



e3p

Phase II Geoenvironmental Site Assessment
East Hub, Knowsley
Reference: 15-354-R2-1
Date: July 2022



PHASE II GEOENVIRONMENTAL SITE ASSESSMENT

East Hub
Knowsley Business Resource Centre
Admin Road
Liverpool
L33 7TX

Prepared for:
Redsun Projects Ltd



Report Ref: 15-354-R2-1
Date Issued: July 2022

East Hub, Knowsley

Phase II Geoenvironmental Site Assessment

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EXECUTIVE SUMMARY

Site Address	Land north of Admin Road, Liverpool, L33 7TX
Grid Reference	E 343310, N 397760
Site Area	1.07 Ha.
Proposed Development	Redsun Projects Ltd intends to construct a commercial development comprising a 50,000 sqft commercial unit with associated loading areas and car parking. Drawing 15-354-002 (Appendix III) identifies the proposed development layout.
Current Site Use	The subject site is a rectangular shaped parcel of land located to the south of Knowsley Industrial Park and was formerly occupied by the 'Admin Building' associated with the former Royal Ordnance Factory (ROF) Kirkby, an ordnance filling factory. The buildings were demolished by 2019 and the existing site is predominantly covered by overgrown grasses with areas of short scrub vegetation and bushes. A series of sporadic semi-mature and mature trees are present along the eastern boundary of the site. A small rectangular area of hardstanding is present in the northwest corner of the site, adjacent to the gated entrance to the site. Wooden boarded fencing supported by oil drums filled with sand, runs along the western and southern boundaries. Metal palisade fencing borders the north and east of the site. Areas of waste plywood boards, planks of wood and empty drums are located in the central area and along the southern boundary of the site. The south of the site is a hardstanding area with several car parking spaces and a small, landscaped area with a single semi-mature tree.
Site History	A review of the pertinent Ordnance Survey mapping suggests that the site comprised agricultural land until circa 1956. Circa 1956 the 'Admin Building' associated with ROF Kirkby was constructed on-site. The main building was a single-storey structure, with a complicated structure of rectangular elements, interlinking corridors, and open spaces between. Additional structures on site included a telephone exchange to the northwest, a post office and two lavatory buildings to the west, five structures marked as banks to the southwest and seven identical structures with earth mounds between the structures to the northeast. Circa 1970, the telephone exchange was no longer recorded/had been demolished. Circa 1977 the structures in the north-eastern sector were no longer recorded/had been demolished. Circa 2001, the north of the site was utilised as a car park. All buildings on site were demolished by 2019 and the existing site is predominantly covered by overgrown grasses with the south of the site being utilised as a car park.



Environmental Setting	Drift Geology	Shirdley Hill Sand Formation – SAND.
	Bedrock Geology	Chester Formation – SANDSTONE.
	Faults	None within influencing distance of site boundary.
	Hydrogeology	Secondary A superficial aquifer overlying Principal bedrock aquifer. Two groundwater abstraction points are recorded within 1 km of the site; located 886 m north of the site for process water, boiler feed, drinking, cooking, sanitary and washing and 887 m southeast for potable water supply.
	Hydrology	The nearest off-site surface water feature is drainage associated with the Acorn Field Plantation located 183 m east of the site.
	Flood Risk	Unaffected by flooding from rivers.
Previous Reports	The following previous site investigation and report was completed by E3P for 'West Hub', the adjacent parcel of land to the west of the site: E3P – <i>Phase I and Phase II Geoenvironmental Site Assessment</i> Knowsley Hub, July 2019, Reference: 13-305-R1-RevA. Prepared for Redsun Projects. A full summary of findings is provided in Section 2.1.	
Utility Locations	✿ Distribution clean water mains are present in the south of the site and within the northern sector of the site. An additional main, partly abandoned, is present on the eastern boundary of the site. Foul sewers are present along the western boundary and across the south of the site. ✿ Medium pressure gas mains are present along the boundaries of the site. ✿ A CCTV box is present in the northwest corner of the site and it is proposed to be diverted near the widened main entrance. ✿ Electricity infrastructure is present along the western boundary. A LV cable is present within the north of the site. LV, HV (22kV/11kV) and EHV (33kV) cables are present in the southwest corner of the site. Out of use LV cables are present in the northern central sector of the site. LV and HV power cables are present in the south of the site adjacent to Admin Road, with an LV feed entering the south of the site. ✿ Virgin media infrastructure is present along the western boundary and across the south of the site with chambers and cabinets also present in the south. ✿ BT infrastructure is present along the western boundary and across the south of the site. Ducting and BT boxes are present in the north of the site.	
Landfill Sites and Ground Gases	No landfill sites (current or historic) are located within 250 m of the site. The site has undergone some historic development, the Made Ground associated with the historic development may produce hazardous ground gases such as methane and carbon dioxide.	



Radon	Less than 1% of houses above the 'Action Level' – no special precautions required.
Coal Mining/Land Stability	The site is not located within a coal mining reporting area or development high risk area; therefore, no further assessment is required.
Brine Workings	The site is not situated within the Cheshire Salt Field and is not within an area deemed to be at risk from historic brine workings or rock salt extraction.
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed development have been identified within influencing distance of the subject site.

GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising: ✿ 20 x mechanically excavated trial pits. ✿ 4 x BRE365 soakaway tests. ✿ 12 x window sample boreholes. ✿ Construction of environmental monitoring installations.
Ground Conditions	Made Ground – 0.00 m bgl to 1.60 m bgl Made Ground deposits were encountered within all exploratory hole locations to a maximum proven depth of 1.60 m bgl. Made Ground deposits comprise a reworked topsoil of brown slightly clayey slightly gravelly fine to medium sand with frequent rootlets and gravel of mudstone, glass, brick and rare ceramic and plastic. Made Ground is generally encountered to a depth of 0.20 m bgl, and to a maximum depth of 0.40m bgl (WS101). Made Ground underlying the reworked topsoil generally comprises dark brown, yellowish-brown or reddish-brown slightly clayey slightly gravelly sand with gravel comprising brick, sandstone, and concrete and occasional cobbles of brick and concrete. A black slightly gravelly clayey sand with rare gravel of brick, glass and concrete, was encountered within TP104/SA102, TP105, TP107, TP110, WS103, WS106 and WS107. A hydrocarbon odour was encountered within TP104 and TP105 from 0.30 m and 0.80 m bgl, respectively. Additionally, a slight hydrocarbon odour was encountered from 0.50 m bgl in TP103e within a yellowish-brown medium to coarse sand, overlying a concrete slab. The base of the Made Ground was not identified in TP103a-TP103e, TP114a and WS109 as the locations terminated or refused on concrete slabs/obstructions.



Ground Conditions	DRIFT – 0.20 m bgl to 2.45 m bgl Drift deposits were encountered in twelve locations between 0.20 m bgl and 1.90 m bgl. The drift deposits are fairly consistent across the site, comprising light yellow slightly clayey medium to coarse SAND or brown medium to coarse SAND.
	SOLID – 0.60 m bgl to 2.70 m bgl The weathered solid bedrock geology was encountered in the majority of locations at depths of between 0.50 m and 2.70 m bgl. The solid geology comprises reddish-brown weathered SANDSTONE recovered as reddish-brown gravelly medium to coarse SAND with gravel and occasional cobbles of weathered sandstone. A whiteish yellow/yellowish brown weathered SANDSTONE was encountered within TP101, TP111 and TP113 at depths between 1.40 and 2.70 m bgl. All exploratory hole locations (except TP103a-e, TP114b and WS109) either refused within the bedrock or were terminated due to difficulty excavating, indicative of the depth of bedrock of the Chester Formation.
	GROUNDWATER – Groundwater strikes were encountered as seepages between 1.80 m bgl and 2.60 m bgl during the site investigation. During return monitoring, all wells were recorded as dry.

CONTAMINATED LAND ASSESSMENT

Human Health	Asbestos in the form of loose chrysotile and amosite fibres has been identified in the Made Ground in TP103a at 0.25 m bgl, which could be released during earthworks and then subsequently inhaled by construction workers and possibly third-party property. Asbestos Quantification analysis was undertaken which identified asbestos at <0.001 % volume/weight. The site is to be covered in hardstanding buildings which will mitigate the risk to future end-users. Materials should be placed in accordance with the E3P Asbestos Conceptual Site Model. Areas of landscaping should be installed with a 300 mm cover system. Upon placement of asbestos impacted soils at depth beneath hardstanding or a 300 mm cover system in areas of landscaping, they will present no unacceptable risk to the future site users.
Controlled Waters	The initial conceptual site model identified the underlying Principal aquifer as the critical receptor; therefore leachate samples obtained from the site were assessed against Drinking Water Standards (DWS). No complete pollutant linkage was identified and thus no unacceptable level of risk to controlled water receptors has been determined.
Ground Gas	The site is classified as Characteristic Situation 1.
Potable Water Infrastructure	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.



GEOTECHNICAL ASSESSMENT

Underground Obstructions	Significant concrete and brick obstructions have been encountered within the Made Ground, indicative of relict foundations from the former buildings on site. During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.
Allowable Bearing Pressure	The underlying natural granular drift deposits have been assessed as being medium dense to very dense sands or weathered sandstone bedrock, where an ABP of between 212–504 kN/m² can be achieved at circa 1.00–2.00 m bgl.
Foundation Options	Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net Allowable Bearing Pressure, the suitable target founding stratum has been identified as the underlying medium dense to very dense sands or weathered sandstone bedrock at circa. 1.00 m bgl. However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove any extensive buried obstructions and cut/fill the site to provide suitable development platform levels. All underground obstructions will require grubbing out in their entirety prior to development. It would be feasible to provide a pad foundation solution for the proposed commercial unit, founding into the medium dense to very dense sands or weathered sandstone bedrock, where an ABP of between 272–504 kN/m² can be achieved at circa 1.00–2.00 m bgl. Should deep Made Ground be encountered on site beyond 2.50 m bgl, consideration may also be given to re-engineer the Made Ground using Vibro Stone Columns (VSC) to support a pad foundation. The use of Vibro will be limited subject to proposed finished floor levels, given the shallow nature of the solid geology. Shallow bedrock has been encountered across the site which may impede excavation for drainage infrastructure using traditional excavation plant and equipment. Specialist equipment may be required. Consideration must also be given to the varying soil matrices and differing settlement characteristics and where a foundation spans two varying matrices the sub-structure should be designed accordingly. It is recommended that, at working drawing stage, a foundation design is prepared for the development, taking account of the depth to bedrock and the current location of deep Made Ground.
Building Floor Slabs	Following enabling works, the site will likely have a variable thickness of Made Ground, that may extend to significant depth in places. Given the structures that are proposed, it is considered that ground-bearing floor slabs will require settlement analysis and detailed design in order to accommodate variability of the formation and account for differential settlement. Given the depth of Made Ground and its loose/variable nature, it will be necessary to undertake some form of Ground Improvement work to ensure the total and differential settlement is within tolerable limits for the Uniformly Distributed Load of the floor slab and any external reinforced concrete yards / hardstanding.



Building Floor Slabs	A traditional solution which comprises the excavation of the upper stratum of Made Ground prior to re-engineering and compaction as a structural upfill may be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation. Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, clay (if encountered) will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer. Where it is necessary to undertake cut-and-fill works utilising site-derived cohesive soils (if encountered), careful consideration must be given to seasonal climatic conditions, which will have a significant impact on moisture conditions and the ability to compact clay soils in the wetter winter months. It may be necessary to undertake an element of stabilisation works through the addition of lime to ensure the soils can be engineered to the required performance standards. It would be possible to utilise soil stabilisation techniques that incorporate the addition of lime and OPC to construct a stiffened soil horizon with a CBR > 15% to constitute a sub-base replacement layer that could then be capped with Type 1 MOT. The use of soil stabilisation could be extended within the conjectured zone of tree influence to modify the structure of clay soils and negate the potential for volumetric instability.
Heave Precautions	Due to the absence of cohesive deposits in the near surface, heave precautions will not be required within the construction of proposed buildings.
Soakaway Drainage	The presence of substantial depths of Made Ground across some areas of the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement. Three of the five soakaway tests did not record a sufficient fall in water level to allow reliable calculation of the infiltration rate. Tests in SA103 showed the granular drift deposits to have good soakage potential. However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365 – Soakaway Design.
Sulphate Assessment	Concrete classification is varied across the site and ranges from Class DS-1 AC-1s, DS-2, AC-1s and DS-3, AC-2s.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favourable climatic conditions.
Cut/Fill	Development levels unknown at this time; however, cut-and-fill works will likely be required to prepare the development platform.



Civil Engineering Excavations	The E3P intrusive ground investigation has identified the presence of weathered/competent bedrock at a shallow depth, the presence of which will impede the excavation materials to form sewerage and drainage infrastructure and foundations. Due to the depth and variability of the Made Ground and the likelihood of trench collapse in some areas of the site, it is recommended that excavations are supported or battered back in accordance with guidance contained in CIRIA R97. If local pumping of groundwater is required during the advancement of excavations for the proposed foundations, then consideration should be given to the potential for dewatering gravels in the surrounding areas that may cause structural damage to building substructures in close proximity to the site.
Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: <i>Waste Classification – Guidance on the classification and assessment of waste</i>.

RECOMMENDATIONS

Based on the findings of the geoenvironmental site assessment, the following additional works are recommended to be completed in due course:

- ✳ Arboriculture survey, should cohesive strata be identified.
- ✳ Geotechnical earthworks strategy (infrastructure).
- ✳ Remediation and enabling works strategy.



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DRAWING LIST

15-354-001 - Site Location Plan
15-354-002 - Proposed Development Plan
15-354-003 - Historical Features Plan
15-354-004 - Site Features Plan
15-354-005 - Exploratory Hole Location Plan
15-354-006 - Depth of Made Ground Plan
15-354-008 - Depth to Founding Strata Plan
15-354-010 - Conceptual Site Model
15-354-012 - Depth to Bedrock Plan
15-354-018 - Contamination Exceedances Plan



1. INTRODUCTION

1.1. BACKGROUND

E3P has been commissioned by Redsun Projects Ltd to undertake a detailed Phase II Geoenvironmental Site Assessment at land to the north of Admin Road, L33 7TX.

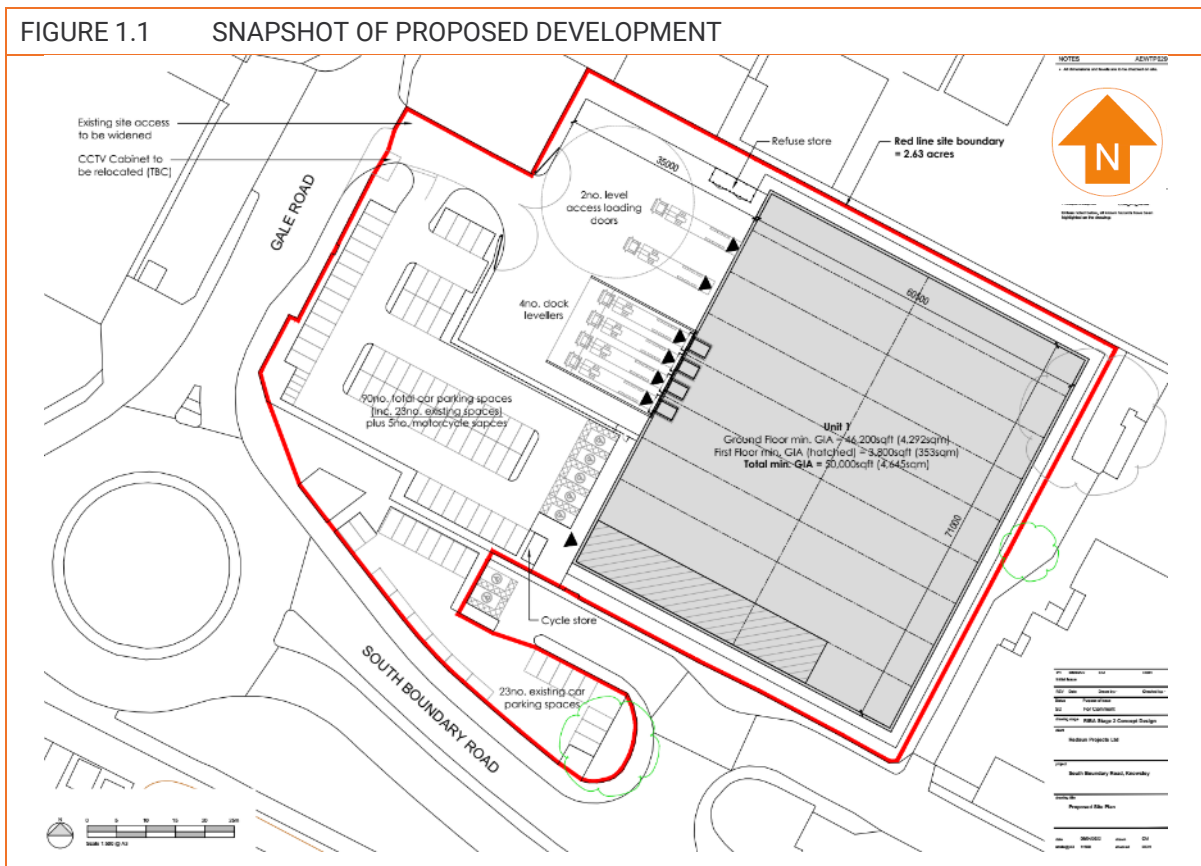
This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for a proposed commercial development.

1.2. PROPOSED DEVELOPMENT

Redsun Projects Ltd intends to construct a commercial development comprising a 50,000 sqft commercial unit with associated loading areas and car parking. Drawing 15-354-002 (Appendix III) identifies the proposed development layout.

A snapshot of the proposed development layout is indicated in Figure 1.1.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



1.3. OBJECTIVES

The objectives of the geoenvironmental assessment are as follows:

- ✦ Review historical plans, geology, hydrogeology, site sensitivity, floodplain issues, mining records and any local authority information available in order to complete a desk study in line with Environment Agency (EA) document *Land Contamination: Risk Management (LCRM) (2019)*.
- ✦ Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified.
- ✦ Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors.
- ✦ Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs.
- ✦ Provide recommendations regarding future works required.

1.4. SCOPE OF WORKS

The scope of work includes the following elements:

- ✦ Design of suitable intrusive ground investigation;
- ✦ Window sample probeholes with, and construction of, environmental monitoring installations;
- ✦ Mechanically excavated trial pits;
- ✦ Soakaway testing;
- ✦ In-situ geotechnical testing;
- ✦ Chemical and geotechnical laboratory analysis;
- ✦ Groundwater monitoring and sampling;
- ✦ Ground gas monitoring;
- ✦ Contamination risk assessment and conceptual site model;
- ✦ Geotechnical assessment and interpretation; and
- ✦ Factual and interpretive reporting.

1.5. LIMITATIONS

The limitations of this report are presented in Appendix I.



1.6. CONFIDENTIALITY

E3P has prepared this report solely for the use of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.



2. GROUND INVESTIGATION

2.1. PREVIOUS SITE INVESTIGATIONS

The following previous site investigation and report was completed by E3P for 'West Hub', the adjacent parcel of land to the west of the site and key findings of the site investigation report are summarised below and where necessary data used to support the E3P geoenvironmental site assessment.

E3P – PHASE I AND PHASE II GEOENVIRONMENTAL SITE ASSESSMENT KNOWSLEY HUB, JULY 2019, REFERENCE: 13-305-R1-REVA. PREPARED FOR REDSUN PROJECTS.

- ✚ Site investigation works were completed between 9th May 2019 and 10th May 2019 and comprised of the following:
 - 18No. mechanically excavated trial pits
 - 12No. window sample boreholes
- ✚ Made Ground deposits were encountered within all exploratory hole locations to depths of between 0.30 m and 1.90 m bgl, although in general Made Ground was encountered to a depth of less than 1.00 m bgl. Made Ground deposits comprise a reworked topsoil of black, brown, gravelly, sandy clay with mudstone, brick, plastic and concrete in the majority of locations. Within all locations, the Made Ground underlying the reworked topsoil comprises a greyish brown, dark reddish brown or black, slightly sandy gravel with gravel comprising of mudstone, ash, brick, asphalt and occasional boulders of concrete and shale. Within TP118 Made Ground was identified to 1.90 m bgl. where the exploratory hole location was terminated at this depth due to the presence of weathered sandstone bedrock.
- ✚ Drift deposits: Drift deposits were encountered within all exploratory hole locations apart from TP118. The drift deposits are fairly consistent across the site, generally comprising a brown clayey SAND, a reddish-brown SAND or orangey brown gravelly SAND with gravel comprising of sandstone.
- ✚ Solid Geology: The weathered solid bedrock geology was encountered at 5No. locations (TP101 – TP105) at depths of between 1.40 m and 2.40 m bgl. The solid geology comprises a red weathered SANDSTONE. All remaining exploratory hole locations either refused within the bedrock or were terminated due to difficulty excavating due to the presence of the underlying bedrock geology.
- ✚ Loose chrysotile fibres were identified within the Made Ground deposits in WS110, TP107 and TP111.
- ✚ The controlled waters risk assessment did not identify any elevated levels of contaminants of concern above the Drinking Water Standards.



- ✦ The presence of varied depths of Made Ground within some areas of the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement. Furthermore, the site is predominantly underlain by circa 1.00-2.00m of likely high permeability SAND. Therefore, the use of soak-away drainage may be possible. Falling head permeability tests have been completed which have shown the underlying SAND to have a moderate soakage potential.
- ✦ Concrete classification is varied across the site and ranges from Class DS-1 AC-1s, DS-2, AC-1s and DS-3, AC-2s.

2.2. GENERAL OVERVIEW

A ground investigation has been designed based on the findings of the desk study, with exploratory holes advanced to target specific potential contaminant sources identified in the previous site investigations. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed between 19 April 2022 and 20 April 2022. The works are summarised in Table 2.1.

2.3. SCOPE OF INVESTIGATION

TABLE 2.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
General Ground Conditions Including the Presence/Nature of Obstructions	WS101	Window Sample Probehole	1.24	N/A
	WS102		1.45	0.70–1.00
	WS103		2.45	1.00–2.00
	WS104		1.31	N/A
	WS105		1.38	0.20–0.50
	WS106		1.88	N/A
	WS107		1.74	N/A
	WS108		1.83	0.50–1.00
	WS109		1.31	0.30–1.00
	WS110		1.68	N/A
	WS111		2.01	N/A
	WS112		1.45	0.50–1.00
General Ground Conditions / Assessment of Permeability Characteristics	TP101–TP114	Mechanically Excavated Trial Pit	2.70	N/A
	SA101–SA104	Mechanically Excavated Trial Pit/ Soakaway Test Location	2.40	N/A



Mechanically excavated trial pits were advanced to investigate ground conditions and to retrieve environmental samples, spatially distributed to offer the maximum site coverage whilst also being advanced to target specific contaminant sources.

Window sample probeholes were advanced to undertake in-situ detailed geotechnical testing, obtain environmental samples and install groundwater and ground gas monitoring wells.

The sampling locations are illustrated in Drawing 15-354-005 (Appendix III). The ground conditions encountered are indicated on the logs, which are provided in Appendix V.

Return visits were made to monitor installations for groundwater level and gas concentrations.

2.4. IN-SITU STANDARD PENETRATION TESTING (SPT)

In-situ geotechnical testing was conducted using the standard penetration test (SPT) and, where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix V and presented in Table 3.4 and discussed in Section 5.

2.5. PERMEABILITY TESTS

BRE 365 soakaway tests were undertaken within trial pits SA101-SA104 in order to assess the likely permeability of the underlying strata to determine the potential suitability for soakaway drainage within the proposed development. The results are presented in Table 3.7 and the test certificates are included within Appendix IX.

2.6. LABORATORY ANALYSIS

Selected soil samples were submitted for a range of chemical analyses comprising:

-  Metals.
-  pH, total sulphate, water-soluble sulphate (2:1 extract).
-  Sulphide.
-  Cyanide.
-  Phenols.
-  Total and speciated polycyclic aromatic hydrocarbons (PAHs).
-  Semi Volatile Organic Compounds (SVOC).
-  Volatile Organic Compounds (VOC).
-  Asbestos identification and quantification.
-  Banded total petroleum hydrocarbon (TPH).
-  Total organic carbon (TOC).
-  Soil leachate analysis.

I2 Analytical undertook the analytical work and the testing results are included in Appendix VI and discussed in Section 4.



Selected samples were submitted to PSL Laboratory where the following geotechnical tests were undertaken:

-  Particle size distribution

Laboratory analysis sheets are included in Appendix VIII and are summarised in Section 3.



3. GROUND AND GROUNDWATER CONDITIONS

3.1. SUMMARY OF GROUND CONDITIONS

The ground investigation generally confirms the published geology and identifies the strata set out in Table 3.1.

TABLE 3.1 SUMMARY OF STRATA

HOLE	DEPTH TO STRATUM (m bgl)				
	MADE GROUND TOPSOIL	MADE GROUND	SAND	WEATHERED SANDSTONE (GRAVELLY SAND)	WEATHERED YELLOW SANDSTONE
TP101/SA101	0.00–0.40	–	0.40–0.60	0.60–1.40 1.60–1.70	1.40–1.60
TP102	0.00–0.20	0.20–0.70	0.70–1.10	1.10–1.60	–
TP103a	0.00–0.20	0.20–0.30	–	–	–
TP103b	0.00–0.20	0.20–0.30	–	–	–
TP103c	0.00–0.15	0.15–0.20	–	–	–
TP103d	0.00–0.20	0.20–0.35	–	–	–
TP103e	0.00–0.25	0.25–0.90	–	–	–
TP104/SA102	0.00–0.20	0.20–1.10	–	1.10–2.40	–
TP105	0.00–0.30	0.30–1.40	–	1.40–1.80	–
TP106	0.00–0.20	0.20–0.50	0.50–1.10	1.10–2.40	–
TP107	0.00–0.20	0.20–0.70	0.70–1.30	1.30–2.00	–
TP108	0.00–0.20	0.20–1.30	–	1.30–2.20	–
TP109	0.00–0.20	0.20–1.50	1.50–1.70	1.70–2.20	–
TP110	0.00–0.30	0.30–1.00	1.00–1.20	1.20–2.70	–
TP111	0.00–0.20	0.30–1.60	1.60–1.90	1.90–2.30	2.30–2.40
TP112/SA104	0.00–0.20	0.20–1.00	–	1.00–1.90	–
TP113	0.00–0.25	0.25–1.40	–	1.40–2.50	2.50–2.70
TP114a	0.00–0.20	0.20–1.40	–	–	–
TP114b/SA103	0.00–0.20	0.20–0.90	–	0.90–2.00	–
TP115	0.00–0.25	0.25–1.20	–	1.20–1.40	–
WS101	0.00–0.10	0.10–0.20	0.20–0.80	0.80–1.24	–
WS102	0.00–0.15	0.15–0.65	0.65–0.85	0.85–1.45	–
WS103	0.00–0.15	0.15–1.00	–	1.00–2.45	–
WS104	0.00–0.30	0.30–0.80	–	0.80–1.31	–
WS105	0.00–0.20	0.20–0.50	0.50–0.80	0.80–1.38	–
WS106	0.00–0.20	0.20–1.50	–	1.50–1.88	–
WS107	0.00–0.15	0.15–1.00	–	1.00–1.74	–



HOLE	DEPTH TO STRATUM (m bgl)				
	MADE GROUND TOPSOIL	MADE GROUND	SAND	WEATHERED SANDSTONE (GRAVELLY SAND)	WEATHERED YELLOW SANDSTONE
WS108	0.00–0.20	0.20–1.00	1.00–1.05	1.05–1.83	–
WS109	0.00–0.20	0.20–1.31	–	–	–
WS110	0.00–0.20	0.20–1.20	–	1.20–1.68	–
WS111	0.00–0.20	0.20–1.20	1.20–1.70	1.70–2.01	–
WS112	0.00–0.20	0.20–0.50	–	0.50–1.45	–

3.2. MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to a maximum proven depth of 1.60 m bgl.

Made Ground deposits comprise a reworked topsoil of brown slightly clayey slightly gravelly fine to medium sand with frequent rootlets and gravel of mudstone, glass, brick and rare ceramic and plastic. Made Ground is generally encountered to a depth of 0.20 m bgl, and to a maximum depth of 0.40 m bgl (WS101).

Made Ground underlying the reworked topsoil generally comprises dark brown, yellowish-brown or reddish-brown slightly clayey slightly gravelly sand with gravel comprising brick, sandstone, and concrete and occasional cobbles of brick and concrete.

A black slightly gravelly clayey sand with rare gravel of brick, glass and concrete, was encountered within TP104/SA102, TP105, TP107, TP110, WS103, WS106 and WS107. A hydrocarbon odour was encountered within TP104 and TP105 from 0.30 m and 0.80 m bgl, respectively. Additionally, a slight hydrocarbon odour was encountered from 0.50 m bgl in TP103e within a yellowish-brown medium to coarse sand, overlying a concrete slab.

The base of the Made Ground was not identified in TP103a-TP103e, TP114a and WS109 as the locations terminated or refused on concrete slabs/obstructions.

A Depth of Made Ground Plan is presented as Drawing 15-345-006 in Appendix III.

3.3. DRIFT DEPOSITS

Drift deposits were encountered in twelve locations between 0.20 m bgl and 1.90 m bgl.

The drift deposits are fairly consistent across the site, generally comprising light yellow slightly clayey medium to coarse SAND or brown medium to coarse SAND.

3.4. SOLID GEOLOGY

The weathered solid bedrock geology was encountered in the majority of locations to depths of between 0.50 m and 2.70 m bgl. The solid geology comprises reddish-brown weathered SANDSTONE recovered as a reddish-brown medium to coarse gravelly SAND with gravel and occasional cobbles of weathered sandstone.



A whiteish yellow/yellowish brown weathered SANDSTONE was encountered within TP101, TP111 and TP113 at depths of between 1.40 and 2.70 m bgl.

All exploratory hole locations (except TP103a-e, TP114b and WS109) either refused within the bedrock or were terminated due to difficulty excavating due to the presence of the underlying bedrock geology, indicative of the depth of bedrock of the Chester Formation.

3.5. GROUNDWATER

Groundwater strikes were encountered as seepages. The depth of the seepages are shown on the exploratory hole records in Appendix V and are summarised in Table 3.2.

TABLE 3.2 SUMMARY OF GROUNDWATER STRIKES

LOCATION	DEPTH TO STRIKE (m)	NOTES
TP105	1.8	Very slow seepage.
TP107	2.0	Slow seepage.
TP110	2.6	Slow to moderate seepage.
TP111	2.4	Very slow seepage.
TP109	2.2	Slow seepage.
TP108	2.2	Slow to moderate seepage.
TP113	2.5	Moderate seepage.

Monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present. These results are summarised in Table 4.6.

3.6. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

Visual and olfactory evidence of potential contamination has been identified during the site investigation and these are summarised in Table 3.3.

TABLE 3.3 SUMMARY OF VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

LOCATION	DEPTH (m)	STRATUM	NOTES
TP103e	0.50	Made Ground	Slight hydrocarbon odour
TP104	0.30	Made Ground	Hydrocarbon odour
TP105	0.80	Made Ground	Very strong hydrocarbon odour

3.7. SOIL CONSISTENCY

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 3.4.

3.8. SIDE STABILITY AND EASE OF EXCAVATION

The sides of the exploratory trial pit excavations appeared to be generally stable during excavation.



The presence of brick and concrete cobbles within the Made Ground deposits meant that in certain places, excavation was slow through the Made Ground and in some places, Made Ground could not be fully penetrated due to the presence of concrete slabs. The natural drift deposits were excavated with relative ease, with difficulty increasing with depth and within the underlying weathered bedrock.



TABLE 3.4 STANDARD/CONE PENETRATION TEST RESULTS

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N ₁) ₆₀	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)	ALLOWABLE BEARING PRESSURE (kN/m ²)*
WS101	1.00	Gravelly SAND	50	50.41	Very Dense	N/A	N/A	N/A	504.07
WS102	1.00	Gravelly SAND	50	50.41	Very Dense	N/A	N/A	N/A	504.07
WS103	1.00	SAND	27	27.22	Medium Dense	N/A	N/A	N/A	272.20
WS103	2.00	Clayey silty SAND	50	45.68	Dense	N/A	N/A	N/A	456.77
WS104	1.00	Gravelly SAND	50	50.41	Very Dense	N/A	N/A	N/A	504.07
WS105	1.00	SAND	50	50.41	Very Dense	N/A	N/A	N/A	504.07
WS106	1.00	MADE GROUND: slightly clayey sand	19	19.15	Medium Dense	N/A	N/A	N/A	191.55
WS106	1.70	Gravelly SAND	50	46.69	Dense	N/A	N/A	N/A	466.86
WS107	1.00	SAND	44	44.36	Dense	N/A	N/A	N/A	443.59
WS107	1.50	SAND	50	47.51	Dense	N/A	N/A	N/A	475.08
WS108	1.00	SAND	37	37.30	Dense	N/A	N/A	N/A	373.02
WS108	1.60	SAND	50	47.08	Dense	N/A	N/A	N/A	470.80
WS109	1.00	MADE GROUND: gravelly sandy clay	50	50.41	N/A	Very High Strength	Very Stiff	252.04	518.19



BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N ₁) ₆₀	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)	ALLOWABLE BEARING PRESSURE (kN/m ²)*
WS110	1.00	MADE GROUND: slightly clayey slightly gravelly sand	30	30.24	Dense	N/A	N/A	N/A	302.44
WS110	1.50	Gravelly SAND	50	47.51	Dense	N/A	N/A	N/A	475.08
WS111	1.00	MADE GROUND: slightly clayey gravelly sand/ SAND	21	21.17	Medium Dense	N/A	N/A	N/A	211.71
WS111	1.70	Gravelly SAND	50	46.69	Dense	N/A	N/A	N/A	466.86
WS112	1.00	Gravelly SAND	50	50.41	Very Dense	N/A	N/A	N/A	504.07

NOTES

* The Allowable Bearing Pressure (ABP) should be considered indicative.

The interpretation of in situ mass undrained shear strength (cu) data from SPT Blow Count (N) results and the influence of the Plasticity Index (PI) was reported in Standard Penetration Test in Insensitive Clays and Soft Rocks. Stroud (1974). The standard penetration test and the engineering properties of glacial materials subsequently. Stroud and Butler (1975) and (1989).

Allowable bearing pressure on sands. Soil Mechanics in Engineering Practice Terzaghi, K. & Peck, R.B. 1996.



3.9. PARTICLE SIZE DISTRIBUTION

Particle Size Distribution Tests have been undertaken on selected samples of granular material via wet sieve to obtain information on the soil fractions. The results are included in Table 3.5. The full results can be found in Appendix VIII.

TABLE 3.5 SUMMARY OF PARTICLE SIZE DISTRIBUTION TEST RESULTS

LOCATION	DEPTH (m)	SOIL FRACTION (%)			
		COBBLES	GRAVEL	SAND	SILT/CLAY
SA103/TP114b	1.50 (Natural)	0	49	43	8
TP105	1.80 (Natural)	0	55	40	5
TP103e	0.40 (Made Ground)	0	50	43	7

3.10. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density/moisture content relationship analysis has been conducted on soils using via utilising proctor compaction tests utilising a 4.5 kg rammer. The results of the tests have been summarised in Table 3.6. The full test results can be found in Appendix VIII.

TABLE 3.6 SUMMARY DRY DENSITY AND MOISTURE CONTENT

LOCATION	LABORATORY DESCRIPTION	TOP DEPTH (m)	METHOD OF COMPACTION	INITIAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	MATERIAL RETAINED ON 37.5 mm SIEVE (%)	MAX DRY DENSITY (mg/m ³)	MATERIAL RETAINED ON 20.0 mm TEST SIEVE (%)
TP103e	MADE GROUND brown very sandy clayey gravel.	0.40	4.5 kg	13	11	5	1.97	25
TP105	Brown very sandy silty GRAVEL.	1.80	4.5 kg	12	12	20	1.94	10

The proctor compaction tests have indicated that the materials on site are variable with the material in TP103e being wet of the optimum. It should be noted that if this material is excavated for use in a cut/fill operation careful consideration should be taken in the stabilisation of this material.

Engineering of this type of material will need to be completed during dry weather periods only.

3.11. SOIL INFILTRATION

In-situ BRE 365 Soakaway tests were undertaken within trial pits completed as SA101-SA104.

The results are presented in Table 3.7 and the test certificates are included within Appendix IX.

TABLE 3.7 BRE365 SOAKAWAY TESTING RESULTS

LOCATION	DEPTH (m)	MATERIAL	TEST NO.	SOIL INFILTRATION RATE (m/s)
SA101	1.70	MADE GROUND/Gravelly SAND	Test No.1	N/A
SA102	2.40	MADE GROUND/Gravelly SAND	Test No.1	N/A
SA103	2.00	MADE GROUND/Gravelly SAND	Test No.1	1.78 E-05
SA103			Test No.2	1.42 E-05
SA104	1.90	MADE GROUND/Gravelly SAND	Test No.1	N/A

Three of the five tests did not record a sufficient fall in water level to allow a reliable calculation of the infiltration rate. Tests in SA103 showed the granular drift deposits to have good soakage potential.

However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365 – *Soakaway Design*.

3.12. pH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in Appendix VI (summarised in Table 3.8), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).

Elevated sulphate concentrations meeting Class DS-3, AC-2s and Class DS-2, AC-1s were noted within Made Ground deposits in TP105 at 0.90 m bgl and TP111 at 1.50 m bgl, respectively.

TABLE 3.8 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
TP114a	0.50	0.35	7.9	DS-1, AC-1s
TP105	0.90	1.8	7.5	DS-3, AC-2s
TP102	0.40	0.025	8.4	DS-1, AC-1s
TP106	1.00	0.089	5.8	DS-1, AC-1s
TP110	0.80	0.13	7.9	DS-1, AC-1s
WS101	0.40	0.31	7.5	DS-1, AC-1s
TP112/SA104	0.50	0.32	7.8	DS-1, AC-1s
TP115	1.50	0.084	7.9	DS-1, AC-1s
TP111	1.50	0.53	5.9	DS-2, AC-1s
TP109	1.00	0.01	7.0	DS-1, AC-1s
TP103a	0.25	0.11	8.1	DS-1, AC-1s
TP108	2.00	0.18	8.2	DS-1, AC-1s
TP113	1.50	0.051	8.2	DS-1, AC-1s



4. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

4.1. DEVIATING SAMPLES

Deviating samples were to be avoided during the ground investigation by using best practice sampling procedures including use of appropriate sampling containers and adhering to the laboratory holding times for each contaminant analysis undertaken. No results were noted to be deviating.

4.2. HUMAN HEALTH RISK ASSESSMENT

At Tier 1 stage, the long-term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published in LQM/CIEH S4UL (S4UL3267).

The results of this comparison have been summarised in Table 4.1.



TABLE 4.1 SUMMARY OF INORGANIC AND HYDROCARBON TOXICITY ASSESSMENT FOR A COMMERCIAL END USE

DETERMINAND	UNITS	GAC	N	MC	LOC. OF EX	PATHWAY	ASSESSMENT
Arsenic	mg/kg	640	20	20	N/A	1	No Further Action
Cadmium	mg/kg	190	20	1	N/A	1	No Further Action
Chromium (VI)	mg/kg	33	20	<4.0	N/A	1	No Further Action
Lead	mg/kg	2300	20	310	N/A	1	No Further Action
Mercury	mg/kg	58	20	0.7	N/A	4	No Further Action
Nickel	mg/kg	980	20	27	N/A	1	No Further Action
Selenium	mg/kg	12000	20	<1.0	N/A	1	No Further Action
Copper	mg/kg	68000	20	210	N/A	1	No Further Action
Zinc	mg/kg	730000	20	540	N/A	1	No Further Action
Cyanide - Total	mg/kg	791	20	<1.0	N/A	1	No Further Action
Phenols - Total.	mg/kg	440	14	<1.0	N/A	1	No Further Action
Asbestos	Fibres	NFD	14	Chrysotile & Amosite	TP103A 0.25m	3	Further Action
Naphthalene	mg/kg	190	20	0.52	N/A	4	No Further Action
Acenaphthylene	mg/kg	83000	20	0.3	N/A	2	No Further Action
Acenaphthene	mg/kg	84000	20	2.5	N/A	1	No Further Action
Fluorene	mg/kg	63000	20	3.7	N/A	1	No Further Action
Phenanthrene	mg/kg	22000	20	23	N/A	2	No Further Action
Anthracene	mg/kg	520000	20	9.3	N/A	2	No Further Action
Fluoranthene	mg/kg	23000	20	49	N/A	2	No Further Action
Pyrene	mg/kg	54000	20	42	N/A	2	No Further Action
Benzo(a)Anthracene	mg/kg	170	20	29	N/A	2	No Further Action
Chrysene	mg/kg	350	20	24	N/A	2	No Further Action
Benzo(b)Fluoranthene	mg/kg	44	20	21	N/A	2	No Further Action
Benzo(k)Fluoranthene	mg/kg	1200	20	13	N/A	2	No Further Action
Benzo(a)Pyrene	mg/kg	35	20	19	N/A	2	No Further Action
Indeno(123-cd)Pyrene	mg/kg	500	20	10	N/A	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	3.5	20	3.5	N/A	2	No Further Action
Benzo(ghi)Perylene	mg/kg	3900	20	9.9	N/A	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	3200	19	<1.0	N/A	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	7800	19	<0.1	N/A	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	2000	19	<0.1	N/A	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	16000	19	18	N/A	4	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	36000	19	22	N/A	4	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	28000	19	190	N/A	1	No Further Action
TPH C21-C35 (aromatic)*	mg/kg	28000	19	1200	N/A	1	No Further Action

Notes

PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration; Loc of Ex = location of exceedance; NFD = no fibres detected.

* The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 1 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

Referring to Table 4.1, the result of this direct comparison indicates that the data exceeds the screening criteria for a commercial end-use for the following contaminants:



Chrysotile and Amosite

Asbestos in the form of loose chrysotile and amosite fibres has been identified in the Made Ground in TP103a at 0.25m bgl. Asbestos Quantification analysis was undertaken which identified asbestos at <0.001 % volume/weight.

No significant concentrations of SVOCs or VOCs were identified in the soils submitted for chemical analysis.

In relation to these exceedances, the following can be determined:

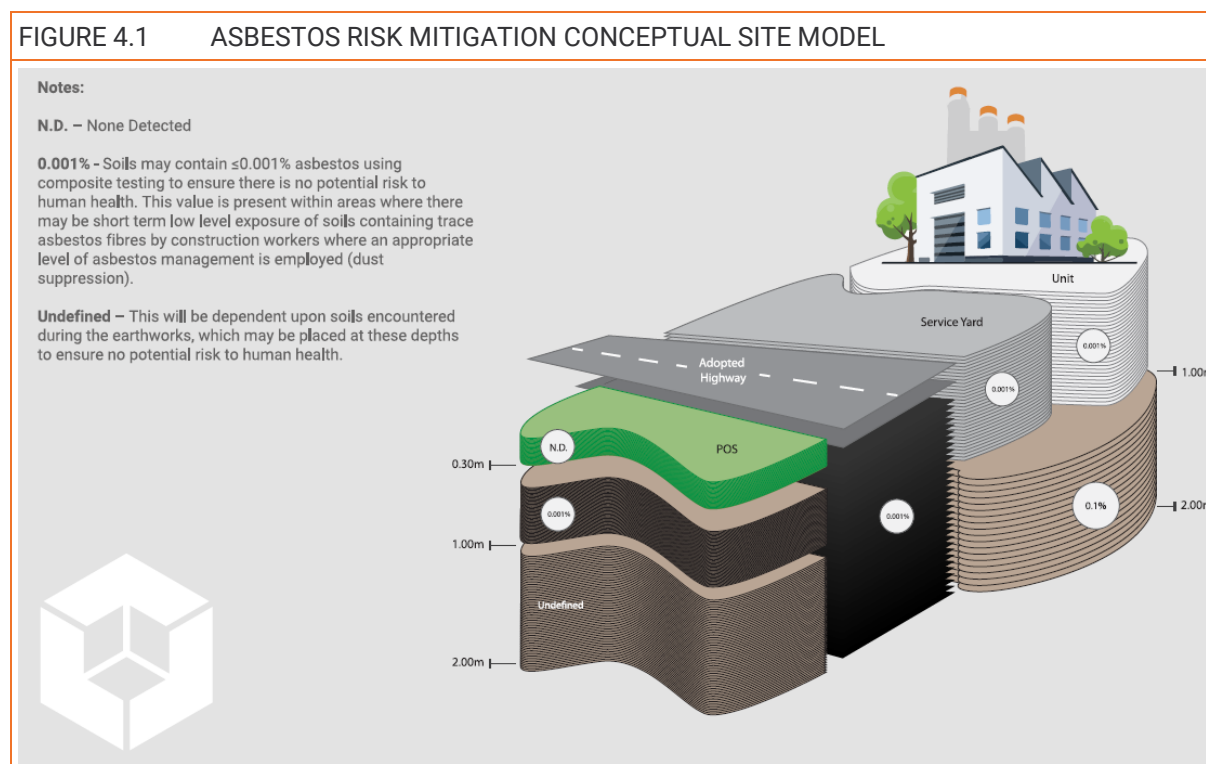
 The main exposure pathway based on the Tier I exceedances is:

- Fibre/dust inhalation.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

Asbestos in the form of chrysotile and amosite has also been identified in shallow Made Ground deposits. No visual signs of ACM were encountered during the ground investigation; it is therefore likely that only trace fibres are present. Impacted soils should be managed according to the asbestos risk mitigation conceptual site model shown in Figure 4.1.

FIGURE 4.1 ASBESTOS RISK MITIGATION CONCEPTUAL SITE MODEL



Notes

ND None Detect

0.001% Soils may contain $\leq 0.001\%$ asbestos using composite testing to ensure there is no potential risk to human health. This value is present within areas where there may be a short term low level exposure of soils containing trace asbestos fibres by construction workers where an appropriate level of asbestos management is employed (dust suppression)

0.1% Soils at a depth of >1.00m bgl may contain <0.1% asbestos using composite testing where they will not be likely to be disturbed in the future and will therefore be in an area of low sensitivity. Risk assessment completed in accordance with Asbestos JIWG risk assessment tools.

Undefined- this will be dependent upon soils encountered during earthworks, which may be placed at these depths to ensure no potential risk to human health.



Chemical analysis of the natural drift deposits has identified these soils to be acceptable for use as subsoil within the proposed landscaped areas; however, further chemical validation samples will be required to confirm this. There are no suitable sources of topsoil available on the site.

4.3. CONTROLLED WATERS RISK ASSESSMENT

E3P has undertaken a controlled waters risk assessment for the site based on the consideration of the conceptual site model and the sensitive receptors which are summarised in Table 4.2.

TABLE 4.2 CONTROLLED WATERS CONCEPTUAL MODEL AND SENSITIVITY PROFILE

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground Heavy metal and PAH contamination may be present as a result of the potential Made Ground infill material from historical features on-site and within the former building footprint.		Moderate
Off-Site Fuel Station The presence of a fuel station located 29 m to the north of the site, may result in spillages and leaching of heavy metal, TPH, SVOCs and PAHs into the underlying soils.		Moderate
Pathway		
Vertical Migration Due to the majority of the site being underlain by granular drift deposits, vertical migration of contaminants towards the secondary A superficial aquifer and Principal bedrock aquifer is likely to occur as a result of the high permeability of the drift deposits.		High
Lateral migration Lateral migration of contaminants is considered possible due to the presence of granular drift deposits across the site.		High
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary A aquifer	Moderate/High
Aquifer Classification in Bedrock	Principal aquifer	High
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected.	Low
Distance to the Closest Groundwater Abstraction Point	Two groundwater abstraction points are recorded within 1 km of the site; located 886 m north of the site for process water, boiler feed, drinking, cooking, sanitary and washing and 887 m southeast for potable water supply.	Moderate
Is the Site Located Within 50 m of a Surface Watercourse?	The risk of surface water is negligible given the absence of a viable receptor within the influencing distance of the site. The closest surface water receptor identified within 250m of the site is drainage associated with the Acornfield Plantation, 183 m east of the site.	Low



The ICSM developed within the context of the site setting has identified a viable pollutant pathway, which would be the downward migration of potentially mobile phase-soluble contaminants towards the underlying principal aquifer.

To ensure a robust appraisal of the identified risk to controlled waters, E3P has identified the sources of potential contamination that represent a risk to controlled waters from the initial CSM, we have then assessed the availability of ground investigation data in the form of analysis of the solid phase (soil) and dissolved phase within the perched groundwater or aquifer. The results of this assessment are presented in Table 4.3.

TABLE 4.3 QUALITATIVE RISK TO CONTROLLED WATERS FROM SOIL ANALYTICAL RESULTS

CONTAMINANT	ASSESSMENT RATING	DISCUSSION
BTEX > 1 mg/kg	The soil data analysis has not identified any detectable concentrations of VOCs above 1mg/kg or TPH C5 to C6 that might otherwise be indicative of VOC impact.	None
Total VOC > 1 mg/kg		
Total SVOC > 1 mg/kg	As above.	None
C5-C10 > 5 mg/kg	All concentrations are below the laboratory LOD.	None
C10-C12 > 10 mg/kg	Concentrations of C10-C12 have been recorded above 10 mg/kg in TP107 at 0.50 m bgl with a concentration of 18 mg/kg.	Further discussion
C12-C16 > 50 mg/kg	No concentrations of C12-C16 have been recorded above 50mg/kg.	None
Phenols > 2 mg/kg	All concentrations are below the laboratory LOD.	None
Naphthalene > 2 mg/kg	Concentrations of naphthalene above 2 mg/kg have not been recorded.	None
Total PAH > 10 mg/kg	Total concentrations of low-solubility PAH compounds greater than 10 mg/kg have been detected throughout the site, with a maximum concentration of 260 mg/kg recorded in TP103a at 0.25 m bgl.	Further discussion
PCB > 1 mg/kg	No potential sources of PCB have been identified	None
Heavy metals > 500 mg/kg	Concentrations of heavy metals above 500 mg/kg have been recorded.	None

The Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground to drinking water standards (DWS), due to the presence of a Principal bedrock aquifer underlying the site. No groundwater samples have been collected, as all wells were dry on return monitoring visits.

These are presented in Table 4.4.



TABLE 4.4 COMPARISON OF LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINAND	UNIT	EQS 1, 2, 3	DWS 3,4,5	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA					
Arsenic	µg/l	50	10	3	2.90	N/A	No Further Action
Cadmium	µg/l	0.08-0.25	5	3	0.13	N/A	No Further Action
Chromium (VI)	µg/l	3.4	–	3	<5.0	N/A	No Further Action
Chromium (III)	µg/l	4.7	50	3	3.8	N/A	No Further Action
Copper	µg/l	1	2000	3	11	N/A	No Further Action
Total Cyanide	µg/l	1	50	3	<1.0	N/A	No Further Action
Lead	µg/l	1.2	10	3	6.4	N/A	No Further Action
Mercury	µg/l	–	1.0	3	<0.5	N/A	No Further Action
Nickel	µg/l	4	20	3	15	N/A	No Further Action
Selenium	µg/l	–	10	3	<4.0	N/A	No Further Action
Zinc	µg/l	10.9	–	3	68 15 11	TP105 0.9 m TP111 1.5 m TP103e 0.9 m	Further Assessment
pH	6–9			3	6.4–7.7	N/A	No Further Action
Naphthalene	µg/l	2	10*	3	<0.01	N/A	No Further Action
Anthracene	µg/l	0.1	10*	3	<0.01	N/A	No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	3	<0.01	N/A	No Further Action
Benzo[k]fluoranthene	µg/l	0.00017*	10*	3	<0.01	N/A	No Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	3	<0.01	N/A	No Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	3	<0.01	N/A	No Further Action
Fluoranthene	µg/l	0.0063	10*	3	<0.01	N/A	No Further Action



DETERMINAND	UNIT	EQS 1, 2, 3	DWS 3,4,5	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA					
Benzo(ghi)perylene	µg/l	1.7–4	10*	3	<0.01	N/A	No Further Action
TPH C5-C6 (benzene)	µg/l	10	1	3	<1.0	N/A	No Further Action
TPH C6-C8 (toluene)	µg/l	74	700	3	<1.0	N/A	No Further Action
TPH C8-C10 (ethyl benzene)	µg/l	20	300	3	<1.0	N/A	No Further Action
TPH C10-C12 (xylene)	µg/l	30	500	3	<10	N/A	No Further Action
TPH C12-C16	µg/l	2	90 ⁵	3	<10	N/A	No Further Action
TPH C16-C35	µg/l	50#	90 ⁵	3	<10	N/A	No Further Action
TPH C5-C6	µg/l	–	15000	3	<1.0	N/A	No Further Action
TPH C6-C8	µg/l	–	15000	3	<1.0	N/A	No Further Action
TPH C8-C10	µg/l	–	300	3	<1.0	N/A	No Further Action
TPH C10-C12	µg/l	–	300	3	<10	N/A	No Further Action
TPH C12-C16	µg/l	–	300	3	<10	N/A	No Further Action
TPH C16-C21	µg/l	–	300**	3	<10	N/A	No Further Action
TPH C21-C35	µg/l	–	300**	3	<10	N/A	No Further Action

Notes

Solubility <0.01µg/l

AA – Annual Average

MAC- Maximum Admissible Concentration

* Polycyclic aromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water

** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.

1. The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)
3. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
4. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)



5. WHO Guidelines for Drinking Water Quality. Third edition (2004)



4.3.1. CONTROLLED WATER RISK ASSESSMENT

This comparison indicates that the data exceeds the EQS value for zinc. No DWS is available for zinc, therefore, to be conservative, the results have been compared to the EQS standard.

Where leachate analysis has been undertaken, this can overstate the risk and is not wholly representative of the site characterisation.

The site was formerly occupied by the 'Admin Building' associated with the former Royal Ordnance Factory (ROF) Kirkby, an ordnance filling factory.

The presence of a fuel station located 29 m to the north of the site may result in spillages and leaching of hydrocarbon compounds into the underlying soils. The presence of proposed hardstanding across the site will limit the vertical and lateral migration of contaminants, offering protection to the underlying soils. No hydrocarbon impact has been identified in the soil leachate analysis and no evidence of impact has been recorded in the exploratory hole locations in the north/west of the site.

The site is underlain by high permeability granular Made Ground, granular SAND and weathered SANDSTONE deposits which may facilitate the potential for mobile phase contaminants to migrate towards the Secondary A superficial and Principal bedrock aquifers. However, the proposed development will create hardstanding cover across the site, thus reducing the amount of infiltration generated. This will, in turn, reduce the generation of leachate and reduce the risk of downward and off-site migration. The closest groundwater abstraction point is located 886 m north, therefore the sensitivity of the underlying aquifers is reduced.

The results of the data review and Tier 1 qualitative risk assessment have allowed E3P to draw the following conclusions with respect to the risk to controlled waters:

- ✧ The primary receptor is the underlying Principal aquifer;
- ✧ The site is underlain by high permeability granular Made Ground, granular SAND and weathered SANDSTONE deposits;
- ✧ There are no groundwater abstractions within 500 m;
- ✧ Exceedances are only noted for zinc when compared to the EQS value;
- ✧ No impact has been identified associated with the nearby fuel station;
- ✧ There is considered to be a low risk to controlled waters.



4.4. GROUND GAS

Hazardous ground gas qualitative risk assessment is based on a conceptual site model (CSM) similar to that used for soil and groundwater contamination sources (i.e., source pathway receptor pollutant linkages).

The risk can be assessed based on knowledge of the ground conditions and CSM and a measure of hazardous gas concentrations and gas flow at the site within monitoring standpipes.

4.5. SOURCES AND PATHWAYS OF GROUND GAS (CSM)

In this instance, the CSM (15-354-R1, April 2022) identified the following potential sources of ground gas:

- ✿ Made Ground
- ✿ Infilled features within 250 m of the site boundary
- ✿ No landfills have been identified within 250 m of the site, and the site is not in an area affected by radon.

There is potential for localised ground gas migration in proximity of the identified sources.

The CIRIA C665 guidance on gas risk assessment includes recommendations for periods and frequencies for monitoring visits. These recommendations take into account the nature of the proposed development and the likely generation potential of the source.

The proposed development comprises commercial units and would be classified as a Type D development in accordance with BS8485:2015+A1:2019. It is considered that the likely generation potential of the identified gas sources (taking into account the likelihood of future increases in gas generation) would be best classified as low.

Therefore, within the context of the proposed commercial end-use and ground gas generation potential, the gas assessment requires four visits over one month, with at least two sets of readings at low or falling atmospheric pressure.

4.6. GROUND GAS RISK ASSESSMENT METHODOLOGY

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in:

- ✿ CIRIA Report 665 – Assessing risks posed by hazardous ground gases to buildings (2007)
- ✿ BS8485:2015+A1:2019 – Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

BS8485 provides guidance on the level of gas protection requirements based upon the characteristic situation (CS) and the proposed development based on building type.

Therefore, in accordance with BS8485, based on the measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) shall be derived for each monitoring point, from which the site characteristic hazardous gas flow rate (Q_{hgs}), and then the Characteristic Situation (CS) can be determined.

The following equation should be utilised:

$$Q_{hg} = q \left(\frac{C_{hg}}{100} \right)$$

Where:

q is the measured flow rate (in litres per hour) of combined gases from the monitoring standpipe
 C_{hg} is the measured hazardous gas concentration (in percentage volume/volume).

The subsequent derived gas screening value (GSV) should be the maximum Q_{hg} (flow rate x concentration as a percentage volume) for all the monitoring events.

A 'worst case check' may be carried out using the maximum recorded flow in any hole with the maximum concentration in any hole to present the plausible worst case conditions. Adoption of the worst case Q_{hg} requires thorough justification and reference to the CSM.

The final derived GSV can then be used to characterise the site as summarised in Table 4.5.

TABLE 4.5 SITE CHARACTERISATION BY GSV (BS8485:2015)

CS	HAZARD POTENTIAL	GSV (l/hr) FOR METHANE AND CARBON DIOXIDE	ADDITIONAL FACTORS
CS1	Very Low	< 0.07	Typically <1% methane concentration and <5% carbon dioxide concentration (otherwise consider an increase to CS2)
CS2	Low	< 0.70	Typical measured flow rate <70 l/h (otherwise consider an increase to CS3)
CS3	Moderate	< 3.5	N/A
CS4	Moderate to High	< 15	N/A
CS5	High	< 70	N/A
CS6	Very High	> 70	N/A

Notes

1. The CS is equivalent to the characteristic GSV in CIRIA C665.
2. The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter should be considered.
3. Gas Screening Value is the Borehole Gas Volume Flow Rate, in litres per hour, multiplied by the concentration in the air stream of the particular gas being considered.
4. The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

4.7. MONITORING METHODOLOGY

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured using a calibrated infrared gas analyser (GFM435) with gas flow rates measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 500 seconds at each location, at which point the maximum concentration of CH₄ and CO₂, together with the lowest concentration of O₂ were recorded.

The results of the ground gas monitoring are presented in Table 4.6.



In addition to the raw data, the results for each individual standpipe have been assessed with reference to guidance provided in BS8485:2015. Based on the initial peak measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) have been derived for each monitoring point, from which an individual Characteristic Situation (CS) can ultimately be determined.



TABLE 4.6 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	STRATA	DATE	CH ₄ PEAK (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ Q _{hg} (l/hr)	CO ₂ PEAK (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ Q _{hg} (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS102	Natural SAND Drift	06/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1019	Rising	0.1	0.1	0.70-1.00	1.00	Dry
		12/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1010	Steady	0.1	0.1		1.03	Dry
		19/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1008	Rising	0.1	0.1		1.03	Dry
		30/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1003	Falling	0.1	0.1		1.03	Dry
WS103	Natural SAND Drift	06/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1020	Rising	0.1	0.1	1.00-2.00	1.90	Dry
		12/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1010	Steady	0.1	0.1		1.99	Dry
		19/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1010	Rising	0.1	0.1		1.99	Dry
		30/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1010	Falling	0.1	0.1		1.99	Dry
WS105	MADE GROUND	06/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1020	Rising	0.1	0.1	0.20-0.50	0.50	Dry
		12/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1010	Steady	0.1	0.1		0.47	Dry
		19/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.8	1008	Rising	0.1	0.1		0.47	Dry
		30/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1005	Falling	0.1	0.1		0.47	Dry
WS108	MADE GROUND	06/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1019	Rising	0.1	0.1	0.50-1.00	0.90	Dry
		12/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1010	Steady	0.1	0.1		1.00	Dry
		19/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1008	Rising	0.1	0.1		1.00	Dry
		30/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1004	Falling	0.1	0.1		1.00	Dry
WS109	MADE GROUND	06/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1019	Rising	0.1	0.1	0.30-1.00	1.05	Dry
		12/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1010	Steady	0.1	0.1		1.05	Dry
		19/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1008	Rising	0.1	0.1		1.05	Dry
		30/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1004	Falling	0.1	0.1		1.05	Dry



WELL	STRATA	DATE	CH ₄ PEAK (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ Q _{hg} (l/hr)	CO ₂ PEAK (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ Q _{hg} (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS112	Natural SAND Drift	06/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1019	Rising	0.1	0.1	0.50-1.00	1.00	Dry
		12/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1010	Steady	0.1	0.1		1.00	Dry
		19/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1008	Rising	0.1	0.1		1.00	Dry
		30/05/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1004	Falling	0.1	0.1		1.00	Dry

Notes

CIRIA Characteristic Situation

Q_{hg}

CS1

<0.07

Typical Max CO₂ <5 % Typical Max CH₄ <1 %

Values in **BOLD** exceed CS1 Thresholds

CS2

<0.7

Flow rate not to exceed 70 l/hr otherwise consider increase to CS3

Values in **BLUE** denote water above level of response zone (flooded)

CS3

<3.5

CS4

<15

Quantitative Risk Assessment required to evaluate scope of protective measures



4.8. SUMMARY OF MONITORING RESULTS

4.8.1. GROUNDWATER

All wells were recorded as dry during the monitoring period.

4.8.2. BAROMETRIC PRESSURE

Visit 1 was undertaken during a period of relatively high/rising pressure, with pressure recorded to be 1020 mbar. Visit 4 was undertaken during a period of falling pressure, with the pressure recorded to be 1003 mbar.

4.8.3. GAS FLOW

Throughout the monitoring period, flow rates were recorded to be 0.1 l/hr (limit of detection of the analyser).

4.8.4. GAS CONCENTRATIONS

The maximum methane value recorded within the monitoring wells was 0.1% v/v (limit of detection of the analyser).

The maximum carbon dioxide value recorded within the monitoring wells was 0.1% v/v (limit of detection of the analyser).

4.9. CONCLUSION

The determined Characteristic Situation for each standpipe for each visit is presented in Table 4.7. This indicates that based on the peak flow rates the majority of the monitoring visits classify as Characteristic Situation (CS)1 – Very Low Gas Risk.



TABLE 4.7 GAS RISK PROFILE AND LOCATION

WELL	DATE	DEPTH TO WATER (m bgl)	MAX FLOW (l/hr)	MAX CH ₄ (%V/V)	MAX CH ₄ Q _{hg} (l/hr)	MAX CO ₂ (%V/V)	MAX CO ₂ Q _{hg} (l/hr)	CHARACTERISTIC SITUATION
WS102	06/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	12/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	19/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS103	06/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	12/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	19/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS105	06/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	12/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	19/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS108	06/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	12/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	19/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS109	06/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	12/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	19/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS112	06/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	12/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	19/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/05/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1

E3P has assessed the previous variables and come to the following conclusions:

-  The site is predominantly Made Ground overlying SAND and weathered SANDSTONE bedrock. The absence of ground gas within the shallow deposits suggests that there is no on-site or off-site source of ground gas affecting the subject site.
-  With due consideration to the Conceptual Site Model and the absence of any persistent gas source and gas generation potential, it is considered by E3P that the site can be classified as CS1, and therefore no gas protection measures are required.



4.10. POTABLE WATER SUPPLY

This section provides a summary of the site investigation data with reference to the selection of potable water supply pipework. The assessment is made with reference to the UK Water Industry Research (UKWIR) publication "Guidance on the selection of Water Supply Pipes to be used in Brownfield Sites"

TABLE 4.8 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold (mg/kg)	Concentrations at <u>Current</u> pipeline depth (mg/kg)
Total VOC	0.5	<0.001
Total BTEX And MTBE	0.1	<0.001
Total SVOCs (Excluding PAH and those substances marked with an *)	2	<0.3
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	<1.2
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	<24 (WS106 0.80m) <22 (TP105 0.90m)
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	1329 (TP105 0.90m) 1590 (WS106 0.80m)
Phenols (From SVOC Analysis)*	2	<0.2
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	<0.3
Ethers*	0.5	NA
Nitrobenzene*	0.5	NA
Ketones*	0.5	NA
Aldehydes*	0.5	NA
Amines	Fail	NA
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	Yes; ✱ EC10-EC16- Aliphatic and Aromatic Hydrocarbons: ○ 33 mg/kg (TP107 0.50m) and 27.6 mg/kg (TP103a 0.25m) ✱ EC16-EC40- Aliphatic and Aromatic Hydrocarbons: ○ 804 mg/kg (TP102 0.40m) and 940 mg/kg (TP103 0.25m)	
Is free product present in soil and groundwater?	None	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	No – heavy end hydrocarbon impact and low solubility PAH has been identified within Made Ground. No significant shallow groundwater body has been identified.	



Will soils impacted with above determinands likely be utilised elsewhere on site?	N/A
Will soils be imported to site as part of any future earth works	Currently unknown, however it is unlikely soils will be required to be imported to site.

Notes - Pipe line depth normally between 0.75m–1.35m

Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development.



4.11. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 4.9 has been prepared for the site.

TABLE 4.9 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Heavy Metals, non-volatile PAH (Made Ground)	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Low Likelihood	Low	LOW
Assessment: No exceedances of screening criteria for a commercial end-use recorded for heavy metals or non-volatile PAH within soil samples.						
Recommendation: Cover system to landscaped areas will promote healthy plant growth. Construction works completed with PPE and provision of welfare to mitigate against previously unidentified contamination.						
PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Buildings. Off-site land users.	Likely	High	LOW
Assessment: Asbestos in the form of loose chrysotile and amosite fibres has been identified in the Made Ground in TP103a at 0.25 m bgl. Asbestos Quantification analysis was undertaken which identified asbestos at <0.001 % volume/weight.						
Recommendation: The site will be covered in hardstanding or buildings which will mitigate the risk to end users. A cover system to landscaped areas will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL4	Volatile contaminants such as hydrocarbons, (Made Ground, fuel station to the north)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Low Likelihood	Low	LOW
Assessment: No elevated concentrations in comparison to commercial end-use screening criteria recorded of volatile contaminants have been identified.						
Recommendation: No further action.						
PL4	Methane, carbon dioxide (Made Ground, potentially infilled features on and within 250 m of the site)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Low likelihood	Low	LOW
Assessment: Made Ground has been identified as a potential source of hazardous ground gas.						
Recommendation: Monitoring suggests that the site can be classified as CS1 and no ground gas protection measures are required.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL5	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (Made Ground, off-site fuel station)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (Principal bedrock aquifer).	Low likelihood	Low	LOW
Assessment: The initial conceptual site model identified the underlying Principal aquifer as the critical receptor; therefore leachate samples obtained from the site were assessed against Drinking Water Standards (DWS). No complete pollutant linkage was identified and thus no unacceptable level of risk to controlled water receptors has been determined. Recommendation: No further action is required.						
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Moderate	LOW
Assessment: The soils at the site generally meet class DS-1, AC-1s. however, localised areas of DS-3-AC-2s (TP105 at 0.90 m) and DS-2 AC-1s (TP111 at 1.50 m) have been identified. Recommendation: Concrete should be designed in accordance with the chemical testing results.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL7	Organic contaminants such as hydrocarbons (Made Ground)	Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Moderate	LOW
Assessment: Elevated concentrations of TPH have been identified at the proposed pipeline depth (0.75 m – 1.35 m). Recommendation: Based on the assessment of current site conditions, it is likely that barrier pipe will be required. This will need to be confirmed with a UKWIR risk assessment post remediation.						
PL8	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Likely	Low/Moderate	LOW
Assessment: Made Ground has been encountered across the site which may contain phytotoxic contaminants. Recommendation: Installation of a clean cover system within any areas of soft landscaping to prevent plant uptake of contaminants.						

Main exposure pathways:

PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants;



5. GEOTECHNICAL ASSESSMENT

5.1. PROPOSED DEVELOPMENT

Redsun Projects Ltd intends to construct a commercial development comprising a 50,000 sqft commercial unit with associated loading areas and car parking. Drawing 15-354-002 (Appendix III) identifies the proposed development layout.

5.2. SITE PREPARATION

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the *Manual of Contract Documents for Highway Works (MCHW)*. This should include the following:

-  Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
-  Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill.
-  Buried structures and old foundations have been encountered on site. These should be excavated from below the proposed development footprint with the resulting void backfilled.

5.3. FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has assessed the net safe allowable bearing pressure (ABP) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum. The results of this assessment are summarised in Table 5.1.

TABLE 5.1 SUMMARY OF ABP

GRANULAR SOILS			
Description	Depth (Range m bgl)	Relative Density	Allowable Bearing Pressure (kN/m ²)
SAND/Gravelly SAND	1.00–2.00	Dense	373–475
SAND (WS103, WS111)	1.00	Medium Dense	212–272
Gravelly SAND	1.00	Very Dense	504

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying medium dense to very dense sands or weathered sandstone bedrock at circa 1.00 m bgl.



However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove the extensive buried obstructions and cut/fill the site to provide suitable development platform levels.

It would be feasible to provide a pad foundation solution for the proposed commercial unit, founding into the medium dense to very dense sands or weathered sandstone bedrock, where an ABP of between 272–504 kN/m² can be achieved at circa 1.00–2.00 m bgl.

Should deep Made Ground be encountered on site beyond 2.50 m bgl, consideration may also be given to re-engineer the Made Ground using Vibro Stone Columns (VSC) to support a pad foundation. The use of Vibro will be limited subject to proposed finished floor levels, given the shallow nature of the solid geology.

Shallow bedrock has been encountered across the site which may impede excavation for drainage infrastructure using traditional excavation plant and equipment. Specialist equipment may be required.

Consideration must also be given to the varying soil matrices and differing settlement characteristics and where a foundation spans two varying matrices the sub-structure should be designed accordingly.

It is recommended that, at working drawing stage, a foundation design is prepared for the development, taking account of the depth to bedrock and the current location of deep Made Ground.

E3P has prepared a ground improvement design risk matrix, summarised in Table 5.2, to ensure that the ground conditions have been proven by the intrusive site investigation are satisfactory to facilitate the appropriate stabilisation in the event that site levels are increased significantly or if deep Made Ground or loose granular deposits are encountered to depths beyond 2.50 m bgl.

TABLE 5.2 GROUND IMPROVEMENT DESIGN RISK MATRIX

RISK ITEM	COMMENT	PASS/FAIL
Soft clays with an undrained shear strength less than 30 kN/m ²	None identified.	PASS
Ground with peat layers close to foundation level or the base of the stone column, or where intermediate layers of peat are thicker than 200 mm, either as a single layer or the sum of the thicknesses of individual layers throughout the length of the stone column	None identified.	PASS
Voided filled ground, e.g. old water tanks, pottery, glass bottles, concrete rubble or brick fill of unsuitable grading	The ground investigation and site inspection has identified a number of areas of below ground structures. These areas will require excavation and backfilling with suitable material.	PASS – on completion of enabling works
Loose or non-engineered fill not previously subject to rising or fluctuating water levels saturation	None identified.	PASS



RISK ITEM	COMMENT	PASS/FAIL
Filled ground still settling or expected to settle under its own weight or due to the effects of surcharging/upfilling where there is a high organic content or where decay is continuing	None identified.	PASS
Fill, containing degradable material where organic material forms more than 15% of fill by volume	None identified.	PASS
Clays with a plasticity index greater than 40%	None identified.	PASS
Highly sensitive soils liable to collapse or remoulding	None identified.	PASS
Cohesive soils with trees in influencing distance	None identified.	PASS
Overall Risk Rating and Suitability for Vibratory Ground Improvement		PASS

A summary of anticipated foundations is presented in Table 5.3.

TABLE 5.3 ANTICIPATED FOUNDATIONS

LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	FOUNDATION TYPE	TYPE OF CONCRETE
WS101	1.15	N/A	Sand/Weathered Bedrock	Y	Pad	DS-1 AC-1s
WS102	1.20	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
WS103	1.35	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
WS104	1.15	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
WS105	1.15	N/A	Sand/Weathered Bedrock	Y	Pad	DS-1 AC-1s
WS106	1.85	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
WS107	1.35	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
WS108	1.35	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
WS109	-	N/A	Depth of Made Ground unproven	N	Pad	DS-1 AC-1s
WS110	1.55	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s



LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	FOUNDATION TYPE	TYPE OF CONCRETE
WS111	1.55	N/A	Sand	N	Pad	DS-1 AC-1s
WS112	0.85	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
TP101/SA101	0.95	N/A	Sand/Weathered Bedrock	Y	Pad	DS-1 AC-1s
TP102	1.05	N/A	Sand	N	Pad	DS-1 AC-1s
TP103a– TP103e	–	N/A	Depth of Made Ground unproven	N	Pad	DS-1 AC-1s
TP104/SA102	1.45	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
TP105	1.75	1.80	Sand/Weathered Bedrock	N	Pad	DS-3, AC-2s
TP106	1.05	N/A	Sand	N	Pad	DS-1 AC-1s
TP107	1.05	2.00	Sand	N	Pad	DS-1 AC-1s
TP108	1.65	2.20	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
TP109	1.85	2.20	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
TP110	1.55	2.60	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
TP111	2.25	2.40	Sand/Weathered Bedrock	N	Pad	DS-2, AC-1s
TP112/SA104	1.35	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
TP113	1.75	2.50	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
TP114a	–	N/A	Depth of Made Ground unproven (Concrete slab encountered)	N	Pad	DS-1 AC-1s
TP114b	1.25	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s
TP115	1.55	N/A	Sand/Weathered Bedrock	N	Pad	DS-1 AC-1s



5.4. GROUND FLOOR SLABS

Following enabling works, the site will likely have a variable thickness of Made Ground, that may extend to significant depth in places. Given the structures that are proposed, it is considered that ground-bearing floor slabs will require settlement analysis and detailed design in order to accommodate variability of the formation and account for differential settlement.

Given the depth of Made Ground and its loose/variable nature, it will be necessary to undertake some form of Ground Improvement work to ensure the total and differential settlement is within tolerable limits for the Uniformly Distributed Load of the floor slab and any external reinforced concrete yards / hardstanding.

A traditional solution which comprises the excavation of the upper stratum of Made Ground prior to re-engineering and compaction as a structural upfill may be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation.

Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, clay (if encountered) will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer.

Where it is necessary to undertake cut-and-fill works utilising site-derived cohesive soils (if encountered), careful consideration must be given to seasonal climatic conditions, which will have a significant impact on moisture conditions and the ability to compact clay soils in the wetter winter months. It may be necessary to undertake an element of stabilisation works through the addition of lime to ensure the soils can be engineered to the required performance standards.

It would be possible to utilise soil stabilisation techniques that incorporate the addition of lime and OPC to construct a stiffened soil horizon with a CBR > 15% to constitute a sub-base replacement layer that could then be capped with Type 1 MOT. The use of soil stabilisation could be extended within the conjectured zone of tree influence to modify the structure of clay soils and negate the potential for volumetric instability.

5.5. HEAVE PRECAUTIONS

Due to the absence of cohesive deposits in the near surface, and the site proven to be underlain by granular soils, heave precautions will not be required within the construction of proposed structures.

5.6. HIGHWAYS CONSTRUCTION

A programme of remediation and enabling works will be required to remediate the proposed road subgrade in accordance with the requirements of the Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works (Series 600-Earthworks) for a method compaction.

It is considered that the material can be re-engineered using method compaction to achieve a CBR in excess of 5% if works are completed in favourable climatic conditions.



5.7. DRAINAGE

The presence of substantial depths of Made Ground across some areas of the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement.

Three of the five soakaway tests did not record a sufficient fall in water level to allow reliable calculation of the infiltration rate. Tests in SA103 showed the granular drift deposits to have good soakage potential.

However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365 – Soakaway Design.

5.8. CONCRETE DURABILITY

Based upon the results of the chemical analyses it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE *Special Digest 1* (2005).

Elevated sulphate concentrations meeting Class DS-3, AC-2s and Class DS-2, AC-1s were noted within Made Ground deposits in TP105 at 0.90 m bgl and TP111 at 1.50 m bgl, respectively. However, upon completion of site enabling works they will, likely, be DS-1 AC1-s.

5.9. EXCAVATIONS

Trial pits were generally stable in both granular Made Ground and natural strata; as such, it is considered that near-surface excavations will be feasible.

Site observations indicated that excavations should be feasible in the near-surface with normal plant; however, obstructions were identified in the near-surface, including former foundations and former floor slabs. It is anticipated that any obstructions will be grubbed out during the reduced-level dig for the substructure works.

However, due to the depth and variability of the Made Ground and the likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97.

If local pumping of groundwater is required during the advancement of excavations for the proposed foundations, then consideration should be given to the potential for dewatering gravels in the surrounding areas that may cause structural damage to building substructures in close proximity to the site.



TABLE 5.4 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sand has been identified.
Minor Water Ingress	Yes	Minor water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure. Ingress of water into foundation excavation will potentially flood foundation excavations, limiting the viability of spread foundations to be constructed.
Shallow Bedrock	Yes	Shallow bedrock has been identified across the site. The presence of bedrock may impede excavation for drainage infrastructure using traditional excavation plant and equipment.

5.10. CONSTRUCTION ACTIVITY AND INSPECTION

The following activities and inspections should be incorporated into the site works:

- ✳ Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and sub-formations to foundations and pavement construction.
- ✳ Excavations, where access is required, should be subject to a risk assessment from a competent person and, where appropriate, mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 should be utilised.
- ✳ It is considered that dewatering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to the provision of space for settling tanks or an attenuation pond.
- ✳ Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
- ✳ The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risks, reduce their impact and, finally, to include the use of personnel protective equipment (PPE).



5.11. GEOTECHNICAL RISK REGISTER

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils	North	TBC	Asbestos in the form of loose chrysotile and amosite fibres has been identified in the Made Ground in TP103a at 0.25 m bgl. The site will be covered in hardstanding or buildings which will mitigate the risk to end users. No further exceedances of screening values in comparison to a commercial end-use identified on-site within soil analysis.
Bedrock	On site	100	Shallow bedrock is identified, this represents a significant risk in terms of the viability for excavations to install infrastructure using standard construction equipment.
Obstructions	All	100	Site has been subject to significant historical development and, while above-ground structures have been removed, potential subsurface obstruction from relict foundations and slabs remain.
Retaining walls	N/A	N/A	No retaining features identified.
Trench collapse	All	100	Made Ground present beneath the site is likely to be loosely compacted and possibly prone to collapse.
Mature trees	Periphery	TBC	Arboriculture survey required to determine areas of potential tree influence, should cohesive strata be identified.
Volume change potential clay	N/A	N/A	No clay deposits have been identified on site. Due to the absence of cohesive deposits in the near surface, and the site proven to be underlain by mainly granular soils, heave precautions will not be required within the construction of proposed buildings.
Running sands	N/A	N/A	Data searches indicate low risk.
Ground dissolution	N/A	N/A	Data searches indicate no hazard.



POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Concrete design	Site-Wide	100	Elevated sulphate concentrations meeting Class DS-3, AC-2s and Class DS-2, AC-1s were noted within Made Ground deposits in TP105 at 0.90 m bgl and TP111 at 1.50m bgl, respectively. However, upon completion of site enabling works they will, likely, be DS-1 AC-1s.
Low-permeability ground	N/A	N/A	Tests in SA103 show the granular drift deposits to have good soakage potential. Three of the five tests did not record a sufficient fall in water level to allow a reliable calculation of the infiltration rate.
Services/sensitive structures	Site boundaries, north and south	30	A number of services are present on-site and at the site boundaries. Piling may not be possible within proximity to any sensitive infrastructure.
Abnormal foundation solutions	Site Wide	TBC	Dependent on proposed levels, consideration may also be given to re-engineer the Made Ground using Vibro Stone Columns (VSC) to support a pad foundation.



5.12. FURTHER WORKS

Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:

-  Arboricultural survey, should cohesive strata be identified.
-  Geotechnical earthworks strategy (infrastructure).
-  Remediation and enabling works strategy.



6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONTAMINATED LAND ASSESSMENT

Human Health	Asbestos in the form of loose chrysotile and amosite fibres has been identified in the Made Ground in TP103a at 0.25m bgl, which could be released during earthworks and then subsequently inhaled by construction workers and possibly third-party property. The site is to be covered in hardstanding or buildings which will mitigate the risk to future end-users. Materials should be placed in accordance with the E3P Asbestos Conceptual Site Model. Areas of landscaping should be installed with a 300 mm cover system. Upon placement of asbestos impacted soils at depth beneath hardstanding or a 300 mm cover system in areas of landscaping, they will present no unacceptable risk to the future site users.
Controlled Waters	The initial conceptual site model identified the underlying Principal aquifer as the critical receptor; therefore leachate samples obtained from the site were assessed against Drinking Water Standards (DWS). No complete pollutant linkage was identified and thus no unacceptable level of risk to controlled water receptors has been determined.
Ground Gas	Characteristic Situation 1.
Potable Water	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.

6.2. GEOTECHNICAL ASSESSMENT

Significant concrete and brick obstructions have been encountered within the Made Ground, indicative of relic foundations from the former building.

During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying medium dense to very dense sands or weathered sandstone bedrock at circa 1.00 m bgl.

However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove the extensive buried obstructions and cut/fill the site to provide suitable development platform levels.

It would be feasible to provide a pad foundation solution for the proposed commercial unit, founding into the medium dense to very dense sands or weathered sandstone bedrock, where an ABP of between 212–504 kN/m² can be achieved at circa 1.00–2.00 m bgl.



Should deep Made Ground be encountered on site beyond 2.50 m bgl, consideration may also be given to re-engineer the Made Ground using Vibro Stone Columns (VSC) to support a pad foundation. The use of Vibro will be limited subject to proposed finished floor levels, given the shallow nature of the solid geology.

Shallow bedrock has been encountered across the site which may impede excavation for drainage infrastructure using traditional excavation plant and equipment. Specialist equipment may be required.

Consideration must also be given to the varying soil matrices and differing settlement characteristics and where a foundation spans two varying matrices the sub-structure should be designed accordingly.

It is recommended that, at working drawing stage, a foundation design is prepared for the development, taking account of the depth to bedrock and the current location of deep Made Ground.

END OF REPORT



APPENDIX I LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



APPENDIX II

GLOSSARY

TERMS

ACM	Asbestos-containing material	MMP	Materials management plan
ADS	Acoustic design statement	ND	Not detected
AST	Above-ground storage tank	NDP	Nuclear density probe
BGS	British Geological Survey	NMP	Noise management plan
BSI	British Standards Institute	NPSE	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	NR	Not recorded
CA	Coal Authority	PAH	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	PCB	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	PI	Plasticity index
CIRIA	Construction Industry Research Association	PID	Photo ionisation detector
CLEA	Contaminated land exposure assessment	POS	Public open space
CML	Council of Mortgage Lenders	PPE	Personnel protective equipment
CoC	Contaminants of concern	ProPG	Professional practice guidance
CSM	Conceptual site model	QA	Quality assurance
DNAPL	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	SGV	Soil guideline value
DWS	Drinking water standard	SPH	Separate-phase hydrocarbon
EA	Environment Agency	SPT	Standard penetration test
EQS	Environmental quality standard	SVOC	Semi-volatile organic compound
FFL	Finished floor level	TPH	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	UKWIR	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	UST	Underground storage tank
HCV	Health criteria value	VCC	Vibro-concrete column
ICSM	Initial conceptual site model	VOC	Volatile organic compound
LEL	Lower explosive limit	VRSC	Vibro-replacement stone columns
LMRL	Lower method reporting limit	VSC	Vibro-stone columns
LNAPL	Light non-aqueous phase liquid (petrol, diesel, kerosene)	WHO	World Health Organisation
MCV	Moisture condition value	WRAP	Waste and Resources Action Programme



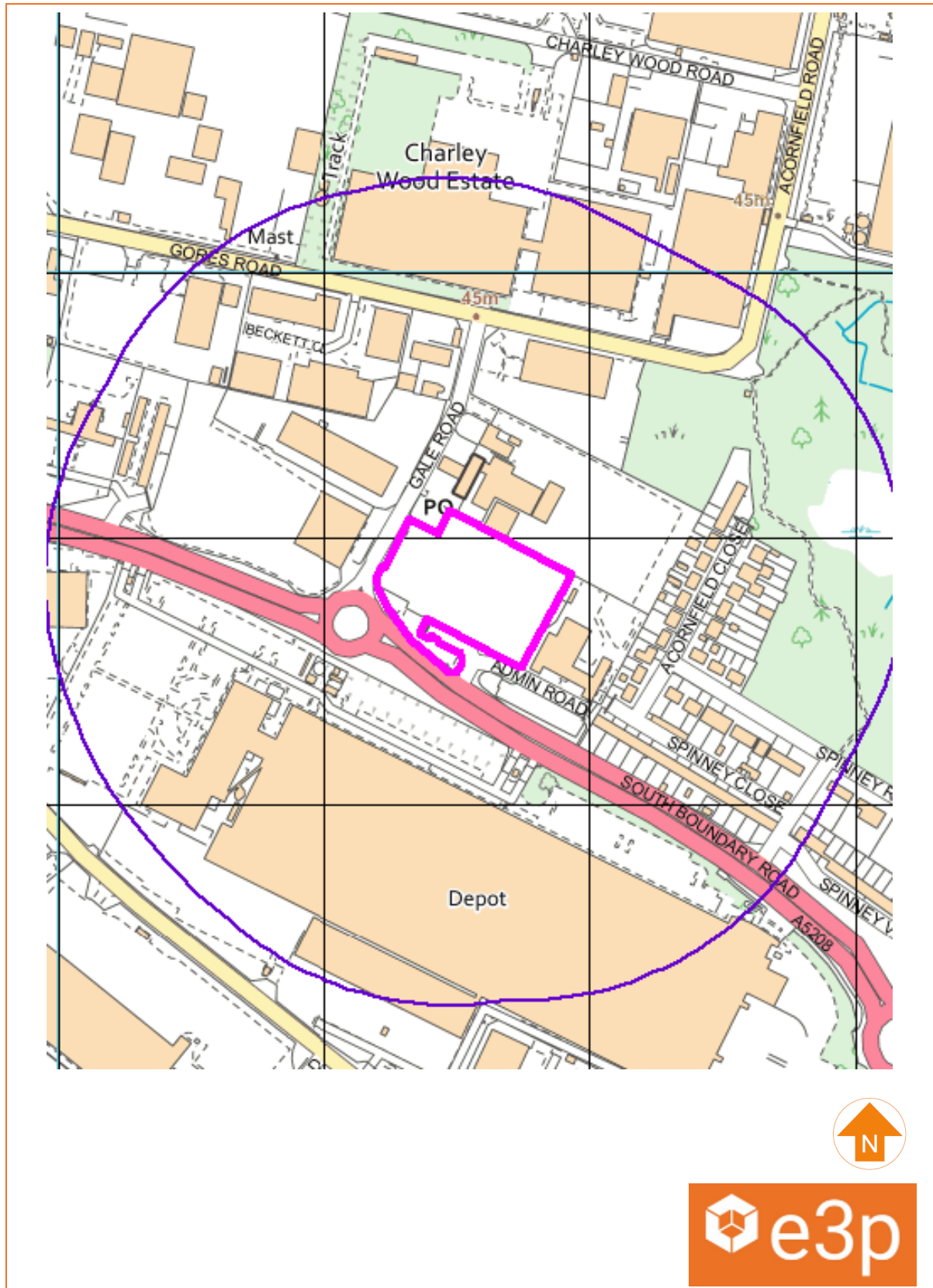
MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons per metre squared
ppb	Parts per billion	µm	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	SSRT	Site Specific Remediation Target
PSD	Particle Size Distribution	DD	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	Mc	Moisture Content
ρ	Bulk Density	GPR	Ground Penetrating Radar
NDP	Nuclear Density Probe	FFL	Finished Floor Level
LEL	Lower Explosive Limit	UKWIR	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	LOD	Limit of Detection

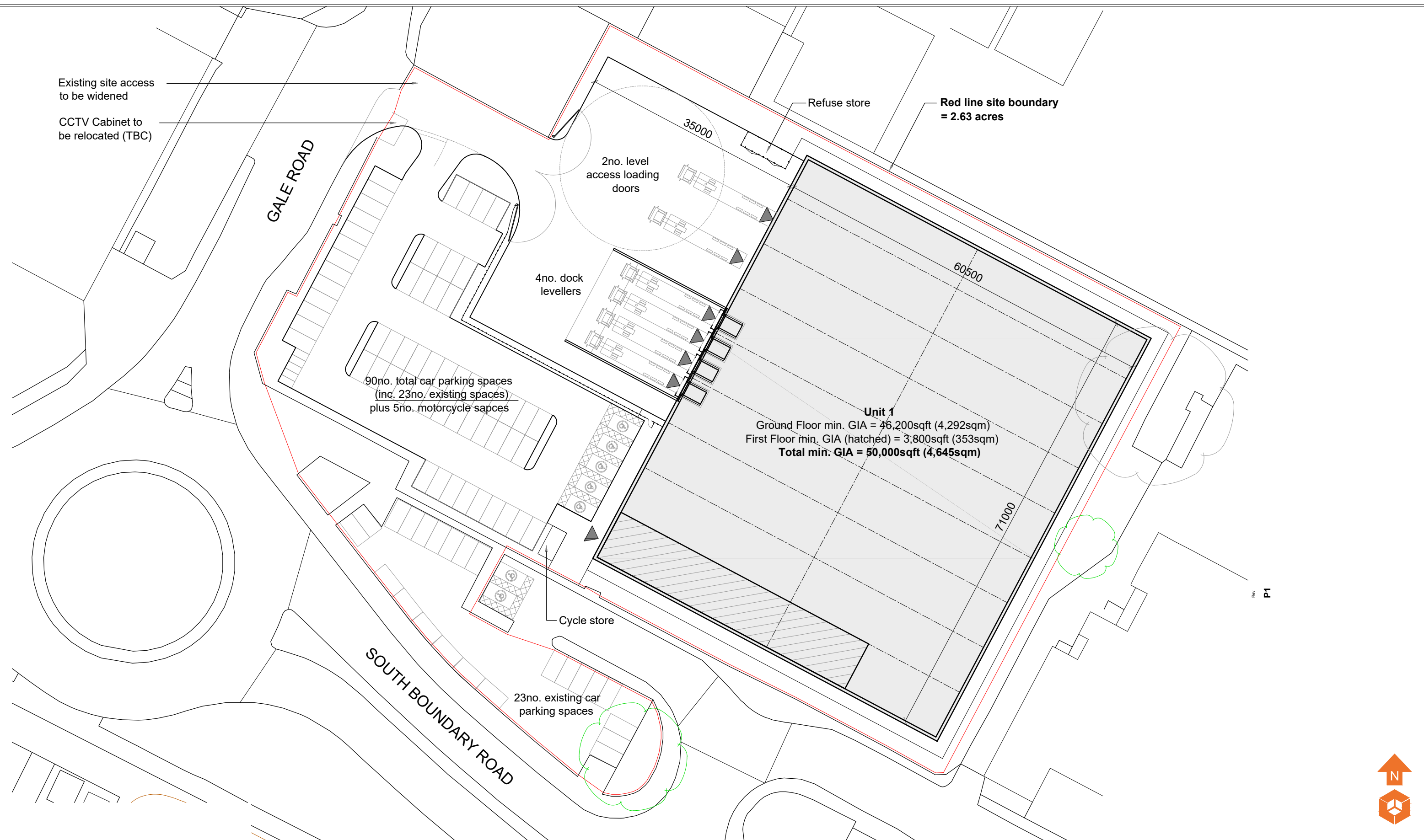


APPENDIX III

DRAWINGS

DRAWING 15-354-001 – SITE LOCATION PLAN





Notes:				
P1	REVA	01.06.2022	EB	NS
Phase	Issue	Date	Drawn	Checked

Client:	Redsun
Job Title:	East Hub, Knowsley

Job No:	15-354
Drawing No:	002

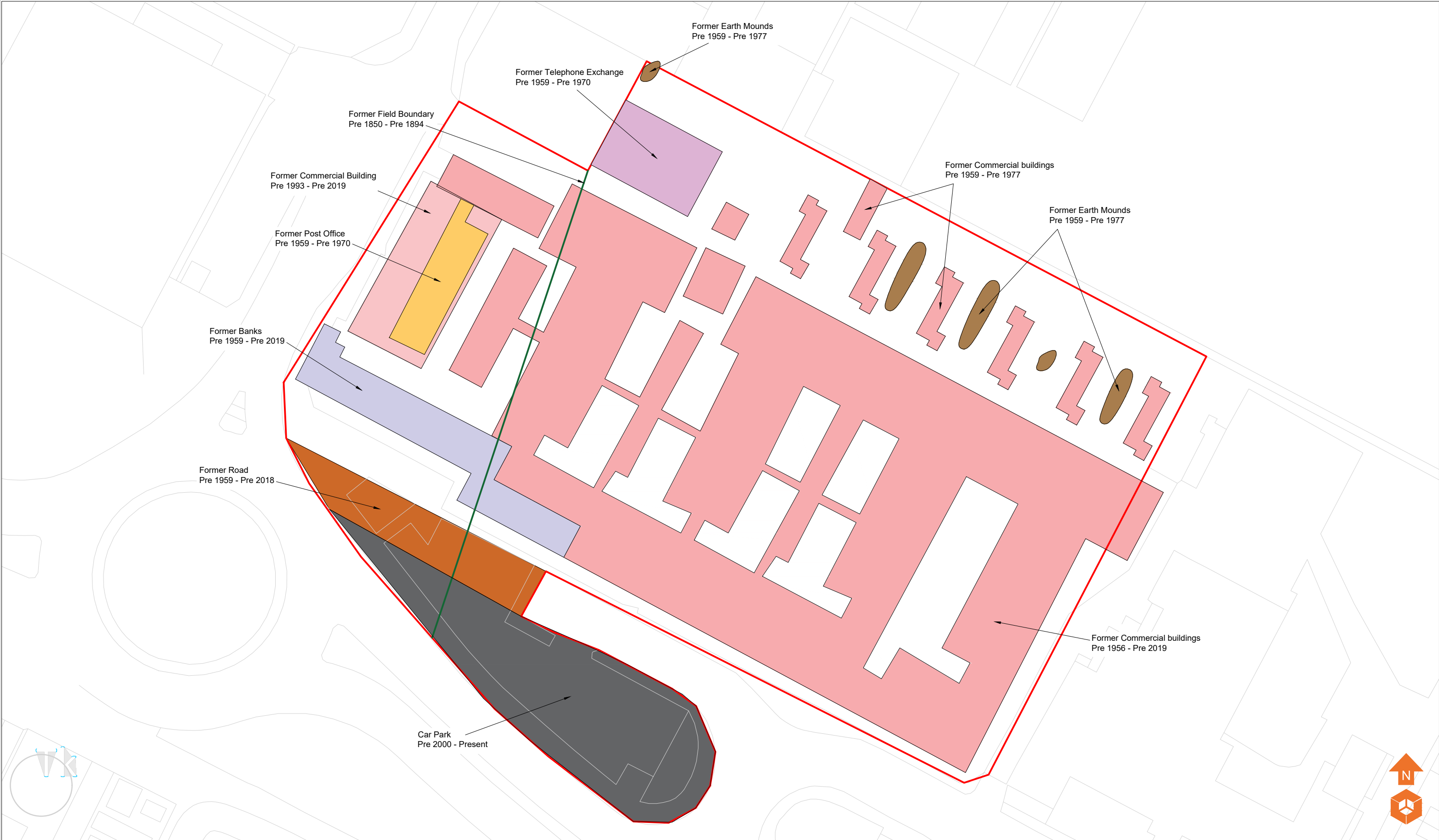
Date:	01.06.2022
Scale:	NTS@ A3



Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

Drawing Title:	Proposed Development Plan
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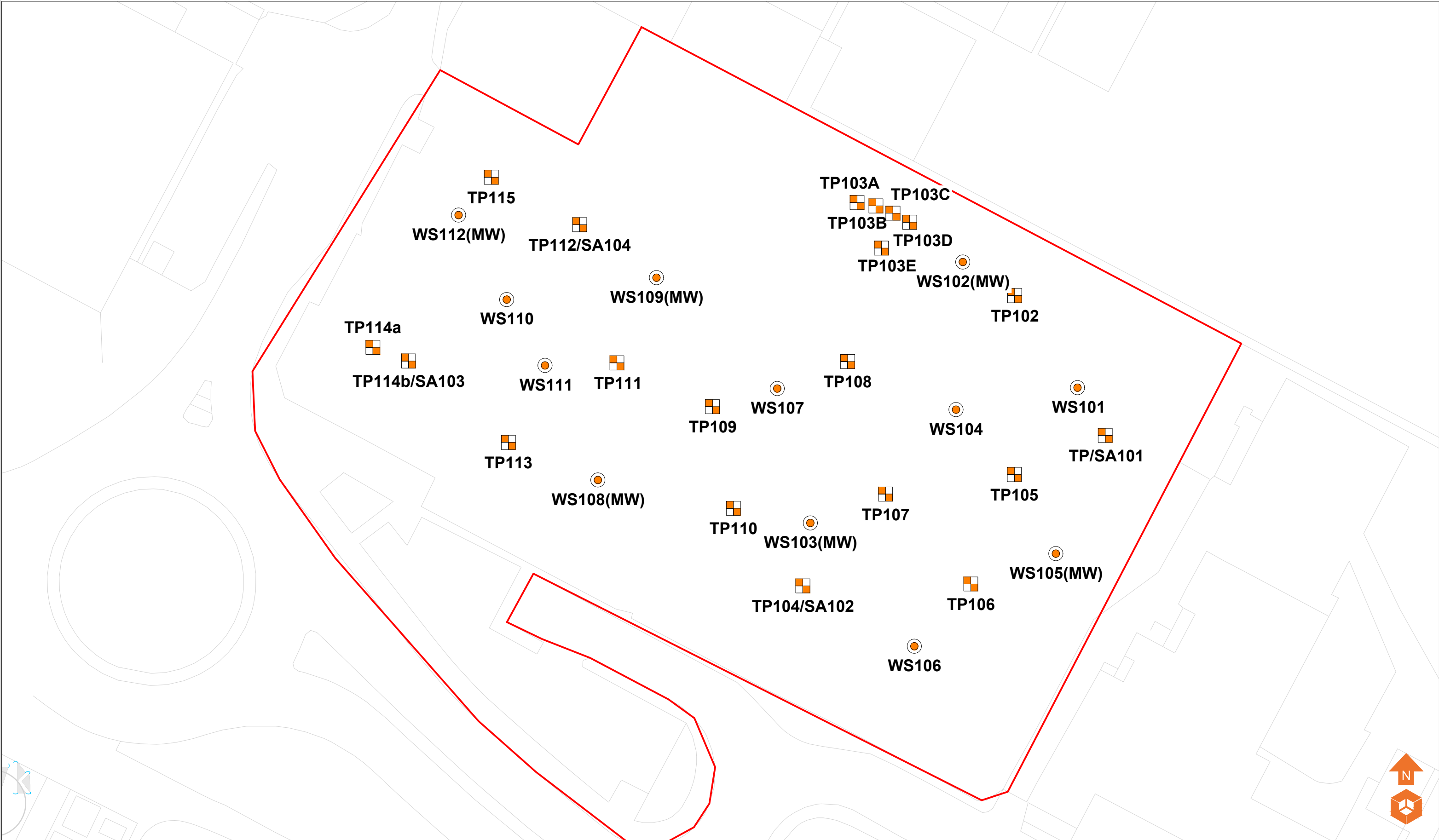
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Historical Features Former Telephone Exchange Former Commercial Buildings Former Post Office Former Banks Former Road Car Park Former Earth Mounds Former Field Boundary

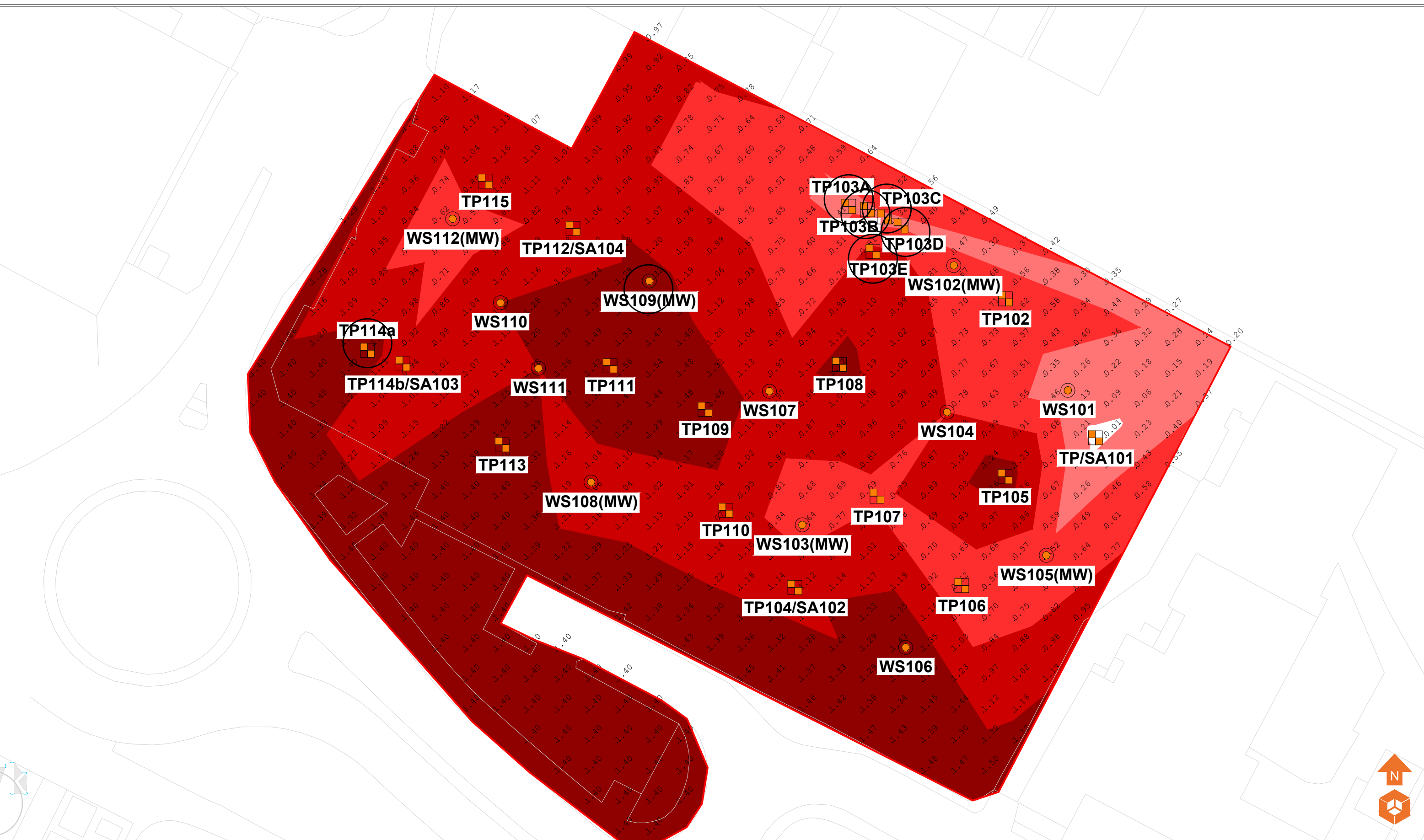


Site Features - Soft Standing - Active Car Park - Hardstanding - Electricity Box - Camera - Rubbish - Access - Fuel Station					Notes:					Client: Redsun		Job No: 15-354	Date: 04.07.2022	 Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk	
										Job Title: East Hub, Knowsley		Drawing No: 004	Scale: NTS@ A3		
P1	REVC	04.07.2022	CB	NS								Site Features Plan		The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.	
P1	REVB	06.06.2022	EB	NS											
P1	REVA	01.06.2022	EB	BH											
Phase	Issue	Date	Drawn	Checked											



Location Symbols  WS Approximate Window Sample Probehole Location  TP Approximate Trial Pit Location  SA Approximate Soakaway Test Location  WS (with install) Approximate Window Sample Probehole Location with Install					Notes:					Client: Redsun		Job No: 15-354		Date: 01.06.2022		 Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk																											
<table><tr><td>P1</td><td>REVD</td><td>01.06.2022</td><td>EB</td><td>NS</td></tr><tr><td>P1</td><td>REVC</td><td>25.04.2022</td><td>EB</td><td>EC</td></tr><tr><td>P1</td><td>REVB</td><td>22.04.2022</td><td>EB</td><td>BH</td></tr><tr><td>P1</td><td>REVA</td><td>12.04.2022</td><td>EB</td><td>BH</td></tr><tr><td>Phase</td><td>Issue</td><td>Date</td><td>Drawn</td><td>Checked</td></tr></table>					P1	REVD	01.06.2022	EB	NS	P1	REVC	25.04.2022	EB	EC	P1	REVB	22.04.2022	EB	BH	P1	REVA	12.04.2022	EB	BH	Phase	Issue	Date	Drawn	Checked						Job Title: East Hub, Knowsley		Drawing No: 005		Scale: NTS@ A3		The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.		
P1	REVD	01.06.2022	EB	NS																																							
P1	REVC	25.04.2022	EB	EC																																							
P1	REVB	22.04.2022	EB	BH																																							
P1	REVA	12.04.2022	EB	BH																																							
Phase	Issue	Date	Drawn	Checked																																							
										Drawing Title: Exploratory Hole Location Plan																																	

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Location Symbols

Approximate Window Sample Probehole Location

Approximate Trial Pit Location

Approximate Soakaway Test Location

Made Ground Depth (m)

Depth of Made Ground 0.00m

Depth of Made Ground 0.01 - 0.39m

Depth of Made Ground 0.40 - 0.79m

Depth of Made Ground 0.80 - 1.19m

Depth of Made Ground >1.20m

Base of Made Ground Not Identified

Notes:

P1	REVB	01.06.2022	EB	NS
P1	REVA	26.05.2022	LM	EC
Phase	Issue	Date	Drawn	Checked

Client:

Redsun

Job Title:

East Hub,
Knowsley

Job No:

15-354

Drawing No:

006

Job Title:

Depth of Made
Ground Plan

Date:

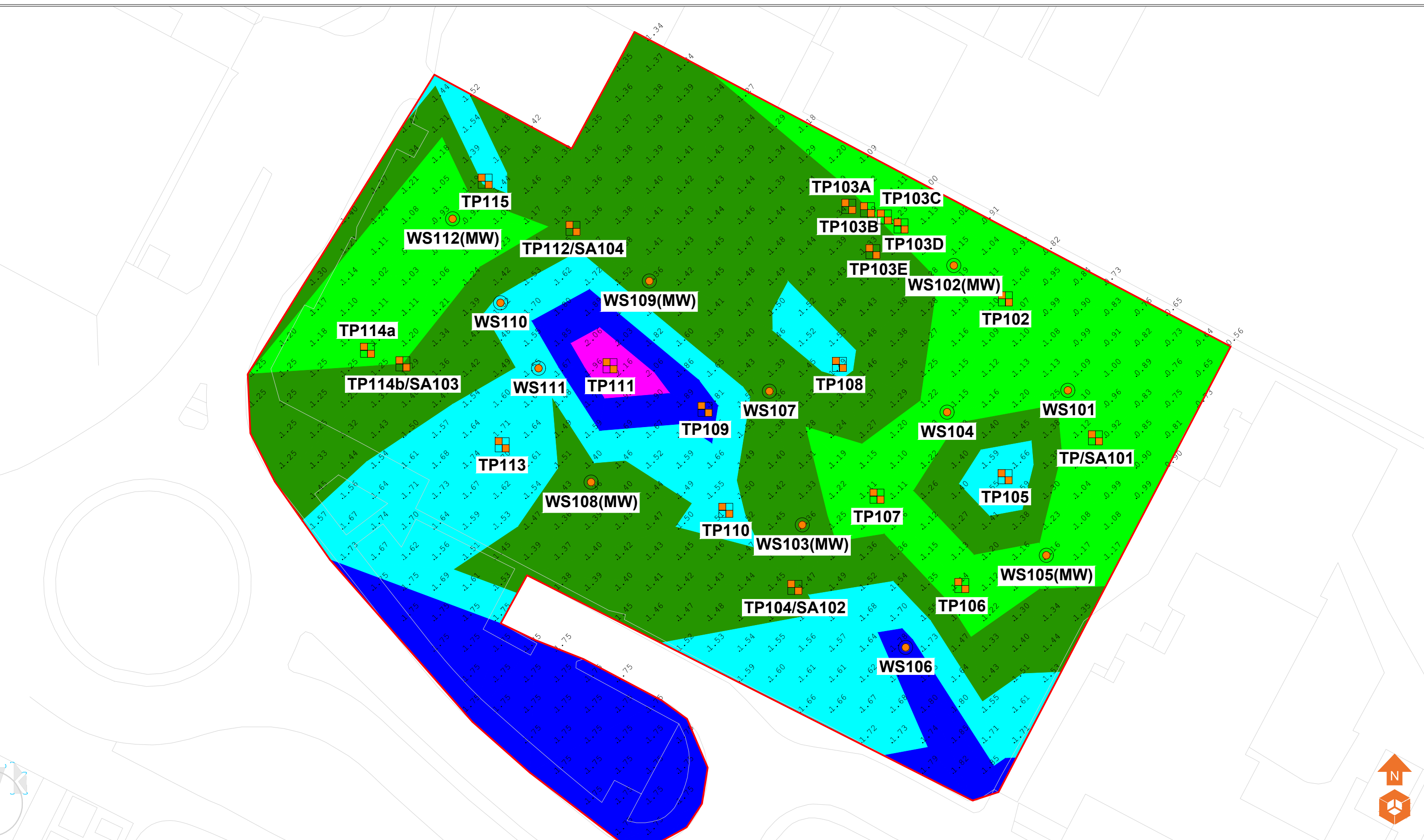
01.06.2022

Scale:

NTS@ A3

Environmental Engineering
Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

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Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Trial Pit Location
- Approximate Soakaway Test Location

Shallow Spread Footings

- Depth to Founding Strata 0.00 - 1.24m
- Depth to Founding Strata 1.25 - 1.49m

Mass Trench Fill Footings

- Depth to Founding Strata 1.50 - 1.74m
- Depth to Founding Strata 1.75 - 1.99m
- Depth to Founding Strata 2.00 - 2.24m

Engineered Footings

- Depth to Founding Strata 2.25 - 2.49m
- Depth to Founding Strata >2.50m

Notes:

P1	REVB	06.06.2022	EB	NS
P1	REVA	26.05.2022	LM	EC
Phase	Issue	Date	Drawn	Checked

Client:

Redsun

Job Title:

East Hub, Knowsley

Job No:

15-354

Drawing No:

008

Date:

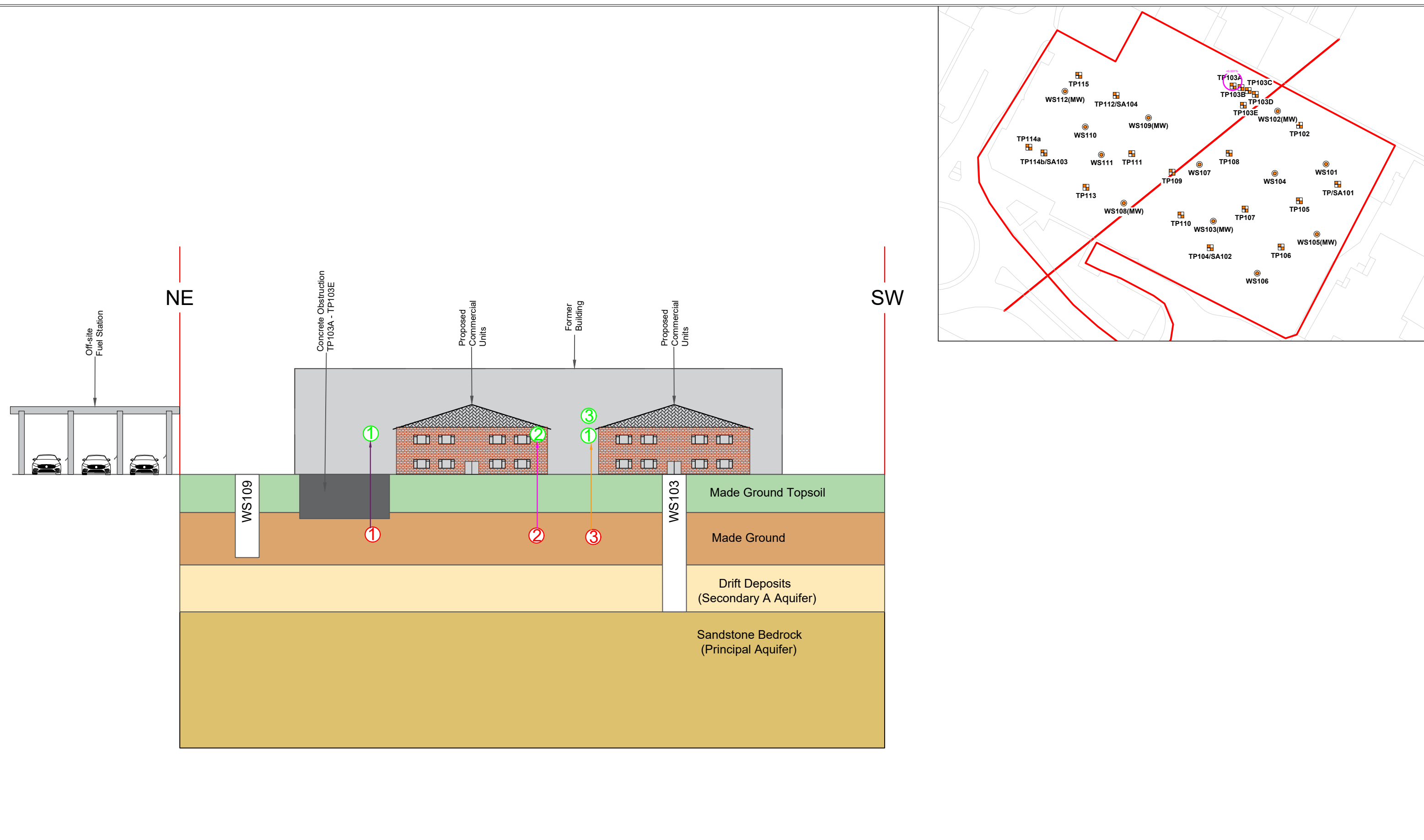
06.06.2022

Scale:

NTS@ A3

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Geology Key

- Made Ground Topsoil
- Made Ground
- Drift Deposits (Secondary A Aquifer)
- Sandstone Bedrock (Principal Aquifer)
- Concrete Obstruction - TP103A - TP103E
- Former Building

Sources

- ① Asbestos
- ② PH & Sulphate
- ③ Organic Contaminants

Receptors

- ① Future Site Users
- ② Building Structure
- ③ Water Pipes

Pathways

- Dust Inhalation
- Corrosion of Concrete
- Ingestion of Tainted Water Supply

Notes:

P1	REVB	06.06.2022	EB	NS
P1	REVA	26.05.2022	LM	EC
Phase	Issue	Date	Drawn	Checked

Client:

Redsun

Job Title:

East Hub, Knowsley

Job No:

15-354

Drawing No:

010

Date:

06.06.2022

Scale:

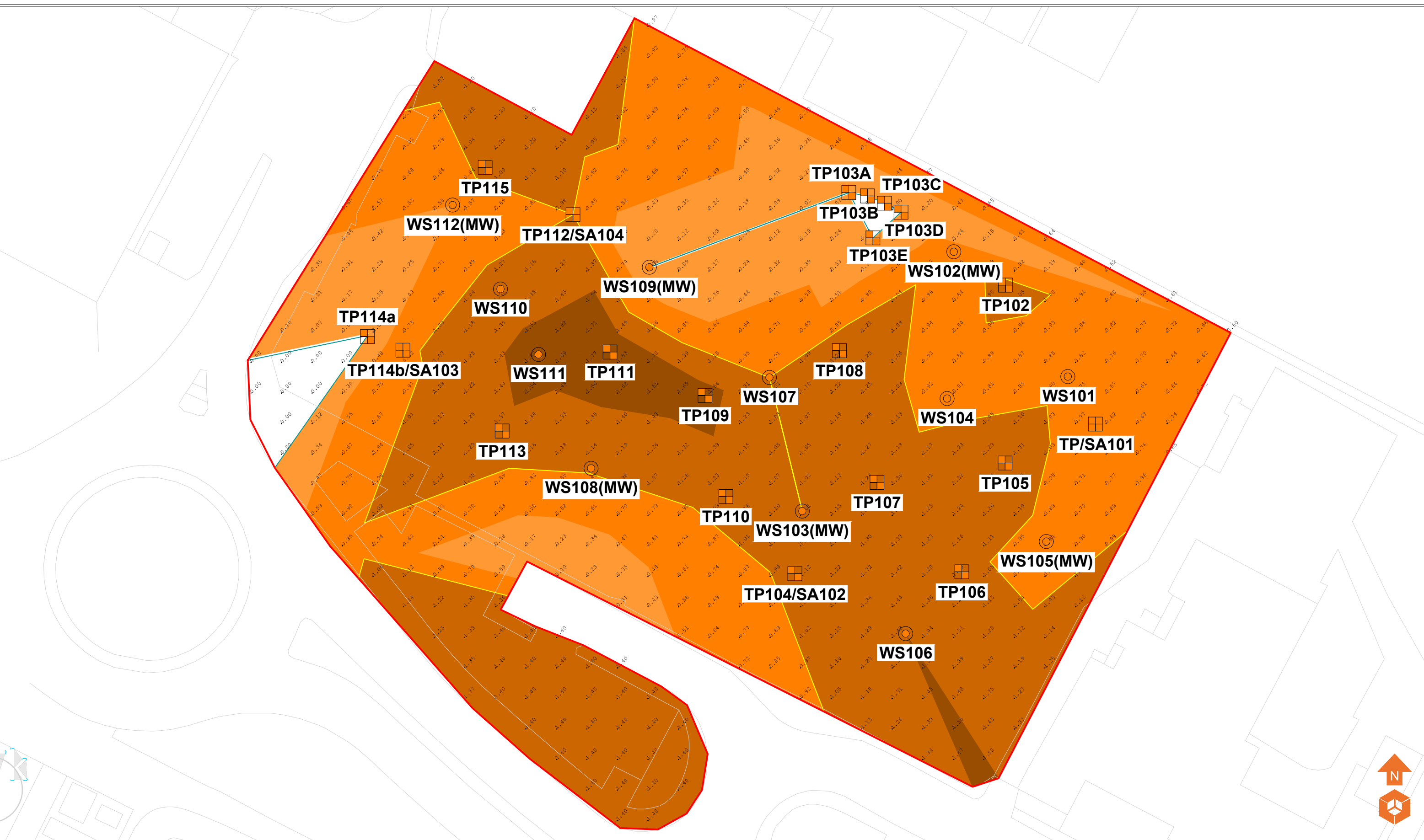
NTS@ A3

Drawing Title:

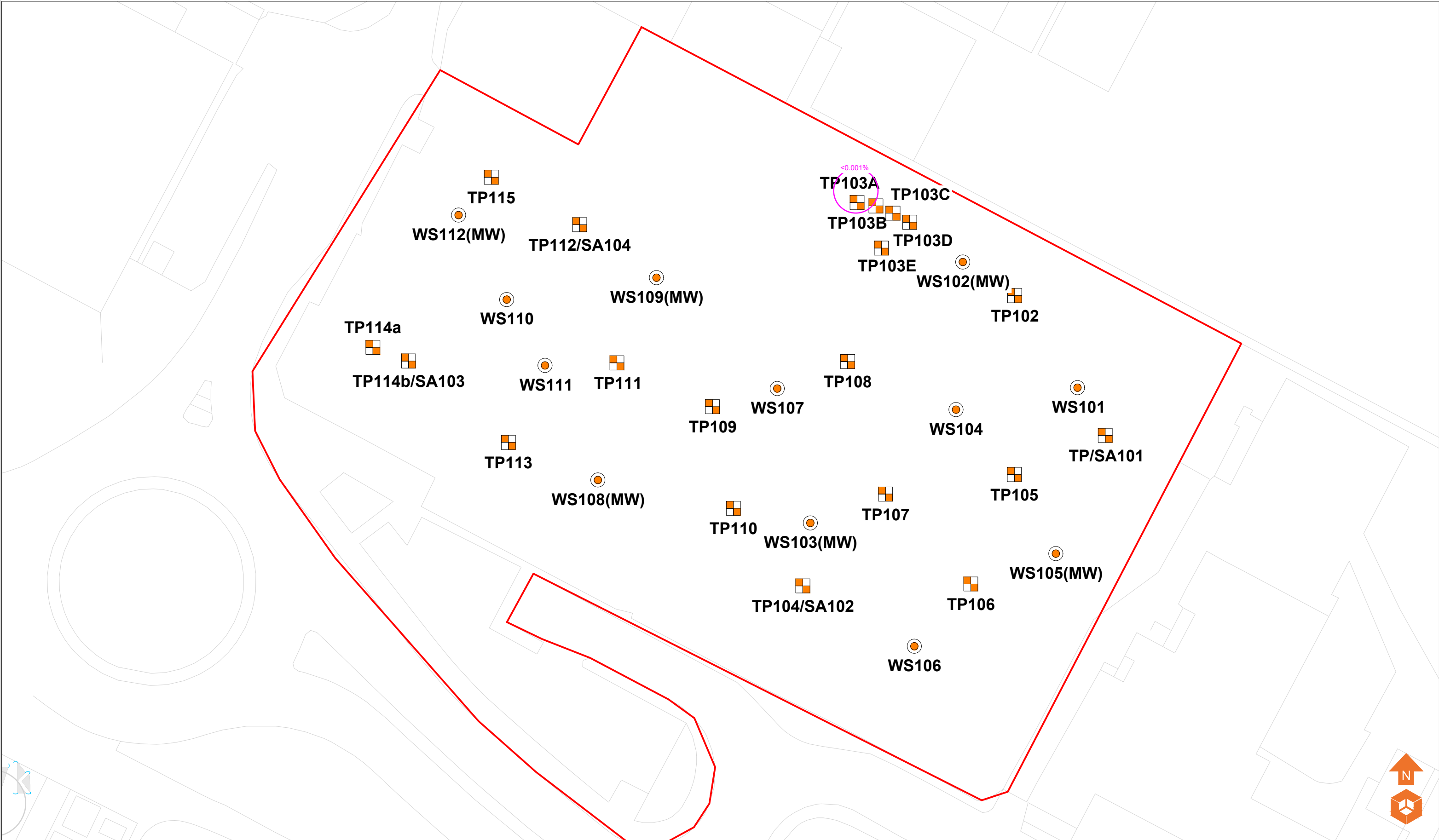
Conceptual Site Model

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

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Location Symbols Approximate Window Sample Probehole Location Approximate Trial Pit Location Approximate Soakaway Test Location		Depth to Bedrock (m) Depth to Bedrock 0.00 - 0.49m Depth to Bedrock 0.50 - 0.99m Depth to Bedrock 1.00 - 1.49m Depth to Bedrock 1.50 - 1.99m Depth to Bedrock >2.00m		Notes:					Client: Redsun		Job No: 15-354	Date: 06.06.2022	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk		
				P1 REVB 06.06.2022 EB NS P1 REVA 26.05.2022 LM EC					Job Title: East Hub, Knowsley		Drawing No: 012		Scale: NTS@ A3		
									Drawing Title: Depth to Bedrock Plan		The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.				
				Phase Issue Date Drawn Checked											



Location Symbols WS111 Approximate Window Sample Probehole Location TP111 Approximate Trial Pit Location SA111 Approximate Soakaway Test Location WS111(MW) Approximate Window Sample Probehole Location with Install		Contamination Issues Asbestos		Notes:					Client: Redsun		Job No: 15-354		Date: 06.06.2022		Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk										
					<table><tr><td>P1</td><td>REVA</td><td>06.06.2022</td><td>EB</td><td>NS</td></tr><tr><td>Phase</td><td>Issue</td><td>Date</td><td>Drawn</td><td>Checked</td></tr></table>					P1	REVA	06.06.2022	EB	NS			Phase	Issue	Date	Drawn	Checked	Job Title: East Hub, Knowsley		Drawing No: 018	
P1	REVA	06.06.2022	EB	NS																					
Phase	Issue	Date	Drawn	Checked																					
										Drawing Title: Contamination Issues Plan		The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.													

APPENDIX IV

PHOTOGRAPHS

PLATE 1 SITE ENTRANCE



PLATE 2 HARDSTANDING IN NORTHWEST CORNER OF SITE FACING EAST



PLATE 3 SCRAP WOOD AND PLYWOOD IN CENTRAL AREA OF THE SITE



PLATE 4 ELECTRICITY BOX IN NORTH WEST CORNER OF SITE



PLATE 5 VIEW OF NORTHERN BOUNDARY OF SITE FACING NORTHEAST



PLATE 6 VIEW OF SITE FACING NORTHWEST



PLATE 7 VIEW OF SOUTHERN BOUNDARY OF THE SITE FACING WEST



PLATE 8 WS102 MONITORING WELL



PLATE 9 TP101/SA101 EXCAVATION



PLATE 10 TP105 EXCAVATION



PLATE 11 TP105 ARISINGS



PLATE 12 BACKFILLED TRIAL PIT



APPENDIX V

E3P EXPLORATORY HOLE LOGS

Project Name: East Hub	Project No. 15354	Co-ords: 343368.00 - 397758.00 Level: 44.62	Date 19/04/2022
Location: Knowsley	Dimensions (m): 2.40 0.70		Scale 1:30
Client: Redsun	Depth 1.70		Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.40	44.22		MADE GROUND: Brown slightly clayey slightly gravelly fine to medium sand with frequent rootlets. Gravel is fine to coarse subangular to angular of brick and concrete. (Topsoil)	
				0.60	44.02		Light yellow slightly clayey medium to coarse SAND.	
				1.40	43.22		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse sand. Gravel is fine to coarse subangular to angular of weathered sandstone).	1
				1.60	43.02		Whiteish yellow weathered SANDSTONE.	
				1.70	42.92		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse SAND with frequent cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone). End of Pit at 1.70m	2
								3
								4

Trial Pit Photographs



TP101



TP101 SPOIL

Remarks: 1. Complete 2. Soakaway test completed.

Stability: Stable.

Project Name: East Hub

Project No.
15354

Co-ords: 343361.00 - 397773.00
Level: 44.81

Date
19/04/2022

Location: Knowsley

Dimensions (m): 2.40

Scale
1:30

Client: Redsun

Depth
1.60

Logged
E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20			0.20	44.61		MADE GROUND: Brown slightly clayey slightly gravelly fine to medium sand with frequent rootlets. Gravel is fine to coarse subangular to angular of brick, concrete and glass. (Topsoil)	
	0.40	ES		0.70	44.11		MADE GROUND: Dark brown gravelly medium to coarse sand with frequent boulders and cobbles. Gravel is fine to coarse subangular of brick, concrete and metal. Cobbles and boulders are subangular of asphalt, concrete and metal.	
	1.00	ES		1.10	43.71		Light yellow slightly clayey medium to coarse SAND.	1
				1.60	43.21		Reddish brown weathered SANDSTONE. (Recovered as reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	
							End of Pit at 1.60m	2
								3
								4

Trial Pit Photographs



TP102



TP102 SPOIL

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 1.60m bgl- excavator unable to dig deeper. 2. Large concrete slab encountered from 0.20-0.70m bgl in eastern wall of trial pit.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343329.00 - 397789.00 Level:	Date 20/04/2022
Location: Knowsley	Dimensions (m): 2.20 0.70 Depth 0.25		Scale 1:30
Client: Redsun			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20 0.25 0.30			MADE GROUND: Brown slightly clayey slightly gravelly fine to medium sand with frequent rootlets. Gravel is fine to medium subangular to subrounded of mudstone and brick. (Topsoil) MADE GROUND: Blackish brown gravelly medium to coarse sand with frequent cobbles. Gravel is fine to coarse subangular of concrete and brick. Cobbles are subangular to angular of brick and concrete. MADE GROUND: Blackish brown gravelly medium to coarse sand with frequent cobbles. Gravel is fine to coarse subangular of concrete and brick. Cobbles are subangular to angular of brick and concrete. End of Pit at 0.25m	1 2 3 4

Trial Pit Photographs



TP103B

Remarks: 1. Terminated at 0.30m bgl- excavator unable to break through Made Ground.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343332.00 - 397788.00 Level:	Date 20/04/2022
Location: Knowsley	Dimensions (m): Depth 0.20		Scale 1:30
Client: Redsun	0.70		Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.15 0.20			MADE GROUND: Brown slightly clayey slightly gravelly fine to medium sand with frequent rootlets. Gravel is fine to medium subangular to subrounded of mudstone and brick. (Topsoil) MADE GROUND: Blackish brown gravelly medium to coarse sand. Gravel is fine to coarse subangular to angular of brick, ceramic, plastic, concrete and asphalt. End of Pit at 0.20m	1 2 3 4

Trial Pit Photographs



TP103C

Remarks: 1. Terminated at 0.30m bgl- excavator unable to break through Made Ground.

Stability: Stable.

Project Name: East Hub

Project No.
15354

Co-ords: 343335.00 - 397786.00
Level:

Date
20/04/2022

Location: Knowsley

Dimensions (m): 2.40

Scale
1:30

Client: Redsun

Depth
0.35

0.70

2.40

Logged
E. Canham

[illegible]

Trial Pit Photographs



TP103D

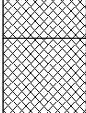


TP103D SPOIL

Remarks: 1. Terminated at 0.30m bgl- excavator unable to break through Made Ground.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343326.00 - 397786.00 Level:	Date 20/04/2022
Location: Knowsley	Dimensions (m): 2.40 Depth 0.90 0.70		Scale 1:30
Client: Redsun			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30 0.40	ES B		0.25 0.50			MADE GROUND: Brown slightly clayey slightly gravelly fine to medium sand with frequent rootlets. Gravel is fine to medium subangular to subrounded of mudstone and brick. (Topsoil)	
							MADE GROUND: Blackish brown clayey gravelly medium to coarse sand with frequent cobbles. Gravel is fine to coarse subangular to angular of concrete, brick, asphalt and mudstone. Cobbles are subangular to angular of brick and concrete.	
	0.90	ES		0.90			MADE GROUND: Yellowish brown clayey medium to coarse sand with concrete slab encountered at 0.90m bgl. (Slight hydrocarbon odour from 0.50m bgl) End of Pit at 0.90m	1
								2
								3
								4

Remarks: 1. Terminated at 0.90m bgl- excavator unable to break through made ground. 2. Slight hydrocarbon odour encountered from 0.50m bgl.

Stability: Stable.



Trial Pit Log

TrialPit No
TP104/
SA102
Sheet 1 of 1

Project Name: East Hub	Project No. 15354	Co-ords: 343324.00 - 397735.00 Level: 44.68	Date 19/04/2022
Location: Knowsley	Dimensions (m): Depth 2.40		Scale 1:30
Client: Redsun			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	44.48		MADE GROUND: Brown slightly clayey slightly gravelly fine to medium sand with frequent rootlets. Gravel is fine to medium subangular to subrounded of mudstone and brick. (Topsoil) MADE GROUND: Blackish brown slightly gravelly clayey sand. Gravel is fine to coarse subangular to angular of brick, glass and concrete. (Hydrocarbon odour)	1
				1.10	43.58		Reddish brown weathered SANDSTONE. (Recovered as reddish brown medium to coarse slightly clayey gravelly SAND with frequent cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone).	2
				2.40	42.28		End of Pit at 2.40m	3
								4

Remarks: 1. Complete 2. Soakaway test completed.

Stability: Stable.



Project Name: East Hub

Project No.
15354

Co-ords: 343354.00 - 397750.00
Level: 44.69

Date
19/04/2022

Location: Knowsley

Dimensions (m): 2.20

Scale
1:30

Client: Redsun

Depth
1.80

Logged
E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 1.80	0.30			0.30	44.39		MADE GROUND: Brown clayey slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to medium subangular to angular of glass, mudstone and brick. (Topsoil)	
	0.80			0.80	43.89		MADE GROUND: Orangish brown gravelly medium to coarse sand. Gravel is fine to medium subangular to subrounded of sandstone.	
	0.90	ES		1.40	43.29		MADE GROUND: Black gravelly clayey fine to medium sand. Gravel is fine to medium subangular to angular of glass, ceramic and plastic. (Very strong hydrocarbon odour encountered from 0.80m bgl)	1
	1.80	B		1.80	42.89		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse SAND with frequent cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone). End of Pit at 1.80m	2
								3
								4

Trial Pit Photographs



TP105



TP105 SPOIL

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 1.80m bgl- excavator unable to dig deeper. 2. Very strong hydrocarbon odour encountered from 0.80m bgl. 3. Water strike encountered at 1.80m bgl- very slow seepage.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343344.00 - 397736.00 Level: 44.55	Date 19/04/2022
Location: Knowsley	Dimensions (m): 2.40 0.70		Scale 1:30
Client: Redsun	Depth 2.40		Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.40	ES		0.20	44.35		MADE GROUND: Brown clayey slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to medium subangular to angular of glass, mudstone and brick. (Topsoil)	
				0.50	44.05		MADE GROUND: Black slightly gravelly clayey medium to coarse sand. Gravel is fine to coarse subangular to subrounded of brick, glass, mudstone, ceramic and plastic.	
				0.70	43.85		Dark brown medium to coarse SAND.	
	1.00	ES		1.10	43.45		Light yellow slightly clayey medium to coarse SAND.	1
							Reddish brown weathered SANDSTONE. (Recovered as reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	2
				2.40	42.15		End of Pit at 2.40m	3
								4

Trial Pit Photographs



TP106



TP106 SPOIL

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 2.40m bgl- excavator unable to dig deeper.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343339.00 - 397751.00 Level: 44.71	Date 19/04/2022
Location: Knowsley		Dimensions (m): 2.40 Depth 2.00	Scale 1:30
Client: Redsun			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.00	0.50	ES		0.20	44.51		MADE GROUND: Brown clayey slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to medium subangular to angular of glass, mudstone and brick. (Topsoil)	1
				0.40	44.31		MADE GROUND: Light brown very gravelly fine to medium sand with occasional cobbles. Gravel is fine to coarse subangular to angular of brick and concrete. Cobbles are subangular of brick.	
				0.70	44.01		MADE GROUND: Black slightly clayey fine to medium sand. Dark brown medium to coarse SAND.	
	1.50	ES		1.10	43.61		Light yellow slightly clayey medium to coarse SAND.	2
				1.30	43.41		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse SAND with frequent cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone).	
				2.00	42.71		End of Pit at 2.00m	

Trial Pit Photographs



Remarks: 1. Terminated on shallow weathered sandstone bedrock at 2.00m bgl- excavator unable to dig deeper. 2. Water strike encountered at 2.00m bgl- very slow seepage.

Stability: Stable.

Project Name: East Hub

Project No.
15354

Co-ords: 343323.00 - 397774.00
Level: 44.59

Date
20/04/2022

Location: Knowsley

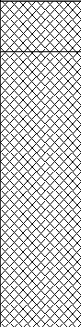
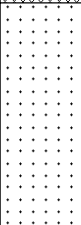
Dimensions (m): 2.40

Scale
1:30

Client: Redsun

Depth
2.20

Logged
E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.20	2.00	ES		0.20	44.39		MADE GROUND: Brown clayey slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to medium subangular to angular of glass, mudstone and brick. (Topsoil) MADE GROUND: Dark brown slightly clayey gravelly medium to coarse sand. Gravel is fine to coarse subangular to subrounded of mudstone, brick, ceramic and sandstone.	1
				1.30	43.29		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse SAND with frequent cobbles from 2.00m bgl. Gravel is fine to coarse subangular to subrounded of mudstone and weathered sandstone. Cobbles are subangular of weathered sandstone. Sand becomes coarse from 2.00m bgl).	2
				2.20	42.39		End of Pit at 2.20m	3
								4

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 2.20m bgl- excavator unable to dig deeper. 2. Water strike encountered at 2.20m bgl- slow to moderate seepage.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343301.00 - 397766.00 Level: 44.75	Date 20/04/2022
Location: Knowsley	Dimensions (m): 2.20 0.70		Scale 1:30
Client: Redsun	Depth 2.20		Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.20	0.15	ES		0.20	44.55		MADE GROUND: Brown clayey slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to medium subangular to angular of mudstone and brick. (Topsoil)	1
				0.40	44.35		MADE GROUND: Dark brown mottled yellowish brown clayey gravelly medium to coarse sand. Gravel is fine to coarse subangular to angular of mudstone, brick, concrete and ceramic.	
	1.00	ES					MADE GROUND: Dark brown slightly clayey gravelly medium to coarse sand with rare boulders and occasional cobbles. Gravel is fine to coarse subangular to subrounded of mudstone, brick and clinker. Cobbles are subangular of brick. Boulders are subangular bricks.	
				1.50	43.25		Light yellow slightly clayey medium to coarse SAND.	2
				1.70	43.05		Reddish brown weathered SANDSTONE. (Recovered as reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	
				2.20	42.55		End of Pit at 2.20m	4

Trial Pit Photographs



TP109



TP109 SPOIL

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 2.20m bgl- excavator unable to dig deeper. 2. Water strike encountered at 2.20m bgl- very slow seepage.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343303.00 - 397753.00 Level: 44.66	Date 19/04/2022
Location: Knowsley	Dimensions (m): 2.40 0.70		Scale 1:30
Client: Redsun	Depth 2.70		Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.60	0.80	ES		0.30	44.36		MADE GROUND: Brown clayey slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to medium subangular to angular of mudstone and brick. (Topsoil)	
				1.00	43.66		MADE GROUND: Black slightly gravelly clayey medium to coarse sand with occasional cobbles. Gravel is fine to coarse subangular to subrounded of brick, and concrete. Cobbles are subangular of brick and concrete.	1
				1.20	43.46		Light yellow slightly clayey medium to coarse SAND.	
							Reddish brown weathered SANDSTONE. (Recovered as Reddish brown gravelly medium to coarse SAND with occasional cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone).	2
				2.70	41.96		End of Pit at 2.70m	3
								4

Trial Pit Photographs



TP110



TP110 SPOIL

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 2.70m bgl- excavator unable to dig deeper. 2. Water strike encountered at 2.60m bgl- slow to moderate seepage.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343293.00 - 397772.00 Level: 44.79	Date 20/04/2022
Location: Knowsley	Dimensions (m): 2.40 0.70		Scale 1:30
Client: Redsun	Depth 2.40		Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.40	0.20			0.20	44.59		MADE GROUND: Brown clayey fine to medium sand with frequent rootlets and occasional roots. (Topsoil)	
	0.40	ES					MADE GROUND: Dark brown slightly clayey gravelly sand with occasional cobbles and band of brown clayey sand from 0.90-1.20mbgl. Gravel is fine to coarse subangular to subrounded of mudstone, plastic, wires and ceramic. Cobbles are subangular of brick and concrete.	1
	1.50	ES		1.60	43.19		Light yellow slightly clayey medium to coarse SAND.	
	2.00	ES		1.90	42.89		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse SAND with occasional cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone).	2
	2.30			2.30	42.49		Yellowish brown weathered SANDSTONE.	
	2.40			2.40	42.39		End of Pit at 2.40m	3
								4

Trial Pit Photographs



TP111



TP111 SPOIL

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 2.40m bgl- excavator unable to dig deeper. 2. Water strike encountered at 2.40m bgl- very slow seepage.

Stability: Stable.

Project Name: East Hub

Project No.
15354

Co-ords: 343289.00 - 397791.00
Level: 44.67

Date
20/04/2022

Location: Knowsley

Dimensions (m): 2.40

Scale
1:30

Client: Redsun

Depth
1.90

Logged
E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20			0.20	44.46		MADE GROUND: Brown clayey fine to medium sand with occasional rootlets. (Topsoil)	
	0.50	ES					MADE GROUND: Reddish brown slightly clayey gravelly medium to coarse sand with frequent cobbles and boulders. Gravel is fine to coarse subangular to subrounded of brick and mudstone. Cobbles and boulders are subangular of brick and concrete.	
	1.20	B		1.00	43.66		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse SAND with occasional cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone).	1
				1.90	42.76		End of Pit at 1.90m	2
								3
								4

Trial Pit Photographs



TP112



TP112 SPOIL

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 1.90m bgl- excavator unable to dig deeper. 2. Soakaway test completed.

Stability: Stable.



Trial Pit Log

TrialPit No
TP113
Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343273.00 - 397756.00
Level: 44.45

Date
20/04/2022

Location: Knowsley

Dimensions (m):

2.40

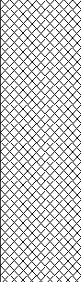
Depth
2.70

0.70

Scale
1:30

Logged
E. Canham

Client: Redsun

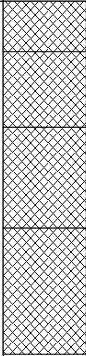
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.50	0.20	ES		0.25	44.20		MADE GROUND: Brown clayey fine to medium sand with occasional rootlets. (Topsoil)	
							MADE GROUND: Dark brown clayey gravelly medium to coarse sand with frequent cobbles and rare bands of dark yellow medium to coarse sand. Gravel is fine to coarse subangular to subrounded of brick and mudstone. Cobbles are subangular of brick.	1
	1.50	ES		1.40	43.05		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse SAND with occasional cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone).	2
				2.50	41.95		Yellowish brown weathered SANDSTONE.	
				2.70	41.75		End of Pit at 2.70m	3
								4

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 2.70m bgl- excavator unable to dig deeper. 2. Water strike encountered at 2.50m bgl- moderate seepage.

Stability: Stable.



Project Name: East Hub	Project No. 15354	Co-ords: 343261.00 - 397769.00 Level: 44.50	Date 19/04/2022
Location: Knowsley	Dimensions (m): 2.40 0.70 Depth 1.40		Scale 1:30
Client: Redsun			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	44.30		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets and frequent cobbles. Gravel is fine to coarse subangular to angular of mudstone and brick. Cobbles are subangular of brick. (Topsoil)	
				0.50	44.00		MADE GROUND: Brown clayey gravelly fine to medium sand with frequent cobbles. Gravel is fine to coarse subangular to angular of mudstone and brick. Cobbles are subangular of brick.	
				0.90	43.60		MADE GROUND: Yellowish brown sandy clay.	1
				1.40	43.10		MADE GROUND: Dark brown gravelly medium to coarse sand. Gravel is fine to coarse subangular to angular of brick.	
							End of Pit at 1.40m	2
								3
								4

Trial Pit Photographs



TP114A



TP114A SPOIL

Remarks: 1. Terminated on concrete slab at 1.40m bgl at the south of the trial pit.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343266.00 - 397769.00 Level:	Date 19/04/2022
Location: Knowsley	Dimensions (m): 2.40 Depth 2.00		Scale 1:30
Client: Redsun			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50	ES		0.20 0.40		MADE GROUND: Brown slightly clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of brick and ceramic. (Topsoil) MADE GROUND: Yellow sandy clay. MADE GROUND: Black and yellow slightly gravelly slightly clayey medium to coarse sand. Gravel is fine to coarse subangular to subrounded of brick and sandstone.		
	1.50	B		0.90 2.00		Reddish brown weathered SANDSTONE. (Recovered as reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).		1
						End of Pit at 2.00m		2
								3
								4

Trial Pit Photographs



TP114B

TP114B SPOIL

Remarks: 1. Complete 2. Soakaway test completed.

Stability: Stable.

Project Name: East Hub	Project No. 15354	Co-ords: 343271.00 - 397800.00 Level: 44.50	Date 20/04/2022
Location: Knowsley	Dimensions (m): 2.20 0.70 Depth 1.40		Scale 1:30
Client: Redsun			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.15	ES		0.25	44.24		MADE GROUND: Brown slightly clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to subrounded of mudstone, glass and plastic sheeting. (Topsoil)	
	0.80	ES		0.80	43.70		MADE GROUND: Orangish brown clayey gravelly medium to coarse sand with occasional cobbles and pockets of firm orange sandy clay. Gravel is fine to coarse subangular to subrounded of sandstone, mudstone, brick, plastic and concrete. Cobbles are subangular of concrete, brick and mudstone.	1
				1.20	43.30		MADE GROUND: Reddish brown slightly clayey gravelly medium to coarse sand with black and grey streaks from 1.10-1.20m bgl. Gravel is fine to coarse subangular to subrounded of concrete, mudstone and sandstone.	
	1.50	ES		1.40	43.10		Reddish brown weathered SANDSTONE. (Recovered as reddish brown gravelly medium to coarse SAND with frequent cobbles. Gravel is fine to coarse subangular to angular of weathered sandstone. Cobbles are subangular of weathered sandstone). End of Pit at 1.40m	2
								3
								4

Trial Pit Photographs



TP115



TP115 SPOIL

Remarks: 1. Terminated on shallow weathered sandstone bedrock at 1.40m bgl- excavator unable to dig deeper.

Stability: Stable.

Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343367.00 - 397767.00

Hole Type
WS

Location: Knowsley

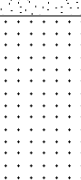
Level: 44.69

Scale
1:20

Client: Redsun

Dates: 19/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES	50 (21,4/50 for 90mm)	0.10	44.59		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of mudstone and brick. (Topsoil)	1
		0.20			0.20	44.49		MADE GROUND: Blackish grey sandy gravel. Gravel is fine to medium subangular to angular of concrete and brick.	
		0.40			0.40			Light brown medium to coarse SAND with pockets of dark orangish brown medium to coarse SAND. Becomes slightly clayey from 0.65-0.70m bgl.	
		1.00			0.80	43.89		Reddish brown weathered SANDSTONE. (Recovered as very dense reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	
					1.24	43.45		End of borehole at 1.24 m	4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.24m bgl.

Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343342.00 - 397784.00

Hole Type
WS

Location: Knowsley

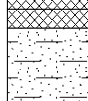
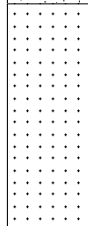
Level: 44.91

Scale
1:20

Client: Redsun

Dates: 19/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES	N=50 (2,4/6,10,15,19)	0.15	44.76		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of mudstone and brick. (Topsoil)	1
					0.30	44.60		MADE GROUND: Greyish brown very gravelly sand. Gravel is fine to medium subangular to angular of concrete.	
							MADE GROUND: Concrete and asphalt.		
		0.60	44.30			MADE GROUND: Black slightly clayey sand.			
		0.65	44.26			Light yellow slightly clayey medium to coarse SAND.			
		0.85	44.06			Reddish brown weathered SANDSTONE. (Recovered as very dense reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).			
		1.45	43.46		End of borehole at 1.45 m				
					2				
					3				
					4				

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.45m bgl. 2. Monitoring well installed- response zone (0.70-1.00m bgl).

Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343323.00 - 397746.00

Hole Type
WS

Location: Knowsley

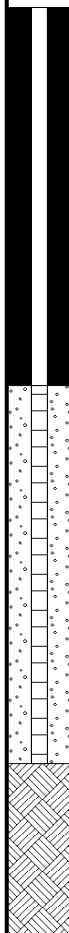
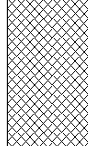
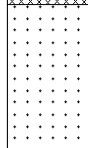
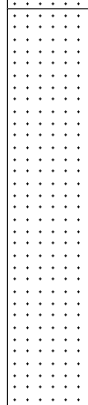
Level: 44.60

Scale
1:20

Client: Redsun

Dates: 19/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.50	ES		0.15	44.45		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of mudstone and brick. (Topsoil)	1	
					0.30	44.30		MADE GROUND: Greyish brown slightly gravelly medium to coarse sand. Gravel is fine to coarse subangular to angular of concrete.		
								MADE GROUND: Black slightly clayey fine to medium sand.		
					0.60	44.00		MADE GROUND: Light yellow slightly clayey medium to coarse sand with concrete cobble at 0.80m bgl.		
		1.00		N=27 (7,8/8,7,6,6)	1.00	43.60		Reddish brown weathered SANDSTONE. (Recovered as Medium dense reddish brown medium to coarse SAND).		
		1.50	ES		1.40	43.20		Reddish brown weathered SANDSTONE. (Recovered as dense reddish brown clayey silty fine to medium SAND).		
		2.00		N=50 (6,8/8,8,17,17)					2	
					2.45	42.15				
									End of borehole at 2.45 m	3
										4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 2.45m bgl. 2. Monitoring well installed- response zone (1.00-2.00m bgl).

Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343349.00 - 397758.00

Hole Type
WS

Location: Knowsley

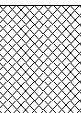
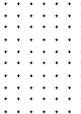
Level: 44.63

Scale
1:20

Client: Redsun

Dates: 19/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES	50 (11,12/50 for 160mm)	0.30	44.33		MADE GROUND: Brown slightly clayey slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to medium subangular to angular of mudstone, ceramic and brick. (Topsoil)	1
					0.50	44.13		MADE GROUND: Dark brown mottled black slightly gravelly medium to coarse sand. Gravel is fine to medium subangular to angular of bitumen and brick.	
		0.75	ES		0.70	43.93		MADE GROUND: Dark orangish brown slightly gravelly medium to coarse sand. Gravel is fine to medium subrounded of mudstone and sandstone.	
					0.80	43.83		MADE GROUND: Dark brown orange and black slightly gravelly sandy clay. Gravel is fine to medium subangular of glass and brick.	
		1.00						Reddish brown weathered SANDSTONE. (Recovered as very dense reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	
					1.31	43.32		End of borehole at 1.31 m	4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.31m bgl.

Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343357.00 - 397738.00

Hole Type
WS

Location: Knowsley

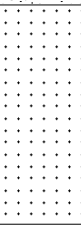
Level: 44.78

Scale
1:20

Client: Redsun

Dates: 19/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.20	44.58		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of mudstone and brick. (Topsoil)	1
					0.30	44.48		MADE GROUND: Brown very gravelly fine to medium sand. Gravel is fine to medium subangular of brick.	
					0.50	44.28		MADE GROUND: Black slightly clayey fine to medium sand.	
					0.60	44.18		Dark brown medium to coarse SAND.	
								Light yellow slightly clayey medium to coarse SAND with rare black streaks.	
		0.90	ES		0.80	43.98		Orange brown weathered SANDSTONE. (Recovered as very dense orange brown medium to coarse SAND).	
		1.00		50 (9,12/50 for 230mm)					
					1.38	43.40		End of borehole at 1.38 m	

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.38m bgl. 2. Monitoring well installed- response zone (0.20-0.50m bgl).

Borehole Log

Borehole No.

WS106

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343336.00 - 397729.00

Hole Type
WS

Location: Knowsley

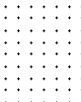
Level: 44.64

Scale
1:20

Client: Redsun

Dates: 19/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES	N=19 (2,3/2,6,6,5)	0.20	44.44		MADE GROUND: Brown slightly clayey slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to medium subangular to angular of ceramic and brick. (Topsoil)	1
								MADE GROUND: Blackish brown slightly clayey gravelly medium to coarse sand. Gravel is fine to coarse subangular to angular of concrete, brick and tar.	
		0.70			0.70	43.94			
		0.80						MADE GROUND: Blackish grey gravelly very sandy clay. Gravel is fine to medium subangular to angular of glass, brick, ceramic and plastic sheeting.	
		1.00							
					1.20 1.25	43.44 43.39		MADE GROUND: Blackish brown slightly clayey gravelly medium to coarse sand. Gravel is fine to coarse subangular to angular of concrete, brick and tar.	
			50 (18,7/50 for 30mm)		1.50	43.14		MADE GROUND: Reddish brown slightly clayey sand with rare cobble of concrete at 1.50m bgl.	2
		1.70						Reddish brown weathered SANDSTONE. (Recovered as dense reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	
					1.88	42.76		End of borehole at 1.88 m	3
									4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.88m bgl.

Borehole Log

Borehole No.

WS107

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343309.00 - 397766.00

Hole Type
WS

Location: Knowsley

Level: 44.67

Scale
1:20

Client: Redsun

Dates: 19/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15			0.15	44.52		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of mudstone and brick. (Topsoil)	
		0.50	ES					MADE GROUND: Blackish brown slightly clayey slightly gravelly fine to medium sand. Gravel is fine to medium subangular to subrounded of mudstone, brick and asphalt.	
		0.80			0.80	43.87			
		1.00		N=44 (8,7/10,9,10,15)	1.00	43.67		MADE GROUND: Blackish brown medium to coarse sand.	
		1.20	ES					Reddish brown weathered SANDSTONE. (Recovered as dense reddish brown medium to coarse SAND).	1
		1.50		50 (23,2/50 for 85mm)					
					1.74	42.93		End of borehole at 1.74 m	2
									3
									4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.74m bgl.

Borehole Log

Borehole No.

WS108

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343295.00 - 397756.00

Hole Type
WS

Location: Knowsley

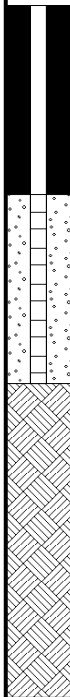
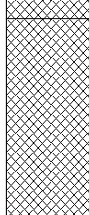
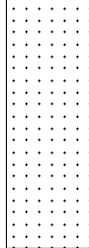
Level: 44.71

Scale
1:20

Client: Redsun

Dates: 20/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.20	44.51		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of mudstone and brick. (Topsoil)	1
		0.40			0.45	44.26		MADE GROUND: Yellowish brown clayey fine to medium sand.	
		1.00	N=37 (1,1/4,7,12,14)		1.00	43.71		MADE GROUND: Blackish brown slightly gravelly clayey medium to coarse sand with rare cobble at 0.80m bgl. Gravel is fine to coarse subangular to angular of brick, glass, mudstone and concrete. Cobble is subangular of sandstone.	
		1.05			1.05	43.66		Yellow medium to coarse SAND.	
		1.60	50 (25,/50 for 75mm)		1.83	42.88		Reddish brown weathered SANDSTONE. (Recovered as dense reddish brown medium to coarse SAND).	
								End of borehole at 1.83 m	2
									3
									4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.83m bgl. 2. Monitoring well installed- response zone (0.50-1.00m bgl).

Borehole Log

Borehole No.

WS109

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343303.00 - 397785.00

Hole Type
WS

Location: Knowsley

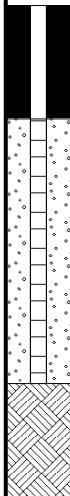
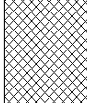
Level: 44.65

Scale
1:20

Client: Redsun

Dates: 20/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
			ES	50 (9,11/50 for 155mm)	0.20	44.45		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of concrete and brick. (Topsoil)	1
					0.40	44.25		MADE GROUND: Dark brown slightly gravelly clayey medium to coarse sand. Gravel is fine to medium of mudstone, brick and concrete.	
					0.70	43.95		MADE GROUND: Orangish brown clayey medium to coarse sand with rare cobble at 0.60m bgl. Cobble is subangular of brick.	
		0.90			0.85	43.80		MADE GROUND: Blackish brown clayey gravelly medium to coarse sand with pockets of yellowish brown sand. Gravel is medium to coarse subangular of concrete.	
		1.00						MADE GROUND: Greyish black gravelly sandy clay. Gravel is fine to medium subangular to angular of concrete, ceramic, plastic and glass.	
					1.31	43.34		End of borehole at 1.31 m	
									2
									3
									4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.31m bgl. 2. Monitoring well installed- response zone (0.30-1.00m bgl).

Borehole Log

Borehole No.

WS110

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343280.00 - 397780.00

Hole Type
WS

Location: Knowsley

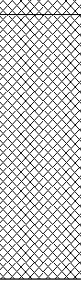
Level: 44.66

Scale
1:20

Client: Redsun

Dates: 20/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15	ES		0.20	44.46		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of concrete and brick. (Topsoil)	1
					0.50	44.16		MADE GROUND: Brown gravelly fine to medium sand with rare cobble at 0.4m bgl. Gravel is fine to medium subangular to subrounded of mudstone and brick. Cobble is subangular of brick.	
		1.00		N=30 (4,3/5,7,7,11)	1.20	43.46		MADE GROUND: Yellowish brown slightly clayey slightly gravelly medium to coarse sand. Gravel is fine to coarse subangular of brick and concrete.	
		1.40	ES					Reddish brown weathered SANDSTONE. (Recovered as dense reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	
		1.50		50 (17,8/50 for 25mm)	1.68	42.98			
								End of borehole at 1.68 m	2
									3
									4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.68m bgl.

Borehole Log

Borehole No.

WS111

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343280.00 - 397766.00

Hole Type
WS

Location: Knowsley

Level: 44.67

Scale
1:20

Client: Redsun

Dates: 20/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20			0.20	44.47		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of concrete and brick. (Topsoil)	1
								MADE GROUND: Blackish brown slightly clayey gravelly medium to coarse sand. Gravel is fine to coarse subangular to angular of concrete and brick.	
		1.00		N=21 (2,2/4,5,6,6)	1.20	43.47		Medium dense light yellow slightly clayey medium to coarse SAND.	
		1.70		50 (11,10/50 for 155mm)	1.70	42.97		Reddish brown weathered SANDSTONE. (Recovered as dense reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	
					2.01	42.66		End of borehole at 2.01 m	2
									3
									4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 2.01m bgl.

Borehole Log

Borehole No.

WS112

Sheet 1 of 1

Project Name: East Hub

Project No.
15354

Co-ords: 343268.00 - 397792.00

Hole Type
WS

Location: Knowsley

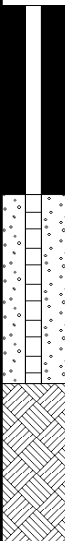
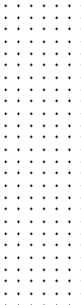
Level: 44.46

Scale
1:20

Client: Redsun

Dates: 20/04/2022 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	44.26		MADE GROUND: Brown clayey gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of concrete and brick. (Topsoil)	1
					0.45	44.01		MADE GROUND: Light brown fine to medium sand.	
					0.50	43.96		MADE GROUND: Concrete.	
		0.80	ES					Reddish brown weathered SANDSTONE. (Recovered as very dense reddish brown medium to coarse gravelly SAND. Gravel is fine to coarse subangular to angular of weathered sandstone).	
		1.00		N=50 (3,5/8,14,20,8)					
					1.45	43.01		End of borehole at 1.45 m	2
									3
									4

Remarks

1. Refusal on shallow weathered sandstone bedrock at 1.45m bgl. 2. Monitoring well installed- response zone (0.50-1.00m bgl).

APPENDIX VI

CHEMICAL TESTING

RESULTS



Eleanor Canham

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e: reception@i2analytical.com

e:

Analytical Report Number : 22-53531

Project / Site name:	East Hub	Samples received on:	21/04/2022
Your job number:	15-354	Samples instructed on/ Analysis started on:	22/04/2022
Your order number:	001359	Analysis completed by:	29/04/2022
Report Issue Number:	1	Report issued on:	29/04/2022
Samples Analysed:	3 leachate samples - 20 soil samples		

Signed:

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249052	2249053	2249054	2249055	2249056
Sample Reference				SA103/TP114A	TP105	TP102	TP107	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.90	0.40	0.50	0.20
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	12	< 0.1	50	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	8.2	17	5.7	14	9.1
Total mass of sample received	kg	0.001	NONE	0.9	0.9	0.3	0.3	0.3

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	JSW	JSW	MDB	MDB	MDB

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	7.5	8.4	5.0	-
Total Cyanide	mg/kg	1	MCERTS	< 1.0	1.1	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	990	63000	360	300	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.35	1.8	0.025	0.018	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	700	3600	50	36	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	351	1780	25.1	18.2	-
Sulphide	mg/kg	1	MCERTS	39	130	40	5.7	-
Total Sulphur	mg/kg	50	MCERTS	410	30000	320	100	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.1	2.6	2.3	4.3	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	0.25	< 0.05	0.25
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	0.26	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.4	-	3	< 0.05	2
Anthracene	mg/kg	0.05	MCERTS	1.2	-	0.73	< 0.05	0.51
Fluoranthene	mg/kg	0.05	MCERTS	7.9	-	6.4	< 0.05	3
Pyrene	mg/kg	0.05	MCERTS	7.3	-	6.1	< 0.05	2.7
Benzo(a)anthracene	mg/kg	0.05	MCERTS	8.1	-	3.1	< 0.05	2
Chrysene	mg/kg	0.05	MCERTS	5.7	-	2.5	< 0.05	1.6
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	7	-	2.6	< 0.05	2.1
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3	-	1.4	< 0.05	0.65
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.1	-	2.5	< 0.05	1.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.5	-	1.7	< 0.05	1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.81	-	0.48	< 0.05	0.31
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.9	-	2	< 0.05	1.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	52.9	-	32.9	< 0.80	19.1
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Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249052	2249053	2249054	2249055	2249056
Sample Reference				SA103/TP114A	TP105	TP102	TP107	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.90	0.40	0.50	0.20
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.8	10	9.5	1.1	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	130
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	-	-	0.57
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	-	-	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.5	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	12	58	12	2.6	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	210	45	5	47
Lead (aqua regia extractable)	mg/kg	1	MCERTS	25	240	60	1.8	150
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.4	0.4	0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	27	12	< 1.0	16
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	21
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	35	530	68	5.7	130

Petroleum Hydrocarbons

TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	18	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	4.2	20	5.5	15	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	20	99	44	57	22
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	68	960	460	200	74
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	270	300	86	31
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	MCERTS	93	1300	820	380	130

Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249052	2249053	2249054	2249055	2249056
Sample Reference				SA103/TP114A	TP105	TP102	TP107	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.90	0.40	0.50	0.20
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-	-
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	-	-
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	-	-

Analytical Report Number: 22-53531
 Project / Site name: East Hub
 Your Order No: 001359

Lab Sample Number				2249052	2249053	2249054	2249055	2249056
Sample Reference				SA103/TP114A	TP105	TP102	TP107	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.90	0.40	0.50	0.20
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	-

Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249052	2249053	2249054	2249055	2249056
Sample Reference				SA103/TP114A	TP105	TP102	TP107	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.90	0.40	0.50	0.20
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs

Aniline	mg/kg	0.1	NONE	-	< 0.1	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	0.49	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	0.48	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	3	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	0.73	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	4.8	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	4	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	3	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	2.3	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	2.6	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.8	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	2	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	1.1	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-

Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249052	2249053	2249054	2249055	2249056
Sample Reference				SA103/TP114A	TP105	TP102	TP107	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.90	0.40	0.50	0.20
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	1.1	-	-	-

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

Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249057	2249058	2249059	2249060	2249061
Sample Reference				TP106	TP110	WS101	WS106	SA104/TP112
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.80	0.40	0.80	0.50
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	8.3	15	10	11	9.7
Total mass of sample received	kg	0.001	NONE	0.3	0.9	0.3	0.9	0.9

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	N/A	JSW	N/A	JSW	JSW

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.8	7.9	7.5	-	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	330	610	700	-	1000
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.089	0.13	0.31	-	0.32
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	180	250	620	-	650
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	89.1	126	310	-	323
Sulphide	mg/kg	1	MCERTS	< 1.0	8.7	3.9	-	2.5
Total Sulphur	mg/kg	50	MCERTS	120	330	290	-	280
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.2	2.9	0.8	-	1

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.22	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.35	< 0.05	1.8	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.42	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.52	< 0.05	3.4	0.3
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.53	< 0.05	3.2	0.32
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.37	< 0.05	2.1	0.23
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.41	< 0.05	1.8	0.31
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.4	< 0.05	2	0.29
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.27	< 0.05	0.84	0.14
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.33	< 0.05	1.8	0.23
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.22	< 0.05	0.93	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.32	< 0.05	1.2	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	3.72	< 0.80	19.6	1.82
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Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249057	2249058	2249059	2249060	2249061
Sample Reference				TP106	TP110	WS101	WS106	SA104/TP112
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.80	0.40	0.80	0.50
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	1.6	5.8	4.4	12	5.7
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	95	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	-	0.68	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	-	12	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.6	< 0.2
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0	< 4.0	5.7
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	4.8	9.5	8.8	-	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	6.2	25	4.5	190	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	5.6	42	7.3	310	21
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	0.7	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	3.8	7.4	3.6	25	8.8
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	20	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	12	69	19	540	33

Petroleum Hydrocarbons

TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	22	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	< 1.0	7	< 1.0	100	7.3
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	< 1.0	18	< 1.0	1200	17
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	380	< 10
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	MCERTS	< 10	25	< 10	1700	25

Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249057	2249058	2249059	2249060	2249061
Sample Reference				TP106	TP110	WS101	WS106	SA104/TP112
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.80	0.40	0.80	0.50
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	NONE	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	-
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	NONE	-	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	-

Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249057	2249058	2249059	2249060	2249061
Sample Reference				TP106	TP110	WS101	WS106	SA104/TP112
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.80	0.40	0.80	0.50
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	-

Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249057	2249058	2249059	2249060	2249061
Sample Reference				TP106	TP110	WS101	WS106	SA104/TP112
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.80	0.40	0.80	0.50
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-

Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249057	2249058	2249059	2249060	2249061
Sample Reference				TP106	TP110	WS101	WS106	SA104/TP112
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.80	0.40	0.80	0.50
Date Sampled				19/04/2022	19/04/2022	19/04/2022	19/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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

Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249062	2249063	2249064	2249065	2249066
Sample Reference				TP115	TP115	TP111	TP111	TP109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	1.50	1.50	2.00	0.15
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	19
Moisture Content	%	0.01	NONE	8.3	8.6	11	12	7.2
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.9	0.3	0.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	MDB	N/A	JSW	N/A	JSW

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	7.9	5.9	-	-
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	210	1100	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	0.084	0.53	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	170	1100	-	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	84.3	534	-	-
Sulphide	mg/kg	1	MCERTS	-	1.2	5.8	-	-
Total Sulphur	mg/kg	50	MCERTS	-	80	470	-	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	0.1	2.7	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.46	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.25	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	2.4	< 0.05	0.22	< 0.05	2
Anthracene	mg/kg	0.05	MCERTS	0.61	< 0.05	< 0.05	< 0.05	0.6
Fluoranthene	mg/kg	0.05	MCERTS	3.9	< 0.05	0.29	< 0.05	3.5
Pyrene	mg/kg	0.05	MCERTS	3.8	< 0.05	0.3	< 0.05	3.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.8	< 0.05	< 0.05	< 0.05	2.3
Chrysene	mg/kg	0.05	MCERTS	2	< 0.05	< 0.05	< 0.05	1.7
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.1	< 0.05	< 0.05	< 0.05	2
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.85	< 0.05	< 0.05	< 0.05	0.87
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.7	< 0.05	< 0.05	< 0.05	2
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.3	< 0.05	< 0.05	< 0.05	1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.41	< 0.05	< 0.05	< 0.05	0.24
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.8	< 0.05	< 0.05	< 0.05	1.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	26.4	< 0.80	0.81	< 0.80	20.6
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Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249062	2249063	2249064	2249065	2249066
Sample Reference				TP115	TP115	TP111	TP111	TP109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	1.50	1.50	2.00	0.15
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	2.9	4.3	2.7	14
Barium (aqua regia extractable)	mg/kg	1	MCERTS	170	-	-	10	130
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.73	-	-	0.21	0.49
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6	-	-	0.2	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	6.3	13	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	55	7.9	17	5.9	43
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	3.6	19	6.5	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.3	0.5	< 0.3	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	3.5	9.5	4	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	24	-	-	10	18
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	170	8.8	28	11	120

Petroleum Hydrocarbons

TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	-
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	-
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	-
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	-
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	4.4	< 4.0	< 4.0	< 4.0	-
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	23	< 1.0	< 1.0	< 1.0	-
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	130	< 1.0	< 1.0	< 1.0	-
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	46	< 10	< 10	< 10	-
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	MCERTS	200	< 10	< 10	< 10	-

Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249062	2249063	2249064	2249065	2249066
Sample Reference				TP115	TP115	TP111	TP111	TP109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	1.50	1.50	2.00	0.15
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chloroethane	µg/kg	1	NONE	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	-
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-	-
Tribromomethane	µg/kg	1	NONE	-	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	-

Analytical Report Number: 22-53531
 Project / Site name: East Hub
 Your Order No: 001359

Lab Sample Number				2249062	2249063	2249064	2249065	2249066
Sample Reference				TP115	TP115	TP111	TP111	TP109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	1.50	1.50	2.00	0.15
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	-

Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249062	2249063	2249064	2249065	2249066
Sample Reference				TP115	TP115	TP111	TP111	TP109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	1.50	1.50	2.00	0.15
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-

Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249062	2249063	2249064	2249065	2249066
Sample Reference				TP115	TP115	TP111	TP111	TP109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	1.50	1.50	2.00	0.15
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

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

Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Lab Sample Number				2249067	2249068	2249069	2249070	2249071
Sample Reference				TP109	TP103A	TP103E	TP108	TP113
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.25	0.90	2.00	1.50
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	18	< 0.1	< 0.1	5.3	< 0.1
Moisture Content	%	0.01	NONE	12	8.7	13	11	18
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.9	0.3	0.3

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile & Amosite	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	-	-
Asbestos Analyst ID	N/A	N/A	N/A	MDB	MDB	JSW	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.0	8.1	-	8.2	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	190	830	-	440	220
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.01	0.11	-	0.18	0.051
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	20	210	-	370	100
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	10.1	107	-	185	51.2
Sulphide	mg/kg	1	MCERTS	3.6	160	-	< 1.0	2.8
Total Sulphur	mg/kg	50	MCERTS	140	660	-	150	82
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.9	2.4	-	0.2	0.2

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.52	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.3	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	2.5	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	3.7	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.4	23	-	< 0.05	0.23
Anthracene	mg/kg	0.05	MCERTS	< 0.05	9.3	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.45	49	-	< 0.05	0.38
Pyrene	mg/kg	0.05	MCERTS	0.45	42	-	< 0.05	0.35
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.32	29	-	< 0.05	0.21
Chrysene	mg/kg	0.05	MCERTS	0.33	24	-	< 0.05	0.29
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.34	21	-	< 0.05	0.31
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.1	13	-	< 0.05	0.15
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.3	19	-	< 0.05	0.26
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	10	-	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	3.5	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	9.9	-	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.69	260	-	< 0.80	2.18
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Lab Sample Number				2249067	2249068	2249069	2249070	2249071
Sample Reference				TP109	TP103A	TP103E	TP108	TP113
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.25	0.90	2.00	1.50
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.6	20	5.9	3.9	2.5
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	54	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	0.32	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	0.3	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	9.6	24	-	5.6	6.7
Copper (aqua regia extractable)	mg/kg	1	MCERTS	25	160	32	8.7	9.2
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20	160	33	5.2	4.9
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	22	7.5	4.1	4.4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	19	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	37	430	95	15	13

Petroleum Hydrocarbons

TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	7.6	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	20	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	< 1.0	190	11	< 1.0	6.6
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	< 1.0	590	24	< 1.0	20
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	160	< 10	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	MCERTS	< 10	970	35	< 10	27

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Lab Sample Number				2249067	2249068	2249069	2249070	2249071
Sample Reference				TP109	TP103A	TP103E	TP108	TP113
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.25	0.90	2.00	1.50
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	-	-	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	-	-	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	< 1.0	-	-

Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249067	2249068	2249069	2249070	2249071
Sample Reference				TP109	TP103A	TP103E	TP108	TP113
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.25	0.90	2.00	1.50
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	< 1.0	-	-

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Lab Sample Number				2249067	2249068	2249069	2249070	2249071
Sample Reference				TP109	TP103A	TP103E	TP108	TP113
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.25	0.90	2.00	1.50
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	< 0.05	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	0.56	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	0.2	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	2	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	1.9	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	1.8	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	1.2	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	1.9	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	0.59	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	1.3	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	0.83	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	0.22	-	-

Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249067	2249068	2249069	2249070	2249071
Sample Reference				TP109	TP103A	TP103E	TP108	TP113
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.25	0.90	2.00	1.50
Date Sampled				20/04/2022	20/04/2022	20/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	0.87	-	-

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



Analytical Report Number: 22-53531
Project / Site name: East Hub
Your Order No: 001359

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

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

Quantitative Analysis

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

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

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

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2249068	TP103A	0.25	155	Loose Fibres & Loose Fibrous Debris	Chrysotile & Amosite	< 0.001	< 0.001

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



Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249072	2249073	2249074
Sample Reference				TP105	TP111	TP103E
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.90	1.50	0.90
Date Sampled				19/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status			

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	7.6	6.4	7.7
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	1.7	1.5	< 1.0
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	1.7	< 1.0	2.9
Cadmium (dissolved)	µg/l	0.08	ISO 17025	0.1	0.13	0.11
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	U/S
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.9	1.7	3.8
Copper (dissolved)	µg/l	0.7	ISO 17025	2	11	11
Lead (dissolved)	µg/l	1	ISO 17025	5.8	3.7	6.4
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	15	4.3	4.2
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	68	15	11

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10



Analytical Report Number: 22-53531

Project / Site name: East Hub

Your Order No: 001359

Lab Sample Number				2249072	2249073	2249074
Sample Reference				TP105	TP111	TP103E
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.90	1.50	0.90
Date Sampled				19/04/2022	20/04/2022	20/04/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status			

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_1D_TOTAL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
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TPH-CWG - Aliphatic >C5 - C6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35) HS+EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10	< 10

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

Analytical Report Number : 22-53531

Project / Site name: East Hub

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2249052	SA103/TP114A	None Supplied	0.5	Brown sandy loam with gravel and stones.
2249053	TP105	None Supplied	0.9	Brown sandy loam with gravel and vegetation.
2249054	TP102	None Supplied	0.4	Brown sandy loam with vegetation and gravel
2249055	TP107	None Supplied	0.5	Brown sandy loam with gravel.
2249056	WS105	None Supplied	0.2	Brown sandy loam with gravel and vegetation.
2249057	TP106	None Supplied	1	Brown sand with gravel.
2249058	TP110	None Supplied	0.8	Brown loam and sand with gravel and vegetation.
2249059	WS101	None Supplied	0.4	Brown clay and sand with gravel.
2249060	WS106	None Supplied	0.8	Brown clay and sand with gravel and vegetation.
2249061	SA104/TP112	None Supplied	0.5	Brown loam and sand with gravel.
2249062	TP115	None Supplied	0.15	Brown loam and sand with gravel and vegetation.
2249063	TP115	None Supplied	1.5	Brown clay and sand with gravel.
2249064	TP111	None Supplied	1.5	Brown loam and clay with gravel.
2249065	TP111	None Supplied	2	Brown clay and sand with gravel.
2249066	TP109	None Supplied	0.15	Brown sandy loam with gravel and vegetation.
2249067	TP109	None Supplied	1	Brown sandy loam with gravel and stones.
2249068	TP103A	None Supplied	0.25	Brown sandy loam with gravel and vegetation.
2249069	TP103E	None Supplied	0.9	Brown sand.
2249070	TP108	None Supplied	2	Brown gravelly sand with stones.
2249071	TP113	None Supplied	1.5	Brown sand.

Analytical Report Number : 22-53531

Project / Site name: East Hub

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

Analytical Report Number : 22-53531

Project / Site name: East Hub

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

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

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
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Analytical Report Number : 22-53531

Project / Site name: East Hub

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
HS	Headspace Analysis				
MS	Mass spectrometry				
FID	Flame Ionisation Detector				
GC	Gas Chromatography				
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))				
CU	Clean-up - e.g. by Florisil®, silica gel				
1D	GC - Single coil/column gas chromatography				
2D	GC-GC - Double coil/column gas chromatography				
Total	Aliphatics & Aromatics				
AL	Aliphatics				
AR	Aromatics				
#1	EH_2D_Total but with humics mathematically subtracted				
#2	EH_2D_Total but with fatty acids mathematically subtracted				
_	Operator - understore to separate acronyms (exception for +)				
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total				

APPENDIX VII

ORIGIN OF TIER I GENERIC ASSESSMENT CRITERIA

CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	2014 LQM/CIEH S4ULs
Cadmium	2014 LQM/CIEH S4ULs
Chromium	2014 LQM/CIEH S4ULs
Lead	PROVISIONAL C4SL
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene ⁽ⁱⁱⁱ⁾	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C ₅ -C ₆ (aliphatic)	
TPH C ₆ -C ₈ (aliphatic)	
TPH C ₈ -C ₁₀ (aliphatic)	
TPH C ₁₀ -C ₁₂ (aliphatic)	
TPH C ₁₂ -C ₁₆ (aromatic)	
TPH C ₁₆ -C ₂₁ (aromatic)	
TPH C ₂₁ -C ₃₅ (aromatic)	



APPENDIX VIII

GEOTECHNICAL TEST

CERTIFICATES



LABORATORY REPORT



4043

Contract Number: PSL22/3070

Report Date: 24 May 2022

Client's Reference: 15-354

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Eleanor Canham

Contract Title: East Hub

Date Received: 29/4/2022

Date Commenced: 29/4/2022

Date Completed: 24/5/2022

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:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)


S Eyre
(Senior Technician)

T Watkins
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

East Hub

Contract No:

PSL22/3070

Client Ref:

15-354

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

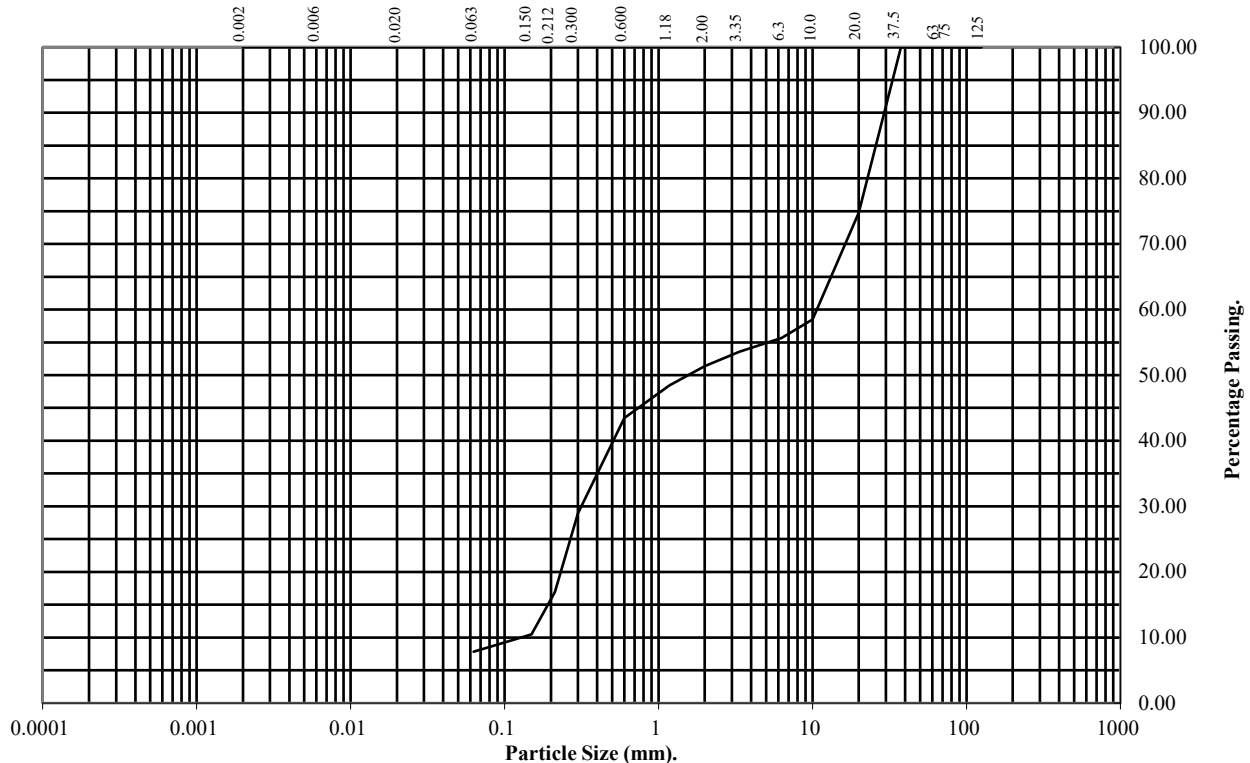
Hole Number: SA103/TP114b

Top Depth (m): 1.50

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	75
10	58
6.3	56
3.35	54
2	51
1.18	48
0.6	43
0.3	29
0.212	17
0.15	10
0.063	8

Soil Fraction	Total Percentage
Cobbles	0
Gravel	49
Sand	43
Silt/Clay	8

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

East Hub

Contract No:
PSL22/3070
Client Ref:
15-354

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

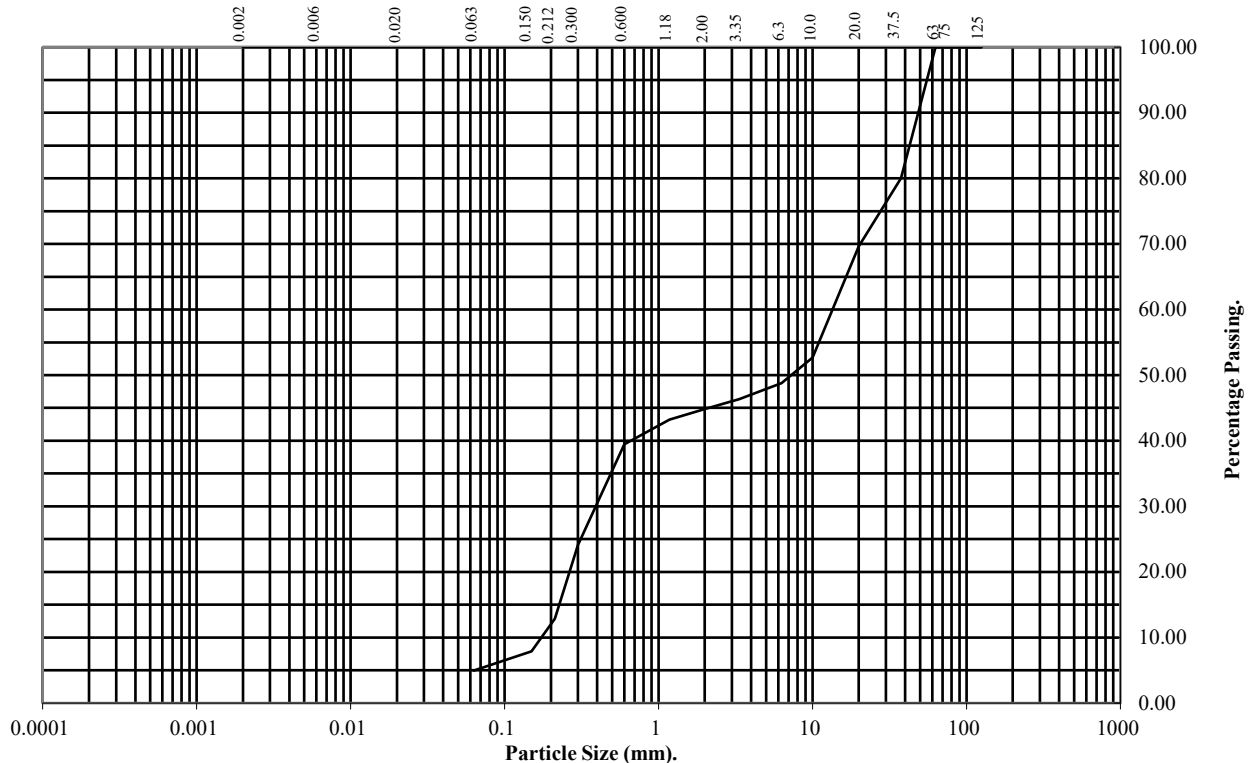
Hole Number: TP105

Top Depth (m): 1.80

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	80
20	70
10	53
6.3	49
3.35	46
2	45
1.18	43
0.6	39
0.3	24
0.212	13
0.15	8
0.063	5

Soil Fraction	Total Percentage
Cobbles	0
Gravel	55
Sand	40
Silt/Clay	5

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

East Hub

Contract No:
PSL22/3070
Client Ref:
15-354

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

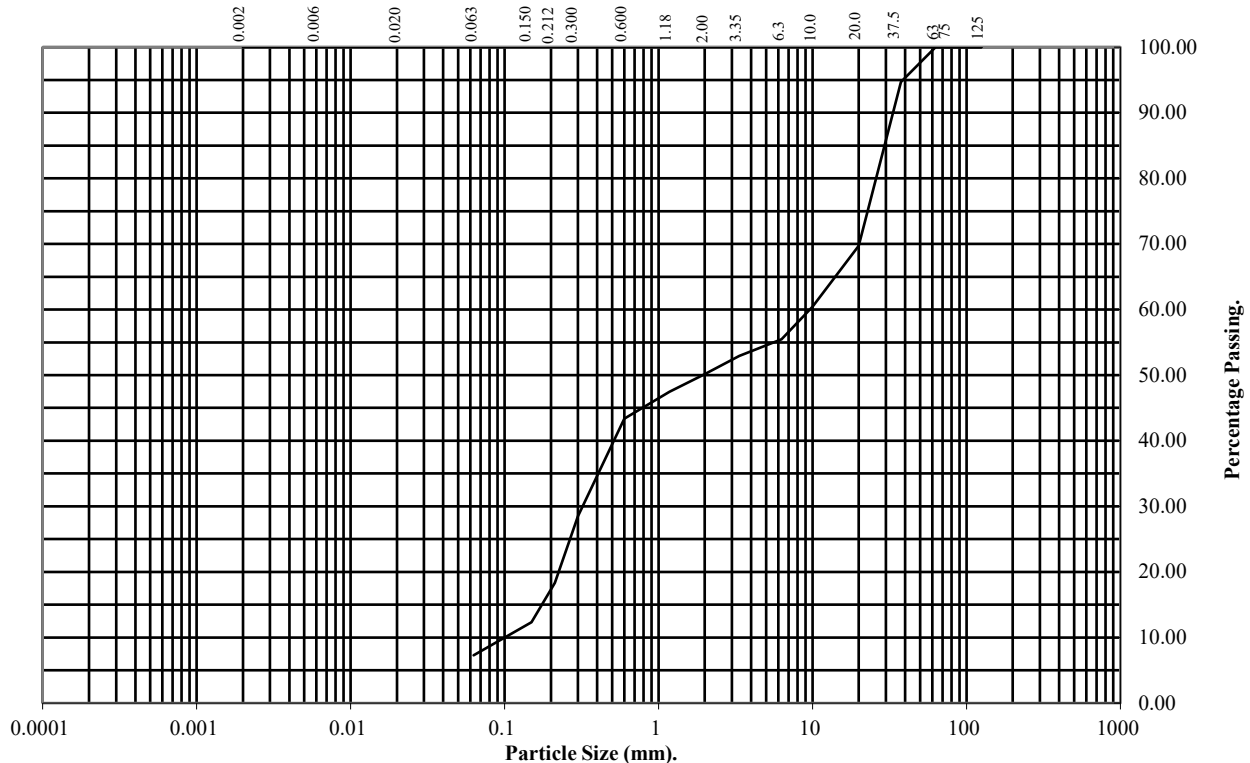
Hole Number: TP103e

Top Depth (m): 0.40

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	95
20	70
10	60
6.3	55
3.35	53
2	50
1.18	47
0.6	43
0.3	28
0.212	18
0.15	12
0.063	7

Soil Fraction	Total Percentage
Cobbles	0
Gravel	50
Sand	43
Silt/Clay	7

Remarks:

See Summary of Soil Descriptions



PSL
Professional Soils Laboratory

East Hub

Contract No:
PSL22/3070
Client Ref:
15-354

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.6 : 1990

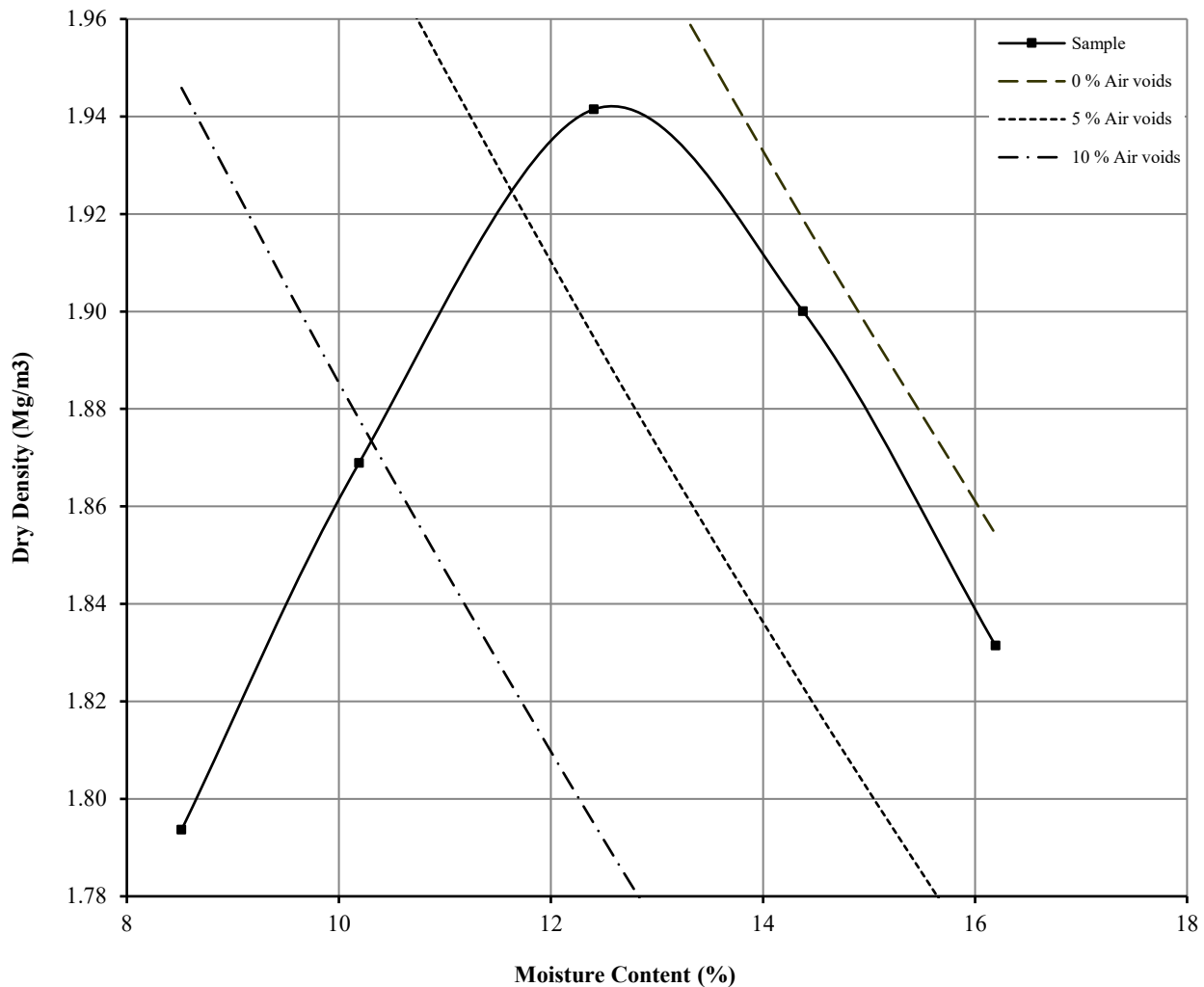
Hole Number: TP105

Top Depth (m) : 1.80

Sample Number:

Base Depth (m) :

Sample Type: B



Initial Moisture Content:	12	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m ³):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	20
Maximum Dry Density (Mg/m ³):	1.94		Material Retained on 20.0 mm Test Sieve (%):	10
Optimum Moisture Content (%):	12			
Remarks See summary of soil descriptions				



PSL
Professional Soils Laboratory

East Hub

Contract
PSL22/3070
Client Ref
15-354

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.6 : 1990

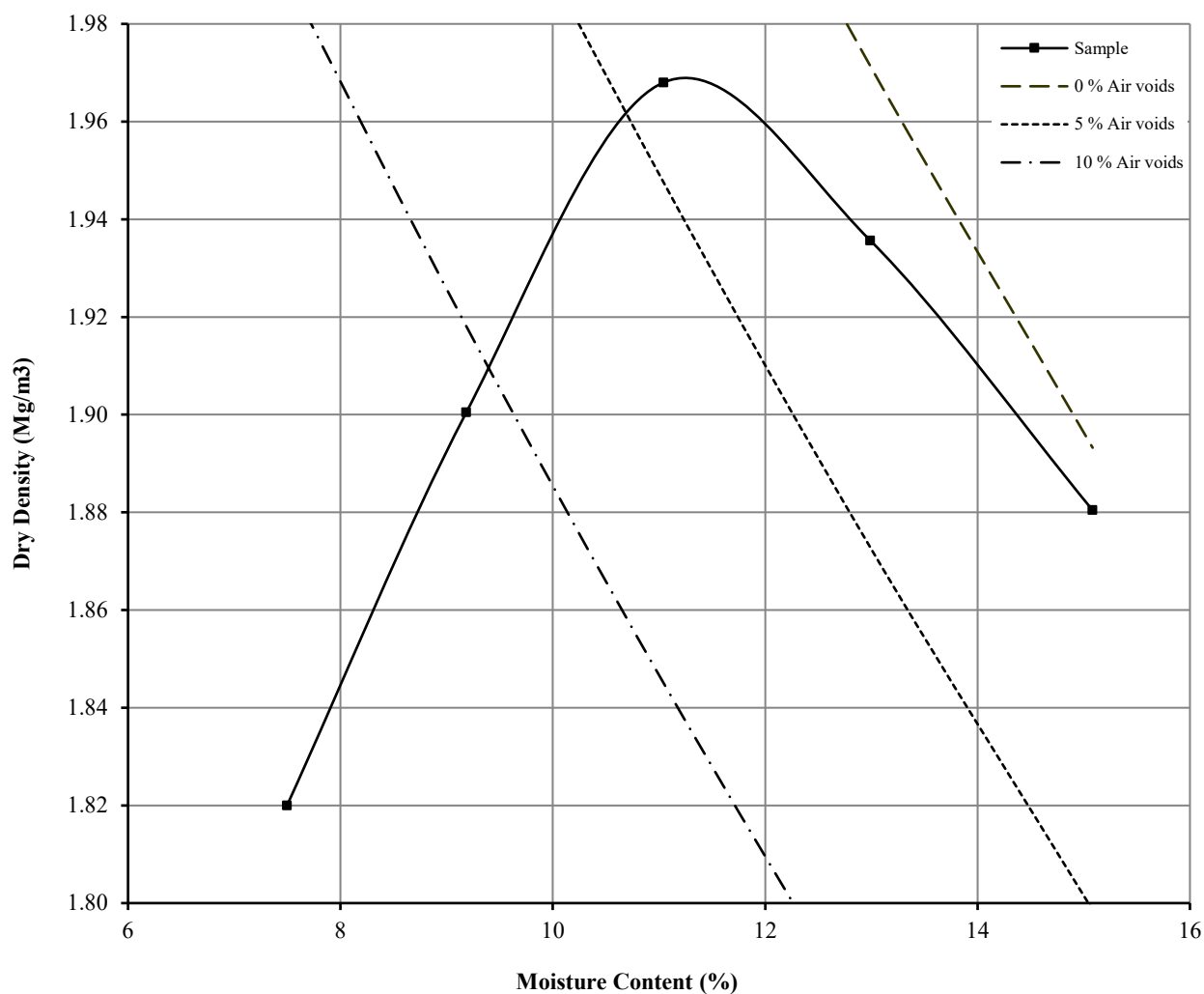
Hole Number: TP103e

Top Depth (m) : 0.40

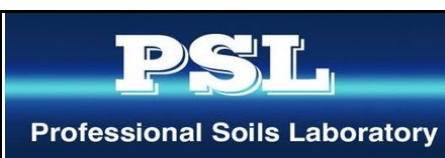
Sample Number:

Base Depth (m) :

Sample Type: B



Initial Moisture Content:	13	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m ³):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	5
Maximum Dry Density (Mg/m ³):	1.97		Material Retained on 20.0 mm Test Sieve (%):	25
Optimum Moisture Content (%):	11			
Remarks See summary of soil descriptions				



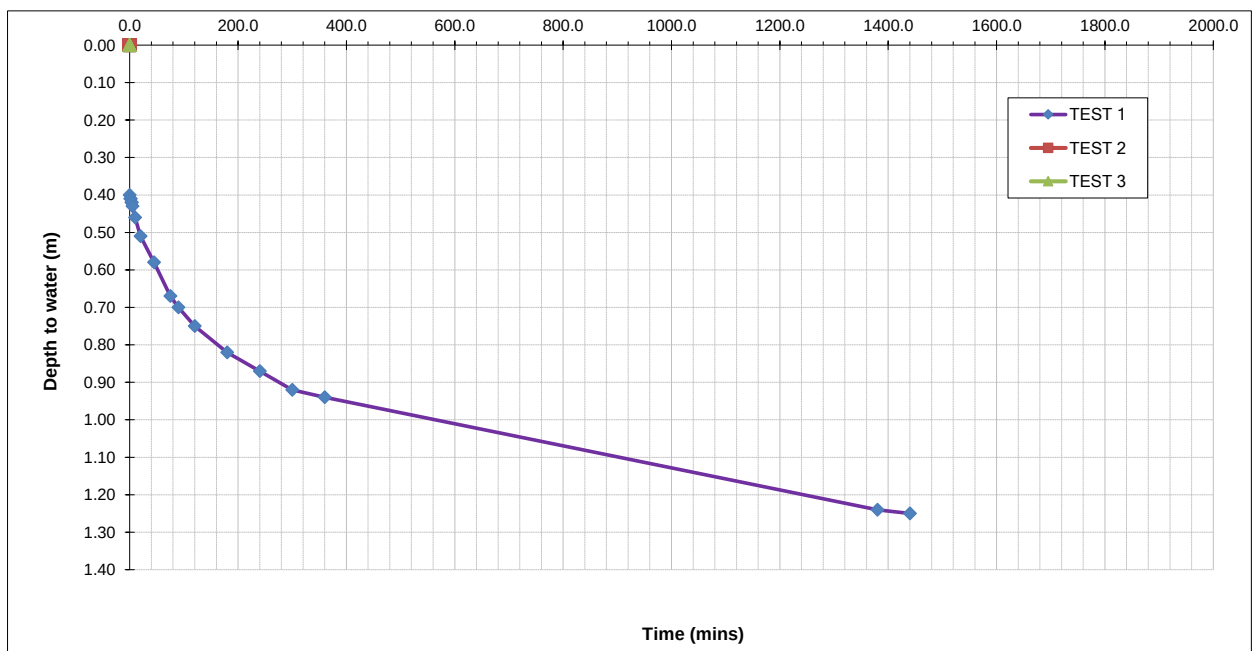
East Hub

Contract
PSL22/3070
Client Ref
15-354

APPENDIX IX SOAKAWAY TEST CERTIFICATES

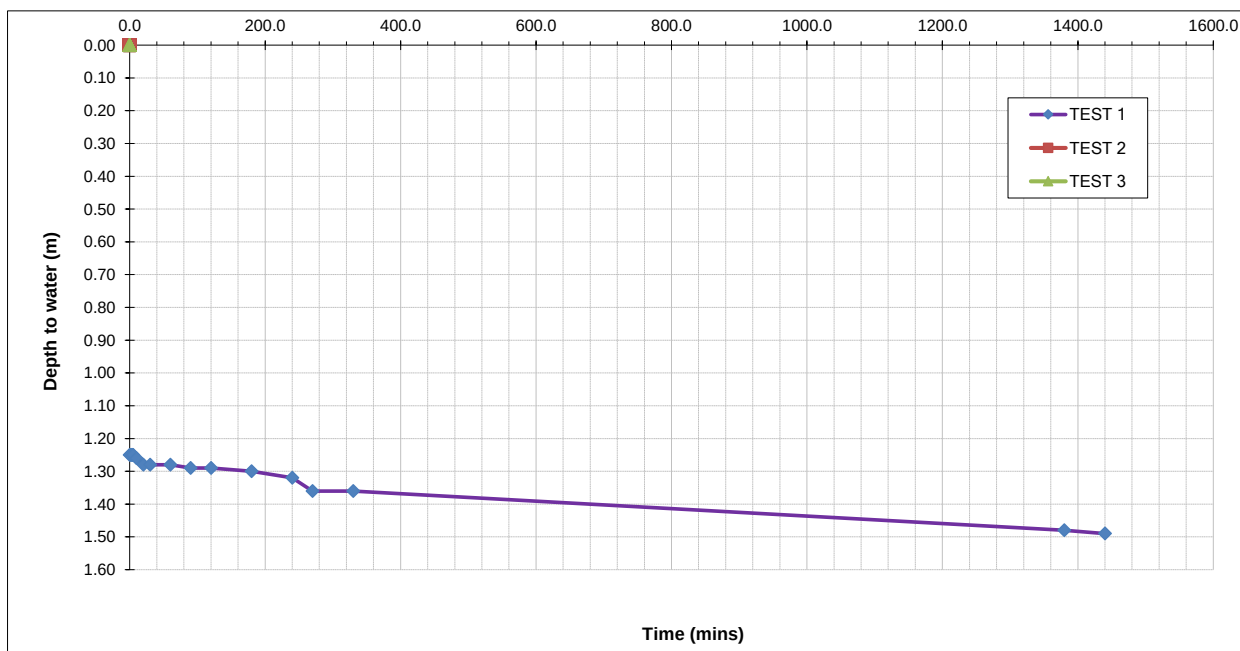
		Site: East Hub Job Number: 15-354 Date of Test: 19/04/2022	Trial Pit Number: SA101 Length: 2.40 m Width: 0.70 m Depth: 1.70 m Groundwater Level: m
The test did not reach 25 % effective storage depth after 24 hours, therefore an infiltration rate could not be calculated.	TEST 1 9.24 Time(min) Depth to Water (m)	TEST 2 Time(min) Depth to Water (m)	TEST 3 Time(min) Depth to Water (m)
	0 0.40 1 0.41 2 0.41 3 0.42 4 0.42 5 0.43 10 0.46 20 0.51 45 0.58 75 0.67 90 0.70 120 0.75 180 0.82 240 0.87 300 0.92 360 0.94 1380 1.24 1440 1.25		
Effective Storage Depth m 75% Effective Storage Depth m (i.e. depth below GL) m 25% Effective Storage Depth m (i.e. depth below GL) m Effective Storage Depth 75%-25% m Time to fall to 75% effective depth mins Time to fall to 25% effective depth mins V (75%-25%) m3 a (50%) m2 t (75%-25%) mins	1.30 0.98 0.73 0.33 1.38 0.65 100.00 N/A 1.09 5.71 N/A		
SOIL INFILTRATION RATE m/s	N/A		

DESIGN SOIL INFILTRATION RATE, f	N/A
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		Site: East Hub Job Number: 15-354 Date of Test: 19/04/2022		Trial Pit Number: SA102 Length: 2.20 m Width: 0.70 m Depth: 2.40 m Groundwater Level: m		
The test did not reach 75 % or 25 % effective storage depth after 24 hours, therefore an infiltration rate could not be calculated.	TEST 1 9.47		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0	1.25				
	1	1.25				
	2	1.25				
	3	1.25				
	4	1.25				
	5	1.25				
	10	1.26				
	20	1.28				
	30	1.28				
	60	1.28				
	90	1.29				
	120	1.29				
	180	1.30				
	240	1.32				
	270	1.36				
330	1.36					
1380	1.48					
1440	1.49					
Effective Storage Depth	m	1.15				
75% Effective Storage Depth	m	0.86				
(i.e. depth below GL)	m	1.54				
25% Effective Storage Depth	m	0.29				
(i.e. depth below GL)	m	2.11				
Effective Storage Depth 75%-25%	m	0.58				
Time to fall to 75% effective depth	mins	N/A				
Time to fall to 25% effective depth	mins	n/A				
V (75%-25%)	m3	0.89				
a (50%)	m2	4.88				
t (75%-25%)	mins	N/A				
SOIL INFILTRATION RATE	m/s	N/A				

DESIGN SOIL INFILTRATION RATE, f	N/A
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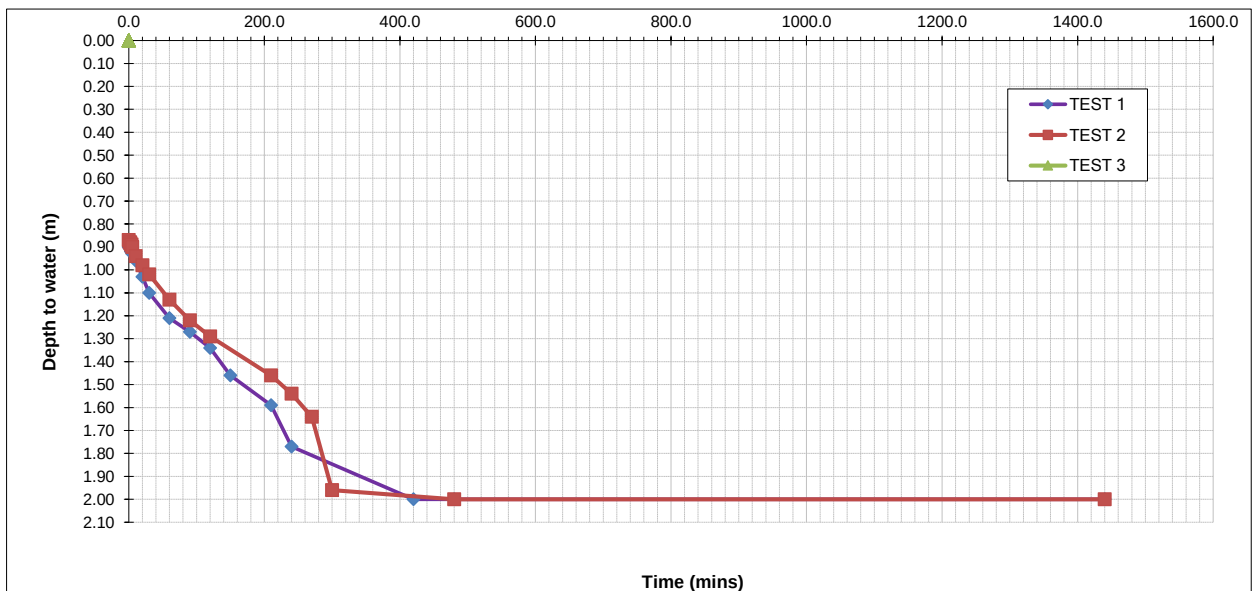


Site: East Hub
Job Number: 15-354
Date of Test: 19/04/2022

Trial Pit Number: SA103
Length: 2.40 m
Width: 0.70 m
Depth: 2.00 m
Groundwater Level:

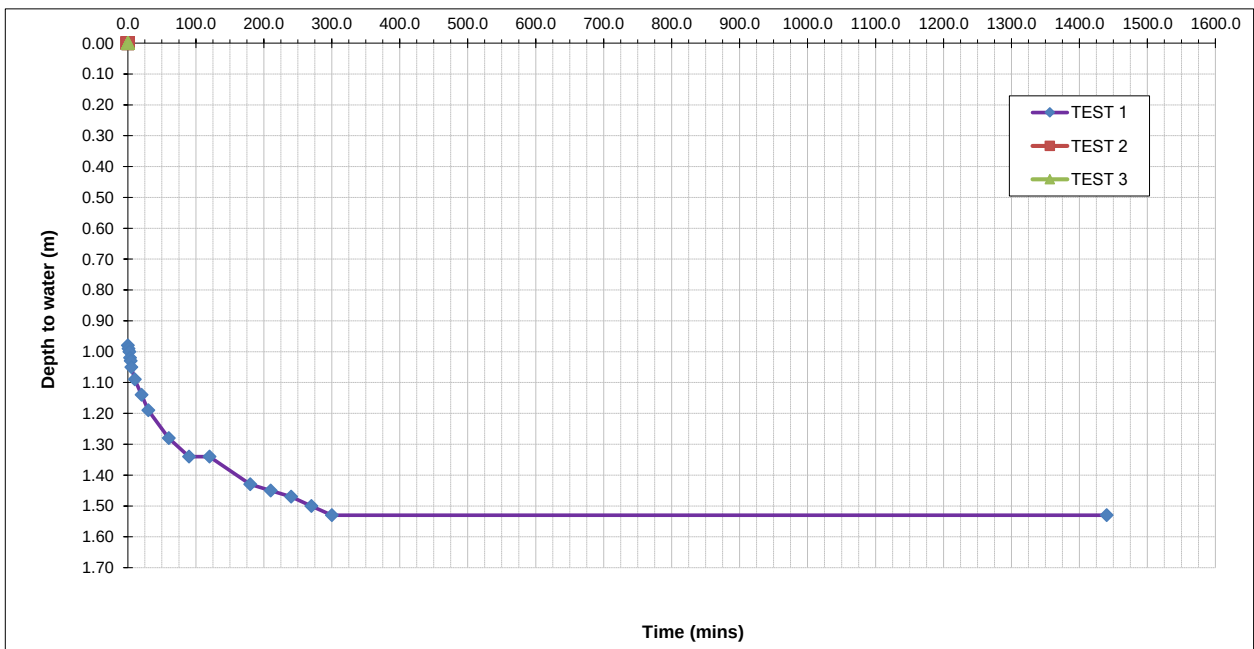
		TEST 1 10.58		TEST 2 9.37		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0	0.90	0	0.87		
		1	0.90	1	0.88		
		2	0.91	2	0.88		
		3	0.92	3	0.89		
		4	0.92	4	0.89		
		5	0.93	5	0.90		
		10	0.96	10	0.94		
		20	1.03	20	0.98		
		30	1.10	30	1.02		
		60	1.21	60	1.13		
		90	1.27	90	1.22		
		120	1.34	120	1.29		
		150	1.46	210	1.46		
		210	1.59	240	1.54		
		240	1.77	270	1.64		
		420	2.00	300	1.96		
		480	2.00	480	2.00		
		1440	2.00	1440	2.00		
Effective Storage Depth	m		1.10		1.13		
75% Effective Storage Depth	m		0.83		0.85		
(i.e. depth below GL)	m		1.18		1.15		
25% Effective Storage Depth	m		0.28		0.28		
(i.e. depth below GL)	m		1.73		1.72		
Effective Storage Depth 75%-25%	m		0.55		0.57		
Time to fall to 75% effective depth	mins		40.00		65.00		
Time to fall to 25% effective depth	mins		210.00		280.00		
V (75%-25%)	m3		0.92		0.95		
a (50%)	m2		5.09		5.18		
t (75%-25%)	mins		170.00		215.00		
SOIL INFILTRATION RATE	m/s		1.78E-05		1.42E-05		

DESIGN SOIL INFILTRATION RATE, f 1.42E-05



		Site: East Hub Job Number: 15-354 Date of Test: 19/04/2022		Trial Pit Number: SA104 Length: 2.40 m Width: 0.70 m Depth: 1.90 m Groundwater Level: m	
The test did not reach 25 % effective storage depth after 24 hours, therefore an infiltration rate could not be calculated.	TEST 110.06		TEST 2		TEST 3
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)Depth to Water (m)
	0	0.98			
	1	0.99			
	2	1.00			
	3	1.02			
	4	1.03			
	5	1.05			
	10	1.09			
	20	1.14			
	30	1.19			
	60	1.28			
	90	1.34			
	120	1.34			
	180	1.43			
	210	1.45			
	240	1.47			
270	1.50				
300	1.53				
1440	1.53				
Effective Storage Depth	m	0.92			
75% Effective Storage Depth	m	0.69			
(i.e. depth below GL)	m	1.21			
25% Effective Storage Depth	m	0.23			
(i.e. depth below GL)	m	1.67			
Effective Storage Depth 75%-25%	m	0.46			
Time to fall to 75% effective depth	mins	35.00			
Time to fall to 25% effective depth	mins	N/A			
V (75%-25%)	m3	0.77			
a (50%)	m2	4.53			
t (75%-25%)	mins	N/A			
SOIL INFILTRATION RATE	m/s	N/A			

DESIGN SOIL INFILTRATION RATE, f	N/A
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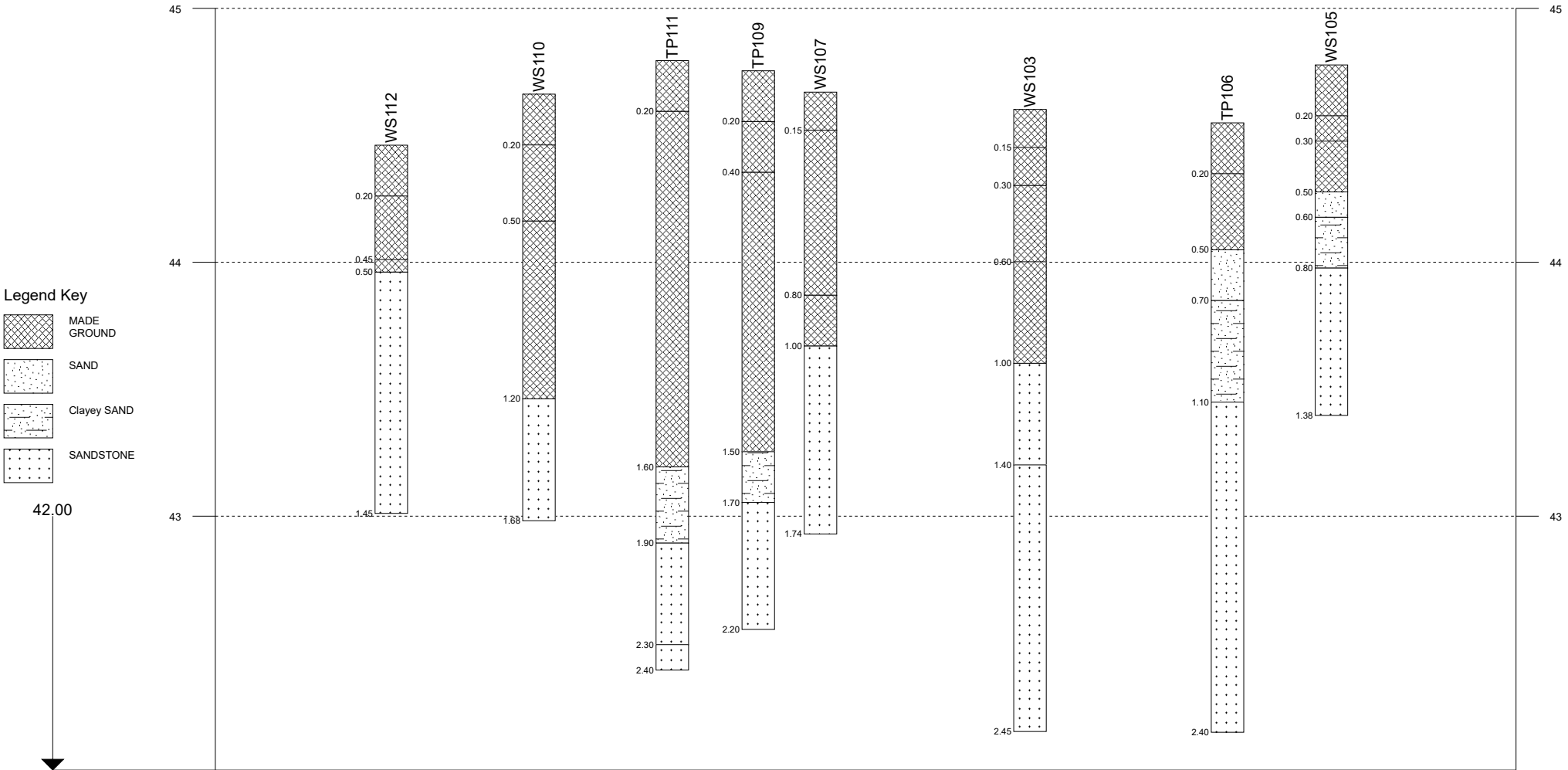


APPENDIX X

CROSS SECTIONS

Project Id: 15354
Project Title: East Hub
Location: Knowsley
Client: Redsun

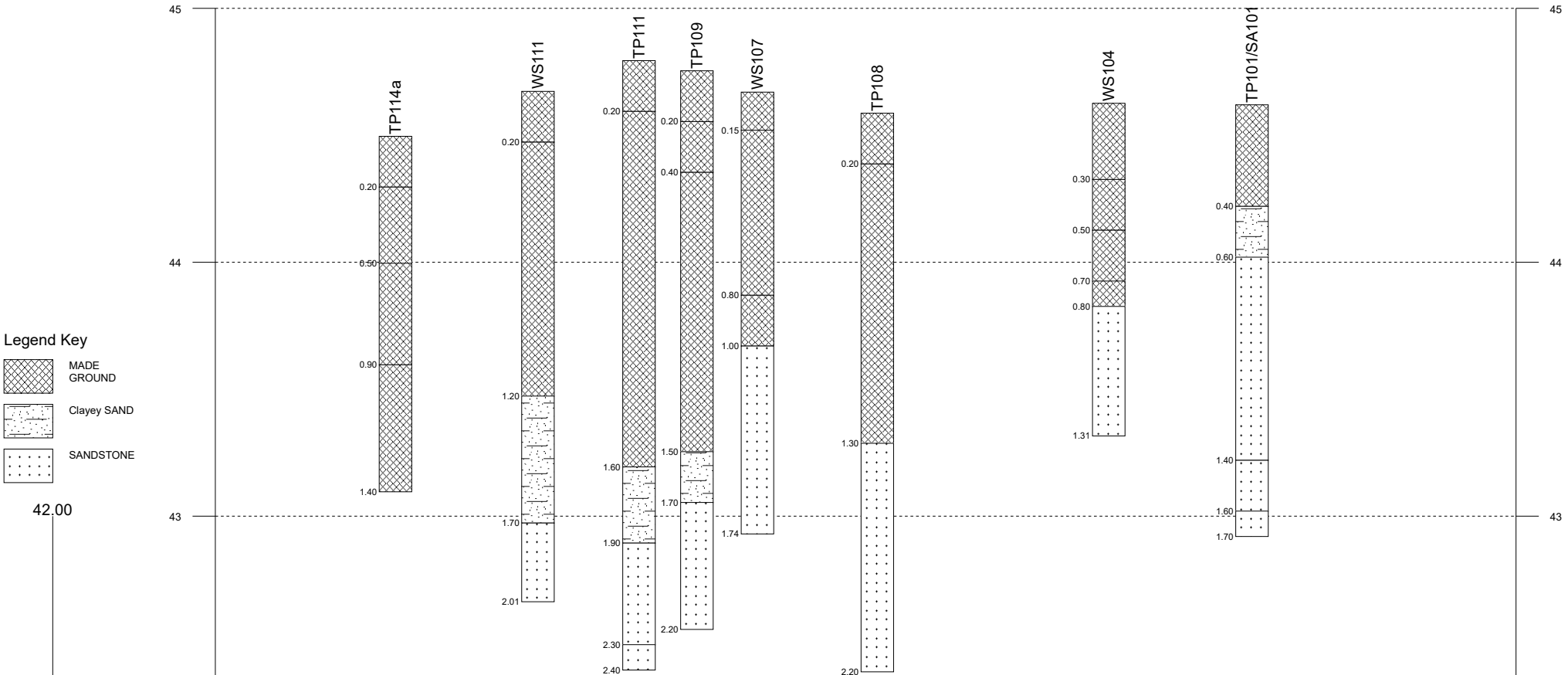
Title: Section line 1
Vertical Scale: 1:23
Horizontal Scale: 1:669
Engineer:



Chainage (m)	0.00	3.40	28.97	35.60	45.45	52.66	79.59	99.21	111.13	115.38
Offset (m)		1.25	0.08	0.99	2.71	0.92	0.88	3.87	1.71	
Elevation (mAOD)	44.46		44.66	44.79	44.75	44.67	44.60	44.55	44.78	

Project Id: 15354
Project Title: East Hub
Location: Knowsley
Client: Redsun

Title: Section line 2
Vertical Scale: 1:23
Horizontal Scale: 1:770
Engineer:



Chainage (m)	0.00	4.46	9.45	23.25	36.58	44.22	52.89	61.50	98.53	101.09	117.42	119.43	132.89
Offset (m)		2.71	2.42	1.39	3.84	2.62	3.08	0.56	0.04		4.25	4.58	
Elevation (mAOD)	44.50			44.67	44.79	44.75	44.67	44.59	44.63		44.62	44.69	

Project Id: 15354
Project Title: East Hub
Location: Knowsley
Client: Redsun

Title: Site Plan
Scale: 1:800
Engineer:
Contractor:



- Legend Key
- Sections - Section line 1
 - Sections - Section line 2
 - Locations By Type - Empty
 - Locations By Type - TP
 - Locations By Type - WS

