y z z			
[m] [m] [m] [m] [m] [mm] Vertical Offset 1 0.0 35.63400 78.27500 100.50000 0.0 0.47806 35.15681 78.24506 100.50000 0.0 0.95613 34.67963 78.21713 100.50000 0.0 1.4342 34.20244 78.18819 100.50000 0.0 1.9123 33.72525 78.15925 100.50000 0.0 2.3903 33.24806 78.13931 100.50000 0.0 2.3903 33.24806 78.13031 100.50000 0.0 3.3464 32.27937 78.10138 100.50000 0.0 3.3464 32.23569 78.07244 100.50000 0.0 4.3026 31.33931 78.01456 100.50000 0.0 4.3026 31.33931 78.01456 100.50000 0.0 4.3026 30.86212 77.38562 100.50000 0.0 5.2567 30.88494 77.32569 100.50000 0.0 5.2567 30.88494 77.32569 100.50000 0.0 5.2480 29.90775 77.22775 100.50000 0.0 6.2148 29.40505 77.88581 100.50000 0.0 6.2148 29.40505 77.86381 100.50000 0.0 7.1710 28.47619 77.84381 100.50000 0.0			

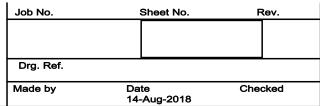


Job No.	Sheet No.	Rev.
Drg. Ref.		
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					1-710	
Dist.		Coordinates		Displacements		
[m]	x [m]	y [m]	z [m]	z [mm]		
7. 6400	07 00000	77 01000 10	20 50000			
7.6490	27.99900	77.81200 10	0.50000	0.0		
		1 0.2		4		
Structui		Sub-struct	ture: GE-	-4		
Dist.	×	Coordinates	z	Displacements z		
[m]	[m]	[m]	[m]	[mm]		
Vertical	l Offset	1				
0.0	27.99900	77.81200 10		0.0		
0.97955	28.03957	77.32264 10 76.83329 10	00.50000	0.0		
1.4693	28.05986	76.34393 10 75.85457 10	00.50000	0.035527 0.12871		
2.4489	28.10043	75.36521 10	00.50000	0.22169		
2.9387 3.4284	28.12071	74.87586 10 74.38650 10	00.50000	0.33240 0.45427		
3.9182	28.16129	73.89714 10 73.40779 10	00.50000	0.56981		
4.8978	28.20186	72.91843 10	00.50000	0.79035		
		72.42907 10 71.93971 10		1.0091		
6.3671	28.26271	71.45036 10 70.96100 10	00.50000	1.1217 1.2382		
7.3467	28.30329	70.47164 10	00.50000	1.3597		
8.3262	28.34386	69.98229 10 69.49293 10	00.50000	1.4873 1.6215		
8.8160	28.36414	69.00357 10 68.51421 10	00.50000	1.7631 1.9124		
9.7955	28.40471	68.02486 10	00.50000	2.0698		
10.285	28.42500	67.53550 10 67.04614 10	00.50000	2.2353		
11.265	28.46557	66.55679 10 66.06743 10	00.50000	2.5906		
12.244	28.50614	65.57807 10	00.50000	2.9762		
12.734	28.52643	65.08871 10 64.59936 10	00.50000	3.1790 3.3877		
13.714	28.56700	64.11000 10	00.50000	3.6013		
Structur		Sub-struct	ture: DH-	-1		
Dist.		Coordinates	-	Displacements		
[m]	x [m]	y [m]	z [m]	z [mm]		
	l Offset					
0.0	44.60300	87.23400 10		0.0		
0.97126	44.66109	86.74924 10 86.26448 10	00.50000	0.0		
1.4569	44.69013	85.77972 10 85.29496 10	00.50000	0.0		
2.4282	44.74822	84.81020 10	00.50000	0.0		
2.9138	44.77726	84.32543 10 83.84067 10	00.50000	0.0		
3.8850	44.83535	83.35591 10 82.87115 10	00.50000	0.0		
4.8563	44.89343	82.38639 10	00.50000	0.0		
5.3419	44.92248	81.90163 10 81.41687 10	00.50000	0.0		
6.3132	44.98057	80.93211 10	00.50000	0.0		
7.2845	45.03865	80.44735 10 79.96259 10	00.50000	0.0		
7.7701 8.2557	45.06770	79.47783 10 78.99307 10	00.50000	0.0		
8.7413	45.12578	78.50830 10	00.50000	0.0		
9.7126	45.18387	78.02354 10 77.53878 10	00.50000	0.18420		
10.684	45.24196	77.05402 10 76.56926 10	00.50000	0.41735		
11.169	45.27100	76.08450 10	00.50000	0.54046		
12.141	45.32909	75.59974 10 75.11498 10	00.50000	0.65868 0.77435		
12.626	45.35813	74.63022 10 74.14546 10	00.50000	0.88964 1.0065		
13.598	45.41622	73.66070 10	00.50000	1.1269		
14.569	45.47430	73.17593 10 72.69117 10	00.50000	1.2522		
15.055	45.50335	72.20641 10 71.72165 10	00.50000	1.5237		
16.026	45.56143	71.23689 10	00.50000	1.8306		
16.997	45.61952	70.75213 10 70.26737 10	00.50000	2.1794		
17.483	45.64857	69.78261 10 69.29785 10	00.50000	2.3709 2.5741		
18.454	45.70665	68.81309 10	00.50000	2.7891 3.0157		
19.425	45.76474	68.32833 10 67.84357 10	00.50000	3.2536		
19.911	45.79378	67.35880 10 66.87404 10	00.50000	3.5023 3.7612		
20.882	45.85187	66.38928 10	00.50000	4.0293 4.3057		
21.853	45.90996	65.90452 10 65.41976 10	00.50000	4.5891		
22.339	45.93900	64.93500 10	00.50000	4.8782		
Structur	re: DH-9	Sub-struct	ture: Du	-2		
			LLLC. DA-			
Dist.	x	Coordinates Y	z	Displacements z		
[m]	[m]	[m]	[m]	[mm]		
	l Offset					
0.0	45.93900	64.93500 10 64.97005 10	00.50000	4.8782 4.8710		
0.98513	46.92163	65.00510 10	00.50000	4.8638		
1.9703	47.90427	65.04014 10 65.07519 10	00.50000	4.8566 4.8494		
2.4628	48.39559	65.11024 10 65.14529 10	00.50000	4.8422 4.8350		
3.4480	49.37822	65.18034 10	00.50000	4.8279		
4.4331	50.36086	65.21538 10 65.25043 10	00.50000	4.8207 4.8135		
4.9257	50.85217	65.28548 10 65.32053 10	00.50000	4.8063 4.7991		
5.9108	51.83481	65.35558 10	00.50000	4.7920		
		65.39063 10 65.42567 10		4.7848 4.7776		
7.3885	53.30876	65.46072 10 65.49577 10	00.50000	4.7705 4.7633		
8.3736	54.29139	65.53082 10	00.50000	4.7562		
		65.56587 10 65.60091 10		4.7453 4.7221		
9.8513	55.76535	65.63596 10	00.50000	4.6866		
10.836	56.74798	65.67101 10 65.70606 10	00.50000	4.6390 4.5866		
11.329	57.23930	65.74111 10 65.77615 10	00.50000	4.5343		
12.314	58.22193	65.81120 10	00.50000	4.4305		
13.299	59.20457	65.84625 10 65.88130 10	00.50000	4.3788 4.3274		
13.792	59.69588	65.91635 10 65.95139 10	00.50000	4.2763 4.2253		
14.777	60.67852	65.98644 10	00.50000	4.1747		
15.762	61.66115	66.02149 10 66.05654 10	00.50000	4.1242 4.0741		
16.255	62.15247	66.09159 10 66.12663 10	00.50000	4.0242		
		66.16168 10		3.9746		
17.240	03.13311					

Oasys

0712 - 138-140 Highgate Rd



CIRIA intallation + excavation	Made by	Date 14-Aug-2018	Checked
Dist. Coordinates Displacements x y z z			
[m] [m] [m] [m] [mm]			
18.225 64.11774 66.23178 100.50000 3.8275 18.718 64.60906 66.26683 100.50000 3.7742 19.210 65.10038 63.0187 100.50000 3.7117			
19,703 65,59169 66,33692 100,50000 3.6407 20.195 66.08301 66.37197 100.50000 3.5616 20.688 66.57433 66.40702 100.50000 3.4750			
21,180 67,0554 66,44207 100,50000 3.3816 21,673 67,55696 66,47712 100,50000 3.2822 22,155 68,04828 66,51216 100,50000 3.1774			
22.658 68.53960 66.54721 100.50000 3.0681 23.151 69.03091 66.58226 100.50000 2.9549 23.643 69.52223 66.61731 100.50000 2.8388			
24.136 70.01355 66.65236 100.50000 2.7203 24.628 70.50487 66.68740 100.50000 2.6004 25.121 70.99618 66.72245 100.50000 2.4797			
25.613 71.48750 66.75750 100.50000 2.3589 26.105 71.97882 66.79255 100.50000 2.2387 26.599 72.47013 66.82760 100.50000 2.1196			
27.091 72.96145 66.86264 100.50000 2.0020 27.584 73.45277 66.89769 100.50000 1.8866 28.076 73.94409 66.93274 100.50000 1.7736 28.569 74.43540 66.96779 100.50000 1.6632			
29.061 74.92672 67.00284 100.50000 1.5556 29.554 75.41804 67.03788 100.50000 1.45510 30.047 75.90356 67.07293 100.50000 1.4510			
30.539 76.40067 67.10798 100.50000 1.2500 31.032 76.89199 67.14303 100.50000 1.1531 31.524 77.38331 67.17808 100.50000 1.0582			
32.017 77.87463 67.2131 100.50000 0.96467 32.509 78.36594 67.24817 100.50000 0.87178 33.002 78.85726 67.28322 100.50000 0.77870			
33.494 79.34858 67.31827 100.50000 0.68446 33.987 79.83989 67.35332 100.50000 0.58792 34.480 80.33121 67.38837 100.50000 0.48778			
34,972 80.82253 67.42341 100.50000 0.38261 35.465 81.31385 67.45846 100.50000 0.26985 35,957 81.80516 67.49351 100.50000 0.18711 36.450 82.29648 67.52856 100.50000 0.10379			
36.145 82.2948 67.55361 10.50000 0.109911 36.942 82.78786 67.55361 10.50000 0.019911 37.435 83.27912 67.58365 100.50000 0.0 37.928 83.77043 67.63370 100.50000 0.0			
38.420 84.26175 67.66875 100.50000 0.0 38.913 84.75307 67.70380 100.50000 0.0			
39, 405 85, 24438 67, 73885 100, 50000 0.0 39, 898 85, 73570 67, 77389 100, 50000 0.0 40, 390 86, 22702 67, 80894 100, 50000 0.0 40, 893 86, 71834 67, 84399 100, 50000 0.0			
41.376 87.20965 67.87904 100.50000 0.0 41.868 87.70097 67.91409 100.50000 0.0 42.361 88.19229 67.94913 100.50000 0.0			
42.853 88.6361 67.98418 100.50000 0.0 43.346 89.17492 68.01923 100.50000 0.0 43.838 89.66624 68.05428 100.50000 0.0 44.331 90.15756 68.08933 100.50000 0.0			
44.351 90.14736 66.0535 100.35000 0.0 44.823 90.64888 68.12438 100.55000 0.0 45.316 91.14019 68.15942 100.50000 0.0 45.809 91.63151 68.19447 100.50000 0.0			
46.301 92.12283 68.22952 100.50000 0.0 46.794 92.61414 68.26457 100.50000 0.0 47.286 93.10546 68.29962 100.50000 0.0			
47.779 93.59678 68.33466 100.50000 0.0 48.271 94.08810 68.36971 100.50000 0.0 48.764 94.57941 68.40476 100.50000 0.0			
49,257 95.07073 68.43981 100.50000 0.0 49,749 95.56205 68.47486 100.50000 0.0 50.242 96.05337 68.50990 100.50000 0.0			
50.734 96.54468 68.54495 100.50000 0.0 51.227 97.03600 68.58000 100.50000 0.0			
Structure: DH-3 Sub-structure: DH-3 Dist. Coordinates Displacements			
x y z z [m] [m] [m] [mm]			
Vertical Offset 1 0.0 97.03600 68.58000 100.50000 0.0 0.48909 96.99859 69.06765 100.50000 0.0 0.97817 96.56117 69.55530 100.50000 0.0			
1.4673 96.92376 70.04296 100.50000 0.0 1.9563 96.88635 70.53061 100.50000 0.0 2.4454 96.84893 71.01826 100.50000 0.0			
2.9345 96.81152 71.50591 100.50000 0.0 3.9127 96.73611 71.99357 100.50000 0.0 3.9127 96.73670 72.48122 100.50000 0.0			
4.4018 96.6928 72.96887 100.50000 0.0 4.8909 96.66187 73.45652 100.50000 0.0 5.3799 96.62446 73.94417 100.50000 0.0			
5.8690 96.58704 74.43183 100.50000 0.0 6.3581 96.54963 74.91948 100.50000 0.0 6.8472 96.51222 75.40713 100.50000 0.0			
7.3363 96.47480 75.89478 100.50000 0.0 7.8254 96.43739 76.38243 100.50000 0.0 8.3144 96.39998 76.87009 100.50000 0.0 8.8035 96.36257 77.35774 100.50000 0.0			
8.8033 96.32517 77.3471 100.30000 0.0 9.7817 96.28774 78.33304 100.50000 0.0 10.271 96.28037 98.82070 100.50000 0.0			
10.750 96.21291 79.30835 100.50000 0.0 11.249 96.17550 79.79600 100.50000 0.0 11.738 96.13809 80.28365 100.50000 0.0			
12.227 96.10067 80.77130 100.50000 0.0 12.716 96.06326 81.25896 100.50000 0.0 13.205 96.02585 81.74661 100.50000 0.0			
13.694 95.98843 82.23426 100.50000 0.0 14.183 95.95102 82.72191 100.50000 0.0 14.673 95.91361 83.20957 100.50000 0.0			
15.162 95.87620 83.69722 100.50000 0.0 15.651 95.83878 84.18487 100.50000 0.0 16.140 95.80137 84.67252 100.50000 0.0 16.629 95.76396 85.16017 100.50000 0.0			
17.118 95.72654 85.64783 100.50000 0.0 17.607 95.68913 86.13548 100.50000 0.0 18.096 95.65172 86.62313 100.50000 0.0			
18.585 95.61430 87.11078 100.50000 0.0 19.074 95.57689 87.59843 100.50000 0.0 19.563 95.53948 88.08609 100.50000 0.0			
20.052 95.50207 88.57374 100.50000 0.0 20.542 95.46465 89.06139 100.50000 0.0 21.031 95.42724 89.54904 100.50000 0.0			
21.520 95.38983 90.3870 100.50000 0.0 22.009 95.35241 90.52435 100.50000 0.0 22.498 95.31500 91.01200 100.50000 0.0			
Structure: DH-4 Sub-structure: DH-4			
Dist. Coordinates Displacements x y z z [m] [m] [m] [mm] [mm]			
Vertical Offset 1 0.0 95.31500 91.01200 100.50000 0.0 0.47118 94.84520 90.97595 100.50000 0.0			
0.4/118 94.88520 90.5795 100.50000 0.0 0.94236 94.37540 90.93990 100.50000 0.0 1.4135 93.90560 90.90385 100.50000 0.0 1.8847 93.43580 90.86780 100.50000 0.0			
2.3559 92.96600 90.83175 100.50000 0.0			



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Dist. Coordinates Displacements x y z z z			
[m] [m] [m] [m] [mm] 2.8271 92.49620 90.79570 100.50000 0.0			
3.2983 92.02640 90.75965 100.50000 0.0 3.7694 91.55660 90.72360 100.50000 0.0 4.2406 91.08680 90.68755 100.50000 0.0			
4.7118 90.61700 90.65150 100.50000 0.0 5.1830 90.14720 90.61545 100.50000 0.0 5.6542 89.67740 90.57940 100.50000 0.0			
6.1254 89.20760 90.54335 100.50000 0.0 6.5965 88.73780 90.50730 100.50000 0.0 7.0677 88.26800 90.47125 100.50000 0.0			
7.5389 87.79820 90.43520 100.50000 0.0 8.0101 87.32840 90.39915 100.50000 0.0 8.4813 86.85860 90.36310 100.50000 0.0			
8.9524 86.38880 90.32705 100.50000 0.0 9.4236 85.91900 90.29100 100.50000 0.0			
Structure: DH-5 Sub-structure: DH-5			
Dist. Coordinates Displacements x y z z			
Vertical Offset 1 0.0 85,91900 90.29100 100.50000 0.0			
0.48006 85.95573 89.81235 100.50000 0.0 0.96012 85.99246 89.33369 100.50000 0.0 1.4402 86.02919 88.85504 100.50000 0.0			
1.9202 86.06592 88.37638 100.50000 0.0 2.4003 86.10255 87.89773 100.50000 0.0 2.8804 86.13938 87.41908 100.50000 0.0			
3.3604 86.17612 86.94042 100.50000 0.0 3.8405 86.21285 86.46177 100.50000 0.0 4.3205 86.24958 85.98312 100.50000 0.0			
4.8006 86.28631 85.50446 100.50000 0.0 5.2807 86.3294 85.02581 100.50000 0.0 5.7607 86.35977 84.54715 100.50000 0.0			
6.2408 86.39650 84.06850 100.50000 0.0 6.7209 86.4323 83.58985 100.50000 0.0 7.2009 86.46996 83.11119 100.50000 0.0			
7.6810 86.50669 82.63254 100.50000 0.0 8.1610 86.54342 82.15388 100.50000 0.0 8.6411 86.58015 81.67523 100.50000 0.0			
9.1212 86.61688 81.19658 100.50000 0.0 9.6012 86.6362 80.71792 100.50000 0.0 10.081 86.69035 80.23927 100.50000 0.0			
10.561 86.72708 79.76062 100.50000 0.0 11.041 86.76381 79.28196 100.50000 0.0 11.521 86.80054 78.80331 100.50000 0.0			
12.002 86.83727 78.32465 100.50000 0.0 12.482 86.87400 77.84600 100.50000 0.0			
Structure: DH-6 Sub-structure: DH-6			
Dist. Coordinates Displacements x y z z			
Vertical Offset 1 0.0 86.87400 77.84600 100.50000 0.0			
0.49556 86.37989 77.80809 100.50000 0.0 0.99112 85.88579 77.77018 100.50000 0.0			
1.4867 85.39168 77,73227 100.50000 0.0 1.9922 84.89758 77.69436 100.50000 0.0 2.4778 84.40347 77.65645 100.50000 0.0 2.9733 83.90936 77.61855 100.50000 0.0			
3.4689 83.41526 77.58064 100.50000 0.0 3.9645 82.92115 77.54273 100.50000 0.0			
4.4600 82.42705 77.50482 100.50000 0.0 4.9556 81.93294 77.46691 100.50000 0.0 5.4511 81.43883 77.42900 100.50000 0.0 5.9467 80.94473 77.39109 100.50000 0.0			
6.4423 80.45062 77.35318 100.50000 0.0 6.9378 79.95652 77.31527 100.50000 0.0 7.4334 79.46241 77.27736 100.50000 0.0			
7.9289 78.96830 77.23945 100.50000 0.0 8.4245 78.47420 77.20155 100.50000 0.0			
8.9200 77.9809 77.16364 100.50000 0.0 9.4156 77.48598 77.12573 100.50000 0.0 9.9112 76.99188 77.08782 100.50000 0.0 10.407 76.49777 77.04991 100.50000 0.0			
10.902 76.00367 77.01200 100.50000 0.0 11.398 75.50956 76.97409 100.50000 0.0 11.893 75.01545 76.93618 100.50000 0.0			
12.389 74.52135 76.89827 100.50000 0.0 12.885 74.02724 76.86036 100.50000 0.0 13.380 73.53314 76.82245 100.50000 0.0			
13.876 73.03903 76.78455 100.50000 0.0 14.371 72.54492 76.74664 100.50000 0.0 14.867 72.05082 76.70873 100.50000 0.0			
15.362 71.55671 76.67082 100.50000 0.0 15.858 71.06261 76.63291 100.50000 0.0 16.353 70.56850 76.59500 100.50000 0.029082			
16.849 70.07439 76.55709 100.50000 0.067052			
18.336 68.59208 76.44336 100.50000 0.17043 18.831 68.09797 76.40545 100.50000 0.20126 19.327 67.60386 76.36755 100.50000 0.23020			
19.822 67.10976 76.32964 100.50000 0.25723 20.318 66.61565 76.29173 100.50000 0.28823 20.813 66.12155 76.25382 100.50000 0.32006			
21.309 55.62744 76.21591 100.50000 0.34866 21.805 65.13333 76.17800 100.50000 0.37418 22.300 64.63923 76.14009 100.50000 0.39845			
22.796 64.14512 76.10218 100.50000 0.42243 23.291 63.65102 76.06427 100.50000 0.44616 23.787 63.15691 76.02636 100.50000 0.46964			
24.282 52.66280 75.98845 100.50000 0.49290 24.778 62.16870 75.95055 100.50000 0.51595 25.273 61.67459 75.91264 100.50000 0.53881			
25.769 51.18048 75.87473 100.50000 0.56149 26.265 60.68638 75.83682 100.50000 0.58401 26.760 60.19227 75.79891 100.50000 0.60639			
27.256 59.69817 75.76100 100.50000 0.62864 27.751 59.2040 75.72309 100.50000 0.65878 28.247 58.70995 75.68518 100.50000 0.67282			
28.742 58.21585 75.64727 100.50000 0.69479 29.238 57.72174 75.60936 100.50000 0.71668 29.733 57.22764 75.57145 100.50000 0.73850 30.229 56.73353 75.23535 100.50000 0.73858			
30.725 56.7335 75.5335 100.50000 0.7888 30.725 56.23942 75.49554 100.5000 0.77600 31.220 55.74532 75.45773 100.50000 0.77600 31.716 55.25121 75.41982 100.50000 0.80279			
31.716 55.25121 75.41982 100.50000 0.80279 32.211 54.75711 75.38191 100.50000 0.81213 32.707 54.26300 75.34400 100.50000 0.81874			
Structure: DH-7 Sub-structure: DH-7			
Dist. Coordinates Displacements x y z z			
Vertical Offset 1 0.0 54.26300 75.34400 100.50000 0.81874			
0.48103 54.22619 75.82362 100.50000 0.70466 0.96205 54.18938 76.30323 100.50000 0.58894 1.4431 54.15288 76.78285 100.50000 0.46939			



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Dist. Coordinates Displacements x y z z [m] [m] [m] [m] [mm]	
1.9241 54.11577 77.26246 100.50000 0.34363 2.4051 54.07896 77.74208 100.50000 0.22665 2.8862 54.04215 78.22169 100.50000 0.13052 3.3672 54.00535 78.70131 100.50000 0.034384 3.8482 53.96854 79.18092 100.50000 0.0 4.3292 53.93173 79.66054 100.50000 0.0 0.0	
1. 810.0 53.89492 80.14015 100.50000 0.0 5.9913 53.89812 80.61397 100.50000 0.0 5.7723 53.82113 81.09938 100.50000 0.0 6.7523 53.78450 81.75790 100.50000 0.0 6.7344 53.74769 82.05862 100.50000 0.0 7.2154 53.74769 82.05862 100.50000 0.0	
7.5964 53.67408 83.01785 100.50000 0.0 8.1774 53.63727 83.49746 100.50000 0.0 8.6585 53.60046 83.97708 100.50000 0.0 9.1395 53.56365 84.45669 100.50000 0.0 9.6205 53.56365 84.93631 100.50000 0.0	
10.102 53.49004 85.41592 100.50000 0.0 10.583 53.4523 85.98954 100.50000 0.0 11.064 53.41642 86.37515 100.50000 0.0 11.545 53.34624 86.37515 100.50000 0.0 12.026 53.34281 87.33438 100.50000 0.0 12.026 53.34281 87.33438 100.50000 0.0	
Structure: DH-8 Sub-structure: DH-8	
Dist. Coordinates Displacements X Y Z Z [m] [m] [m] [m] [mm]	
Vertical Offset 1 0.053.30600 87.81400 100.50000 0.0 0.48457 52.82250 87.78178 100.50000 0.0 0.18457 52.82250 87.78178 100.50000 0.0 1.4537 51.8555 87.71733 100.50000 0.0 1.4537 51.8555 87.71733 100.50000 0.0 1.4537 51.8550 87.71733 100.50000 0.0 1.4537 51.8550 87.71733 100.50000 0.0 1.4537 51.8550 87.71733 100.50000 0.0 1.4537 51.8550 87.71733 100.50000 0.0 1.4537 51.8550 87.517173 100.50000 0.0 1.8576 49.43800 87.5522 100.50000 0.0 1.8766 49.43800 87.5522 100.50000 0.0 1.8766 49.43800 87.5522 100.50000 0.0 1.8766 49.43800 87.5522 100.50000 0.0	
4.8457 48.47100 87.49178 100.50000 0.0 5.8303 47.99750 87.49556 100.50000 0.0 5.8149 47.50400 87.42733 100.50000 0.0 6.2994 47.02050 87.39511 100.50000 0.0 6.7840 46.53700 87.36289 100.50000 0.0 7.2686 46.53508 87.33067 100.50000 0.0 7.7532 45.57500 87.29844 100.50000 0.0	
8.2377 45.08650 87.26622 100.50000 0.0 8.7223 44.60300 87.23400 100.50000 0.0	
Specific Building Damage Results - All Segments Structure: GVA-1 Sub-structure: GVA-1	
Vertical Offset Segment Start Length Curvature Deflection Average Max Max Gradient Max Gradient from Line for Ratio Horizontal Tensile of of Vertical Strain Strain Horizontal Displacement Movement Calculations User Calculations	Radius of Category
[m] [k] [k] [k] 0.0 All settlements are less than the Settlement Trough Limit Sensitivity. Tensile horizontal strains are +ve, compressive horizontal strains are -ve.	[m]
Structure: GVA-2 Sub-structure: GVA-2	
Vertical Offset Segment Start Length Curvature Deflection Average Max Max Gradient Max Gradient from Line for Ratio Horizontal Tensile of of Vertical Strain Strain Horizontal Displacement Ourve Calculations	Radius of Category
[m] [m] [k] [k] [k] 0.0 All settlements are less than the Settlement Trough Limit Sensitivity. Tensile horizontal strains are +ve, compressive horizontal strains are -ve.	[m]
Structure: GVA-3 Sub-structure: GVA-3	
Vertical Offset Segment Start Length Curvature Deflection Average Max Max Gradient Max Gradient from Line for Ratio Horizontal Tensile of of Vertical Strain Strain Horizontal Displacement Ourve	Radius of Category
Calculations Curve [m] [m] [\hat{\text{m}} [\hat{\text{k}}] [\hat{\text{k}	[m]
Structure: GVA-4 Sub-structure: GVA-4	
Vertical Offset Segment Start Length Curvature Deflection Average Max Max Gradient Max Gradient from Line for Ratio Horizontal Tensile of of Vertical Strain Strain Horizontal Displacement Movement Calculations Usys Calculations	Radius of Category
$ \begin{bmatrix} [m] & [m] & [k] & [k] \\ 0.0 & \text{All settlements are less than the Settlement Trough Limit Sensitivity.} \\ \text{Tensile horizontal strains are +ve, compressive horizontal strains are -ve.} $	[m]
Structure: GVA-5 Sub-structure: GVA-5	
Vertical Strain Strain Horizontal Displaceme Movement Displacement Curve Calculations Curve	l Radius of Category nt Curvature
[m] [m] [%] [%] [%] [%] 0.0 1 3.4190 1.4747 Hogging 0.0010590 0.0094468 0.0095468 -236.66E-6 -241.27E	(Negligible)
2 4.8938 1.8997 Sagging 289.54E-6 0.022443 0.022513 -231.96E-6 -228.03E 3 6.7935 1.0205 Hogging 72.743E-6 0.020772 0.020777 -216.22E-6 -213.63E	(Negligible) 0 137710.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.	(Negligible)
Structure: GVA-6 Sub-structure: GVA-6	
Vertical Strain Strain Horizontal Displacemen Displacement Curve Calculations Curve	Radius of Category
[m] [m] [k] [k] [k] 0.0 1 0.0 2.9540 Sagging 229.08E-6 2.4216E-6 216.62E-6 -20.931E-6 -118.76E-	
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.	
Structure: GVA-7 Sub-structure: GVA-7 Vertical Offset Segment Start Length Curvature Deflection Average Max Max Gradient Max Gradient from Line for Gradient Max Gradient M	
RATIO HORIZONTAL TENSILE OF OF Vertical	Radius of Category



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Vertical Movement Calculations							D	Horizontal D Displacement Curve	isplacement Co Curve		
[m] 0.0			[m] 3.7150 H		[%] 0.0016152		[%] 0.032338	-351.78E-6	-378.78E-6	[m] 27630.	0 (Negligible)
Tensile horizontal				e horizont	al strains	are -ve.					
Structure: GVA-8					Defil and a		· · · · ·	W G 44	. W G M	t Min	
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	curvature	Deflection Ratio	Horizontal Strain	Max l Tensile Strain	of	t Max Gradien of Vertical Displacemen t Curve	Radius o	
[m] 0.0	:	[m] 1 0.0	[m] 2.3377	Sagging	[%] 153.62E-6	[%] 5 -0.001184	[%] 1 252.02E-		6 210.73E-	[m] 6 108370	
							1 0.004034	7 -43.918E-	6 210.73E-	6 673600	(Negligible) (Negligible)
Tensile horizontal	strains are	+ve, co	mpressiv	re horizont	al strains	are -ve.					
Structure: GVA-9 Vertical Offset	Sub-structur Segment			Curvature	Deflection	Average	Max	May Gradient	Max Gradient	Min	Damage
from Line for Vertical Movement Calculations					Ratio	Horizontal Strain	Tensile Strain	of	of Vertical Displacement	Radius of Curvature	Category
[m] 0.0	:	[m] 1 0.0	[m] 5.3708	Hogging	[%] 452.90E-6	[%] 0.0099886	[%] 0.010143	-132.39E-6	208.85E-6	[m] 130040.	. 0 (Negligible)
		2 5.3708 3 8.1274				0.015968		-181.61E-6			(Negligible)
Tensile horizontal				- 22 2			0.0088106	-181.61E-6	210.21E-6	21455.	. 0 (Negligible)
Structure: GVA-10	Sub-structu	ure: GVA	-10								
Vertical Offset from Line for Vertical Movement	Segment			urvature D	eflection Ratio I	Average Horizontal Strain	Tensile Strain		of Vertical : Displacement		Damage Category
Calculations [m] 0.0 Al: Tensile horizontal	l settlements strains are	s are le					[%] sitivity.	Curve		[m]	
Structure: GE-1	Sub-structure	e: GE-1									
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start :	Length (urvature D	eflection Ratio I	Horizontal	Tensile Strain		Max Gradient of Vertical I Displacement Curve		Damage Category
[m] 0.0	:	[m] 1 0.0	[m] 7.9120 S	Sagging	[%] 0.0041243	[%] -0.022718 ([%] 0.0048390	348.34E-6	-288.94E-6	[m] 19059.	0 (Negligible)
Tensile horizontal	strains are	+ve, co	mpressiv	re horizont	al strains	are -ve.					(Negligible)
Structure: GE-2 :	Sub-structure										
Vertical Offset											
from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Tensile Strain		Max Gradient of Vertical I Displacement Curve		Damage Category
Vertical Movement		[m]	[m] 10.084			Horizontal Strain	Tensile Strain	of Horizontal Displacement	of Vertical I	Radius of Curvature	Category 1 (Very
Vertical Movement Calculations [m]	:	[m] 1 0.0 2 10.084	[m] 10.084 1.4319	Hogging Sagging	[%] 0.0053848 272.04E-6	Horizontal Strain [%] 0.051435 0.037493	Tensile Strain [%] 0.057330 0.037591	of Horizontal Displacement Curve -592.35E-6	of Vertical Displacement Curve 594.72E-6 258.39E-6	[m] 20159.	Category 1 (Very Slight) 0 (Negligible)
Vertical Movement Calculations [m]	:	[m] 1 0.0 2 10.084 3 11.516	[m] 10.084 1.4319 1.2994	Hogging Sagging Hogging	[%] 0.0053848 272.04E-6 0.0013240	Horizontal Strain [%] 0.051435 0.037493 0.017987	Tensile Strain [%] 0.057330 0.037591	of Horizontal Displacement Curve -592.35E-6	of Vertical 1 Displacement Curve	[m] 20159.	Category 1 (Very Slight)
Vertical Movement Calculations [m] 0.0	strains are	[m] 1 0.0 2 10.084 3 11.516 +ve, co	[m] 10.084 1.4319 1.2994	Hogging Sagging Hogging	[%] 0.0053848 272.04E-6 0.0013240	Horizontal Strain [%] 0.051435 0.037493 0.017987	Tensile Strain [%] 0.057330 0.037591	of Horizontal Displacement Curve -592.35E-6	of Vertical Displacement Curve 594.72E-6 258.39E-6	[m] 20159.	Category 1 (Very Slight) 0 (Negligible)
Vertical Movement Calculations [m] 0.0	strains are	[m] 1 0.0 2 10.084 3 11.516 +ve, co	[m] 10.084 1.4319 1.2994 mpressiv	Hogging Sagging Hogging re horizont	[%] 0.0053848 272.04E-6 0.0013240 al strains	Horizontal Strain [%] 0.051435 0.037493 0.017987 are -ve.	Tensile Strain [%] 0.057330 0.037591 0.018207 Max Tensile Strain	of Horizontal Displacement Curve -592.35E-6 -374.79E-6 -374.79E-6	of Vertical 1 Displacement Curve 594.72E-6 258.39E-6 258.39E-6 Max Gradient of Vertical Displacement of Vertical Displacement	[m] 20159. 69841. 12193.	Category 1 (Very Slight) 0 (Negligible) 0 (Negligible)
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sile horizontal	strains are	+ve, comp	pressive hor	izontal stra	ins are -ve.									
ructure: DH-4 S	Sub-structur	e: DH-4												
tical Offset	Segment	Start Le	ength Curvat	ure Deflecti		Max	Max Gradient	Max Gradient	Min	Damage				
om Line for Vertical				Ratio	Horizontal Strain	Tensile Strain	Horizontal	of Vertical Displacement		Category				
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ucture: DH-5 S	Sub-structur	e: DH-5												
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om Line for Vertical				Ratio	Horizontal Strain	Tensile Strain		of Vertical Displacement		Category				
Movement lculations							Displacement Curve	Curve						
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sile horizontal	strains are	+ve, comp	pressive hor	izontal stra	ins are -ve.									
ucture: DH-6 S	Sub-structur	e: DH-6												
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Structure: GVA-4 | Sub-structure: GVA-4



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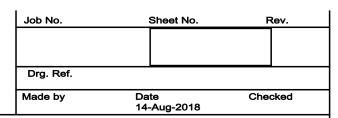
Offset from Line for Vertical Movement	Ratio	Horizontal Strain	Slope Se	ettlement Tens Stra	in Hori Displ	of of Ver zontal Displa acement Cur rve		s of Radius ture Curva ing) (Sagg	ture	
Calculations [m]	[%]	[%]		[mm] [%]		[m] [m]	
Structure: GV										
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio			e Max Settlement	Max Tensile Strain	Horizontal	Max Gradient of Vertical Displacement Curve	Radius of Curvature	Radius of Curvature	Damage Category
[m] 0.0	[%] 0.0010590	[%] 0.022443	-241.27E	[mm] 1.0576	[%] 0.022513	-236.66E-6	-241.27E-6	[m] 13522.	[m] 51895. 0	(Negligible)
Structure: GV	VA-6 Sub-	structure:	GVA-6							
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio			e Max Settlement	Max Tensile Strain	of	of Vertical Displacement Curve	Radius o		Damage Category
[m] 0.0	[%] 229.08E-6	[%] 2.4216E-6	-118.76E	[mm] 1.3872	[%] 216.62E-	6 -20.931E-6	-118.76E-	[m]	[m] - 128810. 0	(Negligible)
Structure: GV	VA-7 Sub-	structure:	GVA-7							
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slop	e Max Settlement	Max Tensile Strain		Max Gradient of Vertical Displacement Curve	Radius of Curvature	Radius of Curvature	Damage Category
[m] 0.0	[%] 0.0016152	[%] 0.031587	-378.78E	[mm] 2.5811	[%] 0.032338	-351.78E-6	-378.78E-6	[m] 27630.	[m] - 0	(Negligible)
Structure: GV	VA-8 Sub-	structure:	GVA-8							
Vertical Offset from Line for Vertical Movement Calculations		Horizontal Strain		e Max Settlement	Strain	of	Max Gradient of Vertical Displacement Curve	Radius of Curvature	Radius of Curvature	Damage Category
[m] 0.0	[%] 153.62E-6	[%] 0.0040341	210.73E-	[mm] -6 2.5814	[%] 0.0040347	46.203E-6	210.73E-6	[m] 673600.	[m] 108370. 0	(Negligible)
Structure: GV										
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain		e Max Settlement	Tensile Strain	Max Gradient Mof of Gradient Morizontal IDisplacement Curve	of Vertical 1	Curvature (Radius of Curvature	Damage Category
[m] 0.0	[%] 0.0011197	[%] 0.015968	210.21E-	[mm] 6 1.9676	[%] 0.016099	-181.61E-6	210.21E-6	[m] 21455.	[m] 61475.0	Negligible)
							210.212 0	21455.		
Structure: GV	VA-10 Sub-	-structure:	GVA-10				210.212 0	21455.		
Vertical Offset from Line for Vertical Movement	Deflection	Average	Max	Max Ma ettlement Tens Stra	ile in Hori Displ	radient Max Gr of of Ver zontal Displa	radient Min rtical Radius acement Curvas	n Min	n Damage s of ture	e Category
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(Hogging)			





GVA-9 GVA-10	Min Radius of Curvature (Sagging) Max Siope Max Setlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) Max Siope Max Setlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature All setlements All setlements	GVA-8 GVA-8 GVA-9 GVA-9 GVA-9 GVA-9 GVA-9 GVA-9 are less than are less than are less than	2 1 3 1 2 3	0.0 2.3377 2.3377 0.0 8.1274 0.0 5.3708 8.1274	2.3377 2.9550 2.9550 2.3377 9.3695 5.3708 8.1274 9.3695	Hogging Hogging Sagging	210.73E-6 210.73E-6 210.73E-6 210.73E-6 210.73E-6 210.21E-6 208.85E-6 208.41E-6	2.5814 2.0975 2.0975 2.5814 0.41030	252.02E-6 252.02E-6 0.0040347	-	108370. 0 108370. 0 - 0	(Negligible) (Negligible) (Negligible)
GVA-9 GVA-10 GE-1	Max Slope Max Settlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) Max Slope Max Settlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) All settlements	GVA-8 GVA-8 GVA-8 GVA-9 GVA-9 GVA-9 GVA-9 GVA-9 are less than are less than are less than	2 2 1 3 1 2 3	0.0 2.3377 2.3377 0.0 8.1274 0.0 5.3708 8.1274	2.3377 2.9550 2.9550 2.3377 9.3695 5.3708 8.1274 9.3695	Sagging Hogging Hogging Sagging Hogging Hogging Sagging	210.73E-6 210.73E-6 210.73E-6 210.73E-6 210.21E-6 208.85E-6	2.5814 2.0975 2.0975 2.5814 0.41030	252.02E-6 0.0040347 0.0040347	673600.	108370. 0	(Negligible)
UVA-9 E-1	Max Settlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) Max Settlement Max Siope Max Settlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Inogging) Min Radius of Curvature All settlements	GVA-8 GVA-8 GVA-8 GVA-9 GVA-9 GVA-9 GVA-9 GVA-9 are less than are less than are less than	2 2 1 3 1 2 3	0.0 2.3377 2.3377 0.0 8.1274 0.0 5.3708 8.1274	2.3377 2.9550 2.9550 2.3377 9.3695 5.3708 8.1274 9.3695	Sagging Hogging Hogging Sagging Hogging Hogging Sagging	210.73E-6 210.73E-6 210.73E-6 210.73E-6 210.21E-6 208.85E-6	2.5814 2.0975 2.0975 2.5814 0.41030	252.02E-6 0.0040347 0.0040347	673600.	108370. 0	(Negligible)
3VA-9 3VA-10 3E-1	Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) Max Salope Max Settlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Gagging) All settlements	GVA-8 GVA-8 GVA-9 GVA-9 GVA-9 GVA-9 GVA-9 are less than are less than are less than	2 1 3 1 2 3	2.3377 0.0 8.1274 0.0 5.3708 8.1274	2.9550 2.3377 9.3695 5.3708 8.1274 9.3695	Hogging Sagging Hogging Hogging Sagging	210.73E-6 210.73E-6 210.21E-6 208.85E-6	2.0975 2.5814 0.41030	0.0040347			(Negligible)
3VA-9 3VA-10 3E-1	(Hogging) Min Radius of Curvature (Sagging) Max Slope Max Setlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) All settlements	GVA-9 GVA-9 GVA-9 GVA-9 GVA-9	3 1 2	8.1274 0.0 5.3708 8.1274	9.3695 5.3708 8.1274 9.3695	Hogging Hogging Sagging	210.21E-6 208.85E-6	0.41030			- 0	(Negligible)
3VA-9 3VA-10 3E-1	Curvature (Sagging) Max Solope Max Settlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) All settlements All settlements All settlements All settlements All settlements All settlements Max Slope	GVA-9 GVA-9 GVA-9 GVA-9 GVA-9	3 1 2	8.1274 0.0 5.3708 8.1274	9.3695 5.3708 8.1274 9.3695	Hogging Hogging Sagging	210.21E-6 208.85E-6	0.41030		-	108370. 0	(Negligible)
GVA-10	Max Settlement Max Tensile Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) All settlements All settlements All settlements All settlements All settlements All settlements Max Slope	GVA-9 GVA-9 GVA-9 are less than are less than are less than	1 2 3	0.0 5.3708 8.1274	5.3708 8.1274 9.3695	Hogging Sagging	208.85E-6					
GVA-10	Strain Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) All settlements	GVA-9 GVA-9 are less than are less than are less than	3	5.3708 8.1274	8.1274 9.3695	Sagging			0.0088106	21455. 130040.		(Negligible) (Negligible)
GVA-10	Min Radius of Curvature (Hogging) Min Radius of Curvature (Sagging) All settlements All settlements All settlements All settlements All settlements Max Slope	GVA-9 are less than are less than are less than				Hogging			0.016099	-	61475. 0	(Negligible)
GVA-10 GE-1	Min Radius of Curvature (Sagging) All settlements All settlements All settlements All settlements All settlements	are less than are less than are less than	2	5.3708			210.21E-6	0.41030	0.0088106	21455.	- 0	(Negligible)
GE-1	All settlements All settlements All settlements All settlements All settlements Max Slope	are less than are less than			8.1274	Sagging	208.41E-6	0.92895	0.016099	-	61475. 0	(Negligible)
GE-1	All settlements Max Slope		the Settle the Settle	ment Tro	ough Li	mit Sensit mit Sensit	tivity.					
		are less than		ment Tro	ough Li	mit Sensit	tivity.					
		GE-1	1			Sagging Sagging	288.94E-6 288.94E-6		0.0048390	-		(Negligible) (Negligible)
	Max Tensile	GE-1	1	0.0	7.9120	Sagging	288.94E-6		0.0048390	-		(Negligible)
	Strain Min Radius of		-	-	-	-	-	-	-	-		
	Curvature (Hogging) Min Radius of	GE-1	1	0.0	7.9120	Sagging	288.94E-6	4.8741	0.0048390	_	19059. 0	(Negligible)
GE-2	Curvature (Sagging) Max Slope	GE-2	1	0.0	10.084	Hogging	594.72E-6	4.8734	0.057330	20159.	- 1	(Very Slight)
	Max Settlement	GE-2	1	0.0	10.084	Hogging	594.72E-6	4.8734	0.057330	20159.	- 1	(Very Slight)
	Max Tensile Strain Min Radius of	GE-2 GE-2	1			Hogging Hogging	594.72E-6 258.39E-6		0.057330	20159. 12193.		(Very Slight) (Negligible)
	Curvature (Hogging) Min Radius of											
	Curvature (Sagging)							0.79951	0.03/591	-	69841. 0	(Negligible)
	All settlements All settlements											
	All settlements All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
	All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
	Max Slope Max Settlement	GE-4 GE-4				Hogging Hogging	435.97E-6 435.97E-6		0.029780	29551. 29551.		(Negligible) (Negligible)
	Max Tensile Strain	GE-4 GE-4	3	5.0363	13.713	Hogging	435.97E-6	3.6009	0.029780		- 0	(Negligible)
	Min Radius of Curvature (Hogging)					Hogging	248.75E-6		0.012256	12798.		(Negligible)
	Min Radius of Curvature (Sagging)	GE-4	2	3.3579	5.0363	Sagging	248.75E-6	0.82111	0.027246	-	56978. 0	(Negligible)
DH-1	Max Slope	DH-1				Hogging	594.97E-6		0.053717	20157. 20157.		(Very Slight)
	Max Settlement Max Tensile	DH-1 DH-1				Hogging Hogging	594.97E-6 594.97E-6		0.053717 0.053717	20157.		(Very Slight) (Very Slight)
	Strain Min Radius of	DH-1	1	9.7126	10.826	Hogging	268.64E-6	0.45331	0.021425	17559.	- 0	(Negligible)
	Curvature (Hogging) Min Radius of	DH-1	2	10.826	12.245	Sagging	253.40E-6	0.79901	0.037523	-	47887. 0	(Negligible)
0	Curvature (Sagging)	0		45.050				0.0405				(== 31 U.S.)
DH-2	Max Slope Max Settlement	DH-2 DH-2	1	0.0	7.3900	Sagging Hogging	245.22E-6 14.619E-6		0.0018839 35.655E-6	84.141E+6	28310. 0 - 0	(Negligible) (Negligible)
	Max Tensile Strain	DH-2	6	32.382	34.817	Sagging	213.47E-6		0.017656	-	45884. 0	(Negligible)
	Min Radius of Curvature (Hogging)	DH-2	7	34.817	36.450	Hogging	228.90E-6	0.41577	0.0071992	15588.	- 0	(Negligible)
	Min Radius of Curvature	DH-2	2	7.3900	11.251	Sagging	106.45E-6	4.7705	0.0046229	-	19874. 0	(Negligible)
DH-3	(Sagging) All settlements All settlements	are less than are less than	the Settle	ment Tro	ough Li	mit Sensit mit Sensit	tivity.					
	All settlements All settlements	are less than are less than	the Settle	ment Tro	ough Li	mit Sensit mit Sensit	tivity.					
	All settlements All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
	All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
	All settlements All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
	All settlements All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
	All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
	All settlements All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
DH-6	All settlements Max Slope	are less than DH-6	the Settle	ment Tro 17.345	ugh Li 19.427	mit Sensit Sagging	73.131E-6	0.23566	197.73E-6	-		(Negligible)
	Max Settlement Max Tensile	DH-6 DH-6	3	20.425	32.706	Sagging Sagging	64.236E-6	0.81873	622.52E-6 622.52E-6	-	89882. 0	(Negligible) (Negligible)
	Strain Min Radius of	DH-6				Hogging	64.236E-6			144010.		(Negligible)
	Curvature (Hogging) Min Radius of	DH-6	3	20.425	32.706	Sagging	64.236E-6	0.81873	622.52E-6	-	89882. 0	(Negligible)
	Curvature (Sagging)											
DH-7	Max Slope Max Settlement	DH-7	1			Sagging Sagging	261.35E-6 261.35E-6		0.037419	-		(Negligible) (Negligible)
	Max Tensile Strain	DH-7	1	0.0	1.5340	Sagging	261.35E-6	0.81874	0.037419	-	59763. 0	(Negligible)
	Min Radius of Curvature (Hogging)	DH-7	2	1.5340	2.8862	Hogging	261.35E-6	0.44561	0.016779	11209.	- 0	(Negligible)
	Min Radius of Curvature (Sagging)	DH-7	1	0.0	1.5340	Sagging	261.35E-6	0.81874	0.037419	-	59763. 0	(Negligible)
DH-8	(Sagging) All settlements All settlements	are less than	the Settle	ment Tro	ough Li	mit Sensit	tivity.					
	All settlements All settlements All settlements	are less than are less than	the Settle the Settle	ment Tro	ough Li	mit Sensit mit Sensit	tivity.					
	All settlements	are less than	i ine Settle	ment Tro	ougn Li	mit sensit	LIVITY.					



CIRIA intallation + excavation + Proposed Loading LT

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Drg. Ref.		
Made by	Date 14-Aug-2018	Checked

Utility Strain Calculation Options Neglect beneficial contribution of axial strains : No Specific Building Damage Results - Horizontal Displacements Structure: GVA-1 | Sub-structure: GVA-1 Displacements x y Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] [mm] [mm] [mm] Dist. Coordinates x y z | The color of the 12.149 8.61550 77.39100 100.50000 13.121 8.56458 76.42044 100.50000 13.121 8.56458 76.42044 100.50000 13.121 8.56458 76.42044 100.50000 14.178 8.53912 75.393516 100.50000 14.178 8.53912 75.393516 100.50000 14.178 8.53912 75.39488 100.50000 15.555 8.43728 73.99404 100.50000 15.555 8.43728 73.99404 100.50000 16.522 8.38636 73.02348 100.50000 17.494 8.33644 72.05292 100.50000 17.494 8.33544 72.05292 100.50000 17.494 8.33544 72.05292 100.50000 17.494 8.33547 72.05292 100.50000 18.466 8.28452 71.08236 100.50000 18.466 8.28452 71.08236 100.50000 19.438 8.23360 70.11180 100.50000 19.438 8.23360 70.11180 100.50000 19.438 8.23586 85559 100.50000 20.410 8.18268 69.14124 100.50000 20.410 8.18268 69.14124 100.50000 20.410 8.18268 69.14124 100.50000 Structure: GVA-2 | Sub-structure: GVA-2 Dist. Coordinates x y z x y Displacements Horizontal displacement displacement along the perpendicular Line to Line [mm] [mm] 0.0 d Structure: GVA-3 | Sub-structure: GVA-3 Dist. Coordinates x y z x y Horizontal Horizontal displacement along the perpendicular Line to Line to Line [mm] [mm] [mm] [mm] [mm] [mm] 0.0 0.0 0.0 | [m] | [m] | [m] | [m] | [mm] Structure: GVA-4 | Sub-structure: GVA-4 Displacements Horizontal Horizontal displacement displacement along the perpendicular Line to Line [mm] Coordinates x y z Dist. Structure: GVA-5 | Sub-structure: GVA-5 Coordinates x v splacements Horizontal displacement displacement along the Line [mm] [mm] 0.0 0.0



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2.g to		
Made by	Date	Checked
1	14-Aug-2018	

Dist. Coordinates	CIKIA	mana	auon +	excav	auon +	Propos	sed Load	ing L i	
2.4422 14.2586 24.7785 100.5000 0.0	Dist.				x		Horizontal displacement	displacement	
Dist. Coordinates X	2.4422 1 2.9306 1 3.4190 1 3.9074 1 4.3959 1 4.8843 1 5.3727 1 5.8612 1 6.3496 1 7.3265 1 7.8149 1	14.25863 14.74575 15.23288 15.72000 16.20713 16.69425 17.18138 17.66850 18.15563 18.64275 19.12988	64.75756 64.72187 64.68619 64.65050 64.61481 64.57913 64.54344 64.50775 64.47206 64.43637 64.4069 64.36500	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.0 0.0 0.0 0.0 0.020812 0.13261 0.24197 0.34875 0.45282 0.55403 0.65222 0.74721	0.0 0.0 0.0 0.0 -0.010191 -0.066638 -0.12488 -0.18501 -0.24713 -0.31134 -0.37776 -0.44649	0.0 0.0 0.0 0.021501 0.13712 0.25044 0.36134 0.46967 0.57530	0.0 0.0 0.0 0.0 -0.0086432 -0.056771 -0.10687 -0.15904 -0.21338 -0.27003 -0.32909	d d d d d d d d d d
X	Structure	e: GVA-6	Sub-st	ructure: G	VA-6				
0.0 13.61700 64.36500 100.50000 0.74721 -0.44649 0.39068 0.39768 0.39768 0.39758 0.39757 0.3	Dist.				x	y E di	Morizontal Fi splacement di along the pe Line	splacement rpendicular to Line	
Dist. x Coordinates x x y y Englacements Rorizontal Replacement Re	0.0 1 0.49248 1 0.98497 1 1.4775 1 1.9699 1 2.4624 1 2.9549 1	19.61700 19.58100 19.54500 19.50900 19.47300 19.43700	64.36500 63.87383 63.38267 62.89150 62.40033 61.90917 61.41800	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.74721 - 0.82023 - 0.89368 - 0.96741 - 1.0412 - 1.1150 - 1.1885 -	-0.44649 -0.46218 -0.47369 -0.48106 -0.48433 -0.48357 -0.47889	0.39068 0.40099 0.40710 0.40905 0.40692 0.40078	0.77784 d 0.85182 d 0.92592 d 0.99999 d 1.0739 d 1.1474 d	
Tructure: GVA-8 Sub-structure: GVA-9 Su					VA-7				
0.019.40100 61.41800 100.50000 1.1885 -0.47889 1.12202 -0.39094 d 0.18469 1.86425 61.38412 100.50000 1.1803 -0.62322 1.13370 -0.44294 d 0.184612 20.38422 61.35012 100.50000 1.1852 -0.62322 1.13370 -0.44294 d 0.184612 20.38422 61.35012 100.50000 1.1852 -0.62322 1.13370 -0.64294 d 0.184612 20.38422 61.55010 5.1002 100.50000 1.1852 -0.62322 1.1818 -0.68893 d 2.3224 21.77125 61.24862 100.50000 1.9002 -0.83938		x	У	z		y Ho dis al	orizontal Ho splacement dis long the per Line	placement pendicular to Line	
Dist. x y z x y Displacements Horizontal Horizontal	0.0 1 0.46449 1 0.92897 2 1.3935 2 1.8579 2 2.3224 2 2.7869 2 3.2514 2 3.7159 2	19.40100 19.86425 20.32750 20.79075 21.25400 21.71725 22.18050 22.64375 23.10700	61.41800 61.38412 61.35025 61.31638 61.28250 61.24862 61.21475 61.18088 61.14700	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	1.1885 -(1.3011 -(1.4589 -(1.6127 -(1.7622 -(1.9072 -(2.0474 -(2.1825 -(2.3123 -(0.47889 0.53927 0.62254 0.70922 0.79957 0.89389 0.99250 -1.0957	1.2202 1.3370 1.5005 1.6601 1.8158 1.9673 2.1143 2.2566	-0.39094 d -0.44294 d -0.51449 d -0.58972 d -0.66893 d -0.75242 d -0.84054 d -0.93364 d	
Note	Structure	e: GVA-8	Sub-st	ructure: G	VA-8				
0. 0 23.19700 61.14700 100.50000 2.1878 -1.2192 -1.1046 -2.2284 d 0.98501 23.18267 61.68833 100.50000 2.1678 -1.2192 -1.1046 -2.2284 d 0.98501 23.18503 62.13067 100.50000 1.8857 -1.2231 -1.1234 -2.0867 d 1.4775 23.18600 62.2250 100.50000 1.8857 -1.2231 -1.1232 -1.3468 d 2.4625 23.23533 63.60617 100.50000 1.8857 -1.2231 -1.1652 -1.0846 -1.5418 d d - Displacements include imported displacements. Structure: GVA-9 Sub-structure: GVA-9 Dist.	Dist.				x	y Hor disp alo	rizontal Horo placement disp ong the perp	endicular	
Dist. Coordinates x	0.0 2 0.49250 2 0.98501 2 1.4775 2 1.9700 2 2.4625 2 2.9550 2	23.10700 23.13267 23.15833 23.18400 23.20967 23.23533 23.26100	61.14700 61.63883 62.13067 62.62250 63.11433 63.60617 64.09800	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	2.3123 -1 2.1678 -1 2.0256 -1 1.8857 -1 1.7486 -1 1.6144 -1 1.4832 -1	1.2040 1.2192 1.2256 1.2231 1.2119 1.1920	-1.0818 -1.1046 -1.1184 -1.1232 -1.1191 -1.1062	-2.3719 d -2.2284 d -2.0867 d -1.9469 d -1.8094 d -1.6743 d	
No. Company	Structure	e: GVA-9	Sub-st	ucture: G	VA-9				
0.0 23, 26100 64,09800 100.50000 1.4832 -1.1635 -1.0846 -1.5418 d 0.98626 23,328670 64,59046 100.50000 1.2300 -1.0812 -1.0157 -1.0554 -1.1619 d 0.98626 23,33810 65,08292 100.50000 1.12300 -1.0812 -1.0157 -1.0157 -1.2847 d 1.4774 23,33810 65,08292 100.50000 1.12300 -1.0812 -1.0157 -1.1604 d 1.47725 23.3630 66.06784 100.50000 0.98944 -0.96659 -0.91363 -1.0309 d 2.4657 23.38950 66,565030 100.50000 0.88411 -0.90739 -0.966007 -0.93020 d 2.4657 23.38950 66,565030 100.50000 0.88411 -0.90739 -0.966007 -0.93020 d 2.4519 23.46500 80.30768 100.50000 0.88411 -0.90739 -0.860007 -0.93020 d 2.4519 23.46500 80.30768 100.50000 0.72046 -0.81244 -0.77279 -0.76183 d 4.43812 23.46500 86.3014 100.50000 0.56639 -0.69746 -0.66700 -0.66015 d 4.43812 23.4520 68.53014 100.50000 0.56639 -0.69746 -0.66700 -0.66187 d 4.9312 23.51800 69.02260 100.50000 0.42255 -0.56376 -0.54103 -0.45036 d 5.9176 23.55940 70.00752 100.50000 0.42255 -0.56376 -0.54103 -0.45036 d 6.4107 23.59510 70.49998 100.50000 0.28554 -0.41269 -0.39725 -0.30666 d 6.9038 23.62080 70.99244 100.50000 0.28555 -0.23699 -0.39725 -0.30666 d 7.3970 23.64650 71.48490 100.50000 0.15790 -0.24555 -0.23699 -0.17048 d 8.8763 23.72360 72.46982 100.50000 0.038140 -0.06356 -0.061492 -0.001708 d 8.8832 23.73250 72.46982 100.50000 0.038140 -0.063566 -0.061492 -0.001708 d 8.8832 23.73250 72.44982 100.50000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000	Dist.				x	У	Horizontal displacement along the	displacement perpendicular to Line	
x y z x y Horizontal Horizontal	0.0 c	33. 26100 33. 28670 34. 28670 35. 28	64.09800 64.59946 65.08292 66.06784 66.56933 66.06784 66.56933 66.06784 67.04522 68.93768 68.53014 69.02260 69.51506 70.00752 70.49998 71.48490 72.46928 73.49474 71.48490 72.46628 74.93212 77.896474 77.9746 77.97476 77.	100.50000 100.50000	1.4832 1.3550 1.2300 1.1083 0.98984 0.88411 0.80108 0.56639 0.56639 0.56639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639 0.0506639	-1.1635 -1.1265 -1.0812 -1.0279 -0.96524 -0.890734 -0.86249 -0.75736 -0.81244 -0.76736 -0.490732 -0.41269 -0.490732 -0.41269 -0.33105 -0.24555 -0.24555 -0.24555 -0.063566 -0.00	-1.0846 -1.0543 -1.0157 -0.96871 -0.91689 -0.866003 -0.819579 -0.72288 -0.72288 -0.72288 -0.39725 -0.31910 -0.23699 -0.15107 -0.061492 -0.00 -0.	-1.5418 -1.4119 -1.2847 -1.1604 -1.0393 -0.30566 -0.3754 -0.30566 -0.37754 -0.305666 -0.305666 -0.305666 -0.305666 -0.3056666 -0.30566666 -0.30566666666666666666666666666666666666	
			Coordinate	es		Horizont	al Horizont		



CIRIA intallation + excavation + Proposed Loading LT

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by	Date 14-Aug-2018	Checked

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Structure: GE-1 | Sub-structure: GE-1

Dist.		Coordinate	es		D	isplacements		
	x	У	z	x	У	Horizontal displacement along the	Horizontal displacement perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	28.56700	64.11000	100.50000	1.9265	-2.8596	1.7836	-2.9508	d
0.49454	29.06094	64.13431	100.50000	1.8957	-3.0521	1.7434	-3.1416	d
0.98907	29.55487	64.15863	100.50000	1.8524	-3.2503	1.6903	-3.3374	d
1.4836	30.04881	64.18294	100.50000	1.7964	-3.4537	1.6244	-3.5378	d
1.9781	30.54275	64.20725	100.50000	1.7277	-3.6618	1.5456	-3.7423	d
2.4727	31.03669	64.23156	100.50000	1.6466	-3.8738	1.4541	-3.9501	d
2.9672	31.53063	64.25588	100.50000	1.5531	-4.0889	1.3502	-4.1603	d
3.4617	32.02456	64.28019	100.50000	1.4479	-4.3061	1.2344	-4.3720	d
3.9563	32.51850	64.30450	100.50000	1.3314	-4.5240	1.1074	-4.5840	d
4.4508	33.01244	64.32881	100.50000	1.2045	-4.7414	0.96996	-4.7949	d
4.9454	33.50637	64.35312	100.50000	1.0681	-4.9567	0.82317	-5.0032	d
5.4399	34.00031	64.37744	100.50000	0.92344	-5.1683	0.66824	-5.2075	d
5.9344	34.49425	64.40175	100.50000	0.77172	-5.3744	0.50657	-5.4058	d
6.4290	34.98819	64.42606	100.50000	0.61443	-5.5732	0.33970	-5.5966	d
6.9235	35.48212	64.45037	100.50000	0.45315	-5.7627	0.16929	-5.7780	d
7.4180	35.97606	64.47469	100.50000	0.28952	-5.9412	-0.0029133	-5.9482	d
7.9126	36.47000	64.49900	100.50000	0.27903	-5.9515	-0.013895	-5.9580	d
d - Dier	alagement.	- include	imported (diamlacer	nonta			

Structure: GE-2 | Sub-structure: GE-2

Dist.		Coordinate	es		Dia	splacements		
	x	У	z	x	У	Horizontal displacement along the	Horizontal displacement perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
	36.47000		100.50000	0.27903	-5.9515	-5.9574	0.081985	
	36.44014		100.50000	0.26535	-5.6596	-5.6653	0.077964	
	36.41029		100.50000	0.25179	-5.3705	-5.3759	0.073982	
	36.38043		100.50000	0.23836	-5.0840	-5.0891	0.070035	
	36.35057		100.50000	0.22504	-4.7998	-4.8046	0.066120	
	36.32071		100.50000	0.21181	-4.5178	-4.5223	0.062235	
	36.29086		100.50000	0.19868	-4.2377	-4.2420	0.058377	
	36.26100		100.50000	0.18564	-3.9594	-3.9634	0.054544	
			100.50000	0.17266	-3.6827	-3.6864	0.050732	
			100.50000	0.15975	-3.4074	-3.4108	0.046938	
	36.17143		100.50000	0.14690	-3.1332	-3.1363	0.043161	
			100.50000	0.13409	-2.8599	-2.8628	0.039397	
			100.50000	0.12131	-2.5875	-2.5901	0.035644	
			100.50000	0.10856	-2.3156	-2.3179	0.031899	
			100.50000	0.095835	-2.0441	-2.0461	0.028158	
			100.50000	0.083342	-1.7776	-1.7794	0.024488	
	35.99229		100.50000	0.074686	-1.5930	-1.5946	0.021944	
			100.50000	0.066031		-1.4098	0.019401	
			100.50000	0.057375		-1.2250	0.016858	
			100.50000	0.048719		-1.0402	0.014315	
			100.50000		-0.85451	-0.85537	0.011771	
			100.50000		-0.66989	-0.67057	0.0092282	
			100.50000		-0.48527	-0.48576	0.0066849	
			100.50000		-0.30066	-0.30096	0.0041417	
			100.50000			-0.11615	0.0015985	
			100.50000	0.0	0.0	0.0	0.0	
	35.69371		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	d
d - Disp	placements	s include	imported o	displacemen	nts.			

Structure: GE-3 | Sub-structure: GE-3

Dist.		Coordinate				Displacement		
	x	y	z	x	Y	Horizontal		
						displacement		
						along the	perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
0.0	35.63400	78.27500	100.50000	0.0	0.0	0.0	0.0	d
0.47806	35.15681	78.24606	100.50000	0.0	0.0	0.0	0.0	d
0.95613	34.67963	78.21713	100.50000	0.0	0.0	0.0	0.0	d
1.4342	34.20244	78.18819	100.50000	0.0	0.0	0.0	0.0	d
1.9123	33.72525	78.15925	100.50000	0.0	0.0	0.0	0.0	d
2.3903	33.24806	78.13031	100.50000	0.0	0.0	0.0	0.0	d
2.8684	32.77087	78.10138	100.50000	0.0	0.0	0.0	0.0	d
3.3464	32.29369	78.07244	100.50000	0.0	0.0	0.0	0.0	d
3.8245	31.81650	78.04350	100.50000	0.0	0.0	0.0	0.0	d
4.3026	31.33931	78.01456	100.50000	0.0	0.0	0.0	0.0	d
4.7806	30.86212	77.98562	100.50000	0.0	0.0	0.0	0.0	d
5.2587	30.38494	77.95669	100.50000	0.0	0.0	0.0	0.0	d
5.7368	29.90775	77.92775	100.50000	0.0	0.0	0.0	0.0	d
6.2148	29.43056	77.89881	100.50000	0.0	0.0	0.0	0.0	d
6.6929	28.95338	77.86987	100.50000	0.0	0.0	0.0	0.0	d
7.1710	28.47619	77.84094	100.50000	0.0	0.0	0.0	0.0	d
7.6490	27.99900	77.81200	100.50000	0.0	0.0	0.0	0.0	d
d - Dist	olacements	s include	imported of	displa	acemer	nts.		
_				-				
Structur	re: GE-4	Sub-str	ucture: GE-	-4				
Dist.	(Coordinate	es			Displac		
	x	y	z	x		у Но	rizontal Hor:	izontal



CIRIA intallation + excavation + Proposed Loading LT

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by	Date 14-Aug-2018	Checked

						displacement along the Line	perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
	27.99900		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000			0.051448	0.014023	
			100.50000		-0.18619	0.18854	0.052759	
			100.50000	0.10638	-0.31956	0.32369	0.093055	
			100.50000	0.15381	-0.45081	0.45679	0.13500	
			100.50000	0.20289	-0.57980	0.58770	0.17870	
			100.50000	0.25374	-0.70640	0.71630	0.22426	
			100.50000	0.30645	-0.83045	0.84243	0.27179	
			100.50000	0.36115	-0.95180	0.96594	0.32142	
			100.50000	0.41797	-1.0703	1.0867	0.37328	
			100.50000	0.47704	-1.1856	1.2044	0.42752	
			100.50000	0.53851	-1.2978	1.3189	0.48430	
8.3262	28.34386	69.49293	100.50000	0.62504	-1.4589	1.4835	0.56408	d
			100.50000	0.71721	-1.6194	1.6477	0.64952	d
			100.50000	0.81344	-1.7744	1.8066	0.73925	
			100.50000	0.91408	-1.9238	1.9600	0.83361	
			100.50000	1.0195	-2.0671	2.1076	0.93298	
10.775	28.44529	67.04614	100.50000	1.1300	-2.2040	2.2489	1.0377	d
			100.50000	1.2461	-2.3339	2.3835	1.1483	d
			100.50000	1.3682	-2.4564	2.5110	1.2652	
12.244	28.50614	65.57807	100.50000	1.4967	-2.5709	2.6307	1.3889	d
12.734	28.52643	65.08871	100.50000	1.6322	-2.6768	2.7421	1.5200	d
13.224	28.54671	64.59936	100.50000	1.7753	-2.7733	2.8444	1.6589	d
13.714	28.56700	64.11000	100.50000	1.9265	-2.8596	2.9369	1.8064	d
d - Dist	olacement:	include	imported of	displaceme	nts.			

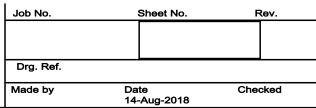
Structure: DH-1 | Sub-structure: DH-1

Dist.	(Coordinate	es		Disp	lacements		
	x	У	z	x	У	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	ſmm.1	[mm.]	
0.0	44.60300	87.23400	100.50000	0.0	0.0	0.0	0.0	d
0.48563	44.63204	86.74924	100.50000	0.0	0.0	0.0	0.0	d
0.97126	44.66109	86.26448	100.50000	0.0	0.0	0.0	0.0	d
1.4569	44.69013	85.77972	100.50000	0.0	0.0	0.0	0.0	d
			100.50000	0.0	0.0	0.0	0.0	
2.4282	44.74822		100.50000	0.0	0.0	0.0	0.0	
	44.77726		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	44.95152			0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	45.09674	78.99307		0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0	
	45.15483		100.50000	0.0	0.0	0.0	0.0	
			100.50000	0.0	0.0	0.0	0.0 -32.071E-6	
			100.50000	0.0086437	-0.18436	0.0024685	-0.0023977	
			100.50000	0.0086437	-0.18436	0.18455	-0.0023977	
			100.50000	0.017172	-0.36626	0.36663	-0.0047633	
			100.50000	0.034228	-0.73005	0.73079	-0.0071289	
			100.50000	0.042756	-0.91195	0.91287	-0.0034340	
			100.50000	0.051284	-1.0938	1.0950	-0.011000	
			100.50000	0.059812	-1.2757	1.2770	-0.016591	
			100.50000	0.068340	-1.4576	1.4591	-0.018957	
			100.50000	0.076868	-1.6395	1.6412	-0.021323	
	45.50335		100.50000	0.086132	-1.8371	1.8390	-0.023892	
15.540	45.53239	71.72165	100.50000	0.098667	-2.1045	2.1066	-0.027370	d
16.026	45.56143	71.23689	100.50000	0.11121	-2.3721	2.3745	-0.030849	d
16.511	45.59048	70.75213	100.50000	0.12378	-2.6400	2.6427	-0.034335	d
16.997	45.61952	70.26737	100.50000	0.13637	-2.9086	2.9116	-0.037827	d
17.483	45.64857	69.78261	100.50000	0.14900	-3.1779	3.1812	-0.041330	d
17.968	45.67761	69.29785	100.50000	0.16167	-3.4483	3.4518	-0.044846	d
18.454	45.70665	68.81309	100.50000	0.17440	-3.7197	3.7235	-0.048377	d
			100.50000	0.18719	-3.9926	3.9966	-0.051925	
			100.50000	0.20005	-4.2669	4.2713	-0.055493	
			100.50000	0.21300	-4.5430	4.5477	-0.059084	
			100.50000	0.22603	-4.8211	4.8260	-0.062700	
			100.50000	0.23917	-5.1012	5.1064	-0.066343	
			100.50000	0.25241	-5.3836	5.3891	-0.070016	
	45.90996		100.50000	0.26577	-5.6686	5.6743	-0.073722	
			100.50000	0.27925	-5.9562	5.9622	-0.077462	d
a - Disp	placement	s include	imported o	11sp1acemen	ıts.			

Structure: DH-2 | Sub-structure: DH-2

Dist.		Coordinate	es		Disp	lacements		
	×	Y	z	x	У	Horizontal	Horizontal	
							displacement	
						along the	perpendicular	
						Line	to Line	
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	
			100.50000	0.27925	-5.9562	-0.14526	-5.9610	
			100.50000	0.27892	-5.9491	-0.14509	-5.9538	
			100.50000	0.27858	-5.9419	-0.14492	-5.9467	
			100.50000	0.27825	-5.9348	-0.14474	-5.9395	
			100.50000	0.27791	-5.9276	-0.14457	-5.9324	
			100.50000	0.27758	-5.9205	-0.14439	-5.9253	
			100.50000	0.27724	-5.9134	-0.14422	-5.9181	
			100.50000	0.27691	-5.9062	-0.14405	-5.9110	
			100.50000	0.27658	-5.8991	-0.14387	-5.9038	
			100.50000	0.27624	-5.8920	-0.14370	-5.8967	
			100.50000	0.27591	-5.8849	-0.14352	-5.8896	
			100.50000	0.27557	-5.8777	-0.14335	-5.8824	
			100.50000	0.27524	-5.8706	-0.14318	-5.8753	
			100.50000	0.27491	-5.8635	-0.14300	-5.8682	
			100.50000	0.27457	-5.8564	-0.14283	-5.8611	
			100.50000	0.27424	-5.8493	-0.14266	-5.8539	
			100.50000	0.27391	-5.8421	-0.14248	-5.8468	
			100.50000	0.27357	-5.8350	-0.14231	-5.8397	
			100.50000	0.080389	-5.8181	-0.33380	-5.8091	
			100.50000	-0.16851	-5.7873	-0.57987	-5.7607	
			100.50000	-0.41244	-5.7443	-0.82012	-5.7004	
			100.50000	-0.62792	-5.6902	-1.0312	-5.6311	
10.836	56.74798	65.70606	100.50000	-0.62217	-5.6381	-1.0218	-5.5795	
			100.50000	-0.61643	-5.5861	-1.0123	-5.5281	
			100.50000	-0.61070	-5.5342	-1.0029	-5.4767	
			100.50000	-0.60498	-5.4824	-0.99354	-5.4254	
			100.50000	-0.59927	-5.4306	-0.98417	-5.3742	
			100.50000	-0.59357	-5.3790	-0.97481	-5.3231	
			100.50000	-0.58788	-5.3274	-0.96546	-5.2721	
			100.50000	-0.58220	-5.2759	-0.95613	-5.2211	
			100.50000	-0.57653	-5.2245	-0.94681	-5.1702	
			100.50000	-0.57087	-5.1732	-0.93751	-5.1195	
			100.50000	-0.56521	-5.1219	-0.92823	-5.0687	
16.255	62.15247	66.09159	100.50000	-0.55957	-5.0708	-0.91895	-5.0181	
16.747			100.50000	-0.55393	-5.0197	-0.90969	-4.9675	
			100.50000	-0.54830	-4.9687	-0.90045	-4.9171	
			100.50000	-0.54268	-4.9177	-0.89122	-4.8666	d
18.225	64.11774	66.23178	100.50000	-0.53708	-4.8668	-0.88201	-4.8163	d





- 1 -			0,100.11				9 –				14-Aug-2018	
	Dist.	Coordinat Y	es z	x	y d:	ncements Horizontal	displac	ement				
	18.718 64.60906 19.210 55.10038 19.703 65.59169 20.195 66.08301 20.688 66.57433 21.680 67.76564 21.673 67.55696 22.655 86.04828 22.658 68.53960 22.655 86.04828 22.658 68.53960 22.651 69.09292 24.136 70.01355 24.136 70.01355 25.11 70.99618 25.613 71.48750 26.106 71.97882 25.613 71.48750 26.106 71.97882 25.613 71.48750 26.599 72.47013 27.091 72.96145 27.584 73.45277 28.076 73.94409 29.061 74.92672 29.061 74.92672 29.061 74.92672 30.093 76.0937 30.0937 30.0	66.30187 66.33692 66.37197 66.40702 66.44207 66.54216 66.57216 66.58216 66.65226 66.65226 66.65226 66.67225 66.79245 66.79245 66.79255 66.8266 66.79255 66.82760 67.0378 67.00284 67.00284 67.00284 67.00284 67.00284 67.00284 67.00388 67.07293 67.10798 67.11789 67.12812 67.12812 67.24817 67.35832 67.24817 67.35832 67.35832 67.36836 67.73832 67.73832 67.73832 67.73832 67.73832 67.73832 67.73832 67.73832 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.73845 67.83832 67.83832 67.94846	100.55000 100.55000	-0.73664 -0.91000 -0.98526 -1.0523 -1.1106 -1.1201 -1.2216 -1.2536 -1.2633 -1.	-4.6894 -4.5072 -4.3216 -4.1335 -3.9441 -3.7544 -3.7546 -3.3769 -3.3769 -3.3769 -3.3769 -1.6629 -1.5629 -1.5629 -1.5629 -1.6629 -1.5629 -1.6629 -1.5629 -1.6629 -1.5629 -1.662		perpend	icular 4.6320 d. 4.4434 d. 4.42518 d. 4.2518 d. 3.6670 d. 3.6700 d. 3.6700 d. 3.2888 d. 2.29116 d. 2.9116 d. 2.91174 d. 2.9116 d. 2.9116 d. 2.9116 d. 3.1670 d. 3.2888				
	50.242 96.05337 50.734 96.54468 51.227 97.03600 d - Displacement	68.54495 68.58000	100.50000	0.0 0.0 0.0 lisplaceme	0.0 0.0 0.0	0.0 0.0 0.0		0.0 d 0.0 d 0.0 d				
	Structure: DH-3	Sub-str		-3	Displacemen	nts						
	x	У	z	х у	Horizontal displacement along the Line	displacem perpendic to Lin	ent ular					
	[m] [m] 0.0 97.03600 1.48909 96.99859 97.03600 1.48909 96.99859 97.97817 96.96117 1.4673 96.92376 8.86535 2.4446 86.86535 2.4446 86.86535 2.4446 86.86535 2.4446 86.86535 2.4236 96.77411 3.9127 96.73670 6.9284 8.8099 96.66187 5.3799 96.62486 6.5881 96.54963 6.8472 96.51222 7.3363 96.54963 6.8472 96.51222 7.3363 96.47480 7.8254 96.43739 97.8254 96.43739 1.736 96.2525 1.736 97.8254 96.43739 1.736 97.8254 96.43739 1.736 97.8254 96.43739 1.736 97.8254 96.43739 1.736 97.8254 97.8254 97.8254 97.8254 97.8254 97.8254 97.8255 97.8256 97.8	69.06765 69.55530 70.04296 70.53061 71.01826 71.50591 71.99357 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 72.481287 73.481287 74.491948 75.40713 77.485539 77.38539 77.38539 77.38539 78.3237 78.36722 88.57237 88.586722 88.586723 88.58639 88.573339 88.57338 87.59843 88.58609 88.573339 88.573339 88.573339 88.573339 98.583339 90.52435	100.55000 100.55000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			0.0 d					
		Sub-str Coordinat Y		х у	Displacement Horizontal	Horizont displacem	ent					
	[m] [m] 0.0 95.31500 0.47118 94.84520 0.94236 94.37540 1.4135 93.90560	90.97595	100.50000 100.50000 100.50000	0.0 0.0	0.0	to Lin [mm]						



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CIIXIA	mitane	י ווטווי	CACAVE	atioi	' '	1 10p03c0	Loading	L1
Dist.	x	Coordinate Y	z	x	У	Displacement Horizontal displacement	Horizontal	
2.3559 2.8271 3.2983 3.7694 4.2406 4.7118 5.1830 5.6542 6.1254 6.5965 7.0677 7.5389 8.0101 8.4813 8.9524 9.4236	92,96600 92.49620 92.02640 91.55660 91.08680 90.61700 90.14720 89.67740 88.73780 88.26800 87.79820 87.32840 86.85860 85.91900	90.83175 90.79570 90.75965 90.72360 90.68755 90.65150 90.61545 90.57940 90.54335 90.50730 90.47125 90.39915 90.36310 90.32705 90.29100	100.50000 100.50000	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	설 성 성 성 성 성 성 성 성 성 성 성 성 성 성 성 성 성 성 성
Structu:		Sub-str	ucture: DH-	·5	У	Displacement Horizontal		
0.48006 0.96012 1.4402 1.9202 2.4003 2.8804 3.8604 3.8405 4.8206 5.2807 5.7607 6.2408 6.7209 7.6810 8.1610 8.6411 9.1212 9.6012 10.081	85.95573 85.99246 86.02919 86.06592 86.10265 86.13938 86.24958 86.24958 86.24958 86.23944 86.35977 86.39650 86.43323 86.4696 86.5562 86.5069 86.55362 86.6065 86.6065 86.6905 86.6905 86.6905 86.6905 86.6905 86.6905 86.6905	[m] 90.29100 89.81235 89.31359 89.81235 89.31369 88.85504 88.85504 88.85504 88.85504 88.85504 86.94042 86.46177 85.98312 85.50446 85.98312 85.50446 86.94042 86.35888 86.94042 85.50848 84.56888 81.67523 81.19558 80.71792 80.23927 79.76662	100.50000 100.50000	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	displacement Line [mm] 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	displacement to Line [mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d d d d d d d d d d d d d d d d d d d
12.482 d - Dis	86.87400 placement	77.84600 s include	100.50000 100.50000 100.50000 imported d	0.0 0.0 Hispla	0.0	0.0	0.0	d
Dist.	x	Coordinate y	es z	×		У	acements Horizontal I Hisplacement di along the pe	isplacement erpendicular
0.49556 0.99112 1.4867 1.9822 2.4778 2.9773 3.4683 3.4683 4.4603 4.4603 4.4603 4.4778 4.9556 4.423 6.9378 7.4334 7.9289 8.4245 8.9200 9.4156 9.9112 10.4002 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 11.398 12.885 13.380	86.37989 85.39168 85.88579 85.39168 84.40347 88.4.89758 884.40347 887.40347	77. 80809 77. 77018 77. 77018 77. 77018 77. 679436 77. 655445 77. 65645 77. 65645 77. 65864 77. 65645 77. 65864 77. 61855 77. 58864 77. 1201 77. 12	100.50000 100.500000 100.500000 100.50000 100.50000	-631. -0.00 -0.0.	0 . C . 0 . C	0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d 0.0 d
	×	У	z	×	•	у Но	HO	



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0.48103 54.2261 0.96205 54.1893 1.4431 54.1525 1.9241 54.1157 2.4051 54.0925 3.8422 53.0635 4.8103 53.8949 4.8103 53.8949 5.2913 53.8581 5.7723 53.8213 6.7344 53.7476 7.2154 53.7108 7.6964 53.6740 8.1774 53.6372 8.6585 53.6005 9.6205 53.5005 9.6205 53.50	5 78.70131 100.5000 4 79.18092 100.5000 3 79.66054 100.5000 2 80.14015 100.5000 1 81.09938 100.5000 0 81.57900 100.5000 9 82.05862 100.5000 8 82.53823 100.5000	0 0.020425 0 0.014913 0 0.00904996 0 0.0028564 0 0.0028564 0 0.00 0 0 0.00 0 0 0.00 0 0 0.00 0 0 0.00 0 0 0.00 0 0 0 0.00 0 0 0 0	a:	[mm]	pendicular to Line [mm] 0.035715 d 0.027070 d 0.027070 d 0.002797 d 0.002797 d 0.00 d
Structure: DH-8 Dist.	Sub-structure: D Coordinates y z	н-8	Displacement Horizontal		
	•	-	displacement along the Line	displacement perpendicular to Line	
0.96915 52.3390 1.4537 51.8555 1.9383 51.3722 2.4229 50.8885 2.9074 50.4055 3.3920 49.9215 3.8766 49.4340 4.3612 48.9545 4.8457 48.4710 5.3303 47.9875 5.8149 47.5040 6.7840 46.5370 7.2686 46.0535 7.7532 45.5700 8.2377 45.0865 8.7223 44.6030 d - Displacemen	0 87.71733 100.5000 0 87.68511 100.5000 0 87.65289 100.5000 0 87.52067 100.5000 0 87.558244 100.5000 0 87.55622 100.5000 0 87.52400 100.5000 0 87.49178 100.5000 0 87.49566 100.5000	0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	[mm] 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d d d d d d d d d d d d d d d d d d d
Structure: GVA-	1 Sub-structure:	GVA-1			
Dist. x	Coordinates Y [m] [m]	Disp z [mm]	Lacements		
0.48595 9.22658 0.097189 9.20108 1.4578 9.12562 1.49438 9.15016 2.4297 9.12470 3.4016 9.07333 4.016 9.07333 4.016 9.07333 4.016 9.07333 4.016 9.07333 4.016 9.07333 4.0735 9.07238 4.0735 9.07238 4.0735 9.07238 4.0735 9.07238 4.0735 9.07238 6.0737 9.0723 8.0741 9.075 9.07	89,52300 100.50000 88,55244 100.50000 87,58188 100.50000 87,58188 100.50000 87,58188 100.50000 87,58188 100.50000 87,58188 100.50000 88,62646 100.50000 88,62646 100.50000 88,62646 100.50000 88,12646 100.50000 88,12648 100.50000 84,18492 100.50000 84,18492 100.50000 83,21436 100.50000	-0.0089555 -0.0088852 -0.00887243 -0.0087243 -0.00853348 -0.00853348 -0.0081227 -0.0081227 -0.0081227 -0.0081227 -0.0074527 -0.0074527 -0.0074527 -0.0076188 -0.0076189 -0.0076188 -0.0076189 -0.0076188 -0.0076189 -0.0076189 -0.0076189 -0.0076189 -0.00761890 -0.0076188	ଷ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ		
	2 Sub-structure:		acements		
[m] [m]	y z [m] [m]	z [mm]			
0.48050 7.95067 0.96101 7.92233 1.4415 7.89400	1 65.25900 100.50000 64.77933 100.50000 64.29967 100.50000 63.82000 100.50000 63.34033 100.50000	0.0061950 c 0.0067229 c 0.0072533 c	1 1 1		



CIRIA intallation + excavation + Proposed Loading LT

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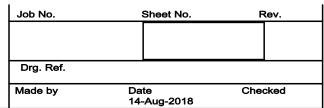
Dist.		Coordinates		Displacements	
[m]	x [m]	y [m]	z [m]	z [mm]	
2.8830	7.80900	62.38100 10	0.50000		
- Disp	lacemen	ts include :	imported o	isplacements.	
tructur	e: GVA-	3 Sub-stru	icture: GV	A-3	
Dist.		Coordinates		Displacements	
	x	y	z	z	
[m]	[m]	[m]	[m]	[mm]	
0.0	Offset 7.8090	0 62.38100 3	100.50000	0.0088506 d	
.47715	8.2848	7 62.34613 1 5 62.31125 1	L00.50000 L00.50000	0.010279 d 0.011804 d	
1.4315	9.2366	3 62.27638 1 0 62.24150 1	L00.50000 L00.50000	0.013431 d 0.015167 d	
2.3858	10.1883	8 62.20662	100.50000	0.017018 d 0.018992 d	
3.3401	11.1401	2 62.13687 3	100.50000	0.021096 d	
3.81/2 - Disp	lacemen	ts include :	imported o	0.023339 d lisplacements.	
tructur	e: GVA-	4 Sub-stru	icture: GV	A-4	
Dist.	×	Coordinates Y	z	Displacements z	
[m]	[m]	[m]	[m]	[mm]	
ertical	Offset	1 0 62.10200 :	100 E0000	0 022220 4	
.47359	11.6505	0 62.57433	100.50000	0.022404 d	
1.4208	11.7195	0 63.04667 1 0 63.51900 1	100.50000	0.020538 d	
1.8944	11.7540	0 63.99133 1 0 64.46367 1	L00.50000 L00.50000	0.019609 d 0.018684 d	
2.8415	11.8230	0 64.93600	100.50000	0.017766 d lisplacements.	
2-05					
ructur	e: GVA-	5 Sub-stru	ucture: GV	A-5	
Dist.		Coordinates	3	Displacements	
[m]	x [m]	y [m]	z [m]	z [mm]	
rtical	Offset				
0.0	11.8230	0 64.93600 3	100.50000	0.017766 d 0.019768 d	
97686	12.7972	5 64.86463 3 8 64.82894 3	100.50000	0.021898 d	
0527	12 7716	0 64 70225 1	100 50000	0 026572 4	
.9306	14.7457	3 64.75756 1 5 64.72187 1 8 64.68619 1	100.50000	0.060949 d	
.9074	15.7200	0 64.65050 3	100.50000	0.24538 d	
.3959	16.2071: 16.6942	3 64.61481 3 5 64.57913 3	L00.50000 L00.50000	0.34864 d 0.46997 d	
.3727	17.1813	8 64.54344 1 0 64.50775 1	100.50000	0.58505 d	
3496	18.1556	3 64.47206	100.50000	0.80394 d	
.3265	19.1298	5 64.43637 3 8 64.40069 3	100.50000	1.0187 d	
.8149	19.6170	0 64.36500 3	100.50000	1.1280 d isplacements.	
ructur	e: GVA-	6 Sub-stru			
ist.	x	Coordinates y		Displacements z	
[m]	[m]	[m]	[m]	[mm]	
	Offset		100 E0000	1 1200 4	
.49248	19.5810	0 64.36500 3 0 63.87383 3	100.50000	1.1897 d	
1.4775	19.5090	0 63.38267 1 0 62.89150 1	100.50000	1.3093 d	
2.4624	19.4370	0 62.40033 1 0 61.90917 1	100.50000	1.4231 d	
.9549	19.4010	0 61.41800 3	100.50000		
			== \		
ructur	e: GVA-	7 Sub-stru	ucture: GV	A-7	
Dist.		Coordinates		Displacements	
[m]	x [m]	y [m]	z [m]	z [mm]	
	Offset				
.46449	19.8642	0 61.41800 1 5 61.38412 1	100.50000	1.6079 d	
.92897	20.3275	0 61.35025 1 5 61.31638 1	100.50000	1.7452 d	
1 8579	21 2540	0 61 28250 1	100 50000	2 0426 d	
.7869	22.1805	0 61.21475	100.50000	2.2034 d 2.3725 d	
.7159	22.6437	5 61.18088 : 0 61.14700 :	L00.50000	2.5500 d 2.7358 d	
Disp	lacemen	ts include :	imported o	isplacements.	
ructur	e: GVA-	8 Sub-stru	ucture: GV	A-8	
Dist.		Coordinates		Displacements	
[m]	x [m]	y [m]	z [m]	z [mm]	
			f III J	f yant 1	
0 0	Offset 23.1070	n 61 147nn 1	100.50000	2.7358 d	
49250 98501	23.1326 23.1583	7 61.63883 1 3 62.13067 1	L00.50000 L00.50000	2.6302 d 2.5226 d	
1.4775	23.1840	0 62.62250 1 7 63.11433 1	100.50000	2.4137 d	
.4625	23.2353	3 63.60617 1 0 64.09800 1	100.50000	2.1944 d	
. posu - Disp	lacemen	ts include	imported o	2.0850 d isplacements.	
		0 0-3- :		73.0	
		9 Sub-stru			
Dist.	x	Coordinates y	z	Displacements z	
[m]	[m]	[m]	[m]	[mm]	
ertical	Offset	1 0 64.09800 :	100 50000	2.0850 d	
.49313	23.2867	0 64.59046	100.50000	1.9763 d	
1.4794	23.3381	0 65.08292 3 0 65.57538 3	LUU.50000 LOO.50000	1.8690 d 1.7631 d	
1.9725	23.3638	0 66.06784 3 0 66.56030 3	L00.50000 L00.50000	1.6592 d 1.5572 d	
2.9588	23.4152	0 67.05276 3 0 67.54522 3	100.50000	1.4573 d 1.3595 d	
3.9450	23.4666	0 68.03768 3	100.50000	1.2635 d	
.9313	23.4923 23.5180	0 68.53014 3 0 69.02260 3	L00.50000	1.1692 d 1.0761 d	



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				147 tag 2010	
Dist.	Coordinates x y z	Displacements z			
[m]	[m] [m] [m]	[mm]			
5.9176	23.54370 69.51506 100.50000 23.56940 70.00752 100.50000	0 0.89156 d			
6.9038	23.59510 70.49998 100.50000 23.62080 70.99244 100.50000 23.64650 71.48490 100.50000	0 0.70433 d			
7.8901 8.3832	23.67220 71.97736 100.50000 23.69790 72.46982 100.50000	0 0.50661 d 0 0.40075 d			
8.8763 9.3695	23.72360 72.96228 100.50000 23.74930 73.45474 100.50000	0 0.29413 d 0 0.21122 d			
10.356	23.77500 73.94720 100.50000 23.80070 74.43966 100.50000 23.82640 74.93212 100.50000	0.043753 d			
11.342	23.85210 75.42458 100.50000 23.87780 75.91704 100.50000	0.028062 d			
12.328 12.821	23.90350 76.40950 100.50000 23.92920 76.90196 100.50000	0 0.023763 d 0 0.021770 d			
13.808	23.95490 77.39442 100.50000 23.98060 77.88688 100.50000	0.018079 d			
14.794	24.00630 78.37934 100.50000 24.03200 78.87180 100.50000 24.05770 79.36426 100.50000	0 0.014754 d			
15.780	24.08340 79.85672 100.50000 24.10910 80.34918 100.50000	0.011765 d			
17.260	24.13480 80.84164 100.50000 24.16050 81.33410 100.50000	0.0078510 d			
18.246	24.18620 81.82656 100.50000 24.21190 82.31902 100.50000 24.23760 82.81148 100.50000	0 0.0055827 d			
19.232	24.26330 83.30394 100.50000 24.28900 83.79640 100.50000	0.0035594 d			
20.218	24.31470 84.28886 100.50000 24.34040 84.78132 100.50000	0 0.0017591 d 0 936.00E-6 d			
21.698	24.36610 85.27378 100.50000 24.39180 85.76624 100.50000 24.41750 86.25870 100.50000	0 -567.94E-6 d			
22.684	24.44320 86.75116 100.50000 24.46890 87.24362 100.50000	0 -0.0018972 d 0 -0.0025016 d			
24.163	24.49460 87.73608 100.50000 24.52030 88.22854 100.50000	0 -0.0035996 d			
24.657 d - Disp	24.54600 88.72100 100.50000 lacements include imported	0 -0.0040969 d displacements.			
Structur	e: GVA-10 Sub-structure:	GVA-10			
Dist.	Coordinates	Displacements			
[m]	x y z [m] [m]	z [mm]			
Vertical 0.0	Offset 1 24.54600 88.72100 100.50000	0 -0.0040969 d			
0.95719	24.06806 88.74606 100.50000 23.59013 88.77112 100.50000	0 -0.0046185 d			
1.9144	23.11219 88.79619 100.50000 22.63425 88.82125 100.50000 22.15631 88.84631 100.50000	0 -0.0051114 d			
2.8716 3.3502	21.67837 88.87138 100.50000 21.20044 88.89644 100.50000	0 -0.0055748 d 0 -0.0057954 d			
3.8288 4.3073	20.72250 88.92150 100.50000 20.24456 88.94656 100.50000 19.76662 88.97163 100.50000	0 -0.0060086 d 0 -0.0062142 d			
5.2645 5.7431	19.28869 88.99669 100.50000 18.81075 89.02175 100.50000	0 -0.0066032 d 0 -0.0067865 d			
6.7003	18.33281 89.04681 100.50000 17.85488 89.07188 100.50000 17.37694 89.09694 100.50000	0 -0.0071310 d			
7.6575	16.89900 89.12200 100.50000 16.42106 89.14706 100.50000	0 -0.0074465 d			
8.6147 9.0933	15.94313 89.17212 100.50000 15.46519 89.19719 100.50000	0 -0.0077335 d 0 -0.0078665 d			
10.050	14.98725 89.22225 100.50000 14.50931 89.24731 100.50000 14.03138 89.27237 100.50000	0 -0.0081123 d			
11.008	13.55344 89.29744 100.50000 13.07550 89.32250 100.50000	0 -0.0083316 d			
11.965 12.443	12.59756 89.34756 100.50000 12.11963 89.37262 100.50000	0 -0.0085255 d 0 -0.0086132 d			
13.401	11.64169 89.39769 100.50000 11.16375 89.42275 100.50000 10.68581 89.44781 100.50000	0 -0.0087709 d			
14.358 14.836	10.20788 89.47288 100.50000 9.72994 89.49794 100.50000	0 -0.0089059 d 0 -0.0089652 d			
	9.25200 89.52300 100.50000 lacements include imported				
Structur	e: GE-1 Sub-structure: GE	E-1			
Dist.	Coordinates	Displacements			
[m]	x y z [m] [m] [m]	z [mm]			
0.0	Offset 1 28.56700 64.11000 100.50000	0 3.8207 d			
0.49454	29.06094 64.13431 100.50000 29.55487 64.15863 100.50000	0 3.9750 d 0 4.1250 d			
1.9781	30.04881 64.18294 100.50000 30.54275 64.20725 100.50000 31.03669 64.23156 100.50000	0 4.4083 d			
2.9672 3.4617	31.53063 64.25588 100.50000 32.02456 64.28019 100.50000	0 4.6629 d 0 4.7773 d			
4.4508	32.51850 64.30450 100.50000 33.01244 64.32881 100.50000	0 4.9759 d			
5.4399	33.50637 64.35312 100.50000 34.00031 64.37744 100.50000 34.49425 64.40175 100.50000	0 5.1300 d			
6.4290 6.9235	34.98819 64.42606 100.50000 35.48212 64.45037 100.50000	0 5.2354 d 0 5.2688 d			
7.9126	35.97606 64.47469 100.50000 36.47000 64.49900 100.50000 lacements include imported	0 5.3018 d			
u - Diap	racements include imported	displacements.			
	e: GE-2 Sub-structure: GE				
Dist.	Coordinates x y z [m] [m] [m]	Displacements z [mm]			
	Offset 1	[mm]			
0.0	36.47000 64.49900 100.50000 36.44014 64.99100 100.50000	0 4.9778 d			
1.4787	36.41029 65.48300 100.50000 36.38043 65.97500 100.50000 36.35057 66.46700 100.50000	0 4.3556 d			
2.4645	36.32071 66.95900 100.50000 36.29086 67.45100 100.50000	0 3.7752 d 0 3.5029 d			
3.4503	36.26100 67.94300 100.50000 36.23114 68.43500 100.50000	0 3.2432 d 0 2.9966 d			
4.9291	36.20129 68.92700 100.50000 36.17143 69.41900 100.50000 36.14157 69.91100 100.50000	0 2.5432 d			
5.9149 6.4078	36.11171 70.40300 100.50000 36.08186 70.89500 100.50000	0 2.1422 d 0 1.9604 d			
6.9007 7.3936	36.05200 71.38700 100.50000 36.02214 71.87900 100.50000	0 1.7901 d 0 1.6306 d			
8.3794	35.99229 72.37100 100.50000 35.96243 72.86300 100.50000 35.93257 73.35500 100.50000	0 1.3391 d			
9.3652	35.90271 73.84700 100.50000	0 1.0753 d			
			ht @ O-ave 1007 2017		Dana





Dist.	x [m]	Coordinates Y [m]	z [m]	Displacements z [mm]
10.351	35.84300	74.83100 1	100.50000	0.94963 d 0.82546 d
11.337	35.78329 35.75343	75.81500 1 76.30700 1	L00.50000 L00.50000	0.70067 d 0.57290 d 0.43960 d 0.30813 d
12.816	35.69371 35.66386	77.29100 1 77.78300 1	L00.50000 L00.50000	0.20442 d 0.10105 d 0.050324 d
d - Disp	placement	s include i	imported o	displacements.
Structur Dist.		Sub-struc		-3 Displacement:
[m]	x [m]	y [m]	z [m]	z [mm]
0.0	35.15681	78.27500 1 78.24606 1	100.50000	0.050324 d 0.049122 d 0.047897 d
1.4342	34.20244 33.72525	78.18819 1 78.15925 1	L00.50000 L00.50000	0.046650 d 0.045385 d 0.044103 d
2.8684 3.3464 3.8245	32.77087 32.29369 31.81650	78.10138 1 78.07244 1 78.04350 1	L00.50000 L00.50000 L00.50000	0.042807 d 0.041500 d 0.040185 d
5.2587	30.38494	77.95669 1	100.50000	0.038863 d 0.037537 d 0.036211 d
6.2148	29.43056 28.95338	77.89881 1 77.86987 1	L00.50000 L00.50000	0.034885 d 0.033562 d 0.032244 d
7.6490	27.99900	77.81200 1	100.50000	0.030934 d 0.029633 d displacements.
Structur	re: GE-4	Sub-struc	cture: GE-	-4
Dist.	x [m]	Coordinates y [m]	z [m]	Displacements z [mm]
Vertical	L Offset :	ı		0.029633 d
0.48978	28.01929 28.03957	77.32264 1	L00.50000 L00.50000	0.032397 d 0.035334 d 0.073982 d
1.9591 2.4489 2.9387	28.08014 28.10043 28.12071	75.85457 1 75.36521 1 74.87586 1	L00.50000 L00.50000	0.17048 d 0.26698 d 0.38143 d
3.4284 3.9182 4.4080	28.14100 28.16129 28.18157	74.38650 1 73.89714 1 73.40779 1	L00.50000 L00.50000 L00.50000	0.50726 d 0.62701 d 0.74285 d
4.8978 5.3876 5.8773	28.20186 28.22214 28.24243	72.91843 1 72.42907 1 71.93971 1	L00.50000 L00.50000 L00.50000	0.85676 d 0.97053 d 1.0858 d
6.8569 7.3467	28.28300 28.30329	71.45036 1 70.96100 1 70.47164 1	L00.50000 L00.50000	1.3266 d 1.4545 d
8.3262 8.8160	28.34386 28.36414	69.98229 1 69.49293 1 69.00357 1	L00.50000 L00.50000	1.7300 d 1.8791 d
9.7955	28.40471 28.42500	68.51421 1 68.02486 1 67.53550 1	L00.50000 L00.50000	2.2022 d 2.3767 d
11.265 11.755	28.46557 28.48586	67.04614 1 66.55679 1 66.06743 1	L00.50000 L00.50000	2.7513 d 2.9511 d
12.734	28.52643 28.54671	65.57807 1 65.08871 1 64.59936 1	L00.50000 L00.50000	3.3731 d 3.5941 d
d - Disp	28.56700 placement:	64.11000 1 s include i	imported o	3.8207 d displacements.
Structur		Sub-struc		-1 Displacement:
[m]	x [m]	y [m]	z [m]	z [mm]
0.0	44.60300 44.63204	87.23400 1	L00.50000 L00.50000	0.010677 d 0.012372 d
0.97126 1.4569 1.9425	44.66109 44.69013 44.71917	86.26448 1 85.77972 1 85.29496 1	L00.50000 L00.50000 L00.50000	0.014190 d 0.016141 d 0.018235 d
2.4282 2.9138 3.3994	44.74822 44.77726 44.80630	84.81020 1 84.32543 1 83.84067 1	L00.50000 L00.50000 L00.50000	0.020480 d 0.022888 d 0.025470 d
3.8850 4.3707 4.8563	44.83535 44.86439 44.89343	83.35591 1 82.87115 1 82.38639 1	L00.50000 L00.50000 L00.50000	0.028239 d 0.031208 d 0.034391 d
5.3419 5.8276 6.3132	44.92248 44.95152 44.98057	81.90163 1 81.41687 1 80.93211 1	L00.50000 L00.50000 L00.50000	0.037804 d 0.041464 d 0.045387 d
6.7988 7.2845 7.7701	45.00961 45.03865 45.06770	80.44735 1 79.96259 1 79.47783 1	L00.50000 L00.50000 L00.50000	0.049594 d 0.054105 d 0.058943 d
8.7413 9.2270	45.12578 45.15483	78.50830 1 78.02354 1	L00.50000 L00.50000	0.064131 d 0.069695 d 0.16274 d 0.26626 d
10.198	45.21291 45.24196	77.05402 1 76.56926 1	L00.50000 L00.50000	0.26626 d 0.37578 d 0.51366 d 0.64468 d
11.655 12.141	45.30004 45.32909	75.59974 1	L00.50000 L00.50000	0.89618 d 0.70139 d 0.89618 d
13.112	45.38717 45.41622	74.14546 1 73.66070 1 73.17593 1	L00.50000 L00.50000	1.1487 d 1.2803 d
14.569 15.055	45.47430 45.50335	72.69117 1 72.20641 1 71.72165 1	L00.50000 L00.50000	1.5628 d 1.7164 d
16.026 16.511	45.56143 45.59048	71.23689 1 70.75213 1 70.26737 1	L00.50000 L00.50000	2.0547 d 2.2411 d
17.483 17.968 18.454	45.64857 45.67761 45.70665	69.78261 1 69.29785 1 68.81309 1	L00.50000 L00.50000 L00.50000	2.6517 d 2.8769 d 3.1155 d
18.940 19.425 19.911	45.73570 45.76474 45.79378	68.32833 1 67.84357 1 67.35880 1	L00.50000 L00.50000 L00.50000	3.3676 d 3.6330 d 3.9115 d
20.396 20.882 21.368	45.82283 45.85187 45.88091	66.87404 1 66.38928 1 65.90452 1	L00.50000 L00.50000 L00.50000	4.2025 d 4.5054 d 4.8195 d
21.853	45.90996 45.93900	65.41976 1 64.93500 1	L00.50000 L00.50000	5.1438 d
		Sub-struc		
Dist.		Coordinates		Displacement
[m]	x [m]	y [m]	z [m]	z [mm]



Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by	Date 14-Aug-2018	Checked

0.0 45.939	900 64.93500	100.50000	5.4772	d
0.49257 46.430 0.98513 46.921	163 65.00510	100.50000	5.4648	d d
1.4777 47.412 1.9703 47.904	127 65.07519	100.50000	5.4576 5.4497	d d
2.4628 48.395 2.9554 48.886 3.4480 49.378	590 65.14529	100.50000	5.4411 5.4320 5.4221	d d
3.9405 49.869	954 65.21538	100.50000	5.4116	d d
4.9257 50.852	217 65.28548	100.50000	5.4006 5.3889	d
5.4182 51.343 5.9108 51.834 6.4034 52.326	481 65.35558	100.50000	5.3766 5.3637	d d
6.8959 52.817	744 65.42567	100.50000 100.50000 100.50000	5.3503 5.3363 5.3217	d
7.3885 53.308 7.8811 53.800	108 65 49577	100.50000	5.3067 5.2911	d d
8.3736 54.291 8.8662 54.782 9.3588 55.274	271 65.56587 403 65.60091	100.50000 100.50000 100.50000	5.2714 5.2389	d d
9.8513 55.765 10.344 56.256	535 65.63596 566 65.67101	100.50000	5.1936 5.1358	d d
10.836 56.747	798 65.70606	100.50000	5.0727 5.0095	d d
11.329 57.239 11.822 57.730 12.314 58.221		100.50000	4.9462 4.8827	d d
12.807 58.713	325 65.84625	100.50000	4.8192 4.7557	d d
13.792 59.695	588 65.91635 720 65.95139	100.50000	4.6923 4.6289	d d
14.777 60.678 15.270 61.169	352 65.98644	100.50000 100.50000	4.5656 4.5025	d d
15.762 61.661 16.255 62.152	115 66.05654 247 66.09159	100.50000 100.50000	4.4396 4.3769	d d
16.747 62.643 17.240 63.135	379 66.12663	100.50000	4.3146 4.2526	d d
17.732 63.626 18.225 64.117	542 66.19673 774 66.23178	100.50000	4.1910 4.1298	d d
18.718 64.609	906 66.26683 038 66.30187	100.50000	4.0642 3.9896	d d
19.703 65.591 20.195 66.083	169 66.33692 301 66.37197	100.50000	3.9066 3.8158	d d
20.688 66.574	133 66.40702	100.50000	3.7178 3.6133	d d
22.165 68.048	328 66.51216	100.50000	3.5030 3.3877	d d
22.658 68.539	960 66.54721 091 66.58226	100.50000	3.2681 3.1450	d d
23.643 69.522 24.136 70.013	223 66.61731 355 66.65236	100.50000	3.0192 2.8915	d d
24.628 70.504 25.121 70.996	487 66.68740 518 66.72245	100.50000	2.7627 2.6333	d d
25.613 71.487 26.106 71.978 26.599 72.470	750 66.75750 382 66.79255	100.50000	2.5042 2.3760	d d
27.091 72.961	145 66.86264	100.50000	2.2492 2.1244	d d
27.584 73.452 28.076 73.944 28.569 74.435	277 66.89769	100.50000 100.50000 100.50000	2.0019 1.8822	d d
29.061 74.926	572 67.00284	100.50000	1.7654	d d
29.554 75.418 30.047 75.909	304 67.03788 936 67.07293	100.50000 100.50000	1.5413	d
30.539 76.400 31.032 76.891 31.524 77.383	067 67.10798 199 67.14303 331 67.17808	100.50000 100.50000 100.50000	1.3294	d
32.017 77.874	463 67.21313	100.50000	1.1278 1.0296	d
32.509 78.365 33.002 78.857	726 67.28322	100.50000	0.93241 0.83521	d
33.494 79.348 33.987 79.839	358 67.31827 989 67.35332	100.50000 100.50000	0.73706 0.63681	d
34.480 80.331 34.972 80.822	121 67.38837 253 67.42341	100.50000	0.53316 0.42466	d
34.480 80.331 34.972 80.822 35.465 81.313	385 67.45846	100.50000 100.50000 100.50000	0.42466	d d d
34.480 80.331 34.972 80.822 35.465 81.313 35.957 81.805 36.450 82.296 36.942 82.787	385 67.45846 516 67.49351 548 67.52856 780 67.56361	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328	d d d d
34,480 80.333 34,972 80.822 35,465 81.313 35,957 81.805 36,450 82.296 36,942 82.787 37,435 83.275	385 67.45846 516 67.49351 548 67.52856 780 67.56361 912 67.59865	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.027893 0.025508	d d d d d d
34.480 80.33 34.972 80.82 35.465 81.31 35.957 81.80 36.450 82.29 36.942 82.78 37.435 83.27 37.928 83.77 38.420 84.261 38.913 84.75	385 67.45846 516 67.49351 548 67.52856 780 67.56361 912 67.59865 943 67.63370 175 67.66875	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.027893 0.025508 0.023255 0.021129	d d d d d d d d d d d d d
34,480 80.33 34,972 80.82 35,465 81.31 35,957 81.80 36,450 82.29 36,942 82.78 37,435 83.27 37,928 83.77 38,420 84.26 38,913 84.75 39,405 85,24 39,898 85,73	885 67.45846 516 67.49351 648 67.52856 780 67.56361 912 67.59865 043 67.63370 175 67.66875 807 67.70380 138 67.73885	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.027893 0.025508 0.023255 0.021129 0.019123	d d d d d d d d d d d d d d d
34.480 80.333 34.972 80.822 35.465 81.313 36.450 82.299 36.942 82.787 37.435 83.279 37.435 83.279 38.928 83.777 38.420 84.261 38.913 84.755 39.405 85.244 39.898 85.733 40.390 86.227	885 67.45846 516 67.49351 548 67.52856 780 67.56361 912 67.59865 943 67.6387 175 67.66875 307 67.70380 438 67.73889 702 67.70389	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.027893 0.025508 0.023255 0.021129 0.019123 0.017231 0.015448	d d d d d d d d d d d d d d d d d d d
34.480 80.33 34.972 80.822 35.465 81.31: 35.957 81.80: 36.450 82.29 36.942 82.78: 37.435 83.27: 37.928 83.77: 38.420 84.26: 38.913 84.75: 40.390 86.24: 40.838 86.71: 41.376 87.20:	885 67.45846 516 67.52856 780 67.52856 780 67.56361 912 67.59865 943 67.63370 175 67.66875 930 67.77380 937 67.77389 947 80894 957 67.87994 997 67.91409	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.027893 0.025508 0.021129 0.019123 0.017231 0.015448 0.013767 0.012184	d d d d d d d d d d d d d d d d d d d
34.480 80.33; 34.972 80.82; 35.465 81.31; 35.957 81.80; 36.450 82.29; 37.435 83.27; 37.928 83.77; 38.420 84.26; 39.405 85.24; 40.893 86.71; 40.893 86.71; 41.376 87.20; 42.851 88.19; 42.861 88.70; 42.861 88.19;	835 67.45846 67.52856 880 67.56361 912 67.56361 913 67.63370 9175 67.63870 9175 67.63870 9175 67.73890 9175 67.73890 9175 67.73890 9175 67.73890 9175 67.73890 9175 67.80894 9175 67.94913	100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000 100.50000	0.42466 0.30874 0.22302 0.050328 0.050328 0.027893 0.02550 0.01129 0.019123 0.017231 0.01548 0.013767 0.012184 0.010693 0.0092909 0.0079718	d d d d d d d d d d d d d d d d d d d
34,480 80.33; 34,972 80.82; 35,465 81,31; 35,957 81.80; 36,450 82,296; 37,435 83,277; 38,420 84,26; 39,405 85,24; 40,390 86,22; 40,883 86,716; 41,376 87,20; 41,361 88,19; 42,361 88,19; 43,346 89,17; 43,334 89,16;	835 67.45846 67.49351 548 67.52856 80.67.56361 912 67.59865 9143 67.63370 9175 67.66875 9175 67.73895 9175 67.73895 9175 9175 9175 91	100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.027893 0.025508 0.023255 0.021129 0.019123 0.017231 0.015448 0.013767 0.012184 0.010693 0.0092909 0.0079718 0.0067317 0.0055665	d d d d d d d d d d d d d d d d d d d
34,480 80.33; 34,972 80.82; 35,465 81.31; 37,475 81.32; 37,435 83.27; 37,435 83.27; 37,435 83.27; 38,420 84.26; 38,913 84.75; 39,405 85.24; 39,898 85,73; 40,390 86.22; 40,883 86,72; 41,376 87.20; 41,376 87.20; 41,376 89.17; 42,853 86.88; 42,853 86.68; 43,346 89.17; 43,888 89.66; 44,831 90.15; 44,831 90.64;	385 67.45846 16 67.49351 16 67.49351 16 67.59856 1912 67.59856 1912 67.59856 1912 67.59856 1912 67.59856 1912 67.59856 1912 67.59856 1912 67.70380 1912 67.70380 1912 67.80894 1912 68.01923 1912 67.91491 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923 1912 68.01923	100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.027893 0.025508 0.021129 0.019123 0.017231 0.015448 0.013767 0.012184 0.010693 0.0092909 0.0097317 0.0055665 0.0044722 0.0034451	ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ
34.480 80.33; 34.972 80.82; 35.465 81.31; 35.957 81.80; 36.450 82.298; 37.435 83.277; 38.420 84.26; 39.405 85.238; 40.398 85.73; 40.398 86.278; 41.868 87.70(41.868 87.8	385 67.45846 16 67.49351 16 67.49351 16 67.59865 1912 67.59865 1912 67.59865 1912 67.6887 175 67.6887 180 77.3885 180 77.3885 180 77.3885 180 77.3885 180 77.3885 180 77.7389	100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.027893 0.022550 0.021129 0.019123 0.017231 0.015448 0.013767 0.012184 0.01093909 0.0067317 0.0055665 0.0044722 0.0034451 0.002481	ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ ପ
34,480 80.33; 34,972 80.82; 35,465 81.31; 36,45 81.80; 36,45 82.27; 37,428 83,77; 38,420 84,26; 38,913 84,75; 39,405 85,244; 39,898 85,73; 40,390 86,22; 40,883 86,71; 41,376 87,20; 41,1868 87,70; 42,361 88,19; 42,431 90,15; 44,231 90,46; 44,231 90,46; 44,231 90,46; 45,809 91,63; 46,531 91,44; 45,809 91,63; 46,531 91,44; 45,809 91,63; 46,531 92,16; 46,531 92,16;	8385 67.45846 67.49351 67.49351 67.59865 67.59865 67.59865 67.66875 67.70380 67.70380 67.70380 67.70380 67.70380 67.70380 67.70380 67.70380 67.80894 67.80894 67.80894 67.80894 68.01923	100.50000 100.50000	0.42466 0.30874 0.23302 0.13688 0.027893 0.025508 0.021299 0.019123 0.017231 0.017231 0.017231 0.017231 0.017231 0.0079178 0.0067317 0.0055665 0.0044722 0.0034816 0.0015783 732.038-6 60.3688-6	ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब ब
34,480 80.33; 34,972 80.82; 35,465 81.31; 36,450 82.29; 36,948 82.78; 37,928 83,77; 38,493 84,75; 39,405 85,244; 39,898 85,73; 40,399 86,22; 40,883 86,718; 41,376 87,20; 41,868 87,70; 42,861 88,19; 42,613 88,68; 44,331 90,64; 44,331 90,15; 44,331 90,15; 44,331 90,15; 46,301 91,144; 46,301 91,144; 47,779 93,19;	385 67.45846 348 348 348 348 348 348 348 348 348 348	100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.057893 0.0225508 0.022129 0.019123 0.017231 0.017231 0.015436 0.003205 0.003205 0.003205 0.003205 0.003205 0.003205 0.003205 0.003205 0.003205 0.003407 0.003200 0.003200 0.003200 0.003201 0.003200 0.003201 0.003407 0.003200 0.003407 0.003200 0.003407 0.003200 0.003407 0.003406	d d d d d d d d d d d d d d d d d d d
34.480 80.33; 34.972 80.82; 35.465 81.31; 36.450 82.29; 36.942 82.78; 37.928 83.77; 38.93 83.77; 38.913 84.75; 39.405 85.24; 39.495 85.24; 39.495 85.24; 39.495 85.24; 40.390 86.22; 40.883 86.71; 41.376 87.20; 41.868 87.70; 42.361 88.19; 42.853 88.68; 43.346 89.17; 43.838 89.66; 44.331 90.15; 44.823 90.64; 45.316 91.14; 45.316 91.14; 45.316 92.12; 46.304 92.12; 47.779 93.59; 48.271 94.08;	385 67.45846 3486 3486 3486 3486 3486 3486 3486 3	100.50000 100.50000	0.42466 0.30874 0.22302 0.13688 0.050328 0.057893 0.025508 0.022125 0.021129 0.019123 0.017231 0.017231 0.017241 0.010693 0.0092900 0.00979128 0.0019123 0.010693 0.0019123 0.0019123 0.0019123	व व व व व व व व व व व व व व व व व व व
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Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by	Date 14-Aug-2018	Checked

Dist.	x [m]	Coordina Y	tes z [m		Displa z [mm]	cements
					-0.0084779 d	
12.227	96.1006	7 80.7713 5 81.2589	0 100.5	0000	-0.0085594 d	
13.694	95.98843	82.2342	6 100.5	0000	-0.0087086 d -0.0087765 d -0.0088400 d	
14.673 15.162	95.91363 95.87620	83.2095 83.6972	7 100.5 2 100.5	0000	-0.0088991 d -0.0089540 d	
15.651 16.140	95.83878	84.1848 7 84.6725	7 100.5 2 100.5	0000	-0.0090046 d -0.0090511 d -0.0090935 d	
17.118	95.72654	1 85.6478 3 86.1354	3 100.5 8 100.5	0000	-0.0091319 d	
18.585	95.61430	87.1107	8 100.5	0000	-0.0091971 d -0.0092240 d -0.0092472 d	
19.563 20.052	95.53948	88.0860 7 88.5737	9 100.5 4 100.5	0000	-0.0092669 d -0.0092831 d	
21.031	95.42724	1 89.5490	4 100.5	0000	-0.0092959 d -0.0093053 d -0.0093116 d	
22.009 22.498	95.35243 95.31500	90.5243 91.0120	5 100.5 0 100.5	0000	-0.0093147 d -0.0093149 d	
d - Disp	placement	s includ	e impor	ted d	lisplacements	-
	re: DH-4	Sub-st		: DH-		
Dist.	x [m]	Coordina y [m]	z [m		z [mm]	cements
Vertical	l Offset	1				
0.47118	94.84520	90.9759	5 100.5	0000	-0.0093149 d -0.0093185 d -0.0093189 d	
1.4135	93.90560	90.9038	5 100.5	0000	-0.0093160 d	
2.8271	92.49620	90.7957	0 100.5	0000	-0.0092996 d -0.0092859 d -0.0092684 d	
3.7694 4.2406	91.55660	90.7236	0 100.5 5 100.5	0000	-0.0092468 d -0.0092211 d	
5.1830	90.14720	90.6154	5 100.5	0000	-0.0091912 d -0.0091569 d -0.0091180 d	
6.1254 6.5965	89.20760 88.73780	90.5433	5 100.5 0 100.5	0000	-0.0090745 d -0.0090262 d	
7.5389	87.79820	90.4352	0 100.5	0000	-0.0089729 d -0.0089146 d -0.0088510 d	
8.4813 8.9524	86.85860 86.38880	90.3631	0 100.5 5 100.5	0000	-0.0087821 d	
					-0.0086277 d lisplacements	
Structur	re: DH-5	Sub-st	ructure	: DH-	-5	
Dist.	x	Coordina	tes z		Displa z	cements
[m] Vertical	[m]	[m]	[m	1	[mm]	
0.0	85.91900 85.95573	90.2910 8 89.8123	5 100.5	0000	-0.0086277 d -0.0085206 d	
0.96012 1.4402	85.99246 86.02919	5 89.3336 9 88.8550	9 100.5 4 100.5	0000	-0.0084046 d -0.0082795 d	
2.4003 2.8804	86.10265 86.13938	2 88.3763 5 87.8977 3 87.4190	8 100.5 3 100.5 8 100.5	0000	-0.0081450 d -0.0080006 d -0.0078461 d	
3.3604 3.8405	86.17612 86.21285	2 86.9404 5 86.4617	2 100.5 7 100.5	0000	-0.0076811 d -0.0075052 d	
4.8006	86.2863	85.5044	6 100.5	0000	-0.0073181 d -0.0071194 d -0.0069088 d	
5.7607 6.2408	86.3597	7 84.5471 0 84.0685	5 100.5 0 100.5	0000	-0.0066858 d	
6.7209	86.43321	83.5898	5 100.5	0000	-0.0062014 d -0.0059393 d -0.0056634 d	
8.1610 8.6411	86.54342 86.58015	2 82.1538 5 81.6752	8 100.5 3 100.5	0000	-0.0053733 d	
9.1212	86.61688	81.1965	8 100.5	0000	-0.0047493 d -0.0044147 d -0.0040645 d	
10.561 11.041	86.72708 86.76383	79.7606 1 79.2819	2 100.5 6 100.5	0000	-0.0036985 d -0.0033163 d	
11.521	86.80054 86.8372	1 78.8033 7 78.3246	1 100.5 5 100.5	0000	-0.0029177 d -0.0025022 d	
					-0.0020698 d lisplacements	
Structur	re: DH-6	Sub-st	ructure	: DH-	-6	
Dist.	x	Coordina Y	tes z		Displa z	cements
[m]	[m]	[m]	[m		[mm]	
	86.87400	77.8460			-0.0020698 d -0.0015094 d	
0.99112 1.4867	85.88579 85.39168	77.7701 77.7322	8 100.5 7 100.5	0000	-917.53E-6 d -293.17E-6 d	
2.4778	84.4034		5 100.5	0000	364.91E-6 d 0.0010579 d 0.0017871 d	
3.4689 3.9645	83.41526	77.5806 77.5427	4 100.5 3 100.5	0000	0.0025536 d 0.0033587 d	
4.9556	81.93294	1 77.4669	1 100.5	0000	0.0042037 d 0.0050897 d 0.0060180 d	
5.9467 6.4423	80.94473	3 77.3910 2 77.3531	9 100.5 8 100.5	0000	0.0069898 d	
6.9378 7.4334	79.95652	2 77.3152 L 77.2773	7 100.5 6 100.5	0000	0.0090686 d 0.010178 d	
8.4245 8.9200	78.47420	77.2394 77.2015 77.1636	5 100.5 4 100.5	0000	0.011335 d 0.012542 d 0.013798 d	
9.4156 9.9112	77.48598	3 77.1257 3 77.0878	3 100.5 2 100.5	0000	0.015106 d 0.016465 d	
10.902 11.398	76.0036	77.0499 777.0120 576.9740	0 100.5 9 100.5	0000	0.017878 d 0.019343 d 0.020863 d	
11.893 12.389	75.01545 74.52135	76.9361 76.8982	8 100.5 7 100.5	0000	0.022437 d 0.024065 d	
13.380	73.53314	1 76.8603 1 76.8224 3 76.7845	5 100.5	0000	0.025749 d 0.027488 d 0.029282 d	
14.371	72.54492	2 76.7466 2 76.7087	4 100.5 3 100.5	0000	0.031131 d 0.033034 d	
15.362 15.858	71.55673	L 76.6708 L 76.6329	2 100.5 1 100.5	0000	0.034991 d 0.037001 d	
16.849	70.07439	76.5950 76.5570 76.5191	9 100.5	0000	0.068145 d 0.10823 d 0.14663 d	
		3 76.4812	7 100.5	0000	0.18331 d 0.21823 d	
18.336	68.59208	3 76.4433 7 76.4054	6 100.5	0000	0.25136 d	



Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by	Date 14-Aug-2018	Checked

Dist.	Coordinates Y	z	Displacement z	s									
[m] [m] 19.327 67.60386	[m]	[m]	[mm] 0.28264 d										
19.822 67.10976 20.318 66.61565	76.32964 1 76.29173 1	00.50000	0.31205 d 0.34547 d										
20.813 66.12155 21.309 65.62744 21.805 65.1333	76.21591 1 76.17800 1	00.50000 00.50000	0.37975 d 0.41082 d 0.43884 d										
22.300 64.63923 22.796 64.14512 23.291 63.65102	76.10218 1	00.50000	0.46563 d 0.49216 d 0.51845 d										
23.787 63.15691 24.282 62.66280	76.02636 1 75.98845 1	00.50000 00.50000	0.54449 d 0.57032 d										
24.778 62.16870 25.273 61.67459 25.769 61.18048	75.91264 1 75.87473 1	00.50000	0.59594 d 0.62136 d 0.64659 d										
26.265 60.68638 26.760 60.19227 27.256 59.69817	75.83682 1 75.79891 1	00.50000	0.67165 d 0.69654 d 0.72128 d										
27.751 59.20406 28.247 58.70995 28.742 58.21585	75.72309 1 75.68518 1	00.50000	0.74588 d 0.77034 d										
29.238 57.72174 29.733 57.22764	75.60936 1 75.57145 1	00.50000	0.79468 d 0.81890 d 0.84299 d										
30.229 56.73353 30.725 56.23942 31.220 55.74532	75.49564 1	00.50000	0.86528 d 0.88485 d 0.90167 d										
31.716 55.25121 32.211 54.75711 32.707 54.26300	75.41982 1 75.38191 1	00.50000	0.91573 d 0.92699 d 0.93544 d										
d - Displacement													
Structure: DH-7													
Dist. x [m] [m]	Coordinates y [m]	z [m]	Displacements z [mm]										
Vertical Offset	1		0.93544 d										
0.0 54.26300 0.48103 54.22619 0.96205 54.18938	75.82362 1 76.30323 1	00.50000	0.81282 d 0.68913 d										
1.4431 54.15258 1.9241 54.11577 2.4051 54.07898	77.26246 1	00.50000	0.56213 d 0.42941 d 0.30594 d										
2.8862 54.04215 3.3672 54.00535 3.8482 53.96854	78.22169 1 78.70131 1	00.50000	0.20375 d 0.10195 d 0.062273 d										
4.3292 53.93173 4.8103 53.89492	79.66054 1 80.14015 1	00.50000	0.057329 d 0.052709 d										
5.2913 53.85812 5.7723 53.82131 6.2533 53.78450	81.09938 1 81.57900 1	00.50000	0.044360 d 0.040591 d										
6.7344 53.74769 7.2154 53.71088 7.6964 53.67408	82.53823 1	00.50000	0.037070 d 0.033779 d 0.030705 d										
8.1774 53.63727 8.6585 53.60046 9.1395 53.56365	83.49746 1 83.97708 1	00.50000 00.50000	0.027832 d 0.025148 d										
9.6205 53.52685	84.93631 1 85.41592 1	00.50000	0.020299 d 0.018111 d										
10.583 53.45323 11.064 53.41642 11.545 53.37962	86.37515 1 86.85477 1	00.50000	0.014161 d 0.012380 d										
12.026 53.34281 12.507 53.30600 d - Displacement	87.81400 1	00.50000 0	.0091672 d										
Structure: DH-8													
		ture: DH-8											
Dist.	Coordinates	ture: DH-8	Displacements										
Dist. x [m] [m]	Coordinates Y [m]	ture: DH-8											
Dist. x [m] [m] Vertical Offset 0.0 53.30600 0.48457 52.82250	Coordinates y [m] 1 0 87.81400 1 0 87.78178 1	z [m] 00.50000 0	Displacements z [mm]										
Dist. x [m] [m] Vertical Offset 0.0 53.3060(0.48457 52.8225(0.96915 52.3390(1.4537 51.8555(1.8556)))	Coordinates y [m] 1 87.81400 1 87.78178 1 87.74956 1 87.71733 1	z [m] 00.50000 0 00.50000 0 00.50000 0	Displacements z [mm] .0091672 d .0093737 d .0095674 d .0097480 d										
Dist. x [m] [m] writical Offset 0.0 53.30600 0.48457 52.83290 0.96915 52.3390 1.4537 51.8555 1.9383 51.3720 2.4229 50.8856 2.9074 50.4050 0.9691	Coordinates y [m] 1 87.81400 1 87.78178 1 87.74956 1 87.74956 1 87.68581 1 87.65289 1 87.65287 1	z [m] 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0	Displacements z [mm] .0091672 d .0093737 d .009574 d .0097480 d .0099150 d 0.010068 d 0.010068 d										
Dist. x [m] [m] Vertical Offset 0.0 53.3060/ 0.48457 52.8225(0.96915 52.3390/ 1.4537 31.8555(1.9383 51.3720/ 2.9422 950.8885(2.9474 50.4050/ 3.8766 49.4380/ 4.3612 48.9545(Coordinates y [m] 1 1 87.81400 1 87.78178 1 87.74956 1 87.74956 1 87.65289 1 87.65289 1 87.52067 1 87.58844 1 87.55622 1 87.52400 1	z [m] 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0	Displacements z [mm]										
Dist. x [m] [m] Vertical Offset 0.0 53.3060/ 0.48457 52.8225/ 0.96915 52.8225/ 0.96915 52.3390/ 1.4537 31.8555/ 1.9383 51.3720/ 2.9422 50.8885/ 2.9074 50.4050/ 3.8766 49.4380/ 4.3612 48.9545/ 4.48457 48.9740/ 5.3304 79.8757	Coordinates y [m] 1 187.81400 1 87.78178 1 87.78178 1 87.71733 1 87.65511 1 87.65289 1 87.62067 1 87.58244 1 87.55622 1 87.58244 1 87.55622 1 87.58240 1 87.49178 1 87.49178 1 87.49178 1 87.49178 1 87.49178 1 87.49178 1	z [m] 00.50000 0	Displacements z [mm] .0091672 d .0093737 d .0095674 d .0095674 d .0097480 d .0090150 d .0090150 d .010058 d .010207 d .010440 d .010440 d .010440 d .010440 d .010613 d										
Dist. [m] [m] Vertical Offset 0.0 53.3060; 0.48457 52.8225(0.96915 52.83290; 1.4537 51.8555(1.9383 51.3720; 2.4222 50.8885(2.3074 50.4029; 3.3920 49.9215(3.3920 49.9215(3.3920 49.9215(3.3920 49.9215(5.3303 47.9875(5.8149 47.1005(5.8149 47.5040(6.2994 47.0205(6.7840 46.5370(Coordinates y y 1 87.81400 1 87.78178 1 87.78178 1 87.74956 1 87.74956 1 87.7528 1 87.65289 1 87.52400 1 87.52400 1 87.45956 1 87.4596 1	z [m] 00.50000 0	Displacements [mm] 1.0091672 d .0093737 d .0095674 d .0097480 d .0099150 d .0100207 d .010088 d .010207 d .010081 d .010631 d .010631 d .010677 d .010677 d .010756 d .010756 d										
Dist. [m] [m] Vertical Offset 0.0 53.30600 0.48457 52.8225(0.96915 52.83290 1.4527 53.8355(1.9383 51.37200 2.4229 50.8885(2.9074 50.40500 3.8766 49.43800 4.3612 48.9545(4.8457 48.97400 5.3303 47.9875(5.8149 47.50406 6.2994 47.50206 6.7840 46.5375(7.7582 45.57000 8.2377 45.0865(Coordinates y [m] 1 187.881400 1 87.78178 1 87.74956 1 87.74956 1 87.74956 1 87.74956 1 87.74956 1 87.62067 1 87.55622 1 87.56207 1 87.5844 1 87.55622 1 87.49178 1 87.49556 1 87.49556 1 87.49556 1 87.4956 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1 87.36289 1	z [m] 00.50000 00.5000 00.50000 00.50000 00.50000 00.500000 00.500000000	Displacements z [mm] .0091672 d .0093737 d .0095674 d .0097480 d .0097480 d .0099150 d .010008 d .010008 d .0.10008 d .0.1010073 d .0.10613 d .0.10613 d .0.10613 d .0.10677 d .0.10724 d .0.10724 d .0.10772 d .0.10772 d										
Dist. [m] [m] Vertical Offset 0.0 53.3060; 0.96915 52.8225(0.96915 52.83290; 1.4537 51.8555(1.9383 51.3720; 2.4222 50.8885(2.9074 50.4050; 3.8920 49.9215(4.8457 48.949); 4.8457 49.9415(5.8149 47.5040); 5.8149 47.5040(6.2994 47.5040); 6.2994 47.5040(6.2994 6.53700; 7.2686 46.63370; 7.2686 46.5370	Coordinates y [m] 1 187.81400 1 87.78178 1 87.74956 1 87.74956 1 87.71733 1 87.6521 1 87.6228 1 87.5284 1 87.5284 1 87.5284 1 87.5287 1	z [m] 00.50000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.5000 00 00.	Displacements [mm] 1.0091672 d .0093737 d .0095674 d .0095674 d .0099180 d .0099180 d .010207 d .010088 d .010207 d .01068 d .010207 d .0106913 d .0106913 d .010697 d .010792 d .010792 d .010792 d .010792 d .010792 d										
Dist. [m] [m] Vertical Offset 0.0 53.3060; 0.96915 52.8225(0.96915 52.83290; 1.4537 51.8555(1.9383 51.3720; 2.4228 50.8885(2.9074 50.4050; 3.8920 49.9215(4.9835) 4.9845 49.9215(5.9840 49.9215(5.9840 49.9215(5.9840 40.5370(5.2994 47.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994 67.5040(6.2994	Coordinates y [m] 1 87.81400 1 87.78178 1 87.78178 1 87.78178 1 87.7828 1 87.65219 1 87.65219 1 87.65219 1 87.65219 1 87.65219 1 87.65219 1 87.65219 1 87.65219 1 87.5522 1 87.5522 1 87.5523 1	[m] 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000 0 00.50000	Displacements 2 [mm] .0091672 d .0093737 d d .0093737 d d d .009160 d d d d d d d d d d d d d d d d d d d										
Dist. [m] [m] Vertical Offset 0.0 53.3060 0.48457 52.8225(0.96915 52.8329(0.96915 52.3390(0.14825 50.8885(1.9383 51.3720(2.4229 50.8885(2.9074 50.4050(3.3920 49.9215(3.8766 49.4380(3.8766 49.4380(5.3393 49.9215(5.3393 49.9215(5.3393 49.9216(5.3393 49.9216(5.3393 49.9216(6.7844 6.5370(7.7522 46.5370(7.7522 46.5370(8.2327 45.0865(8.7223 44.6030(d - Displacement Specific Building Structure: GVA-1	Coordinates	z [m] 00.50000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 0	Displacements z [mm]										
Dist. [m] [m] Vertical Offset 0.0 53.3060 0.96315 52.8225(0.96915 52.83290 1.4537 52.8225(1.9383 51.3720 2.4222 50.8885(2.9074 50.4050 1.4537 50.4050 1.4537 54.9450 1.4540 51.4540 1	Coordinates	z [m] 00.50000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 0	Displacements z mm]	Deflection	Average Horizontal	Max Tensile Strain	of	Max Gradient of Vertical Displacement	Radius of	Damage Category			
Dist. [m] [m] Vertical Offset 0.0 53.3060 0.96915 52.8225(0.96915 52.8225(0.96915 52.83290 1.48237 52.8225(0.96915 52.3390 1.48237 51.88556(1.4233 50.8856(2.9074 50.4050(3.8966 4.94.9480(4.3612 48.9545(4.8457 48.4710(5.3303 47.9875(5.8149 47.5040(6.2994 47.	Coordinates	z [m] 00.50000 00 00.50000 00 00.50000 00 00.50000 00 00.5000	Displacements 2 [mm] .0091672 d .0093737 d .0095674 d .0095674 d .0095180 d .0095180 d .0095180 d .0095180 d .0095180 d .0095180 d .0005180 d .000571 d .000772 d .00072 d .00072 d .00072 d .00072 d .	Deflection Ratio	Horizontal Strain	Tensile Strain	of	of Vertical Displacement	Radius of Curvature				
Dist. [m] [m] [m] Vertical Offset 0.0 53.3060 0.96915 52.8225(0.96915 52.8325(0.96915 52.3390(0.96915 5	Coordinates	z [m] 00.50000 00 00.50000 00 00.50000 00 00.50000 00 00.5000	Displacements z [mm]	Deflection Ratio	Horizontal Strain [%] gh Limit Sen	Tensile Strain	of Horizontal Displacement Curve	of Vertical Displacement	Radius of				
Dist. [m] [m] [m] Vertical Offset 0.0 53.3060 0.96915 52.8225(0.96915 52.8325(0.96915 52.3390(0.96915 5	Coordinates y [m] 1 87.81400 1 87.78178 1 87.78178 1 87.78178 1 87.7823 1 87.65239 1 87.65239 1 87.65239 1 87.65239 1 87.65239 1 87.65240 1 87.55622 1 87.55624 1 87.55624 1 87.55624 1 87.5624 1 87.55624 1 87.55624 1 87.55624 1 87.55625 1 87.55626 1 87.55626 1 87.55626 1 87.55626 1 87.55626 1 87.55626 1 87.42733 1 87.42731 1 87.25626 1 87.	z [m] 00.50000 00.5000 0	Displacements 2 [mm] .0091672 d .0093737 d .0093737 d .0093737 d .0093737 d .0093737 d .009373 d .009374 d .009374 d .009374 d .009313 d .0.010673 d .0.010677 d .0.010756 d .0.010757 d	Deflection Ratio	Horizontal Strain [%] gh Limit Sen	Tensile Strain	of Horizontal Displacement Curve	of Vertical Displacement	Radius of Curvature				
Dist. [m] [m] Vertical Offset 0.0 53.3060 0.0 53.3060 0.96915 52.3390 0.96915 52.3390 0.96915 52.3390 0.3825 0.3926 99.9215 0.0926 99.9215	Coordinates y [m] 1 87.81400 1 87.78178 1 87.78178 1 87.78178 1 87.7823 1 87.65239 1 87.65239 1 87.65239 1 87.65239 1 87.65239 1 87.65240 1 87.55622 1 87.55624 1 87.55624 1 87.55624 1 87.5624 1 87.55624 1 87.55624 1 87.55624 1 87.55625 1 87.55626 1 87.55626 1 87.55626 1 87.55626 1 87.55626 1 87.55626 1 87.42733 1 87.42731 1 87.25626 1 87.	z [m] 00.50000 00.5000 0	Displacements 2 [mm] .0091672 d .0093737 d .0093737 d .0093737 d .0093737 d .0093737 d .009373 d .009374 d .009374 d .009374 d .009313 d .0.010673 d .0.010677 d .0.010756 d .0.010757 d	Deflection Ratio [%] lement Troughtal strains	Horizontal Strain [%] The Limit Sense are -ve.	Tensile Strain [%] ssitivity.	of Horizontal Displacement Curve	of Vertical Displacement Curve	Radius of Curvature [m]	Category			
Dist. [m] [m] [m] Vertical Offset 0.0 53.3060. 0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.9745 52.8928(0.9745 5	Coordinates y [m] 1 87.81400 1 87.78178 1 87.78178 1 87.78178 1 87.7828 1 87.65219 1 87.65219 1 87.65219 1 87.65219 1 87.65219 1 87.65229 1 87.65229 1 87.65229 1 87.55220 1 87.55220 1 87.58240 1 87.45731 1 87	z [m] 00.50000 00.5000 0	Displacements 2 [mm] .0091672 d .0093737 d d .0093737 d d d .0093737 d d d .0093737 d d d .0093730 d d d .0093730 d d .0093150 d d .0093150 d d .000313 d d .0010673 d d .0010677 d d .0010756 d d .0010756 d d .0010757 d .00107	Deflection Ratio [%] lement Troughtal strains	Horizontal Strain [%] gh Limit Sen s are -ve.	Tensile Strain [%] ssitivity.	of Horizontal Displacement Curve Max Gradient of Horizontal Displacement	of Vertical Displacement Curve Max Gradient of Vertical Displacement	Radius of Curvature [m] Min Radius of	Category			
Dist. [m] [m] [m] Vertical Offset 0.0 53.3060 0.96375.3.3060 0.96915 52.32390 1.4537 51.8558(1.9383 51.3720 2.4222 50.8886(2.3274 59.4223 3.8766 94.3300 4.3612 48.9546(4.8457 48.4710 5.3303 47.9878(5.8149 47.5040 6.2994 47.5040 6.2994 47.5040 6.2994 47.5040 6.2994 47.5040 6.2994 47.5040 6.2894 6.5370 7.2686 46.5370 7.2686 46.5370 7.5524 44.6330 d - Displacement Specific Building Structure: GVA-1 Vertical Offset from Line for Vertical Movement Calculations [m] Tensile horizont Structure: GVA-2 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 0.0	Coordinates	z [m] 00.50000 00.5000 00.5	Displacements z [mm] .0091672 d .0093737 d .0095674 d .00957480 d .0097480 d .0099150 d .010028 d .010028 d .010028 d .010021 d .010121 d .010121 d .010724 d .010756 d .010772 d .01077	Deflection Ratio [*] lement Troughtal strains Deflection Ratio [*] lement Troughtal	Horizontal Strain [%] gh Limit Sens are -ve. Average Horizontal Strain [%] gh Limit Sen	Tensile Strain [%] sitivity. Max Tensile Strain	of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve	of Vertical Displacement Curve Max Gradient of Vertical Displacement	Radius of Curvature [m] Min Radius of	Category			
Dist. [m] [m] Vertical Offset 0.0 53.3060 0.96315 52.33950 0.96915 52.38256 0.96915 52.38256 0.96915 52.38256 1.4223 51.88586 1.4223 51.88586 1.4223 51.88586 1.4223 51.88586 1.4233 51.88586 1.4233 51.88586 1.4233 51.88586 1.4233 51.88586 1.4234 51.8868	Coordinates	z [m] 00.50000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0 00.5000 0	Displacements z [mm] .0091672 d .0093737 d .0095674 d .00957480 d .001674 d .001674 d .001674 d .001674 d .001675 d .001675 d .001677	Deflection Ratio [*] lement Troughtal strains Deflection Ratio [*] lement Troughtal	Horizontal Strain [%] gh Limit Sens are -ve. Average Horizontal Strain [%] gh Limit Sen	Tensile Strain [%] sitivity. Max Tensile Strain	of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve	of Vertical Displacement Curve Max Gradient of Vertical Displacement	Radius of Curvature [m] Min Radius of Curvature	Category			
Dist. [m] [m] [m] Vertical Offset 0.0 53.3060 0.96375.3.3060 0.96915 52.32390 1.4537 51.8558(1.9383 51.3720 2.4222 50.8886(2.3274 59.4223 3.8766 94.3300 4.3612 48.9546(4.8457 48.4710 5.3303 47.9878(5.8149 47.5040 6.2994 47.5040 6.2994 47.5040 6.2994 47.5040 6.2994 47.5040 6.2994 47.5040 6.2894 6.5370 7.2686 46.5370 7.2686 46.5370 7.5524 44.6330 d - Displacement Specific Building Structure: GVA-1 Vertical Offset from Line for Vertical Movement Calculations [m] Tensile horizont Structure: GVA-2 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 0.0	Coordinates	2	Displacements z [mm] .0091672 d .0093737 d .0095674 d .00957480 d .001674 d .001674 d .001674 d .001674 d .001675 d .001675 d .001677	Deflection Ratio [%] lement Troughtal strains Deflection Ratio [%] lement Troughtal strains	[%] Average Horizontal Strain Average Horizontal Strain [%] jh Limit Sen is are -ve.	Tensile Strain [%] sitivity. Max Tensile Strain	of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve	of Vertical Displacement Curve Max Gradient of Vertical Displacement	Radius of Curvature [m] Min Radius of Curvature	Category			
Dist. [m] [m] [m] Vertical Offset	Coordinates	2	Displacements z [mm] .0091672 d .0093737 d .0095674 d .0093780 d .0095680 d .0093080 d .0093080 d .0010207 d .001031 d .0010207 d .001031 d .0010535 d .0010677 d .0010772 d .	Deflection Ratio [*] lement Troug ntal strains Deflection Ratio [*] lement Troug ntal strains	[%] Average Horizontal Strain Average Horizontal Strain [%] jh Limit Sen is are -ve.	Tensile Strain [%] sitivity. Max Tensile Strain [%] sitivity.	of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal	of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve	Radius of Curvature [m] Min Radius of Curvature [m]	Damage Category Damage Damage Category			
Dist. [m] [m] [m] Vertical Offset	Coordinates	2	Displacements z [mm] .0091672 d .0093737 d .0095674 d .00957480 d .0097480 d .0093180 d .0095180 d .0093180 d .0093180 d .0093180 d .001631 d .001631 d .001671 d .010724 d .010756 d .010772 d .0	Deflection Ratio [*] lement Trougntal strains Deflection Ratio [*] Deflection Ratio	Horizontal Strain [%] th Limit Sen s are -ve. Average Horizontal Strain [%] th Limit Sen are -ve. Average Horizontal Strain [%]	Tensile Strain [%] Sitivity. Max Tensile Strain [%] Isitivity. Max Tensile Strain [%]	of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve	of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve	Radius of Curvature [m] Min Radius of Curvature [m]	Damage Category Damage Damage Category			
Dist. [m] [m] [m] Vertical Offset 0.0 53.3060. 0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.8928(0.96915	Coordinates	2	Displacements z [mm] .0091672 d .0093737 d .0095674 d .00957480 d .0097480 d .009150 d .010207 d .010208 d .010207 d .010207 d .01027 d .01072 d .010772 d	Deflection Ratio [*] lement Troug ntal strains Deflection Ratio Deflection Ratio Deflection Ratio Deflection Ratio Deflection Ratio	Horizontal Strain [%] jh Limit Sens are -ve. Average Horizontal Strain jh Limit Sens are -ve. Average Horizontal Strain jh Limit Sens are -ve. Average Horizontal Strain jh Limit Sens jare -ve.	Tensile Strain [%] Sitivity. Max Tensile Strain [%] Isitivity. Max Tensile Strain [%]	of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve	of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve	Radius of Curvature [m] Min Radius of Curvature [m] Min Radius of Curvature	Damage Category Damage Damage Category			
Dist. [m] [m] [m] Vertical Offset 0.0 53.3060. 0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.3928(0.96915 52.8928(0.96915	Coordinates	2	Displacements z [mm] .0091672 d .0093737 d .0095674 d .0093737 d .0095674 d .0097480 d .00939150 d .010080 d .010080 d .010080 d .0101631 d .0.101671 d .0.10172 d .0.10772 d	Deflection Ratio [*] lement Troug ntal strains Deflection Ratio Deflection Ratio Deflection Ratio Deflection Ratio Deflection Ratio	Horizontal Strain [%] jh Limit Sens are -ve. Average Horizontal Strain jh Limit Sens are -ve. Average Horizontal Strain jh Limit Sens are -ve. Average Horizontal Strain jh Limit Sens jare -ve.	Tensile Strain [%] Sitivity. Max Tensile Strain [%] Isitivity. Max Tensile Strain [%]	of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve	of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve	Radius of Curvature [m] Min Radius of Curvature [m] Min Radius of Curvature	Damage Category Damage Damage Category			



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from Line for Vertical Movement				Ratio	Horizontal Strain	Tensile Strain	Horizontal Displacement	of Vertical Displacement Curve		Category
		are le	[m] ss than the Sett			[%] nsitivity.	Curve		[m]	
Tensile horizontal				icai sciains	s are -ve.					
Structure: GVA-5 Vertical Offset from Line for Vertical	Sub-structur Segment		5 Length Curvature	Deflection Ratio	n Average Horizontal Strain	Max Tensile Strain	of Horizontal	: Max Gradient of Vertical Displacement	Radius of	
Movement Calculations [m] 0.0	1	[m]	[m] 1.4969 Hogging	[%] 0.001075	[%] L 0.0096504	[%] 0.009753/	Displacement Curve		[m] 13386.	0
0.0			1.7880 Sagging				3 -231.96E-6			(Negligible)
	3	6.7039	1.1101 Hogging	89.450E-6	0.020841	0.02084	7 -216.22E-6	-223.71E-6	118520.	(Negligible) 0 (Negligible)
Tensile horizontal	strains are	+ve, co	mpressive horizon	ntal strains	s are -ve.					
Structure: GVA-6										
Vertical Offset from Line for Vertical Movement Calculations	Segment		Length Curvature	Ratio	Horizontal Strain	Strain		Max Gradient of Vertical Displacement Curve	Curvature	Damage Category
[m] 0.0	1	[m] 0.0	[m] 2.9540 Sagging	[%] 222.67E-6	[%] 2.4216E-6	[%] 210.61E-6	-20.931E-6	-125.26E-6	[m] 130750.	0 (Negligible)
Tensile horizontal	strains are	+ve, co	mpressive horizon	ntal strains	s are -ve.					(Megilgibic)
Structure: GVA-7	Sub-structur	e: GVA-	7							
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length Curvature		Average Horizontal Strain	Tensile Strain	Max Gradient M of o Horizontal I Displacement Curve	of Vertical F		Damage Category
[m] 0.0	1	[m] 0.0	[m] 3.7150 Hogging	[%] 0.0017163	[%] 0.031587	[%] 0.032385	-351.78E-6	-399.82E-6	[m] 25893.	0
Tensile horizontal	strains are	+ve, co	mpressive horizon	ntal strains	s are -ve.				(Negligible)
Structure: GVA-8	Sub-structur	e: GVA-	8							
Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length Curvatu	Ratio	Horizonta Strain		e of	of Vertical Displacement Curve	. Radius o at Curvatur	
[m] 0.0	1	[m] 0.0	[m] 2.1540 Sagging	[%] 137.56E-	[%] -6 -0.001508	[%] 37 311.46E	-6 46.203E-	6 222.83E-	[m] 6 114350	. (Negligible)
manual la bandanata			0.80100 Hogging			0 0.00371	19 -43.918E-	-6 222.83E-	6 470290	. (Negligible)
Tensile horizontal				icai scrain	s are -ve.					
Structure: GVA-9 Vertical Offset										
from Line for Vertical Movement	Segment	Scarc	Length Curvature	Peflection Ratio	n Average Horizontal Strain		of Horizontal	Max Gradient of Vertical Displacement	Radius of	
Vertical Movement Calculations [m]		[m]	[m]	Ratio	Horizontal Strain	Tensile Strain	of Horizontal Displacement Curve	of Vertical Displacement Curve	Radius of Curvature	Category
Vertical Movement Calculations	1	[m] 0.0	[m] 5.4832 Hogging	[%] 504.00E-6	Horizontal Strain	Tensile Strain [%] 0.01024	of Horizontal Displacement Curve	of Vertical Displacement Curve	Radius of Curvature	Category (Negligible)
Vertical Movement Calculations [m]	1 2	[m] 0.0	[m] 5.4832 Hogging	[%] 504.00E-6	Horizontal Strain [%] 0.010065	[%] 0.01617	of Horizontal Displacement Curve -141.42E-6 4 -181.61E-6	of Vertical Displacement Curve 220.32E-6 214.64E-6	Radius of Curvature [m] 119190.	Category (Negligible) (Negligible)
Vertical Movement Calculations [m]	1 2 3	[m] 0.0 5.4832	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging	[%] 504.00E-6 351.71E-6	Horizontal Strain	[%] 0.01617	of Horizontal Displacement Curve -141.42E-6 4 -181.61E-6	of Vertical Displacement Curve 220.32E-6 214.64E-6	[m] 119190.	Category (Negligible) (Negligible)
Vertical Movement Calculations [m] 0.0	1 2 3 strains are	[m] 0.0 5.4832 8.1188 +ve, co	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon	[%] 504.00E-6 351.71E-6	Horizontal Strain	[%] 0.01617	of Horizontal Displacement Curve -141.42E-6 4 -181.61E-6	of Vertical Displacement Curve 220.32E-6 214.64E-6	[m] 119190.	Category (Negligible) (Negligible)
Vertical Movement Calculations [m] 0.0	1 2 3 strains are	[m] 0.0 5.4832 8.1188 +ve, co	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon	[%] 504.00E-6 351.71E-6 0.001152' ntal strains	Horizontal Strain [%] 0.010065 0.016057 0.0062809 s are -ve.	Tensile Strain [%] 0.010244 0.01617- 0.0064524	of Horizontal Displacement Curve -141.42E-6 4 -181.61E-6 3 -181.61E-6	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 Max Gradient of Vertical Displacement	Radius of Curvature [m] 119190. 6 63804. 14093. Min Radius of Curvature	Category (Negligible) (Negligible) (Negligible)
Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m]	1 2 3 strains are Sub-structu Segment	[m] 0.0 5.4832 +ve, co	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon—10 Length Curvature	Ratio [%] 504.00E-6 351.71E-6 0.001152' stal strains Deflection Ratio	Horizontal Strain [%] 0.010065 0.016057 0.0062809 are -ve. Average Horizontal Strain [%] himit Sen	Tensile Strain [%] 0.010244 7 0.01617- 9 0.0064524 Max Tensile Strain	of Horizontal Displacement Curve 0 -141.42=-6 4 -181.61=-6 3 -181.61=-6 Max Gradient of Horizontal Displacement	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 Max Gradient of Vertical Displacement	Radius of Curvature [m] 119190. 6 63804. 14093.	Category (Negligible) (Negligible) (Negligible)
Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Al	2 3 strains are Sub-structu Segment 1 settlements strains are	[m] 0.0 5.4832 8.1188 +ve, co	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon—10 Length Curvature	Ratio [%] 504.00E-6 351.71E-6 0.001152' stal strains Deflection Ratio	Horizontal Strain [%] 0.010065 0.016057 0.0062809 are -ve. Average Horizontal Strain [%] himit Sen	Tensile Strain [%] 0.010244 7 0.01617- 9 0.0064524 Max Tensile Strain	of Horizontal Displacement Curve 0 -141.42=-6 4 -181.61=-6 3 -181.61=-6 Max Gradient of Horizontal Displacement	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 Max Gradient of Vertical Displacement	Radius of Curvature [m] 119190. 6 63804. 14093. Min Radius of Curvature	Category (Negligible) (Negligible) (Negligible)
Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Al Tensile horizontal Structure: GE-1 Vertical Offset from Line for Vertical Movement	2 3 strains are Sub-structu Segment 1 settlements strains are	[m] 0.0 s 5.4832 s 8.1188 s +ve, co sre: GVA start [m] s are le +ve, co	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon—10 Length Curvature	Ratio [%] 504.00E-6 351.71E-6 0.001152' stal strains Deflection Ratio [%] lement Troughtal strains	Horizontal Strain [%] [%] [%] [%] [%] [%] [%] [%] [%] [%]	Tensile Strain	of Horizontal Displacement Curve 0 -141.42E-6 4 -181.61E-6 3 -181.61E-6 Max Gradient of Horizontal Displacement Curve Max Gradient Of Horizontal Displacement Curve	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement	Radius of Curvature [m] 119190.6 63804. 14093. Min Radius of Curvature [m] Min Radius of Curvature	Category (Negligible) (Negligible) (Negligible) (Negligible) Damage Category
Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Al Tensile horizontal Structure: GE-1 Vertical Offset from Line for Vertical Offset from Line for Vertical Offset from Line for Vertical	2 3 strains are Sub-structu Segment 1 settlements strains are Sub-structure	[m] 0.0 5.4832 8.1188 +ve, co are: GVA Start [m] are le +ve, co	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizor-10 Length Curvature [m] ss than the Sett: mpressive horizor	Ratio [%] [54].00E-6 351.71E-6 0.001152' ital strain Deflection Ratio [%] Deflection Ratio [%]	Horizontal Strain [%] [%] [%] [%] [%] [%] [%] [%] [%] [%	Tensile Strain (%)	of Horizontal Displacement Curve 0 -141.42E-6 4 -181.61E-6 3 -181.61E-6 Max Gradient of Horizontal Displacement Curve Max Gradient Curve	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement	Radius of Curvature [m] Min Radius of Curvature [m] Min Radius of Curvature [m]	Category (Negligible) (Negligible) (Negligible) (Negligible) Damage Category
Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m] 10.0 Al Tensile horizontal Structure: GE-1 Vertical Offset from Line for Vertical Movement Calculations [m] Movement Calculations [m] Movement Calculations [m] Movement	strains are Sub-structu Segment settlements strains are Sub-structure Segment	[m] 0.00 Start [m] are lele ++ve, co	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizor -10 Length Curvature [m] ss than the Sett: mpressive horizor Length Curvature [m] 7.9120 Sagging	Ratio [%] [04.00E-6 351.71E-6 0.001152' ital strain Deflection Ratio [%] Lement Troustal strain Deflection Ratio [%] 0.0040686	Horizontal Strain [%] [%] [%] [%] [%] [%] [%] [%] [%] [%	Tensile Strain (%)	of Horizontal Displacement Curve 0 -141.42E-6 4 -181.61E-6 3 -181.61E-6 Max Gradient of Horizontal Displacement Curve Max Gradient Curve	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve	Radius of Curvature [m] Min Radius of Curvature [m] Min Radius of Curvature [m]	Category (Negligible) (Negligible) (Negligible) (Negligible) Damage Category
Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Al Tensile horizontal Structure: GE-1 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 Struct	strains are Sub-structu Segment settlements strains are Sub-structure Segment strains are	[m] 0.0 5.4832 8.1188 +ve, co Start [m] are le in le i	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon—10 Length Curvature [m] ss than the Settimpressive horizon Length Curvature [m] 7.9120 Sagging mpressive horizon	Ratio [%] [54] 504.00E-6 351.71E-6 0.001152' stal strains Deflection Ratio [%] Deflection Ratio [%] 0.0040686 stal strains	Horizontal Strain	Tensile Strain	of Horizontal Displacement Curve 0 -141.42E-6 4 -181.61E-6 3 -181.61E-6 Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve 348.34E-6	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve -311.92E-6	Radius of Curvature [m] Min Radius of Curvature [m] Min Radius of Curvature [m]	Category O(Negligible) O(Negligible) O(Negligible) O(Negligible) Damage Category Damage Category O(Negligible)
Vertical Movement Calculations [m]	strains are Sub-structu Segment settlements strains are Sub-structure segment	[m] 0.0 5.4832 8.1188 +ve, co Start [m] are le +ve, co :: GE-1 Start [m] 0.0 +ve, co :: GE-2 Start	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon -10 Length Curvature [m] ss than the Sett. mpressive horizon Length Curvature [m] 7.9120 Sagging mpressive horizon Length Curvature	Ratio [%] 504.00E-6 351.71E-6 0.001152' stal strains Deflection Ratio [%] lement Troustal strains Deflection Ratio [%] 0.0040686 stal strains	Horizontal Strain [%] 0.010065 0.016057 0.0062809 are -ve. Average Horizontal Strain [%] -0.022718 are -ve.	Tensile Strain	of Horizontal Displacement Curve -141.42E-6 -181.61E-6 Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Additional Max Gradient of Horizontal Max Gradient Curve	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve -311.92E-6 Max Gradient of Vertical Displacement Curve	Radius of Curvature [m] 119190. 6 63804. 14093. Min Radius of Curvature [m] Min Radius of Curvature [m] Min Radius of Curvature Curvature [m] Min Radius of Curvature [m] Curvature Curvature Curvature Curvature	Category (Negligible) (Negligible) (Negligible) (Negligible) Damage Category
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Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Al Tensile horizontal Movement Calculations [m] 0.0 Structure: GE-1 Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0	strains are Sub-structure Segment settlements strains are segment strains are segment strains are segment	[m] 0.0 5.4832 8.1188 +ve, co	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon -10 Length Curvature [m] ss than the Sett. mpressive horizon Length Curvature [m] 7.9120 Sagging mpressive horizon Length Curvature [m] 10.198 Hogging 1.2969 Sagging 1.8134 Hogging	Ratio [%] 504.00E-(351.71E-(0.001152' atal strains Deflection Ratio [%] 0.0040686 atal strains Deflection Ratio [%] 0.0040686 atal strains	Norizontal Strain	Tensile Strain	of Horizontal Displacement Curve 0 -141.42E-6 4 -181.61E-6 4 -181.61E-6 Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve 348.34E-6 Max Gradient of Horizontal Displacement Curve -592.35E-6 -374.79E-6	of Vertical Displacement Curve 1 220.32E-6 214.64E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve 311.92E-6 Max Gradient of Vertical Displacement Curve 656.94E-6 270.34E-6	Min Radius of Curvature [m] [m] [m] [m] [m] [m] [m] [m	Category (Negligible) (Negligible) (Negligible) (Negligible) Damage Category Damage Category O(Negligible) Damage Category O(Negligible)
Vertical Movement Calculations [strains are Sub-structure Segment settlements strains are segment strains are segment strains are segment	[m] 0.0 5.4832 8.1188 +ve, co start [m] are lee -ve, co :: GE-1 Start [m] 0.0 +ve, co :: GE-2 Start [m] 0.0 10.198 11.495 +ve, co :: GE-3	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon -10 Length Curvature [m] ss than the Sett. mpressive horizon Length Curvature [m] 7.9120 Sagging mpressive horizon Length Curvature [m] 10.198 Hogging 1.2969 Sagging 1.8134 Hogging	Ratio [%] 504.00E-6 351.71E-6 0.001152' stal strains Deflection Ratio [%] 1.0040686 stal strains Deflection Ratio [%] 0.0040686 stal strains Deflection Ratio [%] 0.0040101 225.73E-6 0.001435: stal strains	Norizontal Strain	Tensile Strain	of Horizontal Displacement Curve -141.42E-6 -181.61E-6 Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve -348.34E-6 Max Gradient of Horizontal Displacement Curve -592.35E-6 -374.79E-6	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve -311.92E-6 Max Gradient of Vertical Displacement Curve -311.92E-6 Max Gradient Of Vertical Curve -310.34E-6 270.34E-6	Radius of Curvature [m] Min Radius of Curvature Min Radius of Curvature [m] Min Radius of Curvature Min Radius of Curvature [m] Min Radius of Curvature Min Min Min	Category O(Negligible) O(Negligible) O(Negligible) O(Negligible) Damage Category Damage Category O(Negligible) O(Negligible) O(Negligible) Damage Category
Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Al Tensile horizontal Structure: GE-1 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-3 Vertical Offset from Line for Vertical Offset from Line for Vertical Offset from Line for Vertical Movement	strains are Sub-structure Segment settlements strains are segment	[m] 0.0 5.4832 8.1188 +ve, co start [m] are lee -ve, co :: GE-1 Start [m] 0.0 +ve, co :: GE-2 Start [m] 0.0 10.198 11.495 +ve, co :: GE-3	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon -10 Length Curvature [m] 5.8130 Sagging mpressive horizon Length Curvature [m] 7.9120 Sagging mpressive horizon Length Curvature [m] 1.12969 Sagging 1.2969 Sagging 1.8134 Hogging mpressive horizon	Ratio [%] 504.00E-6 351.71E-6 0.001152' stal strains Deflection Ratio [%] 1.0040686 stal strains Deflection Ratio [%] 0.0040686 stal strains Deflection Ratio [%] 0.0040101 225.73E-6 0.001435: stal strains	Norizontal Strain	Tensile Strain	of Horizontal Displacement Curve -141.42E-6 -181.61E-6 Max Gradient of Horizontal Displacement Curve Max Gradient of Horizontal Displacement Curve Max Gradient of Gradient of -348.34E-6 Max Gradient of Arizontal Displacement Curve -592.35E-6 -374.79E-6 -374.79E-6	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve -311.92E-6 Max Gradient of Vertical Displacement Curve -311.92E-6 Max Gradient of Vertical Displacement Curve 656.94E-6 270.34E-6 Max Gradient of Vertical Displacement Curve	Radius of Curvature [m] Min Radius of Curvature [m] Radius of Curvature [m] Radius of Curvature [m] Radius of Curvature	Category O(Negligible) O(Negligible) O(Negligible) O(Negligible) Damage Category Damage Category O(Negligible) O(Negligible) O(Negligible) Damage Category
Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GVA-10 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Al Tensile horizontal Vertical Offset from Line for Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-2 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0 Tensile horizontal Structure: GE-3 Vertical Offset from Line for Vertical Movement Calculations [m] 0.0	strains are Sub-structure Segment Sub-structure Segment Segment Strains are Sub-structure Segment Segment Segment 1 2 3 3 strains are Sub-structure Segment 1 1 2 3 3 3 4 5 5 6 7 7 8 8 9 9 1 1 1 1 1 1 1 1 1 1	[m] 0.0 5.4832 8.1188 +ve, co co cre: GVA start [m] are le eve, co c: GE-1 Start [m] 0.0 +ve, co c: GE-2 Start [m] 0.11.495 +ve, co c: GE-3 Start [m] 0.198 11.495 +ve, co c: GE-3 Start [m] are le eve co co construction of the	[m] 5.4832 Hogging 2.6355 Sagging 1.7438 Hogging mpressive horizon -10 Length Curvature [m] ss than the Sett: mpressive horizon Length Curvature [m] 7.9120 Sagging mpressive horizon Length Curvature [m] 10.198 Hogging 1.2969 Sagging 1.8134 Hogging mpressive horizon Length Curvature [m] ss than the Sett: ss than the Sett:	Ratio [%] 504.00E-6 351.71E-6 0.001152' stal strains Deflection Ratio [%] 1.0040686 stal strains Deflection Ratio [%] 0.0040101 225.73E-6 0.001435: stal strains	Horizontal	Tensile Strain	of Horizontal Displacement Curve 0 -141.42E-6 4 -181.61E-6 8 -181.61E-6 8 -181.61E-6 Max Gradient of Horizontal Displacement Curve 348.34E-6 Max Gradient of Forizontal Displacement Curve 348.34E-6 Max Gradient of Horizontal Displacement Curve -592.35E-6 -374.79E-6 -374.79E-6 Horizontal Displacement Curve	of Vertical Displacement Curve 220.32E-6 214.64E-6 216.17E-6 216.17E-6 Max Gradient of Vertical Displacement Curve Max Gradient of Vertical Displacement Curve -311.92E-6 Max Gradient of Vertical Displacement Curve -311.92E-6 Max Gradient of Vertical Displacement Curve 656.94E-6 270.34E-6 Max Gradient of Vertical Displacement Curve	Radius of Curvature [m] Min Radius of Curvature [m] Radius of Curvature [m] Radius of Curvature [m] Radius of Curvature	Category O(Negligible) O(Negligible) O(Negligible) O(Negligible) Damage Category Damage Category O(Negligible) O(Negligible) O(Negligible) Damage Category



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Vertical Offset	Segment	Start Length Curvature			Max	Max Gradient			Damage		
from Line for Vertical Movement			Ratio	Horizontal Strain	Strain	of Horizontal Displacement	of Vertical Displacement Curve		Category		
Structure: GE-4	Sub-structu	re: GE-4				Displacement	Curve				
Vertical Offset	Segment	Start Length Curvatur			Max	Max Gradient			Damage		
from Line for Vertical			Ratio	Horizontal Strain	Strain		of Vertical Displacement		Category		
Movement Calculations		[m] [m]	[%]	[%]	[%]	Displacement Curve	Curve	[m]			
0.0		1 1.9591 1.4108 Hogging	0.001072	1 0.012203	0.012396			12659.	(Negligible)		
		2 3.3699 1.5791 Sagging 3 4.9490 8.7640 Hogging	257.32E-6	6 0.027167 3 0.026650		-279.83E-6 -335.89E-6			(Negligible)		
Tensile horizonta	l strains ar	e +ve, compressive horizo			0.030027	-333.096-0	-402.506-	2/8/2.	(Negligible)		
Structure: DH-1 Vertical Offset	Sub-structu Segment	re: DH-1 Start Length Curvatur	e Deflection	n Average	Max	Max Gradient	May Gradien	t Min	Damage		
from Line for Vertical	Бедмене	Dourt Bongon Carvacar	Ratio	Horizontal Strain		of Horizontal	of Vertical	Radius of	Category		
Movement Calculations						Displacement Curve	Curve				
[m] 0.0		[m] [m] 1 9.2270 1.6375 Hogging	[%] 0.0014519	[%] 9 0.015406	[%] 0.015519	-374.80E-6	-283.81E-	[m] 5 8244.3	0 (Negligible)		
		2 10.864 1.2212 Sagging	200.53E-6	0.037494	0.037515	-374.80E-6	-269.68E-	54502.	(Negligible)		
		3 12.086 10.252 Hogging	0.006323		0.053937	-592.50E-6	-686.15E-		1 (Very Slight)		
Tensile horizonta	l strains ar	e +ve, compressive horizo	ntal strains	s are -ve.							
Structure: DH-2											
Vertical Offset from Line for	Segment	Start Length Curvatur	e Deflection Ratio	Horizontal		of		l Radius of			
Vertical Movement Calculations				Strain	Strain	Horizontal Displacement Curve	Displacement Curve	nt Curvature	•		
[m] 0.0		[m] [m] 1 0.0 12.935 Sagging	[%] 0.001981	[%] 3 -0.0064667	[%] 0.0016696		6 128.92E	[m] -6 19352.	. 0		
		2 12.935 4.4640 Hogging		6 0.0018876					(Negligible)		
		3 17.399 7.5603 Sagging	0.002147	7 -0.0070585	0.0018839	9 182.34E-6	6 262.53E	-6 28950.	(Negligible) 0 (Negligible)		
		4 24.959 7.5512 Hogging		4 0.012039					. (Negligible)		
		5 32.510 2.2951 Sagging 6 34.805 1.6444 Hogging		0.017679 0.0070724					(Negligible)		
Tensile horizonta	l strains ar	e +ve, compressive horizo			0.0072030	-190.546-	233.302	-0 13433.	(Negligible)		
atuurituus py a l	Sub-atomotion	DV 2									
Structure: DH-3 Vertical Offset	Sub-structu Segment	re: DH-3 Start Length Curvature	Deflection	Average	Max	Max Gradient	May Gradien	t Min	Damage		
from Line for Vertical	Бедмене	Deare Bengen carvacare		Horizontal Strain	Tensile Strain	of	of Vertical Displacement	Radius of			
Movement Calculations						Displacement Curve	Curve				
[m] 0.0 A Tensile horizonta	ll settlemen	[m] [m] its are less than the Sett e +ve, compressive horizo	[%] lement Troug ntal strains	[%] gh Limit Sen s are -ve.	[%] sitivity.			[m]			
Structure: DH-4 Vertical Offset	Sub-structu Segment	re: DH-4 Start Length Curvature	Deflection	Average	Max	Max Gradient	May Gradien	t Min	Damage		
from Line for Vertical	segment	start bength curvature		Horizontal Strain			of Vertical	Radius of			
Movement Calculations						Displacement Curve					
		[m] [m] its are less than the Sett e +ve, compressive horizo			[%] sitivity.			[m]			
Tensile norizonca	I SCIAINS AI	e +ve, compressive norizo.	ntar Strains	s are -ve.							
Structure: DH-5											
Vertical Offset from Line for Vertical	Segment	Start Length Curvature		Average Horizontal Strain	Max Tensile Strain	Max Gradient of	of Vertical Displacement	Radius of	Damage Category		
Movement Calculations				Scrain	Scrain	Displacement Curve		curvacure			
[m] 0.0 A	ll settlemen	[m] [m] its are less than the Sett	[%] lement Troug	[%] gh Limit Sen	[%] sitivity.			[m]			
Tensile horizonta	l strains ar	e +ve, compressive horizo	ntal strains	s are -ve.							
Structure: DH-6											
Vertical Offset from Line for	Segment	Start Length Curvatu	re Deflectio Ratio	Horizonta		e of		al Radius o			
Vertical Movement				Strain	Strain	Displacemen	l Displacement Curve	ent Curvatur	re		
Calculations [m] 0.0		[m] [m] 1 16.849 0.17807 Sagging	[%]	[%]	[%]	Curve	.0 -80.8831	[m] E-6 254540). 0		
		2 17.027 2.3911 Sagging			0 222.12E-		.0 -77.4941		(Negligible)		
		3 19.418 1.0125 Hogging	200.20E	-6 293.53E-	6 383.99E-	-6 -17.971E-	-6 -69.1751	E-6 141170	(Negligible) (Negligible)		
		4 20.431 12.275 Sagging			6 637.40E-	-6 35.974E	-6 -69.175	E-6 87133	(Negligible) (Negligible)		
Tensile horizonta	l strains ar	e +ve, compressive horizo	ntal strains	s are -ve.							
Structure: DH-7											
Vertical Offset from Line for	Segment	Start Length Curvatur	e Deflection Ratio	Horizontal	Tensile	Max Gradient of	of Vertical	Radius of	Damage Category		
Vertical Movement				Strain	Strain	Horizontal Displacement	Displacement Curve	Curvature			
Calculations [m] 0.0		[m] [m] 1 0.0 1.5103 Sagging	[%] 218.14E-6	[%] 6 0.037383	[%] 0.037411	Curve -373.87E-6	275.79E-	[m] 5 69202.	0		
		2 1.5103 1.8569 Hogging						5 5807.5	(Negligible)		
Tensile horizonta	l strains ar	e +ve, compressive horizo							(Negligible)		
Structure: DH-8	Sub-structu	re: DH-8									
Vertical Offset	Segment	Start Length Curvature			Max	Max Gradient			Damage		
from Line for Vertical Movement			Ratio	Horizontal Strain	Strain		of Vertical Displacement Curve		Category		
Movement Calculations [m]		[m] [m]	[%]	[%]	[%]	Displacement Curve	curve	[m]			
0.0 A	ll settlemen l strains ar	ts are less than the Sett e +ve, compressive horizo:	lement Troug	gh Limit Sen				F *** J			



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Vertical Off from Line for Vertical Movement		ment St	tart Length	Curvature D		Average Horizontal Strain		of	ntal Dis	Vertical	Min Radius of C Curvature	Damage Category		
Specific Build	ing Damage I	Results - Cri	itical Values	for All Segme	nts within l	Each Sub-Stru	ucture							
Structure: G	VA-1 Sub-s	structure:	GVA-1											
Vertical Offset from Line for Vertical Movement	Deflection	Average	Max 1	Max Ma tlement Tens Stra	ile o in Horiz	zontal Disp acement C	ertical E lacement (Curvatur		of re	ge Category			
Calculations [m]	[%]	[%]		[mm] [%]			[m]	[m]					
Structure: G	VA-2 Sub-s	structure:	GVA-2											
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average	Max 1	Max Ma tlement Tens Stra	ile o in Horiz	zontal Disp acement C	ertical E lacement (Curvatur		of re	ge Category			
[m]	[%]	[%]		[mm] [%]			[m]	[m]					
Structure: G					v a.		g.,	***	***					
Vertical Offset from Line for Vertical Movement Calculations [m]	Deflection Ratio	Average Horizontal Strain	l Slope Set	Max Matlement Tens Stra	ile c in Horiz Displa Cur	zontal Disp acement C	ertical E	Curvatur		of re	ge Category			
Structure: G Vertical Offset from Line for Vertical Movement Calculations	Deflection	Average	Max 1	Max Ma tlement Tens Stra	ile o in Horiz	zontal Disp acement C	ertical E lacement (Curvatur		of re	ge Category			
[m]	[%]	[%]		[mm] [%]			[m]	[m]					
Structure: G Vertical Offset from Line for Vertical Movement	Deflection		Max Slope	Max Settlement	Strain	Max Gradien of Horizontal Displacemen Curve	of Verti	ical Rad ement Cu	Min dius of Ra rvature Cu ogging) (S	urvature	Damage Cat	tegory		
Calculations [m] 0.0	[%] 0.0010751	[%] 0.022474	4 -248.36E-6	[mm] 5 1.1278	[%] 0.022533	-236.66E-	6 -248.3	36E-6	[m] 13386.	[m] 55095.	0 (Negligib)	le)		
Structure: G	VA-6 Sub-s	structure:	GVA-6											
Vertical Offset from Line for Vertical Movement Calculations		Average Horizontal Strain	Max Slope L	Max Settlement	Max Tensile Strain	Max Gradie of Horizonta Displaceme Curve	of Vert	tical R	Min adius of I urvature (Hogging)	Curvature	1	ategory		
0.0			5 -125.26E-6	5 1.4773	210.61E-6	-20.931E	-6 -125	.26E-6	-		0 (Negligih	ble)		
Structure: G	VA-7 Sub-s	structure:	GVA-7											
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradien of Horizontal Displacemen Curve	of Verti	ical Rad	Min dius of Ra rvature Cu ogging) (8	urvature	Damage Cat	tegory		
[m] 0.0	[%] 0.0017163	[%] 0.031587	7 -399.82E-6	[mm] 5 2.7354	[%] 0.032385	-351.78E-	6 -399.8	32E-6	[m] 25893.	[m] -	0 (Negligibl	le)		
Structure: G	VA-8 Sub-s	structure:	GVA-8											
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope l	Max Settlement	Tensile Strain	Max Gradien of Horizontal Displacemen Curve	of Verti	ical Rad ement Cu	dius of Ra	urvature	Damage Cat	tegory		
[m] 0.0	[%] 137.56E-6	[%] 0.0037100	222.83E-6	[mm] 2.7358	[%] 0.0037119	46.203E-	6 222.8	83E-6	[m] 470290.	[m] 114350.	0 (Negligibl	le)		
Structure: G	VA-9 Sub-s	structure:	GVA-9											
Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain		Max Settlement	Tensile Strain	Max Gradient of Horizontal Displacement Curve	of Vertic	cal Rad	ius of Rac	rvature	Damage Cate	egory		
[m] 0.0	[%] 0.0011527	[%] 0.016057	7 220.32E-6	[mm] 2.0850	[%] 0.016174	-181.61E-6	220.32		[m] 14093.	[m] 63804. 0	(Negligible	e)		
Structure: G										_				
Offset from Line for Vertical Movement Calculations		Horizontal Strain	l Slope Seti	tlement Tens Stra	ile d in Horiz Displa Cur	radient Max of of V zontal Disp acement C	ertical E lacement (Curvatur (Hogging	e Curvatum) (Sagging	of re	ge Category			
[m]	[%]	[%]		[mm] [%	1			[m]	[m]					
Vertical Offset from Line for Vertical	Deflection		Max Slope	Max Settlement	Max Tensile Strain	Max Gradie of Horizonta Displaceme	of Vert	tical R		Curvature		ategory		
Movement Calculations [m] 0.0	[%]	[%] -0.022718	3 -311.92E-	[mm] 5 5.3018	[%] 0.0048311	Curve	-6 -311.		[m]	[m]	0 (Negligik	ble)		
Structure: G	E-2 Sub-st			Max	Max 1	Max Gradient	Max Gradi	ient 1	Min	Min	Damage Cate	egory		



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Offset from Line for Vertical Movement Calculations	Ratio	Horizontal Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging)	
[m]	[%] 0.0060108	[%] [mm] [%] [m] [m] [%] [m] [m] [m] [m] [m] [m] [m] [m] [m] [m	
Structure: GE-	-3 Sub-s	-structure: GE-3	
Line for Vertical Movement		on Average Max Max Max Max Gradient Max Gradient Min Min Damage Category Horisontal Slope Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve	
Calculations [m]	[%]	[%] [mm] [%] [m]	
Structure: GE-	-4 Sub-s	-structure: GE-4	
Vertical D Offset from Line for Vertical Movement Calculations	Deflection Ratio	on Average Max Slope Max Max Max Gradient Max Gradient Min Min Damage Category Horizontal Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve	
[m]	[%] 0.0034163	[%] [mm] [%] [m] [m] [m] [m] [m] [m] [m] [m] [m] [m	
Structure: DH-	-1 Sub-s	-structure: DH-1	
Vertical D Offset from Line for Vertical Movement Calculations	Deflection Ratio	on Average Max Slope Max Max Max Gradient Max Gradient Nin Min Damage Category Horisontal Settlement Tensile of Of Vertical Radius of Radius of Strain Strain Horisontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve (Curve (Hogging) (Sagging)	
[m]	[%] 0.0063235	[%] [mm] [%] [m] [m] [m] [m] [m] [m] [m] [m] [m] [m	
Structure: DH-	-2 Sub-s	-structure: DH-2	
Vertical D Offset from Line for Vertical Movement Calculations	Deflection Ratio	on Average Max Slope Max Max Max Gradient Max Gradient Min Min Damage Category Horizontal Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve	
[m]	[%] 0.002147	[%] [mm] [%] [m] [m] [77 0.017679 262.53E-6 5.4772 0.017743 499.83E-6 262.53E-6 15435. 19352. 0 (Negligible)	
Structure: DH-	-3 Sub-s	-structure: DH-3	
Vertical E Offset from Line for Vertical Movement Calculations		on Average Max Max Max Max Gradient Max Gradient Min Min Damage Category Horizontal Slope Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve	
[m]	[%]	[%] [m] [%]	
		-structure: DH-4	
Vertical E Offset from Line for Vertical Movement Calculations		on Average Max Max Max Max Gradient Max Gradient Min Min Damage Category Horizontal Slope Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve	
[m]	[%]	[%] [mm] [%] [m]	
		-structure: DH-5	
Line for Vertical Movement Calculations	Ratio	Horizontal Slope Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve	
[m]	[%]	[%] [mm] [%] [m] [m]	
		-structure: DH-6 on Average Max Slope Max Max Max Gradient Max Gradient Min Min Damage Category	
Offset from Line for Vertical Movement Calculations	Ratio	Horizontal Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Displacement Curve (Hogging) (Sagging) Curve (mail [m] [m] [m]	
		-6 293.53E-6 -80.883E-6 0.93543 637.40E-6 35.974E-6 -80.883E-6 141170. 87133. 0 (Negligible)	
		structure: DH-7	
Vertical D Offset from Line for Vertical Movement Calculations		on Average Max Slope Max Max Gradient Max Gradient Min Min Damage Category Horizontal Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve	
[m] 0.0	[%] 0.0013276	[%] [mm] [%] [m] [m] [m] [m] [m] [m] [m] [m] [m] [m	
Structure: DH-	-8 Sub-s	-structure: DH-8	
Offset from Line for Vertical Movement		on Average Max Max Max Max Gradient Max Gradient Min Min Damage Category Horizontal Slope Settlement Tensile of of Vertical Radius of Radius of Strain Strain Horizontal Displacement Curvature Curvature Displacement Curve (Hogging) (Sagging) Curve	
Calculations [m]	[%]	[%] [mm] [%] [m]	
Specific Buildin	ng Damage	e Results - Critical Segments within Each Structure	
Structure Name	e Para	rameter Critical Critical Start End Curvature Max Slope Max Max Min Min Damage Category Sub-Structure Segment Tensile Radius of Strain Curvature Curvature (Hogging) (Sagging) [m] [m] [mm] [k] [m] [m]	
GVA-1	All set All set All set	ettlements are less than the Settlement Trough Limit Sensitivity. Ettlements are less than the Settlement Trough Limit Sensitivity. Ettlements are less than the Settlement Trough Limit Sensitivity. Ettlements are less than the Settlement Trough Limit Sensitivity. Ettlements are less than the Settlement Trough Limit Sensitivity. Ettlements are less than the Settlement Trough Limit Sensitivity.	



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Made by	Date 14-Aug-2018	Checked

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Structure Name	Parameter	Critical Sub-Structur	Critical Start re Segment	End	Curvatur		Max Settlement	Max Tensile Strain	Min Radius of I Curvature (Curvature	Damage Category	
VA-2	All settlements	are less than	the Settlement Tr	ough Lim	it Sensi	tivity.						
	All settlements	are less than	the Settlement Tr the Settlement Tr	ough Lim	it Sensi	tivity.						
GVA-3	All settlements	are less than	the Settlement Tr the Settlement Tr	ough Lim	it Sensi	tivity.						
	All settlements	are less than	the Settlement Tr the Settlement Tr	ough Lim	it Sensi	tivity.						
	All settlements	are less than	the Settlement Tr the Settlement Tr	ough Lim	it Sensi	tivitv.						
SVA-4	All settlements	are less than	the Settlement Tr	ough Lim	it Sensi	tivity.						
	All settlements All settlements	are less than are less than	the Settlement Tr	ough Lim	it Sensi	tivity. tivity.						
SVA-5	All settlements Max Slope	are less than GVA-5	the Settlement Tr	ough Lim	it Sensi	tivity. 248.36E-6	0.47742	0.0097534	13386.	- () (Negligible)	
	Max Settlement Max Tensile		3 6.7039	7.8140 i 6.7039 i	Hogging	223.71E-6 235.55E-6	1.1278	0.020847	118520.	- () (Negligible)) (Negligible)	
	Strain											
	Min Radius of Curvature	GVA-5	1 3.4190	4.9159	Hogging	248.36E-6	0.47742	0.0097534	13386.	- ((Negligible)	
	(Hogging) Min Radius of	GVA-5	2 4.9159	6.7039	Sagging	235.55E-6	0.88168	0.022533	_	55095. ((Negligible)	
	Curvature (Sagging)											
SVA-6	Max Slope Max Settlement	GVA-6 GVA-6		2.9540 :		125.26E-6 125.26E-6		210.61E-6 210.61E-6) (Negligible)) (Negligible)	
	Max Tensile	GVA-6		2.9540		125.26E-6	1.4773	210.61E-6	-	130750. ((Negligible)	
	Strain Min Radius of				-	-	-	-	-			
	Curvature (Hogging)											
	Min Radius of Curvature	GVA-6	1 0.0	2.9540	Sagging	125.26E-6	1.4773	210.61E-6	-	130750.	(Negligible)	
VA-7	(Sagging) Max Slope	GVA-7	1 0.0	3.7150	Hogaina	399.82E-6	2.7354	0.032385	25893.	_ () (Negligible)	
,	Max Settlement	GVA-7	1 0.0	3.7150	Hogging	399.82E-6	2.7354	0.032385	25893.	- () (Negligible)	
	Strain	GVA-7		3.7150		399.82E-6		0.032385) (Negligible)	
	Min Radius of Curvature	GVA-7	1 0.0	3.7150	Hogging	399.82E-6	2.7354	0.032385	25893.	- ((Negligible)	
	(Hogging) Min Radius of				_	_	_	-	_			
	Curvature (Sagging)											
VA-8	Max Slope Max Settlement	GVA-8 GVA-8	1 0.0	2.1540 :	Sagging	222.83E-6 222.83E-6	2.7358	311.46E-6 311.46E-6	-	114350. ((Negligible) (Negligible)	
	Max Tensile	GVA-8		2.1540		222.83E-6 222.83E-6		0.0037119		- ((Negligible)	
	Strain Min Radius of	GVA-8	2 2.1540	2.9550	Hogging	222.83E-6	2.2631	0.0037119	470290.	- ((Negligible)	
	Curvature (Hogging)											
	Min Radius of Curvature	GVA-8	1 0.0	2.1540 :	Sagging	222.83E-6	2.7358	311.46E-6	-	114350.	(Negligible)	
VA-9	(Sagging) Max Slope	GVA-9	1 0.0	5.4832	Hogaina	220.32E-6	2.0850	0.010240	119190.	- () (Negligible)	
	Max Settlement	GVA-9	1 0.0	5.4832	Hogging	220.32E-6	2.0850	0.010240	119190.	- ((Negligible)	
	Max Tensile Strain	GVA-9		8.1188		214.64E-6		0.016174) (Negligible)	
	Min Radius of Curvature	GVA-9	3 8.1188	9.8626	Hogging	216.17E-6	0.45752	0.0064528	14093.	- ((Negligible)	
		GVA-9	2 5.4832	8.1188	Sagging	214.64E-6	0.97277	0.016174	_	63804. ((Negligible)	
	Curvature (Sagging)											
SVA-10	All settlements All settlements	are less than	the Settlement Tr	ough Lim	it Sensi	tivity.						
	All settlements	are less than	the Settlement Tr	ough Lim	it Sensi	tivity.						
E-1	All settlements		the Settlement Tr	ough Lim	it Sensi		E 2019	0.0048311		10060 () (Magligible)	
E-1	Max Slope Max Settlement	GE-1	1 0.0	7.9120 :	Sagging	311.92E-6	5.3018	0.0048311	-	18969. () (Negligible)) (Negligible)	
	Max Tensile Strain	GE-1	1 0.0	7.9120	Sagging	311.92E-6	5.3018	0.0048311	-	18969. ((Negligible)	
	Min Radius of Curvature				-	-	-	-	-			
	(Hogging) Min Radius of	GE-1	1 0.0	7.9120	Sagging	311.92E-6	5.3018	0.0048311	_	18969. () (Negligible)	
	Curvature (Sagging)										. , .3 3	
E-2	Max Slope Max Settlement	GE-2 GE-2	1 0.0	10.198	Hogging	656.94E-6 656.94E-6		0.057911		- 1	(Very Slight) (Very Slight)	
	Max Tensile	GE-2	1 0.0	10.198	Hogging Hogging	656.94E-6		0.057911		- 1	(Very Slight)	
	Strain Min Radius of	GE-2	3 11.495	13.308	Hogging	270.34E-6	0.53012	0.013657	6136.7	- ((Negligible)	
	Curvature (Hogging)				-							
	Min Radius of Curvature	GE-2	2 10.198	11.495	Sagging	270.34E-6	0.86398	0.037567	-	79597. ((Negligible)	
3E-3	(Sagging)	are less than	the Settlement Tr	ough Ti-	it Sensi	tivity						
, u - J	All settlements	are less than	the Settlement Tr	ough Lim	it Sensi	tivity.						
	All settlements	are less than	the Settlement Tr	ough Lim	it Sensi	tivity.						
3E-4	Max Slope	GE-4		13.713	Hogging	462.56E-6		0.030027) (Negligible)	
	Max Settlement Max Tensile	GE-4 GE-4	3 4.9490	13.713	Hogging	462.56E-6 462.56E-6	3.8204	0.030027	27872.	- () (Negligible)) (Negligible)	
	Strain	GE-4										
	Min Radius of Curvature	GE=#	1 1.9591	3.3699	oyging	256.84E-6	0.49222	0.012396	12059.	- () (Negligible)	
	(Hogging) Min Radius of	GE-4	2 3.3699	4.9490	Sagging	256.84E-6	0.86866	0.027270	-	61129. ((Negligible)	
	Curvature (Sagging)											
H-1	Max Slope Max Settlement	DH-1 DH-1		5 22.338 I		686.15E-6 686.15E-6		0.053937			(Very Slight) (Very Slight)	
	Max Tensile Strain	DH-1 DH-1		22.338		686.15E-6	5.4765	0.053937	17557.	- 1	(Very Slight)	
	Min Radius of	DH-1	1 9.2270	10.864	Hogging	283.81E-6	0.56239	0.015519	8244.3	- ((Negligible)	
	Curvature (Hogging)											
	Min Radius of Curvature	DH-1	2 10.864	12.086	Sagging	269.68E-6	0.88204	0.037515	-	54502. ((Negligible)	
-2	(Sagging) Max Slope	DH-2	3 17.390	24.959	Sagging	262.53E-6	4.2327	0.0018839	_	28950. 0) (Negligible)	
	Max Settlement Max Tensile	DH-2 DH-2 DH-2	1 0.0	12.935	Sagging	128.92E-6 220.22E-6	5.4772	0.0016696	-	19352. () (Negligible)) (Negligible)	
	Strain											
	Min Radius of Curvature	DH-2	6 34.805	36.450	nogging	235.30E-6	U.46138	0.0072856	15435.	- () (Negligible)	
	(Hogging)	DH-2	1 0.0	12.935	Sagging	128.92E-6	5.4772	0.0016696	-	19352. ((Negligible)	
	Min Radius of				_							
	Curvature (Sagging)				it Sensi	tivity.						
DH−3	Curvature (Sagging) All settlements	are less than	the Settlement Tr	ough Lim	it Core'	tivity						
DH-3	Curvature (Sagging) All settlements All settlements All settlements	are less than are less than	the Settlement Tr	ough Lim	it Sensi	tivity. tivity.						
	Curvature (Sagging) All settlements All settlements All settlements All settlements	s are less than s are less than s are less than s are less than	the Settlement Tr the Settlement Tr the Settlement Tr the Settlement Tr	rough Lim rough Lim rough Lim rough Lim	it Sensi it Sensi it Sensi it Sensi	tivity. tivity. tivity. tivity.						
DH-3 DH-4	Curvature (Sagging) All settlements All settlements All settlements All settlements All settlements All settlements	s are less than s are less than	the Settlement Tr the Settlement Tr the Settlement Tr the Settlement Tr the Settlement Tr the Settlement Tr	cough Lim cough Lim cough Lim cough Lim cough Lim cough Lim	it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi	tivity. tivity. tivity. tivity. tivity. tivity.						
	Curvature (Sagging) All settlements All settlements All settlements All settlements All settlements All settlements All settlements All settlements	s are less than s are less than	the Settlement Tr the Settlement Tr	cough Lim cough Lim cough Lim cough Lim cough Lim cough Lim cough Lim cough Lim	it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi	tivity. tivity. tivity. tivity. tivity. tivity. tivity. tivity.						
	Curvature (Sagging) All settlements All settlements All settlements All settlements All settlements All settlements All settlements All settlements All settlements All settlements	s are less than s are less than s are less than s are less than are less than s are less than	the Settlement Tr the Settlement Tr the Settlement Tr the Settlement Tr the Settlement Tr the Settlement Tr the Settlement Tr	ough Lim	it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi it Sensi	tivity. tivity. tivity. tivity. tivity. tivity. tivity. tivity. tivity.						



Drg. Ref.

Made by Date Checked 14-Aug-2018

Sheet No.

Rev.

CIRIA intallation + excavation + Proposed Loading LT

Structure Name	Parameter	Critical Sub-Structure	Critical Segment	Start	End	Curvature	Max Slope	Max Settlement	Max Tensile Strain	Curvature	Min Radius of Curvature (Sagging)	Damage Category
	All settlements	are less than the	he Settle	ment Tr	ough Li	mit Sensit	ivity.			(5557	(5557	
		are less than th										
		are less than the					ivity.					
DH-6		DH-6				Sagging	80.883E-6		0.0			0 (Negligible)
	Max Settlement	DH-6	4	20.431	32.706	Sagging	69.175E-6	0.93543	637.40E-6	-	87133.	0 (Negligible)
1	Max Tensile	DH-6	4	20.431	32.706	Sagging	69.175E-6	0.93543	637.40E-6	-	87133.	0 (Negligible)
	Strain Min Radius of Curvature (Hogging)	DH-6	3	19.418	20.431	Hogging	69.175E-6	0.35327	383.99E-6	141170.	-	0 (Negligible)
	Min Radius of	DH-6	4	20.431	32.706	Sagging	69.175E-6	0.93543	637.40E-6	-	87133.	0 (Negligible)
	Curvature (Sagging)											
DH-7	Max Slope	DH-7	1			Sagging	275.79E-6		0.037411			0 (Negligible)
		DH-7	1			Sagging	275.79E-6		0.037411			0 (Negligible)
	Max Tensile Strain	DH-7	1			Sagging	275.79E-6		0.037411			0 (Negligible)
		DH-7	2	1.5103	3.3672	Hogging	275.79E-6	0.54358	0.012761	5807.5	-	0 (Negligible)
	Curvature (Hogging)	_										
	Min Radius of Curvature (Sagging)	DH-7	1	0.0	1.5103	Sagging	275.79E-6	0.93544	0.037411	-	69202.	0 (Negligible)
DH-8		are less than the										
		are less than t										
		are less than t										
		are less than t										
	All settlements	are less than the	he Settle	ment Tr	ough Li	mit Sensit	ivity.					

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