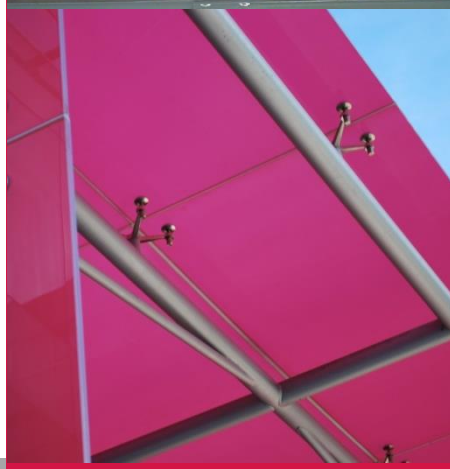








Embassy Village

Phase 2 Ground Investigation

Curtins Ref: 079942-CUR-XX-XX-RP-G-00002

Revision: P01

Issue Date: 21 October 2022

Client Name: Embassy

Client Address: c/o The Message Trust, Lancaster House, Harper Road, Sharston Industrial Area

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Rev	Description	Issued by	Checked	Date

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Executive Summary

Appointment	In March 2022 Curtins were instructed by Embassy to undertake a Phase 2 Ground Investigation for the proposed land under Castlefield Arches located off Dawson Street, Manchester, M15 4NU. The site is centred on NGR SJ 82746 97482 and covers an area of approximately 0.64Ha. Development comprises the construction of around 40no. new permanent accommodation for the homeless **to be located under the existing railway arches. The development will also include associated amenities including a village hall, reception/security pod, outside space with landscaping, vegetable growing areas and sports areas.**
Current Site Status	The site is currently located under and adjacent to masonry railway arches with a railway overhead. Some of the arches on the east of site are infilled with commercial units, the remainder of the arches are open and vacant. The site is accessed via Dawson Street.
Summary of Preliminary Site Assessment	Earliest historical mapping (1848) shows the site is undeveloped land with the River Irwell present to the northwest boundary. site was developed by 1896 and was occupied by railway masonry arches with surrounding residential and commercial development. The site remains as railway arches to present day. Made Ground deposits are indicated to be present onsite according to BGS. There are no BGS records for superficial deposits onsite. Bedrock is recorded as Chester Formation. Environment Agency data indicates the Chester Formation is recorded as a Principal Aquifer. There is no date available for the superficial deposits. There is one surface water abstraction points within 500m of the site. The nearest surface water feature is the River Irwell located along the northern and western boundaries of the site.
Fieldworks Undertaken	Field works were carried out between 28th March and 6th April, comprising fourteen window samples boreholes and sixteen trial pits. Ground gas and groundwater monitoring standpipes were installed within seven windowless sample boreholes (WS01, WS04B, WS05A, WS08, WS10, WS12 and WS13). Selected soil samples were subjected to laboratory analysis. Six ground gas monitoring visits have been undertaken to date between 12th May and 5th July 2022.
Encountered Ground Conditions	Made Ground was encountered in all exploratory holes from ground level to depths between 0.60m and 3.80m bgl. A made ground surface cover of concrete or granular made ground was encountered within all boreholes. Made ground underlying the surface cover typically comprised granular deposits of lightly gravelly, slightly silty, fine and medium SAND. Natural deposits were encountered in ten locations which identified cohesive natural deposits predominantly comprising of either a soft to firm, brown, sandy occasionally silty CLAY or a soft, brown, slightly gravelly, sandy SILT. Granular natural deposits predominantly comprised of a reddish brown, silty, fine and medium SAND. The base of the natural deposits was not encountered. Bedrock was not encountered. During return monitoring visits, groundwater levels were recorded between 1.49m and 2.70m bgl within the natural cohesive Deposits.
Environmental Laboratory Testing	With respect to the proposed *'Residential (with) home grown produce'*, and *'Allotments'* for selective samples, *considering the proposed* end-uses of various parts of the site, several exceedances were noted within the soil samples collected for metals and PAHs. Suspected asbestos containing materials were identified within WSA and a building onsite. Soil samples were also screened for asbestos, laboratory testing identified asbestos within WS14 at 0.20m bgl for amosite loose fibres. However asbestos quantification confirms this was below the limit of detection (<0.001% $^{w}/_{w}$). Groundwater sampling was not undertaken due to insufficient water within boreholes.
Ground Contamination and Ground Gas Assessment	A **Moderate/Low** risk rating is identified to site end-users and construction workers, from soils and dust from inhalation and ingestion. If all hardstanding proposed then no further action is required. Any proposed soft landscaping will need a clean capping layer with an enhanced layer needed within the allotments. A remediation strategy shall detail the clean capping and verification. Appropriate PPE must be provided for construction workers.

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	A **Low** risk rating is identified to controlled waters (Groundwater and Surface Waters) following the ground investigation, where no major sources of contamination were identified and limited pathways considering the majority of the site will be hardstanding. A **Low** risk rating is identified to site end users from ground gases arising from Made Ground and natural soils migrating into buildings and subsequent inhalation by on-site employees. This corresponds to a Characteristic Situation 1 (CS-1) gas regime, with no gas protection measures are required.
Geotechnical Assessment	Made Ground and shallow soft natural deposits will not provide a suitable founding stratum or sub-formation. Given the proposed development, low strength of natural soils and depth of made ground across the site, it is anticipated that a piled foundation solution is adopted to transfer the loads to deeper natural deposits. The carrying capacity of the piles depends not only on their size and the ground conditions but also the method of installation. With consideration of the railway arches, a mini piling rig may be considered given space restrictions. Based on observations on site combined with laboratory tests, it is recommended that consideration be given to a suspended floor slab. Based on the laboratory test results it is considered that a Design Sulphate Class and an ACEC classification for made ground is DS-3 AC-3, natural cohesive soils DS-2 AC-2 and natural granular soils DS-1 AC-1.
Recommendations	Based on the findings of the ground investigation, the following recommendations are made: 1) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results presented herein and within Appendix C. 2) Where soft landscaping is proposed, a clean capping layer will be required. 3) Where works are proposed to be undertaken in existing buildings onsite, an asbestos survey must be carried out before works are started 4) A piled foundation solution should be adopted for proposed structures/facilities. Consultation with piling contractors with experience in piling in similar ground conditions should be considered. Considering the space restrictions with the railway arches a mini piling rig should be used. 5) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer. 6) A Remediation Strategy and Verification report will be required to detail and approve the above measures in relation to capping across the site. 7) Carry out for further ground investigation works for pile design. Ensure they are co-ordinated and agreed with Network Rail and TfGM. 8) Principal Contractor to procure Detailed Unexploded Ordnance Risk Assessment Report to further assess risk to their works.

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Appendices

Appendix A **Drawings**

Appendix B **Exploratory Hole Logs**

Appendix C **Chemical Laboratory Testing Results**

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Appendix E **Ground Gas Monitor Results**

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Appendix G **Risk Assessment Methodology**

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1.0 Introduction

1.1 Project Background

Curtins were instructed by Embassy in March 2022 to undertake a Phase 2 Ground Investigation of land under Castlefield Arches located off Dawson Street, Manchester, M15 4NU. The site is centred on National Grid Reference (NGR) SJ 82746 97482 and covers an area of approximately 0.64 Ha. The site location plan is presented in *Figure 2.1*.

The proposed development comprises the construction of around 40no. new permanent homes for homeless to be located under the existing railway arches. The development will also include associated amenities including a village hall, reception/security pod, outside space with landscaping, vegetable growing areas and sports areas.

1.2 Scope of Services

The Phase 2 Ground Investigation Report will characterise the environmental and geotechnical conditions of the site. The ground investigation has been undertaken to assess the ground and groundwater conditions across the site.

The Phase 2 Ground Investigation Report is intended to:

a) Determine the risk of the proposed end-user being adversely impacted by potential contamination in shallow site soils that may be present on the site due to its known current, recent and historical use;
b) Determine if there is a risk to the end-user from soil gases including methane, carbon dioxide, carbon monoxide and hydrogen sulphide;
c) Provide information of the existing constriction detail for the river wall, canal wall and railway viaducts.
d) Characterise site wide natural soils and provide classification of soils for re-use;
e) Recommendations for the design of foundations and building ground floor slabs; and
f) Recommendations for the specification of sub-structure concrete.

Detailed flood risk assessment, ecology and archaeological studies are outside of the scope of this report.

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2.0 Preliminary Site Assessment Summary

This section presents a summary of the current site setting, history, geology, and hydrogeology/hydrology previously detailed in Curtins Phase 1 report (Ref. 1). As such it is advised that this report is read in conjunction with the Phase 1 report (Ref. 1).

This information will feed into the geotechnical assessment (refer to Section 11.0) and geo-environmental risk assessment (refer to Section 7.0).

2.1 Current Setting

The site is located under and adjacent to masonry railway arches with a Network Rail railway and Transport for Great Manchester (TfGM) metrolink overhead. The site is bound by the Bridgewater Canal at the south and the River Medlock to the north. Located off Dawson Street, Manchester, M15 4NU as show in *Figure 2.1* below.

Some of the arches on the east of site are infilled with commercial units, the remainder of the arches are open and vacant. The site is accessed off Dawson/Edgerton Street at the east of site, the access road slopes moderately towards the west on to site, the topography is then relatively level with the surface covered by hardstanding.

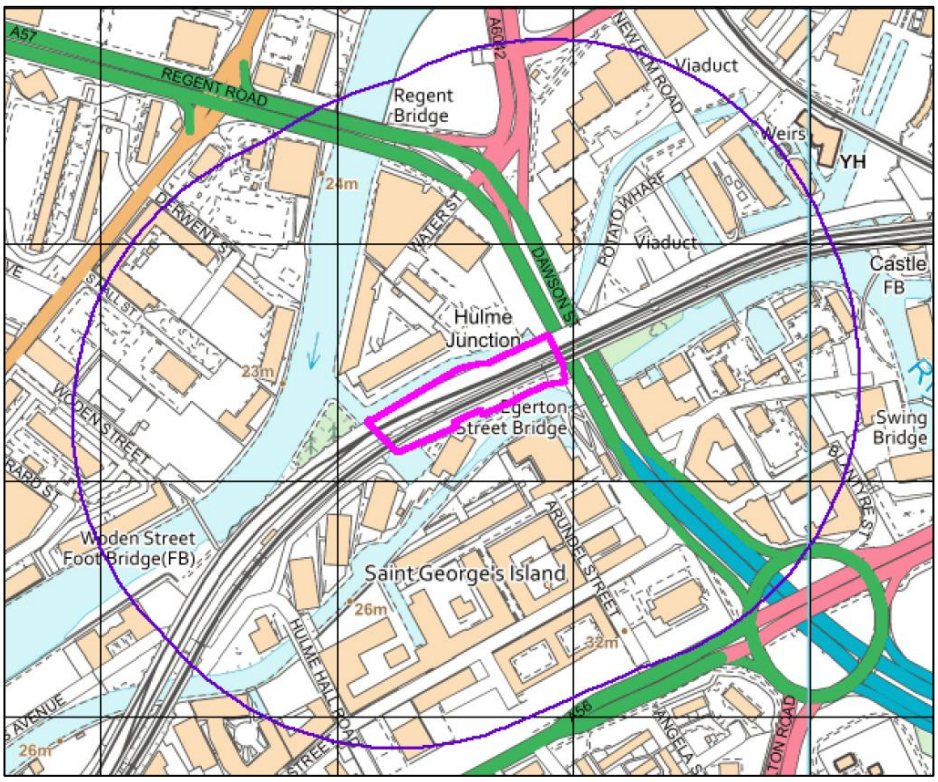


Figure 2.1 *– Site Location Plan (site boundary shown in pink). Crown Copyright. License number 100020245*

2.2 Surrounding Area Details

The following information was also established through undertaking an environmental database search (Ref. 1) included in *Appendix B*.

Table 2.2 – *Surrounding Area*

Surrounding Area	**N**	The River Medlock with flats and office buildings with car parking, the River Irwell beyond,
	E	Dawson Street / A635 Manchester ring road
	W	Railway arches, canal locks and the River Irwell
	S	Bridgewater Canal and Hulme Lock Basin with commercial buildings beyond

2.3 Previous Site Use

A review of the available historical mapping information for the site, as presented within Curtins Phase 1 report (ref. 1) has been undertaken with specific reference to potential sources of contamination.

Earliest mapping (1848) shows that the site was undeveloped land with the River Irwell present to the northwest boundary. The site was developed by 1896 and was occupied by masonry railway arches with surrounding residential and commercial development.

The site remains as railway arches to present day, some of which are infilled with commercial units. The warehouse which was located 10m north of the site seems to have been partly destroyed by 1950 and is then recorded as flats and offices by 2006 to present day.

Throughout the site's history, its surroundings are generally occupied by commercial development and some residential properties with some contaminative potential.

2.4 Published Geology

A review of the Curtins Phase 1 Report (Ref. 1), BGS borehole records and the British Geological Survey (BGS) maps,1:50,000 (Solid and Drift Edition) for Manchester (Sheet 085) (Ref. 2) indicates the following geological sequence underlying the site:

- No superficial deposits recorded.
- Chester Formation.

There are no BGS recorded fault lines on site or within 500m of the site.

There are 4 BGS recorded boreholes located onsite. Two of these boreholes are available and details are given in *Table 2.4*.

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Table 2.4 – *Historical Borehole Record from Surrounding Area*

Borehole Ref.	Location (Easting, Northing)	Details (bottom to top of strata/details/thickness of strata)	
SJ89NW1299	Southeast corner (382780, 397490)	0.00m to 0.15m bgl	Made Ground: Topsoil and ash (0.15m)
		0.15m to 2.10m bgl	Loose brown medium grained SAND and GRAVEL (1.95m)
		2.10m to 3.00m bgl	Loose clayey silty SAND with gravel (0.90m)
		3.00m to 4.10m bgl	Soft grey brown clayey SILT (1.10m)
		4.10m to 5.30m bgl	Soft to firm brown silty slightly peaty CLAY (1.20m)
		5.30m to 6.30m bgl	Medium dense silty fine-grained SAND (1.00m)
		6.30m to 6.40m bgl	Medium dense brown fine to coarse SAND and GRAVEL (0.10m)
		6.40m to 8.40m bgl	Reddish brown medium grained highly weathered SANDSTONE (2.00m)
		8.40m to 17.66m bgl	Reddish brown medium grained moderately weathered SANDSTONE with pieces of mudstone (0.61m)
		2.40m bgl	*Water level encountered*
		17.66m bgl	***Borehole terminated***
SJ89NW1297	Northeast corner (382770, 397520)	0.00m to 0.30m bgl	Made Ground (bricks and ash) (0.30m)
		0.30m to 0.40m bgl	Made Ground (bricks and clay) (0.10m)
		0.40m to 3.20m bgl	Made Ground (clay, brick and ash fill) (2.80m)
		3.20m to 3.80m bgl	Made Ground (sandy clay with brick fragments (0.60m)
		3.80m to 4.00m bgl	Made Ground (very sandy clay) (0.20m)
		4.00m to 5.70m bgl	Made Ground (bricks and ash) (1.70m)
		5.70m to 6.20m bgl	Made Ground (oily ash and sandstone) (0.50m)
		6.20m to 7.50m bgl	Made Ground (iron foundry furnace slag) (1.30m)
		7.50m to 8.10m bgl	Made Ground (sand and brick fragments) (0.60m)
		8.10m to 8.20m bgl	Medium dense reddish brown medium grained SAND (0.10m)
		8.20m to 10.00m bgl	Brown fine to medium grained highly weathered SANDSTONE (1.80m)
		5.70m	*Water level encountered*
		10.00m	***Borehole terminated***

2.4.1 Made Ground Deposits

Made Ground deposits are not indicated on the geological maps; however, it is anticipated that Made Ground of unknown composition will be present given the history of development on site. BGS Records indicate Made Ground deposits present less than 10m from the western boundary.

2.4.2 Superficial Deposits

No superficial deposits recorded.

2.4.3 Bedrock Deposits

Bedrock deposits are indicated to comprise the Chester Formation. The Chester Formation comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The conglomerates have a reddish-brown sandy matrix and consist mainly of pebbles of brown or purple quartzite. Gravel is composed of well-rounded pebbles, cobbles and boulders in a coarse to fine granulestone and silty sandstone matrix.

2.4.4 Mining and Quarrying

The site is not located within a Coal Mining Reporting Area, however it is not located within a Development High-Risk Area. The risk of the development from coal mine workings is **Low** and not considered further.

There are no active or inactive BGS recorded mineral sites within 900m of the site.

2.4.5 Other Ground Stability Issues

The Curtins Phase 1 Report (Ref. 1) confirms that there is a no hazard to very low risk from the following ground stability hazards on the site; collapsible ground, compressible ground, ground dissolution, landslide ground, running sands and shrinking or swelling clay.

2.4.6 Ground Gas

The Curtins Phase 1 Report (Ref.1) identifies one potentially infilled land feature located 126m east of the site.

There are no BGS recorded landfill or historic landfill site within 350m of the site.

The Curtins Phase 1 Report (Ref.1) confirms the site is situated in a lower probability radon area where <1% of homes are above the radon action level. On this basis radon protection measures are not considered necessary in the construction of new dwellings or extensions.

2.5 Hydrogeology and Hydrology

The Curtins Phase 1 Report (Ref. 1) indicates that the geological sequence underlying the site has the following hydrogeological characteristics:

Geology	Associated Hydrogeological Classification
Made Ground deposits are not indicated to be present	N/A
No superficial deposits recorded	No Data Available

Geology	Associated Hydrogeological Classification
Chester Formation[1]	Principal Aquifer[2]

Notes:

1. *The formation comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The conglomerates have a reddish-brown sandy matrix and consist mainly of pebbles of brown or purple quartzite. Gravel is composed of well-rounded pebbles, cobbles and boulders in a coarse to fine granulestone and silty sandstone matrix.*
2. *These are layers of rock or drift deposits that have high intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifers.*

The nearest surface water feature identified by the Envirocheck report (Ref.1) is the River Irwell, located along the northern and western boundaries of the site. The Bridgewater canal also borders the site to the south.

There are 10 pollution incidents to controlled waters recorded within 250m of the site. The closest recorded 54m southwest which recorded chemicals (detergents/surfactant) entering the Manchester Ship Canal dated February 1996. Incident severity was category 3, a minor incident.

There is one surface water abstraction within 500m of the site located 136m west of the site.

There are 24 active discharge consents recorded within 250m of the site. The nearest within the last 25 years is recorded 11m northeast for public sewage: storm sewage overflow. This is dated March 2018 with the receiving water being the River Medlock.

2.6 Unexploded Ordnance (UXO) Risk Assessment

Risk Mapping for UXO's (Ref. 3) has placed the site in a **Moderate** Risk area. Moderate risk areas are those that show a bomb density of 11-50 bombs per 1000 acres and may contain WWII targets.

A review of the available historic mapping identified the warehouse 10m north of the site on the 1938 map but blank spaces on the 1950 map. This could be evidence of bomb damage and the nearest is located being the warehouse. The risk mapping indicates that there are UXO finds approximately 550m north of the site.

Analysis of historical bomb mapping showed evidence of bomb damage within the east section onsite and 15m north from the site. A high explosive bomb hit the site dated December 1940. Within close proximity, the warehouse located 15m north of the site has evidence a high explosive bomb had hit the site dated December 1940. There is evidence of bombing ruins where the warehouse is located and damage the warehouse dated December 1940. This is detailed in Curtins Phase 1 report (Ref.1).

Considering the above, and lack of development since the railway masonry arches, the risk of encountering potential UXO as part of future intrusive works is considered **Moderate to High**. As such

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the procurement of a Detailed UXO Risk Assessment Report is recommended by the Principal Contractor to inform their works.

If unexploded ordnance is discovered during any works, stop immediately, prevent access to the area, and inform the police. If the site boundary or location changes then the UXO risk should be reassessed.

2.7 Summary of Phase 1 Conceptual Site Model

Table 2.7 records initial Potential Pollutant Linkages (PPL) identified which are to be assessed further through the Phase 2 Investigation.

Table 2.7 – *Potential Pollutant Linkages*

Source	Pathway	Receptor	Risk Rating
On-site sources of potential contamination: Potential contamination associated with Made Ground of unknown composition from uncontrolled deposition of materials onsite during the construction **Off-site sources of potential contamination:** Potential contamination associated with the uncontrolled deposition of Made Ground during the construction of roads and structures and demolition near and adjacent to the site's boundaries. Made ground recorded from BGS maps adjacent to the western boundary.	Direct contact, ingestion, inhalation (dust and vapours)	**Site End Users** (Residential)	**Moderate**
		Construction and Maintenance Workers	
	Vertical migration through the superficial deposits (soils)	**Controlled Waters** Groundwater – Principal Aquifer (Bedrock), no data is recorded for the superficial deposits or superficial aquifer	**Moderate/ Low**
On and off-site soils with the potential to generate ground gases: Localised organically rich deposits present within the natural soils. Infilled land (non-water) recorded 126m east of the site.	Vertical and horizontal migration through underlying superficial deposits into buildings and air spaces	**Site End Users** (Residential)	**Moderate**

Potential contaminants of concern associated with any Made Ground present include, amongst others; broad range aliphatic and aromatic hydrocarbons present within any fuel oils; inorganic compounds including heavy metals; and asbestos present in discarded building materials.

The qualitative risk assessment determined the above risks associated with the proposed development of the site warrant further investigation.

It was recommended that a ground investigation is conducted to both confirm this assessment and provide data in support of the structural and civil engineering design. The scope of the investigation undertaken in detailed in *Section 3.0*.

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3.0 Ground Investigation Scope of Works

Site investigation works were undertaken by Ian Farmers on behalf of Curtins between 28th March and 6th April 2022.

The scope of the ground investigation was designed in general accordance with current UK guidance including:

- LCRM (Ref. 4);
- British Standard (BS) 10175:2011+A2:2017 (Ref. 5);
- BS5930:2015+2020 (Ref. 6);
- and BS EN1997: Part 2:2007 Eurocode 7 (Ref. 7).

The scope and rationale are summarised in *Table 3.0*.

Table 3.0 – *Scope and Rationale of Fieldwork Undertaken*

Exploratory Hole Type	Exploratory Hole Ref.	Exploratory Hole Depth (m bgl)	Rationale
Window Sample Boreholes	WS01 WS02 WS03 WS04 WS04A WS04B WS05 WS05A WS07 WS07A WS08 WS09 WS10 WS11 WS11A WS12 WS13 WS14 WS14A WSA	4.45 4.45 0.46 1.36 1.38 4.45 0.24 4.45 0.50 4.45 4.45 4.45 4.45 0.55 5.45 4.45 4.45 1.43 1.40 0.20	Confirm ground conditions Collect soils samples for chemical analysis. Confirm concrete thickness in existing unit (WSA)
Trial Pits	TP01 TP02 TP03 TP04 TP06 TP07 TP08 TP09 TP10 TPA TPB TPC TPD TPE TPF TPG	1.30 1.80 1.20 1.20 1.20 1.20 1.30 2.40 1.20 2.50 1.20 1.20 2.30 2.20 1.15 1.20	Confirm shallow ground conditions Collect soils samples for chemical analysis. Identify extent of existing foundations of railway viaducts (TP01-TP10) Identify extent of existing foundations of canal & river walls (TPA-TPG)

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WS06 and TP05 were included within the original scope of works however Ian Farmers have started these were not carried out due to the presence of asbestos within the building they were located.

For the location of the exploratory holes refer to Ian Farmer Associates drawing ref. Figure No. A1.1.

3.1 Soil Logging and Sampling

Exploratory hole arisings were logged onsite by a qualified Engineer from Ian Farmers Associates and in accordance with the requirements of BS5930 (Ref. 6) including visual and olfactory indications of contamination were recorded. Exploratory hole logs can be referred to *Appendix B*.

3.2 Monitoring Well Installations

Groundwater monitoring 50mm diameter slotted pipes were installed within seven exploratory boreholes (WS01, WS04B, WS05A, WS08, WS10, WS12 and WS13). A bentonite seal was placed at the top and bottom of each of the exploratory holes, surrounding the screened sections of the pipe. A gravel surround was installed in the annulus between the sides of the borehole and the slotted section of the pipe.

The monitoring wells were designed to assess the potential for ground gas and monitor groundwater levels in all exploratory holes. No groundwater samples were collected. The screened sections therefore focused on the more permeable deposits where encountered, when possible, where ground gas and groundwater may be encountered.

A summary of the response zone is presented in *Table 3.2*.

Table 3.2 – *Monitoring Well Response Zones*

Borehole Ref.	Response Zone m bgl (m AOD)	Strata Description(s)
WS01	0.50 – 3.50	Made Ground
WS04B	1.00 – 3.00	Made Ground
WS05A	1.50 – 4.00	SILT
WS08	1.00 – 2.50	Made Ground
WS10	1.00 – 2.50	Made Ground
WS12	2.00 – 4.00	Made Ground and SAND
WS13	1.50 – 4.00	SILT and CLAY

A copy of the borehole logs can be referred to in *Appendix B* of this report.

3.3 Post-Investigation Monitoring

3.3.1 Groundwater and Ground Gas Monitoring

Six groundwater level and ground gas monitoring visits over 3 months have been undertaken to date, to assess the groundwater levels and the ground gas conditions identified in *Section 2.0.*

The results of the groundwater level monitoring are detailed in *Section 5.9.*

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4.0 Laboratory Testing

4.1 Geo-Chemical Analysis

Representative soil samples were selected for laboratory chemical analysis, based on field observations and to provide information about the encountered ground conditions.

Selected soil samples for chemical testing were placed in laboratory provided containers and stored in cool boxes prior to being transported to the nominated laboratory under the laboratory's chain of custody documentation. The laboratory selected by Curtins for chemical analysis was Envirolab (UKAS and MCERTS accredited) and for geotechnical analysis was Ian Farmers Associates (UKAS accredited).

Given the lack of any obvious sources of potential contamination the sampling positions were generally located in a non-targeted, systematic array, beneath the proposed development, to give adequate and representative coverage of the sites proposed end use and the immediate environmental setting, concentrated in the near surface deposits.

4.1.1 Soil Analysis

The source material of contaminants of concern potentially present on the site was considered to include, amongst others; organic matter, ash and fill, hydrocarbons (e.g. fuel/oils), polyaromatic hydrocarbons (PAHs), heavy metals, and asbestos.

The extent of the above is captured by the broad environmental testing suites listed in *Table 4.1.1*.

Table 4.1.1 – *Environmental Chemistry Analysis Suite: Soils*

Suite Ref.	Analyte	LOD
Soils Suite A	Asbestos Screen,	-
	pH Value,	0.01 pH
	2;1 Water Soluble Sulphate	0.01 g/l
	Soil Organic Matter (SOM)	0.1% w/w
	Arsenic, Chromium, Chromium VI, Copper, Lead, Nickel, Selenium	1 mg/kg
	Zinc	5 mg/kg
	Boron (water soluble)	1 mg/kg
	Cadmium	0.5 mg/kg
	Mercury	0.17 mg/kg
	Cyanide (total)	1 mg/kg
	Phenols (screen)	0.2 mg/kg

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Suite Ref.	Analyte	LOD
	PAHs (USEPA 16)	0.01 to 0.08 mg/kg
	TPH (Aro/Ali Split)	0.01 to 1 mg/kg

A total of fifteen soil samples were obtained and tested for Suite A, thirteen samples were taken within the made ground, two samples were undertaken in the natural superficial deposits.

Copies of the environmental chemistry testing certificates are presented in *Appendix C*.

4.1.2 Groundwater Analysis

As detailed in Section 2.7, the Phase 1 desk study (Ref. 1) assessed a Moderate/Low risk to groundwater and surface water receptors respectively, accounting for the site overlying a Principal Aquifer and the distance from the nearest surface water feature.

No visual or olfactory evidence of mobile phase soil contamination was encountered during the ground investigation. There was also insufficient water within the boreholes for obtaining groundwater samples.

The risk is further discussed in Section 7.0.

4.2 Geotechnical Testing

Soil samples for testing were prepared in accordance with BS1377: Part 1:2016 (Ref. 8).

The undertaken geotechnical testing is summarised in *Table 4.2.*

Table 4.2 – *Geotechnical Testing*

Test Type	Quantity	Standard
In Situ Testing		
Standard Penetration Testing	49(1)	BS 5930: 2015, Clause 41
Laboratory Testing (General Testing - Foundation Design)		
Atterberg Limit	8	BS1377 1990, Part 2 (clause 4.5, 5.3 & 5.4)
Moisture Content	8	BS1377 1990, Part 2
Particle size distribution by wet sieving	9	BS EN 17892:Part4:2016 clause 5.2.3
Particle size distribution by pipette analysis	3	BS EN 17892:Part4:2016 (clause 5.2.3) BS EN 17892:Part4:2016 (clause 5.4.3)
Water Soluble Sulphate	10	IS0 17025 MCERTS

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Test Type	Quantity	Standard
pH Value	10	IS0 17025 MCERTS

(1) Only includes SPTs tests in which full penetration was achieved.

The results of the geotechnical testing are summarised in *Section 6.0* of this report.

Copies of the geotechnical testing certificates can be referred to in *Appendix D*.

5.0 Ground Conditions

The ground conditions across the site, determined during the Curtins ground investigation works, generally comprised Made Ground overlying cohesive or granular deposits.

5.1 Encountered Ground Conditions

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

A summary of the geotechnical test results recorded within the superficial deposits are presented in *Section 6.0*. Full details of the geotechnical results can be found in *Appendix D*.

Table 5.1 – *Summary of Ground Conditions Encountered*

Strata	Depth to Top of Strata		Depth to Bottom of Strata		Thickness	
	Min m bgl	Max m bgl	Min m bgl	Max m bgl	Min (m bgl)	Max (m bgl)
Made Ground	0.00		0.20[1]	3.80	0.20	3.80
Cohesive (Clay / Silt)	1.20	3.80	3.39	5.45[1]	0.25[2]	2.30
Granular (sand)	0.60	4.20	1.20[1]	5.20[1]	0.45[2]	2.80

1 Base not proven
2 Thickness not proven

5.2 Made Ground

The Made Ground typically comprised a surface covering of either concrete or granular made ground deposits with granular made ground deposits underlying and some cohesive inclusions. Made Ground was encountered to a maximum depth of 3.80m bgl in WS01.

5.2.1 Surface Covering

Concrete was encountered in thirteen exploratory holes (WS02, WS03, WS05, WS07, WS07A, WS13, WSA, TP06, TP08, TPA, TPC, TPF and TPG), from ground level to depths between 0.05m and 0.18m bgl. Where concrete was not recorded, granular made ground was encountered within the remaining boreholes with the exception of WS01 and TP01. Granular made ground was described as brown slightly silty slightly to very gravelly fine sand with rare to occasional cobbles. Gravel is angular to subrounded and fine to coarse including sandstone, concrete, brick, quartz, clinker, concrete and glass. Cobbles are angular including brick. TPB

recorded gravels across the south west section of the trial pit with sandstone cobbles recorded towards the centre and north west section of the trial pit. WS01 and TP01 recorded grey slightly gravelly sandy silt with rare broken pottery and rare timber. Gravel angular to subangular and fine and medium including slate, clinker, concrete, coal and brick.

5.2.2 Granular Made Ground

Granular Made ground was encountered from ground level or underlying the concrete in all exploratory locations. A granular made ground of sand was recorded in the majority of these locations. Which was described as a slightly gravelly, slightly silty, fine and medium SAND with gravel of angular to subrounded and fine and medium of sandstone, brick, concrete and clinker with rare coal, ash and mudstone. A gravel made ground was encountered within boreholes from ground level within east and southeast section of the site. The gravel made ground was described as a very sandy, occasionally silty, angular to subangular, fine to coarse GRAVEL including limestone, sandstone, ash, clinker, concrete and brick.

5.2.3 Cohesive Made Ground

Cohesive made ground of clay was encountered within six locations within the central south and northwest corner of the site. The cohesive made ground was encountered underlying the granular (sand) made ground, it was described as a firm, brown, slightly sandy, slightly gravelly CLAY. Gravel was subrounded, fine and medium including mudstone, brick, siltstone and sandstone with rare cobbles and rare timber and rare glass. Locally described as firm orange-brown slightly sandy slightly gravelly CLAY. A silt made ground was encountered across the site within seven locations and was described as slightly gravelly, sandy SILT with rare broken pottery. Gravel is angular to subangular, fine and medium including coal, sandstone, slate and brick.

5.3 Cohesive Deposits (Alluvium)

BGS maps do not record superficial deposits onsite. However natural cohesive deposits, considered to be representative of Alluvium, were encountered underlying made ground within ten locations where the base of made ground was encountered. Cohesive Alluvium was typically interbedded with granular Alluvium.

The top of deposits was recorded between 1.20m to 3.80m bgl, recorded to a maximum depth of 5.45m bgl. The base of these deposits was not encountered.

Clay deposits were recorded as soft to firm, brown, sandy occasionally silty CLAY. Silt deposits were recorded as soft, brown, slightly gravelly, sandy SILT. Gravel was subrounded to rounded, fine and medium including sandstone and siltstone.

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WS05A recorded a soft, black, slightly sandy SILT/CLAY with organic odour.

5.4 Granular Deposits (Alluvium)

BGS maps do not record superficial deposits onsite. However natural granular deposits, considered to be representative of Alluvium, were encountered underlying made ground within five locations where the base of made ground was encountered. Granular Alluvium was typically interbedded with cohesive Alluvium.

The top of these deposits was encountered from 0.60m to 4.20m bgl, recorded to a maximum depth of 5.20m bgl. The base of these deposits was not encountered.

Sand deposits were recorded as mainly a reddish brown, silty, fine and medium SAND with pockets of brown, slightly gravelly, very silty, fine and medium sand and with occasional cobbles. Gravel was subangular to subrounded, fine to coarse including sandstone and mudstone. Cobbles were angular to rounded including sandstone and brick.

Sand was also recorded as either a medium dense, dark brown, slightly silty, fine and medium SAND, or a very loose to loose, brown, slightly gravelly, silty, fine to coarse SAND with pockets of clay. Gravel was angular to subrounded, fine and medium including sandstone.

5.5 Bedrock Chester Formation

The Chester Formation bedrock was not encountered during this investigation.

5.6 Observed Potential Contamination

WS06 and TP05 could not be undertaken during the site investigation due to the presence of asbestos within the building.

5.7 Obstructions Encountered

The following window sample boreholes and trial pits were terminated upon encountering the following obstructions or other health and safety issues during the intrusive investigation works detailed within *Table 5.7* below.

Table 5.7 – *Obstructions encountered during the Site Works*

Exploratory Hole	Depth m bgl	Obstruction	Notes
WS03	0.46	Hard brick fill	Pit terminated due to brick surface encountered
WS04	1.36	Potential cobble	Terminated due to SPT refusal. Relocated as WS04A.
WS04A	1.38	Potential cobble	Terminated due to SPT refusal. Relocated as WS04B.

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Exploratory Hole	Depth m bgl	Obstruction	Notes
WS05	0.24	Concrete	Terminated due to thick concrete. Concrete was attempted to be broken out by handheld drill, however concrete was too thick. Borehole relocated as WS05A
WS07	0.50	Possible brick cobble	Terminated due to possible brick cobble obstruction encountered. Relocated as WS07A.
WS11	0.55	Sandstone cobble/boulder	Terminated due to sandstone cobble/boulder obstruction. Relocated as WS11A
WS14	1.43	Possible cobble	Terminated due to SPT refusal on possible cobble. Relocated as WS14A.
WS14A	1.40	Possible cobble	Terminated due to SPT refusal on possible cobble.
TP01	1.30	Brick restricting space	Unable to machine dig deeper due to presence of brick surface creating a narrow space for further excavation.
WSA	0.20	-	Possible asbestos cement identified.

Possible asbestos containing cement was identified within WSA at 0.20m bgl and hence the hole was terminated.

5.8 Foundations/ Substructure of Existing Structures

5.8.1 Foundations of River and Canal Walls

Foundation trial pits were excavated along the internal edge of the River and Canal walls surrounding the site. Trial pits TPB, TPC, TPF and TPG are along the Bridgewater Canal wall and TPA, TPD and TPE were along the River Medlock wall. IFA's logs, photographs and cross sectional sketches are enclosed in Appendix B.

Trial pits along the River Medlock boundary wall all encountered a corbelled brick foundation as summarised below.

- In TPA a concrete step was encountered at 0.08m bgl, projecting 0.45m from the wall face, a brick step then projects out a further 0.90m at 1.70m bgl.
- In TPD and TPE brick step outs at 0.76m, again at 1.26-1.29m and again at 1.73m, each step projects 0.10m. The base of the brick was not encountered in any location and therefore is it is assumed it extends greater than 2.30m bgl.

Trial pits along the Bridgewater Canal, excluding TPB, encountered concrete foundations as summarised below.

- In TPC two concrete steps were recorded from surface with the first step at 0.20m, projecting between 0.20 to 0.30m from the wall and the second at 0.65m bgl projecting

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a further 0.25m from the wall. The base of the second step was not encountered but is assumed to be greater than 1.20m bgl.

- In TPF two concrete steps were encountered with the first projecting 0.20m and the second step at 0.72m bgl projecting a further 0.35m. The base of the second step was not encountered but is assumed to be greater than 1.20m bgl.
- In TPG two concrete steps were encountered with the first at 0.20m bgl, projecting 0.80m and the second step projecting a further 0.29m. Concrete then recedes back inwards, the base of the second step was not encountered but is assumed to be greater than 1.20m bgl.
- TPB was split into three Zones A to C and were terminated at 0.40m bgl, 0.40m bgl and 1.20m bgl respectively. No foundations were encountered within this trial pit.

5.8.2 Foundations for Railway Viaducts

Foundation trial pits TP01 to TP04 and TP06 to TP10 were excavated to between 1.20 to 2.40m bgl, undertaken against the existing railway arches. IFA's logs, photographs and cross sectional sketches are enclosed in Appendix B.

Foundation/substructure details encountered are further summarised below.

- A brick foundation was encountered between 0.50 to 1.00m bgl which stepped out projecting approximately 0.05m to 0.15m from the brick arch wall within 7 of the trial pits.
- The base of these foundations were not determined and are therefore thought to extend below 2.40m bgl.
- Within TP06 and TP10 a brick foundation was not encountered and instead a concrete foundation was identified.
- The concrete was encountered between 0.40 to 0.65m bgl and steps out 0.43 to 0.48m. The concrete base in TP10 was encountered at 1.10m bgl. The base of the concrete foundation was not encountered within TP06.

5.9 Groundwater

A summary of the groundwater levels recorded during the siteworks is presented in *Table 5.9a*.

Table 5.9a – *Groundwater Noted During Site Investigation*

Borehole Ref.	Water Strikes	
	Strike Depth m bgl	Strata
WS04B	3.00	SILT

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Borehole Ref.	Water Strikes	
	Strike Depth m bgl	Strata
WS05A	3.00	SILT
WS07A	3.00	SAND
WS10	3.00	CLAY
WS11A	3.00	SAND
WS12	3.00	SAND
WS13	3.00	CLAY interbedded with sandy SILT
TP06	1.05	MADE GROUND
TPC	0.58	MADE GROUND
TPF	0.90	MADE GROUND
TPG	0.80	MADE GROUND

Six rounds of groundwater monitoring have been undertaken to date, between 12th May and 5th July 2022, the results of which are presented in *Table 5.9b*.

Table 5.9b – *Groundwater Monitoring Results*

Borehole Ref.	Installation Strata	Response Zone m bgl	Depth, m bgl					
			12/05/22	20/03522	31/05/22	06/06/22	10/06/22	05/07/22
WS01	Made ground	0.50 – 3.50	Dry	Dry	Dry	Dry	Dry	Dry
WS04B	Made ground	1.00 – 3.00	3.10	3.07	3.05	Dry	Dry	Dry
WS05A	SILT	1.50 – 4.00	1.49	1.65	1.58	1.56	1.60	1.70
WS08	Made ground	1.00 – 2.50	2.02	2.20	2.17	2.03	2.56	2.53
WS10	Made ground	1.00 – 2.50	Dry	Dry	Dry	Dry	Dry	Dry
WS12	Made ground and SAND	2.00 – 4.00	3.50	3.57	3.50	3.48	3.49	3.59
WS13	SILT and CLAY	1.50 – 4.00	2.67	2.68	2.70	2.66	2.69	2.70

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Perched groundwater was encountered in the made ground deposits at depths from 0.58m bgl.

A consistent groundwater table was encountered at 3.00m bgl within the site investigation works in the natural deposits within a number of the boreholes, groundwater may be in connectivity with the adjacent river.

On return monitoring groundwater levels recorded were reflective of perched water in made ground deposits. Exploratory holes installed within natural strata recorded groundwater between 1.49m and 3.59m bgl.

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6.0 Ground Model

6.1 Made Ground

Made Ground was encountered in all exploratory holes.

The geotechnical test results recorded within the Made Ground are summarised in *Table 6.1.1*

Table 6.1.1 – *Summary of geotechnical test results – Made Ground*

Parameter		No. of tests	Results	
			Minimum	Maximum
SPT 'N' Value (1)		21	2	11
pH		21	7.09	8.13
Water Soluble Sulphate (mg/l)		21	45	2180
Particle Size Distribution		3	See *Figure 6.1.2*	
Atterberg Test	Liquid Limit (%)	2(2)	43	
	Plastic Limit (%)	2(2)	22	
	Plasticity Index (%)	2(2)	21	
	Modified Plasticity Index (%)	2(2)	20.58	

(1) Only includes SPTs tests in which full penetration was achieved.
(2) One result recorded as non-plastic

Three particle distribution tests were carried out on the granular made ground which was typically described as a sand or a silty sand. The sand percentage dry mass within the dredged sand material ranged from 46 to 79%. The percentage of dry mass per fractions is presented in *Figure 6.2* overleaf.

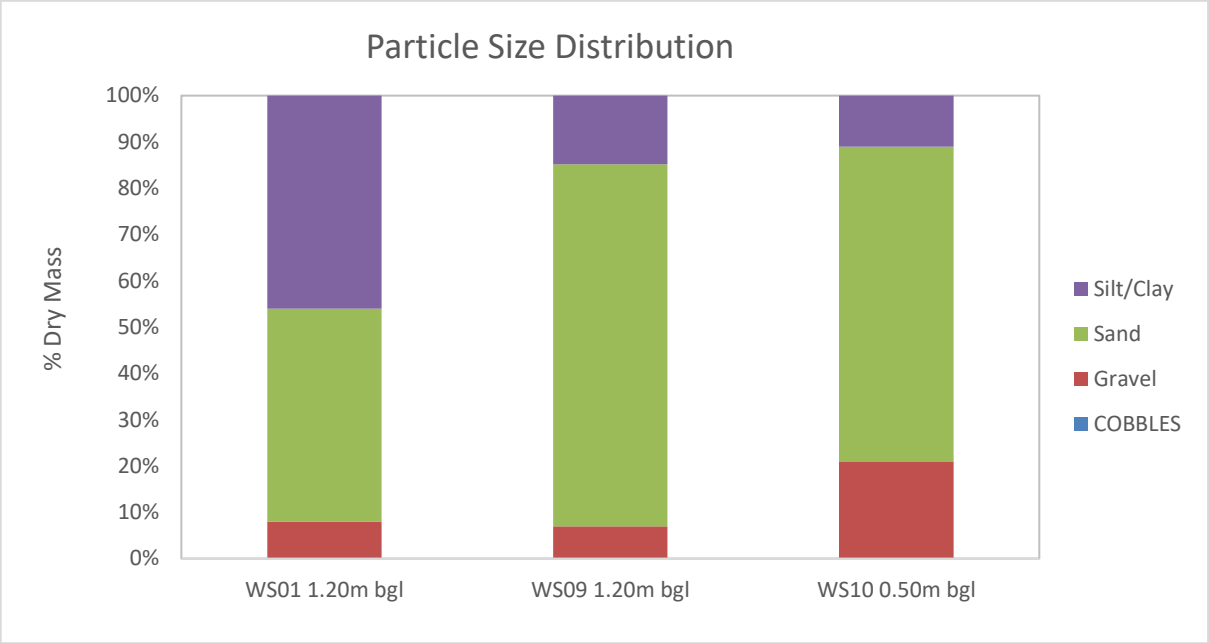


Figure 6.1.2 – *Particle Size Distribution – made ground*

Two Atterberg Tests were completed. One sample reported a non-plastic result (WS12 at 1.00m bgl). The other sample, WS01 at 2.00m bgl, had a modified plasticity limit of 20.5 indicating Low plasticity.

Due to the variable nature of Made Ground, in terms of strength and composition, this layer is not deemed to be a suitable founding stratum. As such, parameters have not been derived for the Made Ground.

6.2 Natural Deposits

Where made ground was bypassed, natural deposits were encountered with ten locations encountering cohesive deposits and five locations encountering granular deposits.

6.2.1 Cohesive Alluvium Deposits

The geotechnical test results recorded within the Cohesive deposits are summarised in *Table 6.2.1.*

Table 6.2.1 – *Summary of geotechnical test results – Cohesive deposits*

Parameter	No. of Tests	Results	
		Minimum	Maximum
In-Situ Tests			
SPT 'N' Value [(1)] – Cohesive	20	0	9
Laboratory Tests			

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Parameter		No. of Tests	Results	
			Minimum	Maximum
Atterberg Test	Liquid Limit (%)	4	28	35
	Plastic Limit (%)	4	16	20
	Plasticity Index (%)	4	11	16
	Modified Plasticity Index (%) (2)	4	8.64	14.88
Moisture Content (%)		4	19.8	27.1
pH		3	5.81	7.33
Water Soluble Sulphate (mg/l)		3	70	641

(1) Only includes SPTs tests in which full penetration was achieved.
(2) Modified plasticity index is the plasticity of components <425µm.

The Atterberg Test results typically indicate Low plasticity clays from the samples taken. The results of the Atterberg Limits are presented in *Figure 6.2.1a*.

The SPT N results are presented on *Figure 6.2.1b*, showing a general increase in SPT values with depth.

A moderately conservative unit weight of 16 kN/m^3 is deemed suitable for soft to firm cohesive above and below the groundwater table in accordance with BS8002:2015 (Ref. 9).

The Undrained Shear Strength, Cu, of cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 10) using Equation 1:

$$Cu = f_1 \times SPT\ N \qquad \textbf{Equation 1}$$

Where:

Cu is the Undrained Shear Strength

f_1 is the Stroud Factor determined from Figure 1.5 (Ref. 10)

SPT N is Characteristic Standard Penetration Test Result

Using an f1 factor of 5.5 for an average plasticity index of 13.5%, Cu values ranging between 0 and 49.5kPa were determined. The estimated results indicate an extremely low to medium strength clay, generally increasing with depth below 3m bgl.

Figure 6.2.1c indicates the estimated Undrained Shear Strength of cohesive deposits derived through correlation between SPTs and plasticity indices is greater than the strength of the soils determined through laboratory analysis, where shear strength values were between primarily recorded as low to medium strength clays (0kPa and 49.5kPa).

The Coefficient of Consolidation, Mv, of the cohesive soils can be estimated from the correlation between Plasticity Indices (PI) and SPT N values (Ref. 11) described by Equation 2:

$$Mv=1/(f_2 \times SPT\ N) \qquad \textbf{Equation 2}$$

Where:

Mv is the coefficient of consolidation

f_2 is the Stroud Factor determined from Figure 1.5

SPT N is Characteristic Standard Penetration Test Result

Using an f2 factor of 0.55 for an average plasticity index of 13.5%, Mv values typically range between 0.202 and 0.909 m^2/MN. The majority of results indicate a medium to high compressibility clay. The values are shown in *Figure 6.2.1d.*

The Angle of Shearing Resistance, ϕ', for the cohesive deposits has been derived from the correlation with Plasticity Indices (Ref. 12) show in *Figure 6.2.1e*.

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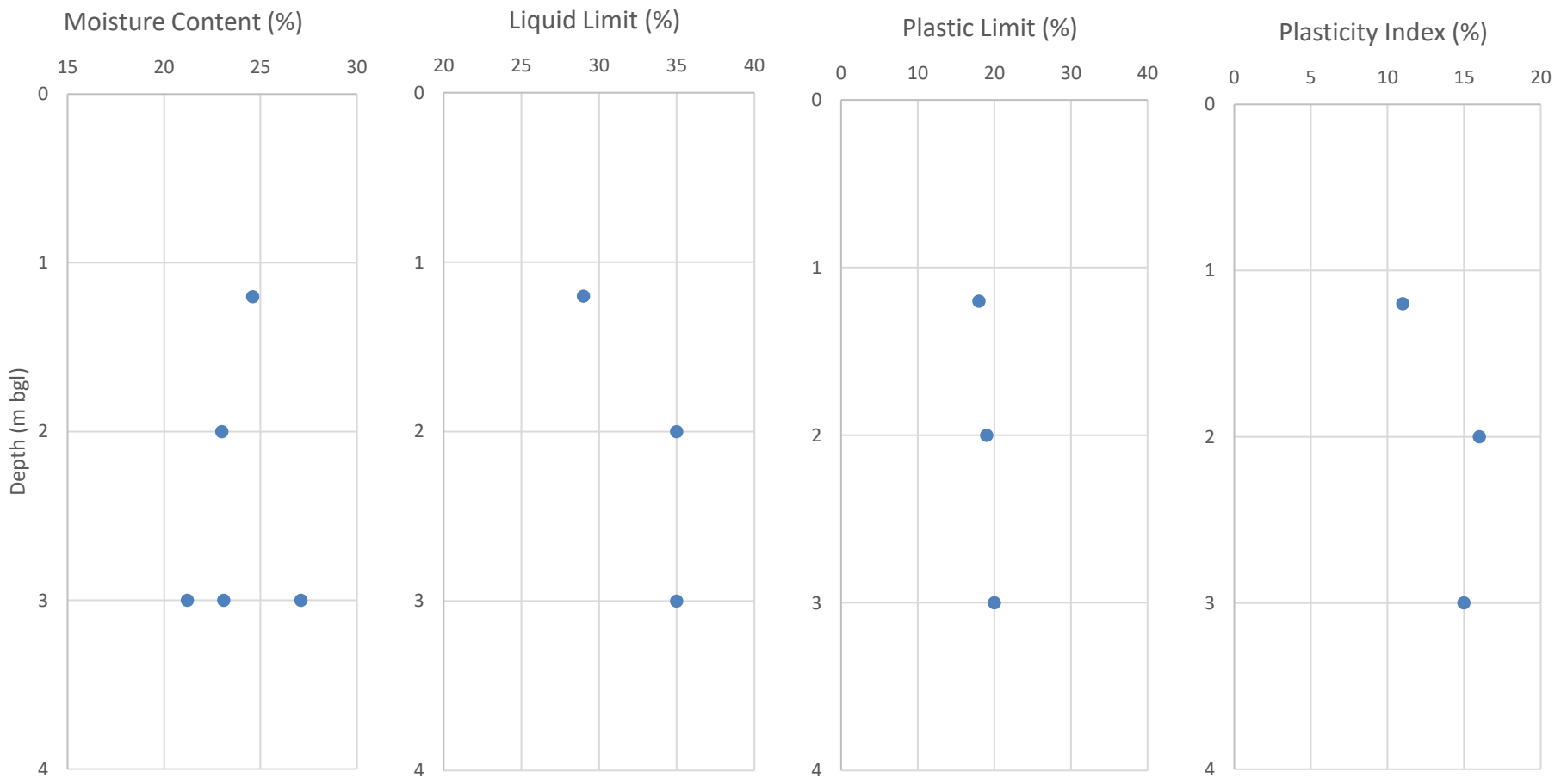


Figure 6.2.1a – *Summary of Atterberg Test Results vs. Depth (m bgl)*

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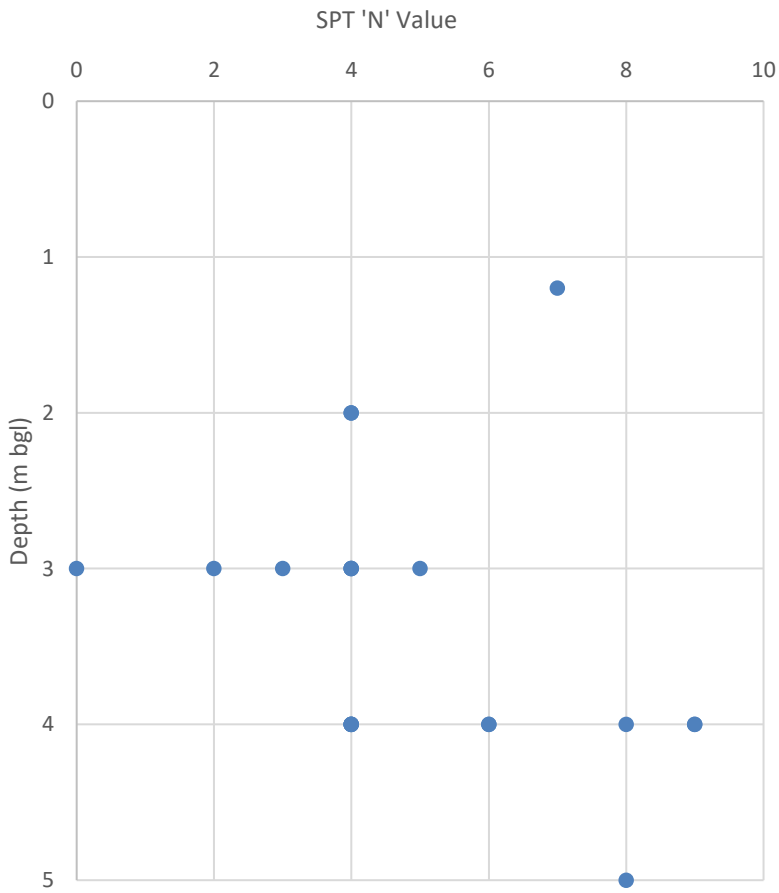


Figure 6.2.1b – *Standard Penetration Test vs. Depth (m bgl)*

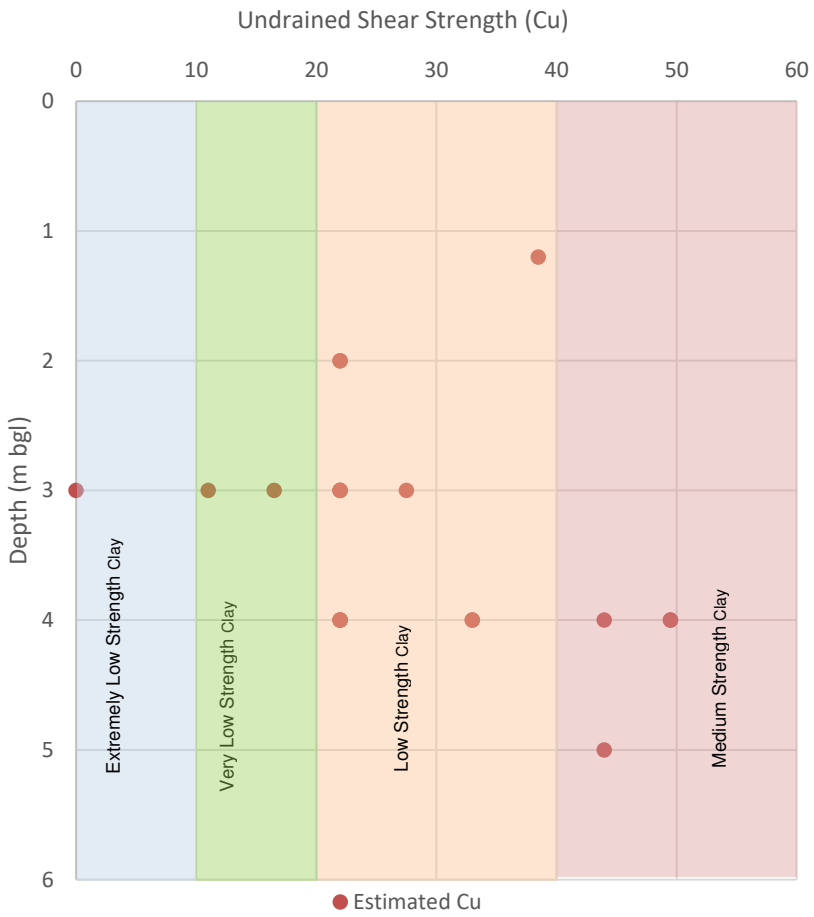


Figure 6.2.1c – *Estimated Undrained Shear Strength vs Depth (m bgl)*

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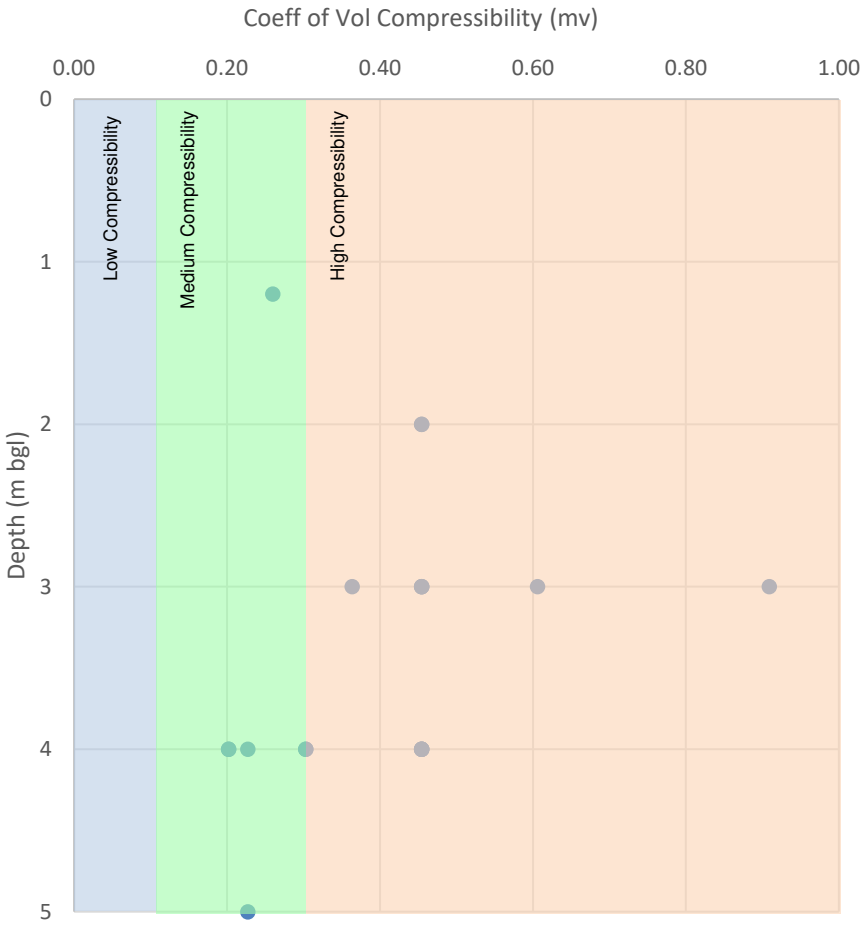


Figure 6.2.1d – *Estimated Volume Compressibility Coefficients (Mv) vs Depth (m bgl)*

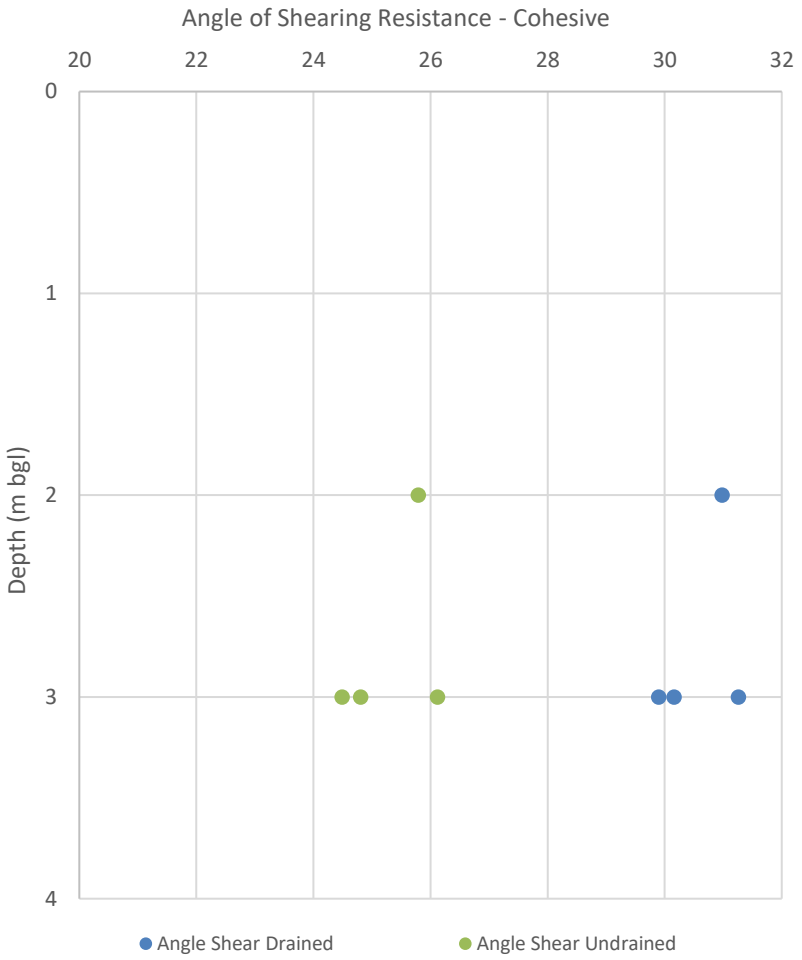


Figure 6.2.1e – *Angle Shearing Resistance (Cohesive) vs Depth (m bgl)*

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6.2.2 Granular Alluvium Deposits

The geotechnical test results recorded within the Granular deposits are summarised in *Table 6.2.2.*

Table 6.2.2 – *Summary of geotechnical test results – Granular deposits*

Parameter	No. of Tests	Results	
		Minimum	Maximum
In-Situ Tests			
SPT 'N' Value (1) – Granular	8	1	17
Laboratory Tests			
Moisture Content (%)	2	23	23.1
pH	2	7.57	7.64
Water Soluble Sulphate (mg/l)	2	30	82
Particle Size Distribution	6	See *Figure 6.2.2a*	

(1) Only includes SPTs tests in which full penetration was achieved.
(2) Modified plasticity index is the plasticity of components <425µm.

Six particle distribution tests were carried out on the granular made ground which was typically described as a sand or a silty sand. The sand percentage dry mass within the sand material ranged from 40 to 79%. The percentage of dry mass per fractions is presented in *Figure 6.2.2a* below.

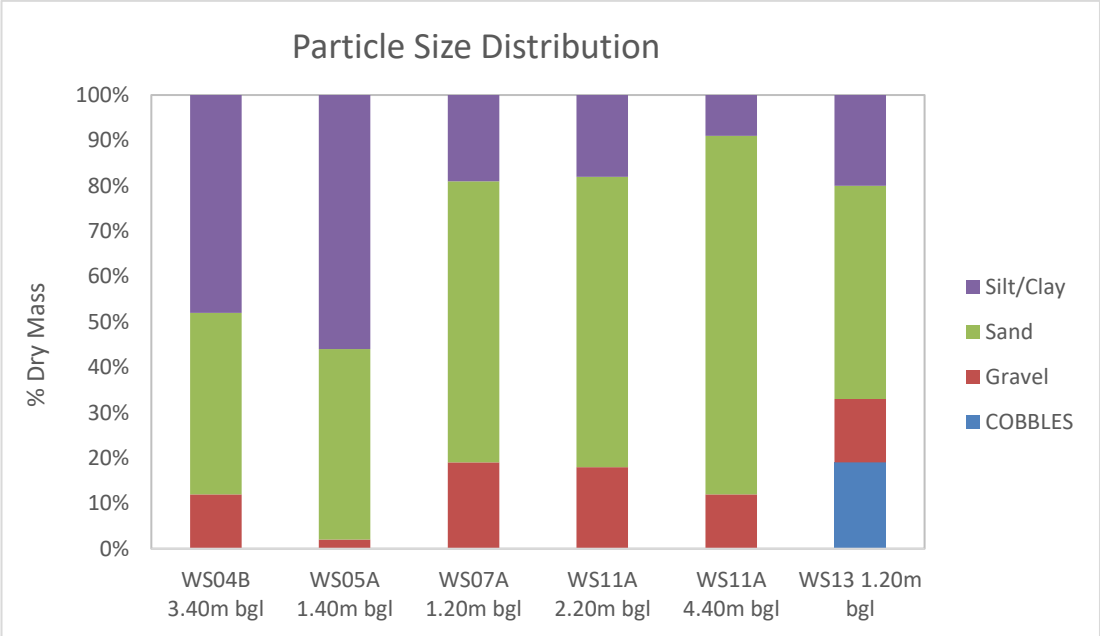


Figure 6.2.2a – *Particle Size Distribution – Granular deposits*

The PSD results carried out in the laboratory are generally consistent with the recorded findings during the investigation.

The SPT N results are presented on *Figure 6.2.2b*.

A moderately conservative unit weight of 16 kN/m^3 is deemed suitable for very loose to medium dense granular soils above water and a unit weight of 18 kN/m^3 is deemed suitable for deposits below groundwater, from a review of published values (Ref. 10).

The Angle of Internal Friction, ϕ', for the granular deposits can been derived from a review of relationships with SPT N values (Ref. 10 & 11) and published values, presented on *Figure 6.4.2c.*

The Drained Young's Modulus, E', can be derived for granular material from the relationship with SPT N values (Ref. 11), as presented in Equation 5.

$$E' = (SPT\ N / 2) + 7.5 \qquad \textbf{Equation 5}$$

Where:

E' is the Drained Youngs Modulus

SPT N is Characteristic Standard Penetration Test Result

It should be noted that care should be taken in using linear stiffness values derived from relationships as they do not necessarily reflect the non-linear nature of soil stiffness. The actual stiffness will be strain dependent and non-linear and thus should be considered in detailed design of sensitive structures.

The estimated drained Young's Modulus, E', for granular deposits from correlation with SPT N values (Ref. 11) are presented on *Figure 6.2.2d.* Based on these results and literature values an E' of 5 is considered suitable for loose soils.

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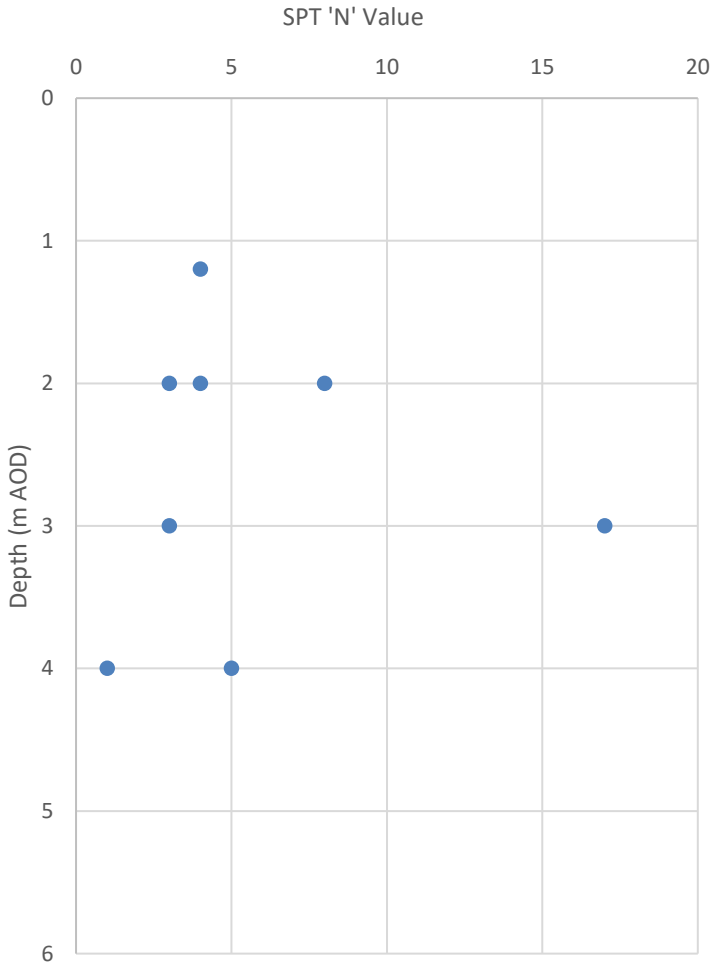


Figure 6.2.2b – *Standard Penetration Test vs. Depth - Granular*

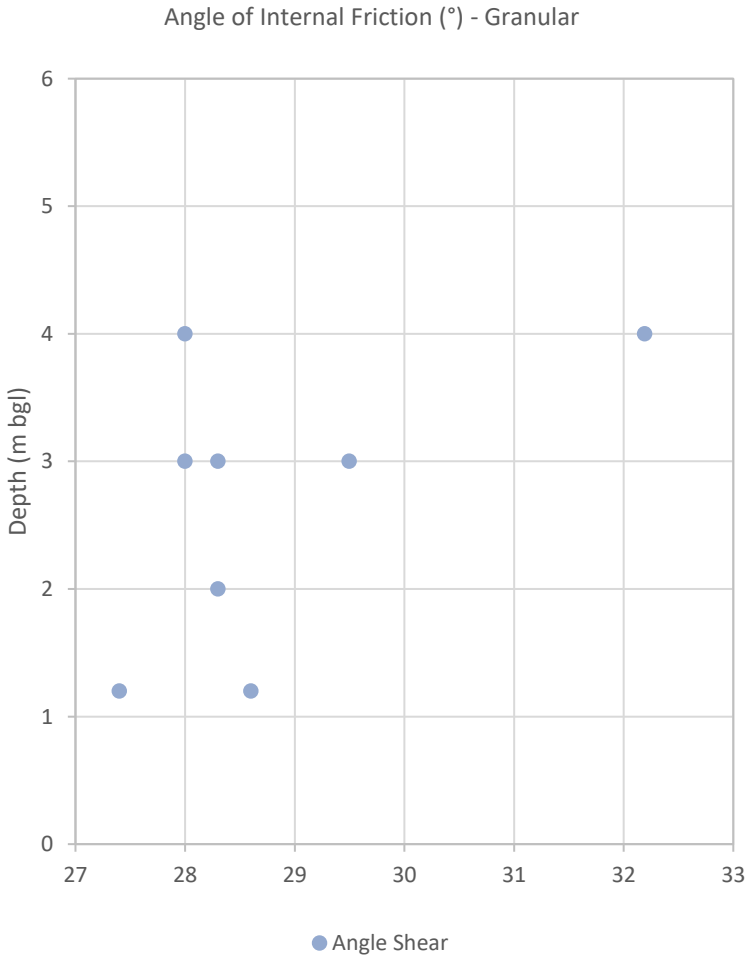


Figure 6.2.2c – *Angle of Internal Friction vs. Depth – Granular*

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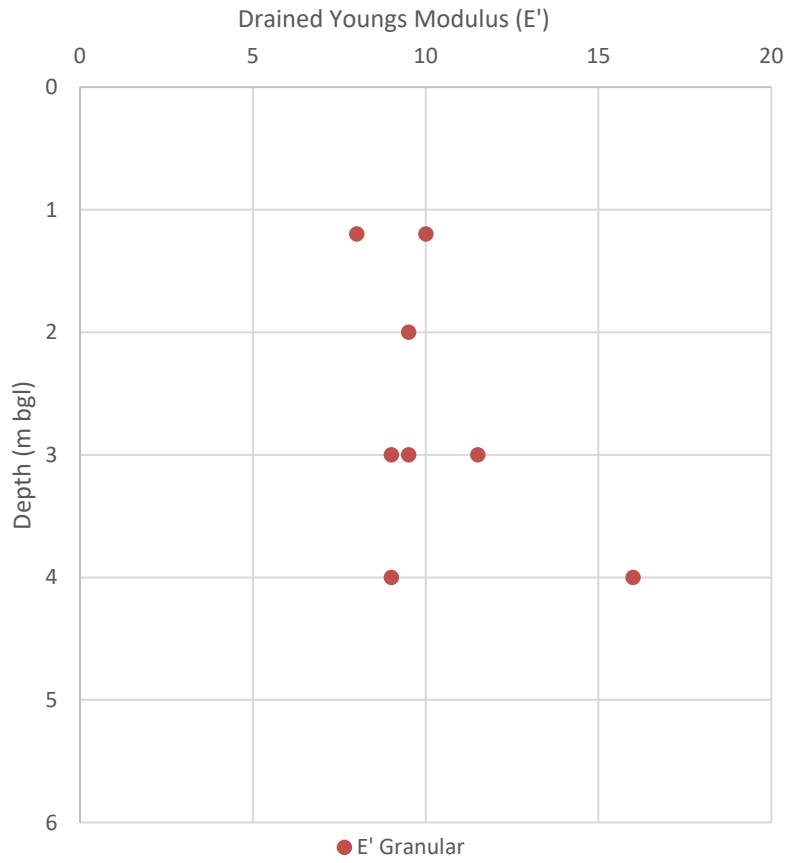


Figure 6.2.2d – *Drained Young's Modulus vs. Depth – Granular*

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6.3 Aggressive Ground Conditions

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the Building Research Establishment (BRE) Special Digest 1, 3rd Edition of 2005 (Ref. 13). A summary of the results obtained as a part of the ground investigation are summarised in *Table 6.3a* and *Table 6.3b* below.

Table 6.3a –*Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Test Type	Range
Made Ground	pH	7.09 – 8.13
	Water Soluble Sulphate (mg/l)	45 – 2180
Alluvium (cohesive)	pH	5.81 – 7.33
	Water Soluble Sulphate (mg/l)	70 – 641
Alluvium (granular)	pH	7.57 – 7.64
	Water Soluble Sulphate (mg/l)	30 – 82

Table 6.3b – *Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Design Sulphate Class	ACEC Class (1)
Made Ground (2)	DS-3	AC-3
Natural (cohesive)	DS-2	AC-2
Natural (granular)	DS-1	AC-1

(1) ACEC assessment was based on the *mobile* groundwater condition in a *brownfield* scheme area

(2) Mean of highest 20% of results used to obtain characteristic value.

In these conditions, and as a preliminary assessment and subject to further testing, it is considered that deterioration of buried concrete due to sulphate or acid attack is unlikely to occur. The preliminary design of buried concrete according to Table C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-3 (AC-3) conditions assuming mobile groundwater.

7.0 Ground and Groundwater Contamination Assessment

This section of the report includes the assessment of the potential contamination, solid, liquid and gas, identified on the subject site which may present a risk to the proposed end-users, associated utilities and the wider environment.

In guidance published by the Environment Agency, the risk to human health or controlled waters is determined through an assessment of pollutant linkages between a source of contamination (within the ground or groundwater either on or off site) and a sensitive receptor such as end-users of the site, building materials, edible plants grown in gardens or groundwater abstracted for drinking. This is termed a source-pathway-receptor relationship. The same model is applied to the assessment of risk arising from ground gases as detailed within BS8576:2013 (Ref.14).

These models have a common approach, which is one of a tiered assessment. At each stage of the assessment further detail can be applied to the conceptual site model to provide a detailed interpretation on a site by site basis. As part of the planning process this approach is adopted to establish either if the site is 'suitable for use' or whether additional work or else remedial work is required for the site to be deemed so.

The sub-sections hereafter therefore incorporate the first tier (Tier 1) of this approach otherwise referred to as the Generic Quantitative Risk Assessment (GQRA). The GQRA builds on the qualitative risk assessment presented in the Phase 1 Desk Study in conjunction with observations made during the ground investigation and is based solely on the results of the chemical and other testing data obtained as part of Curtins ground investigation. The GQRA is used to build/refine the Conceptual Site Model (CSM) for the site as detailed and presented in *Section 9.0* of this report.

The following sections present more detail on the risk assessment methodology rationale for the main receptors.

7.1 Human Health

The soil results will be screened against the relevant Generic Assessment Criteria (GAC) where available, including:

i) **Soil Guideline Values (SGVs):** These have been published by the Environment Agency and are trigger values for screening out low risk areas of land contamination. SGV's give an indication of representative average concentrations of chemicals in soil, below which long-term health risks are likely to be minimal. SGVs have been published for several contaminants including arsenic, cadmium, mercury, nickel, selenium, BTEX, phenols and dioxins, furans and dioxin-like PCB substances for land uses including residential, allotments and commercial. The SGVs have been developed for a sandy loam soil with 6% soil organic matter (SOM) content;

ii) **Supplementary Screening Values (SSVs):** In addition to the SGVs developed by the EA, other third party organisations have derived SSVs for a wider range of contaminants and land uses using the CLEA Model. Curtins have adopted these numbers where applicable, including

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those developed by Atkins AtriskSoil™, the LQM/CIEH Suitable for Use Levels (S4UL) and EIC/AGS/CL:AIRE published thresholds;

iii) **Category 4 Screening Levels (C4SLs):** In March 2014 Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, hexavalent chromium and lead. These values were derived to support the revised Part 2A Statutory Guidance issued in 2012 (Ref. 15) in which four categories of contaminated land are included, ranging from Category 1 (significant/high risk) to Category 4 (low risk). C4SLs are not representative of significant possibility of significant harm (SPoSH) and are low risk levels which, and therefore where the C4SLs are not exceeded, land can be demonstrated to be in Category 4 and cannot be determined as contaminated land.

7.1.1 Adopted Soil Human Health GACs Screening Methodology

Current development proposals indicate the construction of new permanent accommodation with facilities. The samples were split into two different categories for screening against GACs, accounting for the general *Residential (without) home grown produce* end use scenario and the localised proposed Allotments within the southwest of the site. Samples within the southwest of the site closest to the allotments are WS13, WS14 and WS14A and were compared with respect to the *Allotments* end-use thresholds.

Assessment has therefore been undertaken against the following GACs, in order of preference:

1. Environment Agency Soil Guideline Values,
2. CL:AIRE, AGS, EIC. Soil Generic Assessment Criteria for Human Health Risk Assessments,
3. LQM/CIEH 2015 S4ULs for Human Health Risk Assessment, and
4. DEFRA Category 4 Screening Levels.

The soil organic matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e. the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) values for soils ranged from 1.1% to 20.8% within made ground and 0.4% to 0.7% within the natural soils.

With consideration for a calculated geometric average, soils from made ground determined an SOM of 5.5% from the allotment made ground selected samples only, 6.7% for the remaining made ground samples and for natural soils an SOM of 0.53%. As such, a comparison against Generic Assessment Criteria (GAC) thresholds for a conservative SOM of 6% and 1% for the identified end use thresholds have been adopted for made ground and natural soils respectively.

The adopted GAC can be referred to in *Appendix F*.

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7.1.2 Generic Assessment Criteria Screening of Soil Laboratory Results

The results of the environmental testing can be referred to in *Appendix C*.

Several exceedances were noted within these made ground samples collected and are detailed in Table 7.1.2a below. No exceedances were noted within the natural soils.

Table 7.1.2a – *Summary of GAC exceedances compared against 'Allotment' thresholds*

Determinand	2.5% SOM GAC threshold (mg/kg)	Concentration (mg/kg)		
		WS13 0.20m bgl	WS14 0.20m bgl	WS14A 0.50m bgl
Lead	80	180	849	657
Benzo(a)pyrene	2	-	4.09	-
Benzo(b)fluoranthene	2.1	-	3.75	-
Dibenzo(ah)anthracene	0.27	-	0.47	-

Table 7.1.2b – *Summary of GAC exceedances compared against 'Residential with home grown' thresholds*

Determinand	6% SOM GAC (mg/kg)	Concentration (mg/kg)								
		WS01 0.50 m bgl	WS02 0.50 m bgl	WS04B 0.20 m bgl	WS07A 0.20 m bgl	WS08 0.25 m bgl	WS09 0.50 m bgl	WS10 0.30 m bgl	WS11A 0.50m bgl	WS12 0.30m bgl
Arsenic	35 / 40	-	40	-	-	-	-	-	-	-
Cadmium	10	-	-	20.2	-	-	-	-	-	-
Lead	200	548	389	489	2380	2980	445	562	238	212
Zinc	3700	-	4990	14900	-	-	-	-	-	-
Benzo(a)anthracene	13	18.5	-	-	-	-	-	-	-	-
Benzo(a)pyrene	3 / 5	12.5	-	6.51	5.77	-	-	-	-	-
Benzo(b)fluoranthene	3.7	12	-	7.08	5.33	-	-	-	-	-
Dibenzo(ah)anthracene	0.3	1.57	-	0.82	0.75	0.39	-	-	-	-

It was noted that within one of the buildings where WS06 and TP05 were proposed to be located identified the presence of asbestos within the building and therefore these locations were not undertaken. WSA was also terminated at 0.20m bgl due to the possible presence of asbestos.

All soil samples were screened for asbestos. During laboratory analysis, one sample positively identified asbestos of amosite loose fibres. Asbestos quantification analysis was then undertaken for WS14 at 0.20m bgl and the amount of asbestos was <0.001%.

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8.0 Ground Gas Assessment

The assessment of risk presented by ground gases is assessed with reference to guidance published by CIRIA Assessing Risks Posed by Hazardous Ground Gases to Buildings, C665 (Ref. 16), BSI Publication code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings BS8485:2019 (Ref. 17) and other broadly accepted references such as the Ground Gas Handbook 2009 (Ref. 18).

The gas risk assessment adopts a tiered approach. In the first instance this involves a re-evaluation of the Conceptual Site Model described within the Phase 1 Preliminary Risk Assessment (desk study) (Ref. 1) and thereafter validating this conceptual model with the ground gas data, the semi-quantitative risk assessment.

8.1 Ground Gas Monitoring Results

To characterise the site's ground gas regime and validate the qualitative assessment of ground gas risk standpipe installations were incorporated within seven of the boreholes as detailed in *Section 3.2*.

An initial programme of six gas monitoring visits over six weeks was proposed. These visits been undertaken between 12th May and 5th July 2022, with barometric pressure recorded between 1011 and 1024mb. Rising barometric pressure was recorded on the third (31/05) and sixth (05/07) visit, steady barometric pressure was recorded on the fourth (06/06) and fifth (10/06) visit, and falling barometric pressure was recorded on the first (12/05) and second visit (20/05).

The log results sheets are contained within *Appendix E* and summarised in *Table 8.1*

Table 8.1 – *Summary of Ground Gas Monitoring Results*

Exploratory Hole ID	Maximum Methane Concentration (%)	Maximum Carbon Dioxide Concentration (%)	Minimum Steady Oxygen Concentration (%)	Maximum Gas Flow (l/hr)	Steady State Gas Flow (l/hr)
WS01	<0.0	0.7	20.2	<0.0	<0.0
WS04B	<0.0	0.9	19.6	<0.0	<0.0
WS05A	<0.0	3.0(1)	13.0	-0.6(1)	<0.0
WS08	<0.0	3.5	11.9	<0.0	<0.0
WS10	<0.0	0.6	19.9	<0.0	<0.0
WS12	<0.0	1.1	13.3	<0.0	<0.0
WS13	<0.0	2.0	18.2	<0.0	<0.0

(1) Response zone noted as flooded

Methane concentrations were recorded at or below the limit of detection limit within all the monitoring wells.

Maximum peak carbon monoxide was generally recorded at concentrations of between 0.3 and 3.5%$^{v}/_{v}$. The highest peak concentration was 3.5%$^{v}/_{v}$ in WS08 on the fourth visit. WS05A recorded concentrations of between 1.1%$^{v}/_{v}$ and 3.0%$^{v}/_{v}$, however it should be noted that this borehole response zone is considered to be flooded throughout the gas monitoring period.

Hydrogen sulphide was recorded at concentrations at 1ppm or below the limit of detection however, concentrations of 2ppm were recorded in WS04B, WS10 and WS12 on the fourth visit.

Carbon monoxide was generally recorded at concentrations of between 1ppm and 3ppm. The highest concentration was 3ppm in WS01 on the first visit and in WS05A on the sixth visit.

Gas flow was recorded at or below the detection limit within all boreholes throughout the gas monitoring period.

A peak flow rate was recorded within WS05A between -0.1l/hr and -0.6l/hr during the first, second and third visit. From a review of groundwater level monitoring (*Table 5.8b)* and the response zones of the monitoring wells (*Table 3.2)* it can be seen that the response zone was flooded during the monitoring period within WS05A. It is considered that the peak flow rates in this flooded boreholes is likely to be linked to rising shallow groundwater in the solid section of the well installation causing an increase in internal pressure within the pipework, which is released, and subsequently equalised, when the valve tap is opened, resulting in the observed peak flows preceding the considerably lower steady flow. This is detailed within BS8485:2015 (Ref. 17) and CL:AIRE Research Bulletin RB 17 (Ref. 19).

Considering the above, and using professional judgement, the elevated peak flow readings from the affected boreholes have been omitted from the calculations used in assessment of gas risk on site, with remaining peak flow readings considered to give a more representative approach to calculating the 'worst case' scenario for the site. The highest peak steady state flow rate recorded in unflooded boreholes was at or below the detection limit.

Groundwater levels were recorded to be relatively consistent across the monitoring events.

8.2 Ground Gas Assessment

The Conceptual Site Model presented in *Section 2.7* highlighted Made Ground as a potential source of ground gas generation. The report suggests no records of historic or active landfills within close proximity to the site, however there is infilled land noted within 250m of the site including 'made ground' as identified in BGS mapping immediately west of site. Potential noxious and asphyxiate gases were attributed to include, but not limited to, carbon dioxide, carbon monoxide, methane and hydrogen sulphide. The Phase 1 identified a **Moderate** Risk.

Made ground soils were encountered in all locations across the site. Current development plans comprise the construction of a new permanent housing accommodation with associated facilities, so this assessment has been undertaken in accordance with guidance within BS8485:2019 (Ref. 17).

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In accordance with BS8485:2015 (Ref.17), consideration of the recorded soil gas flow rates, presented above, enables hazardous gas flow rates (Q_{hg}) to be evaluated. Q_{hg} can be derived for both 'representative' and 'worst case' scenarios and a comparison made in support of an appropriate assessment of ground gas risk.

As methane was not detected above the gas monitor's limit of detection through the monitoring period, the risk to the site end-users from methane is Low and is therefore not considered further.

For a 'borehole' scenario (highest hazardous gas flow rate that is realistically possible i.e. in a single borehole) highest steady state flow rates and peak gas concentrations are adopted. For worst case check highest peak flows and highest peak gas concentrations are adopted across monitoring wells installed in the same strata (discounting any peak flows deemed to be unrepresentative such as that recorded in WS05A where the well was flooded).

Evaluation of the 'borehole' scenario (highest hazardous gas flow rate that is realistically possible i.e. in a single borehole) recorded a maximum Q_{hg} of 0.0035 l/hr for carbon dioxide with the steady state flow rate of 0.1 l/hr adopted due to the flow being recorded at or below the detection limit. The worst case check records the same value.

In accordance with BS8485:2015, the 'borehole' scenario has been adopted as the GSV and indicates a Characteristic Situation 1 (CS-1) gas regime, with no gas protection measures required.

The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction. Appropriate ground gas monitoring and safety measures should be in place during the works, as the potential presence of ground gases could pose a risk in any confined spaces of deep excavations.

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9.0 Revised Conceptual Site Model

The Preliminary Conceptual Site Model (PCSM) presented *Section 2.7* and discussed in *Section 2.0* of this report has been revised following the GQRA in *Section 7.0* above. The Revised Conceptual Site Model (CSM) is summarised in the table overleaf.

The CSM details the source-pathway-receptor linkages or potential pollutant linkages (PPL) that have been identified as relevant for the site. The GQRA details the associated level of risk relating to these potential pollutant linkages.

The CSM follows the framework outlined within CIRIA C552 (Ref. 20) which is summarised within *Appendix G*.

The 'risk rating' within the CSM refers to the risk that the source, pathway, receptor linkage or PPL is complete. Unless specifically stated it does not necessarily refer to an immediate risk and is intended to be used as a tool to assess the necessity for further assessment/investigation.

Risks presented by Unexploded Ordnance is discussed and assessed in *Section 2.6*.

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 (Ref. 21) which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. It has been assumed that any future construction works on site will be undertaken in compliance with these requirements. Reference should be given to the environmental testing results discussed within *Section 7.0* and presented within *Appendix C*.

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Qualitative Risk Assessment → Generic Quantitative Risk Assessment → Detailed Quantitative Risk Assessment or; Remedial Action

- The table below represents the Second stage in the land quality risk assessment process; the Revised Conceptual Site Model following the Quantitative Risk Assessment.
- For a development site to be deemed 'suitable for use' the level of risk needs to be brought down to acceptable levels, i.e. low to very low risk. The purpose of each stage of risk assessment is ultimately to establish if there is a requirement for additional levels of assessment to be made to have sufficient confidence to support a risk characterisation or management decision, e.g. remedial action.
- In the absence of specific site data, a Generic Quantitative Risk Assessment is invariably recommended.

Conceptual Site Model			Generic Qualitative Risk Assessment			Comments	Action
Identified Source	**Pathway(s)**	**Receptor(s)**	**Consequence**	**Likelihood of Occurrence**	**Risk Rating**		
Significant sources of on-site contamination: • Made ground deposits encountered across the site. • Several exceedances were identified within the made ground soils for heavy metals and PAHs. • Laboratory analysis identified asbestos within WS14 at 0.20m bgl, however, asbestos quantification confirmed the concentration was below the limit of detection (<0.001%). • Visual inspections of the site identified asbestos in a building WS06 and TP05 were supposed to be located. WSA was terminated due to the presence of asbestos. **Significant sources of off-site contamination:** • Uncontrolled deposition of Made Ground during the construction of roads and structures and demolition near and adjacent to the site's boundaries. • Made Ground recorded from BGS maps adjacent to the western boundary.	Direct contact and dermal uptake, soil and dust ingestion, dust and migration inhalation (indoor & outdoor air)	**Site end users** (Residential)	**Medium** Human Health Risk	**Low Likelihood**	**Moderate/Low**	Several exceedances were identified when compared to residential with home grown end-use thresholds. These included heavy metals and PAHs. However as much of the site will have a hardstanding cover across the site, this breaks the source receptor pathway. In relation to the proposed allotments, the selected samples which compared to allotment thresholds identified several exceedances. These include lead and PAHs. Suspected asbestos containing materials (ACMs) were identified within the location of WSA and within a building onsite. Laboratory screening identified asbestos within WS14 at 0.20m bgl for amosite loose fibres. Asbestos quantification confirmed the amount of asbestos present was <0.001%. Visual inspections of the site has identified asbestos within a building and within a WSA situated in southeast of the site.	For areas of soft landscaping proposed, a clean capping layer comprising of topsoil/subsoil should be provided. Within the allotments a significant capping layer must be provided. All details to be included within a remediation strategy in regard to clean capping. Action should be taken if unexpected contamination is encountered during construction. Work should be stopped and advice obtained from appropriate specialist. Appropriate management of contaminated soils during construction to manage the risk to construction with appropriate input from an asbestos management specialist. In regard to refurbishment of the existing buildings onsite, an asbestos survey should be undertaken where works are proposed if the building with visual identified asbestos is demolished. Construction workers to be provided with appropriate PPE.
		Construction and maintenance workers					
	Soil dust ingestion/inhalation produced during construction	**Adjacent residents**					
	Vertical and horizontal migration of soluble phase contamination through groundwater.	**Controlled Waters** (Surface Water) Nearest surface water feature is the River Irwell located along the north and west boundary, the Bridgewater Canal south boundary of the site. River quality for the River Irwell is Grade E. There is one surface water abstraction point located 136m west.	**Medium**	**Unlikely**	**Low**	Limited significant contamination sources on site. No evidence of free product or gross contamination was evident during the ground investigation. The nearest surface water feature is the River Irwell located along the north and west boundary of the site. Considering the site will be all hardstanding, the low permeability will limit potential leaching of contamination and result in a betterment to site conditions.	No further action required.
	Vertical and horizontal migration of soluble phase contamination through superficial deposits and bedrock.	**Controlled Waters** (Groundwater) No data is recorded for superficial deposits or superficial aquifer (Superficial) Principal Aquifer (Bedrock)	**Medium**	**Unlikely**	**Low**	Limited significant contamination sources on site. No evidence of free product or gross contamination was evident during the ground investigation. Not within a Source Protection Zone (SPZ). Considering the site will be all hardstanding, the low permeability will limit potential leaching of contamination and result in a betterment to site conditions.	

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Conceptual Site Model			Generic Qualitative Risk Assessment			Comments	Action
Identified Source	**Pathway(s)**	**Receptor(s)**	**Consequence**	**Likelihood of Occurrence**	**Risk Rating**		
Made ground deposits across the site. BGS recorded made ground recorded immediately west. Localised organically rich deposits present within the natural soils. Infilled land (non-water) recorded 126m east of the site.	Ground gas & vapour migration and inhalation.	**Site End Users** (Commercial)	**Medium** Human Health Risk	**Unlikely**	**Low**	A worst case recorded a maximum Qhg of 0.0035 l/hr for carbon dioxide. Characteristic Situation 1 (CS-1) gas regime, with no gas protection measures are required.	No further action required.

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9.1 Summary of Significant Pollutant Linkages

A **Moderate/Low** risk rating is identified to site end-users and construction workers, from soils and dust from inhalation and ingestion. A clean capping layer must be provided where soft landscaping is proposed this should include and enhanced capping layer within the allotments. A remediation strategy must be obtained with detailed clean capping requirements and verification. An appropriate management of soils including input from an asbestos management specialist in regard to the building identified with asbestos. However, the proposed hardstanding covering all the site will break the source receptor pathway therefore the risk will be reduced to Low. Before any refurbishment of the existing buildings onsite are undertaken, an asbestos survey should be completed where works are proposed. Appropriate PPE must be provided for construction workers.

A **Low** risk rating is identified to controlled waters (Groundwater and Surface Waters) following the ground investigation, where no major sources of contamination were identified considering the site will be all hardstanding, the low permeability will limit potential leaching of contamination.

A **Low** risk rating is identified to site end users from ground gases arising from Made Ground and natural soils migrating into buildings and subsequent inhalation by on-site employees. This corresponds to a Characteristic Situation 1 (CS-1) gas regime, with no gas protection measures are required.

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10.0 Geotechnical Assessment and Recommendations

10.1 Introduction

This section will discuss the ground and groundwater conditions encountered across the site and assess their associated risks for the proposed scope of the works. The proposed development comprises the construction of new permanent housing for homeless with associated amenities and facilities.

It must be noted that at the time of writing this report, the structural details and loadings have not been provided. As such, any changes in the development of designs beyond the issue of this Ground Investigation Report to the client, should be further investigated by the Construction Designer.

10.2 Summary of Ground Conditions

The ground conditions on site generally comprised Made Ground which was underlain by mainly cohesive and locally interbedded granular Deposits. Natural cohesive deposits were typically soft to firm, brown, sandy occasionally silty CLAY or silt deposits recorded as soft, brown, slightly gravelly, sandy SILT. Natural granular deposits were typically reddish brown, silty, fine and medium SAND with pockets of brown, slightly gravelly, very silty, fine and medium sand and with occasional cobbles.

10.3 Foundation Design

It is understood that the proposed development comprises the construction of a new permanent 2-storey housing with associated amenities and facilities. Loadings are currently unknown, it can be anticipated that they will be relatively low considering the proposed development.

The shallow ground conditions comprised 0.60m to 3.80m of made ground and underlain by natural Alluvium deposits within a number of locations across the site comprising of mainly low strength cohesive and also low to medium density granular deposits.

Therefore, existing made ground and the low strength shallow cohesive superficial deposits are unlikely to be able to support shallow foundations. The proximity of the railway arches, River and Canal wall is a further consideration and it should be ensured that the construction of new foundations does not undermine or surcharge the existing foundations for the existing adjacent structures.

It is therefore advised that a piled foundation solution is adopted, taking loads into competent natural deposits bypassing the made ground. Further ground investigation is recommended to deeper depths in order to identity a competent bearing stratum.

Pile design and installation are continually evolving processes, it is recommended that specialist piling contractors are contracted as to the suitability and carrying capacity of the piles in the ground conditions

pertaining to the site. The carrying capacity of piles depends not only on their size and the ground conditions but also their method of installation.

Considering the space restrictions with the railway arches consideration should be given to a mini piling rig. Any further intrusive works including investigation and piling works would need to be co-ordinated and agreed with Network Rail and TfGM ahead of commencement.

10.4 Ground Floor Slabs

Based on the observations on site together with the results of laboratory tests, it is recommended that consideration is given to a suspended ground floor slab. As piled foundations are anticipated, a suspended slab is recommended to bear on the pile caps by a network of beams which will minimise any differential settlement between the floor and piled structure.

10.5 Chemical Attack on Buried Concrete

The site has been classified in accordance with BRE Special Digest (Ref. 13) and laboratory testing undertaken accordingly in *Section 4.0*. Based on the laboratory test results it is considered that for made ground, natural cohesive deposits and natural granular deposits a Design Sulphate Class and an ACEC classification has been obtained and detailed in the *Table 10.5* below.

Table 10.5 – *Aggressive Chemical Environment for Concrete (ACEC) Site Classification*

Stratum	Design Sulphate Class	ACEC Class (1)
Made Ground	DS-3	AC-3
Natural (cohesive)	DS-2	AC-2
Natural (granular)	DS-1	AC-1

(1) ACEC assessment was based on the *mobile* groundwater condition in a *brownfield* scheme area

10.6 Excavation and Support

Observations during the intrusive works and subsequent monitoring indicate that a variable groundwater table appears to be present within the natural deposits at depths between 1.49m and 3.59m bgl, this may be in connectivity with the adjacent River. Perched water was also encountered within the made ground.

Based on these results the localised perched groundwater is likely to be encountered during excavations and will likely require temporary shoring and support and the groundwater may require control by conventional pump sump methods.

Any excavations where the water table is encountered, and in accordance with Health and Safety Regulations, side support for safety purposes should be provided to all excavations which appear

unstable, including where groundwater is encountered, and those more than 1.20m deep. Excavations shallower than 1.20m deep, requiring personnel access, will require closed side support.

The chosen contractor should provide details on how they intend to ensure the safety and stability of proposed excavations.

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11.0 Geo-environmental Conclusions & Recommendations

11.1 Conclusions

11.1.1 Ground and Groundwater Contamination

The environmental chemistry soil results have been compared with the Generic Assessment Criteria (GAC) for soils with respect to human health against '*Residential (with) home grown produce'* thresholds for the majority of the site and against '*Allotment'* thresholds for selected soil samples.

With respect to the proposed end-use of the site several exceedances have been noted with respect to the GAC thresholds for metals and PAHs. Suspected asbestos containing materials (ACMs) were identified within WSA and a building onsite. During laboratory screening WS14 at 0.20m bgl identified amosite loose fibres however asbestos quantification has confirmed the concentration was below the limit of detection.

A **Moderate/Low** risk rating is identified to site end-users and construction workers, from soils and dust from inhalation and ingestion. A clean capping layer must be provided where soft landscaping is proposed. With a significant capping layer within the allotments. A remediation strategy must be obtained with detailed clean capping requirements and verification. An appropriate management of soils including input from an asbestos management specialist in regard to the building identified with asbestos. However, the proposed hardstanding covering all the site will break the source receptor pathway therefore the risk will be reduced to Low. Appropriate PPE must be provided for construction workers.

A **Low** risk rating is identified to controlled waters (Groundwater and Surface Waters) following the ground investigation, where no major sources of contamination were identified and limited pathways due to low permeability superficial deposits.

A **Low** risk rating is identified to site end users from ground gases arising from Made Ground and natural soils migrating into buildings and subsequent inhalation by on-site employees and residents. This corresponds to a Characteristic Situation 1 (CS-1) gas regime, with no gas protection measures are required.

11.2 Recommendations

Based on the findings of the ground investigation, the following recommendations are made:

1) It is recommended that construction workers are provided with appropriate PPE and sanitary facilities, with reference to the environmental testing results presented herein and within *Appendix C.*

2) Where soft landscaping is proposed, a clean capping layer will be required.

3) Where works are proposed to be undertaken in existing buildings onsite, an asbestos survey must be carried out before works are started.

4) A piled foundation solution should be adopted for proposed structures/facilities. Consultation with piling contractors with experience in piling in similar ground conditions should be considered. Considering the space restrictions with the railway arches a mini piling rig should be used.

5) Should unexpected contamination be observed during construction advice should be obtained from a Geo-environmental Engineer.

6) A Remediation Strategy and Verification report will be required to detail and approve the above measures in relation to capping across the site. Carry out for further intrusive investigation works for pile design. Ensure they are co-ordinated and agreed with Network Rail and TfGM.

7) Principal Contractor to procure Detailed Unexploded Ordnance Risk Assessment Report to further assess risk to their works.

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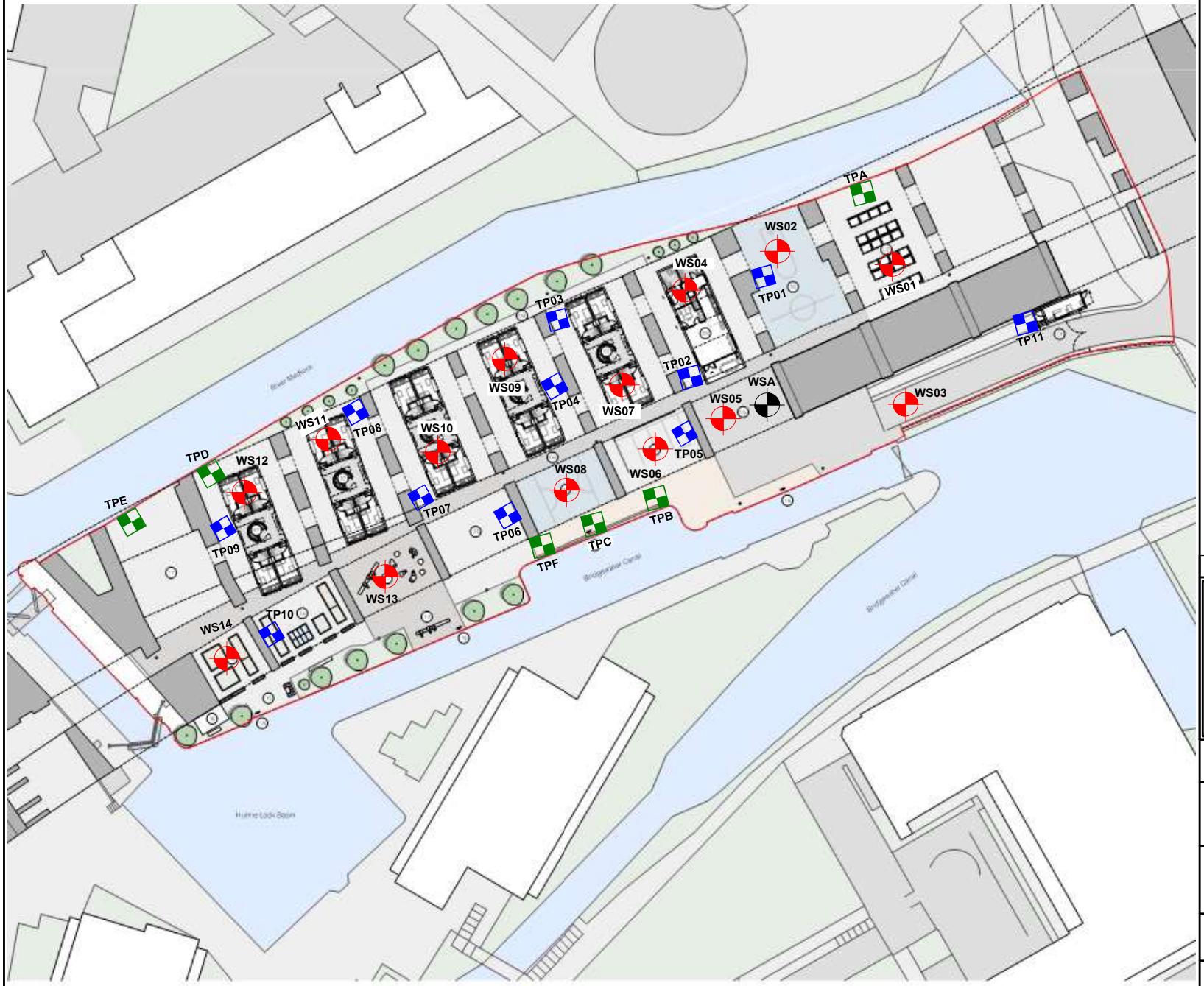
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Appendix A – Drawings

- *Exploratory Hole Location Plan*, Ian Farmers Associates Drawing Ref. Figure No. A1.1

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WINDOW SAMPLE BOREHOLE LOCATIONS

CONCRETE CORE TO PROVE SLAB THICKNESS

HAND DUG/ MACHINE EXCAVATED TRIAL PIT LOCATIONS AT PIERS

HAND DUG/ MACHINE EXCAVATED TRIAL PIT LOCATIONS AT RIVER WALL / CANAL WALL

Rev:	Description:	Date:	By:	Chkd:

curtins

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Status:

INFORMATION

Project:

EMBASSY VILLAGE

Drg Title:

PROPOSED EXPLORATORY HOLE LOCATION PLAN

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	24/02/21	RT	NF

Drg No:	Rev:
077442-CUR-00-XX-DR-GE-002	V03

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Appendix B – Exploratory Hole Logs

- IFA Factual Report
- Window Sample Borehole Logs, WS01 – WS14A and WSA
- Trial Pit logs, TP01 – TP10 and TPA - TPG

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IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS01**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FW/MD / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.05	D1			0.15	MADE GROUND: Grey, slightly gravelly, sandy SILT with rare broken pottery. Gravel is angular to subangular, fine and medium including coal and brick.				
0.20	ES2								
0.40 - 0.70	B3								
0.50	ES4			(1.15)	MADE GROUND: Black, slightly gravelly, slightly silty, fine and medium SAND with rare cobbles. Gravel is angular to subangular, fine to coarse including limestone, brick, slate and concrete. Cobbles are angular including brick.				
1.00	ES5						1		
1.20		SPT(S) N=5 (3,2/2,1,1,1)		1.30					
1.20 - 1.65	D7				MADE GROUND: Firm, brown, slightly gravelly, sandy CLAY. Gravel is subrounded to rounded, fine and medium including quartz, sandstone and brick.				
1.20 - 1.80	B6								
1.80 - 2.00	ES8				*Below 2.00m: orangish brown.*				
2.00		SPT(S) N=5 (2,1/2,1,1,1)					2		
2.00 - 2.45	D9								
2.50	D10			(2.50)	*Between 2.50m and 3.50m: with pockets of silty, fine and medium sand.*				
2.80 - 3.00	ES11								
3.00		SPT(S) N=9 (1,1/2,2,2,3)					3		
3.00 - 3.45	D12								
3.90 - 4.00	D13			3.80	Firm, brown, sandy CLAY.				
4.00		SPT(S) N=9 (1,2/2,1,3,3)		(0.65)			4		
4.00 - 4.45	D14			4.45	End of Borehole at 4.45m				
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		90	
2.00	3.00		70	
3.00	4.00		70	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.71 Energy Ratio: 79%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)
0.00	0.50	Plain	
0.50	3.50	Slotted	

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS02**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: MD / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
				0.05	MADE GROUND: Grey CONCRETE.				
0.20	ES1			0.20	MADE GROUND: BRICK				
0.30	D2				MADE GROUND: Black, brown and grey, very sandy GRAVEL. Gravel is angular to subrounded, fine to coarse including brick, clinker, sandstone and ash.				
0.50	ES3								
0.50 - 1.00	B4								
1.00		SPT(S) N=7 (2,1/2,1,2,2)			*Below 1.00m: loose.*		1		
1.00 - 1.20	ES5								
1.20 - 1.60	D7								
1.20 - 1.80	B6			(2.60)					
1.80 - 2.00	ES8								
2.00		SPT(S) N=4 (1,1/1,1,1,1)					2		
2.00 - 2.45	D9								
2.50 - 2.80	D10								
2.80 - 3.00	ES11			2.80	Soft, brown, sandy, silty CLAY.				
3.00		SPT(S) N=3 (1,1/1,0,1,1)					3		
3.00 - 3.45	D12								
3.50 - 4.00	D13			(1.65)					
4.00		SPT(S) N=4 (2,1/1,1,1,1)					4		
4.00 - 4.45	D14								
				4.45	End of Borehole at 4.45m				
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		100	
2.00	3.00		70	
3.00	4.00		60	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.45 Energy Ratio: 72%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **WS03**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.20	B1			0.08	MADE GROUND: Grey CONCRETE.				
0.30	B2			0.24	MADE GROUND: Coarse black TARMACADAM.				
0.30	ES3			0.46	MADE GROUND: Light brown, very sandy, angular to subangular, fine to coarse GRAVEL including limestone.				
					End of Borehole at 0.46m				

1 2 3 4 5 6 7 8 9 10

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Service inspection pit hand excavated from GL to 0.46m
Pit terminated at 0.46m due to brick surface encountered.

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS04**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
				(1.25)	MADE GROUND: Brown, slightly gravelly, slightly silty, fine SAND with occasional cobbles. Gravel is angular to subrounded, fine to coarse including sandstone, concrete and brick. Cobbles are angular including brick.		1		
1.20		SPT(S) 50 (1,2/50 for 10mm)		1.25 1.36	MADE GROUND: Dark brown, slightly gravelly, very silty, fine and medium SAND. Gravel is angular to subrounded fine and medium including sandstone, brick and coal.				
					End of Borehole at 1.36m		2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Service inspection pit hand excavated from GL to 1.20m.
Window sample hole terminated at 1.36m due to SPT refusal. Relocated as WS04A.

SPT Hammer: 110.71 Energy Ratio: 79%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS04A**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
				(1.25)	MADE GROUND: Brown, slightly gravelly, slightly silty, fine SAND with occasional cobbles. Gravel is angular to subrounded, fine to coarse including sandstone, concrete and brick. Cobbles are angular including brick.		1		
1.20		SPT(S) 50 (1,1/50 for 30mm)		1.25 1.38	MADE GROUND: Dark brown, slightly gravelly, very silty, fine and medium SAND. Gravel is angular to subrounded fine and medium including sandstone, brick and coal.				
					End of Borehole at 1.38m		2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Service inspection pit hand excavated from GL to 1.20m.
Window sample hole terminated at 1.38m due to SPT refusal. Relocated as WS04B.

SPT Hammer: 110.71 Energy Ratio: 79%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used:	Project:	Location ID:
Premier 110	Embassy Village, Castlefield	**WS04B**
Dates:	**Client:**	Sheet 1 of 1
01/04/2022	Curtins	

Dynamic Sample Borehole Log	Location:	Ground level:	Logged by:	Vertical scale:	Project ID:
			FH	1:50	2230462

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/ Installation
0.20	ES1			(1.25)	MADE GROUND: Brown, slightly gravelly, slightly silty, fine SAND with occasional cobbles. Gravel is angular to subrounded, fine to coarse including sandstone, concrete and brick. Cobbles are angular including brick.			
0.20 - 0.50	B2							
0.60	ES3							
0.80 - 1.20	B4							
1.00	ES5							
1.20		SPT(S) N=4 (1,1/1,1,1,1)		1.25				
1.25 - 2.00	B6			(0.75)	MADE GROUND: Loose, dark brown, slightly gravelly, very silty, fine and medium SAND. Gravel is angular to subrounded fine and medium including sandstone, brick and coal.			
1.95	ES7			2.00				
2.00		SPT(S) N=5 (1,1/1,1,1,2)		(0.40)	MADE GROUND: Loose, reddish brown, slightly gravelly, silty, fine and medium SAND with rare pocket of very sandy silt. Gravel is subrounded to rounded, fine and medium including sandstone and quartzite.			
2.00	ES8			2.40				
2.00 - 3.00	B9			(0.60)	MADE GROUND: Brown, slightly sandy, slightly gravelly SILT with rare pockets of reddish brown, slightly silty, fine and medium sand. Gravel is angular to subrounded, fine and medium including sandstone and coal.			
2.20	D10			3.00				
3.00		SPT(S) N=5 (1,1/1,1,1,2)			Soft, brown, slightly gravelly, sandy SILT. Gravel is subrounded to rounded, fine and medium including sandstone and siltstone.			
3.00	ES11							
3.40 - 4.00	B12			(1.45)				
4.00		SPT(S) N=8 (2,1/2,2,2,2)						
4.00	ES13			4.45	End of Borehole at 4.45m			

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		100	
2.00	3.00		90	
3.00	4.00		70	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.71 Energy Ratio: 79%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0	3.00	

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)
0.00	1.00	Plain	
1.00	3.00	Slotted	

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **WS05**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.20	B1			0.18 0.24	MADE GROUND: Grey CONCRETE. MADE GROUND: Greyish brown, silty, sandy GRAVEL. Gravel is subangular to angular, fine to coarse including sandstone and brick. End of Borehole at 0.24m		1 2 3 4 5 6 7 8 9 10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Service inspection pit hand excavated from GL to 0.24m.
Window sample hole terminated at 0.24m due to thick concrete. Concrete was attempted to be broken out by hand held drill, however concrete was too thick. Borehole relocated as WS05A.

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS05A**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/ Installation
				(0.60)	MADE GROUND: Brown, slightly gravelly, very silty, fine and medium SAND with occasional cobbles and with occasional pockets of reddish brown, slightly gravelly, silty fine and medium sand.			
				0.60	Reddish brown, silty, fine and medium SAND with pockets of brown, slightly gravelly, very silty, fine and medium sand and with occasional cobbles. Gravel is subangular to subrounded, fine to coarse including sandstone. Cobbles are angular to rounded including sandstone and brick.			
				(0.60)				
1.20		SPT(S) N=1 (0,0/0,0,0,1)		1.20	Soft, brown, slightly clayey, sandy SILT with rare fine gravel..			
1.20 - 1.65	D1							
1.40 - 2.00	B2							
1.50	ES3							
2.00		SPT(S) N=4 (1,1/1,1,1,1)						
2.00 - 2.45	D5							
2.00 - 3.00	B4			(2.30)				
3.00		SPT(S) N=3 (0,0/0,1,1,1)			*Below 3.00m: clayey.*		▼	
3.00 - 3.45	D7				*Between 3.20m and 3.45m: band of soft black, slightly sandy silt with organic odour.*			
3.00 - 3.50	B6							
				3.50	Soft, black, slightly sandy SILT/CLAY with organic odour.			
3.75	ES8			(0.50)	*Between 3.50m and 3.75m: very clayey silt.* *Between 3.75m and 4.00m: very silty clay.*			
4.00		SPT(S) N=17 (1,2/4,4,4,5)		4.00	Medium dense, dark brown, slightly silty, fine and medium SAND.			
4.00 - 4.45	D9			(0.45)				
				4.45	End of Borehole at 4.45m			

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		80	
2.00	3.00		88	
3.00	4.00		79	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.
Borehole drilled in same position as TPB. As such no samples were taken before 1.20m.

SPT Hammer: 110.71 Energy Ratio: 79%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0	3.00	

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)
0.00	1.50	Plain	
1.50	4.00	Slotted	

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **WS07**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
				0.05	MADE GROUND: Grey CONCRETE.				
				(0.45)	MADE GROUND: Black and dark brown, very gravelly, slightly silty, fine to coarse SAND with rare cobbles, sand contains ash. Gravel is angular to subrounded, fine to coarse including brick, sandstone and clinker. Cobbles are angular including brick.				
				0.50	End of Borehole at 0.50m				

1 2 3 4 5 6 7 8 9 10

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Service inspection pit hand excavated from GL to 0.50m.
Window samples hole terminated at 0.50m due to possible brick cobble obstruction encountered. Relocated as WS07A.

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS07A**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: MD / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.20	D2			0.05	MADE GROUND: Grey CONCRETE.				
0.20	ES1				MADE GROUND: Black and brown, very gravelly, fine to coarse SAND including ash. Gravel is angular to subrounded, fine to coarse including brick, sandstone and clinker.				
0.50	ES3			(0.95)					
0.50 - 1.00	B4								
1.00 - 1.20	ES5			1.00			1		
1.20		SPT(S) N=4 (1,1/1,1,1,1)			Loose, red brown, gravelly, clayey, fine to coarse SAND. Gravel is angular to subrounded, fine and medium including sandstone (possible made ground).				
1.20 - 1.65	D7								
1.20 - 1.80	B6								
1.80 - 2.00	ES8			(1.80)					
2.00		SPT(S) N=4 (1,1/1,1,1,1)					2		
2.00 - 2.45	D9								
2.50 - 2.80	D10								
2.80 - 3.00	ES11			2.80					
3.00		SPT(S) N=0 (0,0/0,0,0,0)			Very loose, brown, slightly gravelly, silty, fine to coarse SAND with pockets of clay. Gravel is angular to subrounded, fine and medium including sandstone.		3	▼	
3.00 - 3.45	D12			(0.80)					
3.45 - 3.60	D13								
3.60 - 4.00	D14			3.60	Soft, brown, slightly sandy CLAY.				
4.00		SPT(S) N=4 (1,1/1,1,1,1)		(0.85)			4		
4.00 - 4.45	D15								
				4.45	End of Borehole at 4.45m				
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		90	
2.00	3.00		60	
3.00	4.00		60	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.71 Energy Ratio: 79%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0	3.00	

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS08**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.20 - 0.70	B1			(1.10)	MADE GROUND: Black, slightly gravelly, silty, fine and medium SAND with rare cobbled. Gravel is angular to subangular, fine to coarse including sandstone, brick and concrete. With rare pockets of very sandy becoming sandy silt and rare broken glass. Cobbles are angular including brick.				
0.25	ES2								
0.60	ES3								
1.00	ES4			1.10			1		
1.20		SPT(C) N=11 (2,2/3,3,3,2)			MADE GROUND: Soft, reddish brown, slightly gravelly, very sandy SILT with occasional pockets of silty fine and medium sand. Gravel is angular to subrounded, fine to coarse including slate and sandstone.				
1.20 - 1.60	B5			(0.50)					
				1.60					
				(0.40)	MADE GROUND: Reddish brown, slightly gravelly, silty, fine and medium SAND. Gravel is subrounded to rounded, fine to coarse including sandstone.				
2.00		SPT(C) N=2 (1,0/0,0,1,1)		2.00			2		
2.00	ES6				MADE GROUND: Soft, brown slightly gravelly, very sandy, SILT. Gravel is angular to subrounded, fine to coarse including sandstone.				
2.00 - 3.00	B7			(1.00)					
3.00		SPT(C) N=4 (2,2/1,1,1,1)		3.00			3		
3.00	ES8				Soft, reddish brown, slightly gravelly, very sandy SILT. Gravel is subrounded to rounded, fine to coarse including sandstone.				
3.30	ES9			(0.40)					
3.40 - 4.00	B10			3.40					
					Firm, brown, slightly sandy CLAY with rare bands of soft and firm, brown, slightly sandy silt.				
4.00		SPT(C) N=9 (1,3/3,2,2,2)		(1.05)			4		
				4.45	End of Borehole at 4.45m				
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		100	
2.00	3.00		79	
3.00	4.00		85	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.71 Energy Ratio: 79%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)
0.00	1.00	Plain	
1.00	2.50	Slotted	

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS09**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: MD / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.20	D1			(0.80)	MADE GROUND: Brown, gravelly, fine to coarse SAND including ash. Gravel is angular to subrounded, fine to coarse including brick, quartz, clinker, coal and sandstone.				
0.30	ES2								
0.50	ES3								
0.50 - 0.80	B4			0.80					
0.90	D5				MADE GROUND: Loose, orange red brown, gravelly, slightly clayey, silty, fine to coarse SAND. Gravel is subangular to subrounded, fine and medium including sandstone.		1		
1.00 - 1.20	ES6								
1.20		SPT(S) N=4 (1,1/1,1,1,1)							
1.20 - 1.60	D8								
1.20 - 1.80	B7								
1.80	ES9			(2.10)					
2.00		SPT(S) N=3 (1,0/1,0,1,1)			*Below 2.00m: very loose.*		2		
2.00 - 2.45	D10								
2.50 - 2.90	D11								
3.00		SPT(S) N=2 (0,0/0,0,1,1)		2.90	Soft, grey, sandy CLAY.		3		
3.00 - 3.45	D12								
3.50 - 3.80	ES13				*Below 3.50m: brown, slightly sandy.*				
				(1.55)					
4.00		SPT(S) N=4 (1,1/1,1,1,1)					4		
4.00 - 4.45	D14								
				4.45	End of Borehole at 4.45m				
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		100	
2.00	3.00		50	
3.00	4.00		50	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.45 Energy Ratio: 72%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS10**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: MD / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.30	D2			(0.35)	MADE GROUND: Brown, gravelly, fine to coarse SAND including ash. Gravel is angular to subrounded, fine to coarse including brick, quartz, clinker, concrete and glass.				
0.30	ES1			0.35					
0.50	D5				MADE GROUND: Very loose, orangish red brown, gravelly, silty, fine to coarse SAND. Gravel is subangular to subrounded including sandstone.				
0.50	ES3								
0.50 - 1.00	B4								
1.00	ES6						1		
1.20		SPT(S) N=3 (1,0/1,0,1,1)							
1.20 - 1.65	D7								
				(2.55)	*Below 1.50m: slightly clayey.*				
1.80	ES8								
2.00		SPT(S) N=3 (1,0/0,1,1,1)					2		
2.00 - 2.45	D9								
2.50 - 2.90	D10								
				2.90					
3.00		SPT(S) N=4 (1,1/1,1,1,1)			Soft, grey brown, very sandy CLAY.		3	▼	
3.00 - 3.45	D11								
3.50 - 3.90	ES12								
				(1.55)	*Below 3.80m: brown, slightly sandy.*				
4.00		SPT(S) N=6 (1,1/1,1,2,2)					4		
4.00 - 4.45	D13								
				4.45	End of Borehole at 4.45m				
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		80	
2.00	3.00		50	
3.00	4.00		50	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.45 Energy Ratio: 72%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0	3.00	

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)
0.00	1.00	Plain	
1.00	2.50	Slotted	

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **WS11**
Dates: 31/03/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.10 - 0.40	B1			0.12	MADE GROUND: Grey CONCRETE.				
0.25	ES2			(0.43)	MADE GROUND: Brown, slightly gravelly, silty, fine SAND. Gravel is angular to subangular, fine to coarse including sandstone, concrete and brick.				
				0.55	End of Borehole at 0.55m				

1 2 3 4 5 6 7 8 9 10

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Service inspection pit hand excavated from GL to 0.55m.
Hole terminated at 0.55m due to sandstone cobble/boulder obstruction. Relocated as WS11A.

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used:	Project:	Location ID:
Premier 110	Embassy Village, Castlefield	**WS11A**
Dates:	**Client:**	Sheet 1 of 1
31/03/2022	Curtins	

Dynamic Sample Borehole Log	Location:	Ground level:	Logged by:	Vertical scale:	Project ID:
			FH	1:50	2230462

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/ Installation
				0.12	MADE GROUND: Grey CONCRETE.			
0.20	ES1			(0.43)	MADE GROUND: Greyish brown, slightly gravelly, slightly silty, fine and medium SAND with occasional cobbles. Gravel is angular to subangular, fine to coarse including brick, sandstone and mudstone.			
0.30 - 0.55	B2			0.55				
0.50	ES3			(0.65)	MADE GROUND: Reddish brown, gravelly, slightly silty, fine and medium SAND. Gravel is angular to subangular, fine to coarse including brick, sandstone and mudstone.			
0.90 - 1.20	B5							
1.00	ES4							
1.20		SPT(S) N=5 (2,1/2,1,1,1)		1.20	Loose, brown, slightly gravelly, silty, fine and medium SAND with rare pockets of firm, brown, slightly sandy clay. Gravel is angular to subangular, fine and medium including sandstone, coal and mudstone.			
1.20 - 1.65	D12							
1.20 - 2.00	B6							
2.00		SPT(S) N=4 (1,1/1,1,1,1)						
2.00	ES7							
2.00 - 2.45	D13							
2.20 - 3.00	B8			(2.80)				
3.00		SPT(S) N=8 (2,4/4,2,1,1)			*Between 3.00m and 4.00m: no recovery.*			
3.00 - 3.45	D14							
4.00		SPT(S) N=4 (1,1/1,1,1,1)		4.00	Soft, grey, sandy SILT.			
4.00 - 4.20	B9			4.20	Soft, grey, sandy CLAY.			
4.00 - 4.45	D15			4.40	Reddish brown, gravelly, clayey, fine and medium SAND. Gravel is subrounded to rounded, fine and medium including mudstone.			
4.20 - 4.40	B10							
4.40 - 4.70	B11			(0.80)				
5.00		SPT(S) 8 (4 for 0mm/8 for 0mm)		5.20	Soft, grey, sandy CLAY.			
5.00 - 5.45	D16			5.45	End of Borehole at 5.45m			

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		100	
2.00	3.00		100	
3.00	4.00		0	
4.00	5.00		70	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.45 Energy Ratio: 72%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0	3.00	

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS12**
Dates: 31/03/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Water Strike	Backfill/ Installation
0.00 - 0.40	B3			(0.45)	MADE GROUND: Grey, slightly gravelly, slightly silty, fine SAND. Gravel is angular to rounded, fine to coarse including sandstone, mudstone, brick and concrete.			
0.30	D1							
0.30	ES2			0.45				
0.60 - 1.00	B7				MADE GROUND: Dark brownish grey, slightly gravelly, very silty, fine and medium SAND. Gravel is angular to rounded, fine to coarse including sandstone, mudstone, brick and concrete.			
0.70	ES4			(0.60)				
1.00	ES6			1.05				
1.00 - 1.45	D5				MADE GROUND: Loose, brown, slightly gravelly, very silty SAND with pockets of sandy silt and rare clay. Gravel is angular to subrounded, fine and medium, including sandstone, mudstone, coal and brick.			
1.20		SPT(S) N=4 (1,1/1,1,1,1)						
1.20	D8							
1.20 - 2.00	B9			(0.95)				
2.00		SPT(S) N=2 (1,1/0,1,0,1)		2.00				
2.00	ES10				MADE GROUND: Very loose, reddish brown, slightly gravelly, fine and medium SAND, Gravel is subangular, fine and medium including sandstone.			
2.00 - 2.20	D12			2.25				
2.00 - 2.45	D11			2.30	MADE GROUND: Firm, brown, slightly sandy, slightly gravelly CLAY. Gravel is subrounded, fine and medium including mudstone.			
2.20 - 2.30	D13							
2.33	D15			(0.75)				
2.40 - 2.50	D14							
3.00		SPT(S) N=4 (1,1/1,1,1,1)		3.05	MADE GROUND: Black, slightly gravelly, very silty becoming silty, fine to coarse SAND. Gravel is subangular to rounded, fine and medium including sandstone and siltstone. *Between 2.38m and 2.45m: brick noted.*			
3.00 - 3.45	D18			3.10				
3.05 - 3.10	D16				Reddish brown, slightly gravelly, fine and medium SAND with occasional pockets of soft, brown, very sandy clay. Gravel is subangular to subrounded, fine and medium including sandstone.			
3.10 - 3.20	D17			(1.35)				
4.00		SPT(S) N=3 (0,1/1,0,1,1)			Loose, dark brown, slightly gravelly, slightly silty, fine and medium SAND with rare pockets of soft and firm, brown clay. Gravel is subangular to subrounded, fine and medium including sandstone. *Below 4.00m: very loose.*			
4.00 - 4.45	D19			4.45	End of Borehole at 4.45m			

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		100	
2.00	3.00		50	
3.00	4.00		18	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.
Insufficient sample below 2.00m to take environmental sample.

SPT Hammer: 110.45 Energy Ratio: 72%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0	3.00	

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)
0.00	2.00	Plain	
2.00	4.00	Slotted	

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS13**
Dates: 31/03/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend
0.20	ES1			0.19	MADE GROUND: Light grey CONCRETE.	
0.25 - 0.65	B2			(0.71)	MADE GROUND: Dark brown, slightly gravelly, silty, fine SAND with rare broken glass, rare pockets of soft, black amorphous peat and rare cobbles. Gravel is angular to subrounded, fine and medium including brick, concrete, sandstone and slate. Cobbles are angular including brick.	
0.60	D4			0.90		
0.60	ES3			(0.30)	MADE GROUND: Dark brown, slightly gravelly, silty, fine and medium SAND with occasional pockets of firm, brown and orange brown, slightly sandy, slightly gravelly clay and rare broken glass. Gravel is angular to rounded, fine to coarse including brick, concrete, quartz and sandstone.	
0.95 - 1.00	B5			1.20		
1.00	D7			(0.80)	Firm, dark brown, slightly gravelly, sandy SILT with occasional bands of firm, brown, slightly sandy, slightly gravelly clay and rare bands of brown, slightly gravelly, fine and medium sand. Gravel is subangular to rounded, fine and medium including sandstone and mudstone. With low cobble content.	
1.00	ES6			2.00		
1.20		SPT(S) N=7 (2,2/1,2,2,2)		(0.65)	Firm, brown, slightly sandy, slightly gravelly CLAY with rare bands of very sandy silt. Gravel is subrounded to rounded, fine and medium including mudstone and sandstone.	
1.20 - 1.65	D9			2.65		
1.20 - 2.00	B8			(0.35)	Soft, brown, slightly sandy, slightly gravelly SILT. Gravel is subrounded to rounded, fine and medium including sandstone and mudstone.	
1.70	ES10			3.00		
2.00		SPT(S) N=4 (1,1/1,1,1,1)		(0.39)	Soft, brown, slightly sandy CLAY interbedded with soft, brown, sandy SILT.	
2.00 - 2.65	B11			3.39		
2.65 - 3.00	D12			(1.06)	No recovery, assumed to be clay or silt.	
3.00		SPT(S) N=4 (0,0/1,1,1,1)		4.45	End of Borehole at 4.45m	
3.00	D14					
4.00		SPT(S) N=6 (14,1/1,2,1,2)				

Groundwater: Water Strike (▼ at 3); Backfill/Installation (solid 0.00–1.50, slotted 1.50–4.00)

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks
1.20	2.00		100	
2.00	3.00		84	
3.00	4.00		39	

Remarks:
Service inspection pit hand excavated from GL to 1.20m.

SPT Hammer: 110.45 Energy Ratio: 72%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0	3.00	

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)
0.00	1.50	Plain	
1.50	4.00	Slotted	

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS14**
Dates: 31/03/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.10 - 0.60	B1			(1.43)	MADE GROUND: Brown, slightly gravelly, silty, fine SAND with occasional cobbles and rare broken glass and pottery. Gravel is angular to subangular, fine to coarse including sandstone, brick and concrete. Cobbles are angular including brick.		1		
0.20	ES2								
0.80	ES3				*Below 0.80m: reddish brown.*				
0.80 - 1.00	B4								
1.20		SPT(S) 50 (25 for 100mm/50 for 125mm)		1.43					
1.20	D5				End of Borehole at 1.43m		2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Service inspection pit hand excavated from GL to 1.20m.
Borehole terminated due to SPT refusal on possible cobble. Relocated as WS14A.

SPT Hammer: 110.45 Energy Ratio: 72%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Premier 110	Project: Embassy Village, Castlefield		Location ID: **WS14A**
Dates: 31/03/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.10 - 0.60	B1			(1.40)	MADE GROUND: Brown, slightly gravelly, silty, fine SAND with occasional cobbles and rare broken glass and pottery. Gravel is angular to subangular, fine to coarse including sandstone, brick and concrete. Cobbles are angular including brick.		1		
0.50	ES2				*Below 0.90m: reddish brown.*				
0.90 - 1.10	B4								
1.10	ES3								
1.20		SPT(S) 50 (25 for 85mm/50 for 115mm)		1.40	End of Borehole at 1.40m		2		
1.20	D5						3		
							4		
							5		
							6		
							7		
							8		
							9		
							10		

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Service inspection pit hand excavated from GL to 1.20m.
Borehole terminated due to SPT refusal on possible cobble.

SPT Hammer: 110.45 Energy Ratio: 72%

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Hand tools and excavator	Project: Embassy Village, Castlefield		Location ID: **TP01**
Dates: 05/04/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.15 0.15	B1 ES4			(0.35)	MADE GROUND: Grey, slightly gravelly, sandy SILT with occasional cobbles, broken glass and rare timber. Gravel is angular to subangular, fine and medium including slate, brick, concrete and clinker.				
				0.35					
0.50 0.50	B2 ES5				MADE GROUND: Brown, slightly gravelly, very silty, fine SAND with occasional cobbles, rare broken glass, rare timber and rare broken pottery. Gravel is angular to subrounded, fine and medium including clinker, brick, slate, coal and sandstone. Cobbles are angular including brick.				
				(0.95)	*Below 0.75m: sand becomes fine and medium.*				
1.00 1.00	B3 ES6						1		
				1.30	End of Trial Pit at 1.30m				
							2		
							3		
							4		
							5		

Termination:

Stability:
Slight spalling of trial pit sides.

Remarks:
Unable to machine dig deeper than 1.30m due to presence of brick surface creating a narrow space for further excavation.

Dimensions (Length m x Width m):
4.10 x 0.55

Water Strikes

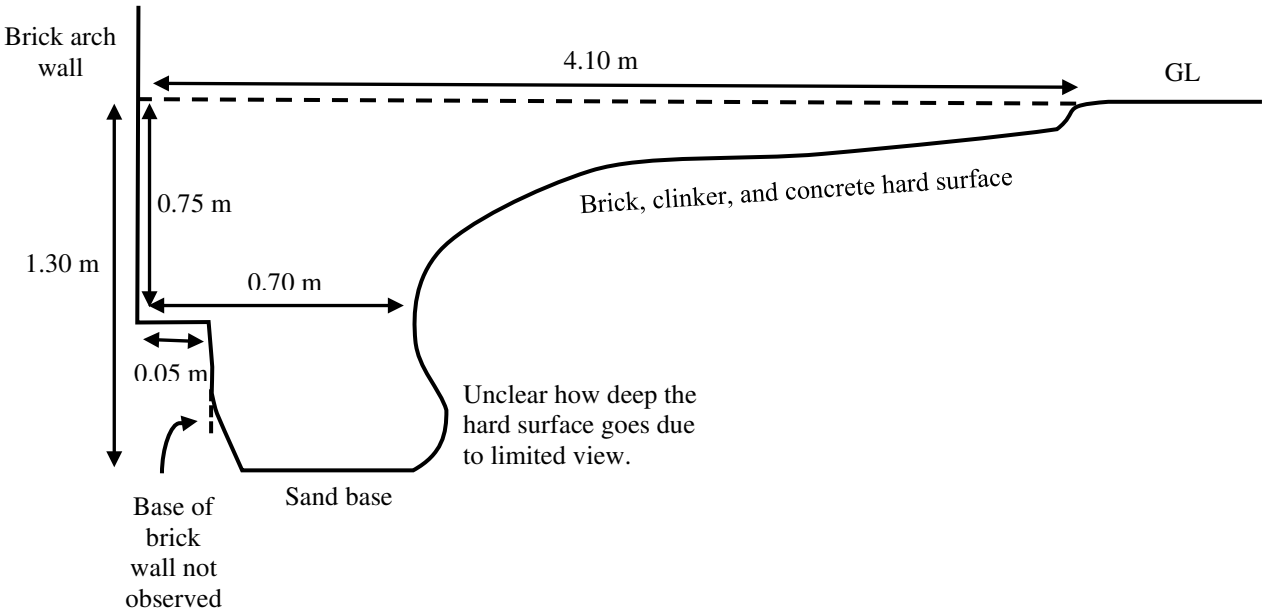
Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

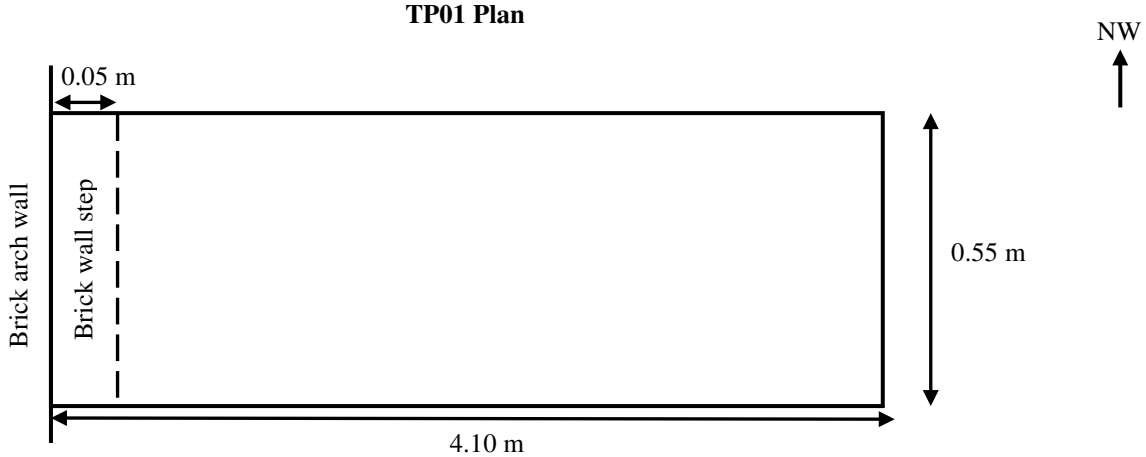
TP01 Trial Pit Drawings

SW NE

TP01 Cross Section



TP01 Plan



TP01 Trial Pit Photographs



TP01 Trial Pit Photographs



TP01 Trial Pit Photographs



TP01 Trial Pit Photographs



TP01 Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools and excavator	Project: Embassy Village, Castlefield		Location ID: **TP02**
Dates: 05/04/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.25	B2			(0.90)	MADE GROUND: Dark grey, slightly gravelly, very silty, fine SAND with occasional cobbles and rare timber and rare broken glass. Gravel is angular to subrounded, fine and medium including sandstone, brick, concrete and clinker. Cobbles are angular including brick and concrete. *Below 0.30m: becomes brown.* *Between 0.50m and 0.90m: becomes gravelly, siltier with depth.*				
0.25	D3								
0.25	ES1								
0.50	B5								
0.50	D6								
0.50	ES4								
1.00	B8			(0.80)	MADE GROUND: Firm, brown, slightly gravelly, very sandy SILT with rare pockets of brown clay. Gravel is angular to rounded, fine and medium including sandstone, brick, slate and coal.		1		
1.00	D9								
1.00	ES7								
1.75	B10			1.80	MADE GROUND: Reddish brown, fine and medium SAND with frequent cobbles. Cobbles are angular to subangular including sandstone. End of Trial Pit at 1.80m		2		
							3		
							4		
							5		

Termination:

Stability:
Spalling of trial pit sides between 0.00m and 0.50m.

Remarks:
B sample at 1.80m no representative due to spalling sides. Sample is cobbles only.

Dimensions (Length m x Width m):
1.50 x 0.55

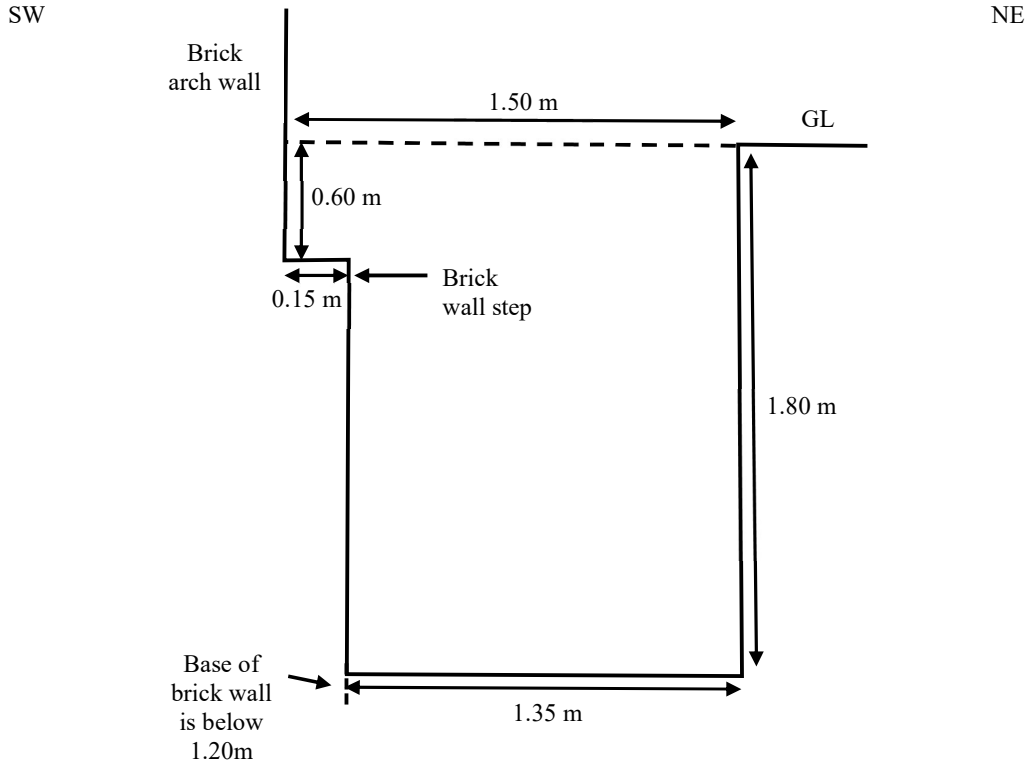
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

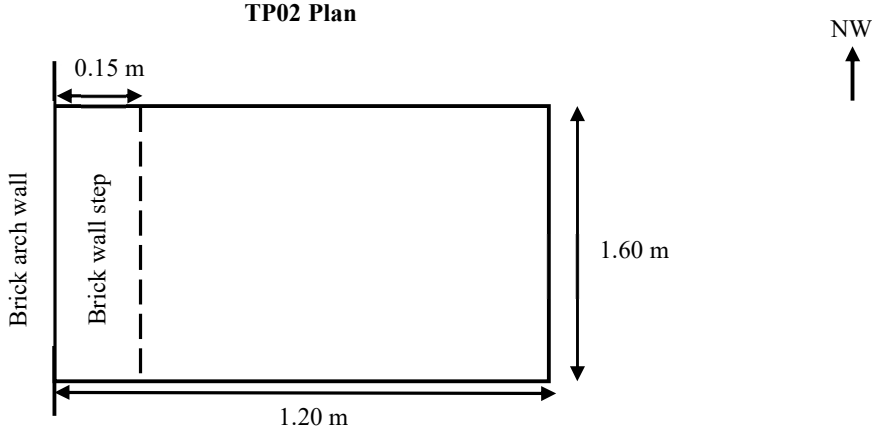
Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

TP02 Trial Pit Drawings

TP02 Cross Section



TP02 Plan



TP02 Trial Pit Photographs



TP02 Trial Pit Photographs



TP02 Trial Pit Photographs



TP02 Trial Pit Photographs



TP02 Trial Pit Photographs



IAN FARMER ASSOCIATES

Trial Pit Log

Plant used: Hand tools and excavator	Project: Embassy Village, Castlefield	Location ID: **TP03**	
Dates: 31/03/2022	Client: Curtins	Sheet 1 of 1	
Location:	Ground level:	Logged by: FH	Vertical scale: 1:25
			Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.00 - 0.30	B1			(0.35)	MADE GROUND: Grey, slightly gravelly, slightly silty, fine SAND with broken glass, rare broken pottery and occasional cobbles. Gravel is angular to subrounded, fine to coarse including sandstone, brick and concrete. Cobbles are angular including brick.				
0.25	ES2			0.35					
0.50	ES4				MADE GROUND: Brown, slightly gravelly, very silty, fine SAND with rare cobbles. Gravel is angular to subrounded, fine to coarse including sandstone, brick and slate. Cobbles are angular including brick.				
0.50 - 0.80	B3			(0.50)					
				0.85					
1.00	ES6			(0.35)	MADE GROUND: Brown, slightly gravelly, silty SAND with occasional pockets of soft, brown sandy silt and soft and firm, brown slightly sandy clay. Gravel is subangular to rounded, fine to coarse including sandstone and siltstone.		1		
1.00 - 1.20	B5			1.20	End of Trial Pit at 1.20m		2		
							3		
							4		
							5		

Termination:

Stability:
Moderate spalling throughout excavation.

Remarks:

Dimensions (Length m x Width m):
1.50 x 0.55

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

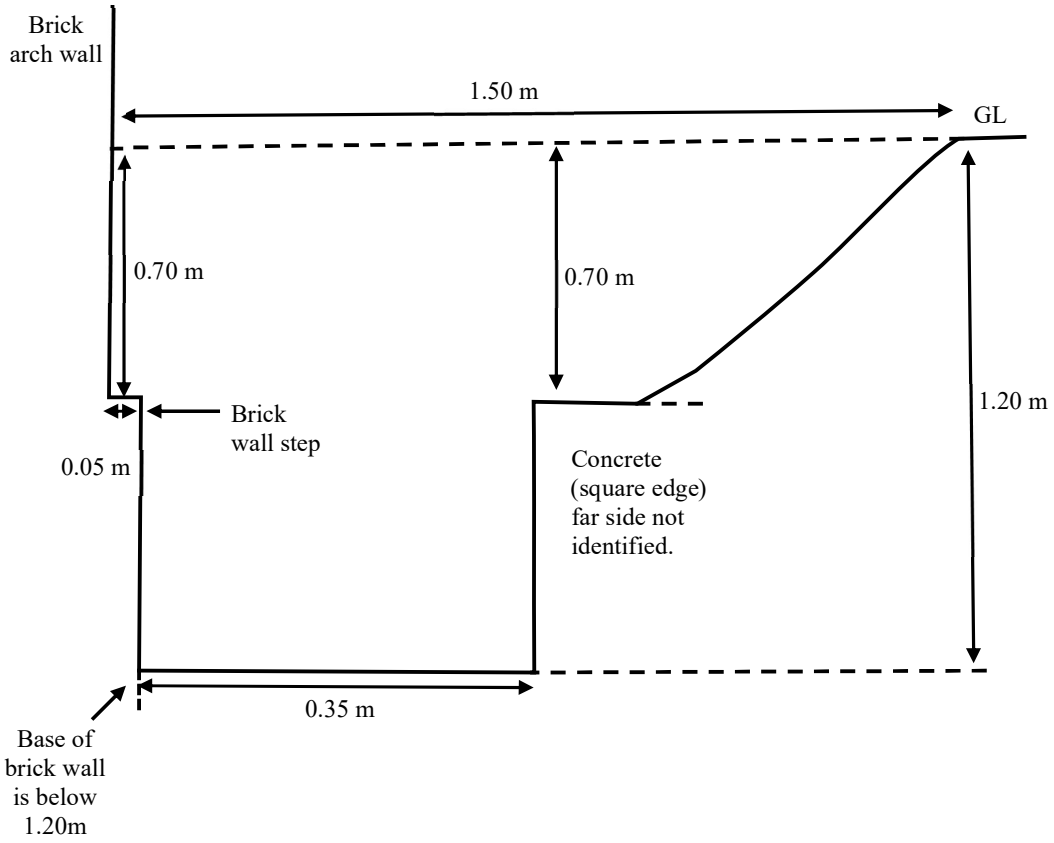
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Status:	DRAFT	

TP03 Trial Pit Drawings

SW

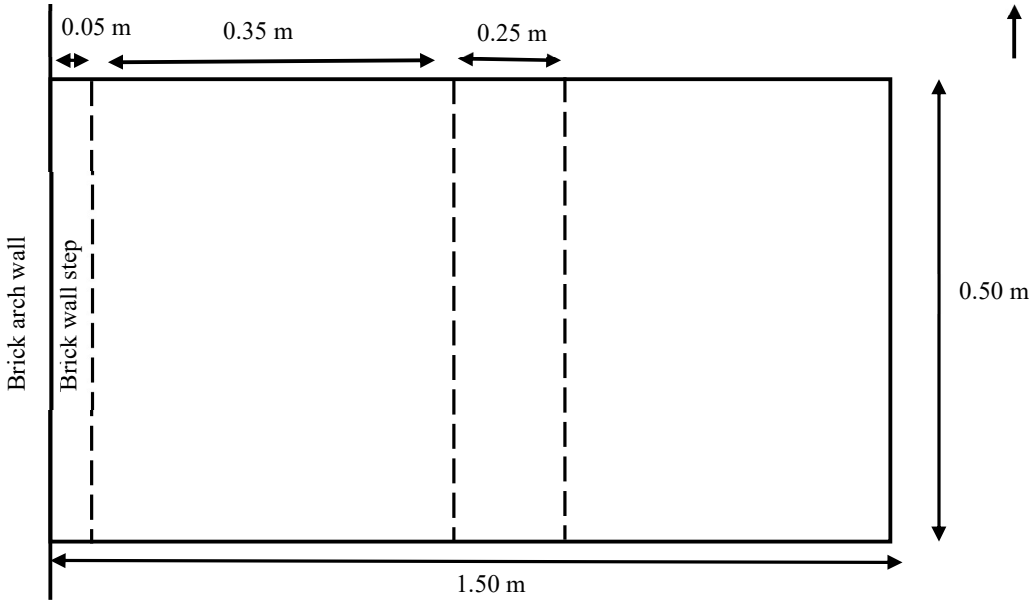
TP03 Cross Section

NE



TP03 Plan

SE



TP03 Trial Pit Photographs



TP03 Trial Pit Photographs



TP03 Trial Pit Photographs



TP03 Trial Pit Photographs



TP03 Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **TP04**
Dates: 29/03/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.15	D2			0.05	MADE GROUND: Grey slightly gravelly silty fine SAND, including rare broken glass and rare timber. Gravel is angular to subangular, fine to coarse including sandstone, concrete, brick, and coal.				
0.15	ES1								
0.30 - 0.70	B3				MADE GROUND: Brown slightly gravelly silty fine SAND with rare broken glass, rare timber and occasional pockets of slightly gravelly very silty fine sand. Gravel is angular to subangular, fine to coarse, including sandstone, concrete, brick, and coal. .				
				(1.15)					
0.90 - 1.20	B6								
1.00	D5						1		
1.00	ES4								
				1.20	End of Trial Pit at 1.20m				
							2		
							3		
							4		
							5		

Termination:

Stability:
Slight spalling throughout excavation.

Remarks:

Dimensions (Length m x Width m):
0.70 x 0.60

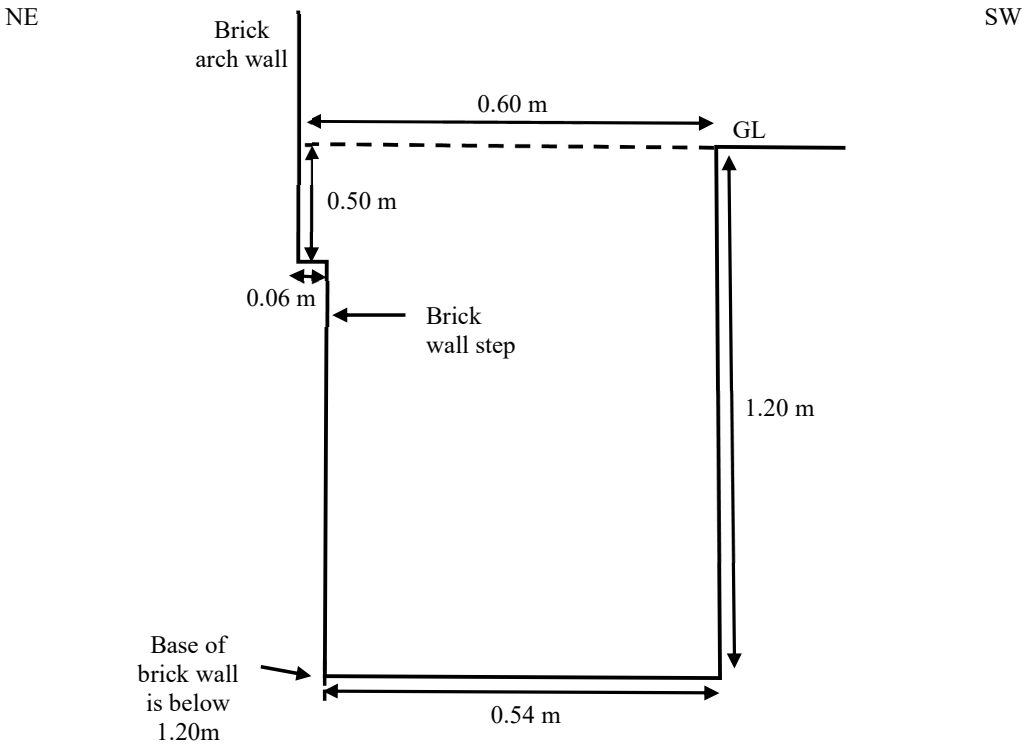
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

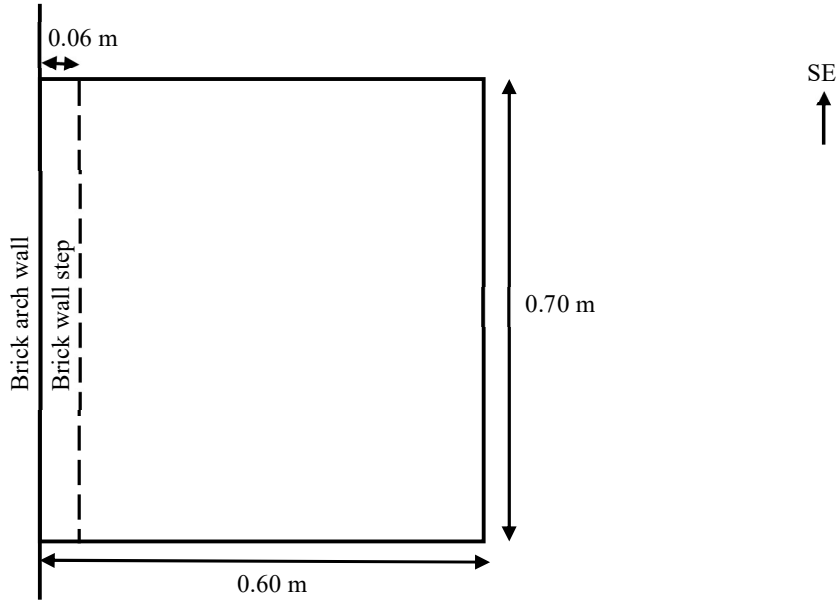
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Status:	DRAFT	

TP04 Trial Pit Drawings

TP04 Cross Section



TP04 Plan



TP04 Trial Pit Photographs



TP04 Trial Pit Photographs



TP04 Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **TP06**
Dates: 29/03/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				0.15	MADE GROUND: Light brown CONCRETE.				
0.20 - 0.50	B1			(0.35)	MADE GROUND: Black slightly gravelly silty fine to coarse SAND partly comprising ash. Gravel is angular to subrounded, fine and medium including sandstone and brick.				
0.40	ES2			0.50					
0.60 - 0.90	B3				MADE GROUND: Firm light brown slightly gravelly slightly sandy silty CLAY with rare cobbles and rare timber and rare glass. Gravel is angular to subrounded, fine and medium including sandstone, brick, and mudstone. Cobbles are angular including brick.		1	▼	
0.80	ES4			(0.70)					
				1.20	End of Trial Pit at 1.20m		2		
							3		
							4		
							5		

Termination:

Stability:
Slight spalling from 0.15 m to 0.50 m.

Remarks:

Dimensions (Length m x Width m):
1.50 x 0.95

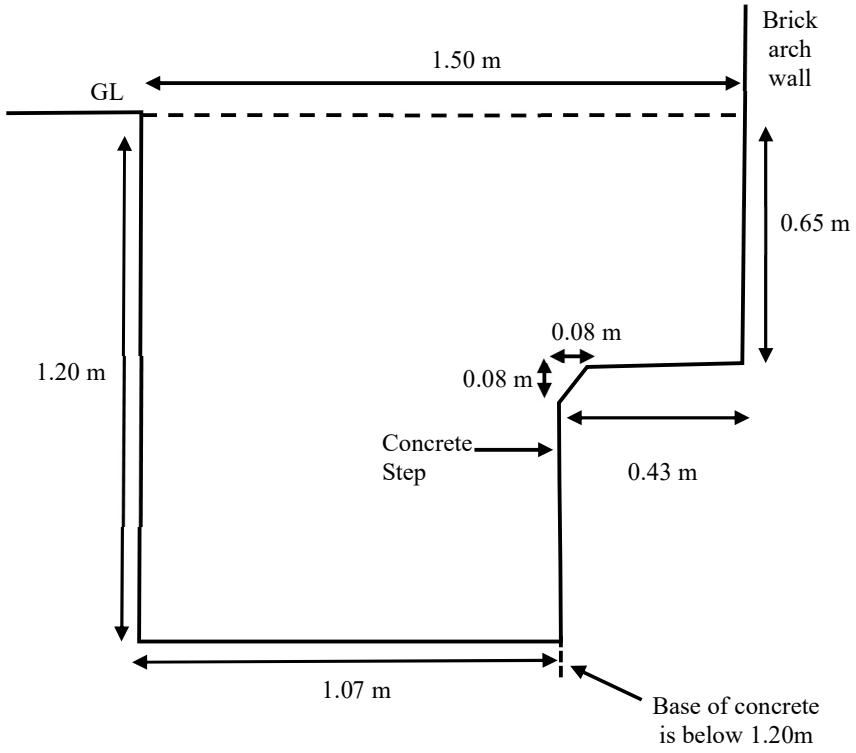
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks
1.05	0	1.05	

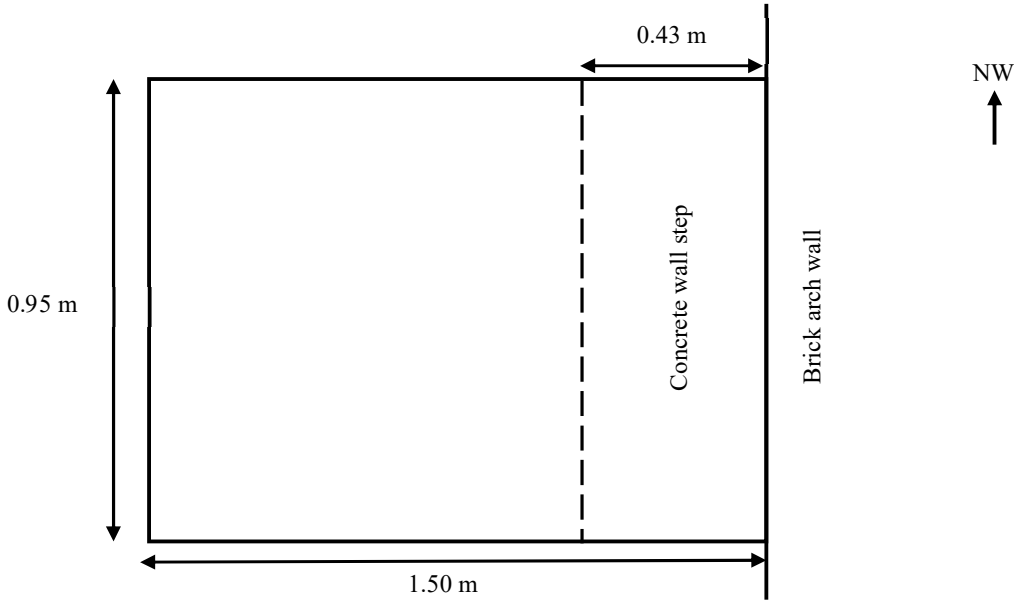
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Status:	DRAFT	

TP06 Trial Pit Drawings

SW **TP06 Cross Section** NE



TP06 Plan



TP06 Trial Pit Photographs



TP06 Trial Pit Photographs



TP06 Trial Pit Photographs



TP06 Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **TP07**
Dates: 29/03/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.10 - 0.40	B1			(0.45)	MADE GROUND: Grey slightly gravelly silty fine SAND with rare cobbles, rare broken glass, rare timber, and rare pottery. Gravel is angular to subangular, fine to coarse, including brick, sandstone, and concrete.				
0.20 0.20	D3 ES2								
0.50 - 0.90	B4			0.45	MADE GROUND: Orange-brown slightly gravelly silty fine SAND with rare cobbles and rare glass. Gravel is angular to subrounded, fine to coarse including brick and sandstone. Cobbles are angular, including brick.				
0.90 0.90	D6 ES5			(0.75)			1		
				1.20	End of Trial Pit at 1.20m		2		
							3		
							4		
							5		

Termination:

Stability: Medium spalling throughout

Dimensions (Length m x Width m): 1.60 x 1.20

Remarks:

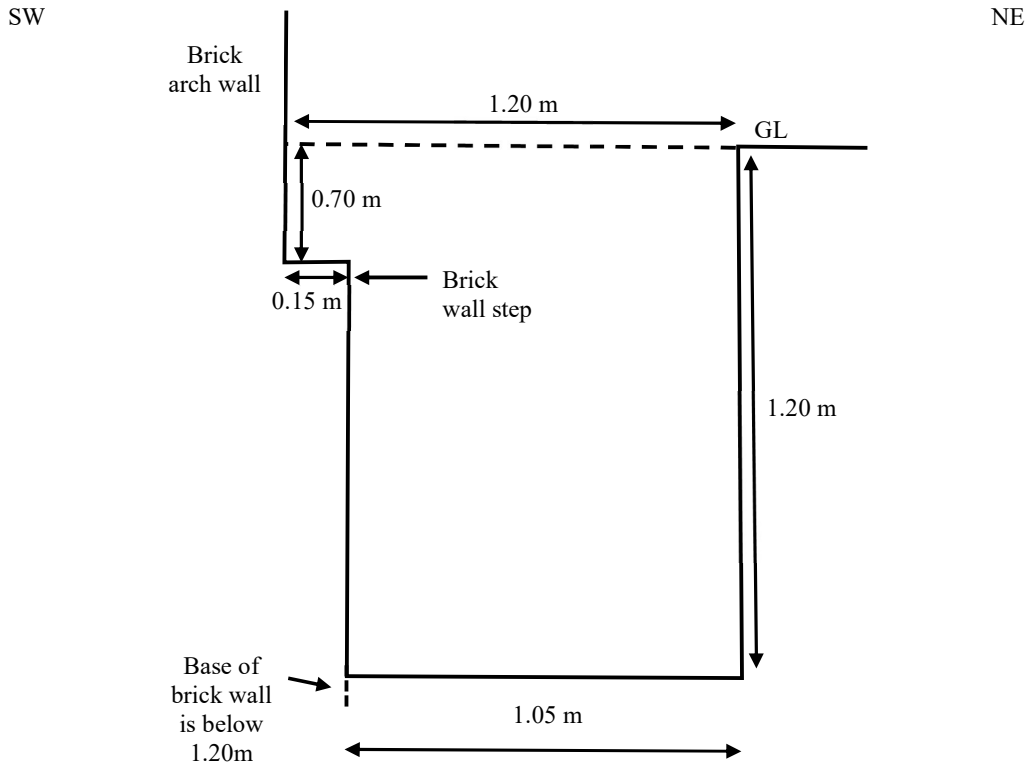
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

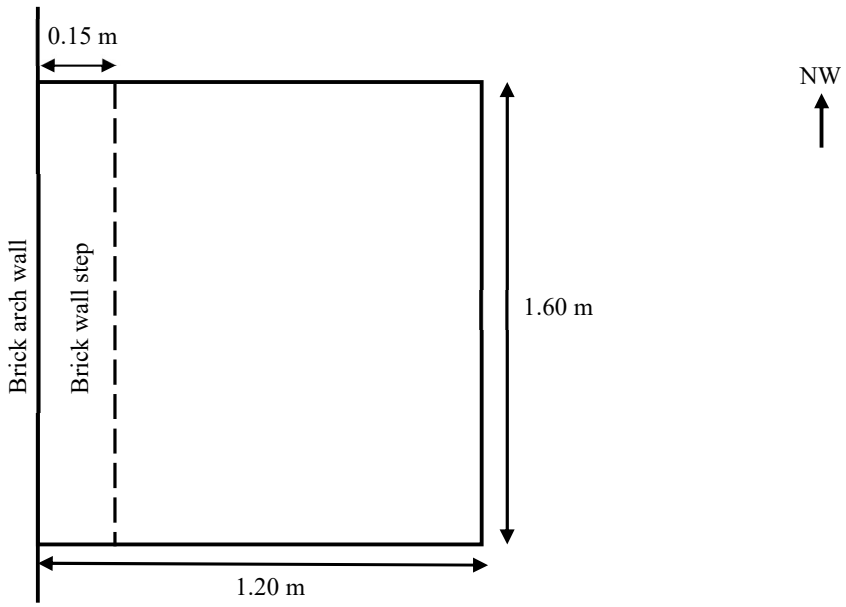
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Status:	DRAFT	

TP07 Trial Pit Drawings

TP07 Cross Section



TP07 Plan



TP07 Trial Pit Photographs



TP07 Trial Pit Photographs



TP07 Trial Pit Photographs



TP07 Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: 3 Tonne Excavator	Project: Embassy Village, Castlefield		Location ID: **TP08**
Dates: 30/03/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: JT / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.05	B2			0.05	MADE GROUND: Grey CONCRETE.				
0.05	D3			0.10	MADE GROUND: Reddish brown, fine and medium SAND.				
0.05	ES1				MADE GROUND: Very dark brown and dark orange, very gravelly, silty, fine to coarse SAND. Gravel is very angular to subrounded, fine to coarse including brick, concrete, glass and metal.				
0.25	B5			(0.40)	*At 0.10m: plastic sheeting.*				
0.25	D6								
0.25	ES4			0.50					
					MADE GROUND: Orangish brown, very gravelly, very silty, fine to coarse SAND. GRavel is angular to subangular, fine to coarse including brick, concrete and glass.				
				(0.80)					
1.00	B8						1		
1.00	D9								
1.00	ES7			1.30	End of Trial Pit at 1.30m				
							2		
							3		
							4		
							5		

Termination:

Stability:
Trial pit remained stable during excavation.

Remarks:

Dimensions (Length m x Width m):
1.80 x 1.00

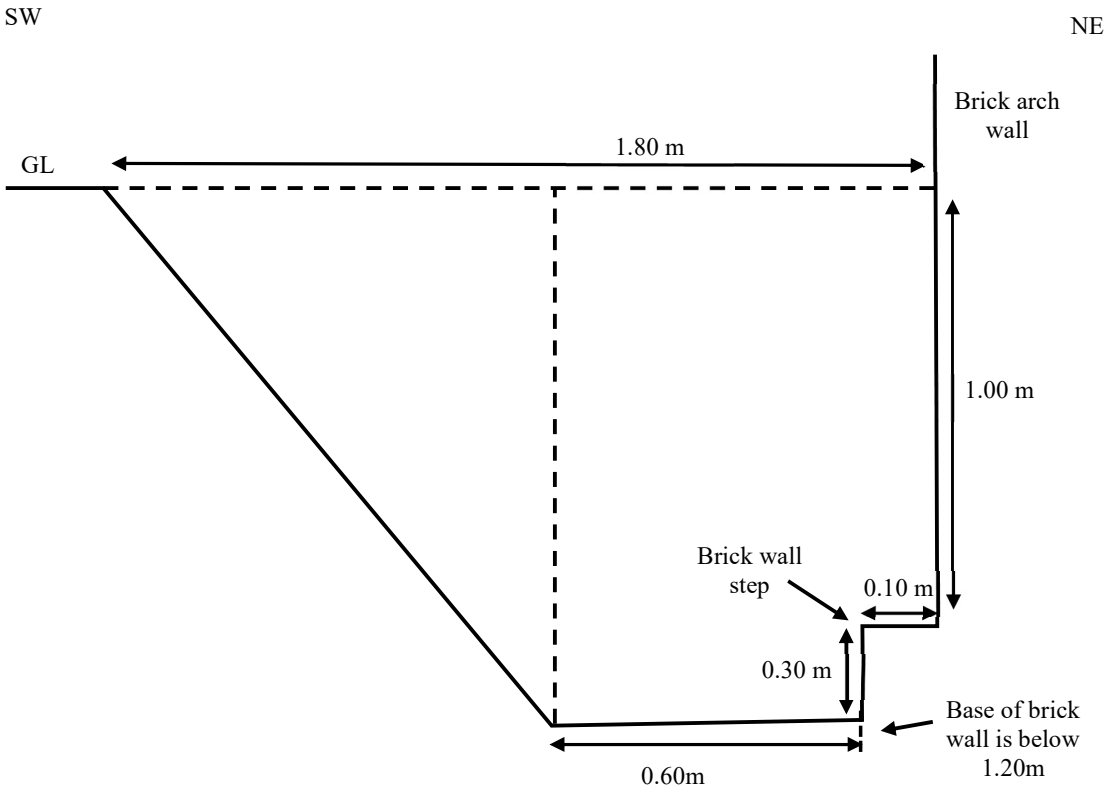
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

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Status:	DRAFT	

TP08 Trial Pit Drawings

TP08 Cross Section



TP08 Plan



TP08 Trial Pit Photographs



TP08 Trial Pit Photographs



TP08 Trial Pit Photographs



TP08 Trial Pit Photographs



TP08 Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: 3 Tonne Excavator	Project: Embassy Village, Castlefield		Location ID: **TP09**
Dates: 04/04/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: TB / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.20 0.20	B2 ES1			(0.40)	MADE GORUND: Dark brown, slightly gravelly, slightly silty, fine to coarse SAND. Gravel is angular to subrounded, fine to coarse including brick, sandstone, concrete, coal, clinker and slate.				
0.50 0.50	B4 ES3			0.40 (0.50)	MADE GROUND: Firm, brown and grey, slightly gravelly, sandy CLAY with low cobble content. Gravel is subangular to subrounded, fine to coarse including brick, concrete, sandstone, siltstone and mudstone. Cobbles are angular to subangular including brick and concrete.				
1.00 1.00	B6 ES5			0.90	MADE GROUND: Light brown and brown, slightly gravelly. fine to coarse SAND. Gravel is subangular to subrounded, fine to coarse including brick, sandstone and concrete.		1		
1.50 - 2.40	B7			(1.50)			2		
				2.40	End of Trial Pit at 2.40m		3		
							4		
							5		

Termination:

Stability:
Trial pit remained stable during excavation.

Remarks:

Dimensions (Length m x Width m):
2.00 x 1.00

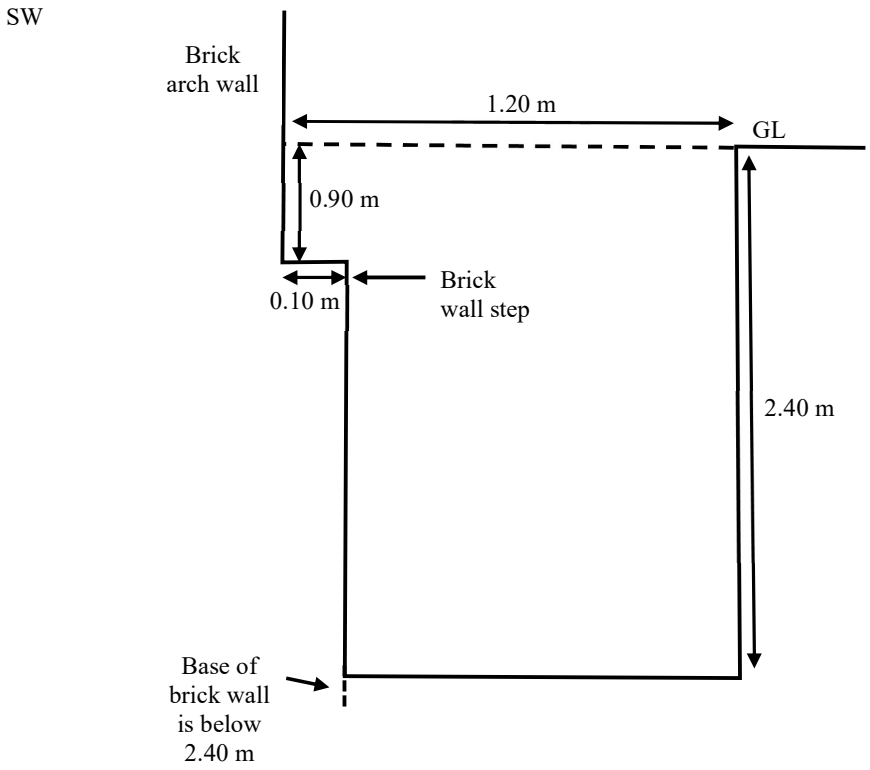
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

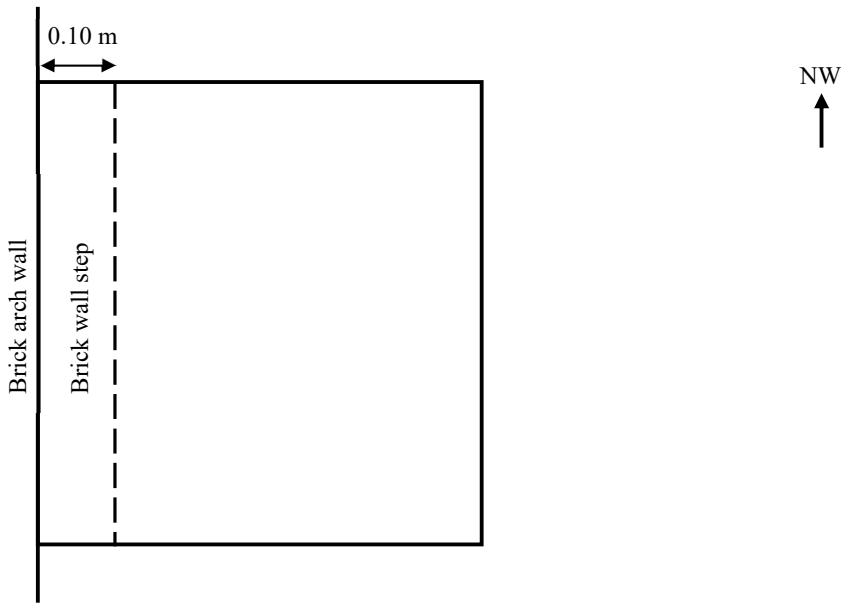
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Status:	DRAFT	

TP09 Trial Pit Drawings

TP09 Cross Section



TP09 Plan



TP09 Trial Pit Photographs



TP09 Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools and excavator	Project: Embassy Village, Castlefield		Location ID: **TP10**
Dates: 31/03/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level: / Logged by: / Vertical scale: 1:25	Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.00 - 0.30	B1			(0.85)	MADE GROUND: Black, gravelly, slightly silty SAND with occasional cobbles and rare fabric, metal and glass. Gravel is angular to subangular, fine to coarse including sandstone, brick and concrete. Cobbles are angular including concrete and brick.		1		
0.20 0.20	D3 ES2								
0.50 - 0.80	B4			0.85					
0.70 0.70	D6 ES5								
0.90 - 1.20	B7			(0.35)	MADE GROUND: Soft, brown, slightly gravelly, very sandy SILT with rare brick and rare pockets of soft, dark grey clay. Gravel is subrounded to rounded, fine and medium including sandstone and mudstone.				
1.10 1.10	D9 ES8			1.20	End of Trial Pit at 1.20m		2 3 4 5		

Termination:

Stability:
Slight spalling throughout.

Remarks:

Dimensions (Length m x Width m):
2.30 x 1.10

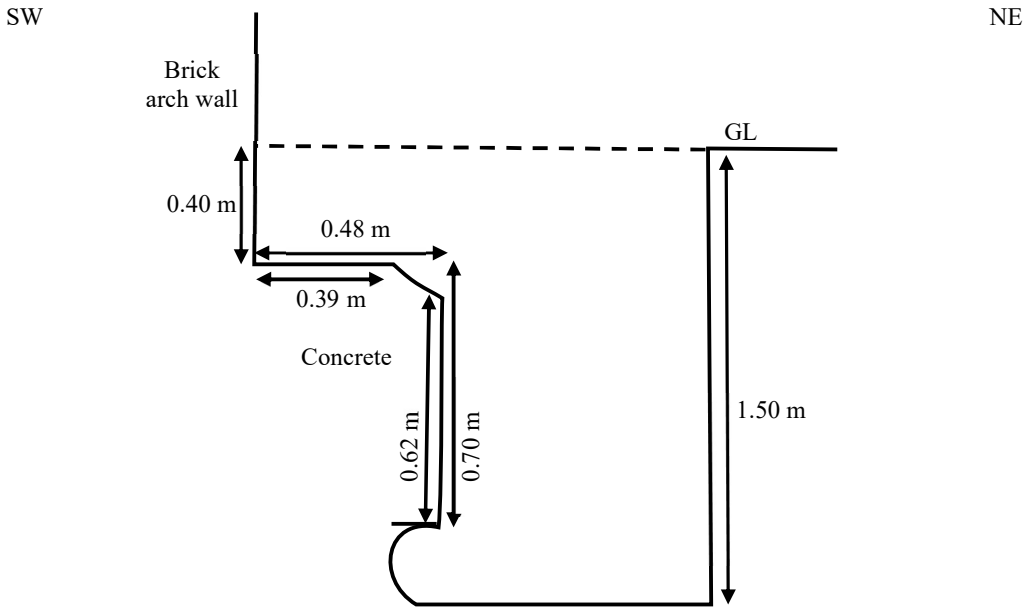
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

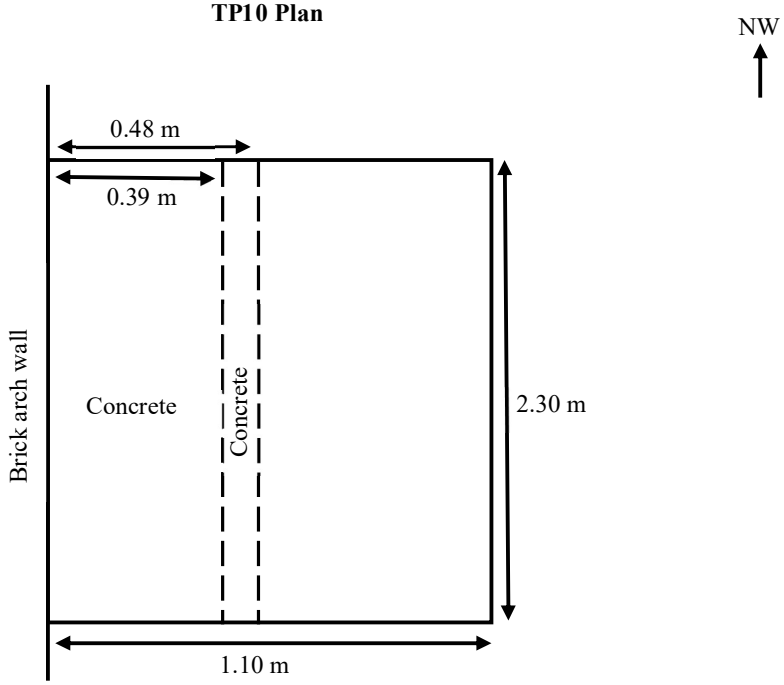
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Status:	DRAFT	

TP10 Trial Pit Drawings

TP10 Cross Section



TP10 Plan



TP10 Trial Pit Photographs



TP10 Trial Pit Photographs



TP10 Trial Pit Photographs



TP10 Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools and excavator	Project: Embassy Village, Castlefield		Location ID: **TPA**
Dates: 06/04/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				0.08	MADE GROUND: Grey CONCRETE.				
0.20	B2			(0.32)	MADE GROUND: Very dark, grey, slightly gravelly, silty, fine SAND with occasional cobbles. Gravel is angular to subangular, fine to coarse including quartzite. brick, slag, concrete and sandstone. Cobbles are angular including brick.				
0.20	D3								
0.20	ES1			0.40					
0.50	B5				MADE GROUND: Dark brown, slightly gravelly, silty, fine SAND with occasional cobbles and rare pockets of firm and stiff brown clay. Gravel is angular to rounded, fine to coarse including slate, coal, slag, quartzite, brick, concrete and sandstone. Cobbles are angular to subrounded including brick, quartzite and sandstone.				
0.50	D6								
0.50	ES4								
1.00	B8						1		
1.00	ES7			(2.10)					
1.80	B9								
2.00	ES10						2		
2.40	B11								
2.50	D12			2.50	End of Trial Pit at 2.50m				
							3		
							4		
							5		

Termination:

Stability:
Slight spalling of trial pit sides between 0.08m and 2.55m.

Remarks:

Dimensions (Length m x Width m):
3.30 x 0.90

Water Strikes

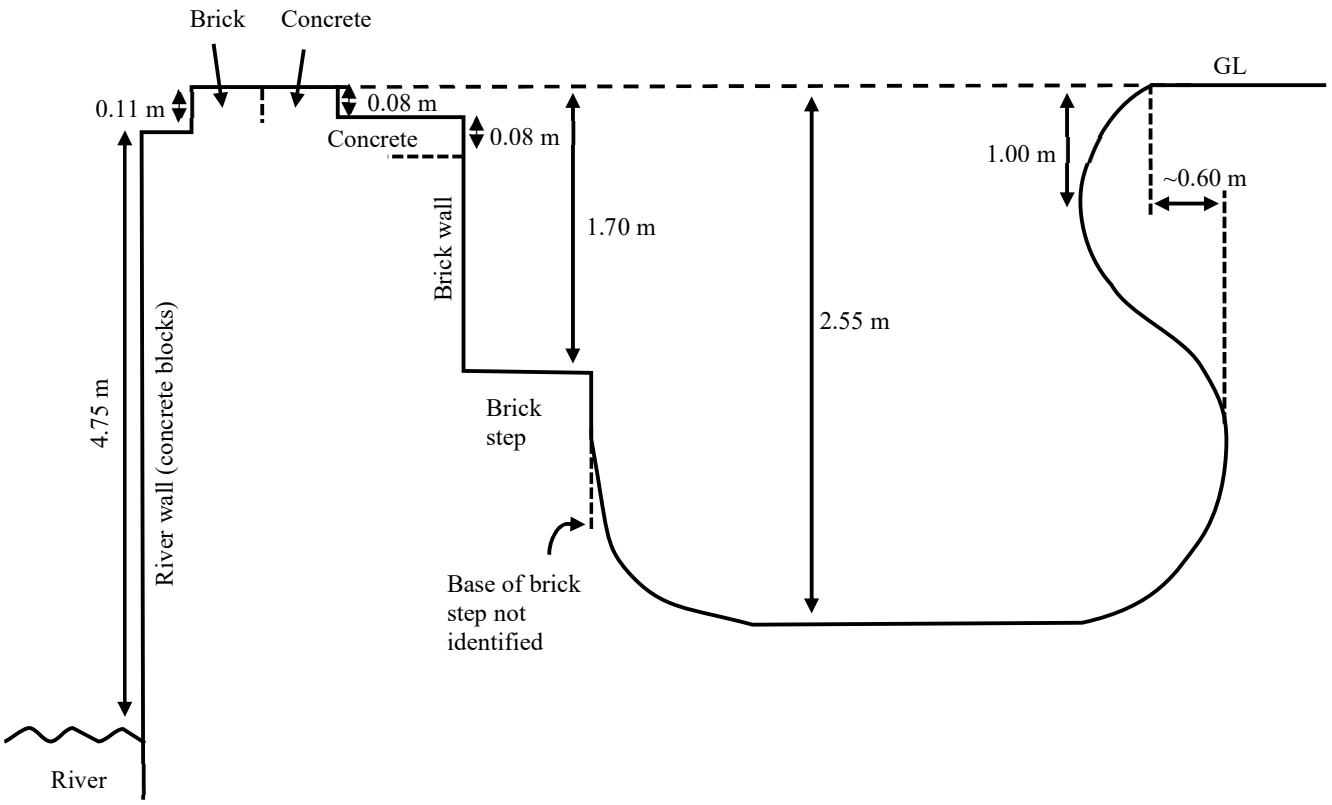
Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	MHW
Status:	DRAFT

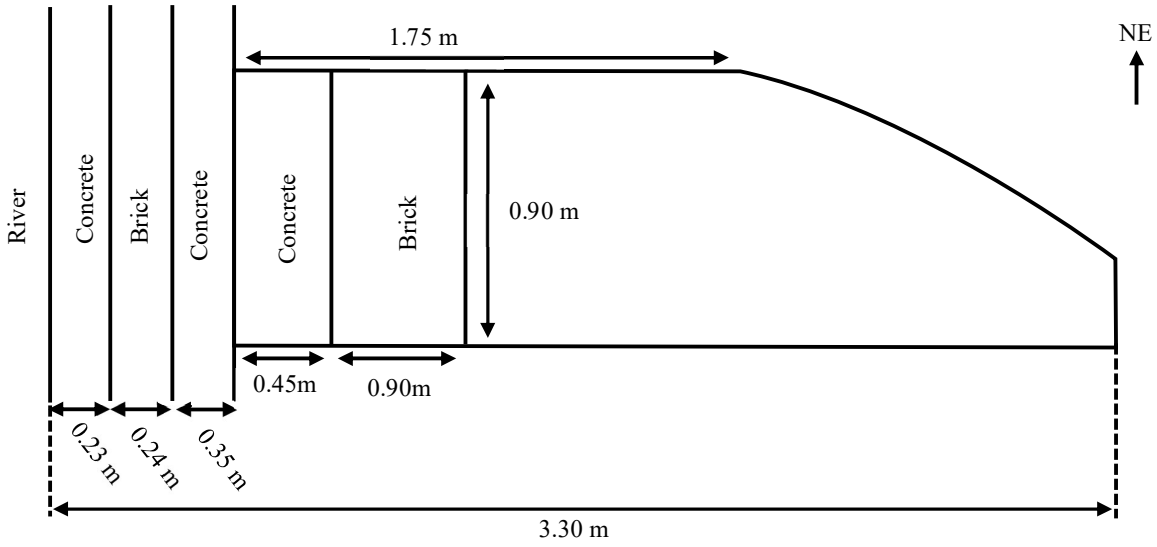
IFA TP v01.01

TPA Trial Pit Drawings

TPA Cross Section



TPA Plan



TPA Trial Pit Photographs



TPA Trial Pit Photographs



TPA Trial Pit Photographs



TPA Trial Pit Photographs



TPA Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **TPB (Zone A)**
Dates: 28/03/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				0.12	MADE GROUND: Light brown sandstone blocks recovered as angular medium to coarse GRAVEL with occasional cobbles.				
				0.18	MADE GROUND: Dark brown gravelly silty fine to medium SAND. Gravel is angular to rounded, fine to medium, including brick, coal, and sandstone.				
				0.40	MADE GROUND: Orange-brown with pockets of dark brown CLAY with rare sand and rare gravel.				
					End of Trial Pit at 0.40m		1 2 3 4 5		

Termination: Encountered clay

Stability: Moderate spalling from 0.12 m to 0.18 m.

Remarks:

Dimensions (Length m x Width m): 0.30 x 0.58

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **TPB (Zone B)**
Dates: 28/03/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.15 0.15 0.15	B3 D2 ES1			0.10 0.18 0.40	MADE GROUND: Light beige subrounded to rounded COBBLES of sandstone and quartzite in a concrete like matrix. MADE GROUND: Dark brown gravelly silty fine and medium SAND. Gravel is angular to rounded, fine and medium including brick, coal, and sandstone. MADE GROUND: Orange-brown with pockets of dark brown CLAY with rare sand and rare gravel. End of Trial Pit at 0.40m		1 2 3 4 5		

Termination: Encountered clay

Stability: Moderate spalling between 0.10 m to 0.18 m.

Remarks:

Dimensions (Length m x Width m): 1.75 x 0.58

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **TPB (Zone C)**
Dates: 29/03/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				0.10	MADE GROUND: Light beige subrounded to rounded COBBLES of sandstone and quartzite in a concrete like matrix.				
				0.18	MADE GROUND: Dark brown gravelly silty fine and medium SAND. Gravel is angular to rounded, fine and medium including brick, coal, and sandstone.				
				(0.34)	MADE GROUND: Soft dark brown sandy gravelly SILT with rare cobbles. Gravel is angular to rounded, fine and medium including sandstone, brick, and siltstone. Cobbles are angular including bricks.				
0.50	B1			0.52					
0.60	D2			0.65	MADE GROUND: Orange-brown slightly sandy silty CLAY with occasional pockets of brown clay and rare cobbles. Cobbles are angular including brick.				
0.85	B5				Reddish brown slightly gravelly fine and medium SAND. Gravel is angular, fine to coarse including sandstone.				
0.90	D4			(0.55)					
0.90	ES3						1		
				1.20	End of Trial Pit at 1.20m				
							2		
							3		
							4		
							5		

Termination:

Stability:
Slight spalling from 0.10 m to 0.52 m.

Remarks:

Dimensions (Length m x Width m):
0.45 x 0.58

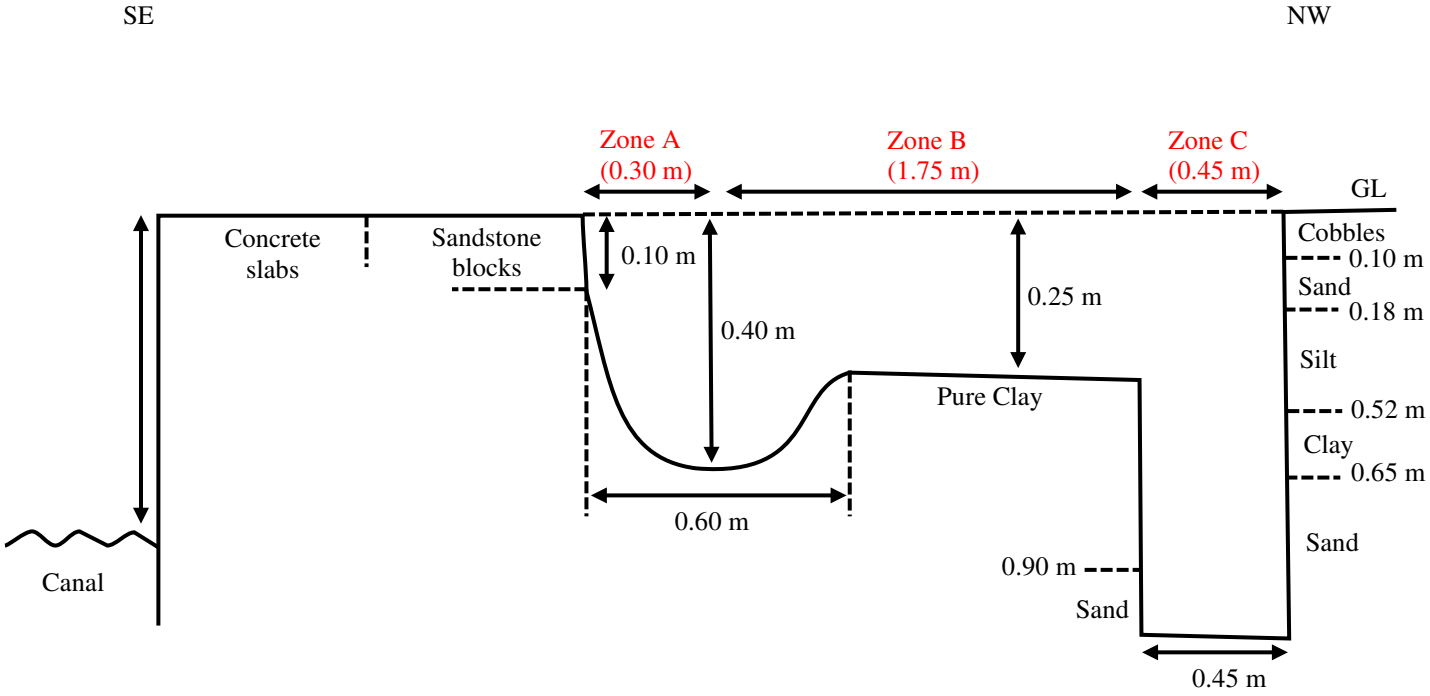
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

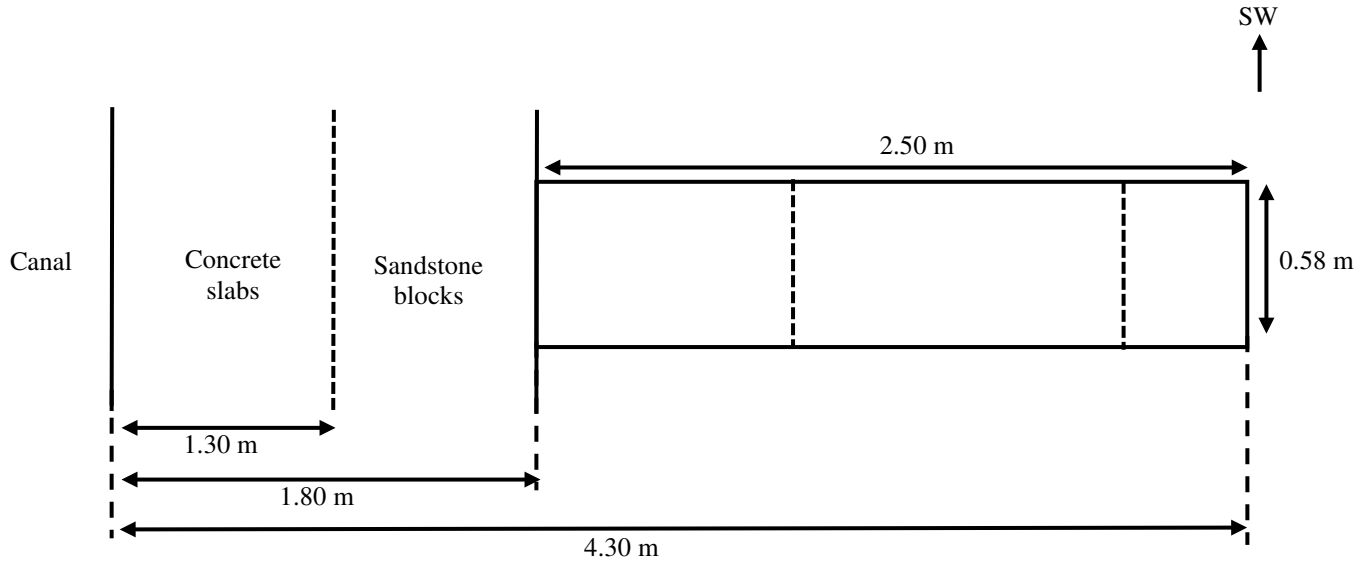
Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

TPB Trial Pit Drawings

TPB (Zones A, B and C) Cross Section



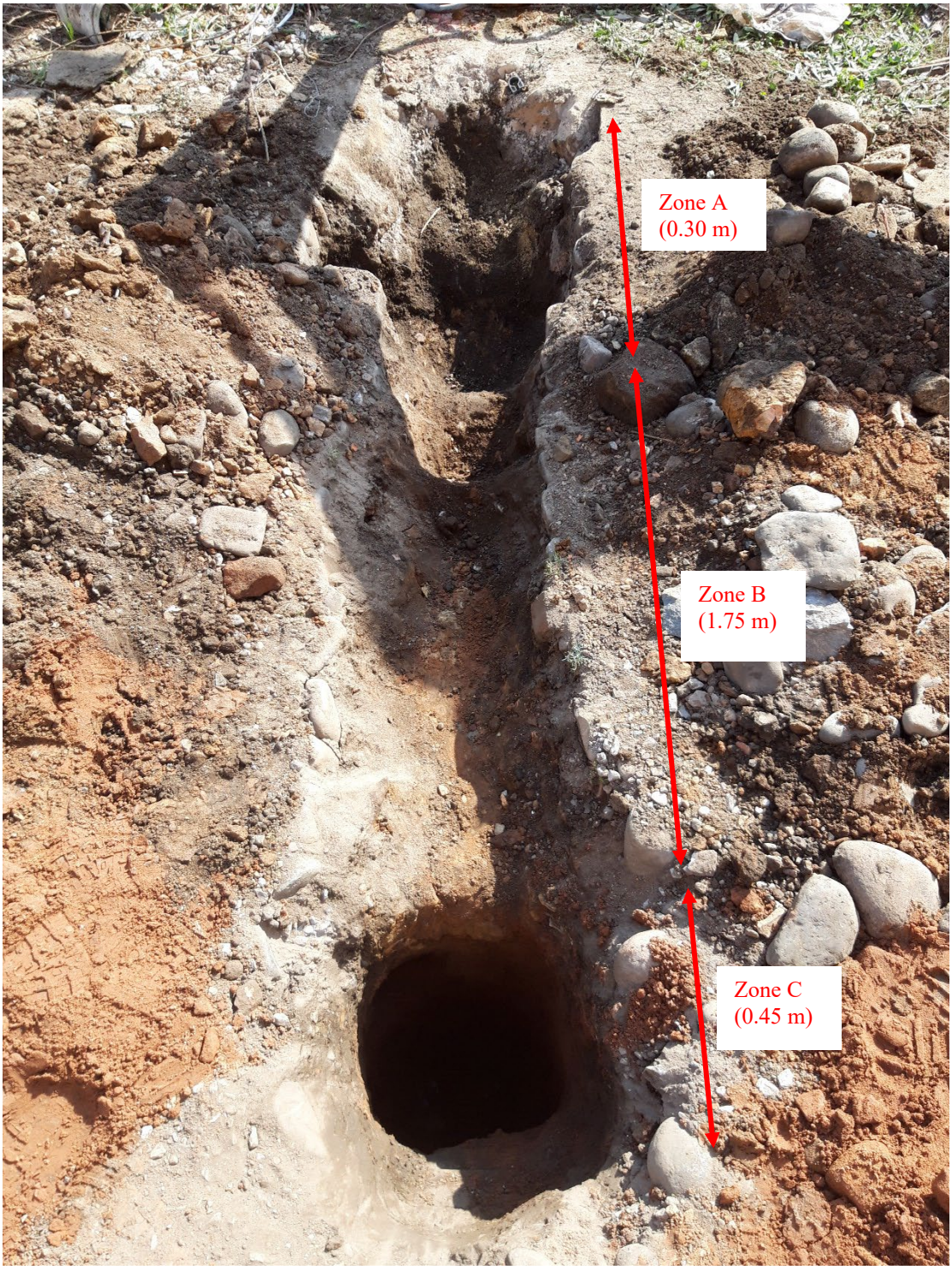
TPB (Zones A, B and C) Plan



TPB Trial Pit Photographs



TPB Trial Pit Photographs



TPB Trial Pit Photographs



TPB Trial Pit Photographs



TPB Trial Pit Photographs



IAN FARMER ASSOCIATES

Trial Pit Log

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **TPC**
Dates: 28/03/2022	Client: Curtins		Sheet 1 of 1
Location:	Ground level:	Logged by: FH	Vertical scale: 1:25
			Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.05	D1			0.15	MADE GROUND: Light grey CONCRETE recovered as angular medium to coarse gravel with frequent angular cobbles. Matrix supported with sand and subrounded to rounded fine to medium gravel, including quartz, mudstone and siltstone.				
0.25	B4			(0.35)	MADE GROUND: Black gravelly silty fine to coarse SAND with rare cobbles. Gravel is angular to subangular, fine to coarse including sandstone, quartz, concrete, and brick. Cobbles are angular, including brick and concrete.				
0.25	D2			0.50					
0.25	ES3			0.60	MADE GROUND: Firm orange-brown slightly sandy slightly gravelly CLAY.				
					MADE GROUND: Soft dark brown sandy gravelly SILT with frequent cobbles.				
0.95	B7			(0.60)			1		
0.95	D5								
0.95	ES6			1.20	End of Trial Pit at 1.20m		2		
							3		
							4		
							5		

Termination:

Stability:
Moderate spalling between 0.15 m and 1.20 m.

Remarks:

Dimensions (Length m x Width m):
3.80 x 0.58

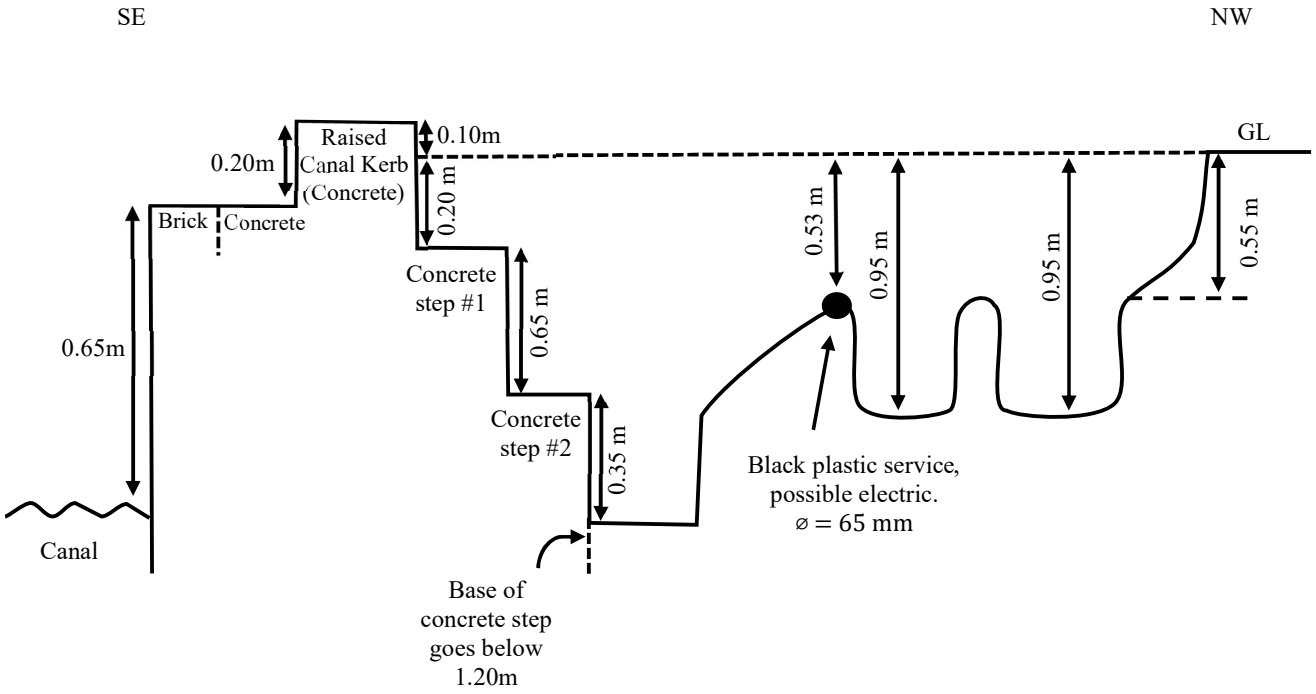
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks
0.58	0	0.58	

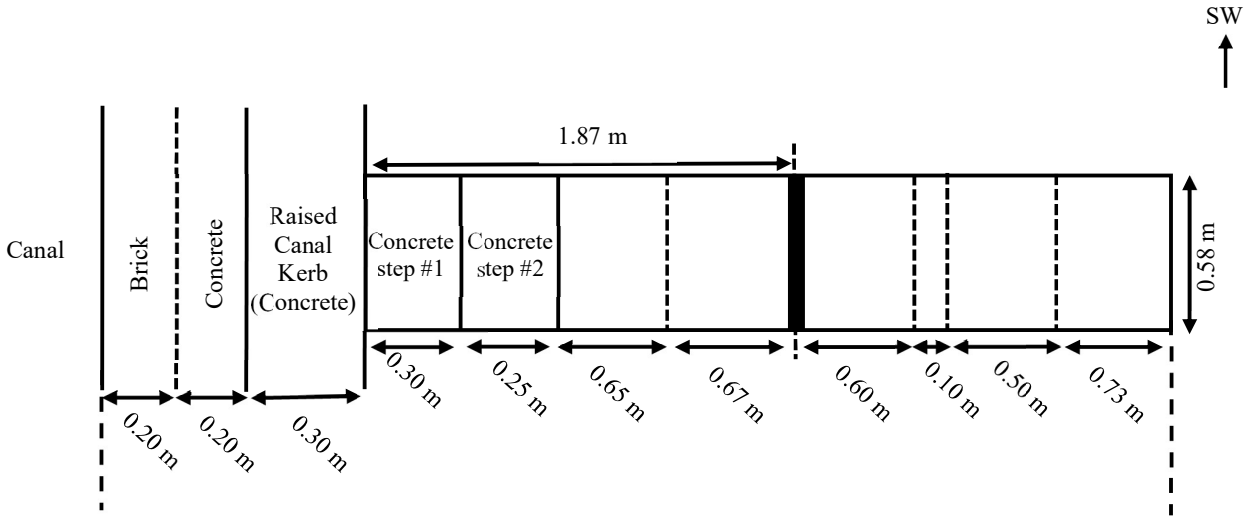
Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

TPC Trial Pit Drawings

TPC Cross Section



TPC Plan



TPC Trial Pit Photographs



TPC Trial Pit Photographs



TPC Trial Pit Photographs



TPC Trial Pit Photographs



TPC Trial Pit Photographs



TPC Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: 3 Tonne Excavator	Project: Embassy Village, Castlefield	Location ID: **TPD**	
Dates: 04/04/2022	Client: Curtins	Sheet 1 of 1	
Trial Pit Log	Location:	Ground level:	Logged by: TB / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.30 0.30	B2 ES1			(0.40) 0.40	MADE GROUND: Dark greyish brown, very gravelly, fine to coarse SAND. Gravel is angular to subrounded, fine to coarse including brick, ash, clinker and slag.				
0.50 0.50	B4 ES3			(1.90)	MADE GROUND: Brown, and light brown, slightly gravelly, sandy SILT with low cobble content. Gravel is angular to subrounded, fine to coarse including slate, brick and sandstone. Cobbles are subangular including brick.		1 2		
1.50 1.50	B6 ES5			2.30	End of Trial Pit at 2.30m		3 4 5		

Termination:

Stability:
Trial pit remained stable during excavation.

Remarks:

Dimensions (Length m x Width m):
1.50 x 0.80

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

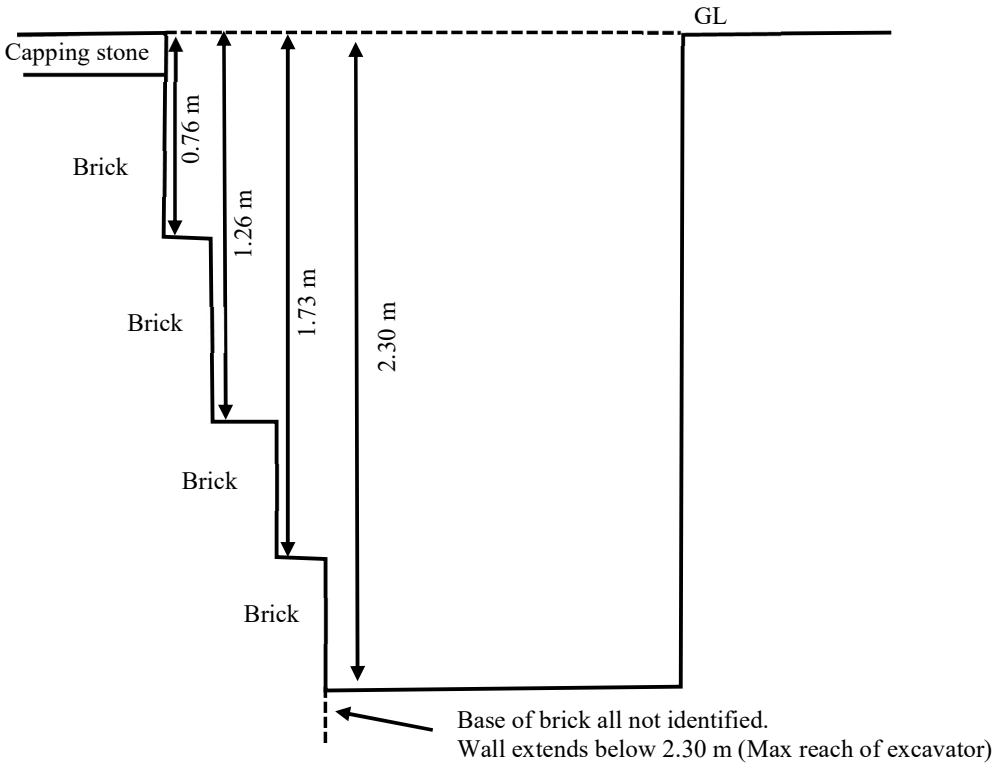
Checked by:	MHW
Status:	DRAFT

IFA TP v01.01

TPD Trial Pit Drawings

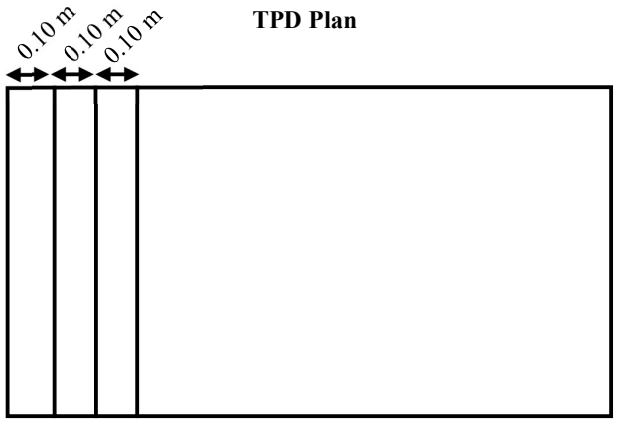
TPD Cross Section

NW SE



TPD Plan

NE



TPD Trial Pit Photographs



TPD Trial Pit Photographs



TPD Trial Pit Photographs



IAN FARMER ASSOCIATES

Trial Pit Log

Plant used: 3 Tonne Excavator	Project: Embassy Village, Castlefield	Location ID: **TPE**	
Dates: 04/04/2022	Client: Curtins	Sheet 1 of 1	
Location:	Ground level:	Logged by: TB	Vertical scale: 1:25
			Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
0.20 0.20	B2 ES1			(2.20)	MADE GROUND: Dark brown (compact) slightly gravelly, slightly silty, fine to coarse SAND with medium cobble content. Gravel is angular to subrounded, fine to coarse including sandstone, brick, clinker, concrete, slag and slate. Cobbles are angular to subrounded, fine to coarse including sandstone, brick, clinker, concrete, slag and slate.		1 2		
0.70 0.70	B4 ES3			2.20	End of Trial Pit at 2.20m		3 4 5		

Termination:

Stability:
Trial pit remained stable during excavation.

Remarks:

Dimensions (Length m x Width m):
1.60 x 1.00

Water Strikes

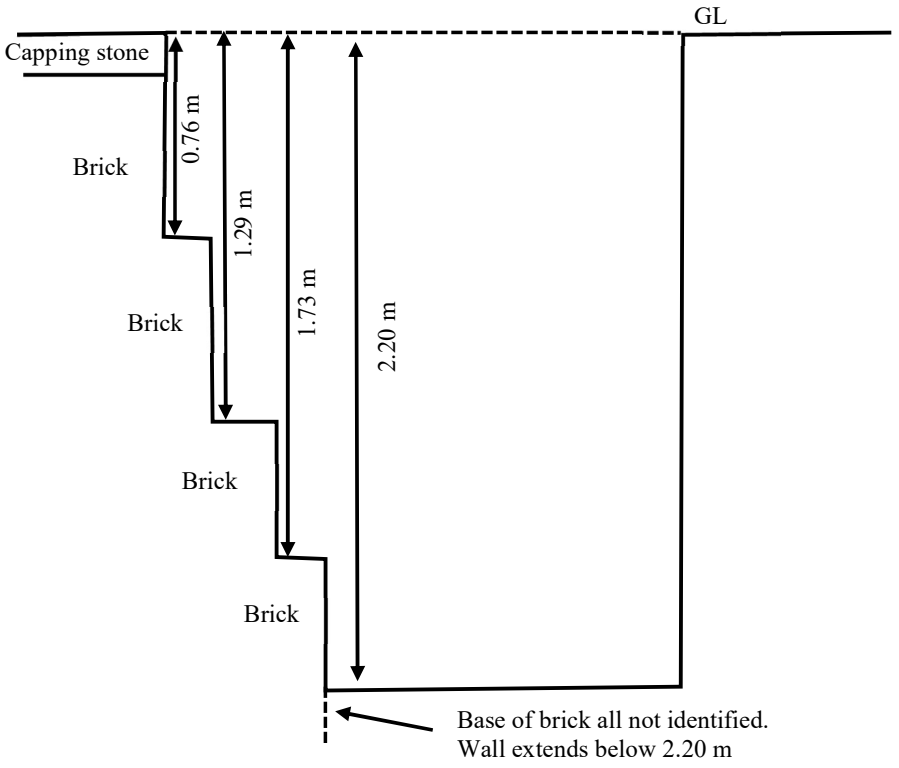
Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

TPE Trial Pit Drawings

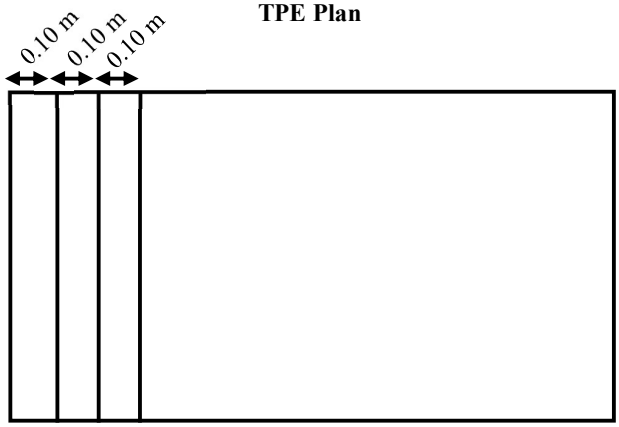
TPE Cross Section

NW SE



TPE Plan

NE



TPE Trial Pit Photographs



TPE Trial Pit Photographs



IAN FARMER ASSOCIATES

Trial Pit Log

Plant used: 3 Tonne Excavator	Project: Embassy Village, Castlefield		Location ID: **TPF**
Dates: 29/03/2022	Client: Curtins		Sheet 1 of 1
Location:	Ground level:	Logged by: JT	Vertical scale: 1:25
			Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				0.10	MADE GROUND: Grey CONCRETE.				
0.20 - 0.50	B1				MADE GROUND: Very dark brown and black, very sandy, silty GRAVEL with high cobble content. Gravel is very angular to subrounded, fine to coarse including sandstone, brick and concrete. Cobbles are angular to rounded including brick and fine grained igneous lithologies.				
0.50 0.50	D2 ES3			(1.05)					
				1.15	End of Trial Pit at 1.15m				

Scale: 1, 2, 3, 4, 5

Termination:
Unable to see base of excavation due to water strike.

Stability:
Major spalling throughout.

Remarks:

Dimensions (Length m x Width m):
2.30 x 1.50

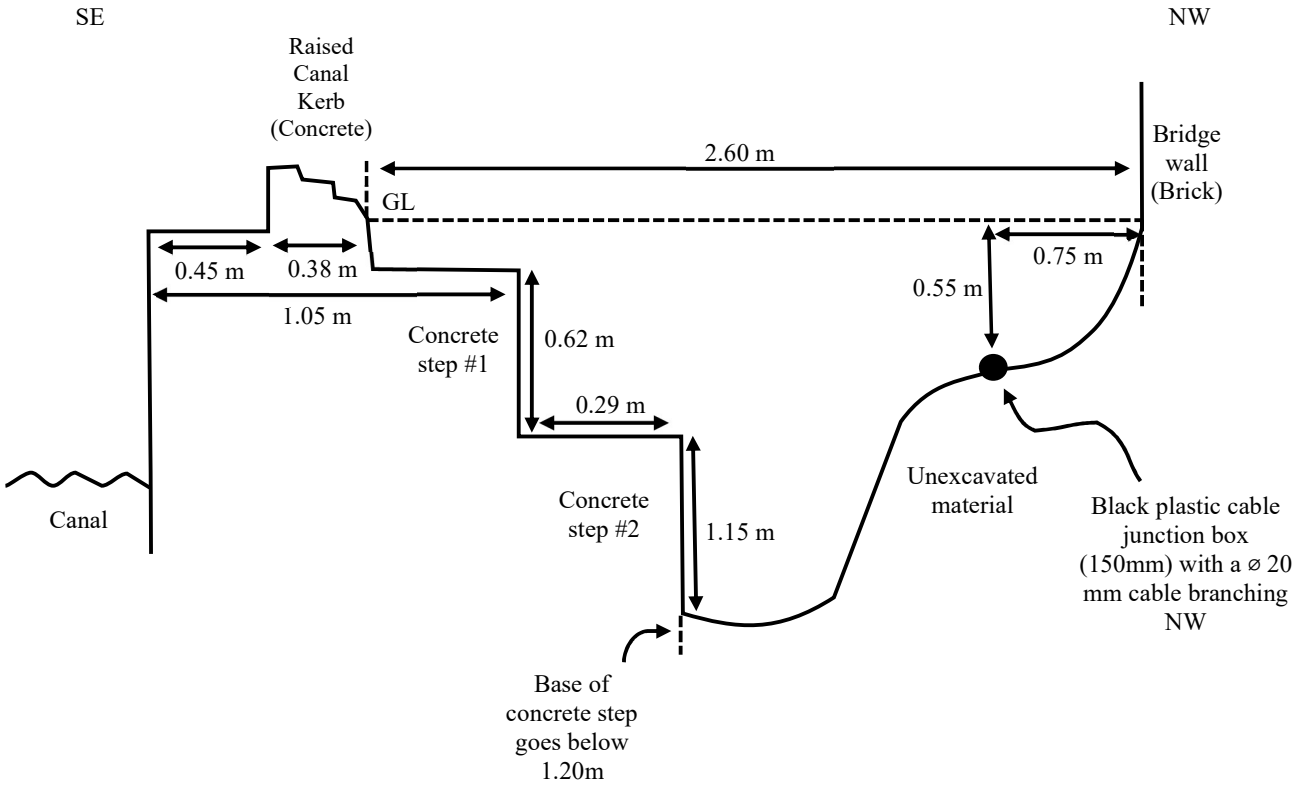
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks
0.90	0	0.90	

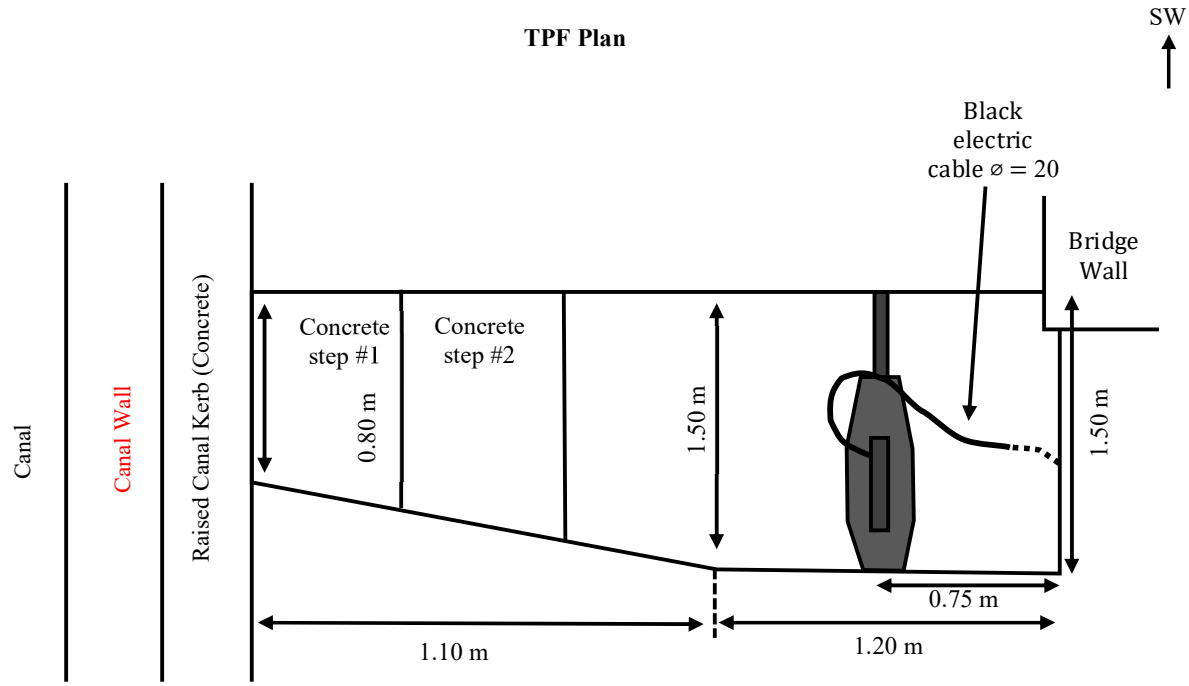
Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

TPF Trial Pit Drawings

TPF Cross Section



TPF Plan



TPF Trial Pit Photographs



TPF Trial Pit Photographs



TPF Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **TPG**
Dates: 05/04/2022	Client: Curtins		Sheet 1 of 1
Trial Pit Log	Location:	Ground level:	Logged by: / Vertical scale: 1:25 / Contract ID: 2230462

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				0.10	MADE GROUND: Grey CONCRETE.				
0.20	B2				MADE GROUND: Black, slightly gravelly, very silty, fine and medium SAND including ash with occasional cobbles. Gravel is angular to subangular, fine to coarse including brick, sandstone and concrete. Cobbles are angular to subrounded, including sandstone brick and concrete.				
0.20	D3								
0.20	ES1								
0.50	B5			(0.75)					
0.50	D6								
0.50	ES4								
				0.85	MADE GROUND: Soft, orange brown, slightly gravelly, slightly sandy CLAY with rare cobbles. Gravel is rounded to angular, fine to coarse including brick and sandstone. Cobbles are rounded to angular including brick.		1		
1.00	B8			(0.35)					
1.00	ES7								
				1.20	End of Trial Pit at 1.20m				
							2		
							3		
							4		
							5		

Termination:

Stability:
Slight spalling of trial pit sides between 0.10m and 0.85m.

Remarks:

Dimensions (Length m x Width m):
1.25 x 0.55

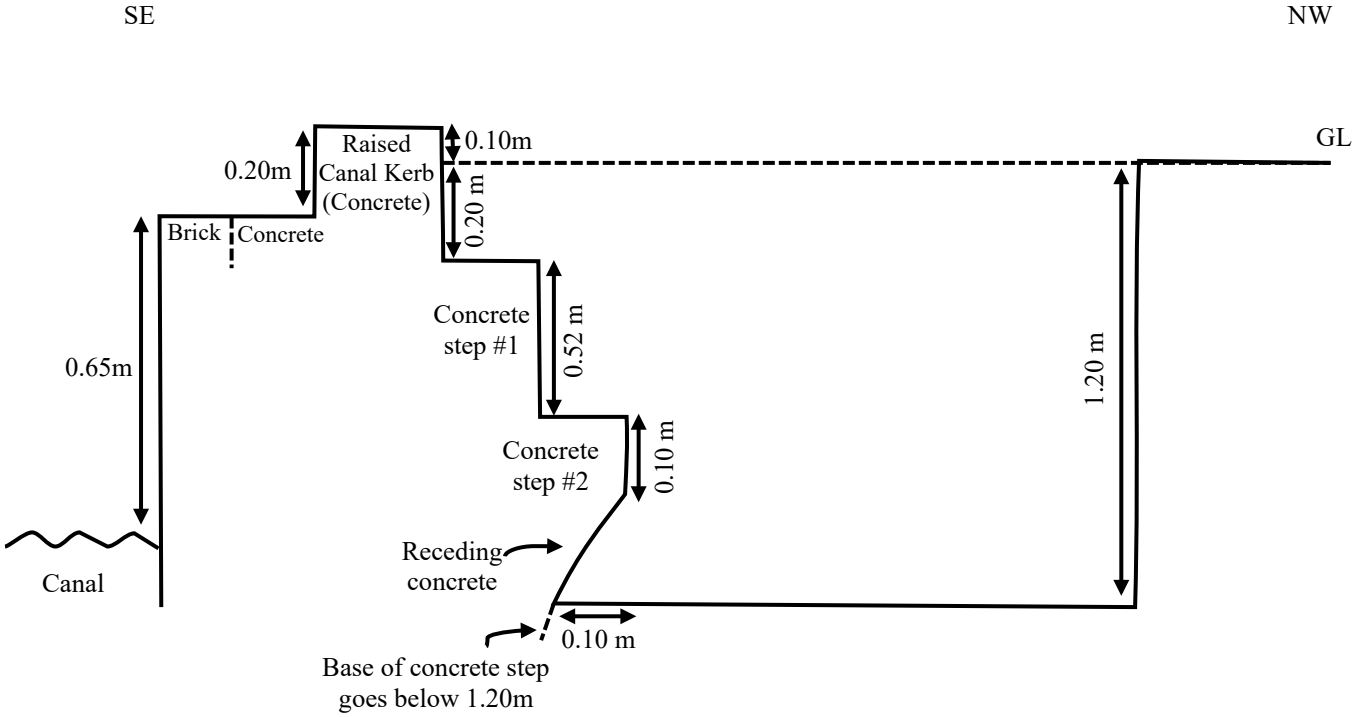
Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks
0.80	0	0.60	

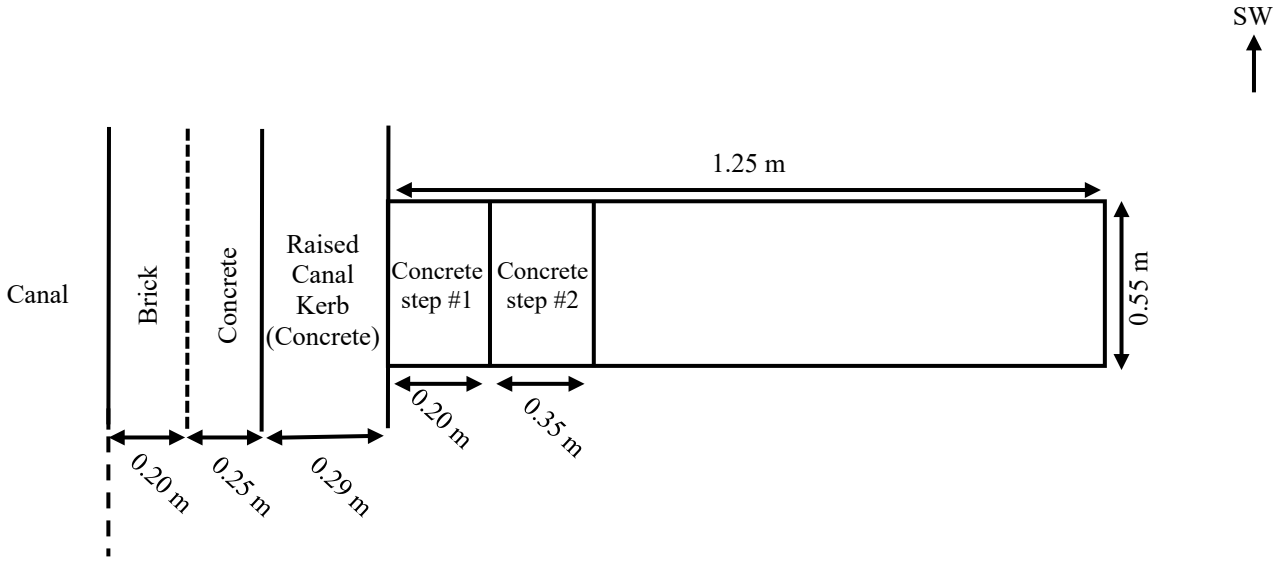
Checked by:	MHW	IFA TP v01.01
Status:	DRAFT	

TPG Trial Pit Drawings

TPG Cross Section



TPG Plan



TPG Trial Pit Photographs



TPG Trial Pit Photographs



TPG Trial Pit Photographs



IAN FARMER ASSOCIATES

Plant used: Hand tools	Project: Embassy Village, Castlefield		Location ID: **WSA**
Dates: 01/04/2022	Client: Curtins		Sheet 1 of 1
Dynamic Sample Borehole Log	Location:	Ground level:	Logged by: FH / Vertical scale: 1:50 / Project ID: 2230462

Samples & In Situ Testing			Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mOD)	Depth (m) (Thickness)	Strata Description	Legend		Water Strike	Backfill/ Installation
0.00 - 0.17	C1			0.17 0.20	MADE GROUND: Grey CONCRETE.				
					MADE GROUND: Greyish brown, sandy, silty GRAVEL. Gravel is subangular to angular, fine to coarse including sandstone, brick and asbestos containing cement.				
					End of Borehole at 0.20m				

1 2 3 4 5 6 7 8 9 10

Dynamic Sample Recovery

Top (m)	Base (m)	Dia (mm)	Recovery %	Remarks

Remarks:
Hole terminated at 0.20m due to possible asbestos present.

Water Strikes

Strike (m)	Cased (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Monitoring Installations

Top (m)	Base (m)	Pipe Type	Dia (mm)

Checked by:	MHW	IFA DS v01.01
Log status:	DRAFT	

Appendix C – Chemical Laboratory Testing Results

- Envirolab, Environmental Chemistry Analysis Results, Soils
    - Final Analytical Test Report Ref. 22/03638
    - Final Analytical Test Report Ref. 22/03801
    - Final Analytical Test Report Ref. 22/03636
    - Final Analytical Test Report Ref. 22/03663

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envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

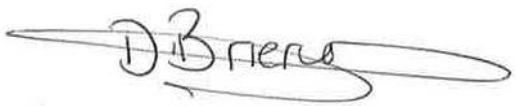
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/03663
Issue Number: 1 **Date:** 26 April, 2022

Client: Ian Farmer Associates (Warrington)
14/15 Rufford Court
Hardwick Grange
Warrington
WA1 4RF

Project Manager: Michelle Hirst-Watson
Project Name: Embassy Village, Castlefield
Project Ref: 2230462
Order No: P7531589
Date Samples Received: 01/04/22
Date Instructions Received: 14/04/22
Date Analysis Completed: 26/04/22

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 22/03663

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16		Units	Limit of Detection	Method ref
Client Sample No	3	2	1	10	2	2				
Client Sample ID	WS11A	WS12	WS13	WS13	WS14	WS14A				
Depth to Top	0.5	0.3	0.2	1.7	0.2	0.5				
Depth To Bottom										
Date Sampled	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6A	6AB	6AB	6A	6A	6A				
% Stones >10mm$_A$	32.1	34.0	18.5	27.4	<0.1	26.8		% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.78	7.83	7.86	7.25	8.13	7.96		pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$$^{M\#}$	1.30	1.19	1.25	0.07	2.18	1.65		g/l	0.01	A-T-026s
Cyanide (total)$_A$$^{M\#}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_A$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		mg/kg	0.2	A-T-050s
Organic matter Default$_D$$^{M\#}$	3.9	6.3	4.3	0.4	NDP	7.0		% w/w	0.1	A-T-032 OM
Arsenic$_D$$^{M\#}$	33	28	11	9	34	26		mg/kg	1	A-T-024s
Boron (water soluble)$_D$	1.5	1.7	<1.0	<1.0	3.3	2.4		mg/kg	1	A-T-027s
Cadmium$_D$$^{M\#}$	1.7	3.4	1.2	1.1	2.6	1.8		mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	735	213	165	166	312	239		mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	20	15	12	11	20	17		mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	238	212	180	154	849	657		mg/kg	1	A-T-024s
Mercury$_D$	<0.17	0.44	0.91	0.60	2.22	2.34		mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	23	23	18	15	31	23		mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	396	721	99	97	431	304		mg/kg	5	A-T-024s

Envirolab Job Number: 22/03663

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16		Units	Limit of Detection	Method ref
Client Sample No	3	2	1	10	2	2				
Client Sample ID	WS11A	WS12	WS13	WS13	WS14	WS14A				
Depth to Top	0.5	0.3	0.2	1.7	0.2	0.5				
Depth To Bottom										
Date Sampled	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6A	6AB	6AB	6A	6A	6A				
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	Amosite	NAD				A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-				A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	Loose Fibres	-				A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A				A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_{D}$	-	-	-	-	<0.001	-		% w/w	0.001	A-T-054

Envirolab Job Number: 22/03663

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16		Units	Limit of Detection	Method ref
Client Sample No	3	2	1	10	2	2				
Client Sample ID	WS11A	WS12	WS13	WS13	WS14	WS14A				
Depth to Top	0.5	0.3	0.2	1.7	0.2	0.5				
Depth To Bottom										
Date Sampled	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6A	6AB	6AB	6A	6A	6A				
PAH-16MS										
Acenaphthene$_A^{M\#}$	0.97	0.10	0.04	<0.01	1.26	0.32		mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	0.04	0.06	0.02	<0.01	0.11	0.08		mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	1.09	0.24	0.11	<0.02	2.33	0.55		mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	3.05	0.95	0.33	<0.04	5.09	1.72		mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	2.44	0.80	0.39	<0.04	4.09	1.76		mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	2.48	1.05	0.37	<0.05	3.75	1.63		mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	1.06	0.55	0.25	<0.05	1.63	0.87		mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.97	0.37	0.14	<0.07	1.50	0.62		mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	3.53	1.06	0.32	<0.06	5.16	1.64		mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.30	0.14	0.06	<0.04	0.47	0.23		mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	7.03	2.61	0.60	<0.08	11.1	3.37		mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	0.78	0.12	0.03	<0.01	0.85	0.26		mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	1.29	0.66	0.29	0.03	2.08	1.03		mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	2.20	0.32	0.06	<0.03	1.86	0.37		mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	7.41	2.48	0.51	<0.03	10.7	2.97		mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	7.33	2.67	0.69	<0.07	10.9	3.42		mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	42	14.2	4.21	<0.08	62.9	20.8		mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/03663

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16		Units	Limit of Detection	Method ref
Client Sample No	3	2	1	10	2	2				
Client Sample ID	WS11A	WS12	WS13	WS13	WS14	WS14A				
Depth to Top	0.5	0.3	0.2	1.7	0.2	0.5				
Depth To Bottom										
Date Sampled	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6A	6AB	6AB	6A	6A	6A				
TPH CWG with Clean Up *C1										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	<5	<1	<1	<1	<1		mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	<5	<1	<1	<1	<1		mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	1	36	9	<1	2	2		mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	4	183	44	<1	6	4		mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	42	332	73	<1	36	33		mg/kg	1	A-T-055s
Total Aliphatics$_A$	48	551	126	<1	43	39		mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	1	6	2	<1	1	<1		mg/kg	1	A-T-055s
Aro >C10-C12$_A$	10	7	2	<1	4	2		mg/kg	1	A-T-055s
Aro >C12-C16$_A$	21	117	20	<1	17	10		mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	70	266	87	<1	59	34		mg/kg	1	A-T-055s
Aro >C21-C35$_A$	227	123	41	2	200	132		mg/kg	1	A-T-055s
Total Aromatics$_A$	330	519	151	2	282	180		mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	378	1070	278	2	325	219		mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Ian Farmer Associates (Warrington), 14/15 Rufford Court, Hardwick Grange, Warrington, WA1 4RF

Project: Embassy Village, Castlefield

Clients Project No: 2230462

Project No: 22/03663

Date Received: 14/04/2022 (am)

Cool Box Temperatures (°C): 5.2 - 8.4

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16
Client Sample No	3	2	1	10	2	2
Client Sample ID/Depth	WS11A 0.5m	WS12 0.3m	WS13 0.2m	WS13 1.7m	WS14 0.2m	WS14A 0.5m
Date Sampled	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22
Deviation Code						
F	✓	✓	✓	✓	✓	✓

Key
F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16
Client Sample No	3	2	1	10	2	2
Client Sample ID/Depth	WS11A 0.5m	WS12 0.3m	WS13 0.2m	WS13 1.7m	WS14 0.2m	WS14A 0.5m
Date Sampled	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22
VPHCWG	✓	✓	✓	✓	✓	✓
PAH-16MS	✓	✓	✓	✓	✓	✓
Cyanide (total)	✓	✓	✓	✓	✓	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16
Client Sample No	3	2	1	10	2	2
Client Sample ID/Depth	WS11A 0.5m	WS12 0.3m	WS13 0.2m	WS13 1.7m	WS14 0.2m	WS14A 0.5m
Date Sampled	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22
A-T-019s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-022s	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022
A-T-024s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-026s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-027s	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022
A-T-031s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-032 OM	25/04/2022	25/04/2022	25/04/2022	25/04/2022	21/04/2022	25/04/2022
A-T-040s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-042sTCN	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-044	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-045	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
A-T-050s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-054					26/04/2022	
A-T-055s	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/03636
Issue Number: 1 **Date:** 25 April, 2022

Client:
Ian Farmer Associates (Warrington)
14/15 Rufford Court
Hardwick Grange
Warrington
WA1 4RF

Project Manager: Michelle Hirst-Watson
Project Name: Embassy Village, Castlefield
Project Ref: 2230462
Order No: P7531589
Date Samples Received: 06/04/22
Date Instructions Received: 13/04/22
Date Analysis Completed: 25/04/22

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	Units	Limit of Detection	Method ref
Client Sample No	4	11	3	1	1	8	2			
Client Sample ID	WS01	WS01	WS02	WS04B	WS07A	WS07A	WS08			
Depth to Top	0.5	2.8	0.5	0.2	0.2	1.8	0.25			
Depth To Bottom										
Date Sampled	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6	6AB	6AB	6AB	6	6AB			
% Stones >10mm$_A$	23.1	<0.1	4.7	10.4	7.1	<0.1	20.8	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.16	7.54	8.10	7.94	7.62	7.64	7.81	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$$^{M\#}$	1.28	0.21	1.12	1.08	1.51	0.03	0.25	g/l	0.01	A-T-026s
Cyanide (total)$_A$$^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_A$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	0.2	A-T-050s
Organic matter Default$_D$$^{M\#}$	13.1	1.1	20.8	4.3	9.3	0.7	8.1	% w/w	0.1	A-T-032 OM
Arsenic$_D$$^{M\#}$	35	6	40	19	30	1	28	mg/kg	1	A-T-024s
Boron (water soluble)$_D$	1.9	<1.0	4.7	2.2	2.9	<1.0	1.0	mg/kg	1	A-T-027s
Cadmium$_D$$^{M\#}$	5.7	1.9	6.1	20.2	2.8	1.1	3.6	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	221	16	469	212	402	15	579	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	17	13	28	17	26	20	29	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	2	2	<1	<1	<1	mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	548	42	389	489	2380	13	2980	mg/kg	1	A-T-024s
Mercury$_D$	1.96	<0.17	0.86	0.66	10.1	<0.17	0.53	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	27	18	88	23	33	20	40	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	2870	68	4990	14900	386	63	3250	mg/kg	5	A-T-024s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	Units	Limit of Detection	Method ref
Client Sample No	4	11	3	1	1	8	2			
Client Sample ID	WS01	WS01	WS02	WS04B	WS07A	WS07A	WS08			
Depth to Top	0.5	2.8	0.5	0.2	0.2	1.8	0.25			
Depth To Bottom										
Date Sampled	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6	6AB	6AB	6AB	6	6AB			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	Units	Limit of Detection	Method ref
Client Sample No	4	11	3	1	1	8	2			
Client Sample ID	WS01	WS01	WS02	WS04B	WS07A	WS07A	WS08			
Depth to Top	0.5	2.8	0.5	0.2	0.2	1.8	0.25			
Depth To Bottom										
Date Sampled	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6	6AB	6AB	6AB	6	6AB			
PAH-16MS										
Acenaphthene$_A^{M\#}$	8.55	0.03	0.08	1.42	1.03	<0.01	0.50	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	1.36	<0.01	0.03	0.08	0.16	<0.01	0.06	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	14.6	0.06	0.13	2.94	2.45	<0.02	1.07	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	18.5	0.08	0.49	9.07	7.96	<0.04	3.61	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	12.5	0.07	0.56	6.51	5.77	<0.04	2.81	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	12	0.07	0.59	7.08	5.33	<0.05	2.99	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	7.37	<0.05	0.41	3.89	3.19	<0.05	1.95	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	4.34	<0.07	0.23	2.53	1.87	<0.07	1.00	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	17.5	0.09	0.57	8.34	7.17	<0.06	3.51	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	1.57	<0.04	0.10	0.82	0.75	<0.04	0.39	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	38.5	0.21	0.98	20.2	15.6	<0.08	7.82	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	7.71	0.03	0.04	0.87	0.78	<0.01	0.37	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	8.77	0.05	0.41	4.85	3.52	<0.03	2.18	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	10	0.03	0.10	1.24	1.69	<0.03	0.49	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	57.7	0.27	0.68	13.8	10.5	<0.03	5.08	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	37.2	0.21	0.97	18	15.6	<0.07	7.25	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	258	1.20	6.37	102	83.4	<0.08	41.1	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	Units	Limit of Detection	Method ref
Client Sample No	4	11	3	1	1	8	2			
Client Sample ID	WS01	WS01	WS02	WS04B	WS07A	WS07A	WS08			
Depth to Top	0.5	2.8	0.5	0.2	0.2	1.8	0.25			
Depth To Bottom										
Date Sampled	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6	6AB	6AB	6AB	6	6AB			
TPH CWG with Clean Up *C1										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<10	<1	<1	<1	2	<1	4	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<10	<1	<1	<1	2	<1	3	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<10	<1	1	2	4	<1	4	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	12	<1	2	5	5	<1	6	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	45	2	4	43	19	<1	52	mg/kg	1	A-T-055s
Total Aliphatics$_A$	66	2	8	51	32	<1	69	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<10	<1	1	2	2	<1	4	mg/kg	1	A-T-055s
Aro >C10-C12$_A$	45	<1	<1	6	7	<1	9	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	249	<1	2	24	39	<1	18	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	575	3	6	160	194	<1	61	mg/kg	1	A-T-055s
Aro >C21-C35$_A$	860	7	18	560	480	<1	154	mg/kg	1	A-T-055s
Total Aromatics$_A$	1730	10	28	751	722	<1	247	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	1800	13	36	802	754	<1	316	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/32	22/03636/36						Units	Limit of Detection	Method ref
Client Sample No	3	1								
Client Sample ID	WS09	WS10								
Depth to Top	0.5	0.3								
Depth To Bottom										
Date Sampled	31-Mar-22	01-Apr-22								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6AB	6AB								
% Stones >10mm$_A$	15.5	14.6						% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.51	8.01						pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$$^{M\#}$	1.50	1.47						g/l	0.01	A-T-026s
Cyanide (total)$_A$$^{M\#}$	<1	<1						mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_A$	<0.2	<0.2						mg/kg	0.2	A-T-050s
Organic matter Default$_D$$^{M\#}$	12.8	8.5						% w/w	0.1	A-T-032 OM
Arsenic$_D$$^{M\#}$	28	30						mg/kg	1	A-T-024s
Boron (water soluble)$_D$	2.7	3.8						mg/kg	1	A-T-027s
Cadmium$_D$$^{M\#}$	4.3	5.0						mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	679	403						mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	25	16						mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1						mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	445	562						mg/kg	1	A-T-024s
Mercury$_D$	0.51	2.00						mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	41	24						mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1						mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	960	1680						mg/kg	5	A-T-024s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/32	22/03636/36						Units	Limit of Detection	Method ref
Client Sample No	3	1								
Client Sample ID	WS09	WS10								
Depth to Top	0.5	0.3								
Depth To Bottom										
Date Sampled	31-Mar-22	01-Apr-22								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6AB	6AB								
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD								A-T-045
Asbestos Matrix (visual)$_{D}$	-	-								A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-								A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A								A-T-045

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/32	22/03636/36						Units	Limit of Detection	Method ref
Client Sample No	3	1								
Client Sample ID	WS09	WS10								
Depth to Top	0.5	0.3								
Depth To Bottom										
Date Sampled	31-Mar-22	01-Apr-22								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6AB	6AB								
PAH-16MS										
Acenaphthene$_A^{M\#}$	0.20	0.24						mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	0.06	0.16						mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	0.40	0.87						mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	1.39	2.44						mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	1.80	1.52						mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	1.59	1.87						mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	1.36	0.98						mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.50	0.59						mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	1.36	2.49						mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.26	0.23						mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	2.27	5.83						mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	0.14	0.19						mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	1.50	1.06						mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	0.64	0.42						mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	1.69	3.66						mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	2.18	6.58						mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	17.3	29.1						mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/32	22/03636/36						Units	Limit of Detection	Method ref
Client Sample No	3	1								
Client Sample ID	WS09	WS10								
Depth to Top	0.5	0.3								
Depth To Bottom										
Date Sampled	31-Mar-22	01-Apr-22								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6AB	6AB								
TPH CWG with Clean Up *C1										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	3	2						mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	2	<1						mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	4	3						mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	4	4						mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	10	8						mg/kg	1	A-T-055s
Total Aliphatics$_A$	22	17						mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	10	2						mg/kg	1	A-T-055s
Aro >C10-C12$_A$	11	5						mg/kg	1	A-T-055s
Aro >C12-C16$_A$	17	23						mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	30	82						mg/kg	1	A-T-055s
Aro >C21-C35$_A$	112	166						mg/kg	1	A-T-055s
Total Aromatics$_A$	179	277						mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	201	294						mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed.
Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Ian Farmer Associates (Warrington), 14/15 Rufford Court, Hardwick Grange, Warrington, WA1 4RF

Project: Embassy Village, Castlefield

Clients Project No: 2230462

Project No: 22/03636

Date Received: 13/04/2022 (am)

Cool Box Temperatures (°C): 11.2 & 12.3

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	22/03636/32	22/03636/36
Client Sample No	4	11	3	1	1	8	2	3	1
Client Sample ID/Depth	WS01 0.5m	WS01 2.8m	WS02 0.5m	WS04B 0.2m	WS07A 0.2m	WS07A 1.8m	WS08 0.25m	WS09 0.5m	WS10 0.3m
Date Sampled	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	31/03/22	01/04/22
Deviation Code									
F	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key

F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	22/03636/32	22/03636/36
Client Sample No	4	11	3	1	1	8	2	3	1
Client Sample ID/Depth	WS01 0.5m	WS01 2.8m	WS02 0.5m	WS04B 0.2m	WS07A 0.2m	WS07A 1.8m	WS08 0.25m	WS09 0.5m	WS10 0.3m
Date Sampled	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	31/03/22	01/04/22
VPHCWG	✓	✓	✓	✓	✓	✓	✓	✓	✓
PAH-16MS	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cyanide (total)	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	22/03636/32	22/03636/36
Client Sample No	4	11	3	1	1	8	2	3	1
Client Sample ID/Depth	WS01 0.5m	WS01 2.8m	WS02 0.5m	WS04B 0.2m	WS07A 0.2m	WS07A 1.8m	WS08 0.25m	WS09 0.5m	WS10 0.3m
Date Sampled	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	31/03/22	01/04/22
A-T-019s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-022s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-024s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-026s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-027s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-031s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-032 OM	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-040s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-042sTCN	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-044	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-045	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
A-T-050s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-055s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Appendix D – Geotechnical Laboratory Testing Results

- IFA, Geotechnical Analysis Results
    - Test Report No. 2230462 / 1

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IAN FARMER ASSOCIATES

Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 2

Determination of Water Content, Liquid Limit and Plastic Limit and Derivation of Plasticity and Liquidity Index

Borehole / Trial Pit	Depth (m)	Sample	Natural Water Content %	Sample Preparation Natural = Hand picked Sieved = Washed on 425µm			Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Class	One-point PI Only		Description / Remarks
				Natural / Sieved	Passing %	Calc. WC %						Cone Penetration (mm)	Correction Factor	
WS01	2.00	D9	25.9	Sieved	98	26	43	22	21	0.21	CI	20.2 20.1	0.998	Brown slightly gravelly, sandy, silty CLAY
WS02	3.00	D12	23	Sieved	84	27		NP						Brown slightly gravelly, silty CLAY/SAND
WS05A	1.20	D1	23.1	Natural	100	23		NP						Brown CLAY/SAND
WS07A	3.00	D12	24.6	Natural	93	26	35	19	16	0.46	CL/CI			Brown slightly sandy CLAY
WS09	3.00	D12	27.1	Natural	97	28	35	20	15	0.52	CL/CI			Brown slightly sandy CLAY
WS10	3.00	D11	21.2	Sieved	84	25	29	18	11	0.65	CL			Brown slightly gravelly, sandy CLAY
WS12	1.00	D5	32.5	Sieved	64	50		NP						Brown slightly gravelly, clayey SAND
WS13	2.00	B11	19.8	Sieved	72	28	28	16	12	0.96	CL	20.3 20.1	0.9968	Brown slightly gravelly, sandy CLAY

Method of Preparation: BS EN ISO 17892 : Part 1 : 2014 : Clause 5.1 Water content test preparation
BS EN ISO 17892 : Part 12 : 2018 : Clause 5.2 Specimen preparation for liquid and plastic limits

Method of Test: BS EN ISO 17892 : Part 1 : 2014 : Clause 5.2 Water content test execution
BS EN ISO 17892 : Part 12 : 2018 : Clause 5.3 Determination of liquid limit by the fall cone method. 80g / 30° Cone
BS EN ISO 17892 : Part 12 : 2018 : Clause 5.5 Determination of plastic limit

UKAS TESTING 1464

General Remarks: All samples tested with increasing water content, unless otherwise stated.
All samples tested to four-point method, unless the extra 'One-point PI Only' data is reported.

Results reported relate only to the samples tested.

IAN FARMER ASSOCIATES

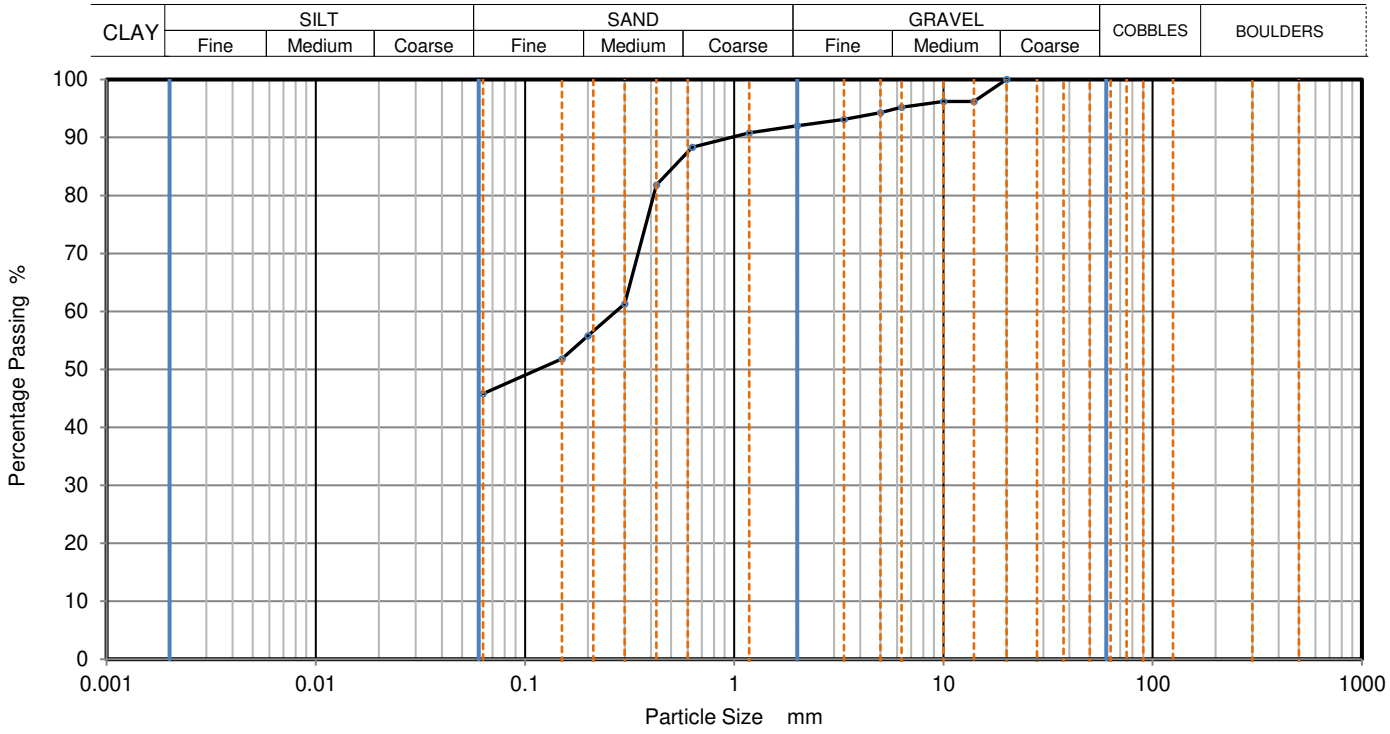
Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 3

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS01	1.20	B6	Wet Sieve	Brown slightly gravelly SAND/CLAY



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	96		
10	96		
6.3	95		
5	94		
3.35	93		
2	92		
1.18	91		
0.63	88		
0.425	82		
0.3	61		
0.2	56		
0.15	52		
0.063	46		

Dry Mass of sample, g: 590

Sample Proportions	% dry mass
Very coarse	0
Gravel	8
Sand	46
Fines <0.063mm	46

Grading Analysis		
D100	mm	20
D60	mm	0.273
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

Result reported relates only to the sample tested.

IAN FARMER ASSOCIATES

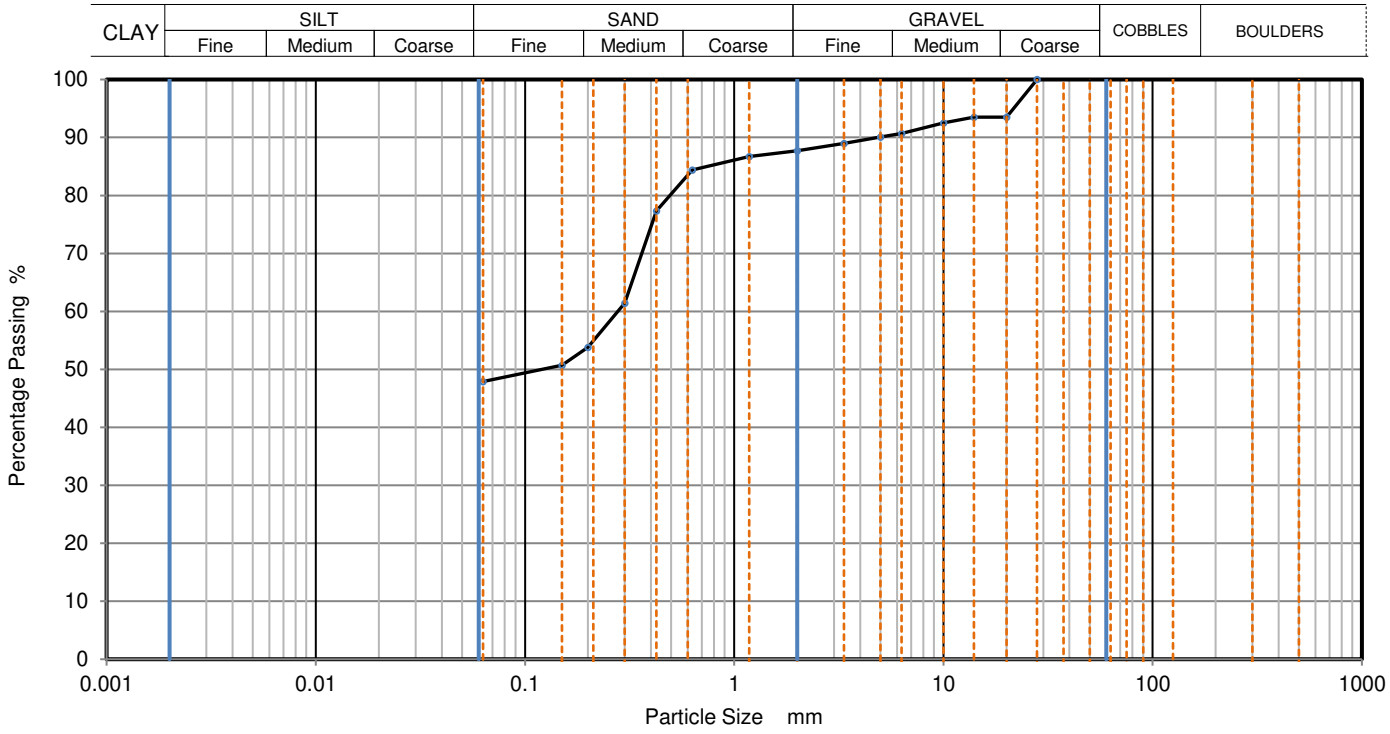
Laboratory Test Report | 2230462 / 1

Site: Embassy Village, Castlefield | **Job Number:** 2230462

Client: Curtins | **Page:** 4

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS04B	3.40	B12	Wet Sieve	Brown gravelly, sandy, silty CLAY



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	94		
14	94		
10	93		
6.3	91		
5	90		
3.35	89		
2	88		
1.18	87		
0.63	84		
0.425	77		
0.3	61		
0.2	54		
0.15	51		
0.063	48		

Dry Mass of sample, g: 477

Sample Proportions	% dry mass
Very coarse	0
Gravel	12
Sand	40
Fines <0.063mm	48

Grading Analysis		
D100	mm	28
D60	mm	0.279
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

Result reported relates only to the sample tested.

IAN FARMER ASSOCIATES

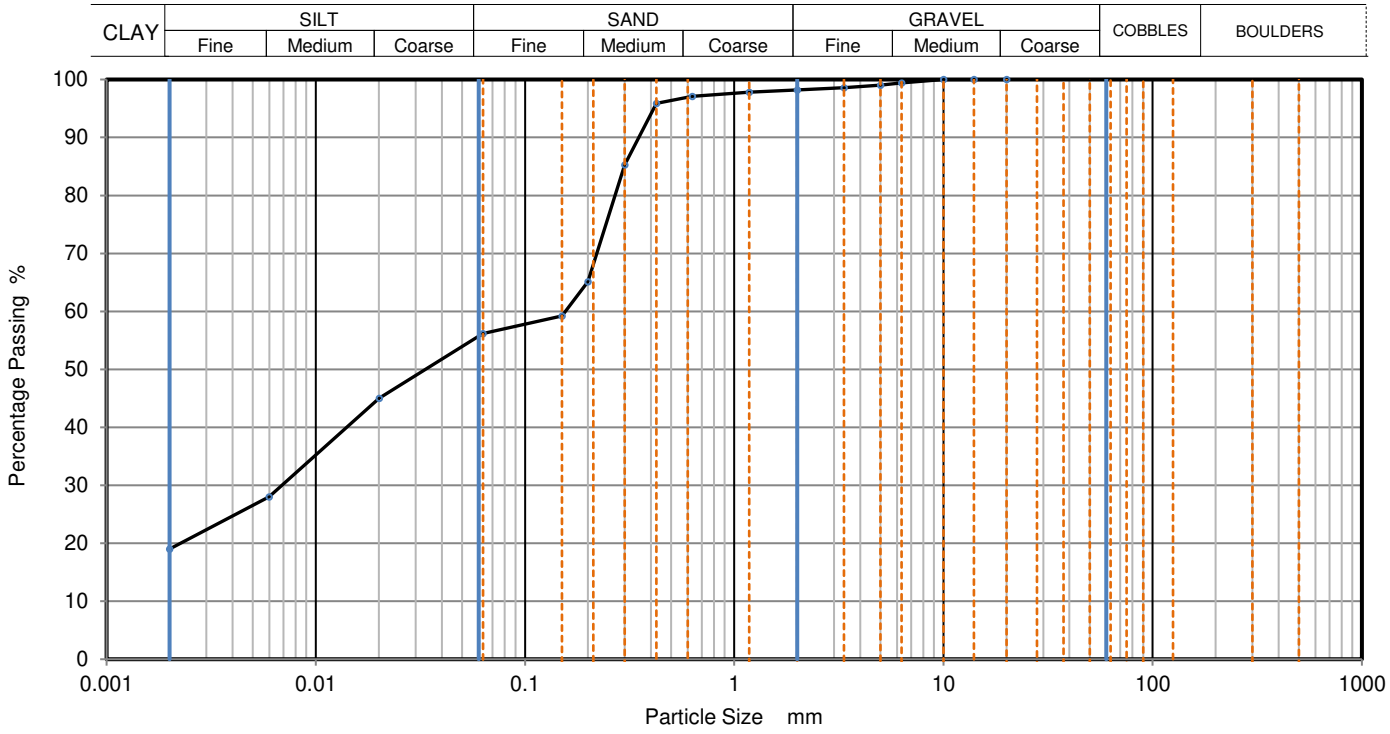
Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 5

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS05A	1.40	B2	Wet Sieve + Pipette	Brown clayey, silty SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0201	45
		0.0060	28
		0.0020	19
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	99		
2	98		
1.18	98		
0.63	97		
0.425	96		
0.3	85		
0.2	65		
0.15	59		
0.063	56		

Particle density (assumed) 2.65 Mg/m3

Dry Mass of sample, g 722

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	42
Silt	37
Clay	19

Grading Analysis		
D100	mm	10
D60	mm	0.156
D30	mm	0.00696
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test
BS EN 17892:Part4:2016, clause 5.4.2 Preparation of samples for pipette test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method
BS EN 17892:Part4:2016, clause 5.4.3 Determination of sedimentation by pipette method

UKAS TESTING 1464

Result reported relates only to the sample tested.

IAN FARMER ASSOCIATES

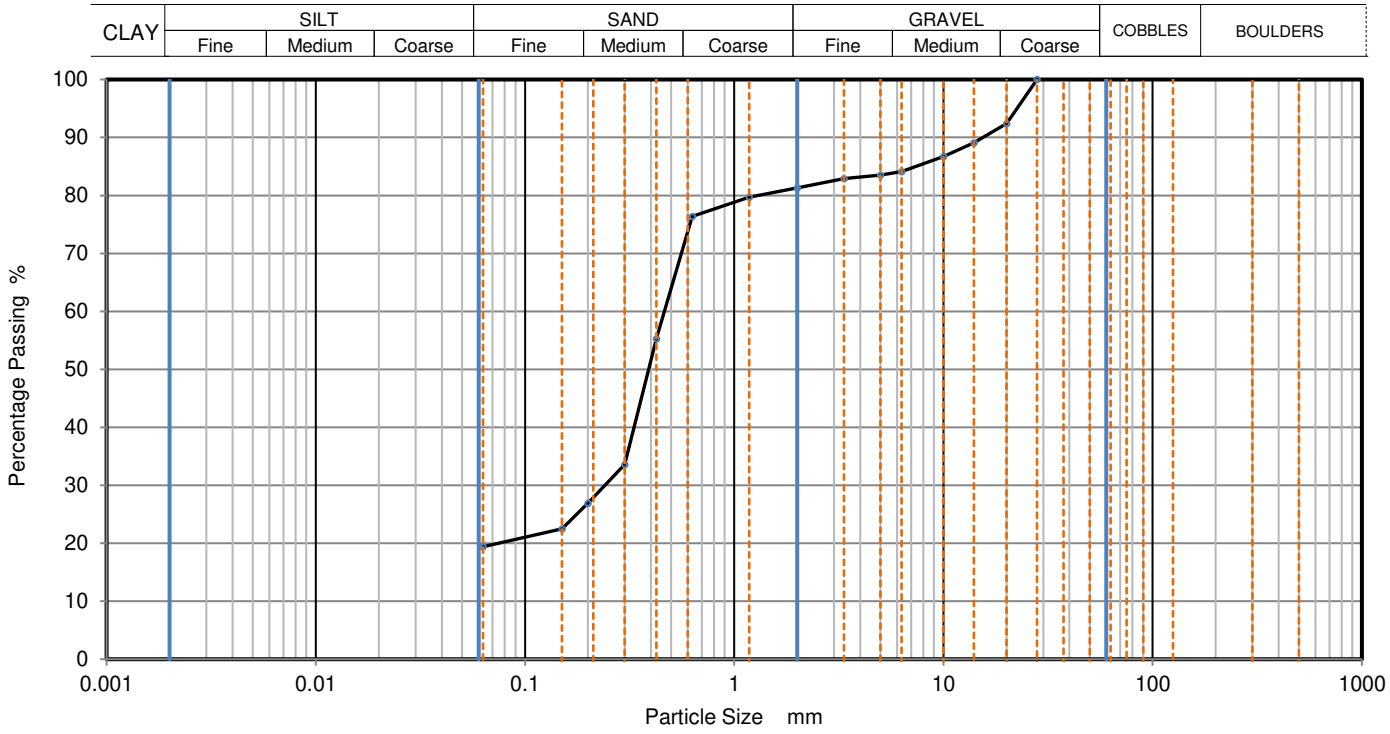
Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 6

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS07A	1.20	B6	Wet Sieve	Brown gravelly, clayey SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	92		
14	89		
10	87		
6.3	84		
5	84		
3.35	83		
2	81		
1.18	80		
0.63	76		
0.425	55		
0.3	34		
0.2	27		
0.15	23		
0.063	19		

Dry Mass of sample, g: 1155

Sample Proportions	% dry mass
Very coarse	0
Gravel	19
Sand	62
Fines <0.063mm	19

Grading Analysis		
D100	mm	28
D60	mm	0.464
D30	mm	0.241
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

Result reported relates only to the sample tested.

IAN FARMER ASSOCIATES

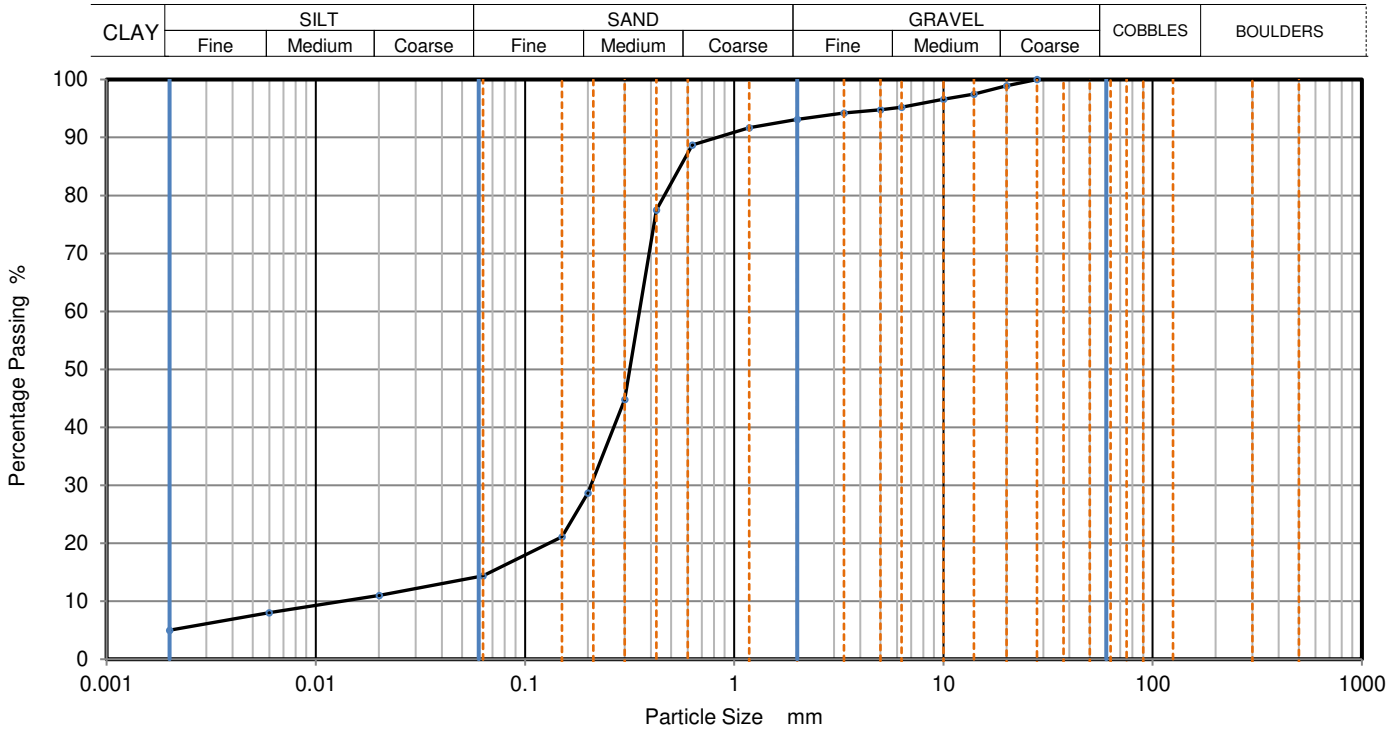
Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 7

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS09	1.20	B7	Wet Sieve + Pipette	Brown slightly clayey, slightly gravelly, slightly silty SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0201	11
		0.0060	8
		0.0020	5
28	100		
20	99		
14	98		
10	97		
6.3	95		
5	95		
3.35	94		
2	93	Particle density (assumed)	
1.18	92	2.65	Mg/m3
0.63	89		
0.425	78		
0.3	45		
0.2	29		
0.15	21		
0.063	14		

Dry Mass of sample, g: 1843

Sample Proportions	% dry mass
Very coarse	0
Gravel	7
Sand	79
Silt	9
Clay	6

Grading Analysis		
D100	mm	28
D60	mm	0.353
D30	mm	0.207
D10	mm	0.013
Uniformity Coefficient		27
Curvature Coefficient		9.3

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test
BS EN 17892:Part4:2016, clause 5.4.2 Preparation of samples for pipette test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method
BS EN 17892:Part4:2016, clause 5.4.3 Determination of sedimentation by pipette method

UKAS TESTING 1464

Result reported relates only to the sample tested.

IAN FARMER ASSOCIATES

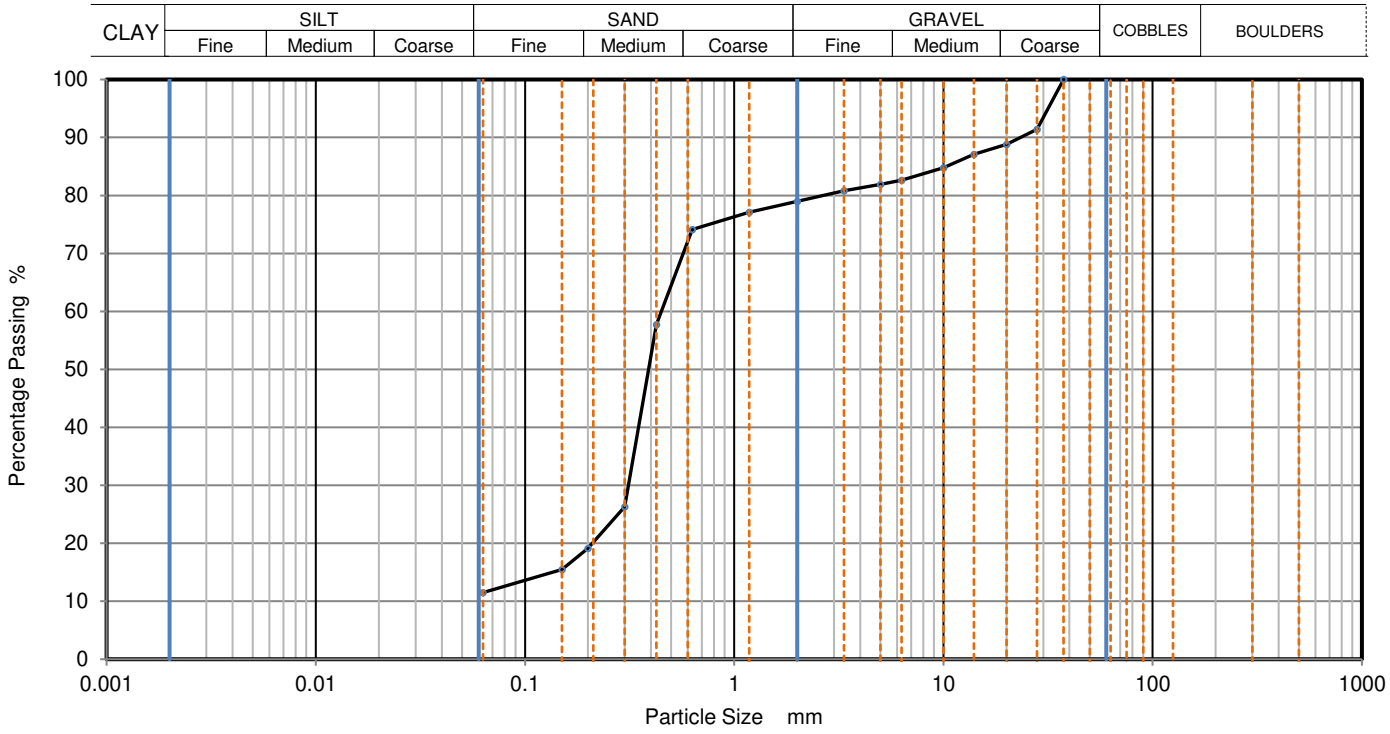
Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 8

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS10	0.50	D5	Wet Sieve	Brown silty, gravelly SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	91		
20	89		
14	87		
10	85		
6.3	83		
5	82		
3.35	81		
2	79		
1.18	77		
0.63	74		
0.425	58		
0.3	26		
0.2	19		
0.15	16		
0.063	12		

Dry Mass of sample, g: 1186

Sample Proportions	% dry mass
Very coarse	0
Gravel	21
Sand	68
Fines <0.063mm	11

Grading Analysis		
D100	mm	37.5
D60	mm	0.449
D30	mm	0.312
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

Result reported relates only to the sample tested.

IAN FARMER ASSOCIATES

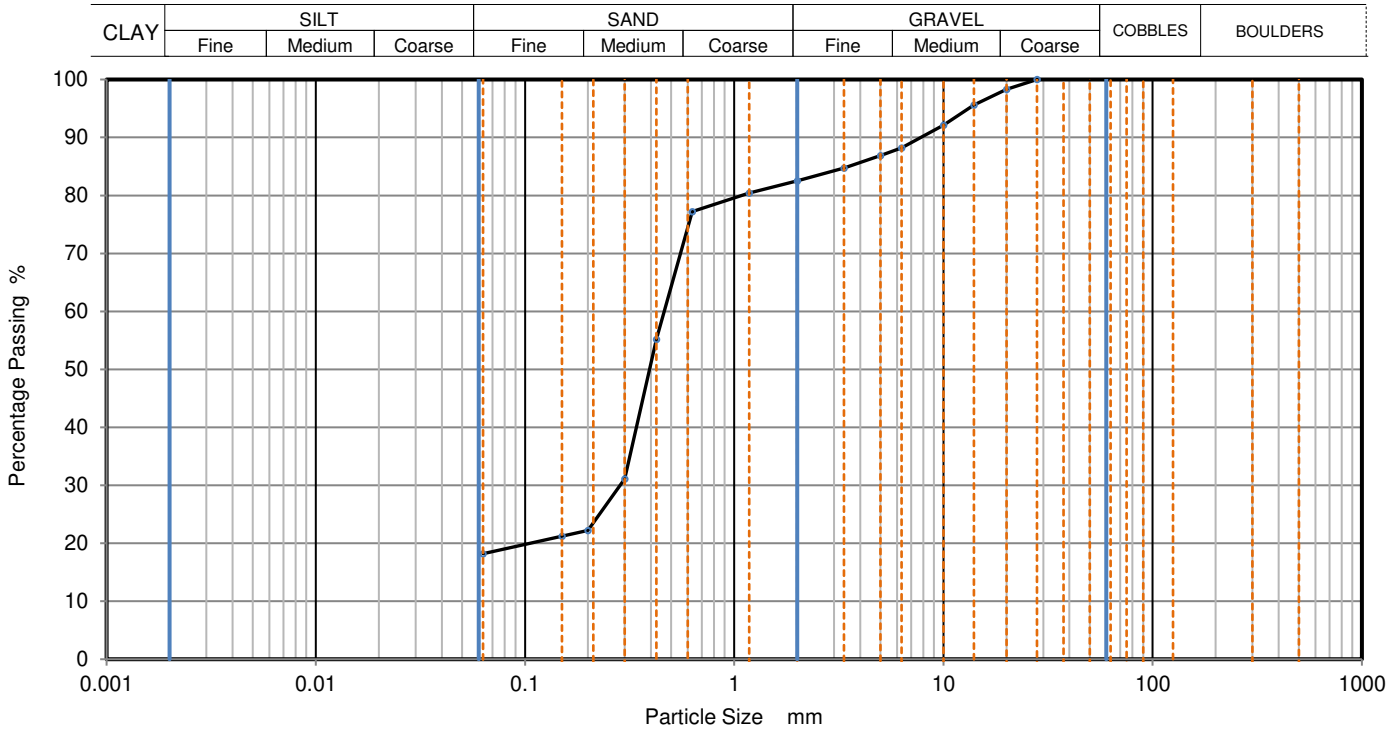
Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 9

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS11A	2.20	B8	Wet Sieve	Brown gravelly, clayey SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	96		
10	92		
6.3	88		
5	87		
3.35	85		
2	83		
1.18	80		
0.63	77		
0.425	55		
0.3	31		
0.2	22		
0.15	21		
0.063	18		

Dry Mass of sample, g: 928

Sample Proportions	% dry mass
Very coarse	0
Gravel	18
Sand	64
Fines <0.063mm	18

Grading Analysis		
D100	mm	28
D60	mm	0.463
D30	mm	0.286
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

Result reported relates only to the sample tested.

IAN FARMER ASSOCIATES

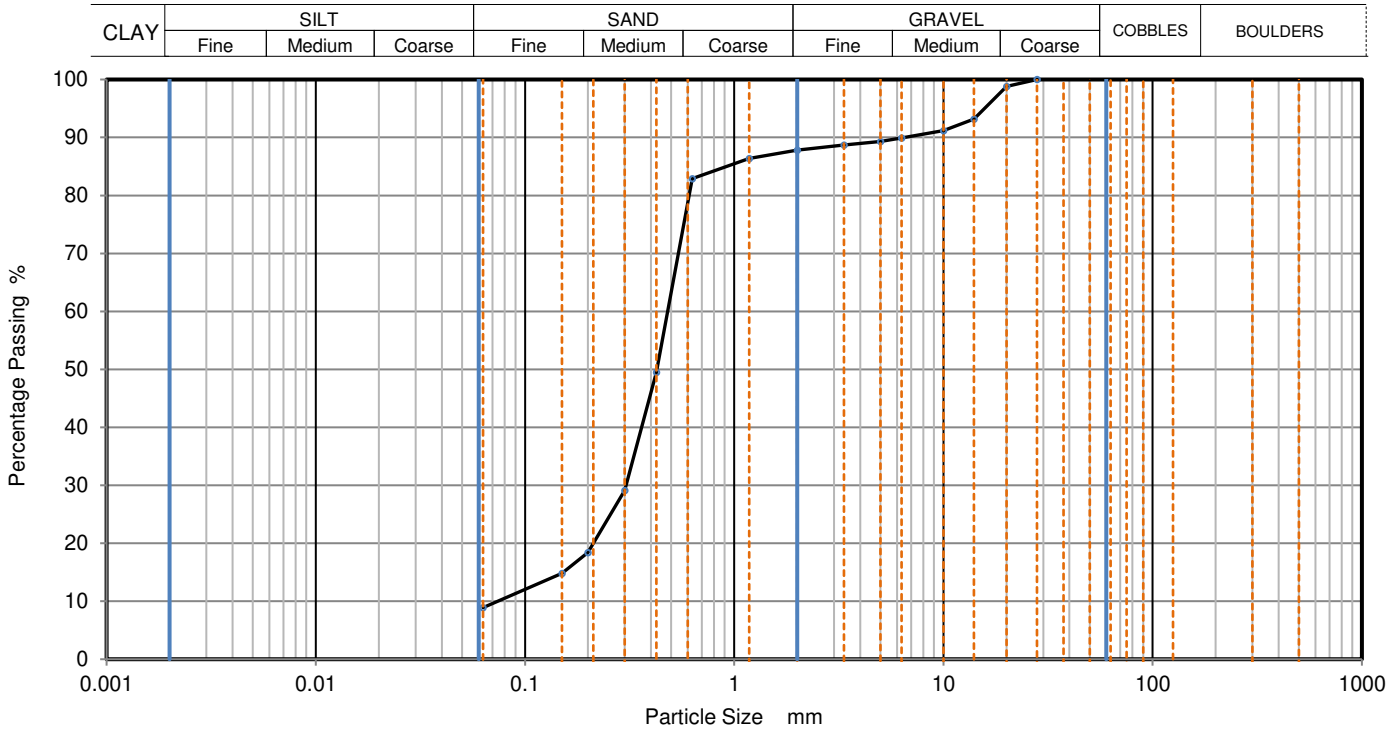
Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 10

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS11A	4.40	B11	Wet Sieve	Red/Brown slightly clayey, gravelly SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	99		
14	93		
10	91		
6.3	90		
5	89		
3.35	89		
2	88		
1.18	86		
0.63	83		
0.425	50		
0.3	29		
0.2	18		
0.15	15		
0.063	9		

Dry Mass of sample, g: 1066

Sample Proportions	% dry mass
Very coarse	0
Gravel	12
Sand	79
Fines <0.063mm	9

Grading Analysis		
D100	mm	28
D60	mm	0.481
D30	mm	0.304
D10	mm	0.0743
Uniformity Coefficient		6.5
Curvature Coefficient		2.6

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method

UKAS TESTING 1464

Result reported relates only to the sample tested.

IAN FARMER ASSOCIATES

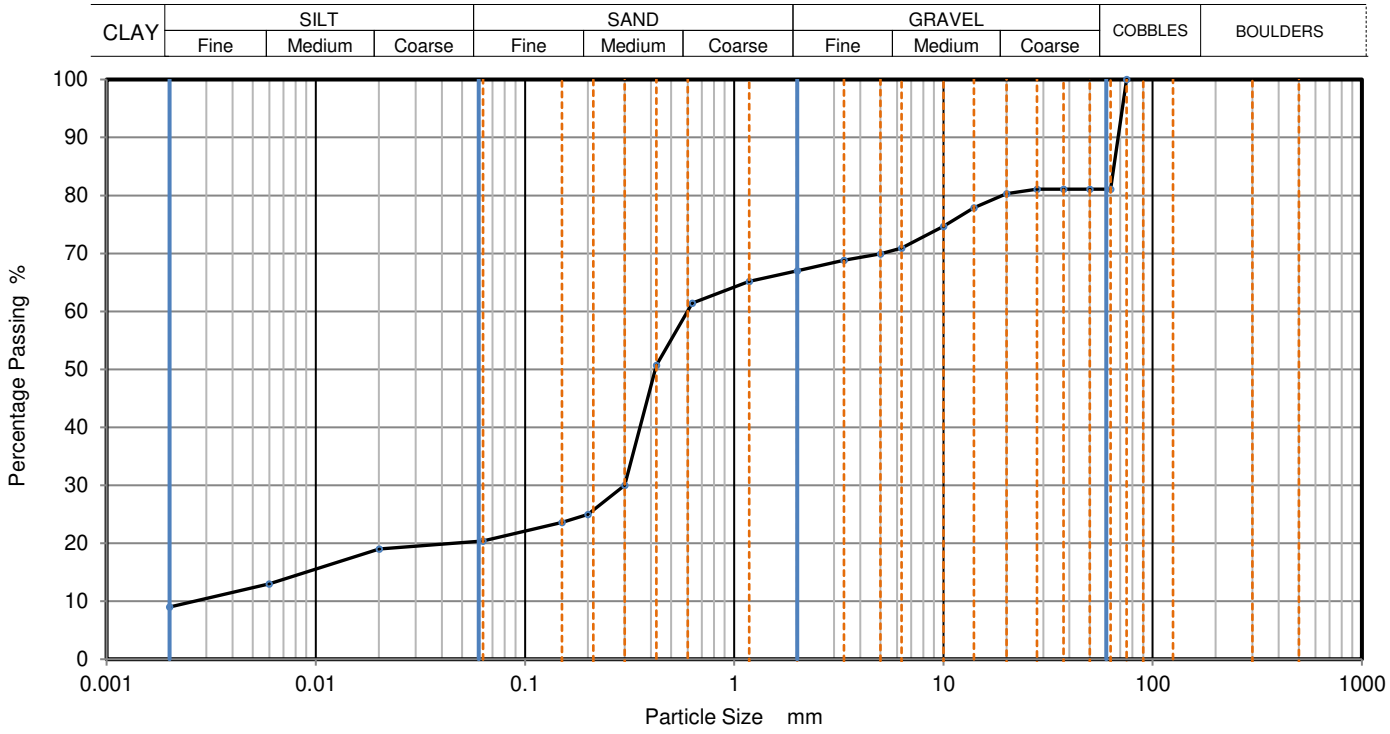
Laboratory Test Report 2230462 / 1

Site: Embassy Village, Castlefield **Job Number:** 2230462

Client: Curtins **Page:** 11

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Testing Type	Description
WS13	1.20	B8	Wet Sieve + Pipette	Brown slightly clayey, silty, gravelly SAND



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0201	19
		0.0060	13
		0.0020	9
75	100		
63	81		
50	81		
37.5	81		
28	81		
20	80		
14	78		
10	75		
6.3	71		
5	70		
3.35	69		
2	67	Particle density (assumed)	
1.18	65	2.65	Mg/m3
0.63	61		
0.425	51		
0.3	30		
0.2	25		
0.15	24		
0.063	20		

Dry Mass of sample, g: 2222

Sample Proportions	% dry mass
Very coarse	19
Gravel	14
Sand	47
Silt	11
Clay	9

Grading Analysis		
D100	mm	75
D60	mm	0.599
D30	mm	0.3
D10	mm	0.00236
Uniformity Coefficient		250
Curvature Coefficient		64

Remarks

Preparation and testing in accordance with BS17892 unless noted below

Method of Preparation: BS EN 17892:Part4:2016, clause 5.2.2 Preparation of samples for wet sieving test
BS EN 17892:Part4:2016, clause 5.4.2 Preparation of samples for pipette test

Method of Test: BS EN 17892:Part4:2016, clause 5.2.3 Determination of particle size distribution by wet sieving method
BS EN 17892:Part4:2016, clause 5.4.3 Determination of sedimentation by pipette method

UKAS TESTING 1464

Result reported relates only to the sample tested.

Final Test Report - 2230462 / 1

Site:	Embassy Village, Castlefield
Job Number:	2230462
Originating Client:	Curtins

All opinions and interpretations contained within this report are outside of our Scope of Accreditation.

This test report shall not be reproduced, except in full and only with the written permission of Ian Farmer Associates Ltd.

Samples will be retained for 28 days from date of issue of the final test report before being disposed of, unless we receive written instruction to the contrary.

Report Issue Date: 12/05/2022

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

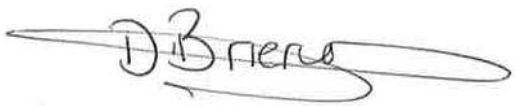
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/03638
Issue Number: 1 **Date:** 25 April, 2022

Client: Ian Farmer Associates (Warrington)
14/15 Rufford Court
Hardwick Grange
Warrington
WA1 4RF

Project Manager: Michelle Hirst-Watson
Project Name: Embassy Village, Castlefield
Project Ref: 2230462
Order No: P7531598
Date Samples Received: 12/04/22
Date Instructions Received: 13/04/22
Date Analysis Completed: 25/04/22

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 22/03638

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03638/1	22/03638/2	22/03638/3	22/03638/4	22/03638/5	22/03638/6	22/03638/7	Units	Limit of Detection	Method ref
Client Sample No	13	6	10	5	7	9	12			
Client Sample ID	WS01	WS02	WS04B	WS05A	WS07A	WS10	WS11A			
Depth to Top	3.90	1.20	2.20	2.00	1.20	2.00	1.20			
Depth To Bottom										
Date Sampled										
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6	6	6A	6	6	6	6A			
% Stones >10mm$_A$	<0.1	<0.1	16.7	<0.1	<0.1	<0.1	21.6	% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	5.81	7.09	7.46	7.33	7.57	7.64	7.97	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	641	1780	132	80	82	342	1540	mg/l	10	A-T-026s

Envirolab Job Number: 22/03638

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03638/8	22/03638/9						Units	Limit of Detection	Method ref
Client Sample No	8	9								
Client Sample ID	WS12	WS13								
Depth to Top	1.20	1.20								
Depth To Bottom										
Date Sampled										
Sample Type	Soil	Soil								
Sample Matrix Code	6	6A								
% Stones >10mm$_A$	<0.1	10.6						% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	7.70	7.61						pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	1090	159						mg/l	10	A-T-026s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Ian Farmer Associates (Warrington), 14/15 Rufford Court, Hardwick Grange, Warrington, WA1 4RF

Project: Embassy Village, Castlefield

Clients Project No: 2230462

Project No: 22/03638

Date Received: 13/04/2022 (am)

Cool Box Temperatures (°C): 13.5

Lab Sample ID	22/03638/1	22/03638/2	22/03638/3	22/03638/4	22/03638/5	22/03638/6	22/03638/7	22/03638/8	22/03638/9
Client Sample No	13	6	10	5	7	9	12	8	9
Client Sample ID/Depth	WS01 3.90m	WS02 1.20m	WS04B 2.20m	WS05A 2.00m	WS07A 1.20m	WS10 2.00m	WS11A 1.20m	WS12 1.20m	WS13 1.20m
Date Sampled									
Deviation Code									
E (no date)	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key
E (no date) *No sampling date provided (all results affected if not provided)*

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/03638/1	22/03638/2	22/03638/3	22/03638/4	22/03638/5	22/03638/6	22/03638/7	22/03638/8	22/03638/9
Client Sample No	13	6	10	5	7	9	12	8	9
Client Sample ID/Depth	WS01 3.90m	WS02 1.20m	WS04B 2.20m	WS05A 2.00m	WS07A 1.20m	WS10 2.00m	WS11A 1.20m	WS12 1.20m	WS13 1.20m
Date Sampled									
A-T-026s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-031s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-044	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

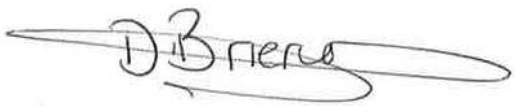
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/03801
Issue Number: 1 **Date:** 27 April, 2022

Client: Ian Farmer Associates (Warrington)
14/15 Rufford Court
Hardwick Grange
Warrington
WA1 4RF

Project Manager: Michelle Hirst-Watson
Project Name: Embassy Village, Castlefield
Project Ref: 2230462
Order No: P7531598
Date Samples Received: 14/04/22
Date Instructions Received: 20/04/22
Date Analysis Completed: 27/04/22

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 22/03801

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03801/1	22/03801/2						Units	Limit of Detection	Method ref
Client Sample No	11	8								
Client Sample ID	WS09	WS12								
Depth to Top	2.50	1.20								
Depth To Bottom										
Date Sampled	01-Apr-22	31-Mar-22								
Sample Type	Soil - D	Soil - D								
Sample Matrix Code	5A	6A								
% Stones >10mm$_A$	<0.1	<0.1						% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	7.73	7.63						pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	45	864						mg/l	10	A-T-026s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Ian Farmer Associates (Warrington), 14/15 Rufford Court, Hardwick Grange, Warrington, WA1 4RF

Project: Embassy Village, Castlefield

Clients Project No: 2230462

Project No: 22/03801

Date Received: 20/04/2022 (am)

Cool Box Temperatures (°C): 12.4

Lab Sample ID	22/03801/1	22/03801/2
Client Sample No	11	8
Client Sample ID/Depth	WS09 2.50m	WS12 1.20m
Date Sampled	01/04/22	31/03/22
Deviation Code		
E (no date)	✓	✓

Key
E (no date) *No sampling date provided (all results affected if not provided)*

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/03801/1	22/03801/2
Client Sample No	11	8
Client Sample ID/Depth	WS09 2.50m	WS12 1.20m
Date Sampled	01/04/22	31/03/22
A-T-026s	27/04/2022	27/04/2022
A-T-031s	26/04/2022	26/04/2022
A-T-044	26/04/2022	26/04/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

APPENDIX 4

CHEMICAL LABORATORY TEST RESULTS

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Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/03636
Issue Number: 1 **Date:** 25 April, 2022

Client:
Ian Farmer Associates (Warrington)
14/15 Rufford Court
Hardwick Grange
Warrington
WA1 4RF

Project Manager: Michelle Hirst-Watson
Project Name: Embassy Village, Castlefield
Project Ref: 2230462
Order No: P7531589
Date Samples Received: 06/04/22
Date Instructions Received: 13/04/22
Date Analysis Completed: 25/04/22

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	Units	Limit of Detection	Method ref
Client Sample No	4	11	3	1	1	8	2			
Client Sample ID	WS01	WS01	WS02	WS04B	WS07A	WS07A	WS08			
Depth to Top	0.5	2.8	0.5	0.2	0.2	1.8	0.25			
Depth To Bottom										
Date Sampled	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6	6AB	6AB	6AB	6	6AB			
% Stones >10mm$_A$	23.1	<0.1	4.7	10.4	7.1	<0.1	20.8	% w/w	0.1	A-T-044
pH$_D$[M#]	7.16	7.54	8.10	7.94	7.62	7.64	7.81	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$[M#]	1.28	0.21	1.12	1.08	1.51	0.03	0.25	g/l	0.01	A-T-026s
Cyanide (total)$_A$[M#]	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_A$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	0.2	A-T-050s
Organic matter Default$_D$[M#]	13.1	1.1	20.8	4.3	9.3	0.7	8.1	% w/w	0.1	A-T-032 OM
Arsenic$_D$[M#]	35	6	40	19	30	1	28	mg/kg	1	A-T-024s
Boron (water soluble)$_D$	1.9	<1.0	4.7	2.2	2.9	<1.0	1.0	mg/kg	1	A-T-027s
Cadmium$_D$[M#]	5.7	1.9	6.1	20.2	2.8	1.1	3.6	mg/kg	0.5	A-T-024s
Copper$_D$[M#]	221	16	469	212	402	15	579	mg/kg	1	A-T-024s
Chromium$_D$[M#]	17	13	28	17	26	20	29	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	2	2	<1	<1	<1	mg/kg	1	A-T-040s
Lead$_D$[M#]	548	42	389	489	2380	13	2980	mg/kg	1	A-T-024s
Mercury$_D$	1.96	<0.17	0.86	0.66	10.1	<0.17	0.53	mg/kg	0.17	A-T-024s
Nickel$_D$[M#]	27	18	88	23	33	20	40	mg/kg	1	A-T-024s
Selenium$_D$[M#]	<1	1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D$[M#]	2870	68	4990	14900	386	63	3250	mg/kg	5	A-T-024s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	Units	Limit of Detection	Method ref
Client Sample No	4	11	3	1	1	8	2			
Client Sample ID	WS01	WS01	WS02	WS04B	WS07A	WS07A	WS08			
Depth to Top	0.5	2.8	0.5	0.2	0.2	1.8	0.25			
Depth To Bottom										
Date Sampled	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6	6AB	6AB	6AB	6	6AB			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	Units	Limit of Detection	Method ref
Client Sample No	4	11	3	1	1	8	2			
Client Sample ID	WS01	WS01	WS02	WS04B	WS07A	WS07A	WS08			
Depth to Top	0.5	2.8	0.5	0.2	0.2	1.8	0.25			
Depth To Bottom										
Date Sampled	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6	6AB	6AB	6AB	6	6AB			
PAH-16MS										
Acenaphthene$_A^{M\#}$	8.55	0.03	0.08	1.42	1.03	<0.01	0.50	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	1.36	<0.01	0.03	0.08	0.16	<0.01	0.06	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	14.6	0.06	0.13	2.94	2.45	<0.02	1.07	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	18.5	0.08	0.49	9.07	7.96	<0.04	3.61	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	12.5	0.07	0.56	6.51	5.77	<0.04	2.81	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	12	0.07	0.59	7.08	5.33	<0.05	2.99	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	7.37	<0.05	0.41	3.89	3.19	<0.05	1.95	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	4.34	<0.07	0.23	2.53	1.87	<0.07	1.00	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	17.5	0.09	0.57	8.34	7.17	<0.06	3.51	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	1.57	<0.04	0.10	0.82	0.75	<0.04	0.39	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	38.5	0.21	0.98	20.2	15.6	<0.08	7.82	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	7.71	0.03	0.04	0.87	0.78	<0.01	0.37	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	8.77	0.05	0.41	4.85	3.52	<0.03	2.18	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	10	0.03	0.10	1.24	1.69	<0.03	0.49	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	57.7	0.27	0.68	13.8	10.5	<0.03	5.08	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	37.2	0.21	0.97	18	15.6	<0.07	7.25	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	258	1.20	6.37	102	83.4	<0.08	41.1	mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	Units	Limit of Detection	Method ref
Client Sample No	4	11	3	1	1	8	2			
Client Sample ID	WS01	WS01	WS02	WS04B	WS07A	WS07A	WS08			
Depth to Top	0.5	2.8	0.5	0.2	0.2	1.8	0.25			
Depth To Bottom										
Date Sampled	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22	01-Apr-22			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AB	6	6AB	6AB	6AB	6	6AB			
TPH CWG with Clean Up *C1										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<10	<1	<1	<1	2	<1	4	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<10	<1	<1	<1	2	<1	3	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<10	<1	1	2	4	<1	4	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	12	<1	2	5	5	<1	6	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	45	2	4	43	19	<1	52	mg/kg	1	A-T-055s
Total Aliphatics$_A$	66	2	8	51	32	<1	69	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<10	<1	1	2	2	<1	4	mg/kg	1	A-T-055s
Aro >C10-C12$_A$	45	<1	<1	6	7	<1	9	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	249	<1	2	24	39	<1	18	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	575	3	6	160	194	<1	61	mg/kg	1	A-T-055s
Aro >C21-C35$_A$	860	7	18	560	480	<1	154	mg/kg	1	A-T-055s
Total Aromatics$_A$	1730	10	28	751	722	<1	247	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	1800	13	36	802	754	<1	316	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/32	22/03636/36						Units	Limit of Detection	Method ref
Client Sample No	3	1								
Client Sample ID	WS09	WS10								
Depth to Top	0.5	0.3								
Depth To Bottom										
Date Sampled	31-Mar-22	01-Apr-22								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6AB	6AB								
% Stones >10mm$_A$	15.5	14.6						% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.51	8.01						pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$$^{M\#}$	1.50	1.47						g/l	0.01	A-T-026s
Cyanide (total)$_A$$^{M\#}$	<1	<1						mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_A$	<0.2	<0.2						mg/kg	0.2	A-T-050s
Organic matter Default$_D$$^{M\#}$	12.8	8.5						% w/w	0.1	A-T-032 OM
Arsenic$_D$$^{M\#}$	28	30						mg/kg	1	A-T-024s
Boron (water soluble)$_D$	2.7	3.8						mg/kg	1	A-T-027s
Cadmium$_D$$^{M\#}$	4.3	5.0						mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	679	403						mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	25	16						mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1						mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	445	562						mg/kg	1	A-T-024s
Mercury$_D$	0.51	2.00						mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	41	24						mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1						mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	960	1680						mg/kg	5	A-T-024s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/32	22/03636/36						Units	Limit of Detection	Method ref
Client Sample No	3	1								
Client Sample ID	WS09	WS10								
Depth to Top	0.5	0.3								
Depth To Bottom										
Date Sampled	31-Mar-22	01-Apr-22								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6AB	6AB								
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD								A-T-045
Asbestos Matrix (visual)$_{D}$	-	-								A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-								A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A								A-T-045

envirolab

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/32	22/03636/36						Units	Limit of Detection	Method ref
Client Sample No	3	1								
Client Sample ID	WS09	WS10								
Depth to Top	0.5	0.3								
Depth To Bottom										
Date Sampled	31-Mar-22	01-Apr-22								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6AB	6AB								
PAH-16MS										
Acenaphthene$_A^{M\#}$	0.20	0.24						mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	0.06	0.16						mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	0.40	0.87						mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	1.39	2.44						mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	1.80	1.52						mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	1.59	1.87						mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	1.36	0.98						mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.50	0.59						mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	1.36	2.49						mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.26	0.23						mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	2.27	5.83						mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	0.14	0.19						mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	1.50	1.06						mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	0.64	0.42						mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	1.69	3.66						mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	2.18	6.58						mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	17.3	29.1						mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/03636

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03636/32	22/03636/36						Units	Limit of Detection	Method ref
Client Sample No	3	1								
Client Sample ID	WS09	WS10								
Depth to Top	0.5	0.3								
Depth To Bottom										
Date Sampled	31-Mar-22	01-Apr-22								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	6AB	6AB								
TPH CWG with Clean Up *C1										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	3	2						mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	2	<1						mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	4	3						mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	4	4						mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	10	8						mg/kg	1	A-T-055s
Total Aliphatics$_A$	22	17						mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	10	2						mg/kg	1	A-T-055s
Aro >C10-C12$_A$	11	5						mg/kg	1	A-T-055s
Aro >C12-C16$_A$	17	23						mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	30	82						mg/kg	1	A-T-055s
Aro >C21-C35$_A$	112	166						mg/kg	1	A-T-055s
Total Aromatics$_A$	179	277						mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	201	294						mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01						mg/kg	0.01	A-T-022s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed.
Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Ian Farmer Associates (Warrington), 14/15 Rufford Court, Hardwick Grange, Warrington, WA1 4RF

Project: Embassy Village, Castlefield

Clients Project No: 2230462

Project No: 22/03636

Date Received: 13/04/2022 (am)

Cool Box Temperatures (°C): 11.2 & 12.3

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	22/03636/32	22/03636/36
Client Sample No	4	11	3	1	1	8	2	3	1
Client Sample ID/Depth	WS01 0.5m	WS01 2.8m	WS02 0.5m	WS04B 0.2m	WS07A 0.2m	WS07A 1.8m	WS08 0.25m	WS09 0.5m	WS10 0.3m
Date Sampled	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	31/03/22	01/04/22
Deviation Code									
F	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key

F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	22/03636/32	22/03636/36
Client Sample No	4	11	3	1	1	8	2	3	1
Client Sample ID/Depth	WS01 0.5m	WS01 2.8m	WS02 0.5m	WS04B 0.2m	WS07A 0.2m	WS07A 1.8m	WS08 0.25m	WS09 0.5m	WS10 0.3m
Date Sampled	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	31/03/22	01/04/22
VPHCWG	✓	✓	✓	✓	✓	✓	✓	✓	✓
PAH-16MS	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cyanide (total)	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/03636/2	22/03636/5	22/03636/7	22/03636/12	22/03636/20	22/03636/23	22/03636/25	22/03636/32	22/03636/36
Client Sample No	4	11	3	1	1	8	2	3	1
Client Sample ID/Depth	WS01 0.5m	WS01 2.8m	WS02 0.5m	WS04B 0.2m	WS07A 0.2m	WS07A 1.8m	WS08 0.25m	WS09 0.5m	WS10 0.3m
Date Sampled	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	01/04/22	31/03/22	01/04/22
A-T-019s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-022s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-024s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-026s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-027s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-031s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-032 OM	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-040s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-042sTCN	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-044	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-045	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
A-T-050s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-055s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

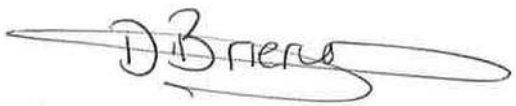
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/03663
Issue Number: 1 **Date:** 26 April, 2022

Client: Ian Farmer Associates (Warrington)
14/15 Rufford Court
Hardwick Grange
Warrington
WA1 4RF

Project Manager: Michelle Hirst-Watson
Project Name: Embassy Village, Castlefield
Project Ref: 2230462
Order No: P7531589
Date Samples Received: 01/04/22
Date Instructions Received: 14/04/22
Date Analysis Completed: 26/04/22

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 22/03663

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16		Units	Limit of Detection	Method ref
Client Sample No	3	2	1	10	2	2				
Client Sample ID	WS11A	WS12	WS13	WS13	WS14	WS14A				
Depth to Top	0.5	0.3	0.2	1.7	0.2	0.5				
Depth To Bottom										
Date Sampled	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6A	6AB	6AB	6A	6A	6A				
% Stones >10mm$_A$	32.1	34.0	18.5	27.4	<0.1	26.8		% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	7.78	7.83	7.86	7.25	8.13	7.96		pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D$$^{M\#}$	1.30	1.19	1.25	0.07	2.18	1.65		g/l	0.01	A-T-026s
Cyanide (total)$_A$$^{M\#}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_A$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		mg/kg	0.2	A-T-050s
Organic matter Default$_D$$^{M\#}$	3.9	6.3	4.3	0.4	NDP	7.0		% w/w	0.1	A-T-032 OM
Arsenic$_D$$^{M\#}$	33	28	11	9	34	26		mg/kg	1	A-T-024s
Boron (water soluble)$_D$	1.5	1.7	<1.0	<1.0	3.3	2.4		mg/kg	1	A-T-027s
Cadmium$_D$$^{M\#}$	1.7	3.4	1.2	1.1	2.6	1.8		mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	735	213	165	166	312	239		mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	20	15	12	11	20	17		mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	238	212	180	154	849	657		mg/kg	1	A-T-024s
Mercury$_D$	<0.17	0.44	0.91	0.60	2.22	2.34		mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	23	23	18	15	31	23		mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	396	721	99	97	431	304		mg/kg	5	A-T-024s

Envirolab Job Number: 22/03663

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16		Units	Limit of Detection	Method ref
Client Sample No	3	2	1	10	2	2				
Client Sample ID	WS11A	WS12	WS13	WS13	WS14	WS14A				
Depth to Top	0.5	0.3	0.2	1.7	0.2	0.5				
Depth To Bottom										
Date Sampled	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6A	6AB	6AB	6A	6A	6A				
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	Amosite	NAD				A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-				A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	Loose Fibres	-				A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A				A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_{D}$	-	-	-	-	<0.001	-		% w/w	0.001	A-T-054

Envirolab Job Number: 22/03663

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16		Units	Limit of Detection	Method ref
Client Sample No	3	2	1	10	2	2				
Client Sample ID	WS11A	WS12	WS13	WS13	WS14	WS14A				
Depth to Top	0.5	0.3	0.2	1.7	0.2	0.5				
Depth To Bottom										
Date Sampled	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6A	6AB	6AB	6A	6A	6A				
PAH-16MS										
Acenaphthene$_A^{M\#}$	0.97	0.10	0.04	<0.01	1.26	0.32		mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	0.04	0.06	0.02	<0.01	0.11	0.08		mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	1.09	0.24	0.11	<0.02	2.33	0.55		mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	3.05	0.95	0.33	<0.04	5.09	1.72		mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	2.44	0.80	0.39	<0.04	4.09	1.76		mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	2.48	1.05	0.37	<0.05	3.75	1.63		mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	1.06	0.55	0.25	<0.05	1.63	0.87		mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.97	0.37	0.14	<0.07	1.50	0.62		mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	3.53	1.06	0.32	<0.06	5.16	1.64		mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.30	0.14	0.06	<0.04	0.47	0.23		mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	7.03	2.61	0.60	<0.08	11.1	3.37		mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	0.78	0.12	0.03	<0.01	0.85	0.26		mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	1.29	0.66	0.29	0.03	2.08	1.03		mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	2.20	0.32	0.06	<0.03	1.86	0.37		mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	7.41	2.48	0.51	<0.03	10.7	2.97		mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	7.33	2.67	0.69	<0.07	10.9	3.42		mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	42	14.2	4.21	<0.08	62.9	20.8		mg/kg	0.01	A-T-019s

Envirolab Job Number: 22/03663

Client Project Name: Embassy Village, Castlefield

Client Project Ref: 2230462

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16		Units	Limit of Detection	Method ref
Client Sample No	3	2	1	10	2	2				
Client Sample ID	WS11A	WS12	WS13	WS13	WS14	WS14A				
Depth to Top	0.5	0.3	0.2	1.7	0.2	0.5				
Depth To Bottom										
Date Sampled	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22	31-Mar-22				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6A	6AB	6AB	6A	6A	6A				
TPH CWG with Clean Up *C1										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	<5	<1	<1	<1	<1		mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	<5	<1	<1	<1	<1		mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	1	36	9	<1	2	2		mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	4	183	44	<1	6	4		mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	42	332	73	<1	36	33		mg/kg	1	A-T-055s
Total Aliphatics$_A$	48	551	126	<1	43	39		mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	1	6	2	<1	1	<1		mg/kg	1	A-T-055s
Aro >C10-C12$_A$	10	7	2	<1	4	2		mg/kg	1	A-T-055s
Aro >C12-C16$_A$	21	117	20	<1	17	10		mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	70	266	87	<1	59	34		mg/kg	1	A-T-055s
Aro >C21-C35$_A$	227	123	41	2	200	132		mg/kg	1	A-T-055s
Total Aromatics$_A$	330	519	151	2	282	180		mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	378	1070	278	2	325	219		mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-022s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Ian Farmer Associates (Warrington), 14/15 Rufford Court, Hardwick Grange, Warrington, WA1 4RF

Project: Embassy Village, Castlefield

Clients Project No: 2230462

Project No: 22/03663

Date Received: 14/04/2022 (am)

Cool Box Temperatures (°C): 5.2 - 8.4

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16
Client Sample No	3	2	1	10	2	2
Client Sample ID/Depth	WS11A 0.5m	WS12 0.3m	WS13 0.2m	WS13 1.7m	WS14 0.2m	WS14A 0.5m
Date Sampled	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22
Deviation Code						
F	✓	✓	✓	✓	✓	✓

Key
F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16
Client Sample No	3	2	1	10	2	2
Client Sample ID/Depth	WS11A 0.5m	WS12 0.3m	WS13 0.2m	WS13 1.7m	WS14 0.2m	WS14A 0.5m
Date Sampled	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22
VPHCWG	✓	✓	✓	✓	✓	✓
PAH-16MS	✓	✓	✓	✓	✓	✓
Cyanide (total)	✓	✓	✓	✓	✓	✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/03663/3	22/03663/6	22/03663/10	22/03663/13	22/03663/14	22/03663/16
Client Sample No	3	2	1	10	2	2
Client Sample ID/Depth	WS11A 0.5m	WS12 0.3m	WS13 0.2m	WS13 1.7m	WS14 0.2m	WS14A 0.5m
Date Sampled	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22	31/03/22
A-T-019s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-022s	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022
A-T-024s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-026s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-027s	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022
A-T-031s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-032 OM	25/04/2022	25/04/2022	25/04/2022	25/04/2022	21/04/2022	25/04/2022
A-T-040s	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-042sTCN	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-044	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022	25/04/2022
A-T-045	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022	19/04/2022
A-T-050s	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022	22/04/2022
A-T-054					26/04/2022	
A-T-055s	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022	26/04/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Appendix E – Ground Gas Monitoring Results

- Gas Monitoring Visits 1 – 6

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Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
Tel: 0161 236 2394
Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Embassy Village	**Date:**	12/05/2022
Job Number:	B077442	**Visit:**	1
Client:	Embassy	**Weather:**	Sunny
Barometric State:	Falling	**Ground Conditions:**	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1015	0.0	0.0	0.0	0.0	0.6	0.6	20.2	0	0	Dry	3.43	**1**
WS04B	1015	0.0	0.0	0.0	0.0	0.8	0.8	19.9	0	0	3.10	3.16	**2**
WS05A	1015	-0.3	0.0	0.0	0.0	2.2	2.2	14.0	0	0	1.49	3.41	**4,5**
WS08	1015	0.0	0.0	0.0	0.0	3.0	3.0	11.9	0	0	2.02	2.70	**2,1**
WS10	1015	0.0	0.0	0.0	0.0	0.5	0.5	19.9	0	0	Dry	2.45	**2**
WS12	1015	0.0	0.0	0.0	0.0	1.0	1.0	19.3	0	0	3.50	4.04	**2,3**
WS13	1015	0.0	0.0	0.0	0.0	1.3	1.3	19.2	0	0	2.67	4.11	**2**

Notes

1 Gas stabilised after 2.75mins
2 Steady state gas flow atchieved after 2mins
3 Gas stabilised after 1.75mins
4 Steady state gas flow atchieved after 4mins
5 Gas stabilised after 3.25mins

Logged by

RuT

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

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GAS MONITORING LOG SHEET

Project:	Embassy Village	**Date:**	20/05/2022
Job Number:	B077442	**Visit:**	2
Client:	Embassy	**Weather:**	Cloudy
Barometric State:	Falling	**Ground Conditions:**	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1016	0.0	0.0	0.0	0.0	0.5	0.3	21.0	0	0	Dry	3.43	
WS04B	1016	0.0	0.0	0.0	0.0	0.3	0.3	21.0	0	0	3.07	3.16	1
WS05A	1016	-0.6	0.0	0.0	0.0	1.9	1.9	17.9	1	0	1.65	3.41	2
WS08	1016	0.0	0.0	0.0	0.0	2.2	2.2	19.9	0	0	2.20	2.70	
WS10	1016	0.0	0.0	0.0	0.0	0.5	0.1	21.0	0	0	Dry	2.45	
WS12	1016	0.0	0.0	0.0	0.0	0.7	0.3	21.0	0	0	3.57	4.04	
WS13	1016	0.0	0.0	0.0	0.0	1.1	1.1	21.0	0	0	2.68	4.11	

Notes

1 Steady state gas flow atchieved after 1min

Logged by

TW

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

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GAS MONITORING LOG SHEET

Project:	Embassy Village	**Date:**	31/05/2022
Job Number:	B077442	**Visit:**	3
Client:	Embassy	**Weather:**	Cloudy
Barometric State:	Rising	**Ground Conditions:**	Wet

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1011	0.0	0.0	0.0	0.0	0.2	0.2	21.0	0	0	Dry	3.43	
WS04B	1011	0.0	0.0	0.0	0.0	0.1	0.1	21.0	0	0	3.05	3.16	
WS05A	1011	-0.1	0.0	0.0	0.0	1.5	1.5	18.8	0	0	1.58	3.41	1
WS08	1011	0.0	0.0	0.0	0.0	2.0	1.9	19.6	0	0	2.17	2.70	
WS10	1011	0.0	0.0	0.0	0.0	0.3	0.3	21.0	0	0	Dry	2.45	
WS12	1011	0.0	0.0	0.0	0.0	0.4	0.4	21.0	0	0	3.50	4.04	
WS13	1011	0.0	0.0	0.0	0.0	1.0	0.7	21.0	0	0	2.70	4.11	

Notes

1 Steady state gas flow atchieved after 30 seconds.

Logged by

TW

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

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GAS MONITORING LOG SHEET

Project:	Embassy Village	**Date:**	06/06/2022
Job Number:	B077442	**Visit:**	4
Client:	Embassy	**Weather:**	Overcast
Barometric State:	Steady	**Ground Conditions:**	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1013	0.0	0.0	0.0	0.0	0.7	0.7	20.2	1	3	Dry	3.40	
WS04B	1014	0.0	0.0	0.0	0.0	0.7	0.7	20.1	2	1	Dry	3.06	
WS05A	1013	0.0	0.0	0.0	0.0	3.0	3.0	13.1	1	2	1.56	3.33	
WS08	1013	0.0	0.0	0.0	0.0	3.5	3.5	12.1	1	1	2.03	2.62	
WS10	1013	0.0	0.0	0.0	0.0	0.6	0.6	20.3	2	1	Dry	2.42	
WS12	1013	0.0	0.0	0.0	0.0	1.1	1.1	19.5	2	1	3.48	3.95	
WS13	1012	0.0	0.0	0.0	0.0	2.0	2.0	18.5	1	1	2.66	4.03	

Notes

Logged by

MH

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

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GAS MONITORING LOG SHEET

Project:	Embassy Village	**Date:**	10/06/2022
Job Number:	B077442	**Visit:**	5
Client:	Embassy	**Weather:**	Sunny
Barometric State:	Steady	**Ground Conditions:**	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1012	0.0	0.0	0.0	0.0	0.6	0.6	20.2	1	1	Dry	3.40	
WS04B	1012	0.0	0.0	0.0	0.0	0.9	0.9	19.6	1	1	Dry	3.10	
WS05A	1012	0.0	0.0	0.0	0.0	2.6	2.6	13.0	1	2	1.60	3.33	
WS08	1011	0.0	0.0	0.0	0.0	3.2	3.2	12.6	1	1	2.56	2.62	
WS10	1011	0.0	0.0	0.0	0.0	0.5	0.5	20.1	0	1	Dry	2.42	
WS12	1011	0.0	0.0	0.0	0.0	0.8	0.8	19.5	0	2	3.49	3.96	
WS13	1011	0.0	0.0	0.0	0.0	1.9	1.9	18.2	0	1	2.69	4.05	

Notes

Logged by

MH

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

Curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
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Fax: 0161 228 7902

GAS MONITORING LOG SHEET

Project:	Embassy Village	**Date:**	05/07/2022
Job Number:	B077442	**Visit:**	6
Client:	Embassy	**Weather:**	Cloudy
Barometric State:	Rising	**Ground Conditions:**	Dry

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
WS01	1024	0.0	0.0	0.0	0.0	0.4	0.2	21.1	0	0	Dry	3.40	
WS04B	1024	0.0	0.0	0.0	0.0	0.8	0.8	21.0	0	1	Dry	3.10	
WS05A	1024	0.0	0.0	0.0	0.0	1.1	1.1	20.5	0	3	1.70	3.33	
WS08	1024	0.0	0.0	0.0	0.0	1.9	1.9	19.8	0	1	2.53	2.62	
WS10	1024	0.0	0.0	0.0	0.0	0.3	0.2	20.9	0	0	Dry	2.42	
WS12	1025	0.0	0.0	0.0	0.0	0.4	0.4	20.9	0	1	3.59	3.96	
WS13	1025	0.0	0.0	0.0	0.0	1.0	1.0	20.9	0	0	2.70	4.05	

Notes

Logged by

TW

1% gas volume = 10,000 ppm
Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

Appendix F – GAC Screening Thresholds

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Adopted Soil Generic Assessment Criteria
Sandy loam with 6% SOM

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Contaminants	Residential with home grown produce	Residential without home grown produce	Allotments	Commercial	Public open space near residential housing POS_{resi}	Public park POS_{park}
Metals						
Beryllium	*1.7*	*1.7*	*35*	*12*	*2.2*	*63*
Boron	*290*	*11,000*	*45*	*240,000*	*21,000*	*46,000*
Cadmium	**10**[13] 22	**85**[13] 150	**1.8** 3.9	**230** 410	*120* 220	*560* 880
Chromium III	*910*	*910*	*18,000*	*8,600*	*1,500*	*33,000*
Chromium VI	*6* 21	*6* 21	*1.8* 170	*33* 49	*7.7* 21	*220* 250
Lead	200	310	80	2,300	630	1,300
Mercury *(elemental)*	**1**	**1**	**26**	**26**	*16*	**26**[8] [*30*]
Mercury (inorganic)	**170**	**240**	**80**	**3600**	*120*	*240*
Nickel	*130*[10]	*180*[10]	*53*[11]	*980*[10]	*230*	*800*
Vanadium	*410*	*1200*	*91*	*9000*	*2000*	*5000*
Copper	*2400*	*7100*	*520*	*68000*	*12000*	*44000*
Zinc	*3700*	*40000*	*620*	*730000*	*81000*	*170000*
Semi-Metals and non-metals						
Arsenic	**32**[12] 37	**35**[12] 40	**43**[12] 49	**640**[12] 640	*79* 79	*170* 170
Antimony		***550***		***7500***	***1500***	***3300***
Selenium	**350**	**600**	**120**	**13000**	*1100*	*1800*
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_6	*160*	*160*	*3900*	*12000*	*600000*	*180000*
$EC_{>6}$ - EC_8	*530*	*530*	*13000*	*40000*	*620000*	*320000*
$EC_{>8}$ - EC_{10}	*150*	*150*	*1700*	*11000*	*13000*	*21000*
EC_{10}-EC_{12}	*760*	*770*	*7300*	*47000*	*13000*	*24000*
EC_{12}-EC_{16}	*4300*	*4400*	*13000*	*90000*	*13000*	*26000*
$EC_{>16}$ - EC_{35}	*110000*	*110000*	*270000*	*1800000*	*250000*	*490000*
$EC>_{35}$ - EC_{44}	*110000*	*110000*	*270000*	*1800000*	*250000*	*490000*
Aromatic risk banded hydrocarbons - TPHCWG method						
$EC>_5$ - EC_7	*300*	*1400*	*57*	*86000*	*56000*	*92000*
$EC>_7$ - EC_8	*660*	*3900*	*120*	*180000*	*56000*	*100000*
$EC_{>8}$ - EC_{10}	*190*	*270*	*51*	*17000*	*5000*	*9300*
EC_{10} - EC_{12}	*380*	*1200*	*74*	*34000*	*5000*	*10000*
EC_{12} - EC_{16}	*660*	*2500*	*130*	*38000*	*5000*	*10000*
$EC_{>16}$ - EC_{21}	*930*	*1900*	*260*	*28000*	*3800*	*7800*
$EC_{>21}$ - EC_{35}	*1700*	*1900*	*1600*	*28000*	*3800*	*7900*
$EC>_{35}$ - EC_{44}	*1700*	*1900*	*1600*	*28000*	*3800*	*7900*
Aliph + Arom EC >44-70	*1900*	*1900*	*3000*	*28000*	3800	7900
Aromatic						
Benzene	**0.33** 0.87	**1.0** 3.3	**0.07** 0.18	**95** 98	*73* 140	*110* 230
Ethyl benzene	**350**	**840**	**90**	**2800**[8] [66000]	**2800**[8] [*25000*]	**2800**[8] [*27000*]
Toluene	**610**	**2700**	**120**	**4400**[8] [190000]	**4400**[8] [*56000*]	**4400**[8] [*100000*]
Xylene[9]	**230**	**290**	**160**	**2600**[8] [32000]	**2600**[8] [*43000*]	**2600**[8] [*31000*]
Phenol	**420**	**520**	**280**	**3200**[14] (38000)	**3200**[14] (*10000*)	**3200**[14] (*9300*)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	*13*	*13*	*24*	*1100*	*4900*	*3000*
Acenaphthylene	*920*	*6000*	*160*	*100000*	*15000*	*30000*
Acenaphthene	*1100*	*6000*	*200*	*100000*	*15000*	*30000*
Fluorene	*860*	*4500*	*160*	*71000*	*9900*	*20000*
Phenanthrene	*440*	*1500*	*90*	*23000*	*3100*	*6300*
Anthracene	*11000*	*37000*	*2200*	*540000*	*74000*	*150000*
Fluoranthene	*890*	*1600*	*290*	*23000*	*3100*	*6400*
Pyrene	*2000*	*3800*	*620*	*54000*	*7400*	*15000*
Benz(a)anthracene	*13*	*15*	*13*	*180*	*29*	*62*
Chrysene	*27*	*32*	*19*	*350*	*57*	*120*
Benzo(b)fluoranthene	*3.7*	*4.0*	*3.9*	*45*	*7.2*	*16.0*
Benzo(k)fluoranthene	*100*	*110*	*130*	*1200*	*190*	*440*
Benzo(a)pyrene	*3.0* 5.0	*3.2* 5.3	*3.5* 5.7	*36* 77	*5.7* 10	*13* 21
Indeno(123cd)pyrene	*41*	*46*	*39*	*510*	*82*	*180*
Dibenzo(ah)anthracene	*0.3*	*0.32*	*0.43*	*3.6*	*0.58*	*1.4*
Benzo(ghi)perylene	*350*	*360*	*640*	*4000*	*640*	*1600*
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	*0.0014*	*0.0015*	*0.0018*	*0.12*	*3.5*	*5.4*
Trichloroethene (TCE)	*0.075*	*0.08*	*0.21*	*5.7*	*120*	*120*
1,1,1,2 Tetrachlorethane	*6.4*	*8.2*	*4.4*	*560*	*1400*	*2100*
Tetrachlorethene (PCE)	*0.90*	*0.92*	*3.6*	*95*	*1400*	*1500*
1,1,1 Trichlorethane	*39*	*40*	*240*	*3000*	*140000*	*100000*

Notes

1. All values above are in mg/kg
2. **Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters**, *numbers in italics are S4ULs*, ***numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters*** and underlined numbers are C4SLs
3. Soil organic matter (SOM) is assumed to be 6% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
6. For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m^{-3}
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
15. NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 2.5% SOM

curtins

Contaminants	Residential with home grown produce	Residential without home grown produce	Allotments	Commercial	Public open space near residential housing POS_{resi}	Public park POS_{park}
Metals						
Beryllium	*1.7*	*1.7*	*35*	*12*	*2.2*	*63*
Boron	*290*	*11,000*	*45*	*240,000*	*21,000*	*46,000*
Cadmium	**10**[13] 22	**85**[13] 150	**1.8** 3.9	**230** 410	*120* 220	*560* 880
Chromium III	*910*	*910*	*18,000*	*8,600*	*1,500*	*33,000*
Chromium VI	*6* 21	*6* 21	*1.8* 170	*33* 49	*7.7* 21	*220* 250
Lead	200	310	80	2,300	630	1,300
Mercury *(elemental)*	**1**	**1**	**26**	**26**	*16*	**26**[8] [*30*]
Mercury (inorganic)	**170**	**240**	**80**	**3600**	*120*	*240*
Nickel	*130*[10]	*180*[10]	*53*[11]	*980*[10]	*230*	*800*
Vanadium	*410*	*1200*	*91*	*9000*	*2000*	*5000*
Copper	*2400*	*7100*	*520*	*68000*	*12000*	*44000*
Zinc	*3700*	*40000*	*620*	*730000*	*81000*	*170000*
Semi-Metals and non-metals						
Arsenic	**32**[12] 37	**35**[12] 40	**43**[12] 49	**640**[12] 640	*79* 79	*170* 170
Antimony		***550***		***7500***	***1500***	***3300***
Selenium	**350**	**600**	**120**	**13000**	*1100*	*1800*
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_6	*78*	*78*	*1700*	*5900*	*590000*	*130000*
$EC_{>6}$ - EC_8	*230*	*230*	*5600*	*17000*	*610000*	*220000*
$EC_{>8}$ - EC_{10}	*65*	*65*	*770*	*4800*	*13000*	*18000*
EC_{10}-EC_{12}	*330*	*330*	*4400*	*23000*	*13000*	*23000*
EC_{12}-EC_{16}	*2400*	*2400*	*13000*	*82000*	*13000*	*25000*
$EC_{>16}$ - EC_{35}	*92000*	*92000*	*270000*	*1700000*	*250000*	*480000*
$EC_{>35}$ - EC_{44}	*92000*	*92000*	*270000*	*1700000*	*250000*	*480000*
Aromatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_7	*140*	*690*	*27*	*46000*	*56000*	*84000*
$EC_{>7}$ - EC_8	*290*	*1800*	*51*	*110000*	*56000*	*95000*
$EC_{>8}$ - EC_{10}	*83*	*110*	*21*	*8100*	*5000*	*8500*
EC_{10} - EC_{12}	*180*	*590*	*31*	*28000*	*5000*	*9700*
EC_{12} - EC_{16}	*330*	*2300*	*57*	*37000*	*5100*	*10000*
$EC_{>16}$ - EC_{21}	*540*	*1900*	*110*	*28000*	*3800*	*7700*
$EC_{>21}$ - EC_{35}	*1500*	*1900*	*820*	*28000*	*3800*	*7800*
$EC_{>35}$ - EC_{44}	*1500*	*1900*	*820*	*28000*	*3800*	*7800*
Aliph + Arom EC >44-70	*1800*	*1900*	*2100*	*28000*	3800	7800
Aromatic						
Benzene	**0.16**	**0.49**	**0.035**	**50**	*72*	*100*
Ethyl benzene	**150**	**380**	**39**	**1200**[8] [35000]	**1200**[8] [*24000*]	**1200**[8] [*22000*]
Toluene	**270**	**1300**	**51**	**1900**[8] [110000]	**1900**[8] [*56000*]	**1900**[8] [*95000*]
Xylene[9]	**98**	**120**	**70**	**1200**[8] [14000]	**1200**[8] [*42000*]	**1200**[8] [*23000*]
Phenol	**290**	**420**	**140**	**1500**[14] (35000)	**1500**[14] (*10000*)	**1500**[14] (*8300*)
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	*5.6*	*5.6*	*10*	*460*	*4900*	*1900*
Acenaphthylene	*420*	*4600*	*69*	*97000*	*15000*	*30000*
Acenaphthene	*510*	*4700*	*85*	*97000*	*15000*	*30000*
Fluorene	*400*	*3800*	*67*	*68000*	*9900*	*20000*
Phenanthrene	*220*	*1500*	*38*	*22000*	*3100*	*6200*
Anthracene	*5400*	*35000*	*950*	*540000*	*74000*	*150000*
Fluoranthene	*560*	*1600*	*130*	*23000*	*3100*	*6300*
Pyrene	*1200*	*3800*	*270*	*54000*	*7400*	*15000*
Benz(a)anthracene	*11*	*14*	*6.5*	*170*	*29*	*56*
Chrysene	*22*	*31*	*9.4*	*350*	*57*	*110*
Benzo(b)fluoranthene	*3.3*	*4.0*	*2.1*	*44*	*7.2*	*15*
Benzo(k)fluoranthene	*93*	*110*	*75*	*1200*	*190*	*410*
Benzo(a)pyrene	*2.7*	*3.2*	*2*	*35*	*5.7*	*12*
Indeno(123cd)pyrene	*36*	*46*	*21*	*510*	*82*	*170*
Dibenzo(ah)anthracene	*0.28*	*0.32*	*0.27*	*3.6*	*0.57*	*1.3*
Benzo(ghi)perylene	*340*	*360*	*470*	*4000*	*640*	*1500*
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	*0.00087*	*0.001*	*0.001*	*0.077*	*3.5*	*5*
Trichloroethene (TCE)	*0.034*	*0.036*	*0.091*	*2.6*	*120*	*91*
1,1,1,2 Tetrachlorethane	*2.8*	*3.5*	*1.9*	*250*	*1400*	*1800*
Tetrachlorethene (PCE)	*0.39*	*0.4*	*1.5*	*42*	*1400*	*1100*
1,1,1 Trichlorethane	*18*	*18*	*110*	*1300*	*140000*	*76000*

Notes

1. All values above are in mg/kg
2. **Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters**, *numbers in italics are S4ULs*, ***numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters*** and underlined numbers are C4SLs
3. Soil organic matter (SOM) is assumed to be 2.5% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
6. For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m^{-3}
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
15. NA: Not applicable

Adopted Soil Generic Assessment Criteria
Sandy loam with 1% SOM

curtins

Contaminants	Residential with home grown produce	Residential without home grown produce	Allotments	Commercial	Public open space near residential housing POS_{resi}	Public park POS_{park}
Metals						
Beryllium	*1.7*	*1.7*	*35*	*12*	*2.2*	*63*
Boron	*290*	*11,000*	*45*	*240,000*	*21,000*	*46,000*
Cadmium	**10**[13] 22	**85**[13] 150	**1.8** 3.9	**230** 410	*120* 220	*560* 880
Chromium III	*910*	*910*	*18,000*	*8,600*	*1,500*	*33,000*
Chromium VI	*6* 21	*6* 21	*1.8* 170	*33* 49	*7.7* 21	*220* 250
Lead	200	310	80	2,300	630	1,300
Mercury *(elemental)*	**1**	**1**	**26**	**26**	*16*	**26**[8] *[30]*
Mercury (inorganic)	**170**	**240**	**80**	**3600**	*120*	*240*
Nickel	*130*[10]	*180*[10]	*53*[11]	*980*[10]	*230*	*800*
Vanadium	*410*	*1200*	*91*	*9000*	*2000*	*5000*
Copper	*2400*	*7100*	*520*	*68000*	*12000*	*44000*
Zinc	*3700*	*40000*	*620*	*730000*	*81000*	*170000*
Semi-Metals and non-metals						
Arsenic	**32**[12] 37	**35**[12] 40	**43**[12] 49	**640**[12] 640	*79* 79	*170* 170
Antimony		***550***		***7500***	***1500***	***3300***
Selenium	**350**	**600**	**120**	**13000**	*1100*	*1800*
Inorganic chemicals						
Cyanide	34	34	34	34	34	34
Organic contaminants						
Aliphatic risk banded hydrocarbons - TPHCWG method						
$EC_{>5}$ - EC_6	*42*	*42*	*730*	*3200*	*570000*	*95000*
$EC_{>6}$ - EC_8	*100*	*100*	*2300*	*7800*	*600000*	*150000*
$EC_{>8}$ - EC_{10}	*27*	*27*	*320*	*2000*	*13000*	*14000*
EC_{10}-EC_{12}	*130*	*130*	*2200*	*9700*	*13000*	*21000*
EC_{12}-EC_{16}	*1100*	*1100*	*11000*	*59000*	*13000*	*25000*
$EC_{>16}$ - EC_{35}	*65000*	*65000*	*260000*	*1600000*	*250000*	*450000*
$EC>_{35}$ - EC_{44}	*65000*	*65000*	*260000*	*1600000*	*250000*	*450000*
Aromatic risk banded hydrocarbons - TPHCWG method						
$EC>_5$ - EC_7	*70*	*370*	*13*	*26000*	*56000*	*76000*
$EC>_7$ - EC_8	*130*	*860*	*22*	*56000*	*56000*	*87000*
$EC_{>8}$ - EC_{10}	*34*	*47*	*8.6*	*3500*	*5000*	*7200*
EC_{10} - EC_{12}	*74*	*250*	*13*	*16000*	*5000*	*9200*
EC_{12} - EC_{16}	*140*	*1800*	*23*	*36000*	*5100*	*10000*
$EC_{>16}$ - EC_{21}	*260*	*1900*	*46*	*28000*	*3800*	*7600*
$EC_{>21}$ - EC_{35}	*1100*	*1900*	*370*	*28000*	*3800*	*7800*
$EC>_{35}$ - EC_{44}	*1100*	*1900*	*370*	*28000*	*3800*	*7800*
Aliph + Arom EC >44-70	*1600*	*1900*	*1200*	*28000*	3800	7800
Aromatic						
Benzene	**0.08**	**0.3**	**0.017**	**28**	*72*	*90*
Ethyl benzene	**65**	**170**	**16**	**520**[8] [17000]	**520**[8] *[24000]*	**520**[8] *[17000]*
Toluene	**120**	**610**	**22**	**860**[8] [59000]	**860**[8] *[56000]*	**860**[8] *[87000]*
Xylene[9]	**41**	**53**	**28**	**480**[8] [69000]	**480**[8] *[41000]*	**480**[8] *[17000]*
Phenol	**180**	**310**	**66**	**760**[14] (31000)	**760**[14] *(10000)*	**760**[14] *(7600)*
Polycyclic Aromatic Hydrocarbons (PAH)						
Naphthalene	*2.3*	*2.3*	*4.1*	*190*	*4900*	*1200*
Acenaphthylene	*170*	*2900*	*28*	*83000*	*15000*	*29000*
Acenaphthene	*210*	*3000*	*34*	*84000*	*15000*	*29000*
Fluorene	*170*	*2800*	*27*	*63000*	*9900*	*20000*
Phenanthrene	*95*	*1300*	*15*	*22000*	*3100*	*6200*
Anthracene	*2400*	*31000*	*380*	*520000*	*74000*	*150000*
Fluoranthene	*280*	*1500*	*52*	*23000*	*3100*	*6300*
Pyrene	*620*	*3700*	*110*	*54000*	*7400*	*15000*
Benz(a)anthracene	*7.2*	*11*	*2.9*	*170*	*29*	*49*
Chrysene	*15*	*30*	*4.1*	*350*	*57*	*93*
Benzo(b)fluoranthene	*2.6*	*3.9*	*0.99*	*44*	*7.1*	*13*
Benzo(k)fluoranthene	*77*	*110*	*37*	*1200*	*190*	*370*
Benzo(a)pyrene	*2.2*	*3.2*	*0.97*	*35*	*5.7*	*11*
Indeno(123cd)pyrene	*27*	*45*	*9.5*	*500*	*82*	*150*
Dibenzo(ah)anthracene	*0.24*	*0.31*	*0.14*	*3.5*	*0.57*	*1.1*
Benzo(ghi)perylene	*320*	*360*	*290*	*3900*	*640*	*1400*
Chlorinated Aliphatic Hydrocarbons						
Vinyl chloride	*0.00064*	*0.00077*	*0.00055*	*0.059*	*3.5*	*4.8*
Trichloroethene (TCE)	*0.016*	*0.017*	*0.041*	*1.2*	*120*	*70*
1,1,1,2 Tetrachlorethane	*1.2*	*1.5*	*0.79*	*110*	*1400*	*1500*
Tetrachlorethene (PCE)	*0.18*	*0.18*	*0.65*	*19*	*1400*	*810*
1,1,1 Trichlorethane	*8.8*	*9*	*48*	*660*	*140000*	*57000*

Notes

1. All values above are in mg/kg
2. **Numbers in bold are SGVs or GAC that are derived based on SGV report input parameters**, *numbers in italics are S4ULs*, ***numbers in bold-italics are based on EIC/AGS/CL:AIRE numbers & input parameters*** and underlined numbers are C4SLs
3. Soil organic matter (SOM) is assumed to be 1% - DEFAULT VALUE
4. Soil type is assumed to be sandy loam - DEFAULT SOIL TYPE
5. For residential, the building type is conservatively assumed to be a small terrace house where the development includes bungalows change to more conservative bungalow setting in computer model
6. For commercial, the building type is conservatively assumed to be a pre 1970s office building, where the proposed development comprises houses, flat with living spaces changes setting in model accordingly
7. For classrooms consider increasing the dust loading fator in the 'Soil and Building Data' of the CLEA 1.04 model from 50 to 100µg m^{-3}
8. Based on vapour saturation limt as suggested by EA / [ ] model value
9. Lowest of o-, m- and p-xylene
10. Based on comparison of inhalation exposure with inhalation TDI
11. Based on comparison of oral, dermal, and inhalation exposure with the oral TDI
12. Based on a comparison of oral and dermal soil exposure with oral Index Dose only
13. Averaged over and based on lifetime exposure
14. Based on critical concentration for skin irritation in humans arising from contact with phenol in aqueous solution (number in brackets based on health effects following long term exposure for illustration)
15. NA: Not applicable

Appendix G – Risk Assessment Methodology

The site-specific risk assessment, presented in this report, follows the principle of establishing whether there is a viable linkage between a contaminant source to a potential receptor, via an exposure pathway.

The risk assessment corresponds with the total site area and incorporates both descriptive (qualitative) and, where available, numerical (quantitative) lines of evidence.

Risk assessment is the process of collating known information on a hazard or set of hazards to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected to the source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway and receptor there can be no risk. Therefore, the presence of contaminant source on a site does not necessarily mean there is a risk.

The risk assessment considers the likelihood of an event taking place (accounting for the presence of the source and receptor and the viability of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment, the consequence of the hazard has been classified as severe or medium or mild or minor and the probability (likelihood) of the circumstances occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross-correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in CIRIA C552.

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability (Likelihood)	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

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In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to an ecosystem or organisation forming part of such ecosystem.	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in an ecosystem or organism forming part of such ecosystem.	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a Principal or Secondary A aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater (inc. Secondary B aquifers). Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

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In accordance with DoE guidance, the following categorisation of **probability** has been developed.

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a *high probability* that *severe harm* could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	*Harm* is *likely to arise* to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	*It is possible* that without appropriate further action *harm could arise* to a designated receptor. It is relatively *unlikely* that any such harm would be *severe,* and if any harm were to occur it is *more likely* that such harm would be *relatively mild.*
Low Risk	*It is possible* that *harm could arise* to a designated receptor from an identified hazard. It is *likely* that, at worst, if any harm was realised any effects would be *mild.*
Very Low Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term ‘risk’ in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation.

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