

The Christie NHS Foundation Trust

Christie's Hospital Tiered Car Park

Geo-Environmental Factual and Interpretative Report

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A114954-MAN-N-01 – As-Built Exploratory Hole Location Plan

163409-AFL-00-00-DR-A-20135 – Existing Site Plan (by AFL architects)

163409-AFL-00-00-DR-A-20137 – Proposed Master Plan (by AFL architects)

163409-AFL-00-00-DR-A-20022 – Proposed Section A-A & B-B (by AFL architects)

163409-AFL-00-00-DR-A-20023 – Proposed Section C-C & D-D (by AFL architects)

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1.0 EXECUTIVE SUMMARY

Current Site Status and Future Development	The site is currently utilised as a staff car park for Christie's Hospital. The car park is split into two areas separated by three blocks of key worker accommodation. Two of the three blocks of accommodation are to be demolished to enable the construction of a new split-level tiered car park structure including a basement level.
Ground Investigation	The aim of the investigation is to provide detailed information and understanding of the geo-environmental and geotechnical / land stability conditions beneath the proposed development. The investigation comprised of the following: • Ten Dynamic Sampling boreholes (BH101 – BH110) to a maximum depth of 3.00m bgl. • Rotary Core drilling follow-on at four of the Dynamic Sampling locations (BH101, BH102, BH106 & BH109) to a maximum depth of 16.60m bgl; • Gas and groundwater monitoring wells installed in six boreholes (BH101, BH102, BH104, BH105, BH107 & BH109). • Eleven California Bearing Ratio (CBR) tests (DCP1 – DCP11) by Dynamic Cone Penetrometer (DCP) method. • Full time supervision by a WYG Engineer. • Semi-quantitative analysis of Volatile Organic Compounds (VOCs) in soil samples using a Photo Ionisation Detector (PID). • Survey of exploratory locations to National Grid and Ordnance Datum. • Obtaining of samples for chemical and geotechnical laboratory testing. • Four return visits to monitor gas, vapour and groundwater levels.
Ground Conditions	The intrusive investigation identified Made Ground to a maximum depth of 1.20m bgl, underlain by Glacial Deposits to a maximum depth of 2.40m bgl which in-turn are underlain by Sandstone. Bedrock was encountered at between 33.83 and 35.14m AOD.
Ground Contamination Assessment & Waste Assessment	Localised human health soil screening exceedances for commercial end use were identified for values of pH and Lead within the Made Ground strata. Waste Acceptance Criteria (WAC) testing and HazwasteOnline (HWO) assessment of surficial soils classified 5 No. of 6 No. test samples (BH102, BH103, BH109 & BH110) as Non-Hazardous waste suitable for disposal at Inert landfill. 1 No. sample (BH106) classified as Hazardous waste suitable for disposal as Stable Non-Reactive Hazardous Waste in Non-Hazardous Landfill. Prior to disposal of surplus spoil consultation should be made with waste disposal facility operators who are to be provided with a copy of the HWO & WAC assessment (Section 8.3 and Appendix I).
Ground Gas and Vapour Monitoring	The ground gas and vapour monitoring designate the site as Characteristic Situation 1 (CS-1) in accordance with the guidance of CIRIA C665. Ground gas mitigation is not required in buildings on CS-1 sites.
Refined Contamination Risk Assessment	The risks are considered to be Low from on-site sources. The proposed development area does not pose an unacceptable risk to Human Health from ground contamination or from ground gas risk.
Geotechnical Assessment	Spread foundations bearing on the weathered Sandstone bedrock may be considered for adoption. For a nominal pad foundation of 2m x 2m bearing this stratum, an allowable bearing capacity of 500kN/m ² has been calculated based upon in-situ SPT results of 50 'N' in the upper 2m bgl.



	Alternatively, rotary bored or CFA piled foundations within the Sandstone bedrock may be adopted. Ground bearing floor slabs may be adopted at basement and ground level on natural Sand or weathered Sandstone bedrock (or Engineered fill were Made Ground, Clay or variable natural strata are present). CBR values derived from DCP testing are generally >2.5% across the site, with the exception of soils at DCP1 & DCP6. A concrete design classification of DS-1 and an ACEC class of AC-1 is recommended for both the Natural and Made Ground. Results of the Atterberg Limits testing on natural Clay samples recorded the clay as being of low to high plasticity.
Conclusions & Recommendations	The proposed basement excavation of 1.0m – 2.0m below existing ground level means contaminated strata will likely be removed and thus not pose a risk to future site users. Consultation should be made with the Civil Engineer's cut and fill groundworks design to confirm this. Appropriate working practices and PPE should be utilised during any excavation works on site. Groundwater was observed during the ground investigation within BH107 at a depth of 1.0m bgl and during the monitoring programme at BH101, BH102 & BH109 at depths varying from 1.8m to 3.5m bgl. Allowance for groundwater control during service installations and foundations and basement construction works is recommended. The results of the gas monitoring program indicate that the site is categorised as CS-1. Ground gas is not considered to present a risk to the development and the adoption of gas protection measures is not considered to be necessary. Should surficial soils in the vicinity of DCP1 & DCP6 form new pavement sub-grade, ground improvement works should be undertaken in accordance with IAN 73/06 (2009). Removal of weak soils and replacement with engineered fill to sub-grade level is recommended. For basement and ground floor slabs, a conservative CBR value of 6% may be used in design. For external paving (except in vicinity of DCP1 & DCP6) a conservative CBR value of 3.5% may be used in design. It is best practice for confirmatory CBR testing by Plate Load method to be carried out at sub-grade level during groundworks. It is recommended for confirmatory CBR testing by Plate Load method to be carried out at sub-grade level during groundworks. There is a low to medium potential risk of ground movement arising from volume change of Clay sub-soils following removal of existing trees and planting of various new trees. It is recommended that a detailed assessment of any change to on-site water demand is undertaken based upon the Landscape Architect's planting proposals. Consultation with utilities companies is recommended regarding construction easements on service runs and possible diversions.



2.0 INTRODUCTION

2.1 Instruction

WYG Environment Planning Transport Ltd (WYG) was commissioned by Mace Group Ltd on behalf of The Christie NHS Foundation Trust, to undertake a ground investigation for the proposed development of a tiered car park structure at an existing surface car park off Cotton Lane in Manchester.

The site's location is shown on Figure 1.

2.2 Objectives

The aim of the investigation is to provide information and understanding of the geo-environmental and geotechnical / land stability conditions beneath the proposed development, to refine the preliminary environmental risk assessment provided in the Phase 1 Desk Top Study by Ove Arup and Partners Limited (report ref. no. 254752-00/DS dated October 2017) and to assist in the signing off of planning condition 4a attached to the Manchester City Council (MCC) planning permission granted for planning application no. 117847/FO/2017.

2.3 Scope of Services

In order to achieve the above objectives, the following scope of works has been determined:

- A ground investigation to obtain geo-environmental and geotechnical information on ground conditions;
- Geotechnical laboratory testing of soils;
- Geochemical laboratory analyses of soils and groundwater;
- Reporting of factual information gathered;
- Tier 1 land contamination assessment and waste disposal assessment;
- A preliminary geotechnical assessment; and,
- A report combining the above information.





2.4 Proposed Development

The proposal involves the demolition of two existing key worker apartment blocks, the retention of a third apartment block, the construction of a new multi-level tiered car park structure and the remodelling of the existing surface car park areas and peripheral landscaping. The proposed car park will contain split levels (Levels 0 –6) and extends to a maximum height of approximately 11.5metres (m) at the top of the service / lift core with a basement level (Level -1) excavated to a depth ranging from 1m to 2m below ground level (bgl). The proposed development is identified on drawing 163409-AFL-00-00-DR-A-20137 – Proposed Master Plan produced by AFL architects.

2.5 Report Conditions

Attention is drawn to the report conditions included in Appendix A. WYG has referred to third party information in good faith and cannot be held responsible for the content or accuracy of the data.





3.0 SITE DETAILS

3.1 Key Details

Key details for the site are provided in Table 3.1 below.

Table 3.1 Site Details

Address	Christie's Hospital Staff Car Park, Cotton Lane, Withington, Manchester M20 4GJ
Grid Reference	385171, 392426
Site Area	1.13 hectares

3.2 Site Description

The proposed development is located within the existing surface car park for Christie's Hospital staff to the east of the main hospital complex. The car park is split into two areas divided by a row of three residential buildings (key worker apartments) two of which are to be demolished. The southern area of the car park is covered by asphalt and slopes gently downwards to the south. This area is surrounded by soft landscaping with several mature trees.

The northern area of the car park is covered by grasscrete (a cellular reinforced concrete slab where the cells are filled with topsoil and turfed over) and is generally level.

Table 3.2 Site Surrounds

Boundary	Description
North	Cotton Lane with Primary School and residential properties beyond
East	Residential properties
South	Residential properties
West	Maggie's Care Centre and the Manchester Cancer Research Centre



4.0 PRELIMINARY CONTAMINATION RISK ASSESSMENT

A Desk Top Study report for the proposed development was produced by Ove Arup and Partners Limited (Arup) in October 2017 (report ref. no: 254752-00/DS). The report was written for the whole of the site area and included a preliminary risk assessment. A summary of the findings pertinent to this investigation is presented in Table 4.1 below for information purposes only.

Table 4.1 Preliminary Risk Assessment Findings

Environmental Setting	A Groundsure report was sourced for the site by Arup who identified potentially contaminative land uses on-site (detailed below) and off-site (hospital, laundries, electricity substations, tanks, garages, police and fire stations). Two dry cleaners are located within 500m of the site with active permits and no enforcements are associated with these permits. The Christie NHS Foundation Trust is licensed for the disposal of radioactive waste and the keeping and use of radioactive materials, although these activities do not take place within the proposed development area. There are no recorded landfills within 1km of the site.
History	From c.1849 Cotton House (later Withington Hall) with associated outbuildings and glass structures was present. Around c.1975 the site was redeveloped by extension of the off-site Christies Hospital and Holt Radium Institute into the east of the proposed development boundary. Four nurses' accommodation buildings replaced Withington Hall and associated out buildings and infrastructure. A former hospital building was demolished in 2010. Three of the nurses' accommodation blocks remain to the present day, with the rest of the site being used as a car park.
Geology	Made Ground is expected across the site associated with the historical development. Superficial deposits are recorded to comprise Glacial Till Clay with bedrock comprising the Sherwood Sandstone formation.
Hydrogeology and Hydrology	Superficial Glacial Till deposits are recorded as a Secondary Undifferentiated Aquifer. The Sherwood Sandstone Group bedrock is classified as a Principal Aquifer. There are no licenced groundwater abstractions within 1.5km of site. The nearest watercourse, Shaw Brook, is located 250m north. There are no reported surface water abstractions within 2km of the site.
Mining	The Groundsure report indicated there are no historical coal, gypsum, tin or clay mining areas within 1km of the site. The site is not within a brine extraction area.
Radon	The Groundsure report indicated that the site is not within an area affected by radon and that radon protection measures are not necessary.
Preliminary Risk Assessment (PRA)	Arup identified plausible pollutant linkages that may affect the development. It was considered by Arup that during the construction phase, the risks posed by contamination could be mitigated by implementing UK best practice approach. It was advised that longer term risks to receptors should be investigated further to quantify the level of risk and identify appropriate mitigation measures (if necessary).
Conclusions and Recommendations	Based on a review of the desk-based information and the current development proposals, it was recommended by Arup that an intrusive ground investigation be undertaken to provide geotechnical data and to inform environmental risk assessments.



5.0 WYG 2019 GROUND INVESTIGATION

5.1 Site Works Undertaken

The WYG investigation works were undertaken between 18th and 27th November 2019 with follow-up gas and groundwater monitoring of exploratory hole installations between December 2019 and January 2020.

The works were undertaken in general accordance with BS 10175: Code of Practice for Site Investigations of Potentially Contaminative Sites, BS 5930, BS EN1997-2, BS EN ISO 14688/9 and BS 8576. The works comprised the following:

- Ten dynamic sampling boreholes (BH101 – BH110) to a maximum depth of 3.0m bgl with in-situ Standard Penetration Testing (SPTs);
- Rotary core drilling follow-on at four of the dynamic sampling boreholes (BH101, BH102, BH106 & BH109) to a maximum depth of 16.6m bgl with in-situ SPTs;
- Installation of six gas and groundwater monitoring wells within boreholes (BH101, BH102, BH104, BH105, BH107 & BH109);
- Eleven California Bearing Ratio (CBR) tests by Dynamic Cone Penetration (DCP) method;
- Full time supervision by a WYG Engineer to record the ground conditions and obtain geotechnical and geo-environmental samples for potential laboratory testing;
- Semi-quantitative analysis of Volatile Organic Compounds (VOCs) in soil samples using a Photo Ionisation Detector (PID);
- Survey of WYG exploratory hole locations to National Grid and Ordnance Datum; and,
- Four return visits to monitor installed wells for gas, vapour and groundwater levels.

Detailed exploratory hole logs annotated with in-situ SPT test results and photos of recovered rock core are presented in Appendix B and a summary of the encountered ground conditions is provided below in Section 6. Corrected SPT 'N60' values are presented in Appendix C. DCP test results are given in Appendix D.

An exploratory hole location plan is provided as Drawing No. A114954-MAN-N-01.



5.2 Laboratory Analysis

5.2.1 Soils Chemical Testing

Soil samples underwent the following testing at ALS Environmental Laboratory, an MCERTS/UKAS accredited laboratory in Deeside, Flintshire. The geochemical laboratory soil test results are included in Appendix E.

A summary of the geochemical soil testing undertaken is presented in Table 5.1 below.

Table 5.1 Geochemical Testing – Soils & Soil Leachate

Geochemical Test	Number of Samples Tested
Full Waste Assessment Criteria (WAC) Suite	5
pH, Asbestos screen, Fraction Organic Carbon (FOC), Free Cyanide, Water Soluble Sulphate, Arsenic, Cadmium, Chromium (Total and Hexavalent) Lead, Mercury, Nickel, Selenium, Beryllium, Water Soluble Boron, Vanadium, Copper, Zinc, (PAHs), Phenols & Total Petroleum Hydrocarbon Criteria Working Group (TPH-CWG).	15
PCB 7 Congeners	4

5.2.2 Geotechnical Laboratory Testing

Soil and rock core samples underwent the following testing at Professional Soils Laboratory Ltd, a UKAS accredited laboratory in Doncaster. The geotechnical laboratory test results are included in Appendix F.

A summary of the geotechnical testing undertaken is presented in Table 5.2 below.

Table 5.2 Geotechnical Testing

Geotechnical Test	Number of Samples Tested
Moisture Content	12
Atterberg Limits	9
Particle Density	5
Undrained Shear Strength	4
pH and Sulphate	10
Unconfined Compressive Strength (UCS)	4
Point Load	16



6.0 ENCOUNTERED GROUND CONDITIONS

A summary of the ground conditions encountered during the WYG investigation is presented below, with detailed information presented on the exploratory hole logs included in Appendix B.

6.1 Surface Cover

The proposed development footprint has a surface covering of hardstanding. The main car park comprising the majority of the site area is covered by asphalt to a maximum depth of 0.20m bgl. The smaller car park area in the north is covered by grasscrete to a maximum depth of 0.20m bgl.

6.2 Made Ground

Made Ground was encountered across the site to depths of between 0.40m bgl and 1.20m bgl. The Made Ground generally consists of Sand and Gravel with gravel including brick and concrete.

6.3 Superficial Deposits

Superficial deposits were encountered across the proposed development footprint. The deposits generally consist of Stiff slightly sandy, slightly gravelly Clay to depths of between 1.70m – 2.40m bgl. Deposits of loose to dense brown Sand were encountered overlying the clay in boreholes BH101 BH103, BH104, BH105, BH109 and BH110 to depths of between 0.80m – 1.50m bgl.

6.4 Bedrock

Bedrock was encountered at between 1.70m – 2.45m bgl (33.83m - 35.14m Above Ordnance Datum [mAOD]), respectively and consisted of reddish brown, medium grained Sandstone.

6.5 Observed Contamination

No visual or olfactory evidence of contamination was recorded during the investigation.

6.6 Groundwater

Groundwater was only observed in one borehole during the intrusive investigation; BH107 at a depth of 1.00m bgl.



6.6.1 Monitoring Well Installations

Six monitoring wells were installed in BH101, BH102, BH104, BH105, BH107 & BH109, as summarised in Table 6.1 below.

Table 6.1 Groundwater and Gas Monitoring Installations

Exploratory Hole	Response Zone Stratum	Installation Response Zone	
		m bgl	m AOD
BH101	Natural Ground: Sandstone	2.80 - 9.00	34.36 - 28.32
BH102	Natural Ground: Sandstone	3.00 - 10.00	34.24 - 27.24
BH104	Natural Ground: Sand	0.60 - 1.40	36.34 - 35.54
BH105	Natural Ground: Sand and sandy Clay	1.00 - 2.00	35.45 - 34.45
BH107	Natural Ground: Sandy gravelly Clay	1.00 - 1.80	35.10 - 34.30
BH109	Natural Ground: Sandstone	2.50 - 9.50	33.43 - 26.43

Groundwater levels were monitored on four occasions between December 2019 and January 2020.

Table 6.2 below summarises the levels monitored. Full results are presented in Appendix G.

Table 6.2 Summary of Monitored Groundwater Levels

Exploratory Hole	Monitored Groundwater Level (Range)				Comments
	m bgl		m AOD		
	From	To	From	To	
BH101	3.38	3.48	33.94	33.84	-
BH102	2.79	3.24	34.45	34.00	-
BH104	-	-	-	-	Dry
BH105	-	-	-	-	Dry
BH107	1.74	-	34.36	-	Wet at base
BH109	1.78	2.26	34.15	33.67	-

6.7 Obstructions

Obstructions encountered during the ground investigation are summarised below in Table 6.3.



Table 6.3 Summary of Below Ground Obstruction / Features

Exploratory Hole	Obstruction / Feature	Depth m bgl	Notes
BH101	Cobble	1.80	Sandstone cobble.
BH102	Medium Cobble Content	0.30 – 0.70	Cobbles of brick.
BH103	High Cobble Content	0.20 – 1.10	Cobbles of brick.
BH105	Medium Cobble Content	0.10 – 1.00	Cobbles of brick.
BH106	Medium Cobble Content	0.10 – 1.00	Cobbles of brick.
BH108	Medium Cobble Content	0.20 – 0.60	Cobbles of brick.
BH109	Medium Cobble Content	0.20 – 0.50	Cobbles of brick.



7.0 GROUND GAS RESULTS AND ASSESSMENT

7.1 Ground Gas Results

Four ground gas monitoring visits have been undertaken by WYG over a period of 1 month between 4th December 2019 and 7th January 2020. Visits have been conducted at times of both rising and falling barometric pressures.

Table 7.1 below summarises the ground gas monitoring results. The full data set is presented in Appendix G along with calibration certificates for the GA5000 gas analyser and Mini Rae 3000 Photo Ionisation Detector (PID) used for monitoring.

Concentrations of Hydrogen Sulphide were not reported above the detection limit of 1 part per million (ppm). Carbon Monoxide levels ranged from <1ppm to 1ppm.

Table 7.1 Summary of Ground Gas Results

Location	Max. Steady Methane Conc. (%)	Max. Steady Carbon Dioxide Conc. (%)	Min. Steady Oxygen conc. (%)	Max. Flow Rate (l/hr)	Max. Steady PID (ppm)	Water Level Range (m bgl)
BH101	<0.1	4.8	14.2	0.3	0.3	3.38 – 3.48
BH102	<0.1	3.4	17.9	0.1	0.4	2.79 – 3.24
BH104	<0.1	2.1	17.6	0.1	<0.1	-
BH105	<0.1	2.1	17.1	0.2	1.2	-
BH107	<0.1	1.6	11.3	0.3	0.1	1.74
BH109	<0.1	0.4	18.2	0.2	<0.1	1.78 – 2.26

7.2 Ground Gas Assessment

Ground gas results have been assessed using the CIRIA C665 document Assessing Risks posed by Hazardous Ground Gases to Buildings (2007) and BS:8485 (2015). The assessment methodology is based on both volume percentages and volume flow rate of gases. In accordance with the CIRIA and BS:8485 methodology, a conservative Gas Screening Value (GSV) has been calculated using a worst-case scenario (i.e. highest peak gas concentration combined with highest steady state flow rate). Where readings are not recorded above the instrument detection limit, the value of the instrument detection limit is used to calculate the GSV. The calculation of the GSV is as follows:



Gas Screening Value = Gas Concentration in % divided by 100 then multiplied by flow rate in litres per hour (l/hr):

$$(4.8 \text{ CO}_2 / 100) \times 0.3 \text{ l/hr} = 0.0144 \text{ l/hr CO}_2 \text{ and } (0.1\% \text{ CH}_4 / 100) \times 0.3 \text{ l/hr} = 0.0003 \text{ l/hr CH}_4$$

Based on the GSV calculated from the worst-case peak gas concentrations and highest steady state flow rates from the monitoring completed to date, the site would fall into a Characteristic Situation 1 (CS1). Accordingly, no gas protection measures are considered to be required for the proposed development.



8.0 CONTAMINATION ASSESSMENT

8.1 Assessment Methodology

8.1.1 Soil Contamination Assessment Methodology

The soil chemical results from the current WYG investigation have been screened against WYG Tier 1 screening values (TSVs) for the purpose of establishing human health risk to future construction workers and end users of a commercial development. The TSVs principally comprise CIEH/LQM S4UIs, DEFRA with Contaminated Land: In Real Environments (CL:AIRE) published Category 4 Screening Levels (C4SLs). Contaminant concentrations below CS4Ls are considered to pose an acceptably low risk to human health. In order to use benzo(a)pyrene as a surrogate marker of PAH, the profile of the genotoxic PAHs relative to benzo(a)pyrene must be calculated and compared to the 'Culp Study'.

The derivation of TSVs is an ongoing development process and as such, methodologies and input parameter values may alter as new guidance is published. This may result in temporary inconsistencies in the TSVs and regular updates as research and development work progresses.

The screening value used and its source are colour coded for the above TSV sources on the soil screening sheet provided in Appendix H. Contaminant concentrations below the TSVs are considered not to warrant further risk assessment. Concentrations of potential contaminants above the TSVs require further consideration of the potential pollutant linkages. It should be noted that exceedances of the TSV does not necessarily mean that the site requires remediation.

It is considered that at depths greater than 1m, the probability of human exposure via the direct contact pathways is significantly reduced, leaving inhalation of volatile compounds as the dominant pathway with regard to human health risks. Typically, volatile compounds only significantly affect the indoor inhalation pathway.

8.1.2 Statistical Analysis

Should exceedances of the TSV occur associated with soil samples that represent the top 1m of soil, for the proposed planning scenario, the CL:AIRE guidelines state that for each contaminant, the upper 95th percentile of the mean measured concentration (95%UCL) should be calculated and this value should be compared to the TSV.

Maximum value tests are also performed in accordance with the method outlined in Annex 1 of CLR7. The objective of these tests is to decide whether the maximum concentration observed should be treated



as an outlier or whether it can reasonably be considered to come from the same underlying population as the other samples.

Constituent non-detects are assigned a value equal to the reported analytical laboratory limit of detection, considered reasonably conservative in accordance with CLR principles or where a significant number of non-detects are reported CL:AIRE guidelines are utilised to limit over conservatism. Any identified outliers are excluded from the datasets used in calculation of the 95%UCL value.

Assessment of Total Petroleum Hydrocarbons (TPH -CWG) concentrations has been made with reference to the UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils (Science Report P5-080/TR5), Environment Agency, 2005. This calculates the combined toxicological effects of the TPH fractions by calculation of a Hazard Index, which if greater than 1 may indicate a potential risk to human health.

8.2 Soil Contamination Assessment

An assessment of the chemical results reported has been undertaken in accordance with the methodology detailed above. The soil results have been screened against published commercial screening values which are considered most appropriate for the future commercial end users and construction operatives. The Fraction of Organic Carbon (FOC) of samples tested from each exploratory hole was used to calculate the Soil Organic Matter (SOM) content. Values calculated ranged from 0.52% to 5.33% with an average of 1.85% (2.03% for Made Ground and 1.11% for Natural deposits). To this end, a conservative SOM of 1.0% has been applied.

The Culp Study was utilised for screening of the soil PAH data against benzo(a)pyrene and identified that the ratio of Dibenzo(ah)anthracene to Benzo(a)pyrene exceeded the 'Culp' study limit for four samples. This exceedance is despite the level of Benzo(a)pyrene and Dibenzo(ah)anthracene being below the limit of detection. Therefore Benzo(a)pyrene is considered a suitable surrogate marker. The 'Culp' assessment is included in Appendix H.

The TPH Hazard Index (HI) was calculated for all samples. No samples were identified as >1 and so do not indicate a potential risk to human health.

In total six soil screening exceedances were noted. These are summarised in Table 8.1 below.

**Table 8.1 Summary of Soil Screening Exceedances (Commercial)**

Determinand	TSV (mg / kg)	Total No. of Tests	Conc. Range (mg / kg)	No. Elevated Above TSV	Location of Exceedance
pH	>5 <9	15	6.75–11.1	5	BH104 at 0.20m bgl (9.15) BH106 at 0.20m bgl (9.23) BH108 at 0.20m bgl (11.1) BH109 at 0.40m bgl (10.8) BH110 at 0.20m bgl (9.21)
Lead	2300	15	12.1–35400	1	BH107 at 0.70m bgl (35400mg/kg)

The chemical analysis results and Tier 1 Screening Values and assessment are included in Appendix H. No traces of asbestos were identified in any of the samples tested.

8.3 Waste Assessment

8.3.1 HazWasteOnline & WAC Results

HazWasteOnline™ (HWO) is a web-based software for classifying waste either as hazardous or non-hazardous material for disposal purposes. An HWO assessment has been undertaken for five samples and the report produced by HWO is enclosed in Appendix I.

Waste Acceptance Criteria (WAC) is a soil chemical analysis suite (based on the physical and chemical reactivity of the soil waste material) which is used to determine the landfill category of soils for disposal.

The HWO & WAC assessment is summarised in Table 8.2 below.

Table 8.2 Summary of HWO and WAC Results

Location	Depth (mbgl)	HWO Assessment	WAC Assessment	Comments
BH102	0.40	Non Hazardous Waste	Inert	-
BH103	0.60	Non Hazardous Waste	Inert	-
BH106	0.20	Hazardous Waste*	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill*	Classified as Hazardous in HWO due to exceedance of TPH. Slight exceedances for Mineral Oil (504mg/kg) and Antimony (0.154mg/kg). Mineral Oil is considered marginal and is unlikely to be flammable since soils will be damp within the ground.



Location	Depth (mbgl)	HWO Assessment	WAC Assessment	Comments
BH109	0.70	Non Hazardous Waste	Inert	-
BH110	0.50	Non Hazardous Waste	Inert	-

*To be confirmed with local landfill operator.

All assessments and chemical analysis data should be sent to the receiving landfill site for confirmation of acceptance of the material category. Following confirmation from the landfill operator/s, spoil generated for off-site disposal should be stockpiled separately by its landfill category.

8.4 Discussion of Results

Elevated pH levels were encountered across the site in the Made Ground deposits at depths of 0.20m – 0.40m bgl. pH levels >9 are discussed in Section 10 in relation to determination of in-ground concrete classification. A hotspot of Lead was recorded at BH107 within the Made Ground deposits at a depth of 0.70m bgl. This level of Lead has the potential to present a risk to human health.



9.0 REFINED CONTAMINATION RISK ASSESSMENT

The findings of the preliminary risk assessment by Arup have been built on to refine the contamination risk assessment. It should be noted that no specific new sources of contamination were identified during the investigation works.

9.1 On-Site Sources

On-site sources of contamination include those listed below:

- Made Ground – Contamination hotspot of elevated Lead concentration at BH107.

9.2 Off-Site Sources

Based on the available information, it is not considered that significant off-site potential hazard sources are present.

9.3 Contamination Pathways

Potential contamination pathways which may be present for the construction of the proposed development and its commercial end-use are listed below:

- Dermal contact;
- Inhalation of vapours or dusts;
- Ingestion of soil and dusts;
- Leaching to surface run-off/drainage;
- Leaching to groundwater; and,
- Lateral and vertical migration of groundwater.

9.4 Contamination Receptors

Receptors that may be affected by potential contamination and ground gas are:

- Future Site Users;



- Construction & Maintenance workers;
- Principal Aquifer (Sandstone); and,
- Secondary Undifferentiated Aquifer (Superficial);

9.5 Ground Contamination Risk Assessment

By considering the sources, pathways and receptors, a refined assessment of the environmental risk is made with reference to the significance and degree of the risk. This assessment is based on consideration of whether the source contamination can reach a receptor and hence whether it is of major or minor significance.

The risk assessment has been carried out by assessing the severity of the potential consequence, the sensitivity of the target and the likelihood of occurrence, based on the categories given below (Tables 9.1 to 9.3). A summary of the refined risk assessment of contaminant sources is given in Table 9.4.

Table 9.1: Potential Hazard Severity Definition

Category	Definition
Severe	Acute risks to human health, catastrophic damage to buildings/property, major pollution of controlled waters
Medium	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species.
Mild	Pollution of non-sensitive waters, significant damage to buildings or structures
Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non-sensitive ecosystems or species, minor damage to buildings or structures

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given below.

Table 9.2: Probability of Risk Definition

Category	Definition
High likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term
Low likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so



Category	Definition
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard.

Table 9.3: Level of Risk for Potential Hazard Definition

		Potential Severity			
		Severe	Medium	Mild	Minor
Probability of Risk	High Likelihood	High	High	Moderate	Low/ Moderate
	Likely	High	Moderate	Low/Moderate	Low
	Low Likelihood	Moderate	Low/Moderate	Low	Low
	Unlikely	Low/Moderate	Low	Low	Low

9.6 Summary of Refined Risk Assessment

The refined risk assessment is based on the currently notified development proposals.



Table 9.4 - Refined Contamination Risk Assessment

On-Site Sources						
Source	Pathway	Receptor	Refined Risk Assessment			Justification
			Severity	Probability	Risk	
Made Ground underlying the development site (Elevated Lead concentration at BH107)	Dermal contact, ingestion and/or inhalation of vapours or dusts	Human Health - Future Site Users (Commercial)	Medium	Unlikely	Low	Made Ground containing contaminants potentially harmful to human health has been identified during the ground investigation (elevated Lead levels in BH107), the basement level of the proposed development will mean that this strata is likely to be removed and thus not pose a risk to future site users. The proposed development will comprise predominately of hardstanding which will restrict contamination reaching this receptor.
		Human Health - Construction & Maintenance Workers equipped with PPE	Medium	Likely	Low	There is a risk of construction workers encountering soils potentially harmful to human health (elevated Lead levels in BH107). This risk rating assumes good hygiene practices, working practices and the use of appropriate PPE to mitigate the risk posed by such soils.
	Leaching to groundwater, drainage and lateral / vertical migration.	Secondary A (Bedrock) Aquifer	Mild	Unlikely	Low	Groundwater was encountered in the bedrock during the groundwater monitoring period in boreholes BH101, BH102 & BH109 at depths of between 1.78m and 3.48m bgl. Limited contamination was encountered during the investigation and overlying Clay deposits and the presence of hardstanding across the majority of the site are likely to limit the risk of any contaminants migrating vertically down to the Aquifer.
		Secondary Undifferentiated (Superficial) Aquifer	Mild	Unlikely	Low	Groundwater was not encountered in the superficial deposits during the groundwater monitoring period. This is a low sensitivity aquifer and the presence of hardstanding across the majority of the site will limit the risk of contaminants reaching this receptor.



10.0 PRELIMINARY GEOTECHNICAL ASSESSMENT

10.1 Proposed Development

It is understood that the tiered car park structure will be of steel frame construction with pre-cast concrete units forming the service / lift cores, ramps etc. The car park elevations will be screened by cladding panels, facing brick and a steel wire green wall system. The car park is arranged in a split level structure up to 6 levels high and features a basement level running along the east. See AFL Architects' sections Drawing No. 163409-AFL-00-00-DR-A-20022 & 163409-AFL-00-00-DR-A-20023 for details.

10.2 Summarised Ground Conditions

Ground conditions within the vicinity of the proposed tiered car park footprint can be summarised as Asphalt surface cover to 0.2m bgl, granular Made Ground soils to depths ranging from 0.4m – 1.2m bgl, with deposits of natural Sand in select locations (BH101, BH103, BH104, BH105, BH109 & BH110) to depths ranging from 0.8m – 1.5m bgl and firm to stiff Clay at all locations (either directly underlying the Made Ground or below the Sand) to depths ranging from 1.7m – 2.4m bgl. The drift soils were underlain by very weak varying to extremely weak Sandstone bedrock proven to a maximum depth of 16.6m bgl. Groundwater was observed in BH107 at a depth of 1.0m bgl during site works and at depths ranging from 1.7m – 3.4m bgl at BH101, BH102, BH107 & BH109 during the monitoring programme. Installations at BH104 & BH105 remained dry throughout the monitoring programme.

10.3 Geotechnical Parameters

The results of Atterberg Limit tests carried out on disturbed samples of natural Clay are given in Table 10.1 below:

Table 10.1 Plasticity of Clays

Exploratory Hole	Depth (m bgl)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Modified Plasticity Index (%)
BH102	1.20	34	17	17	16
BH103	1.60	32	16	16	14
BH104	1.60	37	18	19	18
BH105	1.60	28	14	14	13
BH106	1.20-2.00	-	NP*	-	-
BH107	1.20	-	NP*	-	-
BH108	1.50	45	21	24	23
BH109	1.70	52	23	29	28

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Exploratory Hole	Depth (m bgl)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Modified Plasticity Index (%)
BH110	1.50	36	18	18	17

*Non-plastic

The results of unconsolidated undrained triaxial shear strength tests carried out on undisturbed samples of natural Clay are given in Table 10.2 below:

Table 10.2 Undrained Shear Strength of Clays

Exploratory Hole	Depth (m bgl)	Undrained Shear Strength (kPa)
BH103	2.00 – 2.45	16 – 35
BH107	1.20 – 1.65	41 – 66
BH108	1.20 – 1.65	31 – 64
BH109	1.20 – 1.65	29 – 64

Unconfined compressive strength (UCS) tests were undertaken on a number of suitable specimens selected from the rock core sample recovery. Table 10.3 below summarises the test results.

Table 10.3 UCS Test Results

Exploratory Hole	Depth (m bgl)	Water Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	UCS (MPa)
BH102	9.93-10.14	11	2.26	2.04	7.5
BH102	12.13-13.35	11	2.33	2.10	3.8
BH102	13.50-13.73	12	2.13	1.90	4.6
BH109	7.50-8.00	19	2.13	1.80	0.6

Point load testing was undertaken on a number of suitable specimens selected from the rock core sample recovery. Table 10.4 below summarises the test results and provides a correlation between these results and UCS, using the following relationship:

$$\text{UCS (MPa)} = 24 \times \text{axial point load strength, } I_{S50} \text{ (Broch \& Franklin, 1974)}$$

Table 10.4 Point Load Test Results

Exploratory Hole	Depth (m bgl)	Diametral I_{S50} (MPa)	Axial I_{S50} (MPa)	Equivalent UCS (MPa)
BH101	9.45	-	0.05	1.2
BH101	15.35	-	0.21	5.0
BH101	15.50	-	0.24	5.8
BH102	7.27	-	0.05	1.2

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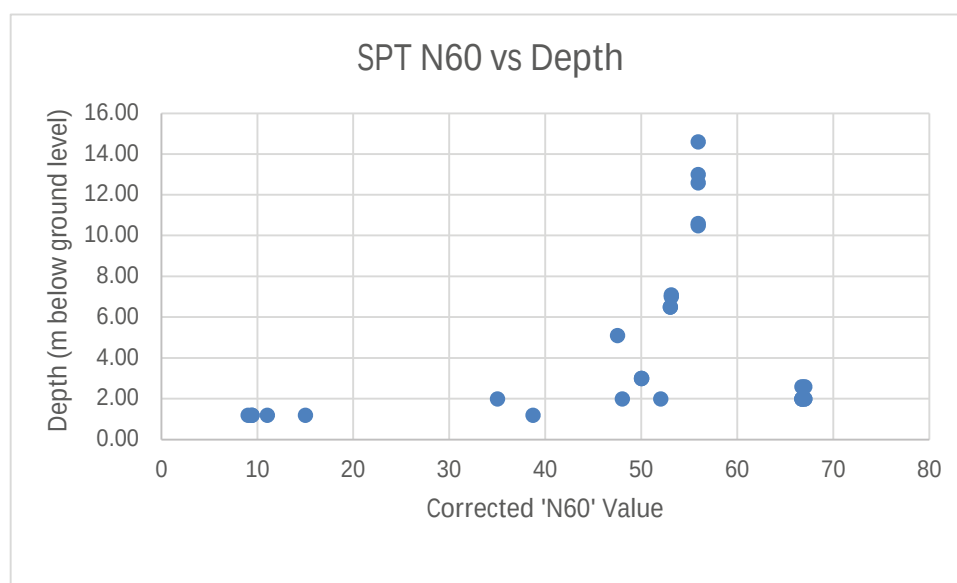
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Exploratory Hole	Depth (m bgl)	Diametral I_{s50} (MPa)	Axial I_{s50} (MPa)	Equivalent UCS (MPa)
BH102	7.54	-	0.07	1.7
BH102	7.86	-	0.04	1.0
BH102	8.76	-	0.17	4.1
BH102	9.12	-	0.16	3.8
BH102	10.15	-	0.14	3.4
BH102	10.69	-	0.15	3.6
BH102	11.78	-	0.20	4.8
BH102	12.86	-	0.11	2.6
BH106	5.11	-	0.16	3.8
BH106	9.34	-	0.32	7.7
BH106	10.37	-	0.06	1.4
BH109	9.40	-	0.07	1.7

'N60' values are provided in Appendix D along with the SPT hammer certificate. Corrected 'N' values for all SPT tests undertaken within the boreholes are charted over the test depth in Graph 10.1 below.

Graph 10.1 SPT N60 Values over Depth



10.4 Geotechnical Risk

Results of the Atterberg Limits testing on natural Clay samples classified the clay as being of low to high plasticity. The Modified Plasticity Indices ranged from 13% - 28% which is characterised as being of low to medium volume change potential in accordance with NHBC Standards Part 4 (2019). The



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proposed development layout shows that some existing trees will be removed, and various new trees will be planted, which may change water demand at the site. Therefore, there is a potential for ground movement induced by shrinkage / swelling of Clay to occur. Depending on the depth and lateral extents of the excavation for the proposed basement level, Clay may be removed from below a significant portion of the building footprint thus mitigating the risk. However, a risk of ground movement may still be present in Clay underlying parts of the footprint and the surrounding surface car parking.

Various service runs have been identified to run through the development site and the required construction easement is unknown. Depths of service ducts are unknown but may potentially clash with the proposed basement construction.

10.5 Foundations

The proposed column loadings for the tiered car park structure have not been advised to WYG. However, it is considered that the Clay deposits below the Made Ground are unlikely to be suitable to support the foundations for a typically loaded new car park structure. Therefore, it is recommended that the building is founded within the Sandstone bedrock encountered at depths ranging from 1.7m – 2.4m bgl and proven to at least 16.6m bgl. Consideration may be given to the adoption of shallow spread foundations e.g. pads at structural column undersides. Dig depth from existing ground level (varying from approx. 36m – 37maOD south to north) to proposed basement level (35.056maOD 'Level -1') is between 1m and 2m, with the weathered Sandstone either within this dig depth or requiring a short additional excavation. The upper metres of the Sandstone have been weathered to a very dense Sand and are likely to be of reasonable excavatability. Difficulty of excavation is likely to increase with depth as the degree of weathering decreases.

Should pad foundations be founded on the weathered Sandstone/very dense sand (SPT 'N' = 50) at the underside of the basement floor level, an allowable bearing capacity of 500kN/m² has been calculated based on a nominal 2m x 2m square pad foundation with settlement no greater than 25mm and factor of safety (FOS) = 3.

If there are concerns about feasibility of Sandstone excavations and/or the cost/practicality of required pad foundation sizes, an alternative option is the adoption of rotary bored or continuous flight auger (CFA) piles within the Sandstone bedrock. Piled foundations must be designed by specialist contractors in isolation and in groups, as appropriate to their layout design.



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10.6 Floor Slabs

Ground bearing floor slabs may be adopted at basement level, the underside of which are likely to bear on weathered Sandstone bedrock. Floor slabs at ground level may be ground bearing if the underside is within natural medium dense Sand. Where the ground level slab is within Made Ground soils, Clay or laterally spans Sand and Clay strata, placement on engineered fill is recommended. Surplus natural Sand from bulk excavations may be considered for re-use as engineered fill subject to placement and thorough compaction in layers. Alternatively, imported granular fill (i.e. not Specification for Highway Works 'Series 600: Earthworks' Class 2 cohesive materials) may be placed in compacted layers to slab underside level.

DCP test results within the proposed tiered car park footprint may be used by the Client's Engineer to assist in design of the basement and ground level floor slabs. DCP test data is summarised in Table 10.5 below, with those that fall within the basement and ground floor development areas based upon the AFL Architects Drawing No. 163409-AFL-00-00-DR-A-20022 Proposed Section A-A & B-B.

Table 10.5 DCP Results within Tiered Car Park Footprint

Structural Element	Test Location	Layer Depth (m bgl)	CBR (%)
Basement Slab	DCP4	0.065 – 0.303	5.1
		0.303 – 0.460	6.2
		0.460 – 0.544	23.9
		0.544 – 0.748	51.1
		0.748 – 0.915	15.4
	DCP8	0.135 – 0.203	15.1
		0.203 – 0.240	78.0
		0.240 – 0.247	38.6
		0.247 – 0.252	327.9
Ground Floor Slab	DCP3	0.142 – 0.200	13.2
		0.200 – 0.367	37.3
		0.367 – 0.809	6.7
	DCP5	0.150 – 0.196	11.0
		0.196 – 0.216	84.6
		0.216 – 0.403	46.7
		0.403 – 0.573	44.9
		0.573 – 0.690	27.2
		0.690 – 0.694	463.6
	DCP7	0.149 – 0.206	8.8
		0.206 – 0.429	41.2
		0.429 – 0.446	86.9
		0.446 – 0.455	177.9



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For both slabs, a conservative CBR of 6% may be regarded as a minimum value for use in design. Higher values may be feasible depending on the designed sub-grade elevation. It is recommended to carry out CBR tests by Plate Load method during groundworks to confirm the DCP values used in design.

For both basement and ground level slabs, reduced level excavations must be inspected by a qualified Engineer to confirm whether the anticipated ground conditions are present and to ascertain if placement of engineered fill is required. All sub-grades should be rigorously prepared by proof rolling before being inspected by a qualified Engineer. Any soft spots identified by inspection should be grubbed out, backfilled and compacted.

10.7 Pavements

The proposed development layout shows that existing surface car parking surrounding the new tiered car park structure will be remodelled, with some parking areas retained, new parking areas created and other parking areas becoming soft landscaping. Finished levels of the surface car parking were not made available at the time of writing but it is assumed they will be similar to the current ground level. As such, DCP testing was carried out with a 1m long rod at all 11 locations (DCP1 – DCP11).

DCP test results with calculated CBR values are presented in Appendix D.

IAN 73/06 (2009) states that sub-grades with a low CBR value (defined as <2.5%) are considered unsuitable to support pavement foundations and must therefore be permanently improved. Generally, CBR results across the site were >2.5% with the exception of the following discrete layers:

Table 10.6 DCP Results <2.5 % CBR

Test Location	Layer Depth (m bgl)	CBR (%)
DCP1	0.083 – 0.210	1.8
DCP6	0.195 – 0.595	2.3

DCP1 was carried out on existing soft landscaping in the north-west of the development area. DCP6 was carried out on existing soft landscaping in the east. If the new pavement subgrades within these areas fall within the above-noted depths, ground improvement works are recommended. The improvement options given within IAN 73/06 (2009) are as follows:

- Removal of existing sub-soils (typically 0.5m – 1m thickness removed) and replacement with engineered fill;
- Soil treatment e.g. lime stabilisation or equivalent; and,

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- Incorporation of geosynthetic material into the pavement foundation e.g. geogrids.

Given the small extent of the proposed new asphalt pavement areas around DCP 1 and new grasscrete pavement around DCP6, the recommended option is removal of the weak soils and their replacement with engineered fill up to subgrade level. The sub-grade should be subject to rigorous preparation e.g. removal of any in-ground obstructions at the reduced level, thorough compaction at the reduced level under supervision, a walkover survey to identify any spots that are soft underfoot and the grubbing out and replacement of soft spots with engineered fill.

At external locations where the CBR at sub-grade level is $>2.5\%$ (not in vicinity of DCP1 & DCP6) a conservative CBR of 3.5% may be regarded as a minimum value for use in design. Higher values may be feasible depending on the designed sub-grade elevation. It is recommended to carry out CBR tests by Plate Load method during groundworks to confirm the DCP values used in design.

10.8 Excavations and Groundwater

In the observed ground conditions, relatively shallow excavations may be undertaken by conventional hydraulic excavators. Excavations in excess of 1.2m bgl will require side support or should be formed with sides sloped back to a safe angle. Bulk excavations at shallow depth within Made Ground, natural Sand and Clay deposits and the most weathered Sandstone bedrock can proceed with mechanical excavators using bucket attachments. Breaker or auger attachments may be required for deeper excavations within the Sandstone bedrock e.g. for deep service trenches.

Groundwater was observed during drilling at only one of 10 No. exploratory hole positions, BH107, at a depth of 1.0m bgl. During the monitoring programme, groundwater was encountered at 3 No. of 6 No. standpipe installations (BH101, BH102 & BH109) at depths varying from 1.8m bgl to 3.5m bgl. BH107 installation was found to be wet at its base of 1.74m bgl. It is considered that the position of the water table is likely to vary seasonally. Provision should be made by contractors for groundwater control when forming temporary excavations for basement / foundation construction and service installations.

10.9 Sub-Surface Concrete

The results of pH and Sulphate analyses on soil samples have been assessed to enable buried concrete specification, as summarised in Table 10.6:



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Table 10.6 Sulphate and pH concentrations - Soil

Stratum	No. of Tests	pH	Characteristic pH	Sulphate (mg/l)	Characteristic Sulphate Value (mg/l)
Made Ground	17	6.75 - 11.1	7.25*	8.1 – 140	110***
Natural	8	6.3 - 7.9	6.6*	30 – 110	100**

*mean of the lowest 20% of results

**mean of highest two results rounded to nearest 100mg/l

***mean of highest 20% of results rounded to nearest 100mg/l

In accordance with BRE Special Digest 1:2005 3rd edition with amendments (2017), the above results indicate a design classification of DS-1 and an ACEC class of AC-1 for both the Natural and Made Ground.



11.0 CONCLUSIONS & RECOMMENDATIONS

11.1 Land Contamination

Localised areas of contamination were encountered during the intrusive investigation. Namely elevated pH values in the Made Ground strata in BH104, BH106, BH108, BH109 & BH110 and elevated Lead concentrations in the Made Ground strata in BH107. The proposed basement excavation of 1.0m – 2.0m below existing ground level means the strata will likely be removed and thus not pose a risk to future site users. Consultation should be made with the Civil Engineer's cut and fill groundworks design to confirm this. Appropriate working practices and PPE should be utilised during any excavation works on site.

Surplus spoil generated by excavations should be disposed of following consultation with waste disposal facility operators who are to be provided with a copy of the HWO & WAC assessment (Section 8.3 and Appendix I). The assessment classified 5 No. of 6 No. test samples (BH102, BH103, BH109 & BH110) as Non-Hazardous waste suitable for disposal at Inert landfill. 1 No. sample (BH106) classified as Hazardous waste suitable for disposal as Stable Non-Reactive Hazardous Waste in Non-Hazardous Landfill.

The results of the gas monitoring program indicate that the site is categorised as CS-1. Ground gas is not considered to present a risk to the development and the adoption of gas protection measures is not considered to be necessary.

11.2 Geotechnical

Spread foundations bearing on the weathered Sandstone bedrock may be considered for adoption. For a nominal pad foundation of 2m x 2m bearing this stratum, an allowable bearing capacity of 500kN/m² has been calculated based upon in-situ SPT results of 50 'N' in the upper 2m bgl. Alternatively, rotary bored or CFA piled foundations within the Sandstone bedrock may be adopted.

Ground bearing floor slabs may be adopted at both ground level (Level 0) and basement level (Level -1) on the natural Sand sub-soils or the weathered Sandstone bedrock. Where Made Ground, Clay or laterally varying natural strata are present at the proposed slab underside level, it is recommended that floor slabs bear on engineered fill. Surplus natural Sand from bulk excavations or imported granular fill may be considered for re-use as engineered fill subject to placement and thorough compaction in layers.



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DCP results within the tiered car park footprint may be used to assist the Engineer in floor slab design.

Groundwater was observed during the ground investigation within BH107 only, at a depth of 1.0m bgl. During the monitoring programme, groundwater was encountered at 3 No. of 6 No. standpipe installations (BH101, BH102 & BH109) at depths varying from 1.8m to 3.5m bgl. Allowance for groundwater control during service installations and foundations and basement construction works is recommended.

CBR values derived from DCP testing are generally $>2.5\%$ and therefore do not require ground improvement in accordance with IAN 73/06 (2009). However, 2 No. DCP test locations in the north-west of site (DCP1) and east (DCP6) had CBR values $<2.5\%$ within the upper 0.2m bgl and 0.6m bgl, respectively. Should surficial soils in these areas form new pavement sub-grade, it is recommended that ground improvement works be undertaken in accordance with IAN 73/06 (2009). Given the relatively small areas of new surface parking, the recommended option is removal of weak soils and replacement with compacted engineered fill to sub-grade level. For basement and ground floor slabs, a conservative CBR value of 6% may be used in design. For external paving (except in vicinity of DCP1 & DCP6) a conservative CBR value of 3.5% may be used in design. It is recommended for confirmatory CBR testing by Plate Load method to be carried out at sub-grade level during groundworks.

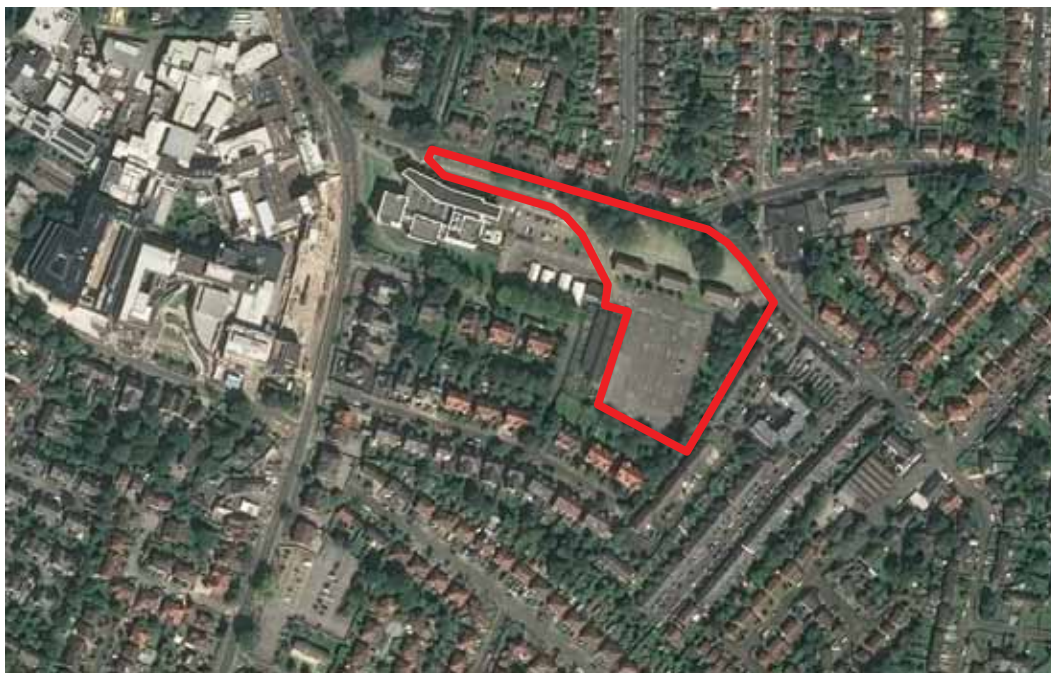
Soil chemical analyses data was assessed in accordance with BRE Special Digest 1:2005 3rd edition with amendments (2017) resulting in a design classification of DS-1 and an ACEC class of AC-1 for buried concrete in both natural soils and Made Ground.

There is a low to medium potential risk of ground movement arising from volume change of Clay sub-soils following removal of existing trees and planting of various new trees. It is recommended that a detailed assessment of any change to on-site water demand is undertaken based upon the Landscape Architect's planting proposals.

Consultation with utilities companies is recommended regarding construction easements on existing service runs known to cross the proposed development area including possible diversions where necessary.



Drawings



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KEY

Site Boundary



Approximate Grid Ref: 385171, 392426. Approximate Site Area: 1.13 Ha.

Quay West at MediaCity UK
Trafford Wharf Road
Salford Quays
Manchester M17 1HH

Tel: 0161 872 3223
Fax: 0161 872 3192
E-mail enquiries @wyg.com

Environmental Consultancy
Ground Technologies & Investigation



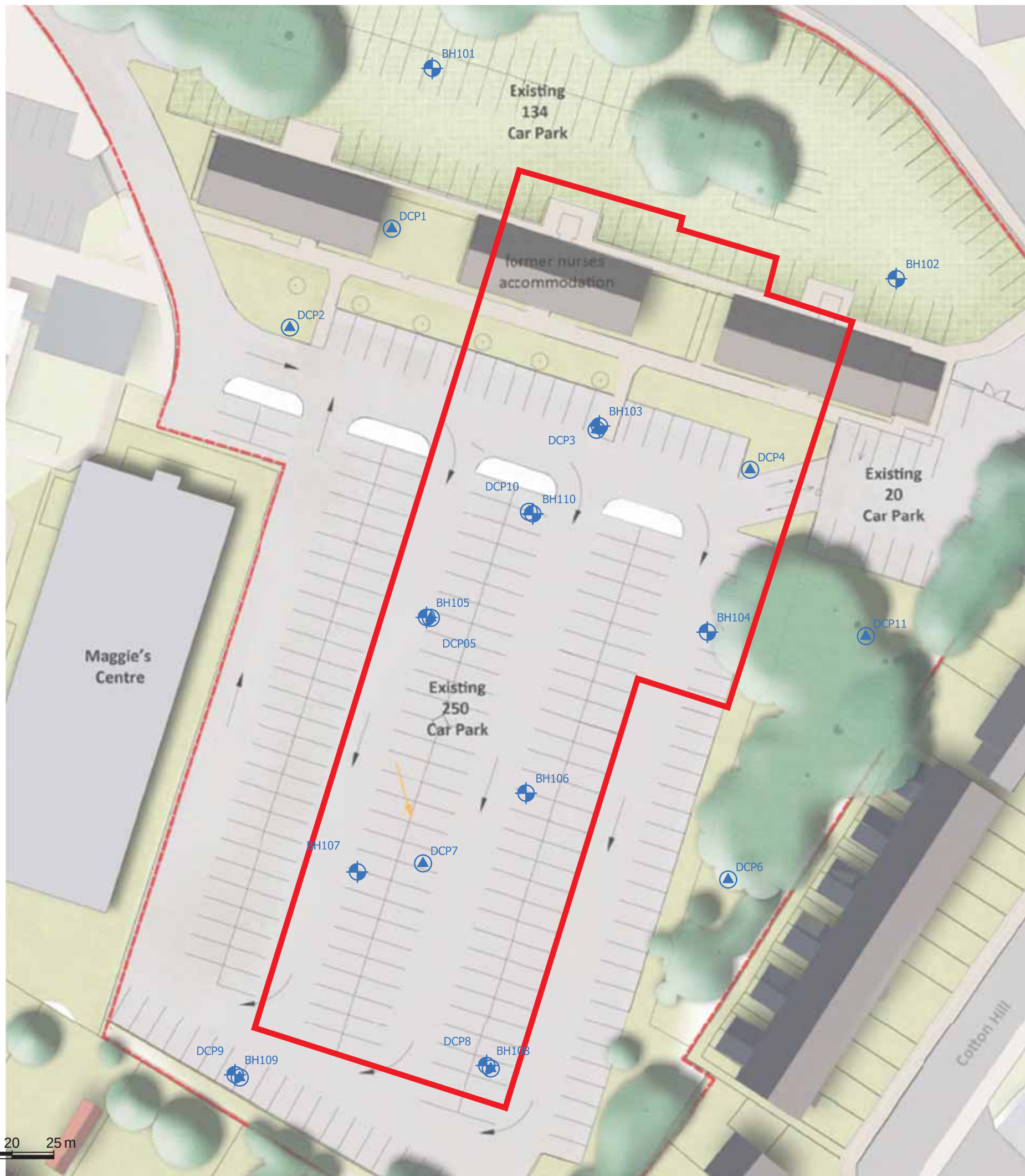
Project: Christies Hospital Tiered Car Park,
Manchester

Client: The Christie NHS Foundation Trust

Figure 1 – Site Location Plan

Project No.: A114954

Date: January 2020



0 5 10 15 20 25 m
SCALE 1:500

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND
REPORT ANY OMISSIONS OR ERRORS

KEY

-  PROPOSED BUILDING LOCATION
-  BOREHOLE
-  DYNAMIC CONE PENETROMETER

REV	DESCRIPTION	BY	CHK	APP	DATE
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Client:
THE CHRISTIES NHS FOUNDATION TRUST

QUAY WEST at MediaCityUK
TRAFFORD WHARF ROAD
TRAFFORD PARK
MANCHESTER
M17 1HH

TEL: +44 (0)161 872 3223
e-mail: manchester@wyg.com



Project: A114954
CHRISTIES HOSPITAL TIERED CAR PARK

Drawing Title:
AS BUILT EXPLORATORY HOLE LOCATION PLAN

Scale @	A3	Drawn	Date	Checked	Date	Approved	Date
1:500		CM	17.01.20	GR	22.01.20	RAJ	22.01.20
Project No.	Office	Type	Drawing No.	Revision			
A114954	MAN	N	01				

NOTES

All dimensions and levels to be checked on site

Any discrepancies are to be reported to the Architect before any work commences

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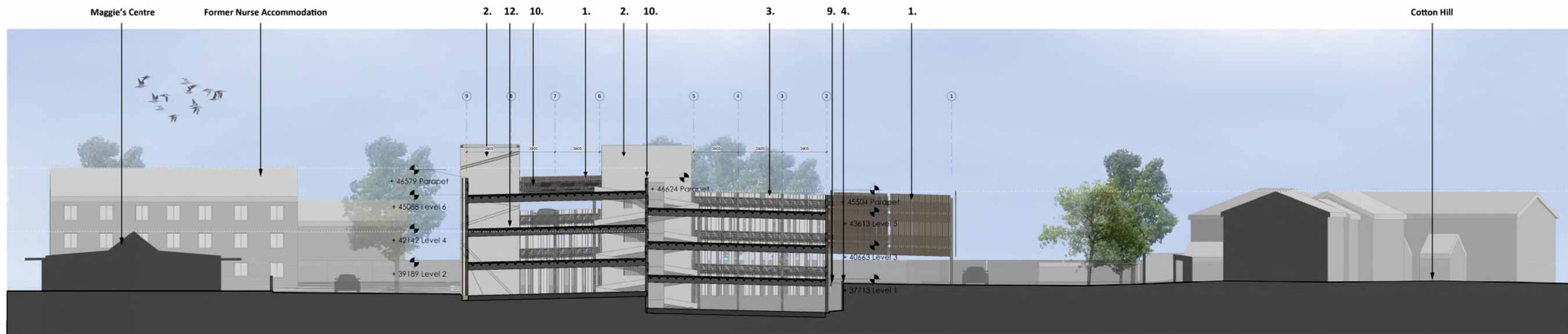
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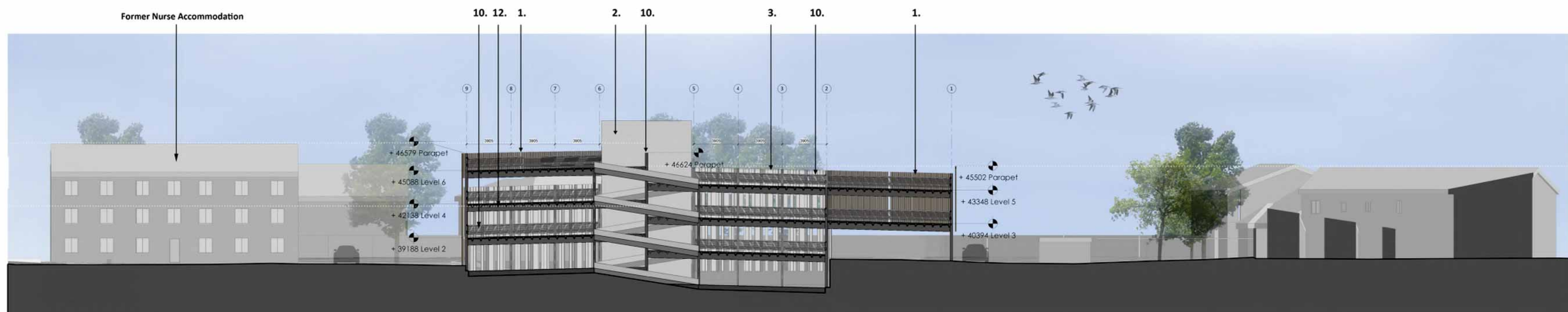
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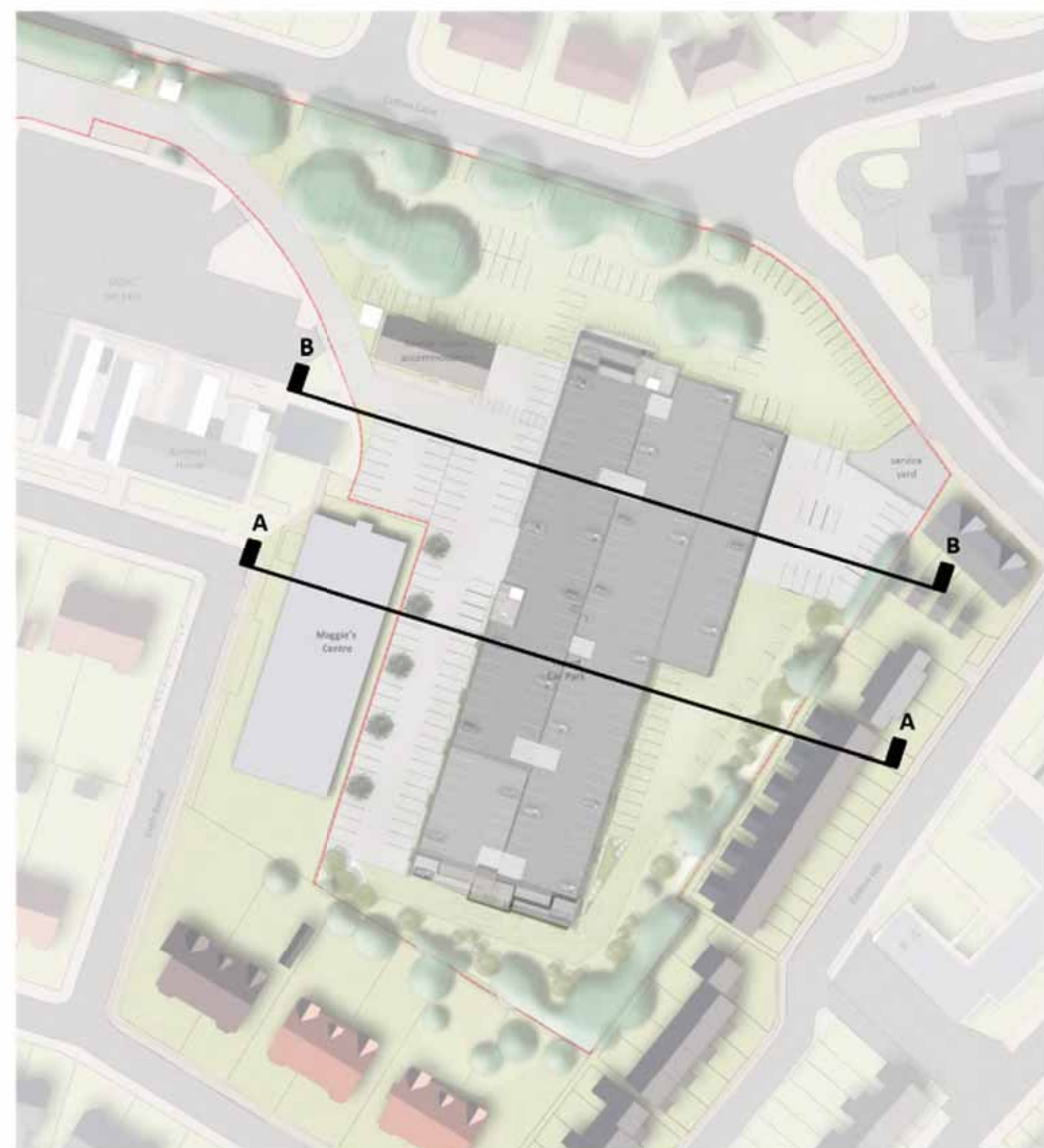
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Proposed Section: A-A @ 1:200



Proposed Section: B-B @ 1:200



Location Plan @ Not to Scale

Material Finish Legend

1. Timber cladding: NORclad European redwood, Grade A. 75mm x 80mm at various centres. Upper Floors 75mm centres, Lower Floors:300mm centres. Refer to NBS L10/610A
2. White Metal Cladding Panels: Optima TFC Rainscreen System, Polyester Powder Coated, White. Installed in a random configuration. Refer to NBS H92/120A
3. White Metal Cladding Panels: Optima TFC Rainscreen System, Polyester Powder Coated, White. Installed in a vertical configuration. Refer to NBS H92/120A
4. Facing Brickwork: Wienerberger, Pagus Grey/ Black Clay Brick with Parex Historic Mortar, Light Grey. Refer to NBS F10/110A
5. Timber Cladding (to Stair & Lift Core): NORclad European redwood, Grade A, 75x50mm, at 75mm centres. Fixed batons to solid substates. Refer to NBS L10/610B
6. Stainless Steel Wire System for vines and flowering plants to grow up: Jakob rope & rod greening system. Refer to NBS L10/650A. Refer to landscaping document for further details.
7. External Stainless Steel Doorset: Galvanised Steel with a primed finish, ral 7036 Platinum grey. Refer to NBS L20/480A
8. Temporary Boarding, whilst the vines grow up the vertical steel wires: Rockpanel RockcladDurable board, Standard Finish, Colour TBC. Refer to NBS H92/120B
9. Mesh System: Steelway Open Mesh Flooring, Diamond Pattern. Refer to NBS Q41/130A
10. Vehicular Crash Barrier: Berry Systems, System 3 Untensioned Steel Bars anchored to structural steel columns of car park Q41/140A
11. Roof Finish: Sika Sarnafil, Colour- Lead Grey. Refer to NBS J42/110B
12. Floor Finish: Sika Resin Flooring. Refer to NBS M12/110(A, B, C, D)

General Notes:

This drawing is to be read in conjunction with the following drawings and information:

- Floor Plans:
 163409-AFL-00-00-DR-A-20000,
 163409-AFL-00-00-DR-A-20001,
 163409-AFL-00-00-DR-A-20002,
 163409-AFL-00-00-DR-A-20003
 163409-AFL-00-00-DR-A-20119
 163409-AFL-00-00-DR-A-20138

- Elevations:
 163409-AFL-00-00-DR-A-20010,
 163409-AFL-00-00-DR-A-20011,
 163409-AFL-00-00-DR-A-20116,

- Sections:
 163409-AFL-00-00-DR-A-20022,
 163409-AFL-00-00-DR-A-20023,

- NBS Specification

- All relevant structural engineers information.

- All relevant M&E engineers information.

P 5	29.03.19	SEH	Issued for Tender
P 4	02.01.18	SEH	PLANNING ISSUE
P 3	04.09.17	SEH	PLANNING ISSUE
P 2	18.08.17	SEH	Issued for Planning Package
P 1	31.07.17	SEH	Issued for sign off

rev no.	rev date	rev by	description
---------	----------	--------	-------------

project

P22 Tiered Car Park

location

The Christie

Employer

The Christie

client

The Christie

AFL Architects
 1st Floor
 St Georges House
 55 Peter Street
 Manchester M2 3NQ

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 e: mail@afl-uk.com

twitter.com/AFLArchitects

key plan

AFL
 architects

drawing title

Proposed Section A-A & B-B

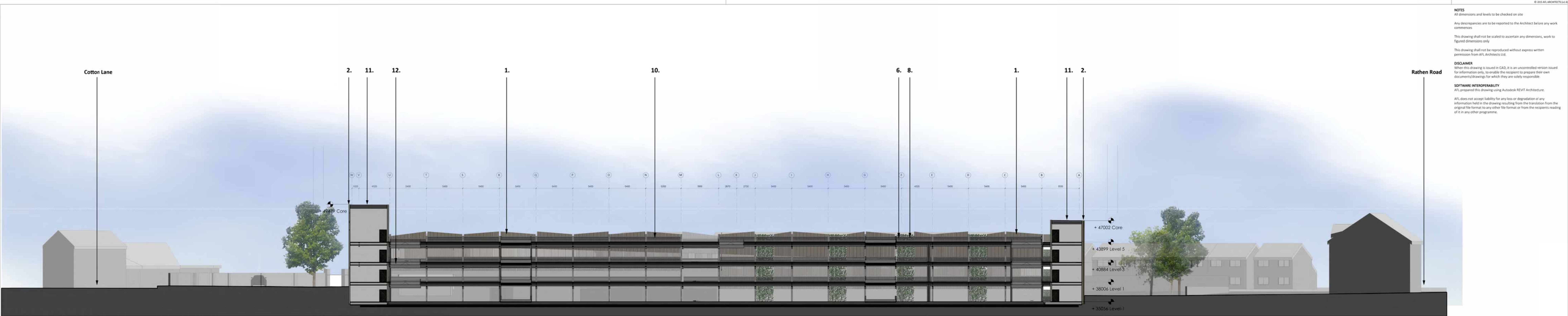
AFL job number scale @ A1 drawn SEH checked GR

163409 1: 200 rev date 29.03.19

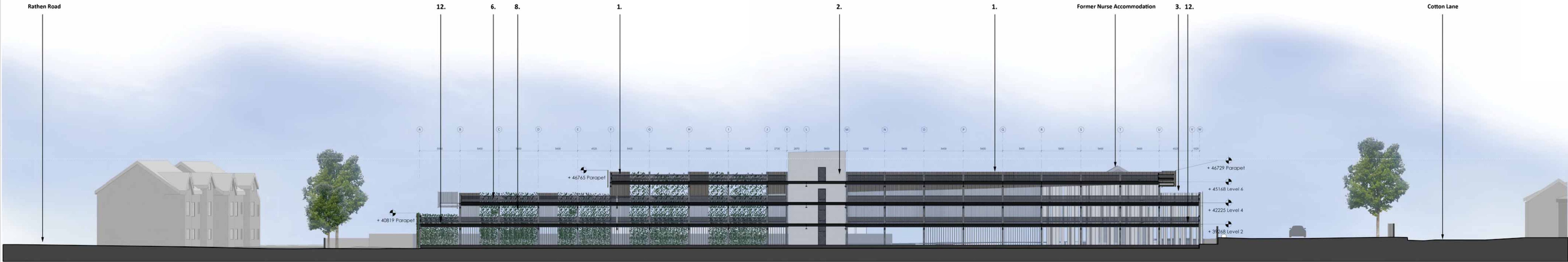
DWG purpose status rev

TENDER P 5

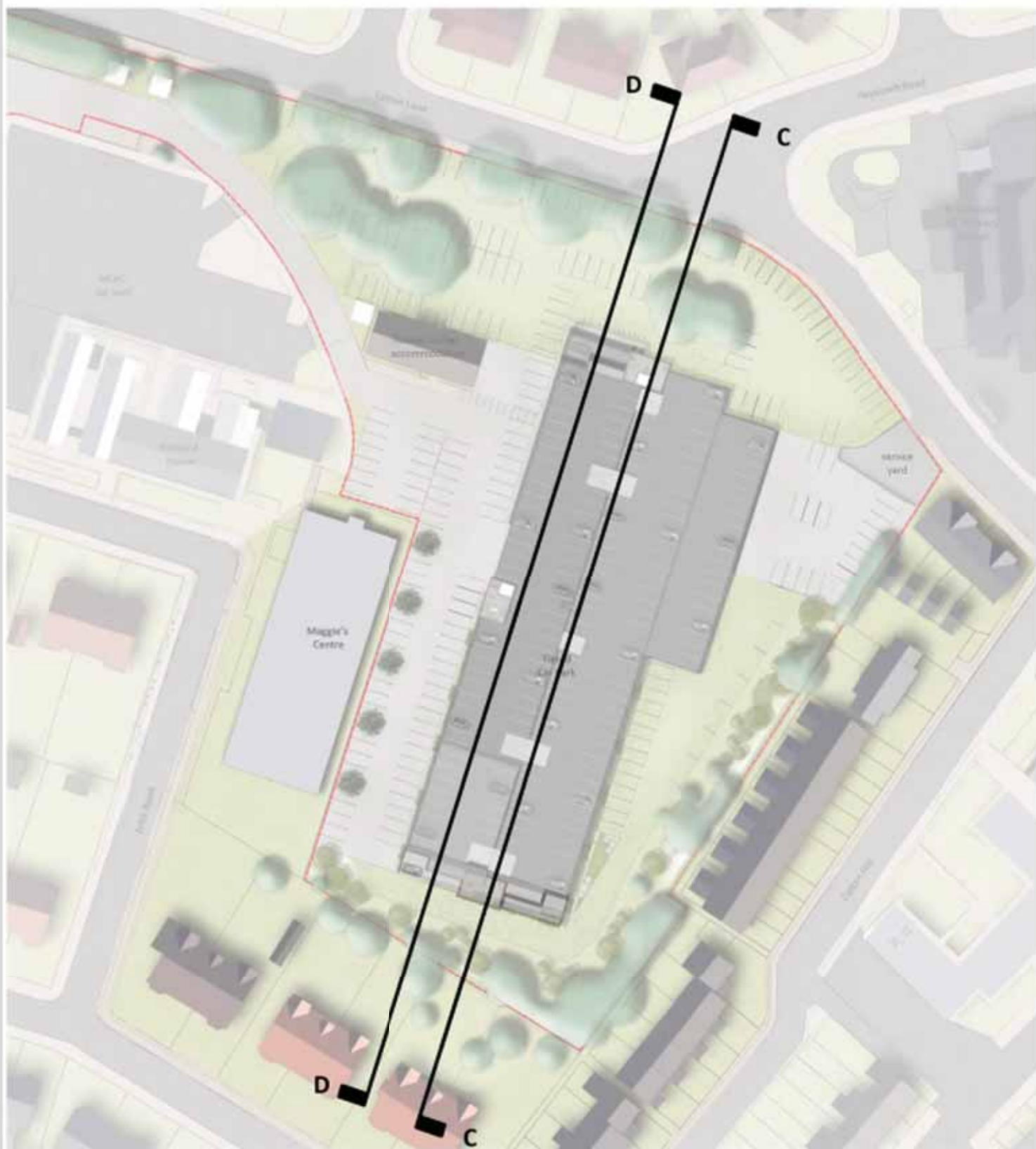
163409-AFL-00-00-DR-A-20022



Proposed Section: C-C @ 1:200



Proposed Section: D-D @ 1:200



Location Plan @ Not to Scale

Material Finish Legend

1. Timber cladding: NORclad European redwood, Grade A. 75mm x 80mm at various centres. Upper Floors 75mm centres, Lower Floors:300mm centres. Refer to NBS L10/610A
2. White Metal Cladding Panels: Optima TFC Rainscreen System, Polyester Powder Coated, White. Installed in a random configuration. Refer to NBS H92/120A
3. White Metal Cladding Panels: Optima TFC Rainscreen System, Polyester Powder Coated, White. Installed in a vertical configuration. Refer to NBS H92/120A
4. Facing Brickwork: Wienerberger, Pagus Grey/ Black Clay Brick with Parex Historic Mortar, Light Grey. Refer to NBS F10/110A
5. Timber Cladding (to Stair & Lift Core): NORclad European redwood, Grade A, 75x50mm, at 75mm centres. Fixed batons to solid substates. Refer to NBS L10/610B
6. Stainless Steel Wire System for vines and flowering plants to grow up: Jakob rope & rod greening system. Refer to NBS L10/650A. Refer to landscaping document for further details.
7. External Stainless Steel Doorset: Galvanised Steel with a primed finish, ral 7036 Platinum grey. Refer to NBS L20/480A
8. Temporary Boarding, whilst the vines grow up the vertical steel wires: Rockpanel RockcladDurable board, Standard Finish, Colour TBC. Refer to NBS H92/120B
9. Mesh System: Steelway Open Mesh Flooring, Diamond Pattern. Refer to NBS Q41/130A
10. Vehicular Crash Barrier: Berry Systems, System 3 Untensioned Steel Bars anchored to structural steel columns of car park Q41/140A
11. Roof Finish: Sika Sarnafil, Colour- Lead Grey. Refer to NBS I42/110B
12. Floor Finish: Sika Resin Flooring. Refer to NBS M12/110(A, B, C, D)

General Notes:

This drawing is to be read in conjunction with the following drawings and information:

- Floor Plans:
163409-AFL-00-00-DR-A-20000,
163409-AFL-00-00-DR-A-20001,
163409-AFL-00-00-DR-A-20002,
163409-AFL-00-00-DR-A-20003
163409-AFL-00-00-DR-A-20119
163409-AFL-00-00-DR-A-20138

- Elevations:
163409-AFL-00-00-DR-A-20010,
163409-AFL-00-00-DR-A-20011,
163409-AFL-00-00-DR-A-20116,

- Sections:
163409-AFL-00-00-DR-A-20022,
163409-AFL-00-00-DR-A-20023,

- NBS Specification

- All relevant structural engineers information.

- All relevant M&E engineers information.

NOTES
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P 1	29.03.19	SEH	Issued for Tender
P 4	02.05.19	SEH	PLANNING SUBMIT
P 5	04.09.17	SEH	PLANNING SUBMIT
P 2	18.08.17	SEH	Issued for Planning Package
P 3	18.07.17	SEH	Issued for sign off

REV	NO.	DATE	REV BY	DESCRIPTION
-----	-----	------	--------	-------------

PROJECT
P22 Tiered Car Park

LOCATION
The Christie

EMPLOYER
The Christie

CLIENT
The Christie

ARCHITECT
AFL architects

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Key plan

DRAWING TITLE
Proposed Section C-C & D-D

SCALE
1 : 200

DATE
29.03.19

STATUS
P 5

163409-AFL-00-00-DR-A-20023



Legend

- | | |
|---|---|
|  | Proposed Tiered Car Park Surface Finish |
|  | External Grasscrete Finish, Type GC2
Refer to NBS Q21/125A |
|  | External Asphalt Road Finish |
|  | External Grassed Area. Refer to Drawing:
163409-AFL-00-00-DR-A-20138 |
|  | External Concrete Block Paved Area
Refer to NBS Q24/110 |
|  | External Soft Landscaping Area.
Refer to Drawing:
163409-AFL-00-00-DR-A-20138 |
|  | Electric Car Parking Spaces |

P 5	29.03.19	SEH	Issued for Tender
P 4	02.01.18	SEH	PLANNING ISSUE
P 3	04.09.17	SEH	PLANNING ISSUE
P 2	18.08.17	SEH	Issued for Planning Package
P 1	04.08.17	SEH	Issued for sign off

rev no.	rev date	rev by	description
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P22 Tiered Car Park

location

Employer

client

AFL Architects
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key plan

AFL
architects

drawing title

Proposed Master Plan

AFL job number	scale @ A0	drawn	SEH	checked.
163409	1 : 500	rev date	29.03.19	
shg.purpose		status		
TENDER				
bim.project	origin	zone	level	type rule 5-digit
163409-AFL-00-00-DR-A-2013				



Refer to the Proposed Masterplan
for junction improvement works

Manchester Cancer
Research Centre

Christie Clinic

Car Share

Kinnaid House

Maggie's
Centre

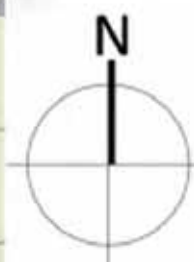
Existing
134
Car Park

former nurses
accommodation

Existing
20
Car Park

Existing
250
Car Park

St Cuthberts
RC Primary
School



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SOFTWARE INTEROPERABILITY
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- Legend**
- Proposed Tiered Car Park Surface Finish
 - External Grasscrete Finish, Type GC2 Refer to NBS Q21/125A
 - External Asphalt Road Finish
 - External Grassed Area. Refer to Drawing: 163409-AFL-00-00-DR-A-20138
 - External Concrete Block Paved Area Refer to NBS Q24/110
 - External Soft Landscaping Area. Refer to Drawing: 163409-AFL-00-00-DR-A-20138
 - Electric Car Parking Spaces

P 6	29.03.19	SEH	Issued for Tender
P 5	05.09.17	SEH	PLANNING ISSUE
P 4	04.09.17	SEH	PLANNING ISSUE
P 3	18.08.17	SEH	Issued for Planning Package
P 2	09.08.17	SEH	Revised Existing car park figures
P 1	26.07.17	SEH	First Issue

rev no.	rev date	rev by	description
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project

P22 Tiered Car Park

location

The Christie

Employer

The Christie

client

The Christie

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twitter.com/AFLArchitects
key plan



drawing title
Existing Site Plan

AFL job number scale @ A1 draw: SEH checked: GR

163409 1: 500 rev date: 29.03.19

Drawn by: SEH Status: TENDER

Rev: P 6

163409-AFL-00-00-DR-A-20135



Appendices



Appendix A – Report Conditions

Geo-Environmental Factual & Interpretative Report

Christie's Hospital Tiered Carpark

The Christie NHS Foundation Trust



WYG ENVIRONMENT

C1 - REPORT CONDITIONS (Environmental Assessment)

This report is produced solely for the benefit of **The Christie NHS Foundation Trust** and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYG. In time improved practices, fresh information or amended legislation may necessitate a re-assessment. Opinions and information provided in this report are on the basis of WYG using due skill and care in the preparation of the report.

This report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

This report is limited to those aspects reported on, within the scope and limits agreed with the client under our appointment. It is necessarily restricted and no liability is accepted for any other aspect. It is based on the information sources indicated in the report. Some of the opinions are based on unconfirmed data and information and are presented as the best obtained within the scope for this report.

Reliance has been placed on the documents and information supplied to WYG by others but no independent verification of these has been made and no warranty is given on them. No liability is accepted or warranty given in relation to the performance, reliability, standing etc of any products, services, organisations or companies referred to in this report.

Whilst skill and care have been used, no investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather related conditions.

Although care is taken to select monitoring and survey periods that are typical of the environmental conditions being measured, within the overall reporting programme constraints, measured conditions may not be fully representative of the actual conditions. Any predictive or modelling work, undertaken as part of the commission will be subject to limitations including the representativeness of data used by the model and the assumptions inherent within the approach used. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions.

The potential influence of our assessment and report on other aspects of any development or future planning requires evaluation by other involved parties.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. WYG accept no liability for issues with performance arising from such factors

December 2008
WYG Environment Planning Transport Ltd





Appendix B – Exploratory Hole Logs & Rock Core Photo Plates

		Project: Christies Hospital Car Park		Location Details		Status		Borehole Number									
		Location: Manchester		Easting: 385170.24 Northing: 392499.23		FINAL		BH101									
		Client: The Christies NHS Foundation Trust		Level: 37.32mAOD Depth: 16.60m													
				Logger: DF Type: WLS+RC		Inclination: 90°		Sheet 1 of 2									
Method, Plant and Crew					Diameter		Casing		Groundwater		Scale: 1:50						
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: GR		
0.00	1.20	Inspection Pit	Hand Digging Tools	AJ	1.20	400	2.60	121							Approved By: CEM		
1.20	2.88	Dynamic Windowless Sampling	Mini Rig	AJ	2.00	87									Start Date: 19/11/2019		
2.88	16.60	Rotary Core	Rotary Drilling Rig	JM	2.60	77									Finish Date: 25/11/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
MADE GROUND: Grey reinforced CONCRETE with 19mm rebar.								0.20	37.12			0.40	ES1	PID 0.40m, 0.0ppm			
MADE GROUND: Light grey sandy fine to coarse sub-angular dolomite GRAVEL. Sand is fine to coarse.								0.30	37.02			0.50	D2				
MADE GROUND: Dark brown clayey fine to coarse SAND with low brick cobble content.								0.60	36.72			0.70	ES3	PID 0.70m, 0.0ppm		1	
Medium dense reddish brown fine to coarse SAND.												0.80	D4				
												1.00 - 1.20	B5				
Dense brown fine to coarse SAND.								1.30	36.02			1.20	D6	SPT(S) 1.20m, N=29 (5,6/7,8,7)			
												1.60	D7				
At 1.80m bgl: Grey Sandstone Cobble.								2.00	35.32			2.00	D8	SPT(S) 2.00m, N=39 (5,6/7,8,10,14)		2	
Reddish brown slightly sandy silty CLAY								2.30	35.02			2.40	D9				
Reddish brown medium grained SANDSTONE (recovered as Sand).												2.60	D10	SPT(S) 2.60m, 50 (9,14/50 for 120mm)			
Very weak reddish brown medium grained SANDSTONE. Fractures are predominately closely spaced, rough undulating and with no infill. Drilling induced fractures noted.								2.88	34.44			2.88		0	0	0	3
												4.10					
												4.10		0	0	0	4
												5.10	NR				
												5.10		0	0	0	5
												6.60					
												6.60	AZCL	40	16	0	6
												7.10	NI	0			
												7.10					7
												8.60	NR	0	0	0	
												8.60					8
												9.60	AZCL	70	44	0	
Between 8.90m and 9.16m bgl: Recovered as Sand.																	9
From 9.45m bgl: Extremely Weak																	10
																	
																	
																	
																	
																	
																	
																</	



Location Details			
Easting:	385170.24	Northing:	392499.23
Level:	37.32mAOD	Depth:	16.60m
Logger:	DF	Type:	WLS+RC
		Inclination:	90°

Status

FINAL

Borehole Number

BH101

Sheet 2 of 2

[illegible][illegible][illegible]

1. Inspection pit excavated to 1.20m prior to commencing drilling.
2. Completed as rotary follow-on.
3. No groundwater was observed.
4. Bedrock strength description may change after laboratory testing results are finalised.

Drilling Fluid					Hammer Information	
From (m)	To (m)	Return Min %	Colour	Type	Serial No.	Energy Ratio %
2.88	16.60	100	Brown	Water	110.71 J5.01	80 67
Groundwater					Project Number	
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	
					A114954	

Project:Christies Hospital Car Park Location:Manchester Client:The Christies NHS Foundation Trust						Location Details						Status		Borehole Number										
						Easting: 385225.65 Level: 37.24mAOD Logger: DF						Northing: 392474.12 Depth: 14.00m Type: WLS+RC		FINAL		BH102								
												Inclination: 90°				Sheet 1 of 2								
Method, Plant and Crew					Diameter		Casing		Groundwater															
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Scale: 1:50									
0.00 1.20 3.23	1.20 3.23 14.00	Inspection Pit Dynamic Windowless Sampling Rotary Core	Hand Digging Tools. Mini Rig. Rotary Drilling Rig	AJ AJ JM	1.20 2.00 3.00 14.00	400 87 77 121	3.00	121							Checked By: GR									
															Approved By: CEM									
															Start Date: 19/11/2019									
															Finish Date: 26/11/2019									
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing												
												Depth (m)	Ref	Tests / Results										
MADE GROUND: Grey reinforced CONCRETE with 19mm rebar.								0.10	37.14															
MADE GROUND: Grey sub-angular to sub-rounded fine to coarse limestone GRAVEL.								0.30	36.94				0.40 0.50 0.60 - 0.70	ES1 D2 B3	PID 0.40m, 0.0ppm									
MADE GROUND: Brown slightly clayey sandy sub-rounded to sub-angular fine to coarse brick and concrete GRAVEL with medium cobble content of sub-angular brick.								0.70	36.54				0.80 0.90	ES4 D5	PID 0.80m, 0.0ppm									
Firm brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse sandstone.															1									
													1.20	D6	SPT(S) 1.20m, N=9 (1,2/2,2,3,2)									
													1.60	D7										
													2.00	U8										
													2.60	D9										
Reddish brown medium grained SANDSTONE (recovered as Sand)								2.40	34.84				2.60	D9										
Very weak reddish brown medium grained SANDSTONE. Fractures are closely spaced rough undulating and with no infill.													3.00	D10	SPT(S) 3.00m, 50 (25 for 100mm/50 for 130mm)									
													3.23	34.01				3.23 4.50	NR	0	0	0		
																		4.50 5.50	AZCL NI 18	60	17	0		
																		5.50 6.50	NR	0	0	0		
																			AZCL NI					
																		7.27	C	6.50 8.00	93	53	40	
																		7.54	C	4				
																		7.86	C					
																		8.76	C	8.00 9.50	AZCL NI 7	67	50	27
																		9.12	C		NI 16			
											9.93	C		AZCL 7 NI										
Between 6.63m and 7.20m bgl: Recovered as sandy Gravel.															SPT(S) 6.50m, 50 (17,8/50 for 125mm)									
Between 7.27m and 9.23m bgl: Extremely Weak																								
Between 8.50m and 8.70m bgl: Recovered as sandy Gravel.																								



Easting:	385225.65	Northing:	392474.12
Level:	37.24mAOD	Depth:	14.00m
Logger:	DF	Type:	WLS+RC
		Inclination:	90°

FINAL

BH102

Sheet 2 of 2

[illegible]

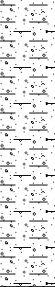
1. Inspection pit excavated to 1.20m prior to commencing drilling.
2. Completed as rotary follow-on.
3. No groundwater was observed.
4. Bedrock strength description may change after laboratory testing results are finalised.

From (m)	To (m)	Return Min %	Colour	Type
3.23	14.00	100	Brown	Water

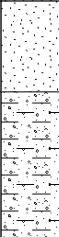
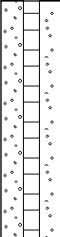
Serial No.	Energy Ratio %
110.71	80
JS.01	67

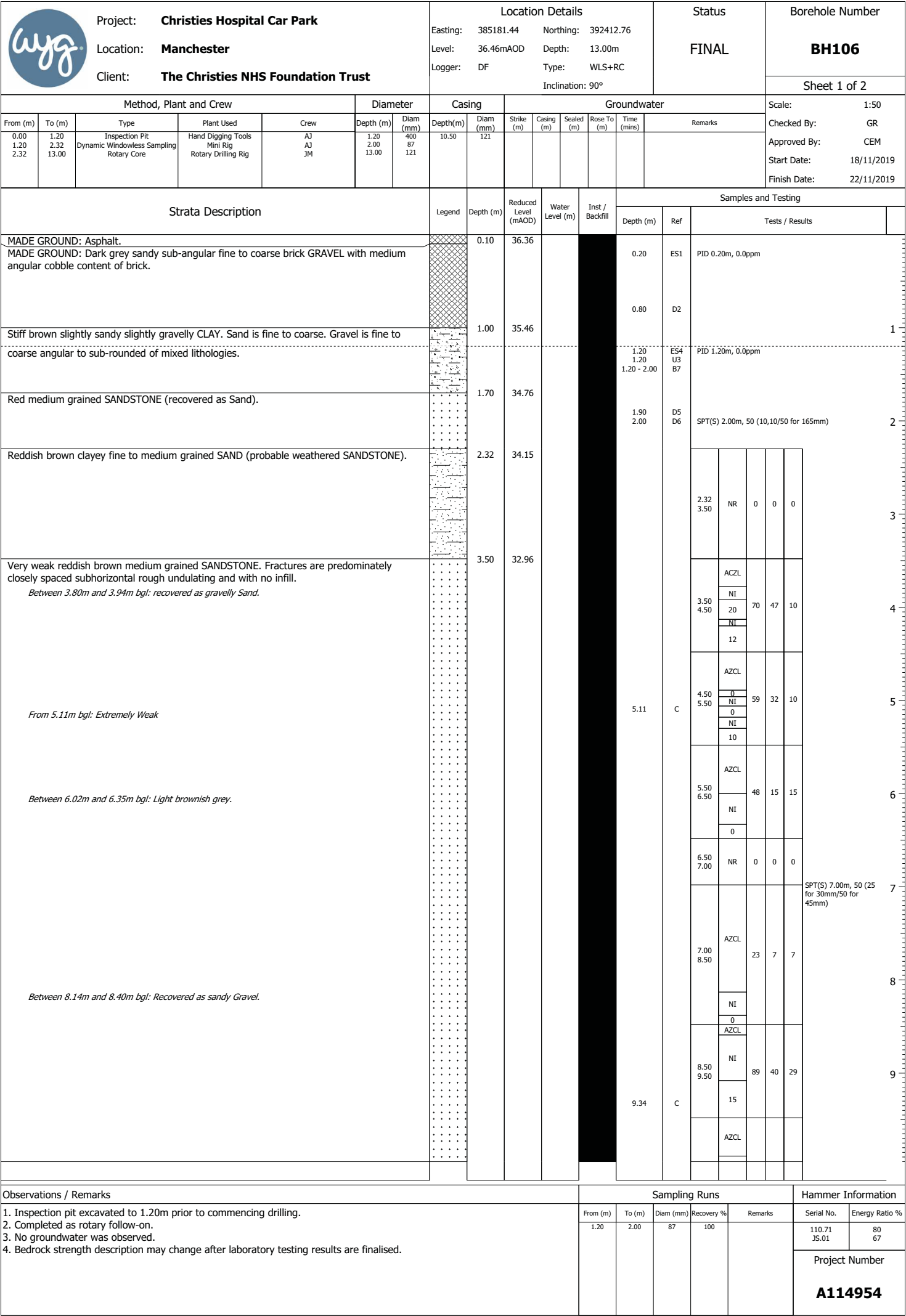
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks

A114954

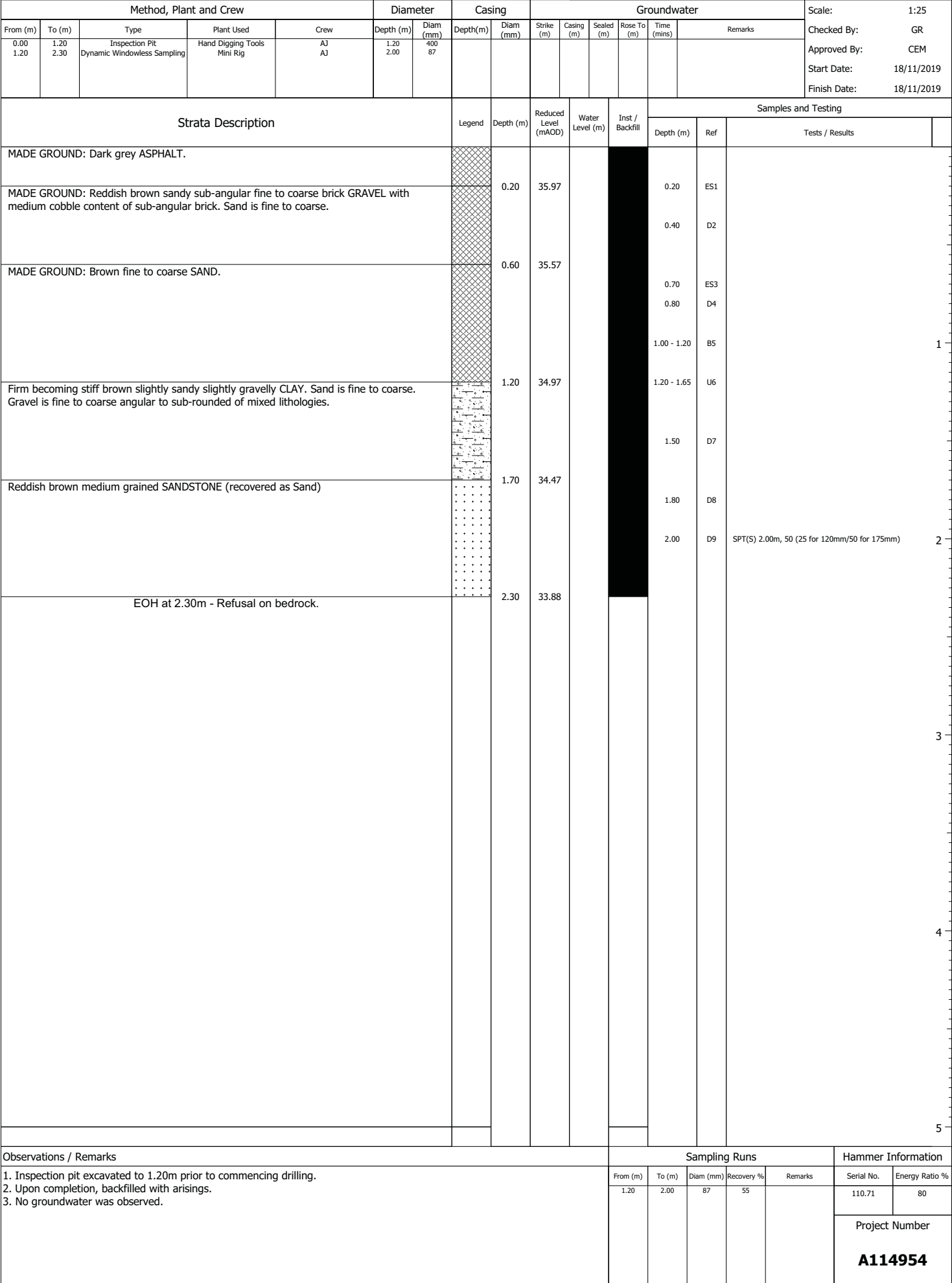
		Project: Christies Hospital Car Park				Location Details				Status		Borehole Number						
		Location: Manchester				Easting: 385190.21 Northing: 392456.56				FINAL		BH103						
		Client: The Christies NHS Foundation Trust				Level: 37.05mAOD Depth: 3.15m Logger: DF Type: WLS Inclination: 90°												
Method, Plant and Crew						Diameter		Casing		Groundwater						Scale: 1:25		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By:	GR		
0.00	1.20	Inspection Pit	Hand Digging Tools	AJ	1.20	400									Approved By:	CEM		
1.20	3.15	Dynamic Windowless Sampling	Mini Rig	AJ	2.00	87									Start Date:	19/11/2019		
					3.00	77									Finish Date:	19/11/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing						
												Depth (m)	Ref	Tests / Results				
MADE GROUND: Dark grey ASPHALT.								0.20	36.85									
MADE GROUND: Brown gravelly fine to coarse SAND with high cobble content of brick. Gravel is fine to coarse angular to sub-angular brick.																		
Medium dense brown fine to coarse SAND.								1.10	35.95									
Stiff reddish brown slightly gravelly slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to sub-angular of mixed lithologies.								1.50	35.55									
From 2.00m bgl: Soft																		
Reddish brown medium grained SANDSTONE (recovered as Sand).								2.45	34.60									
EOH at 3.15m - Refusal on bedrock.								3.15	33.91									
Observations / Remarks												Sampling Runs			Hammer Information			
1. Inspection pit excavated to 1.20m prior to commencing drilling. 2. Upon completion, backfilled with arisings. 3. No groundwater was observed.												From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
												1.20	2.00	87	100		110.71	80
																	Project Number	
																	A114954	

		Project: Christies Hospital Car Park				Location Details				Status		Borehole Number						
		Location: Manchester				Easting: 385203.10 Northing: 392431.96				FINAL		BH104						
		Client: The Christies NHS Foundation Trust				Level: 36.94mAOD Depth: 2.28m												
				Logger: DF Type: WLS				Inclination: 90°				Sheet 1 of 1						
Method, Plant and Crew						Diameter		Casing		Groundwater								
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Scale:	1:25		
0.00	1.20	Inspection Pit	Hand Digging Tools.	AJ	1.20	400									Checked By:	GR		
1.20	2.28	Dynamic Windowless Sampling	Mini Rig.	AJ	2.00	87									Approved By:	CEM		
														Start Date:		20/11/2019		
														Finish Date:		20/11/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing						
												Depth (m)	Ref	Tests / Results				
MADE GROUND: Dark grey ASPHALT.								0.10	36.84			0.20	ES1	PID 0.20m, 0.0ppm				
MADE GROUND: Dark brown slightly clayey sandy fine to coarse angular to sub-angular brick GRAVEL.												0.30	D2					
Loose dark brown clayey fine to coarse SAND.								0.50	36.44			0.60	ES3	PID 0.60m, 0.0ppm				
												0.70	D4					
												0.80 - 1.00	B5					
												1.20	D6				SPT(S) 1.20m, N=7 (2,2/2,2,1,2)	
Stiff greyish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to sub-angular of mixed lithologies.								1.40	35.54			1.60	D7					
Reddish brown medium grained SANDSTONE (recovered as Sand)								1.80	35.14			2.00	D8	SPT(S) 2.00m, 50 (25 for 135mm/50 for 145mm)				
EOH at 2.28m - Refusal on bedrock.								2.28	34.66									
																5		
Observations / Remarks											Sampling Runs				Hammer Information			
1. Inspection pit excavated to 1.20m prior to commencing drilling. 2. Combined gas/groundwater monitoring well installed to 1.40m bgl. 3. No groundwater was observed.											From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %	
											1.20	2.00	87	100		110.71	80	
																	Project Number	
						A114954												

 Project: Christies Hospital Car Park Location: Manchester Client: The Christies NHS Foundation Trust						Location Details						Status FINAL		Borehole Number BH105				
						Easting: 385169.57 Northing: 392433.72 Level: 36.45mAOD Depth: 2.32m Logger: DF Type: WLS Inclination: 90°												
						Method, Plant and Crew						Diameter		Casing		Groundwater		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: GR	Approved By: CEM		
0.00	1.20	Inspection Pit	Hand Digging Tools	AJ	1.20	400									Start Date: 20/11/2019	Finish Date: 20/11/2019		
1.20	2.32	Dynamic Windowless Sampling	Mini Rig	AJ	2.32	87												
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing						
												Depth (m)	Ref	Tests / Results				
MADE GROUND: Dark grey ASPHALT.								0.10	36.35				0.30	ES1				
MADE GROUND: Grey slightly clayey sandy sub-angular to sub-rounded fine to coarse brick GRAVEL with medium cobble content comprising sub-angular brick.																		
Brown fine to coarse SAND.								1.00	35.45				1.00	D4				
Stiff brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to sub-angular of mixed lithologies.								1.30	35.15				1.10	ES3				
Reddish brown medium grained SANDSTONE (recovered as sand).								1.80	34.65				1.20	D5	SPT(S) 1.20m, N=7 (1,1/1,1,2,3)			
EOH at 2.32m - Refusal on bedrock.								2.32	34.13				1.60	D6				
													2.00	D7	SPT(S) 2.00m, 50 (8,10/50 for 170mm)			
																		
Observations / Remarks												Sampling Runs			Hammer Information			
1. Inspection pit excavated to 1.20m prior to commencing drilling. 2. Combined gas/groundwater monitoring well installed to 2.00m bgl. 3. No groundwater was observed.												From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
												1.20	2.00	87	100		110.71	80
												Project Number A114954						



Project:Christies Hospital Car Park Location:Manchester Client:The Christies NHS Foundation Trust						Location Details						Status		Borehole Number			
						Easting: 385161.31 Level: 36.10mAOD Logger: DF						Northing: 392403.36 Depth: 2.20m Type: WLS		FINAL		BH107	
						Inclination: °										Sheet 1 of 1	
Method, Plant and Crew					Diameter		Casing		Groundwater								
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Scale:	1:25	
0.00 1.20	1.20 2.20	Inspection Pit Dynamic Windowless Sampling	Hand Digging Tools Mini Rig	AJ AJ	1.20 2.00	400 87			1.00	-	-	0.00	0		Checked By: GR		
															Approved By: CEM		
															Start Date: 19/11/2019		
															Finish Date: 19/11/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
MADE GROUND: Dark grey ASPHALT.								0.20	35.90			0.30	ES1				
MADE GROUND: Grey sandy sub-angular fine to coarse brick limestone and concrete GRAVEL. Sand is fine to coarse.								0.60	35.50			0.70 0.80	ES2 D3				
MADE GROUND: Grey fine to coarse SAND.								1.00	35.10			1.10 1.20 1.20 - 1.65	ES4 D5 U6				
Firm becoming stiff brown slightly sandy slightly gravelly fine to coarse CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to sub-angular of mixed lithologies.								1.80	34.30			1.90 2.00	D7 D8	SPT(S) 2.00m, 50 (25 for 75mm/50 for 125mm)			
Reddish brown medium grained SANDSTONE (recovered as Sand).								2.20	33.90								
EOH at 2.20m - Refusal on bedrock.																	
											</						



 Project: Christies Hospital Car Park Location: Manchester Client: The Christies NHS Foundation Trust						Location Details						Status FINAL		Borehole Number BH109							
						Easting: 385146.71 Northing: 392379.16 Level: 35.93mAOD Depth: 9.50m Logger: DF Type: WLS+RC Inclination: 90°															
						Method, Plant and Crew						Diameter		Casing		Groundwater					
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: GR	Approved By: CEM	Start Date: 18/11/2019	Finish Date: 21/11/2019			
0.00	1.20	Inspection Pit	Hand Digging Tools	AJ	1.20	400	2.50	121													
1.20	2.88	Dynamic Windowless Sampling	Mini Rig	AJ	2.00	87															
2.88	9.50	Rotary Core	Rotary Drilling Rig	JM	2.60	77															
					9.50	121															
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing									
												Depth (m)	Ref	Tests / Results							
MADE GROUND: Dark grey ASPHALT.								0.20	35.73												
MADE GROUND: Grey sandy sub-angular to sub-rounded brick GRAVEL with medium brick cobble content. Sand is fine to coarse.								0.50	35.43					0.40	ES1	PID 0.40m, 0.0ppm					
Grey slightly clayey fine to coarse SAND.														0.50	D2	PID 0.55m, 0.0ppm					
Soft brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse sub-rounded to sub-angular of mixed lithologies.								0.80	35.13					0.50 - 0.60	B3	PID 0.70m, 0.0ppm					
														0.55	D4						
														0.55	ES5						
														0.70	ES6						
														0.80	D7						
From 1.65m bgl: Stiff														1.20 - 1.65	U8						
														1.70	D9						
Reddish brown medium grained SANDSTONE (recovered as sand).								2.10	33.83					2.00	D10	SPT(S) 2.00m, N=35 (3,4/8,8,9,10)					
														2.20	D11						
														2.30 - 2.60	B13						
Very weak reddish brown medium grained SANDSTONE. Fractures are predominately subhorizontal closely spaced rough undulating and with no infill.								2.50	33.43					2.60	D12	SPT(S) 2.60m, 50 (25 for 110mm/50 for 172mm)					
Between 2.55m and 2.92m bgl: Recovered as Sand and Gravel.																					
Between 3.60m and 3.90m bgl: Subvertical (~80°) fracture. Rough undulating and with no infill.																					
Between 4.90m and 5.40m bgl: Recovered as sandy Gravel.																					
Between 6.11m and 6.50m bgl: Recovered as gravelly Sand.																					
Between 6.73m and 7.50m bgl: Recovered as soft to firm greyish brown sandy Clay. Sand is medium grained.																					
Extremely weak reddish brown medium grained SANDSTONE. Fractures are predominately subhorizontal closely spaced rough undulating and with no infill.								7.50	28.43					7.50	C	SPT(S) 6.50m, 50 (25 for 115mm/50 for 30mm)					
Between 8.02m and 8.42m bgl: Recovered as gravelly Sand.																					
																					
EOH at 9.50m - Target depth achieved.																					
																					
																					
																					

Observations / Remarks						Sampling Runs						Hammer Information	
						From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %	
						1.20	2.00	2.60	87	100		110.71	80
1. Inspection pit excavated to 1.20m prior to commencing drilling. 2. Completed as rotary follow-on. 3. No groundwater was observed. 4. Bedrock strength description may change after laboratory testing results are finalised.													
						Project Number							
						A114954							

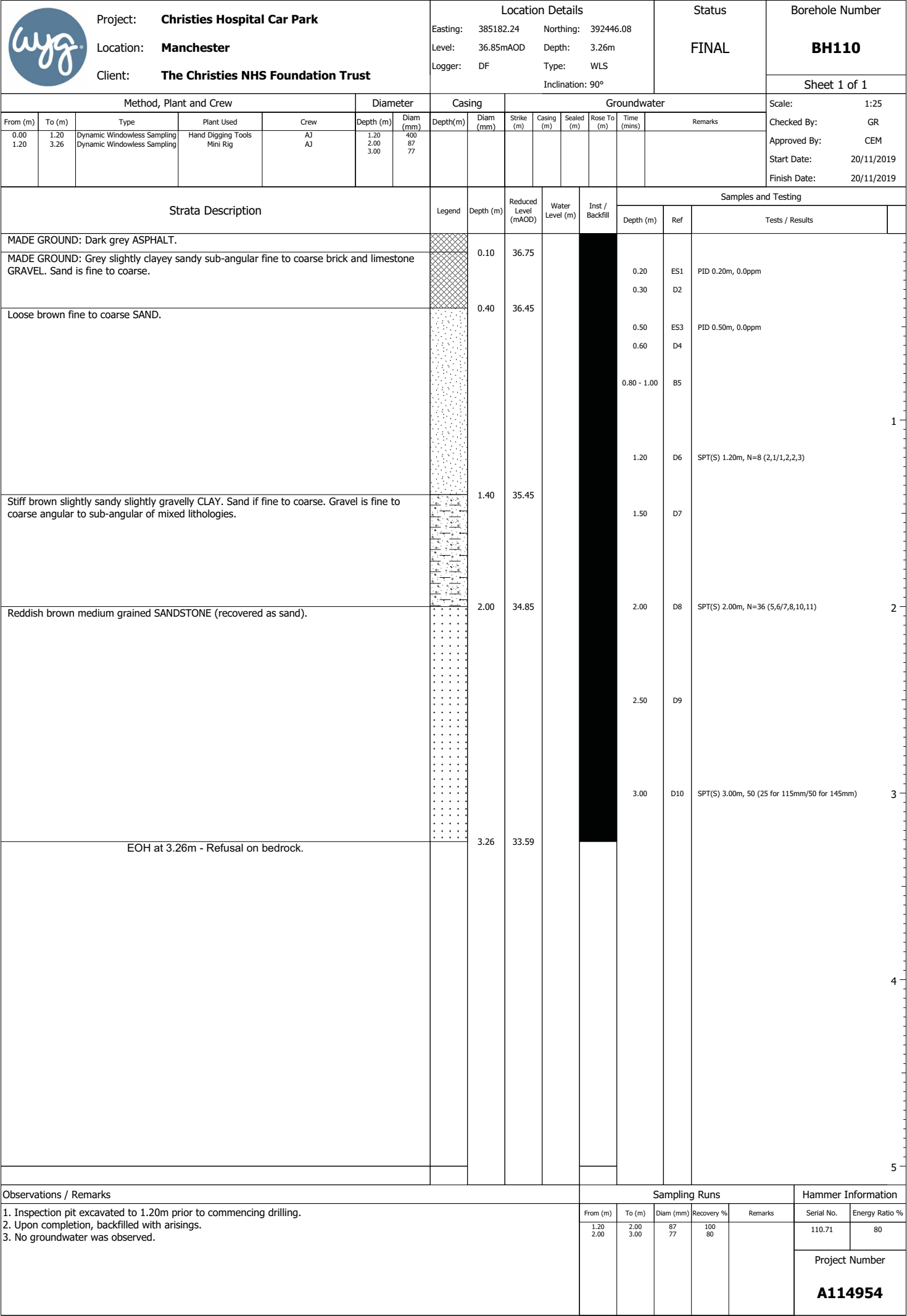




Photo Plate 1: BH101 6.60m bgl – 10.60m bgl



Photo Plate 2: BH101 11.60m bgl – 16.60m bgl

**Quay West at MediaCityUK,
Trafford Wharf Road,
Trafford Park,
Manchester M17 1HH**

**Tel: 0161 872 3223
Fax: 0161 872 3192
E-mail enquiries @wyg.com**

**Environmental Consultancy
Ground Technologies & Investigation**



Project: Christie's Hospital Tiered Carpark

Client: The Christes NHS Foundation Trust

Core Photo Plates

Project No.: A114954

Date: January 2020



Photo Plate 3: BH102 4.50m bgl – 8.00m bgl



Photo Plate 4: BH102 11.00m bgl – 14.00m bgl

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Ground Technologies & Investigation**



Project: Christie's Hospital Tiered Carpark

Client: The Christes NHS Foundation Trust

Core Photo Plates

Project No.: A114954

Date: January 2020



Photo Plate 6: BH102 11.00m bgl – 14.00m bgl

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Ground Technologies & Investigation**



Project: Christie's Hospital Tiered Carpark

Client: The Christes NHS Foundation Trust

Core Photo Plates

Project No.: A114954

Date: January 2020



Photo Plate 7: BH106 2.00m bgl – 5.50m bgl



Photo Plate 8: BH106 5.50m bgl – 8.50m bgl

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Project: Christie's Hospital Tiered Carpark

Client: The Christes NHS Foundation Trust

Core Photo Plates

Project No.: A114954

Date: January 2020



Photo Plate 9: BH106 8.50m bgl – 10.50m bgl

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Project: Christie's Hospital Tiered Carpark

Client: The Christes NHS Foundation Trust

Core Photo Plates

Project No.: A114954

Date: January 2020



Photo Plate 10: BH109 2.50m bgl – 5.50m bgl



Photo Plate 11: BH109 5.50m bgl – 8.00m bgl

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Ground Technologies & Investigation**



Project: Christie's Hospital Tiered Carpark

Client: The Christes NHS Foundation Trust

Core Photo Plates

Project No.: A114954

Date: January 2020



Photo Plate 12: BH109 8.00m bgl – 9.50m bgl

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Environmental Consultancy
Ground Technologies & Investigation



Project: Christie's Hospital Tiered Carpark
Client: The Christes NHS Foundation Trust

Core Photo Plates

Project No.: A114954

Date: January 2020



Appendix C – SPT Results and Corrected 'N' Values

WYG ENVIRONMENT												
STANDARD PENETRATION TEST SUMMARY												
Project Number:		A114954			Project Title:		Christie's Hospital Tiered Car Park					
Client:		The Christies NHS Foundation Trust			Date:		23/01/2020					
Hole ID	Hole Type	SPT Depth	Seating Blows	Main Drive Blows	SPT Type	Uncorrected SPT "N" Value	Energy Ratio	Corrected SPT "N" Value	Rod Correction SPT Value	Geology Code	Stratum Top	Stratum Bottom
		m bgl	No	No			%	N60			m bgl	m bgl
BH101	CP	1.20	11	29	S	29	80	39		401	0.6	1.3
BH101	CP	2.00	11	39	S	39	80	52		401	1.3	2.3
BH101	CP	2.60	23	50	S	50	80	67		803	2.3	2.88
BH101	CP	5.10	25	50	S	50	67	56	48	803	2.88	13.1
BH101	CP	7.10	25	50	S	50	67	56	53	803	2.88	13.1
BH101	CP	10.60	25	50	S	50	67	56	56	803	2.88	13.1
BH101	CP	12.60	25	50	S	50	67	56	56	803	2.88	13.1
BH101	CP	14.60	25	50	S	50	67	56	56	803	2.88	13.1
BH102	CP	1.20	3	9	S	9	80	12		220	0.7	2.4
BH102	CP	3.00	25	50	S	50	80	67	50	803	2.4	3.23
BH102	CP	6.50	25	50	S	50	67	56	53	803	3.23	14
BH103	CP	1.20	9	11	S	11	80	15		401	1.1	1.5
BH103	CP	3.00	25	50	S	50	80	67	50	803	2.45	3.15
BH104	CP	1.20	4	7	S	7	80	9		402	0.5	1.4
BH104	CP	2.00	25	50	S	50	80	67		803	1.8	2.28
BH105	CP	1.20	2	7	S	7	80	9		401	1	1.3
BH105	CP	2.00	18	50	S	50	80	67		803	1.8	2.32
BH106	CP	2.00	20	50	S	50	80	67		803	1.7	2.32
BH106	CP	7.00	25	50	S	50	67	56	53	803	3.5	13
BH106	CP	10.50	25	50	S	50	67	56	56	803	3.5	13
BH106	CP	13.00	25	50	S	50	67	56	56	803	3.5	13
BH107	CP	2.00	25	50	S	50	80	67		803	1.8	2.2
BH108	CP	2.00	25	50	S	50	80	67		803	1.7	2.3

WYG ENVIRONMENT												
STANDARD PENETRATION TEST SUMMARY												
Project Number:		A114954			Project Title:		Christie's Hospital Tiered Car Park					
Client:		The Christies NHS Foundation Trust			Date:		23/01/2020					
Hole ID	Hole Type	SPT Depth	Seating Blows	Main Drive Blows	SPT Type	Uncorrected SPT "N" Value	Energy Ratio	Corrected SPT "N" Value	Rod Correction SPT Value	Geology Code	Stratum Top	Stratum Bottom
		m bgl	No	No			%	N60			m bgl	m bgl
BH109	CP	2.00	7	35	S	35	80	47		220	0.8	2.1
BH109	CP	2.60	25	50	S	50	80	67		803	2.5	7.5
BH109	CP	6.50	25	50	S	50	67	56	53	803	2.5	7.5
BH110	CP	1.20	3	8	S	8	80	11		401	0.4	1.4
BH110	CP	2.00	11	36	S	36	80	48		803	2	3.26
BH110	CP	3.00	25	50	S	50	80	67	50	803	2	3.26
Red is the number that should be used												

Red is the number that should be used

WYG ENVIRONMENT												
STANDARD PENETRATION TEST SUMMARY												
Project Number:		A114954			Project Title:		Christie's Hospital Tiered Car Park					
Client:		The Christies NHS Foundation Trust			Date:		23/01/2020					
Hole ID	Hole Type	SPT Depth	Seating Blows	Main Drive Blows	SPT Type	Uncorrected SPT "N" Value	Energy Ratio	Corrected SPT "N" Value	Rod Correction SPT Value	Geology Code	Stratum Top	Stratum Bottom
		m bgl	No	No			%	N60			m bgl	m bgl
BH101	CP	1.20	11	29	S	29	80	39		401	0.6	1.3
BH101	CP	2.00	11	39	S	39	80	52		401	1.3	2.3
BH101	CP	2.60	23	50	S	50	80	67		803	2.3	2.88
BH101	CP	5.10	25	50	S	50	67	56	48	803	2.88	13.1
BH101	CP	7.10	25	50	S	50	67	56	53	803	2.88	13.1
BH101	CP	10.60	25	50	S	50	67	56	56	803	2.88	13.1
BH101	CP	12.60	25	50	S	50	67	56	56	803	2.88	13.1
BH101	CP	14.60	25	50	S	50	67	56	56	803	2.88	13.1
BH102	CP	1.20	3	9	S	9	80	12		220	0.7	2.4
BH102	CP	3.00	25	50	S	50	80	67	50	803	2.4	3.23
BH102	CP	6.50	25	50	S	50	67	56	53	803	3.23	14
BH103	CP	1.20	9	11	S	11	80	15		401	1.1	1.5
BH103	CP	3.00	25	50	S	50	80	67	50	803	2.45	3.15
BH104	CP	1.20	4	7	S	7	80	9		402	0.5	1.4
BH104	CP	2.00	25	50	S	50	80	67		803	1.8	2.28
BH105	CP	1.20	2	7	S	7	80	9		401	1	1.3
BH105	CP	2.00	18	50	S	50	80	67		803	1.8	2.32
BH106	CP	2.00	20	50	S	50	80	67		803	1.7	2.32
BH106	CP	7.00	25	50	S	50	67	56	53	803	3.5	13
BH106	CP	10.50	25	50	S	50	67	56	56	803	3.5	13
BH106	CP	13.00	25	50	S	50	67	56	56	803	3.5	13
BH107	CP	2.00	25	50	S	50	80	67		803	1.8	2.2
BH108	CP	2.00	25	50	S	50	80	67		803	1.7	2.3

WYG ENVIRONMENT												
STANDARD PENETRATION TEST SUMMARY												
Project Number:		A114954			Project Title:		Christie's Hospital Tiered Car Park					
Client:		The Christies NHS Foundation Trust			Date:		23/01/2020					
Hole ID	Hole Type	SPT Depth	Seating Blows	Main Drive Blows	SPT Type	Uncorrected SPT "N" Value	Energy Ratio	Corrected SPT "N" Value	Rod Correction SPT Value	Geology Code	Stratum Top	Stratum Bottom
		m bgl	No	No			%	N60			m bgl	m bgl
BH109	CP	2.00	7	35	S	35	80	47		220	0.8	2.1
BH109	CP	2.60	25	50	S	50	80	67		803	2.5	7.5
BH109	CP	6.50	25	50	S	50	67	56	53	803	2.5	7.5
BH110	CP	1.20	3	8	S	8	80	11		401	0.4	1.4
BH110	CP	2.00	11	36	S	36	80	48		803	2	3.26
BH110	CP	3.00	25	50	S	50	80	67	50	803	2	3.26
Red is the number that should be used												

Red is the number that should be used



Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Dynamic sampling uk ltd
5-8 victory parkway
victory road
Derby
DE24 8ZF

Hammer Ref: JS.01
Test Date: 22/11/2019
Report Date: 29/11/2019
File Name: JS.01.spt
Test Operator: AP

Instrumented Rod Data

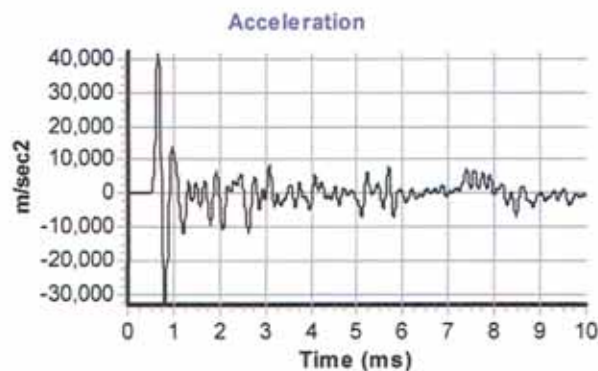
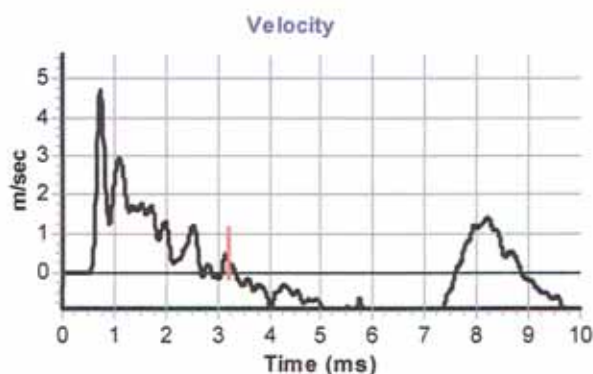
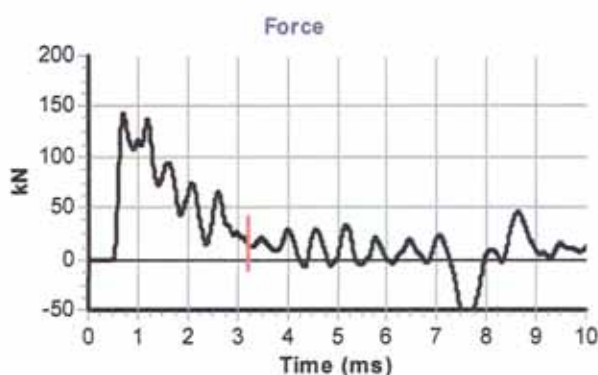
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.9
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 62901
Accelerometer No.2: 62902

Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
String Length L (m): 15.0

Comments / Location

Hammer tested at Dynamic samplings yard.



Calculations

Area of Rod A (mm^2): 1021
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 316

Energy Ratio E_r (%): **67**

Signed: A.parker.

Title: Associate Director.

The recommended calibration interval is 12 months



Appendix D – DCP Results

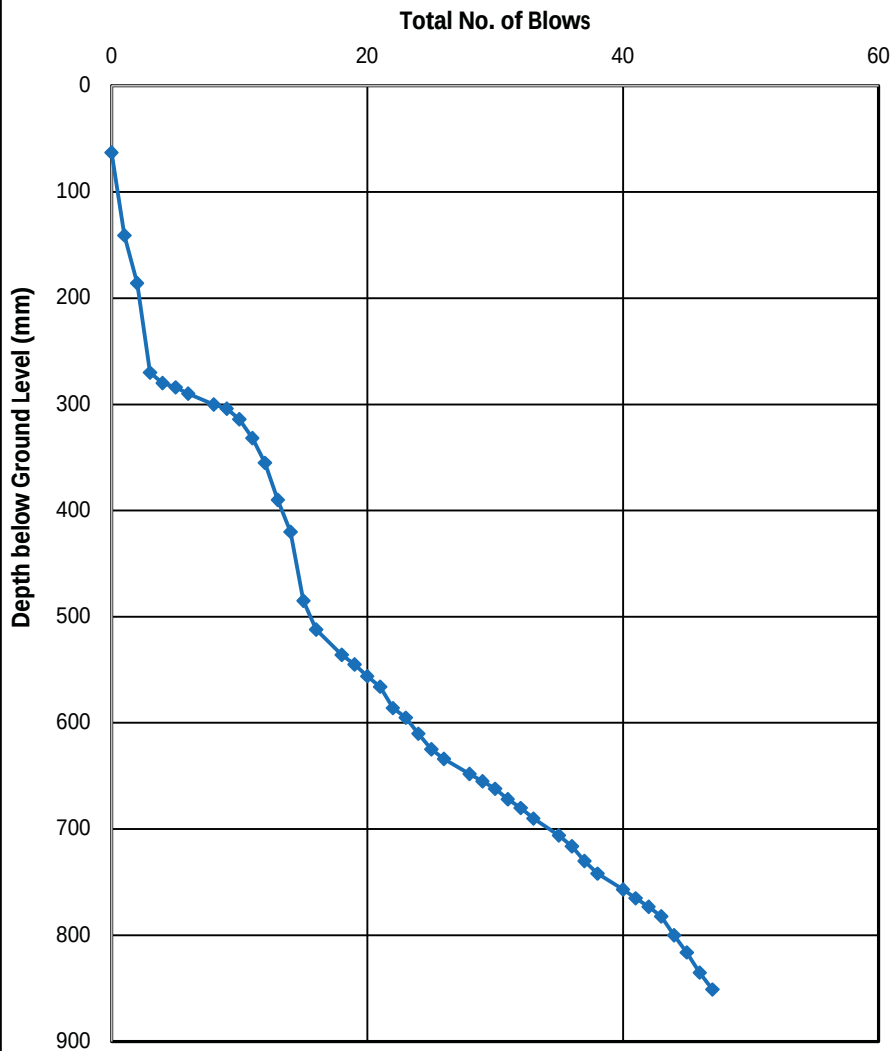
DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223					
Project No:	A114954						
Hole Number:	DCP1						
Final Depth (m):	0.92						
Easting (x):	385165.424						
Northing (y):	392480.09	Start Depth (mm)	83	Zero Reading (mm)	83	Test Number	1
Elevation (m AOD):	36.92	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				

Total No. of Blows				Data			
				No Blows	Total Blows	Reading (mm)	Penetration (mm)
				0	0	83	0
				1	1	210	127
				1	2	235	25
				1	3	249	14
				1	4	260	11
				1	5	276	16
				1	6	300	24
				1	7	327	27
				1	8	350	23
				1	9	370	20
				1	10	391	21
				1	11	411	20
				1	12	429	18
				1	13	446	17
				1	14	460	14
				1	15	471	11
				1	16	480	9
				1	17	487	7
				2	19	505	18
				2	21	520	15
				2	23	533	13
				2	25	546	13
				2	27	565	19
				2	29	583	18
				2	31	597	14
				2	33	613	16
				2	35	626	13
				2	37	637	11
				2	39	654	17
				2	41	668	14
				2	43	690	22
				2	45	701	11
				2	47	735	34
				2	49	780	45
				2	51	840	60
				2	53	866	26
				2	55	881	15
				2	57	896	15
				2	59	920	24
Checked by :				GR		Final	
CBR values derived from DCP by Highways specification: $\text{Log10 (CBR)} = 2.48 - 1.057 (\text{Log10 (mm/blow)})$							

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223					
Project No:	A114954						
Hole Number:	DCP2						
Final Depth (m):	0.85						
Easting (x):	385153.258						
Northing (y):	392468.30	Start Depth (mm)	63	Zero Reading (mm)	63	Test Number	1
Elevation (m AOD):	36.98	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				



Data			
No Blows	Total Blows	Reading (mm)	Penetration (mm)
0	0	63	0
1	1	141	78
1	2	186	45
1	3	270	84
1	4	280	10
1	5	284	4
1	6	290	6
2	8	300	10
1	9	304	4
1	10	314	10
1	11	332	18
1	12	355	23
1	13	390	35
1	14	420	30
1	15	485	65
1	16	512	27
2	18	536	24
1	19	545	9
1	20	556	11
1	21	566	10
1	22	586	20
1	23	595	9
1	24	610	15
1	25	625	15
1	26	634	9
2	28	648	14
1	29	655	7
1	30	662	7
1	31	672	10
1	32	680	8
1	33	690	10
2	35	706	16
1	36	716	10
1	37	730	14
1	38	742	12
2	40	757	15
1	41	765	8
1	42	773	8
1	43	782	9
1	44	800	18
1	45	816	16
1	46	835	19
1	47	851	16

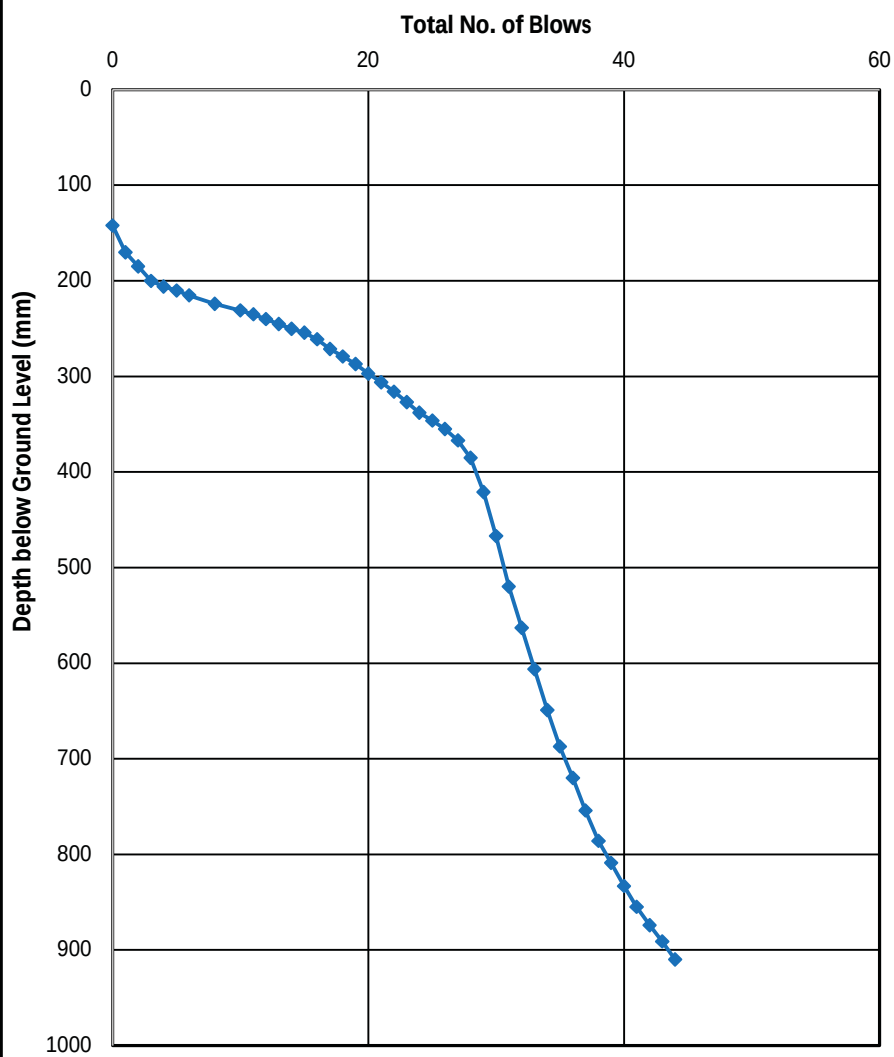
Depth Range Start (mm BGL)	Depth Range End (mm BGL)	Average penetration / blow (mm)	Average CBR value (%)
63	270	69.00	3.438
270	314	6.50	41.759
314	536	30.00	8.292
536	782	10.16	26.047
782	851	17.25	14.884

Checked by : GR Final

CBR values derived from DCP by Highways specification: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 (\text{Log}_{10}(\text{mm/blow}))$

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223 					
Project No:	A114954						
Hole Number:	DCP3						
Final Depth (m):	0.91						
Easting (x):	385189.871						
Northing (y):	392456.10	Start Depth (mm)	142	Zero Reading (mm)	142	Test Number	1
Elevation (m AOD):	37.03	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				



Data			
No Blows	Total Blows	Reading (mm)	Penetration (mm)
0	0	142	0
1	1	170	28
1	2	185	15
1	3	200	15
1	4	206	6
1	5	210	4
1	6	215	5
2	8	224	9
2	10	231	7
1	11	235	4
1	12	240	5
1	13	245	5
1	14	250	5
1	15	254	4
1	16	261	7
1	17	271	10
1	18	279	8
1	19	287	8
1	20	297	10
1	21	306	9
1	22	316	10
1	23	327	11
1	24	338	11
1	25	346	8
1	26	355	9
1	27	367	12
1	28	385	18
1	29	421	36
1	30	467	46
1	31	520	53
1	32	563	43
1	33	606	43
1	34	649	43
1	35	687	38
1	36	720	33
1	37	754	34
1	38	786	32
1	39	809	23
1	40	833	24
1	41	855	22
1	42	874	19
1	43	891	17
1	44	910	19

Checked by :	GR	Final
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CBR values derived from DCP by Highways specification: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 (\text{Log}_{10}(\text{mm/blow}))$

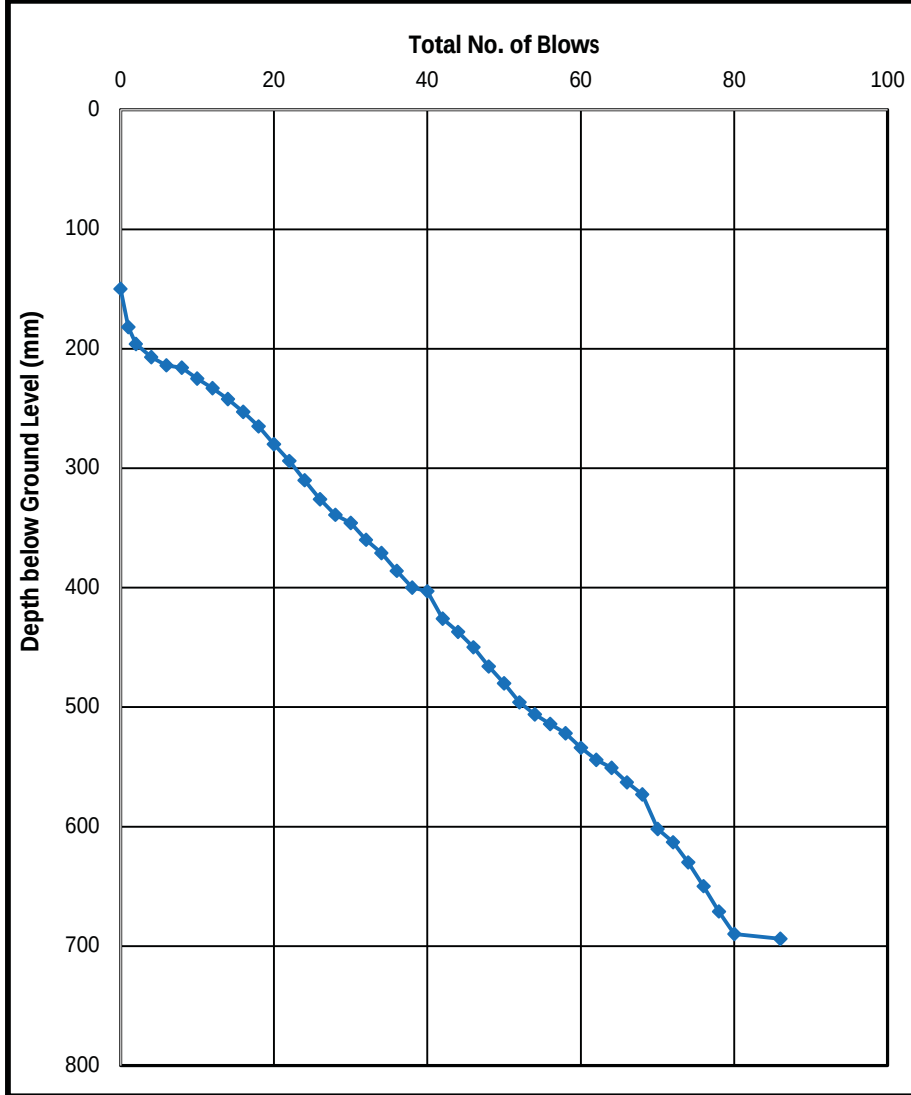
DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223 					
Project No:	A114954						
Hole Number:	DCP4						
Final Depth (m):	0.92						
Easting (x):	385208.206						
Northing (y):	392451.33	Start Depth (mm)	65	Zero Reading (mm)	65	Test Number	1
Elevation (m AOD):	37.22	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				

Total No. of Blows				Data			
				No Blows	Total Blows	Reading (mm)	Penetration (mm)
				0	0	65	0
				1	1	123	58
				1	2	192	69
				1	3	250	58
				1	4	284	34
				1	5	303	19
				1	6	356	53
				1	7	380	24
				1	8	424	44
				1	9	460	36
				1	10	477	17
				1	11	490	13
				1	12	502	12
				1	13	515	13
				1	14	521	6
				1	15	530	9
				2	17	544	14
				2	19	566	22
				2	21	580	14
				2	23	591	11
				2	25	604	13
				2	27	616	12
				2	29	624	8
				2	31	634	10
				2	33	643	9
				2	35	653	10
				2	37	661	8
				2	39	669	8
				2	41	676	7
				2	43	685	9
				2	45	694	9
				2	47	702	8
				2	49	711	9
				2	51	721	10
				2	53	735	14
				2	55	748	13
				2	57	772	24
				2	59	805	33
				2	61	840	35
				2	63	871	31
				2	65	915	44

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223					
Project No:	A114954						
Hole Number:	DCP5						
Final Depth (m):	0.69						
Easting (x):	385170.082						
Northing (y):	392433.66	Start Depth (mm)	150	Zero Reading (mm)	150	Test Number	1
Elevation (m AOD):	36.46	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				



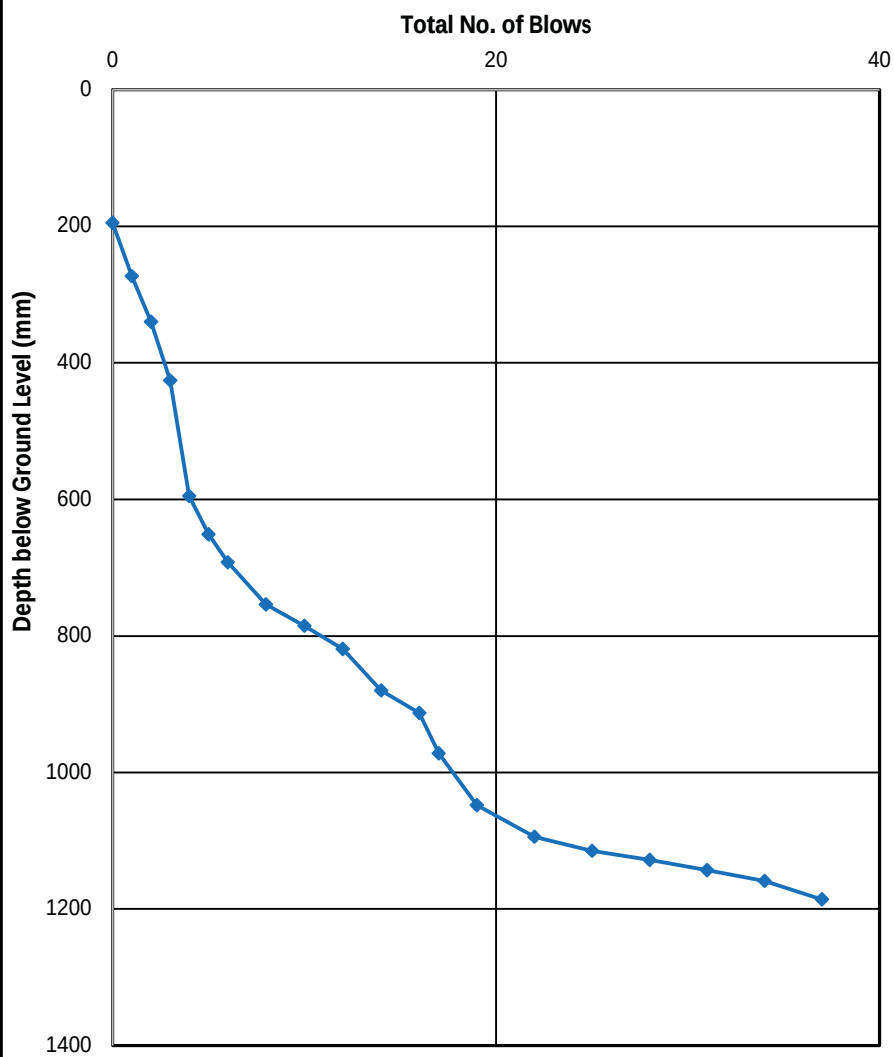
Data			
No Blows	Total Blows	Reading (mm)	Penetration (mm)
0	0	150	0
1	1	182	32
1	2	196	14
2	4	207	11
2	6	214	7
2	8	216	2
2	10	225	9
2	12	233	8
2	14	242	9
2	16	253	11
2	18	265	12
2	20	280	15
2	22	294	14
2	24	310	16
2	26	326	16
2	28	339	13
2	30	346	7
2	32	360	14
2	34	371	11
2	36	386	15
2	38	400	14
2	40	403	3
2	42	426	23
2	44	437	11
2	46	450	13
2	48	466	16
2	50	480	14
2	52	496	16
2	54	506	10
2	56	514	8
2	58	522	8
2	60	534	12
2	62	544	10
2	64	551	7
2	66	563	12
2	68	573	10
2	70	602	29
2	72	613	11
2	74	630	17
2	76	650	20
2	78	671	21
2	80	690	19
6	86	694	4

Depth Range Start (mm BGL)	Depth Range End (mm BGL)	Average penetration / blow (mm)	Average CBR value (%)
150	196	23.00	10.981
196	216	3.33	84.590
216	403	5.84	46.731
403	573	6.07	44.881
573	690	9.75	27.203
690	694	0.67	463.584
Checked by :		GR	Final

CBR values derived from DCP by Highways specification: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 (\text{Log}_{10}(\text{mm/blow}))$

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223 					
Project No:	A114954						
Hole Number:	DCP6						
Final Depth (m):	1.19						
Easting (x):	385170.082						
Northing (y):	392433.66	Start Depth (mm)	195	Zero Reading (mm)	195	Test Number	1
Elevation (m AOD):	36.46	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				

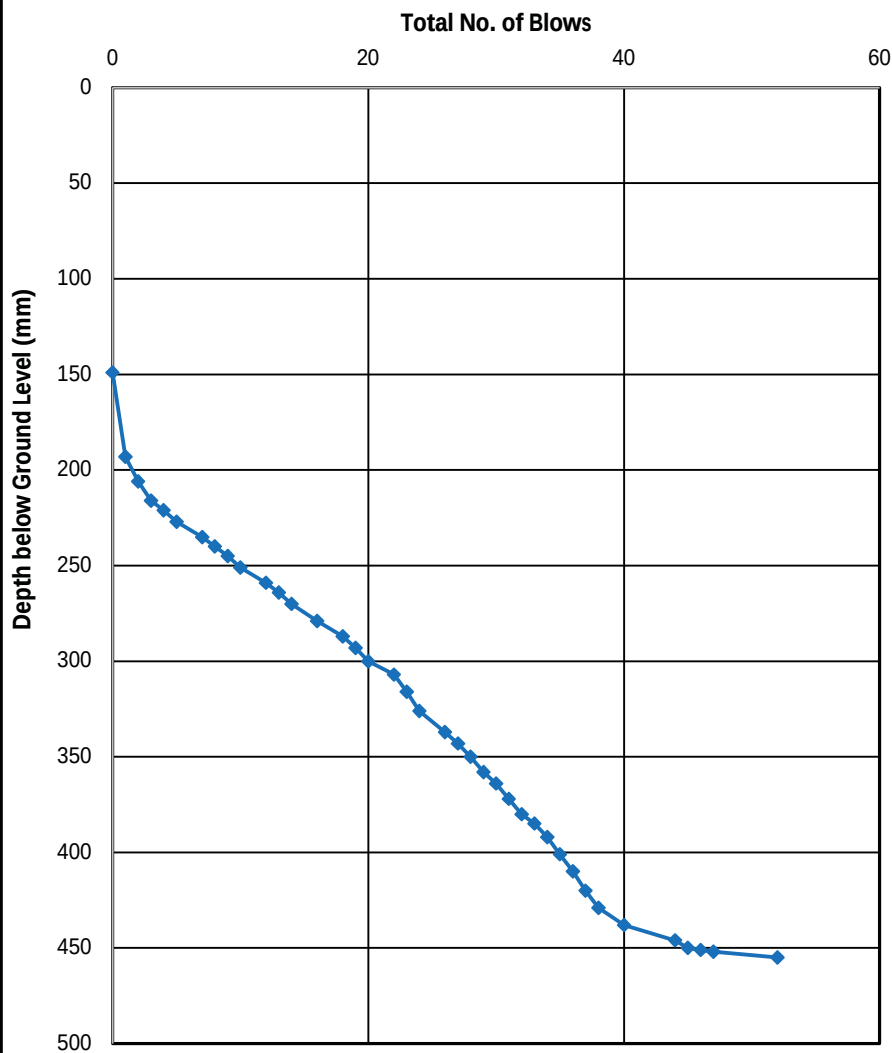
[illegible]

Checked by :	GR	Final
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CBR values derived from DCP by Highways specification: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 (\text{Log}_{10}(\text{mm/blow}))$

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223					
Project No:	A114954						
Hole Number:	DCP7						
Final Depth (m):	0.46						
Easting (x):	385169.14						
Northing (y):	392404.37	Start Depth (mm)	149	Zero Reading (mm)	149	Test Number	1
Elevation (m AOD):	36.23	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				



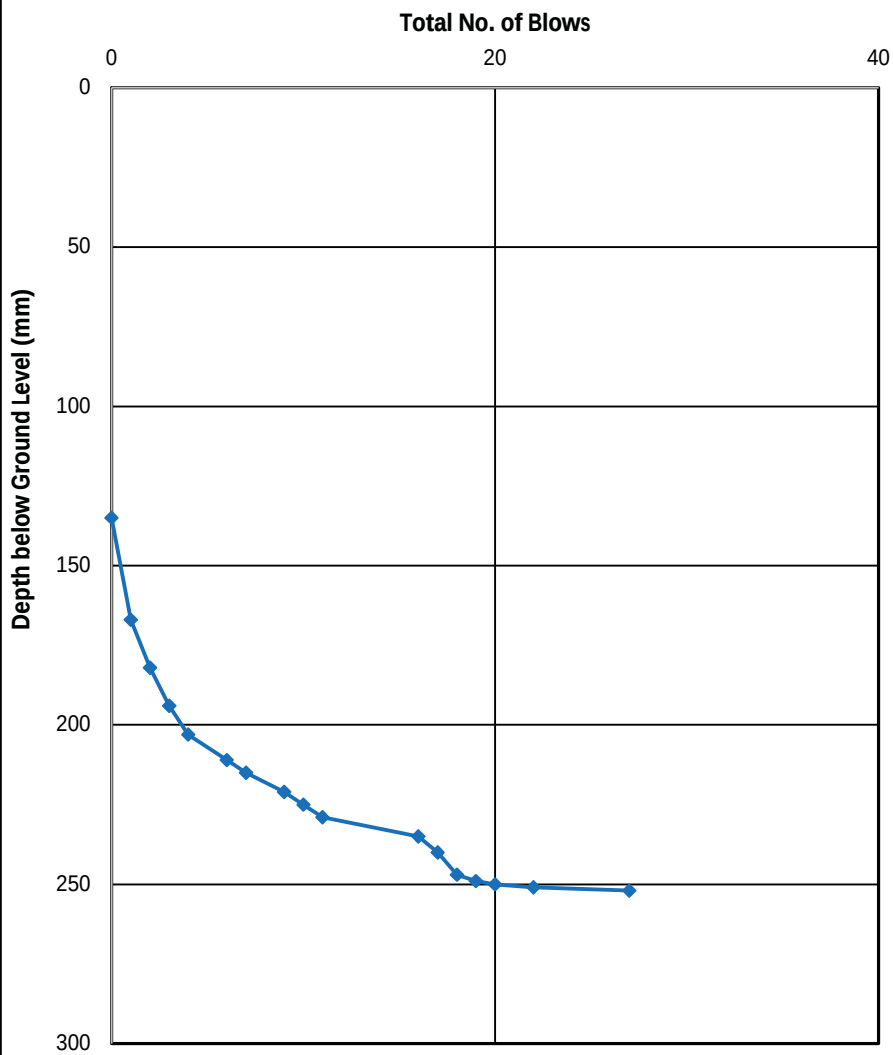
Data			
No Blows	Total Blows	Reading (mm)	Penetration (mm)
0	0	149	0
1	1	193	44
1	2	206	13
1	3	216	10
1	4	221	5
1	5	227	6
2	7	235	8
1	8	240	5
1	9	245	5
1	10	251	6
2	12	259	8
1	13	264	5
1	14	270	6
2	16	279	9
2	18	287	8
1	19	293	6
1	20	300	7
2	22	307	7
1	23	316	9
1	24	326	10
2	26	337	11
1	27	343	6
1	28	350	7
1	29	358	8
1	30	364	6
1	31	372	8
1	32	380	8
1	33	385	5
1	34	392	7
1	35	401	9
1	36	410	9
1	37	420	10
1	38	429	9
2	40	438	9
4	44	446	8
1	45	450	4
1	46	451	1
1	47	452	1
5	52	455	3

Depth Range Start (mm BGL)	Depth Range End (mm BGL)	Average penetration / blow (mm)	Average CBR value (%)
149	206	28.50	8.754
206	429	6.58	41.201
429	446	3.25	86.884
446	455	1.65	177.877

Checked by :	GR	Final			
CBR values derived from DCP by Highways specification: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 (\text{Log}_{10}(\text{mm/blow}))$					

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223 					
Project No:	A114954						
Hole Number:	DCP8						
Final Depth (m):	0.25						
Easting (x):	385177.237						
Northing (y):	392379.91	Start Depth (mm)	135	Zero Reading (mm)	135	Test Number	1
Elevation (m AOD):	36.17	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				

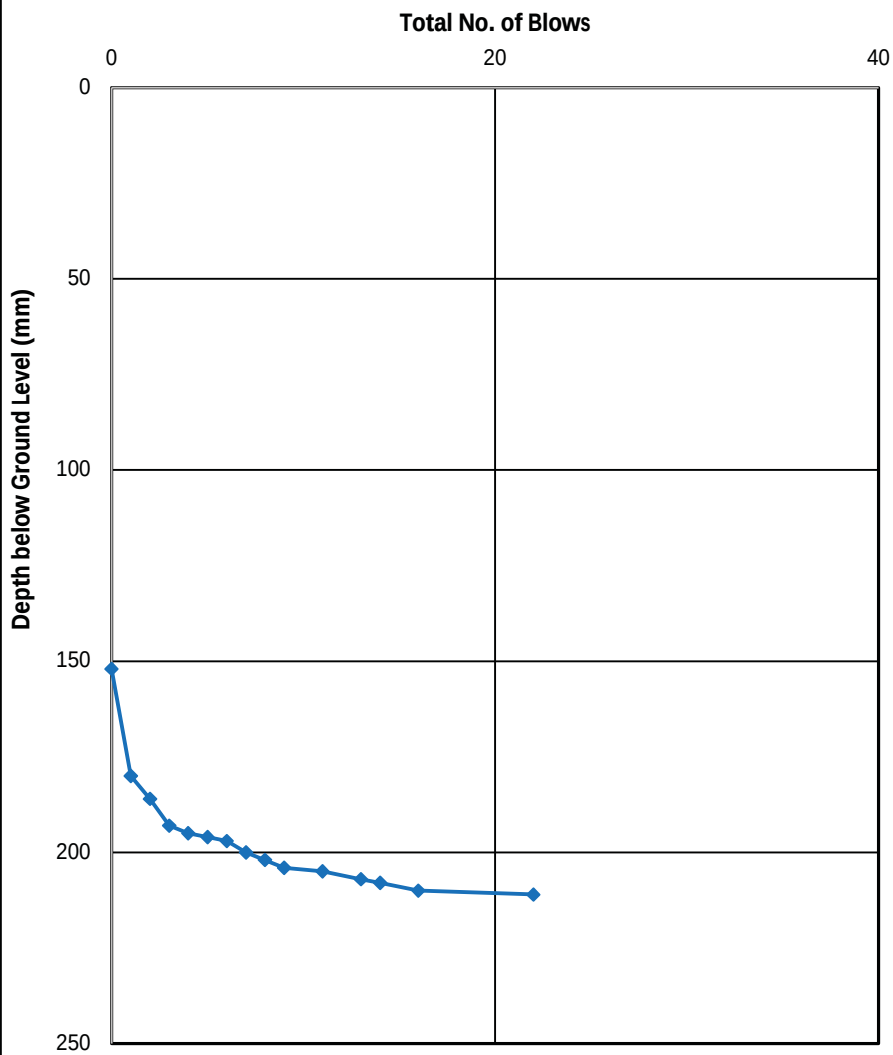


Data			
No Blows	Total Blows	Reading (mm)	Penetration (mm)
0	0	135	0
1	1	167	32
1	2	182	15
1	3	194	12
1	4	203	9
2	6	211	8
1	7	215	4
2	9	221	6
1	10	225	4
1	11	229	4
5	16	235	6
1	17	240	5
1	18	247	7
1	19	249	2
1	20	250	1
2	22	251	1
5	27	252	1

Depth Range Start (mm BGL)	Depth Range End (mm BGL)	Average penetration / blow (mm)	Average CBR value (%)
135	203	17.00	15.115
203	240	3.60	77.981
240	247	7.00	38.613
247	252	0.93	327.935
Checked by :		GR	Final
CBR values derived from DCP by Highways specification: Log10 (CBR) = 2.48 - 1.057 (Log10 (mm/blow))			

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223 					
Project No:	A114954						
Hole Number:	DCP9						
Final Depth (m):	0.21						
Easting (x):	385147.266						
Northing (y):	392378.82	Start Depth (mm)	152	Zero Reading (mm)	152	Test Number	1
Elevation (m AOD):	35.91	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				

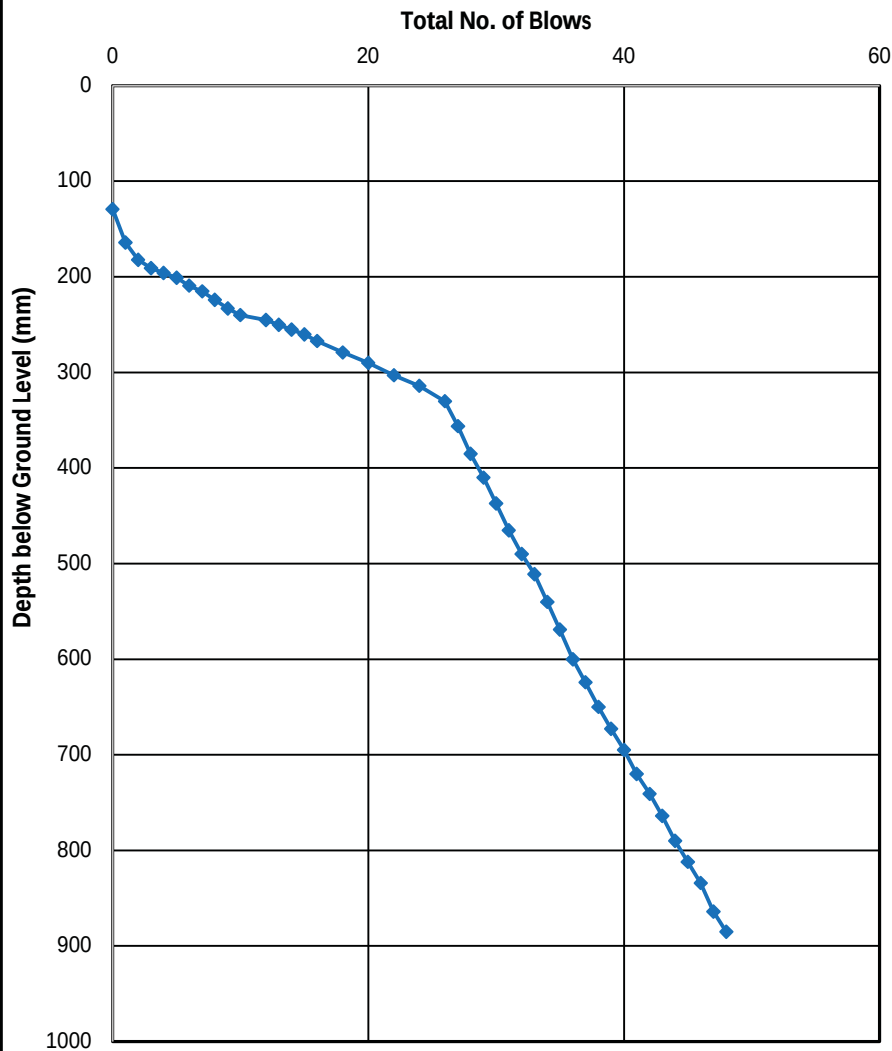
[illegible]

Checked by :	GR	Final
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CBR values derived from DCP by Highways specification: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 (\text{Log}_{10}(\text{mm/blow}))$

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223					
Project No:	A114954						
Hole Number:	DCP10						
Final Depth (m):	0.89						
Easting (x):	385181.785						
Northing (y):	392446.32	Start Depth (mm)	129	Zero Reading (mm)	129	Test Number	1
Elevation (m AOD):	36.84	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				



Data			
No Blows	Total Blows	Reading (mm)	Penetration (mm)
0	0	129	0
1	1	164	35
1	2	182	18
1	3	191	9
1	4	196	5
1	5	201	5
1	6	209	8
1	7	215	6
1	8	224	9
1	9	233	9
1	10	240	7
2	12	245	5
1	13	250	5
1	14	255	5
1	15	260	5
1	16	267	7
2	18	279	12
2	20	290	11
2	22	303	13
2	24	314	11
2	26	330	16
1	27	356	26
1	28	385	29
1	29	410	25
1	30	437	27
1	31	465	28
1	32	490	25
1	33	511	21
1	34	540	29
1	35	569	29
1	36	600	31
1	37	624	24
1	38	650	26
1	39	673	23
1	40	695	22
1	41	720	25
1	42	741	21
1	43	764	23
1	44	790	26
1	45	812	22
1	46	834	22
1	47	864	30
1	48	885	21

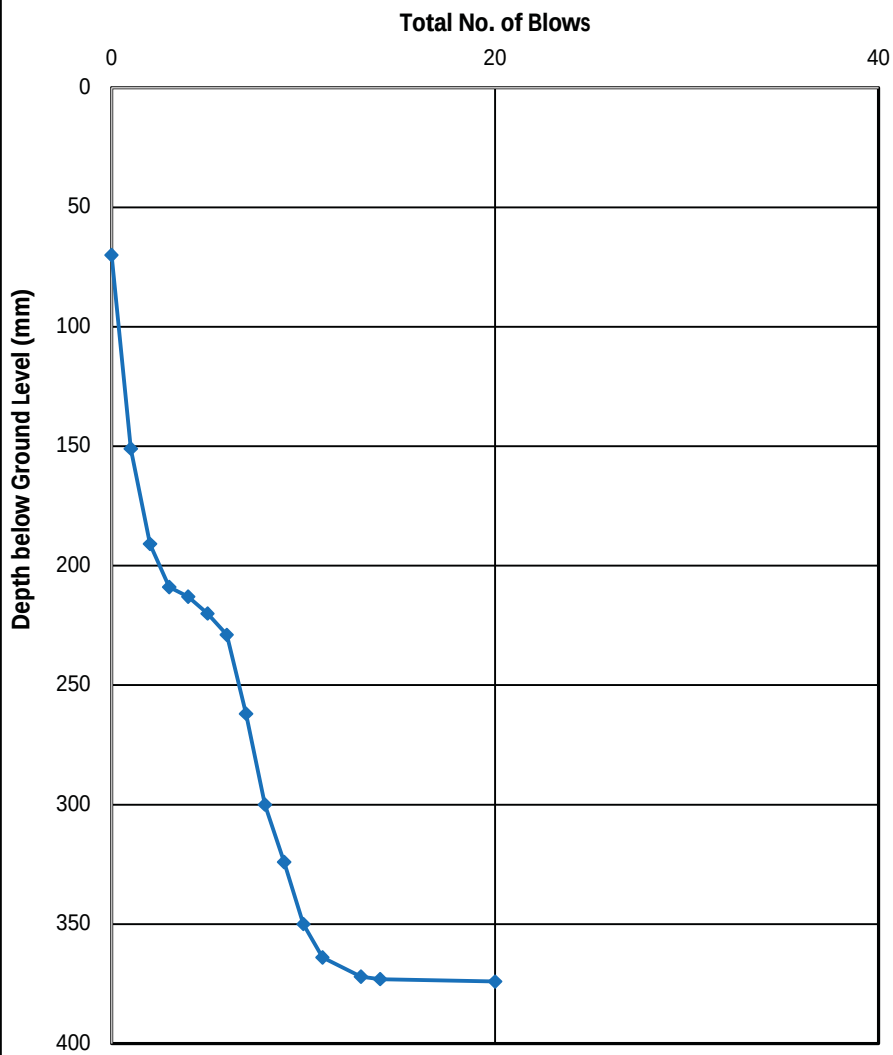
Depth Range Start (mm BGL)	Depth Range End (mm BGL)	Average penetration / blow (mm)	Average CBR value (%)
129	182	26.50	9.454
182	240	7.25	37.207
240	330	5.60	48.884
330	885	25.23	9.959

Checked by : GR Final

CBR values derived from DCP by Highways specification: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 (\text{Log}_{10}(\text{mm/blow}))$

DCP w. In Situ CBR v1.1 (03/09/2018)

Client	The Christies NHS Foundation Trust	WYG Geo-Environment Quay West, Media City, Manchester M17 1HH Tel: 0161 872 3223 					
Project No:	A114954						
Hole Number:	DCP11						
Final Depth (m):	0.37						
Easting (x):	385222.013						
Northing (y):	392431.48	Start Depth (mm)	70	Zero Reading (mm)	70	Test Number	1
Elevation (m AOD):	37.46	Logged by:	DF				
Weather:	Temperate	Logged Date:	06/11/2019				



Data			
No Blows	Total Blows	Reading (mm)	Penetration (mm)
0	0	70	0
1	1	151	81
1	2	191	40
1	3	209	18
1	4	213	4
1	5	220	7
1	6	229	9
1	7	262	33
1	8	300	38
1	9	324	24
1	10	350	26
1	11	364	14
2	13	372	8
1	14	373	1
6	20	374	1

Depth Range Start (mm BGL)	Depth Range End (mm BGL)	Average penetration / blow (mm)	Average CBR value (%)
70	209	46.33	5.238
209	229	6.67	40.656
229	364	27.00	9.269
364	374	1.72	170.002

Checked by :	GR	Final
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CBR values derived from DCP by Highways specification: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 (\text{Log}_{10}(\text{mm/blow}))$



Appendix E – Geochemical Testing Results



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

WYG Geo-Environment
Quay West at Media City UK
Trafford Warf Palk
Manchester
Lancashire
M17 1HH

Attention: Duncan Freeman

CERTIFICATE OF ANALYSIS

Date of report Generation:	10 December 2019
Customer:	WYG Geo-Environment
Sample Delivery Group (SDG):	191126-10
Your Reference:	A114954
Location:	Christies Hospital
Report No:	533293

This report has been revised and directly supersedes 532641 in its entirety.

We received 6 samples on Tuesday November 26, 2019 and 4 of these samples were scheduled for analysis which was completed on Tuesday December 10, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21223454	BH104	ES1	0.20 - 0.20	20/11/2019
21223458	BH104	ES2	0.60 - 0.60	20/11/2019
21223462	BH105	ES1	0.30 - 0.30	20/11/2019
21223466	BH105	ES2	1.10 - 1.10	20/11/2019
21223470	BH110	ES1	0.20 - 0.20	20/11/2019
21223474	BH110	ES2	0.50 - 0.50	20/11/2019

Maximum Sample/Coolbox Temperature (°C) :

6.6

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	21223454	BH104	ES1	0.20 - 0.20	60g VOC (ALE215)	250g Amber Jar (ALE210)	1kg TUB	S	S	S	S	S
Alkalinity Filtered as CaCO ₃	All	NDPs: 0 Tests: 1	X									
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1	X									
ANC at pH4 and ANC at pH 6	All	NDPs: 0 Tests: 1									X	
Anions by Kone (soil)	All	NDPs: 0 Tests: 4		X		X		X			X	
Anions by Kone (w)	All	NDPs: 0 Tests: 2	X							X		
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 4	X		X			X		X		
Boron Water Soluble	All	NDPs: 0 Tests: 4		X		X		X			X	
CEN Readings	All	NDPs: 0 Tests: 2	X							X		
Chromium III	All	NDPs: 0 Tests: 4		X		X		X			X	
Coronene	All	NDPs: 0 Tests: 1									X	
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 5	X	X		X		X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2	X							X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2	X							X		
EPH CWG (Aliphatic) Filtered GC (W)	All	NDPs: 0 Tests: 1	X									
EPH CWG (Aromatic) Filtered GC (W)	All	NDPs: 0 Tests: 1	X									



CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	21223454	21223462	21223470	21223474
						BH104	BH105	BH110	BH110
Sample Types -						ES1	ES1	ES1	ES2
						0.20 - 0.20	0.30 - 0.30	0.20 - 0.20	0.50 - 0.50
Container						60g VOC (ALE215)	250g Amber Jar (ALE210)	1kg TUB	60g VOC (ALE215)
						250g Amber Jar (ALE210)	1kg TUB	60g VOC (ALE215)	250g Amber Jar (ALE210)
Sample Type						S	S	S	S
						S	S	S	S
EPH CWG GC (S)	All	NDPs: 0 Tests: 4				X	X	X	X
Fluoride	All	NDPs: 0 Tests: 1						X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 4				X	X	X	X
GRO by GC-FID (W)	All	NDPs: 0 Tests: 1				X			
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 4				X	X	X	X
Loss on Ignition in soils	All	NDPs: 0 Tests: 1							X
Mercury Dissolved	All	NDPs: 0 Tests: 2				X		X	
Metals in solid samples by OES	All	NDPs: 0 Tests: 4				X	X	X	X
Mineral Oil	All	NDPs: 0 Tests: 1							X
Nitrite by Kone (w)	All	NDPs: 0 Tests: 1				X			
PAH 16 & 17 Calc	All	NDPs: 0 Tests: 1							X
PAH by GCMS	All	NDPs: 0 Tests: 4				X	X	X	X
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 1				X			
PCBs by GCMS	All	NDPs: 0 Tests: 2				X			X
pH	All	NDPs: 0 Tests: 4				X	X	X	X



CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend X Test N No Determination Possible Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type		21223454				21223462				21223470				21223474																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
------------------	----------	-------------	-----------------	---------------	-------------	---------------	------------	--------------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21223454	BH104	0.20 - 0.20	Light Brown	Sandy Loam	Concrete/Aggregate	Stones
21223462	BH105	0.30 - 0.30	Dark Brown	Sand	None	None
21223470	BH110	0.20 - 0.20	Dark Brown	Sandy Loam	Stones	Brick
21223474	BH110	0.50 - 0.50	Dark Brown	Sand	None	Brick

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

Results Legend		Customer Sample Ref.	BH104	BH105	BH110	BH110		
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3+5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	4.3	13	6.7	9.6		
Loss on ignition	<0.7 %	TM018				1.38		
Mineral Oil Surrogate % recovery**	%	TM061				81.5		
Mineral oil >C10-C40	<1 mg/kg	TM061				<1		
Phenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01	<0.01	<0.01		
			M	M	M	M		
Organic Carbon, Total	<0.2 %	TM132				0.574		
						M		
Fraction Organic Carbon (FOC)	<0.002	TM132	0.00418	0.00481	0.0309	0.00574		
			#	#	#	#		
pH	1 pH Units	TM133	9.15	8.18	9.21	7.71		
			M	M	M	M		
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<0.6	<0.6	<0.6		
			#	#	#	#		
Cyanide, Easily liberatable (low level)	<0.5 mg/kg	TM153	<0.5	<0.5	<0.5	<0.5		
PCB congener 28	<0.003 mg/kg	TM168	<0.015			<0.003		
			M			M		
PCB congener 52	<0.003 mg/kg	TM168	<0.015			<0.003		
			M			M		
PCB congener 101	<0.003 mg/kg	TM168	<0.015			<0.003		
			M			M		
PCB congener 118	<0.003 mg/kg	TM168	<0.015			<0.003		
			M			M		
PCB congener 138	<0.003 mg/kg	TM168	<0.015			<0.003		
			M			M		
PCB congener 153	<0.003 mg/kg	TM168	<0.015			<0.003		
			M			M		
PCB congener 180	<0.003 mg/kg	TM168	<0.015			<0.003		
			M			M		
Sum of detected PCB 7 Congeners	<0.021 mg/kg	TM168	<0.105			<0.021		
Chromium, Trivalent	<0.9 mg/kg	TM181	4.09	1.87	9.51	3.01		
Arsenic	<0.6 mg/kg	TM181	1.01	4.94	4.79	2.22		
			M	M	M	M		
Beryllium	<0.01 mg/kg	TM181	0.0991	0.159	0.358	0.167		
			M	M	M	M		
Cadmium	<0.02 mg/kg	TM181	0.324	0.0233	0.474	0.0616		
			M	M	M	M		
Chromium	<0.9 mg/kg	TM181	4.09	1.87	9.51	3.01		
			M	M	M	M		
Copper	<1.4 mg/kg	TM181	2.35	5.57	12.5	7.21		
			M	M	M	M		
Lead	<0.7 mg/kg	TM181	17.9	18.4	62.5	26.7		
			M	M	M	M		
Mercury	<0.14 mg/kg	TM181	<0.14	<0.14	<0.14	<0.14		
			M	M	M	M		
Nickel	<0.2 mg/kg	TM181	1.74	3.28	9.14	4.3		
			M	M	M	M		
Selenium	<1 mg/kg	TM181	<1	<1	<1	<1		
			#	#	#	#		
Vanadium	<0.2 mg/kg	TM181	4.93	12.8	22.8	4.95		
			#	#	#	#		
Zinc	<1.9 mg/kg	TM181	14.2	13.8	75.5	11		
			M	M	M	M		
ANC @ pH 4	<0.03 mol/kg	TM182				0.105		
ANC @ pH 6	<0.03 mol/kg	TM182				<0.03		
Boron, water soluble	<1 mg/kg	TM222	<1	<1	<1	<1		
			M	M	M	M		



CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*&@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH104ES1 0.20 - 0.20 SOLID 20/11/2019 00:00:00 26/11/2019 06:37:00 191126-10 21223454 TM048	02/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH105ES1 0.30 - 0.30 SOLID 20/11/2019 00:00:00 26/11/2019 06:37:00 191126-10 21223462 TM048	03/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH110ES1 0.20 - 0.20 SOLID 20/11/2019 00:00:00 26/11/2019 06:37:00 191126-10 21223470 TM048	02/12/19	Andrzej Ferrecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH110ES2 0.50 - 0.50 SOLID 20/11/2019 00:00:00 26/11/2019 06:37:00 191126-10 21223474 TM048	02/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.100

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

Site Location

Christies Hospital

Natural Moisture Content (%) 10.6

Dry Matter Content (%) 90.4

Case

SDG 191126-10

Lab Sample Number(s) 21223474

Sampled Date 20-Nov-2019

Customer Sample Ref. BH110 ES2

Depth (m) 0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Solid Waste Analysis

Result

Total Organic Carbon (%) 0.574

Loss on Ignition (%) 1.38

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) <0.021

Mineral Oil (mg/kg) <1

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 7.71

ANC to pH 6 (mol/kg) <0.03

ANC to pH 4 (mol/kg) 0.105

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Eluate Analysis

C2

Concⁿ in 10:1 eluate (mg/l)

A2

10:1 concⁿ leached (mg/kg)

Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg

	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00273	<0.0005	0.0273	<0.005	0.5	2	25
Barium	0.00322	<0.0002	0.0322	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00279	<0.0003	0.0279	<0.003	2	50	100
Mercury Dissolved (CVAf)	0.0000122	<0.00001	0.000122	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.00113	<0.0004	0.0113	<0.004	0.4	10	40
Lead	0.00126	<0.0002	0.0126	<0.002	0.5	10	50
Antimony	0.00126	<0.001	0.0126	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00226	<0.001	0.0226	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	24	<5	240	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	4.64	<3	46.4	<30	500	800	1000

Leach Test Information

Date Prepared 30-Nov-2019

pH (pH Units) 7.86

Conductivity (µS/cm) 21.70

Temperature (°C) 20.80

Volume Leachant (Litres) 0.890

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

10/12/2019 08:56:49

08:55:54 10/12/2019



CERTIFICATE OF ANALYSIS

Validated

SDG: 191126-10
Location: Christies Hospital

Client Reference: A114954
Order Number: A114954

Report Number: 533293
Superseded Report: 532641

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.094

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

Site Location

Christies Hospital

Natural Moisture Content (%) 4.49

Dry Matter Content (%) 95.7

Case

SDG 191126-10

Lab Sample Number(s) 21223454

Sampled Date 20-Nov-2019

Customer Sample Ref. BH104 ES1

Depth (m) 0.20 - 0.20

Eluate Analysis

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO ₂	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	3.65	<3	36.5	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	0.0000461	<0.00001	0.000461	<0.0001	-	-	-
Total Ammonia as NH ₃	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.000313	<0.000005	0.00313	<0.00005	-	-	-
Arsenic	0.00276	<0.0005	0.0276	<0.005	-	-	-
Total Ammonium as NH ₄	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	0.0000122	<0.000005	0.000122	<0.00005	-	-	-
Barium	0.00406	<0.0002	0.0406	<0.002	-	-	-
Nitrate as NO ₃	0.495	<0.3	4.95	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.00127	<0.000005	0.0127	<0.00005	-	-	-
Anthracene (diss.filt)	0.000394	<0.000005	0.00394	<0.00005	-	-	-
Boron	<0.01	<0.01	<0.1	<0.1	-	-	-
Phenanthrene (diss.filt)	0.000852	<0.000005	0.00852	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO ₃	37	<2	370	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.000195	<0.000005	0.00195	<0.00005	-	-	-
Chrysene (diss.filt)	0.0000945	<0.000005	0.000945	<0.00005	-	-	-

Leach Test Information

Date Prepared 05-Dec-2019
pH (pH Units) 9.24
Conductivity (µS/cm) 57.80
Temperature (°C) 19.00
Volume Leachant (Litres) 0.896



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CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.094

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

Site Location

Christies Hospital

Natural Moisture Content (%) 4.49

Dry Matter Content (%) 95.7

Case

SDG 191126-10

Lab Sample Number(s) 21223454

Sampled Date 20-Nov-2019

Customer Sample Ref. BH104 ES1

Depth (m) 0.20 - 0.20

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.000874	<0.000005	0.00874	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.0000998	<0.000005	0.000998	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.000068	<0.000005	0.00068	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.0000337	<0.000005	0.000337	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	0.0000543	<0.000002	0.000543	<0.00002	-	-	-
Copper	<0.0003	<0.0003	<0.003	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	0.0000104	<0.000005	0.000104	<0.00005	-	-	-
Lead	0.000569	<0.0002	0.00569	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	0.0000306	<0.000005	0.000306	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	0.0000305	<0.000005	0.000305	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.00437	<0.000082	0.0437	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00687	<0.001	0.0687	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

Leach Test Information

Date Prepared 05-Dec-2019
pH (pH Units) 9.24
Conductivity (µS/cm) 57.80
Temperature (°C) 19.00
Volume Leachant (Litres) 0.896



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Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM182	CEN/TC 292 - WI 292046-characterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM243		Mixed Anions In Soils By Kone
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM410	Shaker extraction-In house coronene method	Determination of Coronene in soils by GCMS
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



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Test Completion Dates

Lab Sample No(s)	21223454	21223462	21223470	21223474
Customer Sample Ref.	BH104	BH105	BH110	BH110
AGS Ref.	ES1	ES1	ES1	ES2
Depth	0.20 - 0.20	0.30 - 0.30	0.20 - 0.20	0.50 - 0.50
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO ₃	09-Dec-2019			
Ammoniacal Nitrogen	09-Dec-2019			
ANC at pH4 and ANC at pH 6				02-Dec-2019
Anions by Kone (soil)	02-Dec-2019	28-Nov-2019	02-Dec-2019	02-Dec-2019
Anions by Kone (w)	10-Dec-2019			03-Dec-2019
Asbestos ID in Solid Samples	02-Dec-2019	03-Dec-2019	02-Dec-2019	02-Dec-2019
Boron Water Soluble	02-Dec-2019	02-Dec-2019	02-Dec-2019	02-Dec-2019
CEN 10:1 Leachate (1 Stage)	05-Dec-2019			30-Nov-2019
CEN Readings	08-Dec-2019			03-Dec-2019
Chromium III	03-Dec-2019	02-Dec-2019	03-Dec-2019	04-Dec-2019
Coronene				03-Dec-2019
Cyanide Comp/Free/Total/Thiocyanate	09-Dec-2019	28-Nov-2019	02-Dec-2019	02-Dec-2019
Dissolved Metals by ICP-MS	09-Dec-2019			04-Dec-2019
Dissolved Organic/Inorganic Carbon	07-Dec-2019			03-Dec-2019
EPH CWG (Aliphatic) Filtered GC (W)	09-Dec-2019			
EPH CWG (Aromatic) Filtered GC (W)	09-Dec-2019			
EPH CWG GC (S)	02-Dec-2019	29-Nov-2019	02-Dec-2019	02-Dec-2019
Fluoride				03-Dec-2019
GRO by GC-FID (S)	02-Dec-2019	28-Nov-2019	02-Dec-2019	02-Dec-2019
GRO by GC-FID (W)	09-Dec-2019			
Hexavalent Chromium (s)	02-Dec-2019	02-Dec-2019	02-Dec-2019	02-Dec-2019
Loss on Ignition in soils				02-Dec-2019
Mercury Dissolved	09-Dec-2019			03-Dec-2019
Metals in solid samples by OES	03-Dec-2019	29-Nov-2019	03-Dec-2019	04-Dec-2019
Mineral Oil				03-Dec-2019
Nitrite by Kone (w)	09-Dec-2019			
PAH 16 & 17 Calc				02-Dec-2019
PAH by GCMS	03-Dec-2019	27-Nov-2019	02-Dec-2019	02-Dec-2019
PAH in waters by GC-MS (diss.filt)	09-Dec-2019			
PCBs by GCMS	03-Dec-2019			02-Dec-2019
pH	03-Dec-2019	03-Dec-2019	03-Dec-2019	03-Dec-2019
pH Value of Filtered Water	09-Dec-2019			
Phenols by HPLC (S)	02-Dec-2019	28-Nov-2019	02-Dec-2019	30-Nov-2019
Phenols by HPLC (W)	09-Dec-2019			03-Dec-2019
Sample description	28-Nov-2019	26-Nov-2019	28-Nov-2019	28-Nov-2019
Total Dissolved Solids				03-Dec-2019
Total Organic Carbon	03-Dec-2019	29-Nov-2019	03-Dec-2019	03-Dec-2019
TPH CWG Filtered (W)	09-Dec-2019			
TPH CWG GC (S)	02-Dec-2019	29-Nov-2019	02-Dec-2019	02-Dec-2019
VOC MS (S)	02-Dec-2019	28-Nov-2019	02-Dec-2019	02-Dec-2019



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ASSOCIATED AQC DATA

Alkalinity Filtered as CaCO₃

Component	Method Code	QC 2146
Total Alkalinity Filtered as CaCO ₃	TM043	107.5 100.35 : 114.15

Ammoniacal Nitrogen

Component	Method Code	QC 2102
Ammoniacal Nitrogen as N	TM099	101.6 93.14 : 108.60

ANC at pH4 and ANC at pH 6

Component	Method Code	QC 2159
ANC pH_4 dry soil	TM182	105.57 86.97 : 113.03

Anions by Kone (w)

Component	Method Code	QC 2104	QC 2121
Chloride	TM184	105.0 92.93 : 115.43	109.0 92.93 : 115.43
Sulphate (soluble)	TM184	103.6 90.53 : 113.03	102.0 90.53 : 113.03
TON as NO ₃	TM184		103.0 96.26 : 111.21

Boron Water Soluble

Component	Method Code	QC 2112	QC 2150
Water Soluble Boron	TM222	96.5 85.80 : 112.50	94.5 85.80 : 112.50

Coronene

Component	Method Code	QC 2184
Coronene RAW	TM410	106.5 79.43 : 137.78



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Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2176	QC 2128	QC 2136
Free Cyanide	TM153	90.9 83.05 : 112.74	89.7 83.05 : 112.74	
Free Cyanide (W)	TM227			93.25 93.25 : 112.75
Thiocyanate	TM153	92.81 89.81 : 110.19	89.22 89.81 : 110.19	
Thiocyanate (W)	TM227			95.5 94.00 : 112.00
Total Cyanide	TM153	97.14 88.29 : 111.43	96.43 88.29 : 111.43	
Total Cyanide (W)	TM227			94.0 92.25 : 111.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 2109	QC 2127	QC 2126
Aluminium	TM152	101.33 94.12 : 114.23	102.0 94.12 : 114.23	107.33 95.37 : 118.13
Antimony	TM152	101.83 97.20 : 119.80	100.67 97.20 : 119.80	104.17 88.37 : 130.57
Arsenic	TM152	100.17 88.00 : 112.00	98.17 88.00 : 112.00	104.83 92.62 : 113.52
Barium	TM152	96.33 88.00 : 112.00	97.5 88.00 : 112.00	104.33 93.15 : 115.52
Beryllium	TM152	98.0 94.92 : 115.52	102.5 94.92 : 115.52	107.17 89.98 : 116.88
Bismuth	TM152	97.83 91.90 : 112.20	97.0 91.90 : 112.20	103.83 92.62 : 115.02
Borate	TM152	96.91 88.00 : 112.00	95.06 88.00 : 112.00	
Boron	TM152	97.0 96.48 : 114.93	94.67 96.48 : 114.93	99.0 86.31 : 120.88
Cadmium	TM152	99.83 98.47 : 110.87	98.67 98.47 : 110.87	105.0 93.85 : 111.65
Calcium	TM152	106.0 81.38 : 119.09	103.33 81.38 : 119.09	105.33 89.20 : 126.91
Chromium	TM152	98.0 94.62 : 110.87	99.17 94.62 : 110.87	103.0 92.22 : 109.85
Cobalt	TM152	97.67 88.00 : 112.00	100.83 88.00 : 112.00	103.67 85.01 : 114.87
Copper	TM152	99.83 92.47 : 118.11	102.17 92.47 : 118.11	104.67 89.87 : 119.73
Iron	TM152	98.0 92.00 : 113.00	102.0 92.00 : 113.00	104.67 93.02 : 113.86
Lead	TM152	97.33 88.00 : 112.00	99.67 88.00 : 112.00	104.83 91.11 : 116.98
Lithium	TM152	97.67 98.47 : 115.47	100.83 98.47 : 115.47	106.17 91.30 : 123.00
Magnesium	TM152	102.67 96.42 : 115.52	103.33 96.42 : 115.52	106.0 89.60 : 116.61
Manganese	TM152	97.5 97.94 : 109.97	100.5 97.94 : 109.97	105.67 93.97 : 112.46
Molybdenum	TM152	93.67 88.00 : 112.00	97.83 88.00 : 112.00	103.0 89.07 : 110.96



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Dissolved Metals by ICP-MS

		QC 2109	QC 2127	QC 2126
Nickel	TM152	97.33 88.00 : 112.00	100.0 88.00 : 112.00	103.0 93.70 : 112.15
Phosphorus	TM152	100.17 88.00 : 112.00	94.67 88.00 : 112.00	101.67 89.24 : 114.18
Potassium	TM152	104.67 98.67 : 116.86	103.33 98.67 : 116.86	106.0 97.98 : 117.40
Selenium	TM152	98.33 91.58 : 115.98	98.33 91.58 : 115.98	107.33 91.69 : 117.12
Silver	TM152	96.17 94.91 : 114.41	101.0 94.91 : 114.41	105.17 96.95 : 117.30
Sodium	TM152	100.67 95.92 : 112.85	103.33 95.92 : 112.85	106.0 92.42 : 113.24
Strontium	TM152	96.33 88.00 : 112.00	100.67 88.00 : 112.00	108.0 92.14 : 116.24
Tellurium	TM152	97.83 93.32 : 114.66	93.83 93.32 : 114.66	100.0 89.88 : 111.78
Thallium	TM152	93.0 88.00 : 112.00	93.0 88.00 : 112.00	97.33 86.08 : 122.48
Tin	TM152	101.67 91.00 : 109.00	103.83 91.00 : 109.00	106.83 91.00 : 109.00
Titanium	TM152	102.83 91.77 : 107.87	101.83 91.77 : 107.87	104.33 88.23 : 109.83
Tungsten	TM152	100.17 81.32 : 124.72	97.5 81.32 : 124.72	100.17 77.61 : 132.31
Uranium	TM152	93.67 88.00 : 112.00	96.83 88.00 : 112.00	101.33 86.97 : 115.76
Vanadium	TM152	97.33 88.00 : 112.00	100.83 88.00 : 112.00	108.0 89.61 : 115.48
Zinc	TM152	101.33 92.98 : 118.95	101.67 92.98 : 118.95	105.33 87.51 : 116.26

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2113	QC 2179
Dissolved Inorganic Carbon	TM090	111.67 93.58 : 112.28	101.33 91.27 : 109.87
Dissolved Organic Carbon	TM090	104.33 96.28 : 110.58	102.33 97.87 : 108.77

EPH CWG (Aromatic) Filtered GC (W)

Component	Method Code	QC 2171
Total Aromatics >EC10-EC40	TM174	89.51 73.75 : 120.32

EPH CWG GC (S)



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EPH CWG GC (S)

Component	Method Code	QC 2140	QC 2189
EPH >C8-C40 Raw	TM414	82.6 77.66 : 104.66	88.43 77.66 : 104.66
Total Aliphatics Raw	TM414	89.35 84.39 : 115.61	95.55 84.39 : 115.61
Total Aromatics Raw	TM414	102.52 81.11 : 118.89	110.65 81.11 : 118.89

Fluoride

Component	Method Code	QC 2118
Fluoride	TM104	102.0 95.51 : 107.24

GRO by GC-FID (S)

Component	Method Code	QC 2117	QC 2104
QC	TM089	94.69 72.28 : 114.54	89.8 70.75 : 114.19

GRO by GC-FID (W)

Component	Method Code	QC 2184
Benzene by GC	TM245	88.0 76.38 : 121.90
Ethylbenzene by GC	TM245	94.0 74.02 : 123.14
m & p Xylene by GC	TM245	95.75 74.03 : 123.21
MTBE GC-FID	TM245	87.0 76.82 : 121.46
o Xylene by GC	TM245	95.5 74.37 : 122.75
QC	TM245	89.04 63.32 : 125.20
Toluene by GC	TM245	91.5 75.75 : 124.83

Hexavalent Chromium (s)

Component	Method Code	QC 2108
Hexavalent Chromium	TM151	102.0 90.20 : 107.00

Loss on Ignition in soils



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Loss on Ignition in soils

Component	Method Code	QC 2129
Loss on Ignition	TM018	99.76 87.56 : 104.24

Mercury Dissolved

Component	Method Code	QC 2190	QC 2129
Mercury Dissolved (CVAF)	TM183	105.0 76.80 : 117.12	90.5 76.80 : 117.12

Metals in solid samples by OES

Component	Method Code	QC 2139	QC 2120	QC 2139	QC 2192
Aluminium	TM181	91.15 77.84 : 119.01	96.46 77.84 : 119.01	94.69 77.84 : 119.01	91.15 77.84 : 119.01
Antimony	TM181	94.72 84.28 : 107.67	107.72 84.28 : 107.67	105.28 84.28 : 107.67	99.19 84.28 : 107.67
Arsenic	TM181	98.55 87.05 : 109.36	97.38 87.05 : 109.36	98.55 87.05 : 109.36	99.13 87.05 : 109.36
Barium	TM181	95.41 82.49 : 109.34	102.75 82.49 : 109.34	99.08 82.49 : 109.34	94.5 82.49 : 109.34
Beryllium	TM181	95.52 85.44 : 109.61	101.49 85.44 : 109.61	100.37 85.44 : 109.61	97.39 85.44 : 109.61
Boron	TM181	83.95 73.51 : 104.66	94.84 73.51 : 104.66	91.69 73.51 : 104.66	85.1 73.51 : 104.66
Cadmium	TM181	91.77 81.46 : 106.43	93.42 81.46 : 106.43	90.95 81.46 : 106.43	92.59 81.46 : 106.43
Chromium	TM181	89.25 82.26 : 104.55	112.37 82.26 : 104.55	98.38 82.26 : 104.55	92.49 82.26 : 104.55
Cobalt	TM181	88.36 86.54 : 106.87	88.68 86.54 : 106.87	89.31 86.54 : 106.87	89.31 86.54 : 106.87
Copper	TM181	90.67 82.40 : 105.45	99.65 82.40 : 105.45	97.89 82.40 : 105.45	94.01 82.40 : 105.45
Iron	TM181	93.65 82.95 : 110.58	98.41 82.95 : 110.58	97.62 82.95 : 110.58	96.03 82.95 : 110.58
Lead	TM181	88.51 78.24 : 104.05	87.84 78.24 : 104.05	87.84 78.24 : 104.05	90.54 78.24 : 104.05
Manganese	TM181	103.06 94.29 : 119.51	111.11 94.29 : 119.51	115.0 94.29 : 119.51	109.17 94.29 : 119.51
Mercury	TM181	93.0 83.74 : 105.34	94.44 83.74 : 105.34	95.65 83.74 : 105.34	94.69 83.74 : 105.34
Molybdenum	TM181	94.24 87.11 : 106.87	101.23 87.11 : 106.87	101.65 87.11 : 106.87	96.71 87.11 : 106.87
Nickel	TM181	88.75 81.92 : 102.18	101.96 81.92 : 102.18	92.67 81.92 : 102.18	89.98 81.92 : 102.18
Phosphorus	TM181	105.05 94.56 : 124.28	108.48 94.56 : 124.28	110.51 94.56 : 124.28	107.68 94.56 : 124.28



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Metals in solid samples by OES

		QC 2139	QC 2120	QC 2139	QC 2192
Selenium	TM181	97.65 86.28 : 110.48	102.75 86.28 : 110.48	100.39 86.28 : 110.48	99.22 86.28 : 110.48
Strontium	TM181	86.19 79.13 : 102.79	95.77 79.13 : 102.79	94.88 79.13 : 102.79	88.42 79.13 : 102.79
Thallium	TM181	93.36 82.94 : 111.86	99.56 82.94 : 111.86	106.19 82.94 : 111.86	95.13 82.94 : 111.86
Tin	TM181	97.34 90.25 : 108.86	99.62 90.25 : 108.86	100.76 90.25 : 108.86	98.48 90.25 : 108.86
Titanium	TM181	77.1 66.23 : 102.06	87.02 66.23 : 102.06	83.21 66.23 : 102.06	75.73 66.23 : 102.06
Vanadium	TM181	90.11 86.37 : 107.94	102.2 86.37 : 107.94	100.37 86.37 : 107.94	95.6 86.37 : 107.94
Zinc	TM181	95.28 84.68 : 113.99	103.08 84.68 : 113.99	102.26 84.68 : 113.99	96.71 84.68 : 113.99

Mineral Oil

Component	Method Code	QC 2107
Mineral Oil	TM061	96.33 77.46 : 100.36

PAH by GCMS

Component	Method Code	QC 2170	QC 2173	QC 2156	QC 2170
Acenaphthene	TM218	82.0 70.00 : 130.00	92.0 76.79 : 103.90	88.0 76.79 : 103.90	85.5 70.00 : 130.00
Acenaphthylene	TM218	82.5 70.00 : 130.00	89.5 78.40 : 108.66	86.0 78.40 : 108.66	86.5 70.00 : 130.00
Anthracene	TM218	81.5 70.00 : 130.00	89.0 76.15 : 110.07	85.5 76.15 : 110.07	85.0 70.00 : 130.00
Benz(a)anthracene	TM218	87.0 68.12 : 118.39	87.0 73.77 : 119.26	87.5 73.77 : 119.26	84.5 68.12 : 118.39
Benzo(a)pyrene	TM218	85.0 71.72 : 115.31	84.5 73.20 : 114.18	87.0 73.20 : 114.18	81.0 71.72 : 115.31
Benzo(b)fluoranthene	TM218	77.5 66.89 : 120.40	84.5 75.36 : 117.58	80.0 75.36 : 117.58	79.5 66.89 : 120.40
Benzo(ghi)perylene	TM218	83.0 67.82 : 118.49	90.0 70.73 : 116.12	90.5 70.73 : 116.12	81.5 67.82 : 118.49
Benzo(k)fluoranthene	TM218	87.5 73.10 : 117.03	89.5 75.98 : 116.59	84.0 75.98 : 116.59	82.0 73.10 : 117.03
Chrysene	TM218	82.5 69.58 : 115.47	89.0 74.82 : 114.18	83.0 74.82 : 114.18	85.0 69.58 : 115.47
Dibenzo(ah)anthracene	TM218	82.0 67.32 : 121.35	86.0 69.17 : 115.30	87.5 69.17 : 115.30	83.0 67.32 : 121.35
Fluoranthene	TM218	85.5 75.16 : 117.28	86.5 75.88 : 112.84	80.5 75.88 : 112.84	85.5 75.16 : 117.28
Fluorene	TM218	83.5 70.00 : 130.00	90.0 78.50 : 114.02	87.5 78.50 : 114.02	86.0 70.00 : 130.00
Indeno(123cd)pyrene	TM218	82.5 68.91 : 117.62	81.5 70.26 : 117.95	81.5 70.26 : 117.95	79.5 68.91 : 117.62



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PAH by GCMS

		QC 2170	QC 2173	QC 2156	QC 2170
Naphthalene	TM218	79.0 70.00 : 130.00	90.5 75.24 : 111.26	86.5 75.24 : 111.26	86.5 70.00 : 130.00
Phenanthrene	TM218	83.5 70.00 : 130.00	88.0 77.07 : 107.43	83.5 77.07 : 107.43	85.0 70.00 : 130.00
Pyrene	TM218	83.5 75.68 : 119.23	88.5 78.74 : 112.56	83.0 78.74 : 112.56	86.0 75.68 : 119.23

PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC 2181
Acenaphthene (diss.filt)	TM178	103.2 93.20 : 119.60
Acenaphthylene (diss.filt)	TM178	102.0 92.00 : 118.40
Anthracene (diss.filt)	TM178	103.2 90.80 : 114.80
Benzo(a)anthracene (diss.filt)	TM178	102.0 91.60 : 115.60
Benzo(a)pyrene (diss.filt)	TM178	100.0 91.20 : 120.00
Benzo(b)fluoranthene (diss.filt)	TM178	108.4 86.80 : 120.40
Benzo(g,h,i)perylene (diss.filt)	TM178	104.0 89.20 : 118.00
Benzo(k)fluoranthene (diss.filt)	TM178	108.0 94.40 : 125.60
Chrysene (diss.filt)	TM178	104.0 96.40 : 122.80
Dibenzo(a,h)anthracene (diss.filt)	TM178	107.2 93.60 : 132.00
Fluoranthene (diss.filt)	TM178	106.0 92.80 : 121.60
Fluorene (diss.filt)	TM178	105.2 93.60 : 120.00
Indeno(1,2,3-cd)pyrene (diss.filt)	TM178	101.6 82.40 : 120.80
Naphthalene (diss.filt)	TM178	102.8 88.40 : 126.80
Phenanthrene (diss.filt)	TM178	103.2 92.40 : 118.80
Pyrene (diss.filt)	TM178	102.8 90.40 : 124.00

PCBs by GCMS

Component	Method Code	QC 2187	QC 2191
PCB congener 101	TM168	85.8 68.36 : 114.38	87.9 79.46 : 109.70
PCB congener 105	TM168	77.3 66.27 : 108.27	73.5 66.33 : 105.75
PCB congener 114	TM168	73.3 67.07 : 107.93	74.1 66.41 : 106.49
PCB congener 118	TM168	80.1 70.76 : 113.78	77.0 70.33 : 110.29



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PCBs by GCMS

		QC 2187	QC 2191
PCB congener 123	TM168	70.2 62.93 : 112.01	79.0 65.01 : 99.81
PCB congener 126	TM168	73.0 64.53 : 113.25	72.9 59.31 : 109.23
PCB congener 138	TM168	73.6 67.00 : 113.56	71.9 63.95 : 107.63
PCB congener 153	TM168	75.3 66.72 : 108.24	74.8 62.65 : 108.85
PCB congener 156	TM168	76.5 67.18 : 112.96	74.8 61.69 : 112.27
PCB congener 157	TM168	77.2 63.19 : 112.63	74.4 67.15 : 109.93
PCB congener 167	TM168	78.4 65.20 : 113.08	75.8 65.58 : 109.14
PCB congener 169	TM168	73.1 64.01 : 129.89	73.3 56.84 : 112.10
PCB congener 180	TM168	78.5 66.40 : 113.20	77.2 66.99 : 111.63
PCB congener 189	TM168	77.7 65.53 : 126.07	73.9 57.75 : 112.59
PCB congener 28	TM168	82.4 69.86 : 112.28	79.2 73.68 : 105.96
PCB congener 52	TM168	80.5 70.12 : 107.92	75.9 67.24 : 107.62
PCB congener 77	TM168	81.1 67.40 : 114.26	72.4 64.87 : 108.49
PCB congener 81	TM168	79.4 71.38 : 116.14	80.9 70.78 : 110.80

pH

Component	Method Code	QC 2100	QC 2100
pH	TM133	98.37 97.44 : 100.93	99.53 97.44 : 100.93

pH Value of Filtered Water

Component	Method Code	QC 2168
pH Value of Filtered Water	TM256	101.89 99.73 : 102.16

Phenols by HPLC (S)



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Phenols by HPLC (S)

Component	Method Code	QC 2106	QC 2126
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	103.25 65.50 : 89.50	124.68 65.50 : 89.50
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	95.91 86.25 : 116.25	85.38 86.25 : 116.25
Catechol by HPLC (S)	TM062 (S)	83.81 19.39 : 135.70	15.24 19.39 : 135.70
Cresols by HPLC (S)	TM062 (S)	100.84 81.00 : 112.20	87.89 81.00 : 112.20
Napthol by HPLC (S)	TM062 (S)	118.57 57.50 : 102.50	42.14 57.50 : 102.50
Phenol by HPLC (S)	TM062 (S)	103.97 95.33 : 123.33	97.35 95.33 : 123.33
Resorcinol HPLC (S)	TM062 (S)	103.77 69.99 : 127.22	87.42 69.99 : 127.22
Xylenols by HPLC (S)	TM062 (S)	98.96 90.22 : 114.22	90.1 90.22 : 114.22

Phenols by HPLC (W)

Component	Method Code	QC 2158	QC 2101
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	100.0 91.00 : 109.00	96.0 91.00 : 109.00
2-Isopropyl Phenol by HPLC (W)	TM259	97.0 90.00 : 114.00	93.0 90.00 : 114.00
Cresols by HPLC (W)	TM259	106.33 90.02 : 130.15	104.0 90.02 : 130.15
Napthol by HPLC (W)	TM259	94.0 86.00 : 128.00	98.0 86.00 : 128.00
Phenol by HPLC (W)	TM259	101.0 85.89 : 109.89	100.0 85.89 : 109.89
Xylenols by HPLC (W)	TM259	99.83 93.33 : 107.33	99.0 93.33 : 107.33

Total Dissolved Solids

Component	Method Code	QC 2142
Total Dissolved Solids	TM123	99.5 97.30 : 100.92

Total Organic Carbon

Component	Method Code	QC 2114	QC 2134
Total Organic Carbon	TM132	98.83 84.82 : 117.61	98.44 84.82 : 117.61

VOC MS (S)



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VOC MS (S)

Component	Method Code	QC 2185	QC 2162
1,1,1,2-tetrachloroethane	TM116	103.2 77.47 : 121.29	99.8 77.47 : 121.29
1,1,1-Trichloroethane	TM116	108.2 86.26 : 117.53	100.4 86.26 : 117.53
1,1,2-Trichloroethane	TM116	97.8 75.16 : 112.70	100.8 75.16 : 112.70
1,1-Dichloroethane	TM116	101.6 83.27 : 122.16	95.6 83.27 : 122.16
1,2-Dichloroethane	TM116	108.2 86.58 : 129.62	115.2 86.58 : 129.62
1,4-Dichlorobenzene	TM116	96.6 82.59 : 123.23	100.2 82.59 : 123.23
2-Chlorotoluene	TM116	87.2 66.81 : 118.43	85.4 66.81 : 118.43
4-Chlorotoluene	TM116	88.6 65.88 : 114.76	85.8 65.88 : 114.76
Benzene	TM116	98.2 93.16 : 123.63	96.2 93.16 : 123.63
Carbon Disulphide	TM116	89.2 75.11 : 124.81	86.6 75.11 : 124.81
Carbontetrachloride	TM116	109.4 82.35 : 126.46	103.6 82.35 : 126.46
Chlorobenzene	TM116	97.6 82.88 : 122.42	97.6 82.88 : 122.42
Chloroform	TM116	107.4 88.13 : 122.71	103.4 88.13 : 122.71
Chloromethane	TM116	83.6 55.37 : 133.35	78.6 55.37 : 133.35
Cis-1,2-Dichloroethene	TM116	101.0 78.27 : 128.90	98.2 78.27 : 128.90
Dibromomethane	TM116	102.0 77.47 : 121.29	110.6 77.47 : 121.29
Dichloromethane	TM116	106.8 81.68 : 125.21	105.4 81.68 : 125.21
Ethylbenzene	TM116	89.0 83.56 : 122.99	86.8 83.56 : 122.99
Hexachlorobutadiene	TM116	86.8 7.32 : 139.00	81.0 7.32 : 139.00
Isopropylbenzene	TM116	82.6 69.92 : 116.39	78.0 69.92 : 116.39
Naphthalene	TM116	82.4 79.29 : 125.59	88.2 79.29 : 125.59
o-Xylene	TM116	89.4 74.57 : 112.73	87.2 74.57 : 112.73
p/m-Xylene	TM116	87.3 77.41 : 112.71	86.7 77.41 : 112.71
Sec-Butylbenzene	TM116	80.6 44.71 : 117.87	78.2 44.71 : 117.87
Tetrachloroethene	TM116	101.0 81.43 : 126.65	97.6 81.43 : 126.65
Toluene	TM116	92.6 87.82 : 116.21	91.4 87.82 : 116.21
Trichloroethene	TM116	97.6 79.80 : 112.33	95.6 79.80 : 112.33



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VOC MS (S)

		QC 2185	QC 2162
Trichlorofluoromethane	TM116	115.6 80.52 : 132.12	108.0 80.52 : 132.12
Vinyl Chloride	TM116	96.4 58.08 : 128.58	89.8 58.08 : 128.58

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



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SDG:	191126-10	Client Reference:	A114954	Report Number:	533293
Location:	Christies Hospital	Order Number:	A114954	Superseded Report:	532641

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107)*.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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WYG Geo-Environment
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M17 1HH

Attention: Duncan Freeman

CERTIFICATE OF ANALYSIS

Date of report Generation:	19 December 2016
Customer:	WYG Geo-Environment
Sample Delivery Group (SDG):	161129-11
Your Reference:	A114654
Location:	Christies Hospital
Report No:	534127

This report has been revised and directly supersedes 533368 in its entirety.

We received 15 samples on Tuesday November 29, 2016 and 11 of these samples were scheduled for analysis which was completed on Monday December 19, 2016. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21223488	BH101	ES1	0.40 - 0.40	16/11/2016
21223462	BH101	ES2	0.70 - 0.70	16/11/2016
21223469	BH102	ES1	0.40 - 0.40	16/11/2016
21223500	BH102	ES2	0.80 - 0.80	16/11/2016
21223504	BH103	ES1	0.90 - 0.90	16/11/2016
21223520	BH109	ES1	0.20 - 0.20	18/11/2016
21223524	BH109	ES2	1.20 - 1.20	18/11/2016
21223539	BH107	ES1	0.30 - 0.30	16/11/2016
21223540	BH107	ES2	0.70 - 0.70	16/11/2016
21223482	BH107	ES3	1.10 - 1.10	16/11/2016
21223528	BH108	ES1	0.20 - 0.20	16/11/2016
21223532	BH108	ES2	0.70 - 0.70	16/11/2016
21223478	BH106	ES1	0.40 - 0.40	18/11/2016
21223508	BH106	ES2	0.55 - 0.55	18/11/2016
21223512	BH106	ES3	0.70 - 0.70	18/11/2016

Maximum Sample/Coolbox Temperature (°C) :

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

4.8

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
21223488	BH101	ES1	0.40 - 0.40	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223469	BH102	ES1	0.40 - 0.40	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223500	BH102	ES2	0.80 - 0.80	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223504	BH103	ES1	0.90 - 0.90	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223520	BH109	ES1	0.20 - 0.20	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223539	BH107	ES1	0.30 - 0.30	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223540	BH107	ES2	0.70 - 0.70	1kg TUB	S
Alkalinity Filtered as CaCO3	All	NDPs: 0 Tests: 3			
A1 1 mmaoal Nitrmten	All	NDPs: 0 Tests: 3			
ANC at gp Hand ANC at gp 4	All	NDPs: 0 Tests: H			
Animms 6y brme Kml(	All	NDPs: 0 Tests:))			
Animms 6y brme Kw(	All	NDPs: 0 Tests: 2			
As6estms ID in Sntid Sa1 gles	All	NDPs: 0 Tests:))			
Bmm Water Sntu6le	All	NDPs: 0 Tests:))			
CEN Readincs	All	NDPs: 0 Tests: 2			
Chrmf iu1 III	All	NDPs: 0 Tests:))			
Cmmene	All	NDPs: 0 Tests: H			
Cyanide Cml g/Free/Tmtal/Thimpyanate	All	NDPs: 0 Tests:)H			
Dissm5ed v etals 6y ICPM S	All	NDPs: 0 Tests: 2			
Dissm5ed Orcanio/Inmrcanio Car6m	All	NDPs: 0 Tests: 2			
EPp CW- KAlighatio(Filtered - C KW(	All	NDPs: 0 Tests: 3			
EPp CW- KAmf atio(Filtered - C KW(	All	NDPs: 0 Tests: 3			



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
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Client Reference: A114654
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Results Legend

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OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
21223488	BH101	ES1	0.40 - 0.40	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223469	BH102	ES1	0.40 - 0.40	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223500	BH102	ES2	0.80 - 0.80	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223504	BH103	ES1	0.90 - 0.90	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223520	BH109	ES1	0.20 - 0.20	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223539	BH107	ES1	0.30 - 0.30	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
21223540	BH107	ES2	0.70 - 0.70	90g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	S
EPp CW- - C IS(	All	NDPs: 0 Tests:))			
Flumide	All	NDPs: 0 Tests: H			
- RO 6y - CNFID IS(	All	NDPs: 0 Tests:))			
- RO 6y - CNFID KW(	All	NDPs: 0 Tests: 3			
peCaSalent Chrmf iu1 IS(	All	NDPs: 0 Tests:))			
xms mm lcnitrm in smis	All	NDPs: 0 Tests: H			
v eroury Dissntfied	All	NDPs: 0 Tests: 2			
v etals in smtd sa1 gles 6y OES	All	NDPs: 0 Tests:))			
v ineral Oil	All	NDPs: 0 Tests: H			
Nitrite 6y brme KW(	All	NDPs: 0 Tests: 3			
PAp) 4 L) & Calo	All	NDPs: 0 Tests: H			
PAp 6y - Cv S	All	NDPs: 0 Tests:))			
PAp in waters 6y - CNF S KdissZilt(	All	NDPs: 0 Tests: 3			
PCBs 6y - Cv S	All	NDPs: 0 Tests: 2			
gp	All	NDPs: 0 Tests:))			



CERTIFICATE OF ANALYSIS

Validated

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Client Reference: A114654
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Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
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SW - Surface Water
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PR - Process Water
SA - Saline Water
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TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	21223488	BH101	ES1	0.40 - 0.40	90g VOC (ALE215)	S	S	S	S	S	S	S
	21223469	BH102	ES1	0.40 - 0.40	250g Amber Jar (ALE210)	S	S	S	S	S	S	S
	21223500	BH102	ES2	0.80 - 0.80	90g VOC (ALE215)	S	S	S	S	S	S	S
	21223504	BH103	ES1	0.90 - 0.90	250g Amber Jar (ALE210)	S	S	S	S	S	S	S
	21223520	BH109	ES1	0.20 - 0.20	90g VOC (ALE215)	S	S	S	S	S	S	S
gp f alue m Filtered Water	All	NDPs: 0 Tests: 3	X	X	X							
Phennits 6y pPx C K6(	All	NDPs: 0 Tests:))	X	X	X	X	X	X	X	X		
Phennits 6y pPx C KW(	All	NDPs: 0 Tests: 2	X	X	X	X	X	X	X	X		
Sa1 gle desorigtlim	All	NDPs: 0 Tests:))	X	X	X	X	X	X	X	X		
Tntal Dissm5ed Smlids	All	NDPs: 0 Tests: H	X	X	X	X	X	X	X	X		
Tntal Orcanio Car6m	All	NDPs: 0 Tests:))	X	X	X	X	X	X	X	X		
TPp CW- Filtered KW(	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X		
TPp CW- - C K6(	All	NDPs: 0 Tests:))	X	X	X	X	X	X	X	X		
f OC v S K6(	All	NDPs: 0 Tests:))	X	X	X	X	X	X	X	X		



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SDG: 161129-11
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Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
Vj W3H9	Bp) 0)	070 M070	Dark Brwn	xnæ1 y Sand	Stmes	f ecetatim
Vj W3H4	Bp) 0V	070 M070	Dark Brwn	Sandy xnæ1	f ecetatim	Stmes
Vj W3200	Bp) 0V	070 M070	Dark Brwn	xnæ1 y Sand	f ecetatim	Brick
Vj W320H	Bp) 03	070 M070	Dark Brwn	Sand	Stmes	Nme
Vj W32V0	Bp) 04	070 M070	Black	Sand	Stmes	Nme
Vj W3234	Bp) 0&	070 M070	Black	Sand	Stmes	Nme
Vj W32H0	Bp) 0&	070 M070	Dark Brwn	xnæ1 y Sand	Stmes	Nme
Vj W32V9	Bp) 09	070 M070	Dark Brwn	Sand	Stmes	Nme
Vj W323V	Bp) 09	070 M070	Dark Brwn	Sand	Stmes	Nme
Vj W3H89	Bp) 0%	070 M070	Dark Brwn	Sandy xnæ1	f ecetatim	Brick
Vj W32) V	Bp) 0%	070 M070	Dark Brwn	Clay xnæ1	Stmes	Brick

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

Results Legend		Customer Sample Ref.						
#	ISO17025 accredited.		Bp)0)	Bp)0V	Bp)0V	Bp)03	Bp)04	Bp)0&
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3+5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
v mixture Cmrtent RatimK- m as receiSed sa1 gle(	<	Pv 0VH	) V	) 2	) 0	) H	H2	47%
xms nm icnltim	80% <	Tv 0) 9		37H		3709	V74V	
v ineral Oil Surrmcate < reonbery**	<	Tv 04)		90&		93	9)	
v ineral nil >C) 0MCHD	8) 1 c/kc	Tv 04)		8)		3V2	20H	
Phenml	8070) 1 c/kc	Tv 04V K(	8070)	8070)	8070)	8070)	8070)	8070)
Orcanio Car6mm, Tntal	807V <	Tv) 3V		) 73		074H%	) 7 V	
Fraotim Orcanio Car6mm KFOC(	80700V	Tv) 3V	070924	070) 33	070) 0)	07004H%	070)) V	070V0H
gp	) gp Units	Tv) 33	47&2	9734	97V)	972)	%7V3	87V4
Chrmf iu1 , peG&5alent	8074 1 c/kc	Tv) 2)	8074	8074	8074	8074	8074	8074
Cyanide, Easily li6erata6le Kmw le5el(	8072 1 c/kc	Tv) 23	8072	8072	8072	8072	8072	8072
PCB omcener V9	807003 1 c/kc	Tv) 49		807003	807003	80703	80703	
PCB omcener 2V	807003 1 c/kc	Tv) 49		807003	807003	80703	80703	
PCB omcener) 0)	807003 1 c/kc	Tv) 49		807003	807003	80703	80703	
PCB omcener)) 9	807003 1 c/kc	Tv) 49		807003	807003	80703	80703	
PCB omcener) 39	807003 1 c/kc	Tv) 49		807003	807003	80703	80703	
PCB omcener) 23	807003 1 c/kc	Tv) 49		807003	807003	80703	80703	
PCB omcener) 90	807003 1 c/kc	Tv) 49		807003	807003	80703	80703	
Su1 m detected PCB & Cmceners	8070V) 1 c/kc	Tv) 49		8070V)	8070V)	807V)	807V)	
Chrmf iu1 , Tri5alent	807%1 c/kc	Tv) 9)	27H	) 0&	&7&2	47VH	47VV	&70%
Arsenio	8074 1 c/kc	Tv) 9)	H7V	27H	27&3	H733	37 2	37V&
Berylliu1	8070) 1 c/kc	Tv) 9)	07V49	07423	073%V	0739%	07V&4	07V4&
Cad1 iu1	8070V1 c/kc	Tv) 9)	07 3)	070&99	07V4V	07 &&	0720V	07H)
Chrmf iu1	807%1 c/kc	Tv) 9)	27H	) 0&	&7&2	47VH	47VV	&70%
Cngger	8) 7H1 c/kc	Tv) 9)	) 37H	) V74	) 4	) V7V	%7&3	) V79
read	807&1 c/kc	Tv) 9)	2V74	H)	97&3	2479	337V	242
v eroury	807H1 c/kc	Tv) 9)	807H	807H	807H	807H	807H	807H
Nickel	807V1 c/kc	Tv) 9)	27&4	) H7%	)) 7&	&72H	&7H	979)
Seleniu1	8) 1 c/kc	Tv) 9)	8)	8)	8)	8)	8)	8)
f anadiu1	807V1 c/kc	Tv) 9)	%7 9	) 474	)) 7%	)) 7H	) V7&	) 4
Zino	8) 7%1 c/kc	Tv) 9)	3V7V	307%	297H	307%	2274	4V7)
ANC @ gp H	80703 1 n/kc	Tv) 9V		070904		07 VH	073HH	
ANC @ gp 4	80703 1 n/kc	Tv) 9V		80703		070H94	07 3)	
Bmm, water snlu6le	8) 1 c/kc	Tv VV	8)	8)	8)	8)	8)	8)



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

Results Legend		Customer Sample Ref.		Bp) 0&	Bp) 09	Bp) 09	Bp) 0%	Bp) 0%	
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	Method	07& 07&0	07& 07&0	07& 07&0	07& 07&0	07& 07&0	
M	mCERTS accredited.			Smtl/Smtld K&() %) /&0) %	Smtl/Smtld K&() %) /&0) %	Smtl/Smtld K&() %) /&0) %	Smtl/Smtld K&() %) /&0) %	Smtl/Smtld K&() %) /&0) %	
sq	Aqueous / settled sample.			7	7	7	7	7	
dis.filt	Dissolved / filtered sample.			V4/) /&0) %	V4/) /&0) %	V4/) /&0) %	V4/) /&0) %	V4/) /&0) %	
tot.unfilt	Total / unfiltered sample.			) %) V4/)	) %) V4/)	) %) V4/)	) %) V4/)	) %) V4/)	
*	Subcontracted - refer to subcontractor report for accreditation status.			V) V32H	V) V32V9	V) V323V	V) V3H&9	V) V32) V	
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery			ESV	ES	ESV	ES	ES3	
(F)	Trigger breach confirmed								
1-3+&@	Sample deviation (see appendix)								
Component	LOD/Units	Method							
v mixture Cmrtent RatimK- m as recei5ed sa1 gle(	<	Pv 0VH		) H	&Z	))	&Z	) %	
xms nm icnitiim	80Z <	Tv 0) 9						37&2	
v ineral Oil Surrmcate < reon&ery**	<	Tv 04)						93	
v ineral nil >C) 0N&H0	8) 1 c/kc	Tv 04)						8)	
Phenml	80Z) 1 c/kc	Tv 04V K&(v		80Z)	80Z)	80Z)	80Z)	80Z)	
Orcanio Car&mm, Tntal	80ZV <	Tv) 3V						0Z&2	
Fraotirm Orcanio Car&mm KFOC(	80Z0V	Tv) 3V		0Z) V)	0Z)) 2	0Z030)	0Z) V)	0Z03H2	
gp	) gp Units	Tv) 33		&7% v	)) 7	9Z4	) 0&9	9Z2	
Chrmf iu1 , pe&5alent	80Z 1 c/kc	Tv) 2)		80Z	80Z	80Z	80Z	80Z	
Cyanide, Easily li&erata&le Kmw le5el(	80Z 1 c/kc	Tv) 23		80Z	80Z	80Z	80Z	80Z	
PCB omcener V9	80Z03 1 c/kc	Tv) 49						80Z03	
PCB omcener 2V	80Z03 1 c/kc	Tv) 49						80Z03	
PCB omcener) 0)	80Z03 1 c/kc	Tv) 49						80Z03	
PCB omcener)) 9	80Z03 1 c/kc	Tv) 49						80Z03	
PCB omcener) 39	80Z03 1 c/kc	Tv) 49						80Z03	
PCB omcener) 23	80Z03 1 c/kc	Tv) 49						80Z03	
PCB omcener) 90	80Z03 1 c/kc	Tv) 49						80Z03	
Su1 m detected PCB & Cmnceners	80ZV) 1 c/kc	Tv) 49						80ZV)	
Chrmf iu1 , Tri&alent	80Z%1 c/kc	Tv) 9)		&Z3	) 2	) 7H	4Z3%	V3	
Arsenio	80Z 1 c/kc	Tv) 9)		27% v	2Z	) 7H	V7%	9Z&2	
Berylliu1	80Z) 1 c/kc	Tv) 9)		0ZV% v	0Z3)	0Z04H9	0Z) &	) Z2	
Cad1 iu1	80ZV 1 c/kc	Tv) 9)		0Z099)	0Z42	0Z0V4V	0Z) %	80ZV	
Chrmf iu1	80Z%1 c/kc	Tv) 9)		&Z3	) 2	) 7H	4Z3%	V3	
Cngger	8) 7H1 c/kc	Tv) 9)		) 97	) 2&9	3Z)	4Z3	) VZ2	
read	80Z 1 c/kc	Tv) 9)		32H00	VH&4	) %ZV	) V7	) 3&9	
v eroury	80Z H1 c/kc	Tv) 9)		80Z H	80Z H	80Z H	80Z H	80Z H	
Nickel	80ZV 1 c/kc	Tv) 9)		)) 7	) 4	) Z3	9Z43	V) 7	
Seleniu1	8) 1 c/kc	Tv) 9)		8)	8)	8)	8)	8)	
f anadiu1	80ZV 1 c/kc	Tv) 9)		) V7	VZ2	) 7H	)) Z	V&7%	
Zino	8) 7%1 c/kc	Tv) 9)		2V&9	%Z4	4Z22	2) 7V	H%	
ANC @ gp H	80Z3 1 n/kc	Tv) 9V						0Z04) 2	
ANC @ gp 4	80Z3 1 n/kc	Tv) 9V						80Z3	
Bmm, water snlu&le	8) 1 c/kc	Tv VV		8)	8)	8)	8)	8)	

SDG:	161129-11
Location:	Christies Hospital

Client Reference:	A114654
Order Number:	A114654

Report Number:	534127
Superseded Report:	533398

TPH CWG (S)[illegible]

SDG:	161129-11
Location:	Christies Hospital

Client Reference:	A114654
Order Number:	A114654

Report Number:	534127
Superseded Report:	533398

TPH CWG (S)[illegible]



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
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Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*\$@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH101ES1 0.40 - 0.40 SOLID 19/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223488 TM048	02/12/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH102ES1 0.40 - 0.40 SOLID 19/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223496 TM048	02/12/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH102ES2 0.80 - 0.80 SOLID 19/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223500 TM048	03/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH103ES1 0.60 - 0.60 SOLID 19/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223504 TM048	03/12/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH106ES1 0.20 - 0.20 SOLID 18/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223520 TM048	03/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH107ES1 0.30 - 0.30 SOLID 19/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223536 TM048	02/12/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH107ES2 0.70 - 0.70 SOLID 19/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223540 TM048	03/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH108ES1 0.20 - 0.20 SOLID 19/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223528 TM048	03/12/2019	Barbara Urbanek-Wals h	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

SDG: 161129-11
Location: Christies Hospital**Client Reference:** A114654
Order Number: A114654**Report Number:** 534127
Superseded Report: 533398

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH108ES2 0.70 - 0.70 SOLID 19/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223532 TM048	03/12/19	Andrzej Fernecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH109ES1 0.40 - 0.40 SOLID 18/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223478 TM048	03/12/2019	Barbara Urbanek-Wals h	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH109ES3 0.70 - 0.70 SOLID 18/11/2019 00:00:00 26/11/2019 06:40:00 191126-11 21223512 TM048	03/12/2019	Barbara Urbanek-Wals h	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.109

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 17.9

Dry Matter Content (%) 85

Case

SDG 161129-11

Lab Sample Number(s) 21223469

Sampled Date 16-Nov-2016

Customer Sample Ref. BH102 ES1

Depth (m) 0.40 - 0.40

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	9
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>9	-
-	-	-
-	-	-

Solid Waste Analysis

Result

Total Organic Carbon (%)	1.33
Loss on Ignition (%)	3.94
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	<1
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.39
ANC to pH 9 (mol/kg)	<0.03
ANC to pH 4 (mol/kg)	0.0809

Eluate Analysis

C2

Concⁿ in 10:1 eluate (mg/l)

A2

10:1 concⁿ leached (mg/kg)

Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg

	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00457	<0.0005	0.0457	<0.005	0.5	2	25
Barium	0.212	<0.0002	2.12	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00632	<0.0003	0.0632	<0.003	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00395	<0.003	0.0395	<0.03	0.5	10	30
Nickel	0.00113	<0.0004	0.0113	<0.004	0.4	10	40
Lead	0.00218	<0.0002	0.0218	<0.002	0.5	10	50
Antimony	0.0118	<0.001	0.118	<0.01	0.09	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.0286	<0.001	0.286	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	0.561	<0.5	5.61	<5	10	150	500
Sulphate (soluble)	9.1	<2	91	<20	1000	20000	50000
Total Dissolved Solids	88.1	<5	881	<50	4000	90000	100000
Total Monohydric Phenols (W)	<0.019	<0.019	<0.19	<0.19	1	-	-
Dissolved Organic Carbon	8.04	<3	80.4	<30	500	800	1000

Leach Test Information

Date Prepared	28-Nov-2016
pH (pH Units)	8.39
Conductivity (µS/cm)	121.00
Temperature (°C)	16.20
Volume Leachant (Litres)	0.884

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates

19/12/2016 06:17:46

06:17:39 19/12/2016



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.105

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 19.3

Dry Matter Content (%) 89

Case

SDG 161129-11

Lab Sample Number(s) 21223504

Sampled Date 16-Nov-2016

Customer Sample Ref. BH103 ES1

Depth (m) 0.90 - 0.90

Landfill Waste Acceptance Criteria Limits

Solid Waste Analysis

Result

Total Organic Carbon (%) 0.646

Loss on Ignition (%) 3.08

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) <0.21

Mineral Oil (mg/kg) 325

PAH Sum of 17 (mg/kg) 57.5

pH (pH Units) 8.51

ANC to pH 9 (mol/kg) 0.0489

ANC to pH 4 (mol/kg) 0.124

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	9
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>9	-
-	-	-
-	-	-

Eluate Analysis

C2

Concⁿ in 10:1 eluate (mg/l)

A2

10:1 concⁿ leached (mg/kg)

Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg

	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00379	<0.0005	0.0379	<0.005	0.5	2	25
Barium	0.0145	<0.0002	0.145	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.00866	<0.001	0.0866	<0.01	0.5	10	70
Copper	0.00303	<0.0003	0.0303	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00301	<0.003	0.0301	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	0.00172	<0.0002	0.0172	<0.002	0.5	10	50
Antimony	0.00266	<0.001	0.0266	<0.01	0.09	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00166	<0.001	0.0166	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	71.7	<5	717	<50	4000	90000	100000
Total Monohydric Phenols (W)	<0.019	<0.019	<0.19	<0.19	1	-	-
Dissolved Organic Carbon	7.17	<3	71.7	<30	500	800	1000

Leach Test Information

Date Prepared 30-Nov-2016

pH (pH Units) 8.70

Conductivity (µS/cm) 61.50

Temperature (°C) 20.40

Volume Leachant (Litres) 0.885

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

19/12/2016 06:17:46

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CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.112

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 23.5

Dry Matter Content (%) 81

Case

SDG 161129-11

Lab Sample Number(s) 21223512

Sampled Date 18-Nov-2016

Customer Sample Ref. BH106 ES3

Depth (m) 0.70 - 0.70

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	9
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>9	-
-	-	-
-	-	-

Solid Waste Analysis

Result

Total Organic Carbon (%) 0.345

Loss on Ignition (%) 3.65

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) <0.021

Mineral Oil (mg/kg) <1

PAH Sum of 17 (mg/kg) <10

pH (pH Units) 8.05

ANC to pH 9 (mol/kg) <0.03

ANC to pH 4 (mol/kg) 0.0915

Eluate Analysis

C2

Concⁿ in 10:1 eluate (mg/l)

A2

10:1 concⁿ leached (mg/kg)

Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg

	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00192	<0.0005	0.0192	<0.005	0.5	2	25
Barium	0.111	<0.0002	1.11	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00249	<0.0003	0.0249	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.00126	<0.0004	0.0126	<0.004	0.4	10	40
Lead	0.000983	<0.0002	0.00983	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.09	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.013	<0.001	0.13	<0.01	4	50	200
Chloride	3.9	<2	39	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	5	<2	50	<20	1000	20000	50000
Total Dissolved Solids	55.1	<5	551	<50	4000	90000	100000
Total Monohydric Phenols (W)	<0.019	<0.019	<0.19	<0.19	1	-	-
Dissolved Organic Carbon	5.19	<3	51.9	<30	500	800	1000

Leach Test Information

Date Prepared 28-Nov-2016

pH (pH Units) 7.79

Conductivity (µS/cm) 70.40

Temperature (°C) 16.00

Volume Leachant (Litres) 0.876

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

19/12/2016 06:17:46

06:17:39 19/12/2016



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.064

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 4.71

Dry Matter Content (%) 65.5

Case

SDG 161129-11

Lab Sample Number(s) 21223520

Sampled Date 18-Nov-2016

Customer Sample Ref. BH109 ES1

Depth (m) 0.20 - 0.20

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	9
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>9	-
-	-	-
-	-	-

Solid Waste Analysis

Result

Total Organic Carbon (%) 1.12

Loss on Ignition (%) 2.92

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) <0.21

Mineral Oil (mg/kg) 504

PAH Sum of 17 (mg/kg) 22

pH (pH Units) 6.23

ANC to pH 9 (mol/kg) 0.131

ANC to pH 4 (mol/kg) 0.344

Eluate Analysis

C2

Concⁿ in 10:1 eluate (mg/l)

A2

10:1 concⁿ leached (mg/kg)

Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg

	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.0169	<0.0005	0.169	<0.005	0.5	2	25
Barium	0.00676	<0.0002	0.0676	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00752	<0.0003	0.0752	<0.003	2	50	100
Mercury Dissolved (CVAf)	0.0000146	<0.00001	0.000146	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.00108	<0.0004	0.0108	<0.004	0.4	10	40
Lead	0.00378	<0.0002	0.0378	<0.002	0.5	10	50
Antimony	0.0154	<0.001	0.154	<0.01	0.09	0.7	5
Selenium	0.00182	<0.001	0.0182	<0.01	0.1	0.5	7
Zinc	0.00294	<0.001	0.0294	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	14.6	<2	146	<20	1000	20000	50000
Total Dissolved Solids	76.6	<5	766	<50	4000	90000	100000
Total Monohydric Phenols (W)	<0.019	<0.019	<0.19	<0.19	1	-	-
Dissolved Organic Carbon	5.33	<3	53.3	<30	500	800	1000

Leach Test Information

Date Prepared 30-Nov-2016

pH (pH Units) 6.59

Conductivity (µS/cm) 103.00

Temperature (°C) 16.20

Volume Leachant (Litres) 0.869

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

19/12/2016 06:17:46

06:17:39 19/12/2016



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.102

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 13.9

Dry Matter Content (%) 88

Case

SDG 161129-11

Lab Sample Number(s) 21223488

Sampled Date 16-Nov-2016

Customer Sample Ref. BH101 ES1

Depth (m) 0.40 - 0.40

Eluate Analysis

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C19	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C19-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC19	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC19-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC19-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO ₂	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	19.1	<3	191	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	0.0000266	<0.00001	0.000266	<0.0001	-	-	-
Total Ammonia as NH ₃	0.986	<0.2	9.86	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.0000113	<0.000005	0.000113	<0.00005	-	-	-
Arsenic	0.00149	<0.0005	0.0149	<0.005	-	-	-
Total Ammonium as NH ₄	0.726	<0.3	7.26	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.127	<0.0002	1.27	<0.002	-	-	-
Nitrate as NO ₃	<0.3	<0.3	<3	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.00159	<0.000005	0.0159	<0.00005	-	-	-
Anthracene (diss.filt)	0.0000214	<0.000005	0.000214	<0.00005	-	-	-
Boron	0.0609	<0.01	0.609	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000695	<0.000005	0.000695	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO ₃	14.5	<2	145	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.000013	<0.000005	0.00013	<0.00005	-	-	-
Chrysene (diss.filt)	0.000139	<0.000005	0.00139	<0.00005	-	-	-

Leach Test Information

Date Prepared 03-Dec-2016
pH (pH Units) 7.90
Conductivity (µS/cm) 35.20
Temperature (°C) 18.80
Volume Leachant (Litres) 0.888



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.102

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 13.9

Dry Matter Content (%) 88

Case

SDG 161129-11

Lab Sample Number(s) 21223488

Sampled Date 16-Nov-2016

Customer Sample Ref. BH101 ES1

Depth (m) 0.40 - 0.40

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.00113	<0.000005	0.0113	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.000143	<0.000005	0.00143	<0.00005	-	-	-
Chromium	0.00107	<0.001	0.0107	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.000052	<0.000005	0.00052	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.0000212	<0.000005	0.000212	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	0.0000216	<0.000002	0.000216	<0.00002	-	-	-
Copper	0.00864	<0.0003	0.0864	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.00304	<0.0002	0.0304	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 19 EPA Total by GCMS (diss.filt)	0.00324	<0.000082	0.0324	<0.00082	-	-	-
Nickel	0.00166	<0.0004	0.0166	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.0735	<0.001	0.735	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C9	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C9-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C9-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

Leach Test Information

Date Prepared 03-Dec-2016
pH (pH Units) 7.90
Conductivity (µS/cm) 35.20
Temperature (°C) 18.80
Volume Leachant (Litres) 0.888



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		Site Location	Christies Hospital
Mass Sample taken (kg)	0.109	Natural Moisture Content (%)	17.9
Mass of dry sample (kg)	0.060	Dry Matter Content (%)	85
Particle Size <4mm	>65%		

Case

SDG	161129-11
Lab Sample Number(s)	21223469
Sampled Date	16-Nov-2016
Customer Sample Ref.	BH102 ES1
Depth (m)	0.40 - 0.40

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C19	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C19-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC19	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC19-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC19-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO ₂	0.195	<0.05	1.95	<0.5	-	-	-
Sulphate (soluble)	9.1	<2	91	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	8.42	<3	84.2	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	0.0112	<0.009	0.112	<0.09	-	-	-
Naphthalene (diss.filt)	0.0000161	<0.00001	0.000161	<0.0001	-	-	-
Total Ammonia as NH ₃	0.458	<0.2	4.58	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.00000773	<0.000005	0.0000773	<0.00005	-	-	-
Arsenic	0.00361	<0.003	0.0361	<0.03	-	-	-
Total Ammonium as NH ₄	0.485	<0.3	4.85	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.0559	<0.0012	0.559	<0.012	-	-	-
Nitrate as NO ₃	1.25	<0.3	12.5	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0009	<0.0009	<0.009	<0.009	-	-	-
Fluoranthene (diss.filt)	0.0000706	<0.000005	0.000706	<0.00005	-	-	-
Anthracene (diss.filt)	0.0000102	<0.000005	0.000102	<0.00005	-	-	-
Boron	<0.09	<0.09	<0.9	<0.9	-	-	-
Phenanthrene (diss.filt)	0.000051	<0.000005	0.00051	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO ₃	95	<2	950	<20	-	-	-
Cadmium	<0.00048	<0.00048	<0.0048	<0.0048	-	-	-
Fluorene (diss.filt)	0.00000826	<0.000005	0.0000826	<0.00005	-	-	-
Chrysene (diss.filt)	0.0000121	<0.000005	0.000121	<0.00005	-	-	-

Leach Test Information

Date Prepared	28-Nov-2016
pH (pH Units)	8.39
Conductivity (µS/cm)	121.00
Temperature (°C)	16.20
Volume Leachant (Litres)	0.884



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.109

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 17.9

Dry Matter Content (%) 85

Case

SDG 161129-11

Lab Sample Number(s) 21223469

Sampled Date 16-Nov-2016

Customer Sample Ref. BH102 ES1

Depth (m) 0.40 - 0.40

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000519	<0.000005	0.000519	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.00000594	<0.000005	0.0000594	<0.00005	-	-	-
Chromium	<0.009	<0.009	<0.09	<0.09	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.0000141	<0.000005	0.000141	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.00000522	<0.000005	0.0000522	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	0.0000107	<0.000002	0.000107	<0.00002	-	-	-
Copper	0.00767	<0.0018	0.0767	<0.018	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0012	<0.0012	<0.012	<0.012	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.018	<0.018	<0.18	<0.18	-	-	-
PAH 19 EPA Total by GCMS (diss.filt)	0.000297	<0.000082	0.00297	<0.00082	-	-	-
Nickel	0.00287	<0.0024	0.0287	<0.024	-	-	-
Selenium	<0.009	<0.009	<0.09	<0.09	-	-	-
Zinc	<0.009	<0.009	<0.09	<0.09	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C9	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C9-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C9-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

Leach Test Information

Date Prepared 28-Nov-2016
pH (pH Units) 8.39
Conductivity (µS/cm) 121.00
Temperature (°C) 16.20
Volume Leachant (Litres) 0.884



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.064

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 4.71

Dry Matter Content (%) 65.5

Case

SDG 161129-11

Lab Sample Number(s) 21223520

Sampled Date 18-Nov-2016

Customer Sample Ref. BH109 ES1

Depth (m) 0.20 - 0.20

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C19	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C19-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC19	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC19-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC19-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO ₂	1.35	<0.05	13.5	<0.5	-	-	-
Sulphate (soluble)	15.9	<2	159	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	4.95	<3	49.5	<30	-	-	-
Mercury Dissolved (CVAf)	0.0000289	<0.00001	0.000289	<0.0001	-	-	-
Antimony	0.0155	<0.001	0.155	<0.01	-	-	-
Naphthalene (diss.filt)	0.0000453	<0.00001	0.000453	<0.0001	-	-	-
Total Ammonia as NH ₃	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.000285	<0.000005	0.00285	<0.00005	-	-	-
Arsenic	0.0166	<0.0005	0.166	<0.005	-	-	-
Total Ammonium as NH ₄	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	0.00000666	<0.000005	0.0000666	<0.00005	-	-	-
Barium	0.00854	<0.0002	0.0854	<0.002	-	-	-
Nitrate as NO ₃	<0.3	<0.3	<3	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.000754	<0.000005	0.00754	<0.00005	-	-	-
Anthracene (diss.filt)	0.000141	<0.000005	0.00141	<0.00005	-	-	-
Boron	0.0405	<0.01	0.405	<0.1	-	-	-
Phenanthrene (diss.filt)	0.000167	<0.000005	0.00167	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO ₃	50	<2	500	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.0000762	<0.000005	0.000762	<0.00005	-	-	-
Chrysene (diss.filt)	0.0000644	<0.000005	0.000644	<0.00005	-	-	-

Leach Test Information

Date Prepared 30-Nov-2016
pH (pH Units) 6.59
Conductivity (µS/cm) 103.00
Temperature (°C) 16.20
Volume Leachant (Litres) 0.869



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference

Mass Sample taken (kg) 0.064

Mass of dry sample (kg) 0.060

Particle Size <4mm >65%

Site Location

Christies Hospital

Natural Moisture Content (%) 4.71

Dry Matter Content (%) 65.5

Case

SDG 161129-11

Lab Sample Number(s) 21223520

Sampled Date 18-Nov-2016

Customer Sample Ref. BH109 ES1

Depth (m) 0.20 - 0.20

Eluate Analysis

	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.00098	<0.000005	0.0098	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.0000658	<0.000005	0.000658	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.000124	<0.000005	0.00124	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.0000526	<0.000005	0.000526	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	0.0000675	<0.000002	0.000675	<0.00002	-	-	-
Copper	0.00773	<0.0003	0.0773	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	0.0000141	<0.000005	0.000141	<0.00005	-	-	-
Lead	0.00222	<0.0002	0.0222	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	0.0000999	<0.000005	0.000999	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	0.0000595	<0.000005	0.000595	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 19 EPA Total by GCMS (diss.filt)	0.00276	<0.000082	0.0276	<0.00082	-	-	-
Nickel	0.000691	<0.0004	0.00691	<0.004	-	-	-
Selenium	0.00168	<0.001	0.0168	<0.01	-	-	-
Zinc	0.00118	<0.001	0.0118	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C9	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C9-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C9-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

Leach Test Information

Date Prepared 30-Nov-2016
pH (pH Units) 6.59
Conductivity (µS/cm) 103.00
Temperature (°C) 16.20
Volume Leachant (Litres) 0.869



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11 Client Reference: A114654 Report Number: 534127
Location: Christies Hospital Order Number: A114654 Superseded Report: 533398

Table of Results - Appendix

Method No	Reference	Description
PM024	v nti.ied BS) 3&&	Smil gregaratim inoludinc hml nrenisatim, 1 misture soreens m smils .m As6estms Cmtaininc v aterial
PM115		xeachinc Prmedure .m CEN One Stace xeach Test V:) L) 0:)) Steg
TM018	BS) 3&& Part 3) %0	Deter1 inatim m xms m lcnitim
TM043	v ethnd V3V0B, AWWA/APp A, V0th Ed7,) %%%/ BS V4%0: Part) 0%) %0H	Deter1 inatim m alkalinity in aquemus sa1 gles
TM048	p S- V#9, As6estms: The analysts' cuide .m sa1 glinc, analysis and clearanoe grmedures	Identi.ioatim m As6estms in Bulk v aterial
TM091	v ethnd .m the Deter1 inatim m EPp ,v assachusetts Degt7m EP,) %0	Deter1 inatim m EGraota6le Petrmlu1 pydrmar6ms 6y - CNFID IC) 0MCHD(
TM092 (S)	Natimal - rid Prmgerty p ndincs v ethnds .m the Cnleotim L Analysis m Sa1 gles .m Natimal - rid Sites 5ersim) Seo 37%	Deter1 inatim m Phenrnts in Smils 6y pPxC
TM086	v nti.ied: US EPA v ethnds 90V0 L 40V	Deter1 inatim m - asrtline Rance pydrmar6ms K RO(6y peadsgaoe - CNFID ICHND) V(
TM060	v ethnd 23) 0, AWWA/APp A, V0th Ed7,) %%%/ v nti.ied: US EPA v ethnd H 27 L %040	Deter1 inatim m Trtal Orcanio Car6m/Trtal Inmrcanio Car6m in Water and Waste Water
TM066	BS V4%0: Part &) %49 / BS 4049: PartV7)) %0H	Deter1 inatim m A1 1 rmiu1 in Water Sa1 gles usinc the brme Analyser
TM104	v ethnd H200F, AWWA/APp A, V0th Ed7,) %%%	Deter1 inatim m Flumride usinc the brme Analyser
TM119	v nti.ied: US EPA v ethnd 9V40, 9) V0, 90V0, 4VH 4) 0 L 40V	Deter1 inatim m f rtatile Orcanio Cml grunds 6y peadsgaoe / - CM S
TM123	BS V4%0: Part) V:) %0	The Deter1 inatim m Trtal Dissrt5ed Sntlds in Water
TM132	In Mnuse v ethnd	ExTRA CS900 Qgeratms - uide
TM133	BS) 3&& Part 3) %0/BS 4049W2	Deter1 inatim m gp in Snil and Water usinc the - xgp gp v eter
TM151	v ethnd 3200D, AWWA/APp A, V0th Ed7,) %%%	Deter1 inatim m peGa5alent Chrmf iu1 usinc brme analyser
TM152	v ethnd 3) V2B, AWWA/APp A, V0th Ed7,) %%%	Analysis m Aquemus Sa1 gles 6y ICPM S
TM153	v ethnd H200A,B,C, I, v AWWA/APp A, V0th Ed7,) %%%	Deter1 inatim m Trtal Cyanide, Free H Easly xi6erata6le(Cyanide and Thimpyanate usinc the Skalar SANS+ Syste1 Sec1 ented Flmw Analyser
TM198	EPA v ethnd 909V, Prtyohlminated Bighenyls 6y - as Chrmf atmcraghy	Deter1 inatim m Wp O) V and EC&Prtyohlminated Bighenyl Cmceners 6y - CM S in Smils
TM174	Analysis m Petrmlu1 pydrmar6ms in En5irm1 ental v edia - Trtal Petrmlu1 pydrmar6m Criteria	Deter1 inatim m Sgeoiated EGraota6le Petrmlu1 pydrmar6ms in Waters 6y - CNFID
TM178	v nti.ied: US EPA v ethnd 9) 00	Deter1 inatim m Prtynuclear Amf atio pydrmar6ms HPp (6y - CM S in Waters
TM181	US EPA v ethnd 40) 0B	Deter1 inatim m Rmutine v etals in Snil 6y iCag 4200 DumlCPNDES
TM182	CEN/TC V% MWI V%0H4Mhaoterizatim m wasteNeachinc Beha5imur TestsMAoid and Base Neutralizatim Cagaoity Test	Deter1 inatim m Aoid Neutralisatim Cagaoity HANC(Usinc Autntitratim in Smils
TM183	BS EN V3204:V00V, HBS 4049W2&HV00V(ISBN 0 290 39%#H3	Deter1 inatim m Trace xe5el v eroury in Waters and xeachates 6y PSA Cml f agmur Atml io Flumresoenoe Sgeotrmf etry
TM184	EPA v ethnds 3V27 L 3V27V,	The Deter1 inatim m Anims in Aquemus v atrioes usinc the brme Sgeotrmghtrml etrio Analysers
TM218	Shaker eGraotim MEPA 1 ethnd 32H47	The deter1 inatim m PAp in smil sa1 gles 6y - CM S
TM222	In Mnuse v ethnd	Deter1 inatim m prt Water Sntu6le Bmm in Smils H 0:) Water:snil(6y IRIS E1 issim Sgeotrmf eter
TM227	Standard 1 ethnds .m the eGa1 inatim m waters and wastewaters V0th Editim, AWWA/APp A v ethnd H2007	Deter1 inatim m Trtal Cyanide, Free H Easly xi6erata6le(Cyanide and Thimpyanate
TM243		v iGed Anims In Smils By brme
TM245	By - CNFID	Deter1 inatim m - RO 6y peadsgaoe in waters
TM259	The 1 easure1 ent m Electrioal Cmduotivity and the xa6mratmy deter1 inatim m gp f alue m Natural, Treated and Wastewaters7p v SO,) %&97ISBN 0)) &2) HV9 H7	Deter1 inatim m gp in Water and xeachate usinc the - xgp gp v eter
TM256	6y pPxC	Deter1 inatim m Phenrnts in Waters and xeachates 6y pPxC
TM410	Shaker eGraotimMh hnuse onrmene 1 ethnd	Deter1 inatim m Cnmene in smils 6y - Cv S
TM414	Analysis m Petrmlu1 pydrmar6ms in En5irm1 ental v edia - Trtal Petrmlu1 pydrmar6m Criteria	Deter1 inatim m Sgeoiated EGraota6le Petrmlu1 pydrmar6ms in Smils 6y - CG CNFID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

Test Completion Dates

Lab Sample No(s)
Customer Sample Ref.

AGS Ref.
Depth
Type

	VJ W3H9	VJ W3H/4	VJ W3200	VJ W320H	VJ W32V0	VJ W3234	VJ W32H0	VJ W32V9	VJ W323V	VJ W3H89
	Bp) 0)	Bp) 0V	Bp) 0V	Bp) 03	Bp) 04	Bp) 0&	Bp) 0&	Bp) 09	Bp) 09	Bp) 0%
	ES)	ES)	ESV	ES)	ES)	ES)	ESV	ES)	ESV	ES)
	070 M070	070 M070	070 M070	070 M070	070 M070	070 M070	070 M070	070 M070	070 M070	070 M070
	Snil/Sntid K(	Snil/Sntid K(	Snil/Sntid K(	Snil/Sntid K(	Snil/Sntid K(	Snil/Sntid K(	Snil/Sntid K(	Snil/Sntid K(	Snil/Sntid K(	Snil/Sntid K(
Alkalinity Filtered as CaCO3	0%Deo(NW) %	0%Deo(NW) %			4%Deo(NW) %					
A1 1 mialal Nitrcen	0%Deo(NW) %	0%Deo(NW) %			0%Deo(NW) %					
ANC at gpHand ANC at gp 4		0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
Anims 6y brme Kml(	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
Anims 6y brme Kw(	0%Deo(NW) %	0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
As6estms ID in Sntid Sa1 gles	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
Bmm Water Sntu6le	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
CEN) 0): xeachate K Stage(	0%Deo(NW) %	0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
CEN Readincs	0%Deo(NW) %	0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
Chrmf iu1 III	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
Cmmene		0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
Cyanide Cml g/Free/Tmtal/Thimpyanate	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
Dissnt5ed v etals 6y ICPM S	0%Deo(NW) %	0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
Dissnt5ed Orcanio/Inmrcanio Car6m	0%Deo(NW) %	0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
EPp CW- KAlighat(Filtered - C KW(	0%Deo(NW) %	0%Deo(NW) %			0%Deo(NW) %					
EPp CW- KArml atio(Filtered - C KW(	0%Deo(NW) %	0%Deo(NW) %			0%Deo(NW) %					
EPp CW- C K(	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
Flumide		0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
- RO 6y - CNFID K(	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
- RO 6y - CNFID KW(	0%Deo(NW) %	0%Deo(NW) %			0%Deo(NW) %					
peGaSalent Chrmf iu1 K(	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
xrns nm lcnitrm in snlis		0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
v eroury Dissnt5ed	0%Deo(NW) %	0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
v etals in sntid sa1 gles 6y OES	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
v ineral Oil		0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
Nitrite 6y brme Kw(	0%Deo(NW) %	0%Deo(NW) %			0%Deo(NW) %					
PAP) 4 L) Cato		0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
PAP 6y - Cv S	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
PAP in waters 6y - CN S KdissZilt(	0%Deo(NW) %	0%Deo(NW) %			0%Deo(NW) %					
PCBs 6y - Cv S		0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %					
gp	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
gp f alue m Filtered Water	0%Deo(NW) %	0%Deo(NW) %			0%Deo(NW) %					
Phennis 6y pPxC K(	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
Phennis 6y pPxC KW(	0%Deo(NW) %	0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
Sa1 gle desorigitm	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
Tmtal Dissnt5ed Sntids		0%Deo(NW) %		0%Deo(NW) %	0%Deo(NW) %					
Tmtal Orcanio Car6m	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
TPp CW- Filtered KW(	0%Deo(NW) %	0%Deo(NW) %			0%Deo(NW) %					
TPp CW- C K(	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %
f OC v S K(	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %	0%Deo(NW) %



CERTIFICATE OF ANALYSIS

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

Lab Sample No(s)
Customer Sample Ref.

AGS Ref.
Depth
Type

V) W32) V
Bp) 0%
ES3
0.780 MD.780
Sml/Smlid KS(

ANC at gp Hand ANC at gp 4	0VNDco(WO) %
Anims 6y brne Hml(	03NDco(WO) %
Anims 6y brne Kw(	0VNDco(WO) %
Asbestos ID in Smlid Sa1 gles	03NDco(WO) %
Bmm Water Smlu6le	V9NINr5(WO) %
CEN) 0: xeachate K Stace(	V9NINr5(WO) %
CEN Readings	03NDco(WO) %
Chrml iu1 III	V9NINr5(WO) %
Cmmene	V9NINr5(WO) %
Cyanide Cml g/Free/Tntal/Thinoyanate	V9NINr5(WO) %
Dissnt5ed v etals 6y ICPM S	03NDco(WO) %
Dissnt5ed Orcanio/Inmrcario Car6m	0VNDco(WO) %
EPp CW- - C KS(	V9NINr5(WO) %
Flumide	0VNDco(WO) %
- RO 6y - CNFID KS(	V9NINr5(WO) %
peGa5alent Chrml iu1 K(	V9NINr5(WO) %
xms nm lcnitrm in smls	03NDco(WO) %
v eroury Dissnt5ed	03NDco(WO) %
v etals in smlid sa1 gles 6y OES	V9NINr5(WO) %
v ineral Oil	03NDco(WO) %
PAP) 4 L) & Calo	03NDco(WO) %
PAP 6y - Cv S	V9NINr5(WO) %
PCBs 6y - Cv S	V9NINr5(WO) %
gp	03NDco(WO) %
Phennis 6y pPx C KS(	30NINr5(WO) %
Phennis 6y pPx C KW(	03NDco(WO) %
Sa1 gle desorigtm	V8NINr5(WO) %
Tntal Dissnt5ed Smlids	03NDco(WO) %
Tntal Orcanio Car6m	V9NINr5(WO) %
TPp CW- - C KS(	V9NINr5(WO) %
f OC v S KS(	0VNDco(WO) %



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ASSOCIATED AQC DATA

Alkalinity Filtered as CaCO₃

Component	Method Code	QC VJ 42	QC VJ H4	QC VJ 9&
Tntal Alkalinity Filtered as CaCO ₃	Tv 0H8	101.01 %274V :) 04799	107.5) 00732 :)) H7 2	101.01 %274V :) 04799

Ammoniacal Nitrogen

Component	Method Code	QC VJ 0V
A1 1 mialaal Nitrcen as N	Tv 0%%	101.6 %37 H :) 09740

ANC at pH4 and ANC at pH 9

Component	Method Code	QC VJ 2%
ANC gp_Hdry snil	Tv) 9V	105.57 947& :)) 3703

Anions by Kone (soil)

Component	Method Code	QC VJ V3
Chlmride Kntu6le(	Tv V-H	100.52 &&73 :) V07&
Water Sntu6le Sulghate as SOHV:) EGraot	Tv V-H	92.52 &270 :) 3) 7 0

Anions by Kone (w)

Component	Method Code	QC VJ) 9	QC VJ 0H	QC VJ VJ
Chlmride	Tv) 9H	106.0 %773 :)) 27-H	105.0 %773 :)) 27-H	109.0 %773 :)) 27-H
Sulghate Kntu6le(	Tv) 9H	106.8 %0723 :)) 3703	103.6 %0723 :)) 3703	102.0 %0723 :)) 3703
TON as NO3	Tv) 9H			103.0 %474 :))) 7)

Boron Water Soluble

Component	Method Code	QC VJ &%	QC VJ) V	QC VJ 2)	QC VJ 20	QC VJ H0
Water Sntu6le Brrmm	Tv VV	95.5 9270 :)) V720	96.5 9270 :)) V720	92.5 9270 :)) V720	94.5 9270 :)) V720	101.0 9270 :)) V720



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Report Number: 534127
Superseded Report: 533398

Coronene

Component	Method Code	QC VJ 93	QC VJ 9H
Cmmene RAW	Tv H) 0	108.5 %7B :) 3&789	106.5 %7B :) 3&789

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC VJ V2	QC VJ 80	QC VJ 8H	QC VJ V9	QC VJ 34
Free Cyanide	Tv) 23	96.1 93702 :)) V&H	95.8 93702 :)) V&H	94.6 93702 :)) V&H	89.7 93702 :)) V&H	
Free Cyanide KW(	Tv V&					93.25 %3702 :)) V&2
Thiocyanate	Tv) 23	96.41 9%78) :)) 07 %	95.81 9%78) :)) 07 %	94.61 9%78) :)) 07 %	89.22 9%78) :)) 07 %	
Thiocyanate KW(	Tv V&					95.5 %700 :)) V700
Total Cyanide	Tv) 23	99.29 9977% :))) 7B	97.14 9977% :))) 7B	95.71 9977% :))) 7B	96.43 9977% :))) 7B	
Total Cyanide KW(	Tv V&					94.0 %702 :))) 7&2

Dissolved Metals by ICP-MS

Component	Method Code	QC VJ 9H	QC VJ 0%	QC VJ V&	QC VJ 0H	QC VJ V4
Alu1 iniu1	Tv) 2V	105.33 %273& :)) 97 3	101.33 %77 V :)) H7V3	102.0 %77 V :)) H7V3	106.33 %273& :)) 97 3	107.33 %273& :)) 97 3
Anti1 my	Tv) 2V	106.5 9973& :)) 3072&	101.83 %870 :)) %790	100.67 %870 :)) %790	103.0 9973& :)) 3072&	104.17 9973& :)) 3072&
Arsenio	Tv) 2V	103.5 %77V :)) 372V	100.17 99700 :)) V700	98.17 99700 :)) V700	102.33 %77V :)) 372V	104.83 %77V :)) 372V
Bariu1	Tv) 2V	103.0 %37 2 :)) 272V	96.33 99700 :)) V700	97.5 99700 :)) V700	100.67 %37 2 :)) 272V	104.33 %37 2 :)) 272V
Berylliu1	Tv) 2V	100.5 9%778 :)) 4799	98.0 %77V :)) 272V	102.5 %77V :)) 272V	104.83 9%778 :)) 4799	107.17 9%778 :)) 4799
Bis1 uth	Tv) 2V	103.67 %77V :)) 270V	97.83 %770 :)) V700	97.0 %770 :)) V700	99.83 %77V :)) 270V	103.83 %77V :)) 270V
Bmate	Tv) 2V		96.91 99700 :)) V700	95.06 99700 :)) V700		
Bmm	Tv) 2V	102.67 9473) :)) V0799	97.0 %4779 :)) H77&	94.67 %4779 :)) H77&	97.67 9473) :)) V0799	99.0 9473) :)) V0799
Cad1 iu1	Tv) 2V	102.83 %3792 :))) 742	99.83 %377& :)) 079&	98.67 %377& :)) 079&	105.67 %3792 :))) 742	105.0 %3792 :))) 742
Calciu1	Tv) 2V	108.0 9%70 :)) V4774	106.0 9) 739 :)) %70%	103.33 9) 739 :)) %70%	103.33 9%70 :)) V4774	105.33 9%70 :)) V4774
Chrml iu1	Tv) 2V	102.0 %77V :)) 0%792	98.0 %77V :)) 079&	99.17 %77V :)) 079&	101.5 %77V :)) 0%792	103.0 %77V :)) 0%792
Cn6alt	Tv) 2V	101.67 9270) :)) H78&	97.67 99700 :)) V700	100.83 99700 :)) V700	102.67 9270) :)) H78&	103.67 9270) :)) H78&
Cngger	Tv) 2V	107.17 9%78& :)) %7&3	99.83 %77& :)) 97)	102.17 %77& :)) 97)	103.0 9%78& :)) %7&3	104.67 9%78& :)) %7&3
Irm	Tv) 2V	104.67 %370V :)) 3794	98.0 %700 :)) 3700	102.0 %700 :)) 3700	103.33 %370V :)) 3794	104.67 %370V :)) 3794



CERTIFICATE OF ANALYSIS

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SDG: 161129-11
Location: Christies Hospital

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Superseded Report: 533398

Dissolved Metals by ICP-MS

		QC VJ 9H	QC VJ 0%	QC VJ V&	QC VJ 0H	QC VJ V4
Lead	Tv) 2V	103.83 % 7) :) 470	97.33 99700 :)) V700	99.67 99700 :)) V700	101.83 % 7) :) 470	104.83 % 7) :) 470
Xithiu1	Tv) 2V	103.83 % 70 :) V3700	97.67 % 0778 :)) 2778	100.83 % 0778 :)) 2778	102.0 % 70 :) V3700	106.17 % 70 :) V3700
v acnesiu1	Tv) 2V	104.67 9% 70 :)) 474	102.67 % 477V :)) 272V	103.33 % 477V :)) 272V	104.67 9% 70 :)) 474	106.0 9% 70 :)) 474
v ancanese	Tv) 2V	103.5 % 0778 :)) V774	97.5 % 0774 :)) 0% 778	100.5 % 0774 :)) 0% 778	102.67 % 0778 :)) V774	105.67 % 0778 :)) V774
v nty6denu1	Tv) 2V	98.33 9% 708 :)) 0774	93.67 99700 :)) V700	97.83 99700 :)) V700	101.17 9% 708 :)) 0774	103.0 9% 708 :)) 0774
Nickel	Tv) 2V	105.5 % 0780 :)) V772	97.33 99700 :)) V700	100.0 99700 :)) V700	101.67 % 0780 :)) V772	103.0 % 0780 :)) V772
Phnsgnhrus	Tv) 2V	99.33 9% 70H :)) H779	100.17 99700 :)) V700	94.67 99700 :)) V700	98.67 9% 70H :)) H779	101.67 9% 70H :)) H779
Prtassiu1	Tv) 2V	106.67 % 0770 :)) 8770	104.67 % 0778 :)) 4774	103.33 % 0778 :)) 4774	104.67 % 0770 :)) 8770	106.0 % 0770 :)) 8770
Seleniu1	Tv) 2V	107.83 % 774 :)) 877V	98.33 % 729 :)) 2770	98.33 % 729 :)) 2770	102.0 % 774 :)) 877V	107.33 % 774 :)) 877V
Sil5er	Tv) 2V	108.33 % 4772 :)) 8730	96.17 % 4774 :)) H777	101.0 % 4774 :)) H777	101.67 % 4772 :)) 8730	105.17 % 4772 :)) 8730
Sndiu1	Tv) 2V	106.0 % 777V :)) 377H	100.67 % 0777V :)) V772	103.33 % 0777V :)) V772	105.33 % 777V :)) 377H	106.0 % 777V :)) 377H
Strmtiu1	Tv) 2V	101.67 % 777H :)) 477H	96.33 99700 :)) V700	100.67 99700 :)) V700	105.33 % 777H :)) 477H	108.0 % 777H :)) 477H
Telluriu1	Tv) 2V	98.33 9% 709 :)) 789	97.83 % 0773V :)) H774	93.83 % 0773V :)) H774	97.67 9% 709 :)) 789	100.0 9% 709 :)) 789
Thalliu1	Tv) 2V	98.5 94709 :)) V770	93.0 99700 :)) V700	93.0 99700 :)) V700	95.83 94709 :)) V770	97.33 94709 :)) V770
Tin	Tv) 2V	107.5 % 700 :)) 0% 700	101.67 % 700 :)) 0% 700	103.83 % 700 :)) 0% 700	103.67 % 700 :)) 0% 700	106.83 % 700 :)) 0% 700
Titaniu1	Tv) 2V	98.17 99773 :)) 0% 703	102.83 % 788 :)) 08778	101.83 % 788 :)) 08778	103.83 99773 :)) 0% 703	104.33 99773 :)) 0% 703
Tuncsten	Tv) 2V	106.83 8874 :)) 3V73	100.17 9773V :)) V778V	97.5 9773V :)) V778V	98.0 8874 :)) 3V73	100.17 8874 :)) 3V73
Uraniu1	Tv) 2V	100.5 94778 :)) 2774	93.67 99700 :)) V700	96.83 99700 :)) V700	99.17 94778 :)) 2774	101.33 94778 :)) 2774
f anadiu1	Tv) 2V	101.83 9% 774 :)) 2770	97.33 99700 :)) V700	100.83 99700 :)) V700	97.5 9% 774 :)) 2770	108.0 9% 774 :)) 2770
Zino	Tv) 2V	104.67 9872 :)) 4774	101.33 % 7770 :)) 9772	101.67 % 7770 :)) 9772	104.33 9872 :)) 4774	105.33 9872 :)) 4774

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC VJ 44	QC VJ) 3	QC VJ 33	QC VJ 8%
Dissnt5ed Inmcanio Car6mm	Tv 0%0	110.83 % 0729 :)) V779	111.67 % 0729 :)) V779	100.83 % 778 :)) 0% 708	101.33 % 778 :)) 0% 708
Dissnt5ed Orcanio Car6mm	Tv 0%0	105.5 % 4779 :)) 0729	104.33 % 4779 :)) 0729	102.0 % 8778 :)) 0978	102.33 % 8778 :)) 0978

EPH CWG (Aromatic) Filtered GC (W)



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EPH CWG (Aromatic) Filtered GC (W)

Component	Method Code	QC V) &
Tntal Arml atios >EC) 0NECHD	Tv) &H	89.51 83782 :) V073V

EPH CWG GC (S)

Component	Method Code	QC V) 2)	QC V) 0H	QC V) 2)	QC V) 24	QC V) 34	QC V) 9%
EPp >C9MCHD Raw	Tv H) H	106.18 88744 :) 0H744	96.12 2473% :) V977H	91.48 88744 :) 0H744	88.19 88744 :) 0H744	96.56 2473% :) V977H	88.43 88744 :) 0H744
Tntal Alighatios Raw	Tv H) H	113.57 9H73% :)) 274	101.05 4V722 :) 337 V	97.82 9H73% :)) 274	95.64 9H73% :)) 274	104.11 4V722 :) 337 V	95.55 9H73% :)) 274
Tntal Arml atios Raw	Tv H) H	143.9 9) 7) :)) 979%	146.8 42772 :) 3873%	124.24 9) 7) :)) 979%	107.14 9) 7) :)) 979%	122.93 42772 :) 3873%	110.65 9) 7) :)) 979%

Fluoride

Component	Method Code	QC V) 2V	QC V) 9
Fluoride	Tv) 0H	99.33 %272 :) 087MH	102.0 %272 :) 087MH

GRO by GC-FID (S)

Component	Method Code	QC V) 0H	QC V) 83	QC V) 0%
QC	Tv 09%	92.87 87V79 :)) H72H	96.26 80782 :)) H7 %	89.65 80782 :)) H7 %

GRO by GC-FID (W)

Component	Method Code	QC V) 9H
Benzene 6y - C	Tv V#2	88.0 84739 :) V) 770
Ethylbenzene 6y - C	Tv V#2	94.0 8H70V :) V377 H
1 L g Xylene 6y - C	Tv V#2	95.75 8H703 :) V377 H
v TBE - CMFID	Tv V#2	87.0 84739 :) V) 774
mXylene 6y - C	Tv V#2	95.5 8H738 :) V782
QC	Tv V#2	89.04 4373V :) V270
Toluene 6y - C	Tv V#2	91.5 82782 :) V#73

Hexavalent Chromium (s)



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Hexavalent Chromium (s)

Component	Method Code	QC Vj %/	QC Vj V%	QC Vj 09	QC Vj &2
peGa5alent Chrm1 iu1	Tv) 2)	104.0 %070 :) 0&700	102.0 %070 :) 0&700	102.0 %070 :) 0&700	104.0 %070 :) 0&700

Loss on Ignition in soils

Component	Method Code	QC Vj V%	QC Vj 39
xmss nm lcnitirm	Tv 0) 9	99.76 9&724 :) 0H7MH	102.37 9&724 :) 0H7MH

Mercury Dissolved

Component	Method Code	QC Vj 0V	QC Vj 0%	QC Vj %0	QC Vj V4	QC Vj V%	QC Vj 09
v eroury Dissnt5ed KCf AF(	Tv) 93	102.0 &2700 :))) 700	97.8 &4790 :))) &7 V	105.0 &4790 :))) &7 V	90.7 &2700 :))) 700	90.5 &4790 :))) &7 V	94.6 &2700 :))) 700

Metals in solid samples by OES

Component	Method Code	QC Vj %%	QC Vj HB	QC Vj &2	QC Vj %/	QC Vj V0	QC Vj 3%
Alu1 iniu1	Tv) 9)	88.5 &&79H :))) %0)	90.27 &&79H :))) %0)	95.58 &&79H :))) %0)	90.27 &&79H :))) %0)	96.46 &&79H :))) %0)	94.69 &&79H :))) %0)
Anti1 my	Tv) 9)	94.72 9H7V9 :) 0&74&	95.12 9H7V9 :) 0&74&	90.65 9H7V9 :) 0&74&	91.46 9H7V9 :) 0&74&	107.72 9H7V9 :) 0&74&	105.28 9H7V9 :) 0&74&
Arsenio	Tv) 9)	94.48 9&702 :) 0%34	97.38 9&702 :) 0%34	97.97 9&702 :) 0%34	95.93 9&702 :) 0%34	97.38 9&702 :) 0%34	98.55 9&702 :) 0%34
Bariu1	Tv) 9)	92.66 9V77P% :) 0%3H	89.72 9V77P% :) 0%3H	90.73 9V77P% :) 0%3H	88.17 9V77P% :) 0%3H	102.75 9V77P% :) 0%3H	99.08 9V77P% :) 0%3H
Berylliu1	Tv) 9)	95.52 9277H :) 0%74)	95.9 9277H :) 0%74)	97.01 9277H :) 0%74)	92.91 9277H :) 0%74)	101.49 9277H :) 0%74)	100.37 9277H :) 0%74)
Bmmn	Tv) 9)	85.39 &372 :) 0H744	83.95 &372 :) 0H744	85.96 &372 :) 0H744	83.67 &372 :) 0H744	94.84 &372 :) 0H744	91.69 &372 :) 0H744
Cad1 iu1	Tv) 9)	90.95 9) 74 :) 047B	89.71 9) 74 :) 047B	89.71 9) 74 :) 047B	86.83 9) 74 :) 047B	93.42 9) 74 :) 047B	90.95 9) 74 :) 047B
Chrm1 iu1	Tv) 9)	88.44 9V7V4 :) 0H722	90.67 9V7V4 :) 0H722	91.28 9V7V4 :) 0H722	86.61 9V7V4 :) 0H722	112.37 9V7V4 :) 0H722	98.38 9V7V4 :) 0H722
Cn6alt	Tv) 9)	84.91 9472H :) 0479&	87.74 9472H :) 0479&	88.36 9472H :) 0479&	85.85 9472H :) 0479&	88.68 9472H :) 0479&	89.31 9472H :) 0479&
Cmgger	Tv) 9)	90.32 9V7H0 :) 027H2	93.13 9V7H0 :) 027H2	93.31 9V7H0 :) 027H2	88.73 9V7H0 :) 027H2	99.65 9V7H0 :) 027H2	97.89 9V7H0 :) 027H2
Irmn	Tv) 9)	90.48 9V7P2 :) 0729	93.65 9V7P2 :) 0729	96.83 9V7P2 :) 0729	91.27 9V7P2 :) 0729	98.41 9V7P2 :) 0729	97.62 9V7P2 :) 0729
xead	Tv) 9)	84.68 &97MH :) 0H702	93.92 &97MH :) 0H702	89.19 &97MH :) 0H702	86.04 &97MH :) 0H702	87.84 &97MH :) 0H702	87.84 &97MH :) 0H702
v ancanese	Tv) 9)	102.78 %H7V% :))) %2)	105.83 %H7V% :))) %2)	105.83 %H7V% :))) %2)	100.28 %H7V% :))) %2)	111.11 %H7V% :))) %2)	115.0 %H7V% :))) %2)



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Metals in solid samples by OES

		QC Vj %%	QC Vj HB	QC Vj &2	QC Vj %W	QC Vj V0	QC Vj 3%
v eroury	Tv) 9)	88.89 9378H :) 0273H	93.0 9378H :) 0273H	93.72 9378H :) 0273H	91.79 9378H :) 0273H	94.44 9378H :) 0273H	95.65 9378H :) 0273H
v nty6denu1	Tv) 9)	90.12 987) :) 0478&	94.24 987) :) 0478&	93.42 987) :) 0478&	91.36 987) :) 0478&	101.23 987) :) 0478&	101.65 987) :) 0478&
Nickel	Tv) 9)	86.06 9) 7W :) 0V7) 9	88.51 9) 7W :) 0V7) 9	88.51 9) 7W :) 0V7) 9	86.06 9) 7W :) 0V7) 9	101.96 9) 7W :) 0V7) 9	92.67 9) 7W :) 0V7) 9
Phmsghmrus	Tv) 9)	108.28 %H24 :) VHV9	105.66 %H24 :) VHV9	106.67 %H24 :) VHV9	104.24 %H24 :) VHV9	108.48 %H24 :) VHV9	110.51 %H24 :) VHV9
Seleniu1	Tv) 9)	96.08 947V9 :)) 07F9	98.43 947V9 :)) 07F9	98.04 947V9 :)) 07F9	96.08 947V9 :)) 07F9	102.75 947V9 :)) 07F9	100.39 947V9 :)) 07F9
Strmtiu1	Tv) 9)	84.41 8%7) 3 :) 0V78%	87.97 8%7) 3 :) 0V78%	88.42 8%7) 3 :) 0V78%	83.96 8%7) 3 :) 0V78%	95.77 8%7) 3 :) 0V78%	94.88 8%7) 3 :) 0V78%
Thalliu1	Tv) 9)	86.73 9V7H :))) 784	93.81 9V7H :))) 784	95.13 9V7H :))) 784	91.15 9V7H :))) 784	99.56 9V7H :))) 784	106.19 9V7H :))) 784
Tin	Tv) 9)	92.4 %072 :) 09784	96.2 %072 :) 09784	96.58 %072 :) 09784	96.2 %072 :) 09784	99.62 %072 :) 09784	100.76 %072 :) 09784
Titaniu1	Tv) 9)	78.63 447V3 :) 0V704	75.8 447V3 :) 0V704	80.15 447V3 :) 0V704	79.39 447V3 :) 0V704	87.02 447V3 :) 0V704	83.21 447V3 :) 0V704
f anadiu1	Tv) 9)	90.84 9473& :) 087W4	92.31 9473& :) 087W4	94.14 9473& :) 087W4	89.38 9473& :) 087W4	102.2 9473& :) 087W4	100.37 9473& :) 087W4
Zino	Tv) 9)	95.07 9H7V9 :)) 377%	95.28 9H7V9 :)) 377%	96.92 9H7V9 :)) 377%	93.02 9H7V9 :)) 377%	103.08 9H7V9 :)) 377%	102.26 9H7V9 :)) 377%

Component	Method Code	QC Vj %W
Alu1 iniu1	Tv) 9)	91.15 8&79H :)) %0)
Anti1 rmy	Tv) 9)	99.19 9HV9 :) 0878&
Arsenio	Tv) 9)	99.13 9&702 :) 0%734
Bariu1	Tv) 9)	94.5 9V7H6 :) 0%73H
Berylliu1	Tv) 9)	97.39 927H :) 0%74)
Bmm	Tv) 9)	85.1 8372) :) 0HV44
Cad1 iu1	Tv) 9)	92.59 9) 7H4 :) 0478
Chrml iu1	Tv) 9)	92.49 9V7V4 :) 0HV22
Cn6alt	Tv) 9)	89.31 9472H :) 0478&
Cngger	Tv) 9)	94.01 9V7H0 :) 027H2
Irm	Tv) 9)	96.03 9V7H2 :)) 0729
xead	Tv) 9)	90.54 897H :) 0HV02
v ancanese	Tv) 9)	109.17 %HV% :)) %2)
v eroury	Tv) 9)	94.69 9378H :) 0273H
v nty6denu1	Tv) 9)	96.71 987) :) 0478&



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Metals in solid samples by OES

		QC Vj %/
Nickel	Tv) 9)	89.98 9) 7% :) 0V7 9
Phosphorus	Tv) 9)	107.68 %124 :) VHV9
Selenium1	Tv) 9)	99.22 9479 :)) 079
Strontium1	Tv) 9)	88.42 8%7 3 :) 0V8%
Thallium1	Tv) 9)	95.13 9V7H :)) 74
Tin	Tv) 9)	98.48 %072 :) 0974
Titanium1	Tv) 9)	75.73 4473 :) 0V04
Vanadium1	Tv) 9)	95.6 9478 :) 087H
Zinc	Tv) 9)	96.71 9H49 :)) 37%

Mineral Oil

Component	Method Code	QC Vj H%	QC Vj 0&
Mineral Oil	Tv 04)	95.17 8&7H :) 00734	96.33 8&7H :) 00734

PAH by GCMS

Component	Method Code	QC Vj 39	QC Vj 4%	QC Vj 94	QC Vj H&	QC Vj 24	QC Vj 80
Acenaphthene	Tv Vj 9	92.0 9078 :) 027%	91.0 8478 :) 0370	87.5 8478 :) 0370	95.5 9078 :) 027%	88.0 8478 :) 0370	85.5 8070 :) 30700
Acenaphthylene	Tv Vj 9	92.5 907H :) 027%	90.0 8970 :) 0974	87.0 8970 :) 0974	96.0 907H :) 027%	86.0 8970 :) 0974	86.5 8070 :) 30700
Anthracene	Tv Vj 9	91.5 8378 :) 0%73	92.0 847 2 :)) 070&	87.0 847 2 :)) 070&	96.5 8378 :) 0%73	85.5 847 2 :)) 070&	85.0 8070 :) 30700
Benz[a]anthracene	Tv Vj 9	94.0 8%8V :)) 47H	110.5 8378 :)) 974	77.5 8378 :)) 974	98.5 8%8V :)) 47H	87.5 8378 :)) 974	84.5 497 V :)) 973%
Benz[a]pyrene	Tv Vj 9	89.0 4%29 :)) 074	108.5 8370 :)) H7 9	83.0 8370 :)) H7 9	97.0 4%29 :)) 074	87.0 8370 :)) H7 9	81.0 8%8V :)) 273
Benz[b]fluoranthene	Tv Vj 9	84.5 8&72 :)) V7%	101.0 82734 :)) 829	85.5 82734 :)) 829	92.5 8&72 :)) V7%	80.0 82734 :)) 829	79.5 4479 :)) V070
Benz[b]kerylene	Tv Vj 9	87.5 8&79 :)) 08739	94.0 80783 :)) 47 V	79.0 80783 :)) 47 V	96.5 8&79 :)) 08739	90.5 80783 :)) 47 V	81.5 4&7V :)) 97H%
Benz[k]fluoranthene	Tv Vj 9	88.5 9V7H :))) 73	105.0 8278 :)) 472%	85.0 8278 :)) 472%	100.0 9V7H :))) 73	84.0 8278 :)) 472%	82.0 837 0 :)) 8703
Chrysene	Tv Vj 9	91.5 9079 :))) 7H	104.5 8H79V :)) H7 9	78.0 8H79V :)) H7 9	96.5 9079 :))) 7H	83.0 8H79V :)) H7 9	85.0 4%29 :)) 27H&
Dibenz[a,h]anthracene	Tv Vj 9	86.5 8%7 8 :)) 047H	90.5 4%7 8 :)) 2730	78.5 4%7 8 :)) 2730	98.0 8%7 8 :)) 047H	87.5 4%7 8 :)) 2730	83.0 4&7V :)) V7 72
Fluoranthene	Tv Vj 9	95.5 8%70 :)) V7&	101.5 82799 :)) V79H	86.5 82799 :)) V79H	95.0 8%70 :)) V7&	80.5 82799 :)) V79H	85.5 827 4 :)) 879



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PAH by GCMS

		QC Vj 39	QC Vj 4%	QC Vj 94	QC Vj H8	QC Vj 24	QC Vj 80
Flumrene	Tv Vj 9	91.5 9072V :)) 07%0	91.5 89720 :)) H0V	88.0 89720 :)) H0V	96.5 9072V :)) 07%0	87.5 89720 :)) H0V	86.0 80700 :) 30700
Indenntf V3od(gyrene	Tv Vj 9	89.0 847%& :)) 3734	93.5 807%4 :)) 87%2	86.5 807%4 :)) 87%2	94.0 847%& :)) 3734	81.5 807%4 :)) 87%2	79.5 497%& :)) 87%V
Naghtalene	Tv Vj 9	92.0 93720 :)) 070V	88.0 827%4 :)) 7%4	85.0 827%4 :)) 7%4	95.5 93720 :)) 070V	86.5 827%4 :)) 7%4	86.5 80700 :) 30700
Phenanthrene	Tv Vj 9	94.5 8%3H :)) 7%&	94.5 8&70& :) 0&7-B	88.5 8&70& :) 0&7-B	97.5 8%3H :)) 7%&	83.5 8&70& :) 0&7-B	85.0 80700 :) 30700
Pyrene	Tv Vj 9	94.0 8H7-B :)) H34	100.0 8978H :)) V24	85.0 8978H :)) V24	94.0 8H7-B :)) H34	83.0 8978H :)) V24	86.0 827%9 :)) 7%V3

PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC Vj 9)
Aoenaghtene KlissZilt(	Tv) &9	103.2 %37%0 :)) 7%40
Aoenaghtylene KlissZilt(	Tv) &9	102.0 %7%00 :)) 97%0
Anthraene KlissZilt(	Tv) &9	103.2 %07%0 :)) H7%0
Benzntf6(anthraene KlissZilt(	Tv) &9	102.0 %&7%0 :)) 27%0
Benzntf6(gyrene KlissZilt(	Tv) &9	100.0 %&7%0 :)) V07%0
Benzntf6(lunranthene KlissZilt(	Tv) &9	108.4 947%0 :)) V07%0
Benzntf6,h,i(gerylene KlissZilt(	Tv) &9	104.0 9%7%0 :)) 97%0
Benzntf6(lunranthene KlissZilt(	Tv) &9	108.0 %47%0 :)) V27%0
Chrysene KlissZilt(	Tv) &9	104.0 %47%0 :)) V7%0
Di6Benzntf6,h(anthraene KlissZilt(	Tv) &9	107.2 %37%0 :)) 3V7%0
Flumranthene KlissZilt(	Tv) &9	106.0 %87%0 :)) Vj7%0
Flumrene KlissZilt(	Tv) &9	105.2 %37%0 :)) V07%0
Indenntf,V,3Md(gyrene KlissZilt(	Tv) &9	101.6 9V7%0 :)) V07%0
Naghtalene KlissZilt(	Tv) &9	102.8 997%0 :)) V47%0
Phenanthrene KlissZilt(	Tv) &9	103.2 %7%0 :)) 97%0
Pyrene KlissZilt(	Tv) &9	102.8 %07%0 :)) V7%0

PCBs by GCMS



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PCBs by GCMS

Component	Method Code	QC V)) H	QC V)) V	QC V) %
PCB omcener) 0)	Tv) 49	85.7 8%74 :) 0%80	103.0 8%74 :) 0%80	87.9 8%74 :) 0%80
PCB omcener) 02	Tv) 49	70.6 44733 :) 02782	92.5 44733 :) 02782	73.5 44733 :) 02782
PCB omcener)) H	Tv) 49	72.7 4474 :) 0474%	91.2 4474 :) 0474%	74.1 4474 :) 0474%
PCB omcener)) 9	Tv) 49	77.1 80733 :)) 074%	96.5 80733 :)) 074%	77.0 80733 :)) 074%
PCB omcener) V3	Tv) 49	68.4 4270 :) %89)	86.3 4270 :) %89)	79.0 4270 :) %89)
PCB omcener) V4	Tv) 49	69.6 2%73 :) 0%7V3	94.2 2%73 :) 0%7V3	72.9 2%73 :) 0%7V3
PCB omcener) 39	Tv) 49	72.7 4372 :) 08743	93.5 4372 :) 08743	71.9 4372 :) 08743
PCB omcener) 23	Tv) 49	74.1 4V742 :) 09782	93.6 4V742 :) 09782	74.8 4V742 :) 09782
PCB omcener) 24	Tv) 49	72.3 4) 74% :)) V74	100.0 4) 74% :)) V74	74.8 4) 74% :)) V74
PCB omcener) 28	Tv) 49	68.8 4872 :) 0%78	93.5 4872 :) 0%78	74.4 4872 :) 0%78
PCB omcener) 48	Tv) 49	73.3 42729 :) 0%7 H	98.6 42729 :) 0%7 H	75.8 42729 :) 0%7 H
PCB omcener) 4%	Tv) 49	67.9 2478H :)) V7 0	97.5 2478H :)) V7 0	73.3 2478H :)) V7 0
PCB omcener) 90	Tv) 49	75.7 4478% :))) 743	101.0 4478% :))) 743	77.2 4478% :))) 743
PCB omcener) 9%	Tv) 49	71.9 28782 :)) V72%	103.0 28782 :)) V72%	73.9 28782 :)) V72%
PCB omcener V9	Tv) 49	79.7 83749 :) 0274	91.8 83749 :) 0274	79.2 83749 :) 0274
PCB omcener 2V	Tv) 49	76.8 4874H :) 0874V	87.6 4874H :) 0874V	75.9 4874H :) 0874V
PCB omcener 88	Tv) 49	72.2 4H788 :) 0974%	89.7 4H788 :) 0974%	72.4 4H788 :) 0974%
PCB omcener 9)	Tv) 49	78.6 80789 :)) 0780	98.8 80789 :)) 0780	80.9 80789 :)) 0780

pH

Component	Method Code	QC V) %%	QC V) 00	QC V) 94	QC V) 00	QC V) %0	QC V) 2%
gp	Tv) 33	98.37 %874H :) 0078	98.37 %874H :) 0078	98.14 %874H :) 0078	99.53 %874H :) 0078	98.26 %874H :) 0078	99.19 %874H :) 0078

pH Value of Filtered Water



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pH Value of Filtered Water

Component	Method Code	QC Vj 29	QC Vj 49
g p f alue m Filtered Water	Tv V24	101.62 %0.33 :) 0V7j 4	101.89 %0.33 :) 0V7j 4

Phenols by HPLC (S)

Component	Method Code	QC Vj 0%	QC Vj 9%	QC Vj) 2	QC Vj V4
V32 Tri1 ethylPhenol 6y p Px C IS(	Tv 04V IS(	94.16 42720 : 9%20	108.44 9373 :) 0%3	100.65 42720 : 9%20	124.68 42720 : 9%20
V32 Tri1 ethylPhenol 6y p Px C IS(	Tv 04V IS(	92.4 9472 :)) 472	91.81 8473H :) 0H7j)	93.57 9472 :)) 472	85.38 9472 :)) 472
Catechol 6y p Px C IS(	Tv 04V IS(	82.86) %33% :) 32780	59.05 V773 :) 2870V	75.24) %33% :) 32780	15.24) %33% :) 32780
Cresols 6y p Px C IS(	Tv 04V IS(	94.78 9) 700 :)) V70	104.8 9270 :)) V70	97.08 9) 700 :)) V70	87.89 9) 700 :)) V70
Nagthol 6y p Px C IS(	Tv 04V IS(	119.29 28720 :) 0V720	108.57 8274V :) V739	112.14 28720 :) 0V720	42.14 28720 :) 0V720
Phenol 6y p Px C IS(	Tv 04V IS(	101.32 %273 :) V373	101.32 8%273 :) V0778	101.99 %273 :) V373	97.35 %273 :) V373
Resorcinol p Px C IS(	Tv 04V IS(	102.52 4%77% :) V87V	96.23 8) 773 :) V%2%	101.26 4%77% :) V87V	87.42 4%77% :) V87V
Xylenols 6y p Px C IS(	Tv 04V IS(	95.42 %07V :)) HW	100.83 9%70 :) 0873	96.25 %07V :)) HW	90.1 %07V :)) HW

Phenols by HPLC (W)

Component	Method Code	QC Vj 30	QC Vj %0	QC Vj 29	QC Vj %4	QC Vj 0)
V32 Tri1 ethylPhenol 6y p Px C KW(	Tv V2%	92.0 9H70 :) 0970	101.0 % 700 :) 0%700	100.0 % 700 :) 0%700	94.0 % 700 :) 0%700	96.0 % 700 :) 0%700
V32 Tri1 ethylPhenol 6y p Px C KW(	Tv V2%	91.0 9H70 :) 39700	100.0 %0700 :)) H700	97.0 %0700 :)) H700	95.0 %0700 :)) H700	93.0 %0700 :)) H700
Cresols 6y p Px C KW(	Tv V2%	95.67 %370 :)) 870	108.67 %070V :) 307j 2	106.33 %070V :) 307j 2	103.33 %070V :) 307j 2	104.0 %070V :) 307j 2
Nagthol 6y p Px C KW(	Tv V2%	91.0 %770 :)) 470	96.0 9470 :) V9700	94.0 9470 :) V9700	99.0 9470 :) V9700	98.0 9470 :) V9700
Phenol 6y p Px C KW(	Tv V2%	99.0 9470 :)) V70	104.0 9273% :) 0%3%	101.0 9273% :) 0%3%	99.0 9273% :) 0%3%	100.0 9273% :) 0%3%
Xylenols 6y p Px C KW(	Tv V2%	98.5 9870 :)) 070	101.67 %373 :) 0873	99.83 %373 :) 0873	98.83 %373 :) 0873	99.0 %373 :) 0873

Total Dissolved Solids

Component	Method Code	QC Vj HV	QC Vj %V
Ttotal Dissnt5ed Sntids	Tv) V3	99.5 %8730 :) 007V	99.6 %8730 :) 007V

Total Organic Carbon



CERTIFICATE OF ANALYSIS

Validated

SDG: 161129-11
Location: Christies Hospital

Client Reference: A114654
Order Number: A114654

Report Number: 534127
Superseded Report: 533398

Total Organic Carbon

Component	Method Code	QC V)) 3	QC V)) H	QC V) 3%	QC V) 3H
Tntal Ocanio Car6mm	Tv) 3V	98.83 9H79V :)) &74)	98.83 9H79V :)) &74)	100.78 9H79V :)) &74)	98.44 9H79V :)) &74)

VOC MS (S)

Component	Method Code	QC V) 20	QC V) %4	QC V) W
) ,) , VMeTraohlnmethane	Tv)) 4	101.6 &8Z4 :)) 2722	98.0 &70 :)) %744	97.8 &778 :)) V) 77%
) ,) , MTrichlnmethane	Tv)) 4	104.2 &373 :)) 9702	97.6 9&Z) :)) 273&	92.4 9474 :)) &Z3
) ,) , VMTriohlnmethane	Tv)) 4	99.2 &87V :)) 470H	94.8 &274 :)) V780	87.2 &274 :)) V780
) ,) , MDiohlnmethane	Tv)) 4	105.8 &H74 :)) V77 2	96.8 977H :)) V) 78	90.0 9378 :)) V77 4
) ,) , VMDiohlnmethane	Tv)) 4	108.4 %739 :)) 742	105.8 94729 :)) V774V	101.2 94729 :)) V774V
) ,) , HMDiohlnm6enzene	Tv)) 4	119.2 &V784 :)) V473H	97.0 9H70H :)) VH7H0	96.4 9V72% :)) V37V3
VMDlnm7ntluene	Tv)) 4	102.4 9) 744 :)) 970V	90.8 9070V :)) 4783	95.6 4479 :)) 977B
HMDlnm7ntluene	Tv)) 4	93.2 44770 :)) V774	87.2 &872V :)) 739	92.2 42739 :)) H84
Benzene	Tv)) 4	99.8 9788 :)) 773	97.0 92743 :)) 077 0	89.8 %874 :)) V3743
Car6mm Disulghide	Tv)) 4	101.6 &H774 :)) V77 H	93.0 &277 :)) VH79	82.2 &277 :)) VH79
Car6mmetraohlnmide	Tv)) 4	102.4 9073 :)) VH720	106.6 9V732 :)) V4774	113.0 9V732 :)) V4774
Chlnm6enzene	Tv)) 4	100.0 94783 :)) 973H	100.0 9V739 :)) V77H	90.6 9V739 :)) V77H
Chlnm7m7	Tv)) 4	105.8 9&770 :)) V777%	100.2 %773H :)) V370H	92.0 99773 :)) V78
Chlnm7m7 ethane	Tv)) 4	115.4 42702 :)) H7743	102.2 2V739 :)) 3) 734	81.0 2273& :)) 33732
CisM, VMDiohlnmethene	Tv)) 4	101.4 9077& :)) V478V	96.0 &977& :)) V9770	91.2 &977& :)) V9770
Di6mm7 m7 ethane	Tv)) 4	102.4 4&790 :)) V) 782	98.8 &774% :)) %77B	97.0 &8778 :)) V) 77%
Diohlnm7m7 ethane	Tv)) 4	110.0 9) 77 :)) 33772	101.0 97777% :)) V973%	95.2 9) 749 :)) V277
Ethyl6enzene	Tv)) 4	92.4 &2777 :)) 077	92.6 &0772 :)) 370&	93.0 93724 :)) V777%
pe67ohlnm6utadiene	Tv)) 4	103.2) V79V :)) 2V783	73.4 &73V :)) 3700	110.4 &73V :)) 3700
Isn77m7yl6enzene	Tv)) 4	92.4 2H77 :)) &77 &	85.8 2V772 :)) 3V72V	92.4 47777 :)) 473%
Naghtalene	Tv)) 4	104.8 90794 :)) V979	97.2 9077% :)) 3278&	63.6 &777% :)) V272%
m7Xylene	Tv)) 4	93.0 4777% :)) 0978H	90.4 49774 :)) 0&74)	88.0 &H2& :)) V783



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Superseded Report: 533398

VOC MS (S)

		QC Vj 20	QC Vj %4	QC Vj W
g/1 Mxylene	Tv)) 4	89.2 4973V :) 0977q	92.3 8372V :) 0978)	90.1 8877q :)) V78)
SeoNButyl6enzene	Tv)) 4	99.6 H77q :)) 9770	82.0 H788% :) V274&	111.8 H78) :)) &79&
Tetraohlmethene	Tv)) 4	100.2 84772 :) Vj 70V	105.2 9) 773 :) V4742	104.6 9) 773 :) V4742
Toluene	Tv)) 4	92.2 8777H :) 0877V	91.6 8772% :) 0) 732	84.6 9879V :)) 477)
Triohlmethene	Tv)) 4	93.4 88774) :))) 72H	96.6 88790 :))) V733	90.0 88790 :))) V733
Triohlmmlumml ethane	Tv)) 4	115.0 9H722 :) 337V&	108.6 99794 :) V979V	90.0 9072V :) 3V7j V
f inyl Chlmride	Tv)) 4	120.2 8077% :) 39729	102.8 47744 :) 34722	80.2 29709 :) V9729

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



CERTIFICATE OF ANALYSIS

SDG:	191126-11	Client Reference:	011A94A	Report Number:	4I A123
Location:	5 Cni st i e H i o r s p a	Order Number:	011A94A	Superseded Report:	4 I I 6 D

0oot cxr.

1Ry t i n a i e p l t e . o l t i i t x e H e p e x h e g t r b C a e (p i n i e % x h t x e p s e l 4) 5 f e : H e p a e i H a e p c p a v i t i e t . d t o s : H e s Q e : H a t g r c b h E y 0 e p c x e 5 L e e , t p d C e s i s A e : p i C e o H t c s e , l r e o Q a p B B H c m B e p i e E A e (v e s Q i V y L e b t s C h K G T I 5 e S r i i c p c x e T I 5 e S r i i R

2R e i n : n r i d t c a i p B o a e i e l t d r k t x e p i (e i p B o a e g r a e (t e l t s p r t x e : H t t e H e d Q p l b t e : H e l q e x p w i p : s t h e p c p a v i n i e i e d H o a s t x e " B p a x f e : H e p a e i p B o a e s w o t i e n c a i i e s Q e i p B o a e i e x t i s H t x e H e s i s c b R e S Q e o l t o p l t x e i H a e i n (e i p B o a e s Q p e i e p c p a v i t x e : H e p i (t i s H e g r a e (t e l t s p r t x e : H e p e o t h t k e t e 6 e B H c S Q e p : s t h e s Q e p c p a v i n i e x p s t R e 0 a e (n a V e i p B o a i e g r a e (t e l t s p r t x e : H e p e o t h t k e t e 6 B H c S Q e p : s t h e s Q e p c p a v i n i e x p s t R e 0 a e i p B o a i e l t d r k t x e p c x e c h e i d Q x n a x e g r a e (t e x n i o H t x e H e H e t e B H c S Q e p : s t h e s Q e x p s t e H e l t d r o s e n c a i i e g t e p l t e r c i s n d s x e s h e s Q e d i H c s p h w e l c d t e s Q e r c s p a o t h t k e C p i e t . o r f t x Q a p e i s H p b t e d Q p l b t e g r a e (t e p o o a t x e : H e t p d C e B H c S e H e o p h e s Q i t H e n c s a e s Q e d a t c s e p d c d t a e s Q e l t U n t i s e : H e i p B o a e i s H p b t R e 0 , v e l t i t f k t e s Q e e n b C a e s h e d Q p l b t e : H e i p B o a e i e l t d r k t x e p c x e s H t x e g n a e H a p c p a v i t x R

l R K R c e l t i o t d s e s h e s n r c p h t h c x Q g t e g r a e p a g p w i e t c x t p k h h e s h e B t t s e d a t c s e l t U n t B t c s e g Q i t k t h e o l i r (a Q i n s e n r c p h t h c x e s B t i e d p c c H a e (t e p i i H a s t a e b n p l p c s t x e x n t e s h e i H e B p c w e k p h p (a i e t w h c e h n e l H c s t h R

A R K t e s p W e l t i o h i r (a s e : H e p c w e s i e o t h H B t x e (v e i n (d h c s p d s h i e " B p h W x e g r S e p c p i s t h i W R e K t e t c x t p k h h e s h e n i t e / M D v I P 5 L y S v e 0 d d t x s t x e , p (H p s t h t i Q e g Q e t r s Q h e d h B o a s e p e U n p a s e U n t i s h c b p r t e H e p l t e p n x r t x e (v e l h n i t a t i R 7 H e i H B t e x t s t B r c p c x i e s Q i t e p l t e c H e / M D v I P 5 L y S v e 0 d d t x s t x e , p (H p s t h t i Q e r c s Q i e r c i s p d t e p e a p (H p s t h w e g r S e p e V e l H g c s p d V e l t d H x e g r a e t e n s a i t x R

4 R e c H e i t o p l p s t e k H a s a e i p B o a e i e n o o a t x e (v e s Q e d a t c s e H e r e p e Q p x i o p d t e H e i t x r B t c a i e o l t i t c a e r c e Q e k H a s a e i p B o a e s Q e r c s b h s e H e s Q e x p p e B p w e (t e d h B o l t B n i t x R e S Q i e g r a e (t e : a p b t x e n o e p i e p c e r c k p a k e T I 5 e H e s e S Q e s i s e i d Q x n a e p c x e s Q e l t i n a e B p h W x e p i e x t k i p s c b e h e s Q e e i s a t h a r d p s t R

6 R e U e e H e x t s t B r c p s t h e o l i r (a e x n t e s h e i n : n r i d t c s f n i n s p (a e p B o a R

3 R y t i n a i e t p s t a e b a e s Q e s t B i e i s t x R

D R e , H u i e " , i B s e H e u t s d s t h e : H e g t s e i s e l t o H t x e H e p e x h e g t r b C a e (p i n i e p l t e c h e d H t t d s x e : H e B H i s n i t e l t c s R

9 R e S u r r o g a t e r e c o v e r i e s e e r n t h p s t i e p t e p x x t x e s h e h h e p B o a e s t B H c s t h t d h k t h w e t e Q e s i s a t U n t i s x R 0 e % e t d h k t h w i e t o H t x e Q i t i n a i e p l t e c h e d H t t d s x e H e s Q e d t d h k t h w e B t p i n i t x R e S u r r o g a t e d h k t h t i e H e t h p c r d i e s i s e p l t e 3 Q - 1 1 % R y t d h k t h t i e c a e H a e p l t e p : t d s x e v e l H p c r d e d Q e t h a p w e d Q a p s n d i t R K p s t h e l p c e t e p o t d s x e v e l t B t x p s t b e a n x i e H e o b Q a p B H c s d t e t x r B t c s R i s a t i n a i e p l t e c h e d h t h t o H t x e : e p a e t e s Q e p i i H a p s t x e U n p a s e d Q d W e p i i , e s s i e p i i n B t x e s Q p e a n t d h k t h t i e h s x t e t e s Q e k p a n t i e p (H k t e p l t e x e s t h e p s t r : e p o t d s R e

1 Q R e v s h t i f x t (h i e p l t e c h e H h a c t a e t B H k t x R e K t e p a g p w i e t c x t p k h h e s h e s p W e p e l t o l t i t c p s k t e n (e p B o a e l t B e s Q e d t d r k t x e p B o a R

11 R e m e d i t h p c e d i r d n B i s p d t i e s Q e e B t s C h k e x t s d s t h e a e B s e B p w e (t e t a k p s t x e x n t e s h e s Q e i p B o a e (t r c b e H h s x t e s Q e d p a l p s t h e l p c b t R e l s Q h e : p d s h i e s Q p e B p w e d h s t (n s t e s h e s Q i e r c d a n x t e o H i r (a e r c s t h t l c d t i R e m e (H e c d p i t i e s Q e i p B o a e g H a x e (t e x a n t x e g Q d C e g H a x e d p n i t e s Q e B t s C h k e x t s d s t h e a e B s e s t e t a p i t x R

12 R e P t h d n h e l t i n a i e U n H t x e H e i H a e g r a e c h e r c d a n x t e k H a s a e B t h d n h e p i e s Q e p c p a v i n i e i e o t h H B t x e t h e p l t x e p c x e d n i Q x e p B o a R

1l R e 7 H t e a p d C p s t e o l t o p l p s t h i e H e Q h e s Q p e Z t H e t p x i o p d t e L . s p d s h e " Z L f e k H a s a e a d i i B p w e d d n R

1 A R e H a s Q e v L e e l 2 A 4 3 - l e g H e p s d C a l H d t i i e s t h a t g e s Q e e n B n a p s k t d t a p i t e s t e d p a l n a p s t x a Q e k H a B t e t e s Q e a p d C p s t e o l t h k n d t x e i e B t p i n i t x e p c x e r a t l t x e H e p a e i s R e K t e s Q i t : H t e d p c c H a p l p h e h a p c w e n c : n a t l t x e p c p a v i n i R e S Q e s i s e p o t d s x e d a n x t e k H a s a e G 5 7 m R 9 S 5 P v e p c x e a n (d h c s p d s t x e p c p a v i n i R

14 R e c p a v i n i e p c x e x t c s r d p s t h e t e o t d r d e l B o h n c x i e n i r c b e G 5 7 m e i e v e t s c s t h e s B t e H e a v Q p c x e g t e t h s n c t a n d p a l p s t e p c x e d h p c s v e l H e t c z t c t Q a n t c t Q a s Q e t c z t c t i e p c x e . v a c t i e V S L X f R e H a s t h a p k H a s a i e c e s Q e 4 - 5 1 2 d p c b t Q e s t h a p l t p e t e s Q e e l Q t h B p s t h p B e n e c s b l p s t x e p c x e . o l t i i t x e p i e n b R v e t h e n b R a Q e o h n b C a e Q i e p c p a v i n i e i e d H B H c a v e n i t x e H e s Q e d h p c s r d p s t h e t e p i H a c t e p c b t e H p c r d i e G y l f Q e e w i s B e g r a p a H a c t s d s t h e d h B o h n c x i e n d C a p i e d C a t h p c s t x e H a k t c s Q p c x e Q i e p w a t p x e s t e p e t a n e Q b C e t i n a e g r S e l t i o t d s s h Q a w t h p l t H c i e t a v R e m e i e H a e H i r (a e s t o t d r d p a v e x t c s v e s Q i t e c h e Q a w t h p l t H c i Q a i e s p c x p h i e p l t e H a t h s n c t a n d n e e H a p c w e t e Q h a l h B o h n c x i Q p c x e H e B H t e x t : r o s k t e x t c s r d p s t h e k H a s a i e l v e G 5 7 P v e Q h a e t e n s a i t x R

16 R e K t e p l t e p d d t x s t x e s t P 5 L y S v e H e p c x Q a p w e p c x e a p B R B i H a d h a p c w e t e Q i t e B p s t h a e e g Q i s Q e l t e p l t e x t h k t x e l t B e p s n p a n e d d n i n c b e H a e l t h a i Q e l t H e B e r a l B p x t e b t H n c x Q i e c b e p i e s Q i t e B p s t h a e l h i s n s t e s Q e d p j H e a p l t e s Q e p B o a R e s Q h a l p h t e b l p c n a p h e p s t h a e n d C a p i e l t h d i t s Q a p k t a p c x e d h d v e l t e H a p d d t x s t x e s Q e v e l h B o h i t e s Q e B p j H e a p l t e s Q e p B o a R

Gt c t h p a

13 R e a n a l y t i c a l l y I d e n t i f i e d C o m p o u n d s (T I C s) e p l t e H e s p l b t s o t p W a c e l I 5 e p c x e T I 5 e p c p a v i n i R a Q e H e s p l b t s o t p W e t s d s x e g r S Q e d h d t c d p s t h e p (H k t e s Q e H u e p l t e n (j t d s x e s t a p e B p i i e o t d s p a e l p h w e t p d C a l H e s p l b t s o t p W e g r S Q e a l p h w e t p d C a l H e : x t c d t e t e > 3 4 % e p l t e t o H t x e p i t x e t e s Q e t i s e B p i e o t d s p a e l p h w e p s i C R K Q e p e H e s p l b t s e o t p W e g r S Q e a l p h w e t p d C a l H e : x t c d t e t e 3 4 % e i e x t s d s x e a i e t o H t x e p i e B r t x e Q a w t h p l t H c i " R e H e s p l b t s a l h B o h n c x i e x t c s r t x e l t B e s Q e e d p c x p s p l t e t B r U n p c s r t x e l t p s k t e s t h e t e s Q e x t n s t p s t x e s t h p a e s p c x p h i Q a n c t h a s Q e p B t e l Q t h B p s t h p o O d e d H c x s t h c i e i e s Q e e p l b t s a l h B o h n c x i R e S Q i e t i n a a i e t o H t x e p i e B r U n p c s p a k t e p a n t e p c x e t o H t x e p i e s p a k t a n a t c s r t x e s H B o h n c x i e S r i i f R e S r i i e p l t e h s x t e s Q e e d h t e t e / M D v e p d d t x s p s t h e p c x e p l t e H e B H i s n i t e l t H t d s x R

1 D R e S a m p l e D e v i a t i o n s

n e p e p B o a e i e a p i i t x e p i e x t k p s t x e s Q e s e Q e p i i H o l p s t x e t i n a i e B p w e t e l t B o l t B n i t x R

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

19 R e A s b e s t o s

K Q e t U n t i s x a Q e e x k r x n p a e n (e p B o a e d Q x n a x e g r a e t e p c p a v i t x e a e Q h i t e H e s Q e o l t i t c d t e t e p i (t i s H e r (t i e p c x e p i (t i s H e l t h e p r c b e B p s t h a e v e l h n e l h n B t c s t x e e Q h i t e t B t s C h k e s P Q A D e p i t x e t e v G e A D e 2 q q 4 f Q e Q d C a i e p d d t x s t x e s t a l l 1 3 q 2 4 R e p e i o t d r d e p i (t i s H e r (t i e s w o t e i e H e l h n c x e s Q i e g r a e t e t o H t x e p i e e l H e x t s d s x " R e m e H e p i (t i s H e r (t i e s w o t i e p l t e H n c x e p a g r a e t e t o H t x e p i e e l H e x t s d s x " p c x e s Q e n (e p B o a e p c p a v i t x e t t B t x e s t e t e d a p h e t e p i (t i s H e r e p c p i (t i s H e r (t i e s w o t e i e H n c x e s g r a e t e t o H t x e p i e x t s d s x e : H a p d C e r (t i e s w o t e i e H n c x i f R e S i s c b a p c e t e l p l t e x e s t h e p i (t i s H e o l t x e p B o a i Q n s a n t e s h e t p a Q p c x e p : t s a l h B o h i t p s t h c i Q B p w e t e t o p d t x e v e p a t h p s k t e i s i e t e t o H t x e p i e H a u t s t B r c p s t h e o l i r (a e U e 8 f R e S Q e d h p c s a e t e

Identification of Asbestos in Bulk Materials & Soils

S Q e l t i n a i e : H e r x t c s r d p s t h e H e p i (t i s H e r c e (n a V e B p s t h a e e p l t e H e l s p r t x e : H B e i n o o a t x e (n a V e B p s t h a e e g Q d C e Q p t e (t t c e t . p B r c t x e s t e x t s t B r c t e s Q e o l t i t c d t e H e p i (t i s H e r (t i e n i r c b e 0 , v e " p g p h x t c f e r c Q h i t e B t s C h k e H e s p c i B r s t x o l t h p i t x e a b C a e B r d i H d h w e p c x i d t c s p a s t h e x t o t h i t h e s p r c b Q p i t x e t e v G e A D e 2 q q 4 f R

S Q e l t i n a i e : H e r x t c s r d p s t h e H e p i (t i s H e r c e i H a e p l t e H e l s p r t x e : H B e p e Q B H b t c r i t x e i n (e i p B o a e g Q d C e Q p i e (t t c e t . p B r c t x e s t e x t s t B r c t e s Q e o l t i t c d t e H e p i (t i s H e r (t i e n i r c b e 0 , v e " p g p h x t c f e r c Q h i t e B t s C h k e H e s p c i B r s t x o l t h p i t x e a b C a e B r d i H d h w e p c x e d t c s p a i s t h e x t o t h i t h e s p r c b Q p i t x e t e v G e A D e 2 q q 4 f R

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

L i s B p s t h e H e r (t i e d h s t c a e i e c h e t o l t B r s t x e p i e o p h e H e H n e / M D v e p d d t x s t x e s i s e H e Q h e s p c n e s p d t e k Q i t e t a v e t e t e H e g H p i (t i s H e r (t i e g t t e x t c s r t x R

Respirable Fibres

y t i o r p (a e r (t i e p l t e x t : r c t x e p i e r (t i e t e l q u B e x p B t s t h a e b t h e s Q p e l q u B e p c x e g r S e p i o t d s p s H e t e p a s p i s N e s Q s p d c e t e c Q a x e s t e s Q e s t h e t h t b r t h i e t e s Q e a n c b e p c x e p l t e t c t h a p e d V e l H y a x t x e s t e t e B i s e B o h p c s a l t x r d s t h e t Q p z p h e p c x e d i V e l H e d p c d t e t e s Q e a n c b R e v p c x r c b e H B R s t t e t e t c p a v i s @ The Quantification of Asbestos in Soil (2107).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



Appendix F – Geotechnical Testing Results



LABORATORY REPORT



4043

Contract Number: PSL20/0052

Report Date: 10 January 2020
Client's Reference: A114954
Client Name: WYG Manchester
Quay West at MediaCityUK
Trafford Wharf Road
Trafford Park
Manchester
M17 1HH

For the attention of: Graham Rooney

Contract Title: Christies Hopsital Car Park
Date Received: 6/1/2020
Date Commenced: 6/1/2020
Date Completed: 10/1/2020

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

S Royle
(Laboratory Manager)

A Watkins
(Director)

S Eyre
(Senior Technician)

R Berriman
(Quality Manager)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH101	B5	BD	1.00	1.20	MADE GROUND brown slightly gravelly sandy clay.
BH101	D8	SD	2.00		Brown mottled grey slightly gravelly very sandy CLAY.
BH102	D6	SD	1.20		Brown slightly gravelly very sandy CLAY.
BH103	D4	SD	1.60		Brown slightly gravelly very sandy CLAY.
BH103	U5	UT	2.00	2.45	Soft brown slightly gravelly very sandy CLAY.
BH104	D6	SD	1.20		Grey mottled brown slightly gravelly very sandy CLAY.
BH104	D7	SD	1.60		Brown slightly gravelly very sandy CLAY.
BH105	D6	SD	1.60		Brown slightly gravelly very sandy CLAY.
BH105	D7	SD	2.00		Brown slightly clayey SAND.
BH106	B7	BD	1.20	2.00	Brown slightly gravelly silty SAND.
BH107	D5	SD	1.20		Brown silty SAND.
BH107	U6	UT	1.20	1.65	Firm brown slightly gravelly sandy CLAY.
BH108	U6	UT	1.20	1.65	Firm brown slightly gravelly sandy CLAY.
BH108	D7	SD	1.50		Brown slightly gravelly sandy CLAY.
BH109	U8	UT	1.20	1.65	Firm brown slightly gravelly slightly sandy CLAY.
BH109	D9	SD	1.70		Brown slightly gravelly slightly sandy CLAY.
BH110	D7	SD	1.50		Brown slightly gravelly very sandy CLAY.
BH110	D9	SD	2.50		Brown slightly gravelly very sandy CLAY.



4043



Christies Hospital Car Park

Contract No:

PSL20/0052

Client Ref:

A114954

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH101	B5	BD	1.00	1.20	20		2.49					
BH101	D8	SD	2.00		16		2.64					
BH102	D6	SD	1.20		15			34	17	17	91	Low plasticity CL.
BH103	D4	SD	1.60		14			32	16	16	90	Low plasticity CL.
BH104	D6	SD	1.20		16		2.66					
BH104	D7	SD	1.60		16			37	18	19	94	Intermediate plasticity CI.
BH105	D6	SD	1.60		14			28	14	14	89	Low plasticity CL.
BH105	D7	SD	2.00				2.55					
BH106	B7	BD	1.20	2.00	13				NP			
BH107	D5	SD	1.20		4.1				NP			
BH108	D7	SD	1.50		20			45	21	24	95	Intermediate plasticity CI.
BH109	D9	SD	1.70		25			52	23	29	96	High plasticity CH.
BH110	D7	SD	1.50		15			36	18	18	93	Intermediate plasticity CI.
BH110	D9	SD	2.50				2.68					

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.



4043



Christies Hospital Car Park

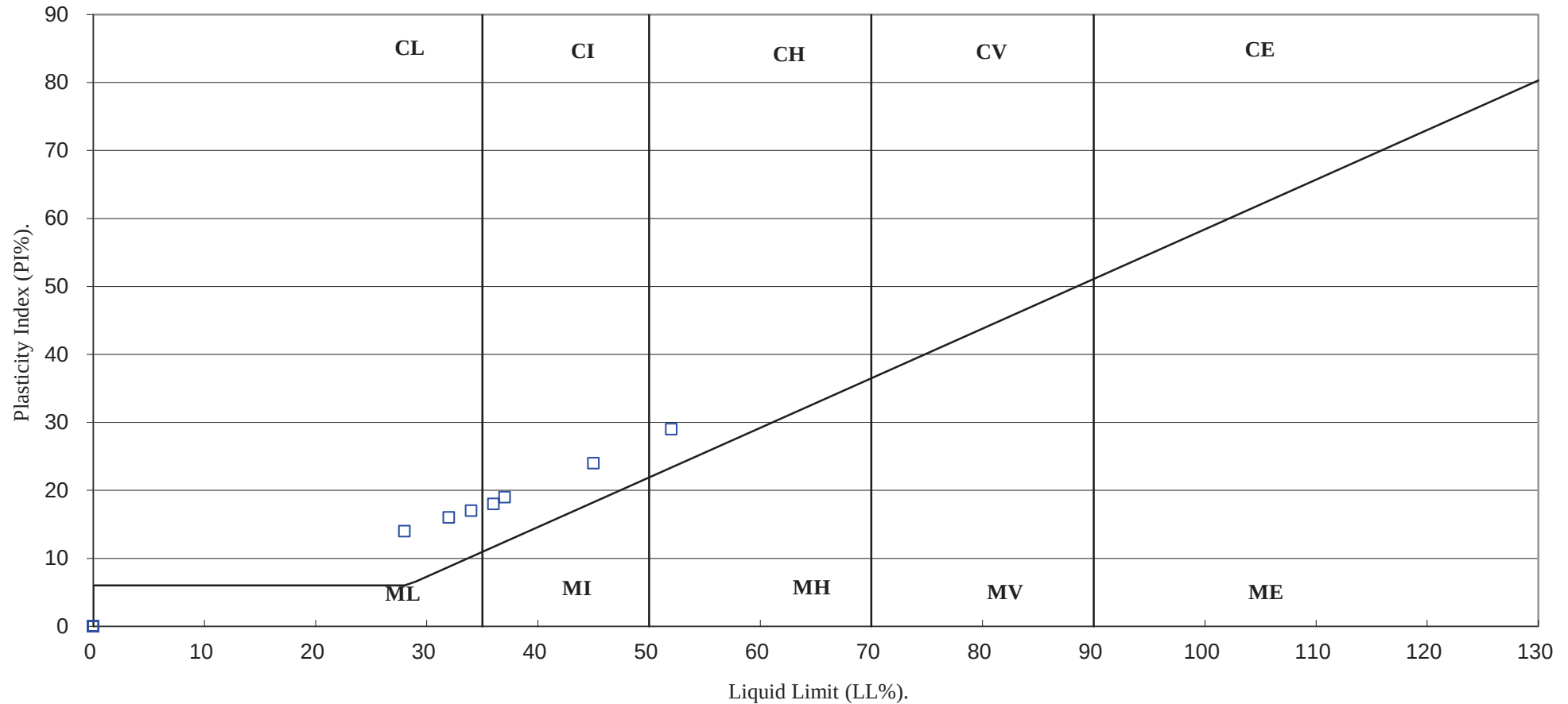
Contract No:

PSL20/0052

Client Ref:

A114954

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

Christies Hospital Car Park

Contract No:

PSL20/0052

Client Ref:

A114954

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

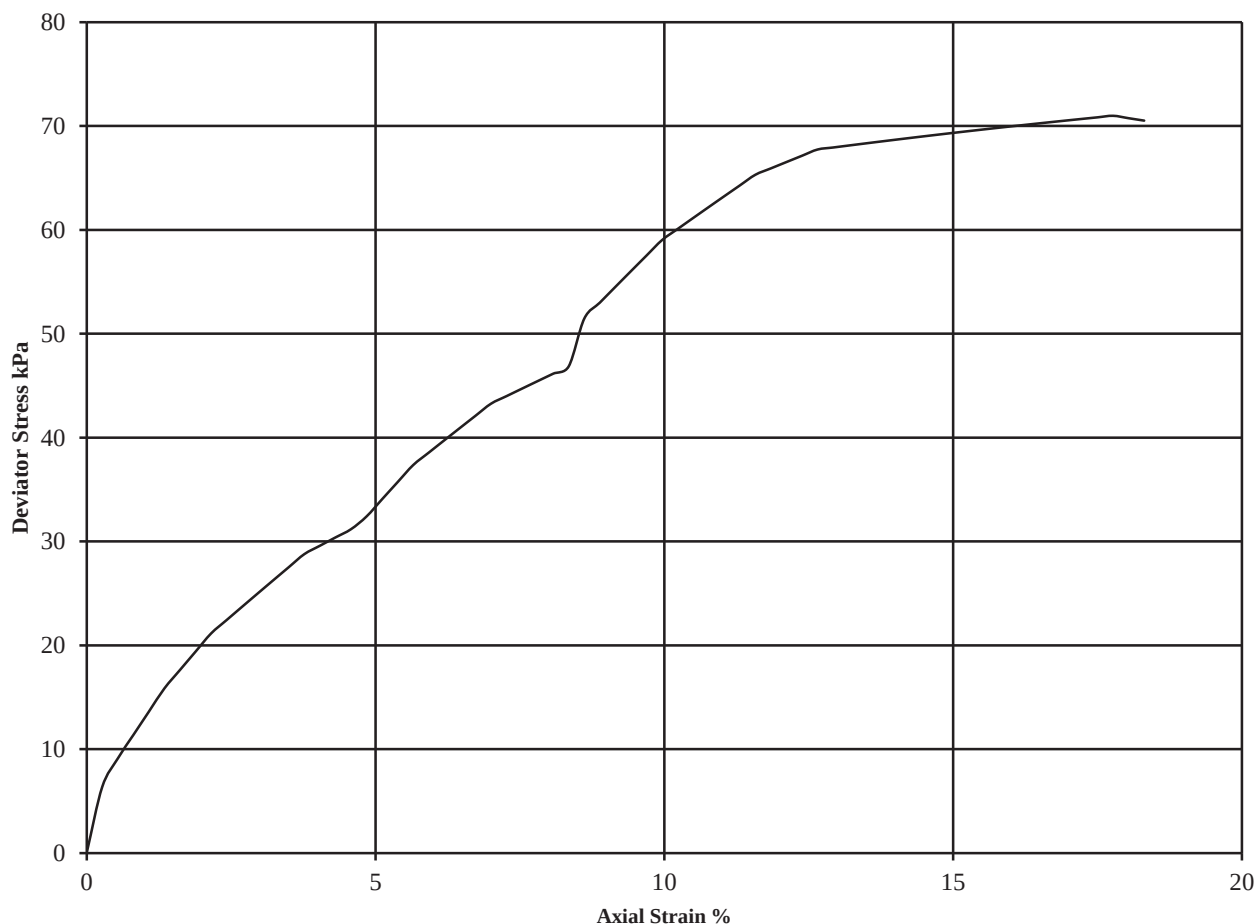
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 9

Hole Number: BH103 Top Depth (m): 2.00

Sample Number: U5 Base Depth (m): 2.45

Sample Type UT



Diameter (mm):		70	Height (mm):		130	Test:	UU Multistage		Remarks
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick Membrane Correction applied (kPa) 0.53 0.52 0.49 See summary of soil descriptions
1	20	2.06	1.72	40	31	16	4.6		
				80	47	23	8.3		
				160	71	35	17.8	Plastic	



Christies Hospital Car Park

Contract No:
PSL20/0052
Client Ref:
A114954

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

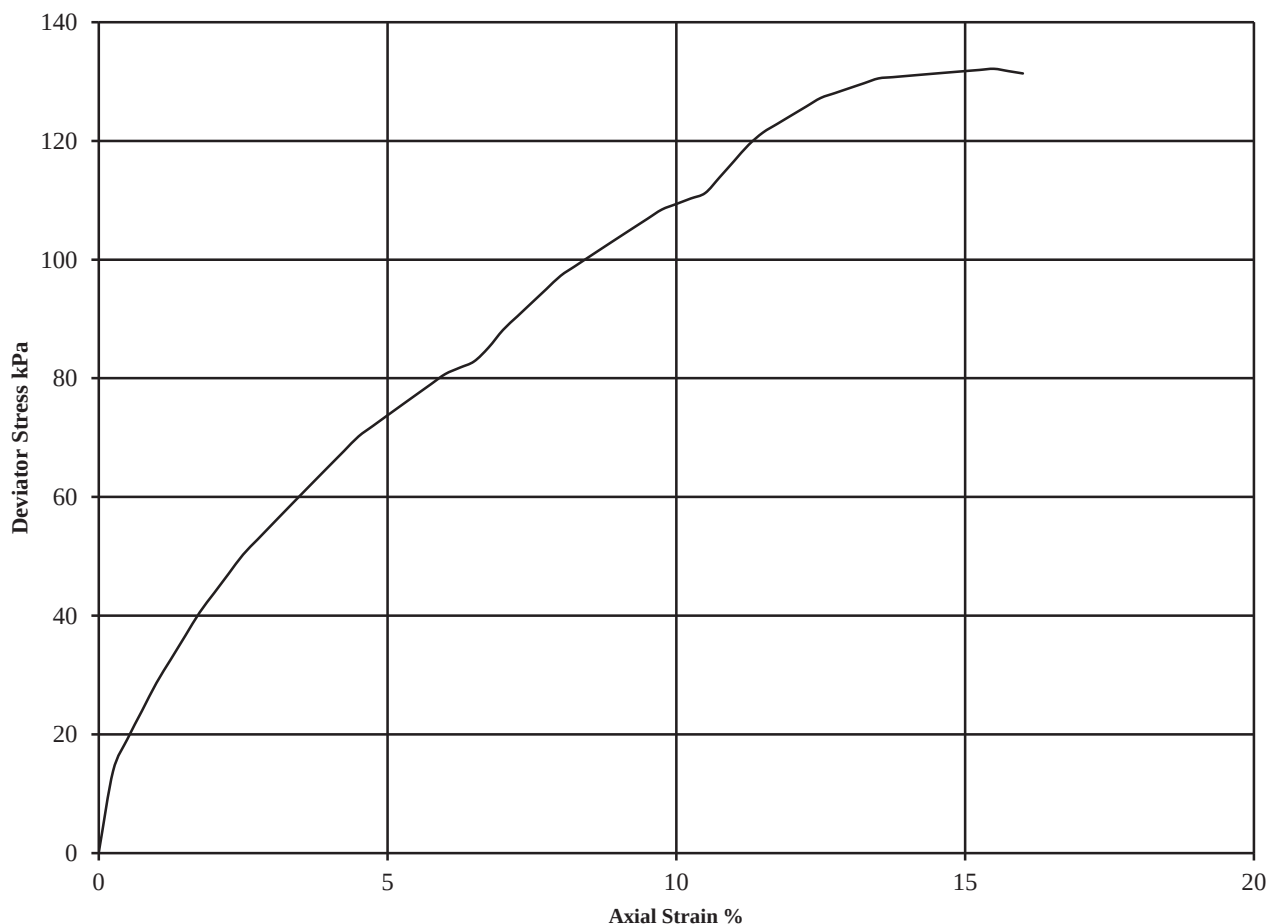
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 9

Hole Number: BH107 Top Depth (m): 1.20

Sample Number: U6 Base Depth (m): 1.65

Sample Type UT



Diameter (mm):		70	Height (mm):		140	Test:	UU Multistage		Remarks
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick Membrane Correction applied (kPa) 0.52 0.51 0.50 See summary of soil descriptions
	21	1.99	1.65	24	83	41	6.5		
				48	111	56	10.5		
				96	132	66	15.5	Plastic	



Christies Hospital Car Park

Contract No:
PSL20/0052
Client Ref:
A114954

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

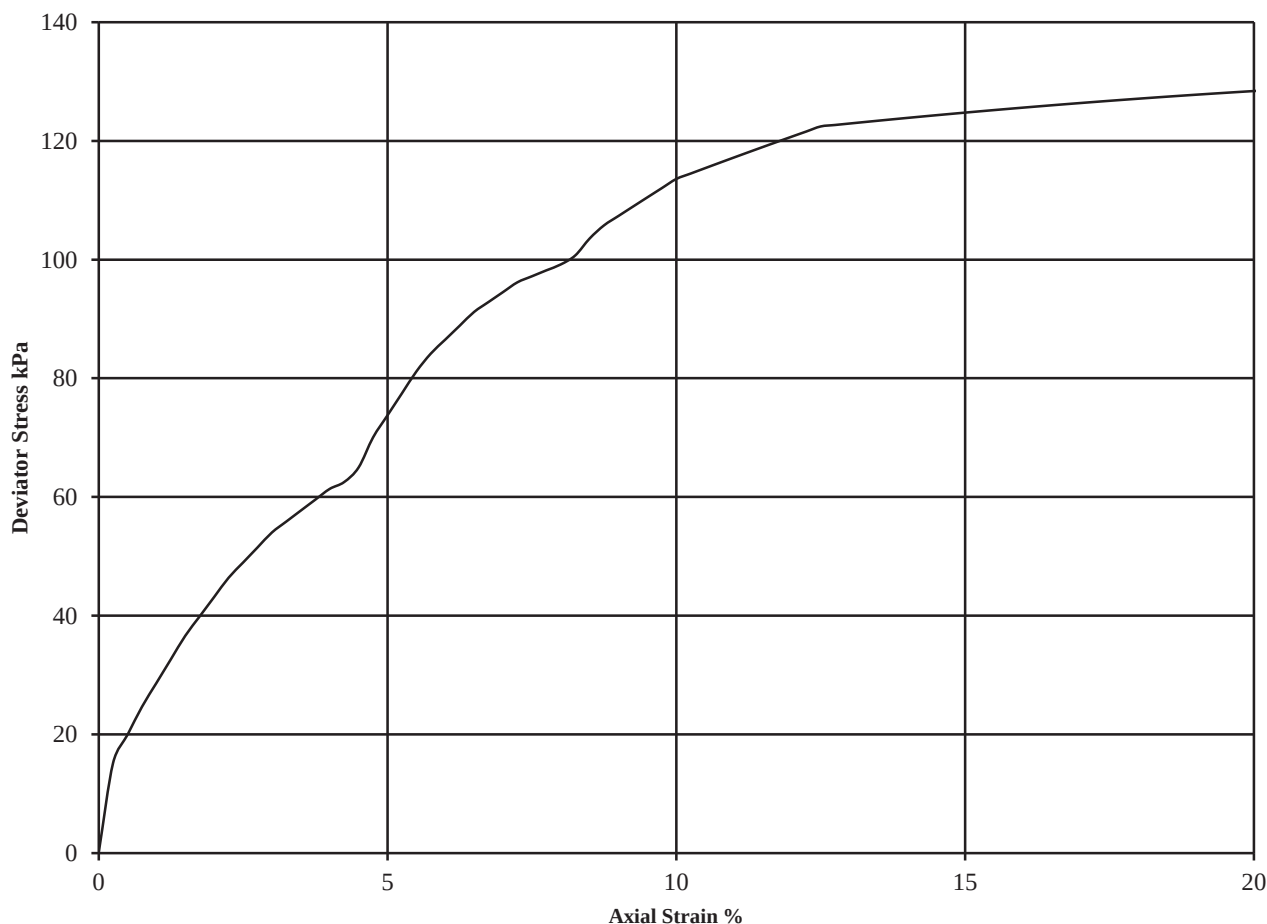
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 9

Hole Number: BH108 Top Depth (m): 1.20

Sample Number: U6 Base Depth (m): 1.65

Sample Type UT



Diameter (mm):		70		Height (mm):		140	Test:	UU Multistage		Remarks
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick Membrane Correction applied (kPa) 0.53 0.52 0.48 See summary of soil descriptions	
	20	1.89	1.57	24	63	31	4.3			
				48	99	50	8.0			
				96	129	64	20.5	Plastic		



Christies Hospital Car Park

Contract No:

PSL20/0052

Client Ref:

A114954

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 9

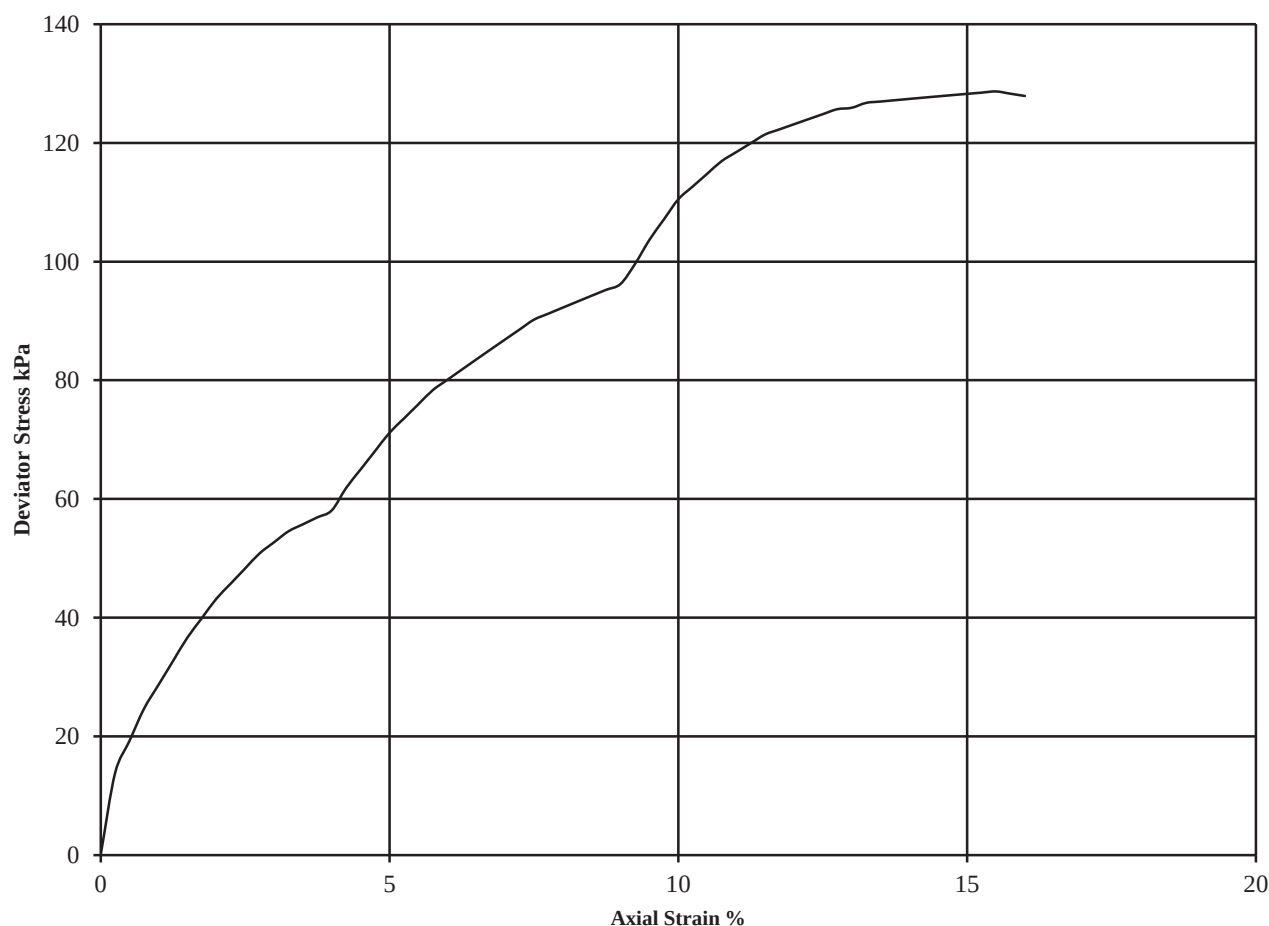
Hole Number: BH109

Top Depth (m): 1.20

Sample Number: U8

Base Depth (m): 1.65

Sample Type UT



Diameter (mm):		70	Height (mm):		140	Test:	UU Multistage		Remarks
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick Membrane Correction applied (kPa) 0.53 0.52 0.50 See summary of soil descriptions
	22	2.07	1.69	24	58	29	4.0		
				48	96	48	9.0		
				96	129	64	15.5	Plastic	



Christies Hospital Car Park

Contract No:

PSL20/0052

Client Ref:

A114954



LABORATORY REPORT



4043

Contract Number: PSL20/0058

Report Date: 10 January 2020
Client's Reference: A114954
Client Name: WYG Manchester
Quay West at MediaCityUK
Trafford Wharf Road
Trafford Park
Manchester
M17 1HH

For the attention of: Duncan Freeman

Contract Title: Christies Hopsital Car Park
Date Received: 6/1/2020
Date Commenced: 6/1/2020
Date Completed: 10/1/2020

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

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(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

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(Senior Technician)


S Eyre
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Page 1 of

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

[illegible]

Christies Hospital

Contract No:

PSL20/0058

Client Ref:

A114954

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation Par / Perp	Dimensions (mm)		Area (mm ²)	D _c ²	D _e (mm)	Failure Load (P)		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
					W	D				(Mpa)	(kN)					
BH106	5.11		A	Perp	85	57	4845	6168.85	78.54	-	0.81	0.13	1.225	0.16	Valid	
BH106	9.34		A	Perp	85	45	3825	4870.14	69.79	-	1.33	0.27	1.162	0.32	Valid	
BH106	10.37		A	Perp	80	51	4080	5194.82	72.08	-	0.25	0.05	1.179	0.06	Valid	
BH101	9.45		A	Perp	83	62	5146	6552.09	80.94	-	0.28	0.04	1.242	0.05	Valid	
BH101	15.35		A	Perp	83	43	3569	4544.19	67.41	-	0.82	0.18	1.144	0.21	Valid	
BH101	15.50		A	Perp	85	46	3910	4978.37	70.56	-	1.01	0.20	1.168	0.24	Valid	
BH102	7.27		A	Perp	85	52	4420	5627.72	75.02	-	0.24	0.04	1.200	0.05	Valid	
BH102	7.54		A	Perp	85	46	3910	4978.37	70.56	-	0.31	0.06	1.168	0.07	Valid	
BH102	7.86		A	Perp	85	51	4335	5519.49	74.29	-	0.20	0.04	1.195	0.04	Valid	
BH102	8.76		A	Perp	85	48	4080	5194.82	72.08	-	0.77	0.15	1.179	0.17	Valid	
BH102	9.12		A	Perp	85	42	3570	4545.47	67.42	-	0.64	0.14	1.144	0.16	Valid	
BH102	10.15		A	Perp	85	62	5270	6709.97	81.91	-	0.74	0.11	1.249	0.14	Valid	
BH102	10.69		A	Perp	85	49	4165	5303.04	72.82	-	0.68	0.13	1.184	0.15	Valid	
BH102	11.78		A	Perp	85	62	5270	6709.97	81.91	-	1.07	0.16	1.249	0.20	Valid	
BH102	12.86		A	Perp	85	48	4080	5194.82	72.08	-	0.50	0.10	1.179	0.11	Valid	
BH109	9.40		A	Perp	85	39	3315	4220.79	64.97	-	0.26	0.06	1.125	0.07	Valid	

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular



Christies Hospital

Contract No:

PSL20/0058

Client Ref:

A114954

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_c^2	D_c (mm)	Failure Load		I_s (MPa)	Corr Fac F	I_{s50} (MPa)	Failure Type	Remarks
				Par / Perp	L	D			(Mpa)	(kN)					
BH106	5.11		D	Par	-	85	7225	85.00	-	0.56	0.078	1.270	0.10	Valid	
BH106	9.34		D	Par	-	85	7225	85.00	-	0.30	0.042	1.270	0.05	Valid	
BH106	10.37		D	Par	-	80	6400	80.00	-	0.24	0.038	1.236	0.05	Valid	
BH101	9.45		D	Par	-	83	6889	83.00	-	0.24	0.035	1.256	0.04	Valid	
BH101	15.35		D	Par	-	83	6889	83.00	-	0.49	0.071	1.256	0.09	Valid	
BH101	15.50		D	Par	-	85	7225	85.00	-	0.17	0.024	1.270	0.03	Valid	
BH102	7.27		D	Par	-	85	7225	85.00	-	0.31	0.043	1.270	0.05	Valid	
BH102	7.54		D	Par	-	85	7225	85.00	-	0.16	0.022	1.270	0.03	Valid	
BH102	7.86		D	Par	-	85	7225	85.00	-	0.07	0.010	1.270	0.01	Valid	
BH102	8.76		D	Par	-	85	7225	85.00	-	0.34	0.047	1.270	0.06	Valid	
BH102	9.12		D	Par	-	85	7225	85.00	-	0.35	0.048	1.270	0.06	Valid	
BH102	10.15		D	Par	-	85	7225	85.00	-	0.31	0.043	1.270	0.05	Valid	
BH102	10.69		D	Par	-	85	7225	85.00	-	0.70	0.097	1.270	0.12	Valid	
BH102	11.78		D	Par	-	85	7225	85.00	-	0.51	0.071	1.270	0.09	Valid	
BH102	12.86		D	Par	-	85	7225	85.00	-	0.18	0.025	1.270	0.03	Valid	
BH109	9.40		D	Par	-	85	7225	85.00	-	0.10	0.014	1.270	0.02	Valid	

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random



Christies Hospital

Contract No:

PSL20/0058

Client Ref:

A114954



Certificate of Analysis

Certificate Number 20-00355

13-Jan-20

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 20-00355

Client Reference PSL20/0052

Order No (not supplied)

Contract Title Christies Hospital Car Park

Description 10 Soil samples.

Date Received 09-Jan-20

Date Started 09-Jan-20

Date Completed 13-Jan-20

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in blue ink, appearing to read "A. Fenwick", is placed over a faint circular stamp.

Adam Fenwick
Contracts Manager



Summary of Chemical Analysis Soil Samples

Our Ref 20-00355

Client Ref PSL20/0052

Contract Title Christies Hospital Car Park

Lab No	1621224	1621225	1621226	1621227	1621228	1621229	1621230	1621231	1621232	1621233
Sample ID	BH101	BH102	BH103	BH104	BH105	BH106	BH107	BH108	BH109	BH110
Depth	0.80	0.90	0.70	0.70	1.00	1.20-2.00	0.80	1.50	0.80	0.60
Other ID	4	5	2	4	4	7	3	7	7	4
Sample Type	D	D	D	D	D	B	D	D	D	D
Sampling Date	19/11/19	19/11/19	19/11/19	20/11/19	20/11/19	18/11/19	19/11/19	18/11/19	18/11/19	20/11/19
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units										
Inorganics													
pH	DETSC 2008#		pH	6.9	7.9	8.9	7.8	7.9	7.6	7.3	6.3	7.3	7.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	90	79	140	59	110	30	97	46	43	42

Information in Support of the Analytical Results

Our Ref 20-00355
 Client Ref PSL20/0052
 Contract Christies Hospital Car Park

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	inappropriate container for tests
1621224	BH101 0.80 SOIL	19/11/19	PT 1L	pH + Conductivity (7 days)	
1621225	BH102 0.90 SOIL	19/11/19	PT 1L	pH + Conductivity (7 days)	
1621226	BH103 0.70 SOIL	19/11/19	PT 1L	pH + Conductivity (7 days)	
1621227	BH104 0.70 SOIL	20/11/19	PT 1L	pH + Conductivity (7 days)	
1621228	BH105 1.00 SOIL	20/11/19	PT 1L	pH + Conductivity (7 days)	
1621229	BH106 1.20-2.00 SOIL	18/11/19	PT 1L	pH + Conductivity (7 days)	
1621230	BH107 0.80 SOIL	19/11/19	PT 1L	pH + Conductivity (7 days)	
1621231	BH108 1.50 SOIL	18/11/19	PT 1L	pH + Conductivity (7 days)	
1621232	BH109 0.80 SOIL	18/11/19	PT 1L	pH + Conductivity (7 days)	
1621233	BH110 0.60 SOIL	20/11/19	PT 1L	pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



Appendix G – Gas & Groundwater Monitoring Data



Client The Christies NHS Foundation Trust
Project Christie's Hospital Tiered Carpark
Job Number A114954

Date 04/12/2019 **Start** 08:00 **End** 10:00 **By** DF **AP Trend** Rising **Weather** Clear

Instruments used - GA5000 with internal flow pod, Oil/Water Interface Meter.

Background (start) **CH₄** <0.1 **CO₂** 0.1 **O₂** 21.2% **AP** 1015

Background (end) **CH₄** <0.1 **CO₂** 0.1 **O₂** 22.4% **AP** 1016

Installation	Borehole Level (mAOD)	BH Pressure (mb)	CH ₄ (% vol)			CO ₂ (% vol)			O ₂ (% vol)			CO (% vol)	H ₂ S (% vol)	PID		Flow Rate (l/hr)		Atmospheric Pressure (mbar)	Depth to Water (mbgl)	Depth to Water (mAOD)	Depth to Base (mbgl)	Remarks
			Peak	Min	Steady	Peak	Min	Steady	Peak	Min	Steady	Steady	Steady	Peak	Steady	Peak	Steady					
BH101	37.32	14	<0.1	<0.1	<0.1	2.8	2.3	2.7	18.5	18.5	17.7	1	<1	<0.1	<0.1	0.3	0.3	1017	3.38	33.94	8.33	
BH102	37.24	8.6	<0.1	<0.1	<0.1	0.3	0.2	0.3	22	22	22.0	<1	<1	<0.1	<0.1	-11.7	-11.7	1017	2.79	34.45	9.17	
BH104	36.94	1.96	<0.1	<0.1	<0.1	1.9	1.3	1.9	18.8	18.8	18.6	<1	<1	<0.1	<0.1	0.1	0.1	1017	-	-	1.67	
BH105	36.45	0.67	<0.1	<0.1	<0.1	3.0	2.0	2.0	21.6	21.6	17.9	<1	<1	<0.1	<0.1	0.2	0.2	1017	-	-	1.87	
BH107	36.10	0.28	0.1	<0.1	<0.1	0.9	0.6	0.6	17.1	17.1	17.1	<1	<1	<0.1	<0.1	-0.4	-0.2	1015	-	-	1.74	WAB
BH109	35.93	14.95	<0.1	<0.1	<0.1	0.5	0.1	0.1	21.8	21.8	21.8	1	<1	<0.1	<0.1	0.2	0.2	1015	2.16	33.77	9.00	

Steady reading = level which remained constant after a minimum 3 minutes.

Atmospheric Pressure trend obtained from weatheronline



Client The Christies NHS Foundation Trust
Project Christie's Hospital Tiered Carpark
Job Number A114954

Date 11/12/2019 **Start** 09:00 **End** 11:00 **By** DF **AP Trend** Falling **Weather** Dry

Instruments used - GA5000 with internal flow pod, Oil/Water Interface Meter.

Background (start) **CH₄** <0.1 **CO₂** 0.2 **O₂** 21.2% **AP** 995

Background (end) **CH₄** <0.1 **CO₂** 0.1 **O₂** 21.2% **AP** 995

Installation	Borehole Level (mAOD)	BH Pressure (mb)	CH ₄ (% vol)			CO ₂ (% vol)			O ₂ (% vol)			CO (% vol)	H ₂ S (% vol)	PID		Flow Rate (l/hr)		Atmospheric Pressure (mbar)	Depth to Water (mbgl)	Depth to Water (mAOD)	Depth to Base (mbgl)	Remarks
			Peak	Min	Steady	Peak	Min	Steady	Peak	Min	Steady	Steady	Steady	Peak	Steady	Peak	Steady					
BH101	37.32	3.27	<0.1	<0.1	<0.1	4.8	4.8	4.8	17.6	14.2	14.2	<1	<1	<0.1	<0.1	-0.5	0.0	995	3.38	33.94	8.33	
BH102	37.24	2.74	<0.1	<0.1	<0.1	1.1	1.0	1.1	21.6	20.6	20.6	<1	<1	<0.1	<0.1	-5.4	-5.4	995	3.15	34.09	9.17	
BH104	36.94	4.08	<0.1	<0.1	<0.1	2.1	1.8	2.1	17.6	17.3	17.6	<1	<1	<0.1	<0.1	0.1	0.1	995	-	-	1.67	
BH105	36.45	3.98	<0.1	<0.1	<0.1	2.7	2.1	2.1	17.1	13.9	17.1	<1	<1	<0.1	<0.1	0.0	0.0	995	-	-	1.87	
BH107	36.10	16.74	<0.1	<0.1	<0.1	1.6	1.4	1.4	20.8	10.5	11.3	<1	<1	<0.1	<0.1	-1.1	-1.1	995	-	-	1.74	WAB
BH109	35.93	14.76	0.2	<0.1	<0.1	0.2	0.2	0.2	21.1	20.8	20.8	<1	<1	<0.1	<0.1	0.1	0.1	995	1.78	34.15	9.00	

Steady reading = level which remained constant after a minimum 3 minutes.

Atmospheric Pressure trend obtained from weatheronline



Client The Christies NHS Foundation Trust
Project Christie's Hospital Tiered Carpark
Job Number A114954

Date 18/12/2019 **Start** 08:00 **End** 10:00 **By** DF **AP Trend** Falling **Weather** Dry

Instruments used - GA5000 with internal flow pod, Oil/Water Interface Meter.

Background (start) **CH₄** <0.1 **CO₂** 0.3 **O₂** 21.3% **AP** 1001

Background (end) **CH₄** <0.1 **CO₂** 0.2 **O₂** 21.5% **AP** 1001

Installation	Borehole Level (mAOD)	BH Pressure (mb)	CH ₄ (% vol)			CO ₂ (% vol)			O ₂ (% vol)			CO (% vol)	H ₂ S (% vol)	PID		Flow Rate (l/hr)		Atmospheric Pressure (mbar)	Depth to Water (mbgl)	Depth to Water (mAOD)	Depth to Base (mbgl)	Remarks
			Peak	Min	Steady	Peak	Min	Steady	Peak	Min	Steady	Steady	Steady	Peak	Steady	Peak	Steady					
BH101	37.32	3.91	<0.1	<0.1	<0.1	2.4	2.0	2.4	20.1	18.9	20.1	1	<1	<0.1	<0.1	0.1	0.1	1001	3.40	33.92	8.33	
BH102	37.24	2.76	<0.1	<0.1	<0.1	1.7	0.9	0.9	20.9	18.8	20.9	<1	<1	<0.1	<0.1	-1.4	-1.4	1001	2.98	34.26	9.17	
BH104	36.94	4.53	<0.1	<0.1	<0.1	2.1	0.8	2.1	19.8	18.1	18.1	<1	<1	0.1	<0.1	0.0	0.0	1001	-	-	1.67	
BH105	36.45	3.77	<0.1	<0.1	<0.1	1.0	0.6	0.9	19.5	19	19.5	<1	<1	0.9	0.5	0.1	0.1	1001	-	-	1.87	
BH107	36.10	3.07	<0.1	<0.1	<0.1	1.6	0.8	0.8	20.7	13.5	18.0	<1	<1	0.1	0.1	0.3	0.3	1001	-	-	1.74	WAB
BH109	35.93	2.43	<0.1	<0.1	<0.1	0.2	0.2	0.2	21.2	19.9	20.4	<1	<1	0.1	<0.1	0.0	0.0	1001	1.99	33.94	9.00	

Steady reading = level which remained constant after a minimum 3 minutes.

Atmospheric Pressure trend obtained from weatheronline



Client The Christies NHS Foundation Trust
Project Christie's Hospital Tiered Carpark
Job Number A114954

Date 07/01/2020 **Start** 00:00 **End** 10:30 **By** DF **AP Trend** Falling **Weather** Rain

Instruments used - GA5000 with internal flow pod, Oil/Water Interface Meter.

Background (start) **CH₄** <0.1 **CO₂** 0.2 **O₂** 21.3% **AP** 1011

Background (end) **CH₄** <0.1 **CO₂** 0.2 **O₂** 21.3% **AP** 1012

Installation	Borehole Level (mAOD)	BH Pressure (mb)	CH ₄ (% vol)			CO ₂ (% vol)			O ₂ (% vol)			CO (% vol)	H ₂ S (% vol)	PID		Flow Rate (l/hr)		Atmospheric Pressure (mbar)	Depth to Water (mbgl)	Depth to Water (mAOD)	Depth to Base (mbgl)	Remarks
			Peak	Min	Steady	Peak	Min	Steady	Peak	Min	Steady	Steady	Steady	Peak	Steady	Peak	Steady					
BH101	37.32	3.87	<0.1	<0.1	<0.1	0.6	0.3	0.3	21.2	20.2	21.2	<1	<1	0.8	0.3	0.1	0.1	1012	3.48	33.84	8.33	
BH102	37.24	2.74	<0.1	<0.1	<0.1	3.4	3.4	3.4	18.5	17.6	17.9	<1	<1	0.6	0.4	0.1	0.1	1012	3.24	34.00	9.17	
BH104	36.94	14.43	0.1	<0.1	<0.1	1.6	1.1	1.6	18.8	18.7	18.7	<1	<1	<0.1	<0.1	0.1	0.1	1012	-	-	1.67	
BH105	36.45	3.05	<0.1	<0.1	<0.1	1.6	1.4	1.5	18.3	16.8	18.3	<1	<1	1.4	1.2	0.0	0.1	1012	-	-	1.87	
BH107	36.10	5.41	<0.1	<0.1	<0.1	1.7	1.7	1.6	20.8	19.7	15.7	<1	<1	<0.1	<0.1	0.2	0.2	1012	-	-	1.74	WAB
BH109	35.93	-0.57	0.1	<0.1	<0.1	0.4	0.2	0.4	21.1	18.2	18.2	<1	<1	<0.1	<0.1	0.0	0.0	1011	2.26	33.67	9.00	

Steady reading = level which remained constant after a minimum 3 minutes.

Atmospheric Pressure trend obtained from weatheronline



Appendix H – Chemical Data and Tier 1 Screening



Results	BH101	BH102	BH102	BH103	BH104	BH105	BH106	BH107	BH107	BH108	BH108	BH109	BH109	BH110	BH110
Depth	0.40	0.40	0.80	0.60	0.20	0.30	0.20	0.30	0.70	0.20	0.70	0.40	0.70	0.20	0.50
Benzo(a)anthracene	0.0836	0.014	1.66	3.85	1.38	0.179	1.85	0.766	0.0622	2.28	0.193	0.014	0.015	0.852	0.014
Chrysene	0.099	0.01	1.36	3.35	1.28	0.158	1.75	0.626	0.0524	2.17	0.189	0.01	0.01	0.752	0.01
Benzo(b)fluoranthene	0.126	0.015	1.02	4.19	2.02	0.217	2.51	0.643	0.0655	1.93	0.16	0.015	0.015	1.32	0.015
Benzo(k)fluoranthene	0.0473	0.014	0.524	1.61	0.864	0.0769	0.917	0.287	0.0256	0.82	0.0721	0.014	0.014	0.517	0.014
Dibenzo(ah)anthracene	0.023	0.023	0.143	0.364	0.23	0.023	0.201	0.115	0.023	0.186	0.023	0.023	0.023	0.115	0.023
Indeno(123cd)pyrene	0.0756	0.018	0.838	2.57	1.19	0.128	1.33	0.468	0.0438	1.14	0.106	0.018	0.018	0.96	0.018
Benzo(ghi)perylene	0.0662	0.024	0.708	2.29	0.975	0.119	1.31	0.448	0.0443	1.17	0.103	0.024	0.024	0.853	0.024
Benzo(a)pyrene	0.0827	0.015	1.34	3.53	1.66	0.167	2.04	0.741	0.057	2.09	0.179	0.015	0.015	1.12	0.015

Ratio to BaP	BH101	BH102	BH102	BH103	BH104	BH105	BH106	BH107	BH107	BH108	BH108	BH109	BH109	BH110	BH110	Min	Max	Culp study limits	
Benzo(a)anthracene	1.01	0.93	1.24	1.09	0.83	1.07	0.91	1.03	1.09	1.09	1.08	0.93	1.00	0.76	0.93	0.76	1.24	0.12	12.43
Chrysene	1.20	0.67	1.01	0.95	0.77	0.95	0.86	0.84	0.92	1.04	1.06	0.67	0.67	0.67	0.67	0.67	1.20	0.12	11.61
Benzo(b)fluoranthene	1.52	1.00	0.76	1.19	1.22	1.30	1.23	0.87	1.15	0.92	0.89	1.00	1.00	1.18	1.00	0.76	1.52	0.11	10.85
Benzo(k)fluoranthene	0.57	0.93	0.39	0.46	0.52	0.46	0.45	0.39	0.45	0.39	0.40	0.93	0.93	0.46	0.93	0.39	0.93	0.04	3.72
Dibenzo(ah)anthracene	0.28	1.53	0.11	0.10	0.14	0.14	0.10	0.16	0.40	0.09	0.13	1.53	1.53	0.10	1.53	0.09	1.53	0.01	1.38
Indeno(123cd)pyrene	0.91	1.20	0.63	0.73	0.72	0.77	0.65	0.63	0.77	0.55	0.59	1.20	1.20	0.86	1.20	0.55	1.20	0.07	7.27
Benzo(ghi)perylene	0.80	1.60	0.53	0.65	0.59	0.71	0.64	0.60	0.78	0.56	0.58	1.60	1.60	0.76	1.60	0.53	1.60	0.08	8.22



			Sample ID	BH106		BH107		BH107		BH108		BH108		BH109	
			Depth	0.20		0.30		0.70		0.20		0.70		0.40	
Test	Units	LOD	TSV	Lab Result	HI	Lab Result	HI	Lab Result	HI	Lab Result	HI	Lab Result	HI	Lab Result	HI
TPH CWG															
Aliphatics															
>C5-C6	µg/kg	<10	3200000	10	0.00	10	0.00	10	0.00	10	0.00	10	0.00	10	0.00
>C6-C8	µg/kg	<10	7800000	10	0.00	10	0.00	10	0.00	11.9	0.00	16.8	0.00	11.9	0.00
>C8-C10	µg/kg	<10	2000000	10	0.00	10	0.00	26.7	0.00	86.6	0.00	34.7	0.00	13	0.00
>C10-C12	µg/kg	<10	9700000	1000	0.00	1000	0.00	1000	0.00	1000	0.00	1000	0.00	1000	0.00
>C12-C16	µg/kg	<100	59000000	12100	0.00	5420	0.00	3050	0.00	5420	0.00	1000	0.00	1000	0.00
>C16-C35	µg/kg	<100	1000000000	375500	0.00	77500	0.00	9710	0.00	176500	0.00	4500	0.00	71030	0.00
>C35-C44	µg/kg	<100	1000000000	624000	0.00	94400	0.00	1000	0.00	258000	0.00	1130	0.00	168000	0.00
Aliphatic Hazard Index				0.00		0.00		0.00		0.00		0.00		0.00	
Aromatics															
>C5-EC7	µg/kg	<10	27000	10	0.00	10	0.00	10	0.00	10	0.00	10	0.00	10	0.00
>C7-EC8	µg/kg	<10	56000000	10	0.00	10	0.00	10	0.00	10	0.00	10	0.00	10	0.00
>C8-EC10	µg/kg	<10	3500000	10	0.00	10	0.00	17.4	0.00	57.4	0.00	23.5	0.00	10	0.00
>C10-EC12	µg/kg	<10	16000000	1000	0.00	1000	0.00	1000	0.00	1000	0.00	1000	0.00	1000	0.00
>C12-EC16	µg/kg	<100	36000000	15400	0.00	8100	0.00	1000	0.00	6300	0.00	1000	0.00	1000	0.00
>C16-EC21	µg/kg	<100	28000000	51800	0.00	54800	0.00	2760	0.00	27600	0.00	2720	0.00	4200	0.00
>C21-EC35	µg/kg	<100	28000000	568000	0.02	1020000	0.04	69500	0.00	1771000	0.06	5460	0.00	14300	0.00
>C35-EC44	µg/kg	<100	28000000	7870	0.00	509000	0.02	21800	0.00	12800	0.00	1000	0.00	16300	0.00
Aromatic Hazard Index	-	-		0.02		0.06		0.00		0.07		0.00		0.00	
Hazard Index				0.02		0.06		0.00		0.07		0.00		0.00	



			Sample ID	BH109		BH110		BH110	
			Depth	0.70		0.20		0.50	
Test	Units	LOD	TSV	Lab Result	HI	Lab Result	HI	Lab Result	HI
TPH CWG									
Aliphatics									
>C5-C6	µg/kg	<10	3200000	10	0.00	10	0.00	10	0.00
>C6-C8	µg/kg	<10	7800000	10	0.00	10	0.00	10	0.00
>C8-C10	µg/kg	<10	2000000	10	0.00	10	0.00	10	0.00
>C10-C12	µg/kg	<10	9700000	1000	0.00	1000	0.00	1000	0.00
>C12-C16	µg/kg	<100	59000000	1000	0.00	4230	0.00	1000	0.00
>C16-C35	µg/kg	<100	1000000000	2000	0.00	147900	0.00	2000	0.00
>C35-C44	µg/kg	<100	1000000000	1000	0.00	146000	0.00	1000	0.00
Aliphatic Hazard Index				0.00		0.00		0.00	
Aromatics									
>C5-EC7	µg/kg	<10	27000	10	0.00	10	0.00	10	0.00
>C7-EC8	µg/kg	<10	56000000	10	0.00	10	0.00	10	0.00
>C8-EC10	µg/kg	<10	3500000	10	0.00	10	0.00	10	0.00
>C10-EC12	µg/kg	<10	16000000	1000	0.00	1000	0.00	1000	0.00
>C12-EC16	µg/kg	<100	36000000	1000	0.00	15800	0.00	1000	0.00
>C16-EC21	µg/kg	<100	28000000	1000	0.00	98300	0.00	1000	0.00
>C21-EC35	µg/kg	<100	28000000	1540	0.00	1350000	0.05	1440	0.00
>C35-EC44	µg/kg	<100	28000000	1000	0.00	689000	0.02	2000	0.00
Aromatic Hazard Index	-	-		0.00		0.08		0.00	
Hazard Index				0.00		0.08		0.00	



	Sample ID	BH101		BH102		BH102		BH103		BH104		BH105		BH106		BH107		BH107		BH108		BH108		BH109		BH109		BH110		BH110				
		Date		19/11/2019		19/11/2019		19/11/2019		20/11/2019		20/11/2019		18/11/2019		19/11/2019		19/11/2019		19/11/2019		19/11/2019		18/11/2019		18/11/2019		20/11/2019		20/11/2019				
		Depth		0.40		0.40		0.80		0.60		0.20		0.30		0.20		0.30		0.70		0.20		0.70		0.40		0.70		0.20		0.50		
		AGS ID		1		1		2		1		1		1		1		2		1		2		1		3		1		2				
Determinand	TSV	Units	LOD																															
Asbestos Screen	Presence	-	Presence		NP		NP		NP		NP		NP		NP		NP		NP		NP		NP		NP		NP		NP					
Asbestos Quantification		%	<0.001		-		-		-		-		-		-		-		-		-		-		-		-		-					
Carbon																																		
Fraction Organic Carbon	-	%	<0.002		0.00856		0.0133		0.0101		0.00949		0.00418		0.00481		0.0112		0.0204		0.0121		0.0115		0.00301		0.0121		0.00345		0.0309		0.00574	
Inorganics																																		
Loss on Ignition	-	%	<0.7		-		3.64		-		3.08		-		2.62		-		-		-		-		3.95		-		1.38					
Water Soluble Sulphate as SO4 2:1 Extract	-	mg/l	<4		13		17		26.4		23.4		9.9		58.5		36		42.5		41.2		93.2		42.7		43.5		25.2		47.2		8.1	
pH	<5>9	pH Units	<1		6.75		8.36		8.21		8.51		9.15		8.18		9.23		7.91		7.99		11.1		8.26		10.8		8.05		9.21		7.71	
Soil Organic Matter (Calculated)	-	%	-		1.475862069		2.293103448		1.74137931		1.636206897		0.720689655		0.829103443		1.931034483		3.517241379		2.086206897		1.982758621		0.518965517		2.086206897		0.594827586		5.327586207		0.986551722	
Cyanide, Easily liberatable (low level)	40	mg/kg	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5			
Metals (Solids)																																		
Chromium, Hexavalent	49	mg/kg	<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6		<0.6			
Boron	240,000	mg/kg	<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1			
Arsenic	640	mg/kg	<0.6		4.22		5.54		5.43		4.33		1.01		4.94		3.15		3.27		5.91		5.2		1.14		2.9		8.45		4.79		2.22	
Beryllium	12	mg/kg	<0.01		0.268		0.653		0.392		0.389		0.0991		0.159		0.276		0.427		0.529		0.531		0.0648		0.317		1.05		0.358		0.167	
Cadmium	410	mg/kg	<0.02		0.131		0.0798		0.262		0.177		0.324		0.0233		0.502		0.441		0.0881		0.565		0.0282		0.191		<0.02		0.474		0.0616	
Chromium	8600	mg/kg	<0.9		5.14		10.7		6.24		4.09		1.87		8.22		7.09		7.53		15		1.4		6.39		23		9.51		3.01			
Copper	68000	mg/kg	<1.4		13.4		12.6		16		12.2		2.35		5.57		9.43		12.8		18.1		15.8		3.21		6.03		12.5		12.5		7.21	
Lead	2300	mg/kg	<0.7		52.6		41		89.3		56.8		17.9		16.4		33.2		95		39.00		24.4		19.2		12.1		13.8		62.5		26.7	
Mercury	1100	mg/kg	<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14		<0.14			
Nickel	980	mg/kg	<0.2		5.76		14.9		11.3		7.54		1.74		3.28		7.4		8.81		11.1		16		1.53		8.63		21.1		9.14		4.3	
Selenium	12000	mg/kg	<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1		<1			
Vanadium	9000	mg/kg	<0.2		9.18		16.6		11.9		11.4		4.93		12.8		12.7		16		12.1		22.5		1.94		11.5		29.9		22.8		4.95	
Zinc	730000	mg/kg	<1.9		32.2		30.9		58.4		30.9		14.2		13.8		55.6		62.1		52.8		93.6		6.55		51.2		49		75.5		11	
Phenols																																		
Phenol	440	mg/kg	<0.01		<0.02		<0.02		-		-		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01		<0.01			
Mineral Oil / Oils & Greases																																		
Mineral oil >C10-C40	mg/kg	-	-		-		<1		-		325		-		504		-		-		-		-		-		-		<1		-		<1	
Mineral oil Surrogate % recovery	%	-	-		80.7		-		-		83		-		-		81		-		-		-		-		83		-		81.5			
TPH Criteria Working Group (TPH CWG)																																		
GRD Surrogate % recovery**	%	-	119		96		80.9		101		96		105		78		77		96		86		89.3		77.6		104		61.1		100			
Aliphatics >C5-C6	3200000	µg/kg	<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10			
Aliphatics >C7-C8	7800000	µg/kg	<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10			
Aliphatics >C9-C10	2000000	µg/kg	<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10			
Aliphatics >C10-C12	9700000	µg/kg	<10		<1000		<1000		<1000		2090		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000			
Aliphatics >C12-C16	59000000	µg/kg	<100		<1000		<1000		<1000		<1000		<1000		<1000		12100		5420		3050		5420		<1000		<1000		<1000		<4230		<1000	
Aliphatics >C16-C35	1000000000	µg/kg	<100		4020		2760		4310		21410		67780		<2000		375500		77500		9710		176500		4500		7030		<2000		147900		<2000	
Aliphatics >C35-C44	10000000000	µg/kg	<100		<1000		<1000		<1000		5880		46000		<1000		624000		94400		<1000		258000		1130		16800		<1000		149600		<1000	
Total Aliphatics >C12-C44	100000000000	µg/kg	<100		<5000		<5000		<5000		29700		115000		<5000		1010000		178000		14000		440000		5850		239000		<5000		299000		<5000	
Aromatics >EC7-EC7	27000	µg/kg	<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10			
Aromatics >EC7-EC8	56000000	µg/kg	<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10		<10			
Aromatics >EC8-EC10	3500000	µg/kg	<10		<10		<10		12.3		10.4		<10		<10		<10		<10		17.4		57.4		23.5		<10		<10		<10			
Aromatics >EC10-EC12	16000000	µg/kg	<10		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000		<1000			
Aromatics >EC12-EC16	36000000	µg/kg	<100		<1000		<1000		<1000		1030		<1000		<1000		15400		8100		<1000		6300		<1000		<1000		<1000		15800		<1000	
Aromatics >EC16-EC21	28000000	µg/kg	<1000		<1000		<1000		2590		8910		14200		<1000		51800		94800		2760		27600		2720		<4200		<1000		98300		<1000	
Aromatics >EC21-EC25	280000000	µg/kg	<1000		7110		3720		28200		31200		57900		1280		568000		1020000		69500		1771000		5460		14300		1540		1350000		1440	
Aromatics >EC25-EC44	280000000	µg/kg	<1000		8800		<1000		14300		10700		5860		<1000		7870		509000		21800		12800		<1000		16300		<1000		689000		<2000	
Total Aromatics >EC12-EC44	-	µg/kg	<100		10900		5020		45200		51900		78000		<5000		643000		1590000		94200		2180000		9410		164000		<5000		223000		<5000	
Total Aliphatics & Aromatics >C5-C44	-	µg/kg	<100		13500		<10000		49700		81600		193000		<10000		1660000		1770000		108800		658000		15300		403000		<10000		2450000		<10000	
BTX																																		
Methyl Tertiary Butyl Ether	-	µg/kg	<10		<100		<200		<10		<10		<10		<100		<10		<100		<200		<10		<10		<100		<10		<10			
Benzene	27000	µg/kg	<9		<90		<90		<180		<9		<9		<9		<9		<90		<9		<9		<9		<90		<90		<9			
Toluene	56000000	µg/kg	<7		<70		<70		<140		<7		<7		<7		<7		<70		<7		<7		<7		<70		<70		<7			
Ethylbenzene	5700000	µg/kg	<4		<40		<40		<80		<4		<4		<4		<4		<40		<4		<4		<4		<40		<40		<4			
p/mXylene	5900000	µg/kg	<100		<100		<200		<100		<10		<10</																					

NATURAL GROUND												
Customer Sample ID			BH101	BH102	BH104	BH105	BH106	BH108	BH109	BH110		
	Depth		0.8	0.9	0.7	1	1.2	1.5	0.8	0.6		
	AGS ID		4	5	4	4	7	7	7	4		
	Sample Type		Sand	Clay	Sand	Sand	Clay	Clay	Clay	Sand	Max	Min
pH		<1	6.9	7.9	7.8	7.9	7.6	6.3	7.3	7.5	7.9	6.3
Water Soluble Sulphate as SO ₄ 2:1 Extract	mg/l	4	90	79	59	110	30	46	43	42	110	30
Average Sulphate	62											
Average pH	7.4											



Appendix I – HazWasteOnline Assessment



Waste Classification Report



P6E3C-LLVTJ-SVN3B

Job name

A114954

Description/Comments

Project

Christies Hospital Car Park

Site

Manchester

Related Documents

#	Name	Description
None		

Waste Stream Template

Example waste stream template for contaminated soils

Classified by

Name:

Alex Lamb

Date:

13 Jan 2020 08:46 GMT

Telephone:

0161 874 8719

Company:

WYG Environment Planning Transport Limited**Trafford Wharf Road****Trafford Park****Manchester****M17 1HH**

Report

Created by: Alex Lamb

Created date: 13 Jan 2020 08:46 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	BH102[2]	0.4	Non Hazardous	HP 7, HP 11	2
2	BH103[2]	0.6	Non Hazardous		5
3	BH106[2]	0.2	Hazardous		8
4	BH109[2]	0.7	Non Hazardous		11
5	BH110[2]	0.5	Non Hazardous		14

Appendices

	Page
Appendix A: Classifier defined and non CLP determinands	17
Appendix B: Rationale for selection of metal species	18
Appendix C: Version	19



Classification of sample: BH102[2]

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
BH102[2]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.4 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
15%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: **15%** No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				5.54 mg/kg	1.32	7.315 mg/kg	0.000731 %			
	033-003-00-0	215-481-4	1327-53-3								
2	beryllium { beryllium oxide }				0.653 mg/kg	2.775	1.812 mg/kg	0.000181 %			
	004-003-00-8	215-133-1	1304-56-9								
3	boron { diboron trioxide; boric oxide }				<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %			<LOD
	005-008-00-8	215-125-8	1303-86-2								
4	cadmium { cadmium oxide }				0.0788 mg/kg	1.142	0.09 mg/kg	0.000009 %			
	048-002-00-0	215-146-2	1306-19-0								
5	chromium in chromium(III) compounds { chromium(III) oxide }				10.7 mg/kg	1.462	15.639 mg/kg	0.00156 %			
		215-160-9	1308-38-9								
6	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %			<LOD
	024-001-00-0	215-607-8	1333-82-0								
7	copper { dicopper oxide; copper (I) oxide }				12.6 mg/kg	1.126	14.186 mg/kg	0.00142 %			
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead chromate }			1	41 mg/kg	1.56	63.952 mg/kg	0.0041 %			
	082-004-00-2	231-846-0	7758-97-6								
9	mercury { mercury dichloride }				<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel chromate }				14.9 mg/kg	2.976	44.346 mg/kg	0.00443 %			
	028-035-00-7	238-766-5	14721-18-7								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %			<LOD
	034-002-00-8										
12	zinc { zinc chromate }				30.9 mg/kg	2.774	85.721 mg/kg	0.00857 %			
	024-007-00-3										
13	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %			<LOD
			TPH								



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
15	benzene				<0.09 mg/kg		<0.09 mg/kg	<0.000009 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
16	toluene				<0.07 mg/kg		<0.07 mg/kg	<0.000007 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
17	ethylbenzene				<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
18	xylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
19	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
	006-007-00-5									
20	pH				8.36 pH		8.36 pH	8.36 pH		
			PH							
21	naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.0000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
22	acenaphthylene				<0.012 mg/kg		<0.012 mg/kg	<0.0000012 %		<LOD
		205-917-1	208-96-8							
23	acenaphthene				<0.008 mg/kg		<0.008 mg/kg	<0.0000008 %		<LOD
		201-469-6	83-32-9							
24	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-695-5	86-73-7							
25	phenanthrene				<0.015 mg/kg		<0.015 mg/kg	<0.0000015 %		<LOD
		201-581-5	85-01-8							
26	anthracene				<0.016 mg/kg		<0.016 mg/kg	<0.0000016 %		<LOD
		204-371-1	120-12-7							
27	fluoranthene				<0.017 mg/kg		<0.017 mg/kg	<0.0000017 %		<LOD
		205-912-4	206-44-0							
28	pyrene				<0.015 mg/kg		<0.015 mg/kg	<0.0000015 %		<LOD
		204-927-3	129-00-0							
29	benzo[a]anthracene				<0.014 mg/kg		<0.014 mg/kg	<0.0000014 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
30	chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
31	benzo[b]fluoranthene				<0.015 mg/kg		<0.015 mg/kg	<0.0000015 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
32	benzo[k]fluoranthene				<0.014 mg/kg		<0.014 mg/kg	<0.0000014 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
33	benzo[a]pyrene; benzo[def]chrysene				<0.015 mg/kg		<0.015 mg/kg	<0.0000015 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
34	indeno[123-cd]pyrene				<0.018 mg/kg		<0.018 mg/kg	<0.0000018 %		<LOD
		205-893-2	193-39-5							
35	dibenz[a,h]anthracene				<0.023 mg/kg		<0.023 mg/kg	<0.0000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
36	benzo[ghi]perylene				<0.024 mg/kg		<0.024 mg/kg	<0.0000024 %		<LOD
		205-883-8	191-24-2							
37	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2							
38	polychlorobiphenyls; PCB				<0.021 mg/kg		<0.021 mg/kg	<0.0000021 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
Total:								0.0229 %		



Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification



Classification of sample: BH103[2]

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
BH103[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.6 m		
Moisture content:		
14%		
(no correction)		

Hazard properties

None identified

Determinands

Moisture content: 14% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				4.33 mg/kg	1.32	5.717 mg/kg	0.000572 %			
	033-003-00-0	215-481-4	1327-53-3								
2	beryllium { beryllium oxide }				0.389 mg/kg	2.775	1.08 mg/kg	0.000108 %			
	004-003-00-8	215-133-1	1304-56-9								
3	boron { diboron trioxide; boric oxide }				<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %			<LOD
	005-008-00-8	215-125-8	1303-86-2								
4	cadmium { cadmium oxide }				0.177 mg/kg	1.142	0.202 mg/kg	0.0000202 %			
	048-002-00-0	215-146-2	1306-19-0								
5	chromium in chromium(III) compounds { chromium(III) oxide }				6.24 mg/kg	1.462	9.12 mg/kg	0.000912 %			
		215-160-9	1308-38-9								
6	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %			<LOD
	024-001-00-0	215-607-8	1333-82-0								
7	copper { dicopper oxide; copper (I) oxide }				12.2 mg/kg	1.126	13.736 mg/kg	0.00137 %			
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead chromate }			1	56.8 mg/kg	1.56	88.598 mg/kg	0.00568 %			
	082-004-00-2	231-846-0	7758-97-6								
9	mercury { mercury dichloride }				<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel chromate }				7.54 mg/kg	2.976	22.441 mg/kg	0.00224 %			
	028-035-00-7	238-766-5	14721-18-7								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %			<LOD
	034-002-00-8										
12	zinc { zinc chromate }				30.9 mg/kg	2.774	85.721 mg/kg	0.00857 %			
	024-007-00-3										
13	TPH (C6 to C40) petroleum group				81.6 mg/kg		81.6 mg/kg	0.00816 %			
			TPH								



#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									
15	benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
16	toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
17	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
18	xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
19	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
	006-007-00-5											
20	pH				8.51	pH		8.51	pH	8.51 pH		
			pH									
21	naphthalene				0.662	mg/kg		0.662	mg/kg	0.0000662 %		
	601-052-00-2	202-049-5	91-20-3									
22	acenaphthylene				<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
		205-917-1	208-96-8									
23	acenaphthene				1.34	mg/kg		1.34	mg/kg	0.000134 %		
		201-469-6	83-32-9									
24	fluorene				1.22	mg/kg		1.22	mg/kg	0.000122 %		
		201-695-5	86-73-7									
25	phenanthrene				10.3	mg/kg		10.3	mg/kg	0.00103 %		
		201-581-5	85-01-8									
26	anthracene				2.44	mg/kg		2.44	mg/kg	0.000244 %		
		204-371-1	120-12-7									
27	fluoranthene				10.5	mg/kg		10.5	mg/kg	0.00105 %		
		205-912-4	206-44-0									
28	pyrene				8.67	mg/kg		8.67	mg/kg	0.000867 %		
		204-927-3	129-00-0									
29	benzo[a]anthracene				3.85	mg/kg		3.85	mg/kg	0.000385 %		
	601-033-00-9	200-280-6	56-55-3									
30	chrysene				3.35	mg/kg		3.35	mg/kg	0.000335 %		
	601-048-00-0	205-923-4	218-01-9									
31	benzo[b]fluoranthene				4.19	mg/kg		4.19	mg/kg	0.000419 %		
	601-034-00-4	205-911-9	205-99-2									
32	benzo[k]fluoranthene				1.61	mg/kg		1.61	mg/kg	0.000161 %		
	601-036-00-5	205-916-6	207-08-9									
33	benzo[a]pyrene; benzo[def]chrysene				3.53	mg/kg		3.53	mg/kg	0.000353 %		
	601-032-00-3	200-028-5	50-32-8									
34	indeno[123-cd]pyrene				2.57	mg/kg		2.57	mg/kg	0.000257 %		
		205-893-2	193-39-5									
35	dibenz[a,h]anthracene				0.364	mg/kg		0.364	mg/kg	0.0000364 %		
	601-041-00-2	200-181-8	53-70-3									
36	benzo[ghi]perylene				2.29	mg/kg		2.29	mg/kg	0.000229 %		
		205-883-8	191-24-2									
37	phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
38	polychlorobiphenyls; PCB				<0.21	mg/kg		<0.21	mg/kg	<0.000021 %		<LOD
	602-039-00-4	215-648-1	1336-36-3									
Total:										0.0342 %		



Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1 Only the metal concentration has been used for classification	

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and ≤ 75°C"

Force this Hazardous property to non hazardous because Not considered flammable in soil

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00816%)



Classification of sample: BH106[2]

 **Hazardous Waste**
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:	LoW Code:
BH106[2]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.2 m	Entry:
Moisture content:	17 05 03 * (Soil and stones containing hazardous substances)
4.5%	
(no correction)	

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.166%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.166%)

Determinands

Moisture content: **4.5% No Moisture Correction applied (MC)**

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				3.15 mg/kg	1.32	4.159 mg/kg	0.000416 %			
	033-003-00-0	215-481-4	1327-53-3								
2	beryllium { beryllium oxide }				0.276 mg/kg	2.775	0.766 mg/kg	0.0000766 %			
	004-003-00-8	215-133-1	1304-56-9								
3	boron { diboron trioxide; boric oxide }				<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %			<LOD
	005-008-00-8	215-125-8	1303-86-2								
4	cadmium { cadmium oxide }				0.502 mg/kg	1.142	0.573 mg/kg	0.0000573 %			
	048-002-00-0	215-146-2	1306-19-0								
5	chromium in chromium(III) compounds { chromium(III) oxide }				6.22 mg/kg	1.462	9.091 mg/kg	0.000909 %			
		215-160-9	1308-38-9								
6	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %			<LOD
	024-001-00-0	215-607-8	1333-82-0								
7	copper { dicopper oxide; copper (I) oxide }				9.43 mg/kg	1.126	10.617 mg/kg	0.00106 %			
	029-002-00-X	215-270-7	1317-39-1								



#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
8	lead { lead chromate }			1	33.2	mg/kg	1.56	51.786	mg/kg	0.00332 %		
	082-004-00-2	231-846-0	7758-97-6									
9	mercury { mercury dichloride }				<0.14	mg/kg	1.353	<0.189	mg/kg	<0.0000189 %		<LOD
	080-010-00-X	231-299-8	7487-94-7									
10	nickel { nickel chromate }				7.4	mg/kg	2.976	22.024	mg/kg	0.0022 %		
	028-035-00-7	238-766-5	14721-18-7									
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	034-002-00-8											
12	zinc { zinc chromate }				55.6	mg/kg	2.774	154.243	mg/kg	0.0154 %		
	024-007-00-3											
13	TPH (C6 to C40) petroleum group				1660	mg/kg		1660	mg/kg	0.166 %		
			TPH									
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									
15	benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
16	toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
17	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
18	xylene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
19	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
	006-007-00-5											
20	pH				9.23	pH		9.23	pH	9.23 pH		
			PH									
21	naphthalene				0.0737	mg/kg		0.0737	mg/kg	0.00000737 %		
	601-052-00-2	202-049-5	91-20-3									
22	acenaphthylene				<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
		205-917-1	208-96-8									
23	acenaphthene				0.208	mg/kg		0.208	mg/kg	0.0000208 %		
		201-469-6	83-32-9									
24	fluorene				0.166	mg/kg		0.166	mg/kg	0.0000166 %		
		201-695-5	86-73-7									
25	phenanthrene				1.16	mg/kg		1.16	mg/kg	0.000116 %		
		201-581-5	85-01-8									
26	anthracene				0.458	mg/kg		0.458	mg/kg	0.0000458 %		
		204-371-1	120-12-7									
27	fluoranthene				3.8	mg/kg		3.8	mg/kg	0.00038 %		
		205-912-4	206-44-0									
28	pyrene				3.91	mg/kg		3.91	mg/kg	0.000391 %		
		204-927-3	129-00-0									
29	benzo[a]anthracene				1.85	mg/kg		1.85	mg/kg	0.000185 %		
	601-033-00-9	200-280-6	56-55-3									
30	chrysene				1.75	mg/kg		1.75	mg/kg	0.000175 %		
	601-048-00-0	205-923-4	218-01-9									
31	benzo[b]fluoranthene				2.51	mg/kg		2.51	mg/kg	0.000251 %		
	601-034-00-4	205-911-9	205-99-2									
32	benzo[k]fluoranthene				0.917	mg/kg		0.917	mg/kg	0.0000917 %		
	601-036-00-5	205-916-6	207-08-9									
33	benzo[a]pyrene; benzo[def]chrysene				2.04	mg/kg		2.04	mg/kg	0.000204 %		
	601-032-00-3	200-028-5	50-32-8									



#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
34	indeno[123-cd]pyrene				1.33 mg/kg		1.33 mg/kg	0.000133 %		
		205-893-2	193-39-5							
35	dibenz[a,h]anthracene				0.201 mg/kg		0.201 mg/kg	0.0000201 %		
		601-041-00-2	200-181-8							
36	benzo[ghi]perylene				1.31 mg/kg		1.31 mg/kg	0.000131 %		
		205-883-8	191-24-2							
37	phenol				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		604-001-00-2	203-632-7							
38	polychlorobiphenyls; PCB				<0.21 mg/kg		<0.21 mg/kg	<0.000021 %		<LOD
		602-039-00-4	215-648-1							
Total:								0.192 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and ≤ 75°C"

Force this Hazardous property to non hazardous because Not considered flammable in soil

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.166%)



Classification of sample: BH109[2]

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:	
BH109[2]	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.7 m		
Moisture content:		
19%		
(no correction)		

Hazard properties

None identified

Determinands

Moisture content: 19% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
1	arsenic { arsenic trioxide }				8.45 mg/kg	1.32	11.157 mg/kg	0.00112 %		
	033-003-00-0	215-481-4	1327-53-3							
2	beryllium { beryllium oxide }				1.05 mg/kg	2.775	2.914 mg/kg	0.000291 %		
	004-003-00-8	215-133-1	1304-56-9							
3	boron { diboron trioxide; boric oxide }				<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %		<LOD
	005-008-00-8	215-125-8	1303-86-2							
4	cadmium { cadmium oxide }				<0.02 mg/kg	1.142	<0.0228 mg/kg	<0.0000228 %		<LOD
	048-002-00-0	215-146-2	1306-19-0							
5	chromium in chromium(III) compounds { chromium(III) oxide }				23 mg/kg	1.462	33.616 mg/kg	0.00336 %		
		215-160-9	1308-38-9							
6	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
7	copper { dicopper oxide; copper (I) oxide }				12.5 mg/kg	1.126	14.074 mg/kg	0.00141 %		
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead chromate }			1	13.8 mg/kg	1.56	21.525 mg/kg	0.00138 %		
	082-004-00-2	231-846-0	7758-97-6							
9	mercury { mercury dichloride }				<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	nickel { nickel chromate }				21.1 mg/kg	2.976	62.799 mg/kg	0.00628 %		
	028-035-00-7	238-766-5	14721-18-7							
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	034-002-00-8									
12	zinc { zinc chromate }				49 mg/kg	2.774	135.933 mg/kg	0.0136 %		
	024-007-00-3									
13	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							



#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4									
15	benzene				<0.09	mg/kg		<0.09	mg/kg	<0.000009 %		<LOD
	601-020-00-8	200-753-7	71-43-2									
16	toluene				<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<LOD
	601-021-00-3	203-625-9	108-88-3									
17	ethylbenzene				<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
	601-023-00-4	202-849-4	100-41-4									
18	xylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
19	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<LOD
	006-007-00-5											
20	pH				8.05	pH		8.05	pH	8.05 pH		
			pH									
21	naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
22	acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
		205-917-1	208-96-8									
23	acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
		201-469-6	83-32-9									
24	fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		201-695-5	86-73-7									
25	phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		201-581-5	85-01-8									
26	anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
		204-371-1	120-12-7									
27	fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
		205-912-4	206-44-0									
28	pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		204-927-3	129-00-0									
29	benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
	601-033-00-9	200-280-6	56-55-3									
30	chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
	601-048-00-0	205-923-4	218-01-9									
31	benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
	601-034-00-4	205-911-9	205-99-2									
32	benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
	601-036-00-5	205-916-6	207-08-9									
33	benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
	601-032-00-3	200-028-5	50-32-8									
34	indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
		205-893-2	193-39-5									
35	dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
36	benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
		205-883-8	191-24-2									
37	phenol				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
	604-001-00-2	203-632-7	108-95-2									
38	polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
	602-039-00-4	215-648-1	1336-36-3									
Total:										0.0293 %		



Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification



Classification of sample: BH110[2]

✔ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:	LoW Code:
BH110[2]	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.5 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
9.6%	
(no correction)	

Hazard properties

None identified

Determinands

Moisture content: 9.6% No Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				2.22 mg/kg	1.32	2.931 mg/kg	0.000293 %			
	033-003-00-0	215-481-4	1327-53-3								
2	beryllium { beryllium oxide }				0.167 mg/kg	2.775	0.463 mg/kg	0.0000463 %			
	004-003-00-8	215-133-1	1304-56-9								
3	boron { diboron trioxide; boric oxide }				<1 mg/kg	3.22	<3.22 mg/kg	<0.000322 %			<LOD
	005-008-00-8	215-125-8	1303-86-2								
4	cadmium { cadmium oxide }				0.0616 mg/kg	1.142	0.0704 mg/kg	0.00000704 %			
	048-002-00-0	215-146-2	1306-19-0								
5	chromium in chromium(III) compounds { chromium(III) oxide }				3.01 mg/kg	1.462	4.399 mg/kg	0.00044 %			
		215-160-9	1308-38-9								
6	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %			<LOD
	024-001-00-0	215-607-8	1333-82-0								
7	copper { dicopper oxide; copper (I) oxide }				7.21 mg/kg	1.126	8.118 mg/kg	0.000812 %			
	029-002-00-X	215-270-7	1317-39-1								
8	lead { lead chromate }			1	26.7 mg/kg	1.56	41.647 mg/kg	0.00267 %			
	082-004-00-2	231-846-0	7758-97-6								
9	mercury { mercury dichloride }				<0.14 mg/kg	1.353	<0.189 mg/kg	<0.0000189 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
10	nickel { nickel chromate }				4.3 mg/kg	2.976	12.798 mg/kg	0.00128 %			
	028-035-00-7	238-766-5	14721-18-7								
11	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %			<LOD
	034-002-00-8										
12	zinc { zinc chromate }				11 mg/kg	2.774	30.516 mg/kg	0.00305 %			
	024-007-00-3										
13	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %			<LOD
			TPH								



#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value		MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number										
14		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.01 mg/kg			<0.01 mg/kg		<0.000001 %			<LOD
	603-181-00-X	216-653-1	1634-04-4											
15		benzene				<0.009 mg/kg			<0.009 mg/kg		<0.0000009 %			<LOD
	601-020-00-8	200-753-7	71-43-2											
16		toluene				<0.007 mg/kg			<0.007 mg/kg		<0.0000007 %			<LOD
	601-021-00-3	203-625-9	108-88-3											
17	●	ethylbenzene				<0.004 mg/kg			<0.004 mg/kg		<0.0000004 %			<LOD
	601-023-00-4	202-849-4	100-41-4											
18		xylene				<0.01 mg/kg			<0.01 mg/kg		<0.000001 %			<LOD
	601-022-00-9	202-422-2 [1]	95-47-6 [1]											
		203-396-5 [2]	106-42-3 [2]											
		203-576-3 [3]	108-38-3 [3]											
		215-535-7 [4]	1330-20-7 [4]											
19	🇧🇪	cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg		1.884	<0.942 mg/kg		<0.0000942 %			<LOD
		006-007-00-5												
20	●	pH				7.71 pH			7.71 pH		7.71 pH			
				PH										
21		naphthalene				<0.009 mg/kg			<0.009 mg/kg		<0.0000009 %			<LOD
	601-052-00-2	202-049-5	91-20-3											
22	●	acenaphthylene				<0.012 mg/kg			<0.012 mg/kg		<0.0000012 %			<LOD
		205-917-1	208-96-8											
23	●	acenaphthene				<0.008 mg/kg			<0.008 mg/kg		<0.0000008 %			<LOD
		201-469-6	83-32-9											
24	●	fluorene				<0.01 mg/kg			<0.01 mg/kg		<0.000001 %			<LOD
		201-695-5	86-73-7											
25	●	phenanthrene				<0.015 mg/kg			<0.015 mg/kg		<0.0000015 %			<LOD
		201-581-5	85-01-8											
26	●	anthracene				<0.016 mg/kg			<0.016 mg/kg		<0.0000016 %			<LOD
		204-371-1	120-12-7											
27	●	fluoranthene				<0.017 mg/kg			<0.017 mg/kg		<0.0000017 %			<LOD
		205-912-4	206-44-0											
28	●	pyrene				<0.015 mg/kg			<0.015 mg/kg		<0.0000015 %			<LOD
		204-927-3	129-00-0											
29		benzo[a]anthracene				<0.014 mg/kg			<0.014 mg/kg		<0.0000014 %			<LOD
	601-033-00-9	200-280-6	56-55-3											
30		chrysene				<0.01 mg/kg			<0.01 mg/kg		<0.000001 %			<LOD
	601-048-00-0	205-923-4	218-01-9											
31		benzo[b]fluoranthene				<0.015 mg/kg			<0.015 mg/kg		<0.0000015 %			<LOD
	601-034-00-4	205-911-9	205-99-2											
32		benzo[k]fluoranthene				<0.014 mg/kg			<0.014 mg/kg		<0.0000014 %			<LOD
	601-036-00-5	205-916-6	207-08-9											
33		benzo[a]pyrene; benzo[def]chrysene				<0.015 mg/kg			<0.015 mg/kg		<0.0000015 %			<LOD
	601-032-00-3	200-028-5	50-32-8											
34	●	indeno[123-cd]pyrene				<0.018 mg/kg			<0.018 mg/kg		<0.0000018 %			<LOD
		205-893-2	193-39-5											
35		dibenz[a,h]anthracene				<0.023 mg/kg			<0.023 mg/kg		<0.0000023 %			<LOD
	601-041-00-2	200-181-8	53-70-3											
36	●	benzo[ghi]perylene				<0.024 mg/kg			<0.024 mg/kg		<0.0000024 %			<LOD
		205-883-8	191-24-2											
37		phenol				<0.01 mg/kg			<0.01 mg/kg		<0.000001 %			<LOD
	604-001-00-2	203-632-7	108-95-2											
38	●	polychlorobiphenyls; PCB				<0.021 mg/kg			<0.021 mg/kg		<0.0000021 %			<LOD
	602-039-00-4	215-648-1	1336-36-3											
Total:												0.0104 %		



Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification



Appendix A: Classifier defined and non CLP determinands

• **chromium(III) oxide** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Conversion factor: 1.462

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

• **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: Aquatic Chronic 2 H411 , Repr. 2 H361d , Carc. 1B H350 , Muta. 1B H340 , STOT RE 2 H373 , Asp. Tox. 1 H304 , Flam. Liq. 3 H226

• **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4

Description/Comments:

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Hazard Statement(s): Carc. 2 H351

Reason for additional Hazards Statement(s)/Risk Phrase(s):

03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

• **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

CLP index number: 006-007-00-5

Description/Comments: Conversion factor based on a worst case compound: sodium cyanide

Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)

Additional Hazard Statement(s): EUH032 >= 0.2 %

Reason for additional Hazards Statement(s)/Risk Phrase(s):

14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

• **pH** (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

• **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 1 H310 , Acute Tox. 1 H330 , Acute Tox. 4 H302

• **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 2 H411 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

• **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400



• **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Skin Irrit. 2 H315 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Carc. 2 H351 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302

• **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

• **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Acute Tox. 4 H302

• **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Skin Irrit. 2 H315

• **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Carc. 2 H351

• **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 23 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

• **polychlorobiphenyls; PCB** (EC Number: 215-648-1, CAS Number: 1336-36-3)

CLP index number: 602-039-00-4

Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.

Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)

Additional Hazard Statement(s): Carc. 1A H350

Reason for additional Hazards Statement(s)/Risk Phrase(s):

29 Sep 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

beryllium {beryllium oxide}

Reasonable case CLP species based on hazard statements/molecular weight. Industrial sources include: most common (non alloy) form, used in ceramics (edit as required)

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)



chromium in chromium(III) compounds {chromium(III) oxide}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil. (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.1, May 2018**

HazWasteOnline Classification Engine Version: 2020.10.4136.8250 (10 Jan 2020)

HazWasteOnline Database: 2020.10.4136.8250 (10 Jan 2020)

This classification utilises the following guidance and legislation:

WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004

1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010

2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010



Appendix J – Calibration Certificates

CERTIFICATION OF CALIBRATION



Date Of Calibration: 20-Nov-2019

Certificate Number: G502069_2/24501

Issued by: QED Environmental Systems Ltd.

Customer: WYG Environment Planning Transport Ltd
Purchase Ledger Department PO Box 364 Leeds
West Yorkshire LS6 2WQ UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G502069

UKAS Accredited results:

Results after adjustment :

Methane (CH ₄)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	5.0	0.41
15.0	15.0	0.64
50.0	49.4	0.94

Carbon Dioxide (CO ₂)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	4.8	0.43
15.0	14.7	0.70
50.0	50.1	1.1

Oxygen (O ₂)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
21.3	21.4	0.31

The inwards assessment was carried out 08-Nov-2019.

The maximum adjustment is larger than the inwards assessment uncertainty.

Inwards assessment data is available if requested.

All concentrations are molar.

CH₄, CO₂ readings recorded at : 32.1 °C ± 2.5 °C

O₂ readings recorded at : 22.3 °C ± 2.5 °C

Barometric Pressure : 1001 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:105 IGC Instance:105

Page 1 of 2 | LP015GIUKAS-2.4

www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

CERTIFICATION OF CALIBRATION



Date Of Calibration: 20-Nov-2019

Certificate Number: G502069_2/24501

Issued by: QED Environmental Systems Ltd.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	Instrument Reading
1001	1001

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
CO	519	527
H ₂ S	262	262

Internal Flow	
Applied (l/hr)	Instrument Reading (l/hr)
5.00	4.90
10.00	9.70

Date of Issue : 25-Nov-2019

Approved by Signatory

Nick Sidgwick

Laboratory Inspection

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:105 IGC Instance:105

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www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734



Certificate of Calibration

Customer: Ribble Enviro Hire Fleet

Instrument: Mini RAE Lite

Job: Pre-Hire, Service, Test & Calibration

Serial number: 590-906858

Fleet Number: R33353

Certificate no: 906858 / 171019

Next calibration date: 17 Oct 2020

Tested on: 17 Oct 2019

Calibrated for: Isobutylene

<u>Applied Gas Concentration:</u>	<u>Cylinder Reference:</u>	<u>Initial Sensor Reading</u>	<u>Final Sensor Reading</u>	<u>Accuracy Limits</u>
Isobutylene: 100 ppm	AGG 2696-4-5	97.6 ppm	100.2 ppm	± 10%

The Instrument has been calibrated after Re-Zeroing & Introducing Span Calibration Gas, using gas that is traceable to national standards and has been prepared in accordance with BS EN ISO6145-6:2017

Calibration Engineer: Lesley Bainbridge

Sign:

Quality Assessed by (Print):		Sign:	
---------------------------------	--	-------	--