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Flood Risk Assessment

Prepared by	**BW**
Reviewed by	CFK CEng MICE
Civic Job No.	1826-01
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1. Introduction

1.1 Scope and Objectives

Civic Engineers Ltd has been appointed by Manchester City Council (MCC) to prepare a Flood Risk Assessment to support a full planning application for the redevelopment of Ancoats Green, Prussia Walkway, Jersey Green and public realm land off Jersey Street, Ancoats, Manchester.

The Flood Risk Assessment presented herein will demonstrate that the proposed development will be safe from flooding and will not pose a flood risk to sites elsewhere.

This Flood Risk Assessment will:

- Investigate all potential risks of flooding to the site.
- Consider the impact the development may have elsewhere with regards to flooding.
- Consider proposals to mitigate any potential risk of flooding determined to be present; and,
- Consider drainage proposals to mitigate flood risk from the site.

This report reviews the following information:

- Environment Agency Online Flood mapping.
- UK Government Long Term Flood Risk Information for surface water flooding and reservoir flooding.
- United Utilities Asset Location Search Sewer Map.
- Phase 1 Desk top study prepared by E3P
- Preliminary results from Phase 2 Ground Investigation undertaken by E3P.

1.2 Development Proposals

The proposed park re-development within the Ancoats Green park area offers a re-developed green space creating a multifunctional green heart to the neighbourhood which fosters a sense of community. The park provides an area with the potential to incorporate rainwater attenuation and SuDS such as rain gardens.

Due to the Jersey Green's current popularity with the community, the intention is to maintain its current layout with minimal yet impactful interventions to the green. The design proposal is to improve footpaths, additional seating opportunities, improve connection across the Rochdale canal and New Islington and Miles Platting and wildflower lawn. There will be no official drainage proposal within this area and cut and fill.

Similarly, Prussia Walkway will contain little cut and fill but to the north of the site it will contain a rain garden which will form part of the drainage system for Ancoats Green.

The Ancoats Green site covers an area of 1.08ha.

Prussia Walkway and Jersey Green sites cover an area of 0.20ha and 0.54ha respectively.

The proposed site plan is included in Appendix A.

2. Existing Site Details

2.1 Location

The proposed development sites Ancoats Green and Prussia Walkway are located in Ancoats, Manchester and lie approximately 0.5km to the northeast of Manchester City Centre. The site is bounded by Portugal Street to the north, Wadeford Close to the east, Jersey Street to the south and industrial buildings to the west.

The proposed development site Jersey Green is located further south of the other two sites with Jersey Street to the northeast and the Rochdale Canal bordering the south of the site.

Ancoats Green site area is approximately 1.08ha. The OS Grid Coordinates at the approximate centre of the site are 385220, 398947 and the nearest postcode is M4 6BZ. The site location and extents are shown in Figure 1 below. Prussia Walkway is approximately 0.20ha and the OS Grid Coordinated at the approximate centre of the site are 385258, 398838. Jersey Green is approximately 0.54ha and the OS Grid Coordinated at the approximate centre of the site are 385368, 398825.



Figure 1: Site location plan

2.2 Current and Historic Use

The Ancoats Green and Jersey Green were and are currently used as a greenspace/park area within Ancoats. Most of the existing site is soft landscaping comprising mainly grassed areas and trees of varying maturity. Hard standing areas in the site are the park public footpaths. The scheme

will include the demolition of a redundant, infilled former canal arm bridge on Jersey Street to create level access to the Prussia Walkway which links Jersey Street to Ancoats Green and to the Rochdale canal.

Prussia Walkway is currently hardstanding car park area with soft landscaping to the north of the site.

2.3 Existing Watercourses and Waterbodies.

The nearest waterbodies to the sites are the Rochdale Canal and the River Medlock. The Rochdale Canal lining the Jersey Green site to the south and the River Medlock being 856m south east of the Ancoats Green.

2.4 Existing Drainage

Plans provided by United Utilities (UU) which show the sewer network in the vicinity of the site are included in Appendix B of this report.

The records indicate the following public sewer infrastructure in the vicinity of the site:

- A 450mm x 675mm combined water sewer is located running below Wadeford Close and down into Jersey Street. The combined sewer also continues down to the south of Wadeford Close and where it sits on the west side of the Jersey Green site.
- A 450mm x 675mm combined water sewer is located running below Wadeford Close and along into Portugal Street to the north of the Ancoats Green site.
- A combined water sewer is located running along Jersey Street and runs west along the length of Jersey Street to the east of the Jersey Green site.
- The existing drainage in the park is absorption through the soft landscaping but there are several existing gullies surrounding the park. There are 3 no. existing gullies on Portugal Street which sits at the north edge of the park. 2no existing gullies are positioned on the south of the site at Wadeford Close. To the south of the Ancoats Green on Jersey Street and Mozart Close there are 3no. existing gullies.

2.5 Topography

A topographical survey was undertaken by Malcolm Hughes Chartered Surveyors in February 2022 and is contained in Appendix C of this report. The survey shows the Ancoats Green site is relatively level, varying from 50.2m in the southwest to 52.5m in the northwest of the site. The survey shows the Jersey Green site is also relatively level, varying from 51.3m in the northwest to 49.6m in the southwest of the site. Prussia Walkway levels range within 50.0m – 51.0m.

2.6 Geology

Intrusive site investigations were carried out by E3P on the week commencing 12th December 2022. The results report is found in Appendix D.

During the investigation made Ground was encountered within all exploratory hole locations from ground level to a maximum depth of 3.80 m bgl. The Made Ground was shallowest on the eastern boundary and became deeper to the west.

Made Ground encountered along the western boundary in association with the former infilled canal comprised of reworked topsoil overlying interlayered gravelly sands and reworked gravelly clay. Made Ground comprised a grey gravel was encountered overlying gravels and reworked gravelly clay. Gravels of sandstone, mudstone, slate, brick, and concrete were encountered as well as fragments of glass, ceramic, tar, ash, and clinker were also encountered throughout the Made Ground. Hydrocarbon odours and sheens were encountered between 0.50 – 3.70 m bgl in WS101 to WS104. The rest of the site (central and eastern section) encountered shallower Made Ground and generally comprised a reworked topsoil overlying a sandy gravel followed by a reworked gravelly clay. Gravels of sandstone, mudstone, limestone, brick and concrete were encountered as well as fragments of glass, ceramic, metal, timber, and plastic throughout this layer. A slight sheen was encountered within perched water in TP104. No other odours were encountered.

3. Relevant Policy and Guidance

3.1 National Planning Policy Framework

In July 2021, the Ministry of Housing, Communities and Local Government revised the National Planning Policy Framework document (NPPF) and the Planning Practice Guidance which provides guidance on how flood risk should be assessed during the planning and development process.

The NPPF refers to the Flood Zones which are shown on the Environment Agency Flood Map, and establishes the range of uses which are appropriate, or compatible, land uses for each Flood Zone.

The Flood Zones can be summarised as follows:

Zone 1: Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)

Zone 2: Medium Probability. This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

Zone 3a: High Probability. This zone comprises land assessed as having 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Zone 3b: Functional Flood Plain. This zone comprises land where water must flow or be stored in times of flood. Strategic Flood Risk Assessments should identify this zone.

Annex 3 of the National Planning Policy Framework (NPPF) 2021 defines the type and nature of different development classifications in the context of their flood risk vulnerability. The following extract below outlines the NPPF Flood Risk Vulnerability Classifications.

HIGHLY VULNERABLE

- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure'.)

MORE VULNERABLE

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

LESS VULNERABLE

- Police, ambulance and fire stations which are not required to be operational during flooding.

- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
- Car parks.

WATER-COMPATIBLE DEVELOPMENT

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

The flood risk vulnerability and flood zone 'compatibility' has been summarised in Table 1 below. The EA presents a set of recommendations based on the level of vulnerability of a proposed structure and its Flood Zone.

Table 1: Flood Risk vulnerability and Flood Zone compatibility from NPPF Technical Guide

Flood Risk Vulnerability Classification		Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone (See Table 1)	Zone 1	√	√	√	√	√
	Zone 2	√	Exception Test Required	√	√	√
	Zone 3a	Exception Test Required	×	Exception Test Required	√	√
	Zone 3b (functional floodplain)	Exception Test Required	×	×	×	√
	√ Development is appropriate × Development should not be permitted.					

3.2 Site Specific NPPF Flood Risk Categorisation

To assess the NPPF flood risk classification for the site, the Government web based 'Flood Map for Planning' is reviewed, the flood map identifies the probability of flooding from rivers or sea (not taking into account the presence of flood defences). The Government web based 'Long Term Flood Risk Assessment for Locations in England' was also used to identify the flood risks from rivers and seas, surface water and reservoirs. The Flood Map for Planning and surrounding areas is shown as figure 3 in section 4.4.

3.3 Site Specific Flood Zone Compatibility

The proposal for the development is park area which is classed as water compatible in the Flood Risk Vulnerability Classification (Table 1). From the River and Sea Flooding Map (Figure 2), it is clear to see the site sits within flood zone 1 which is compatible with the proposed development.

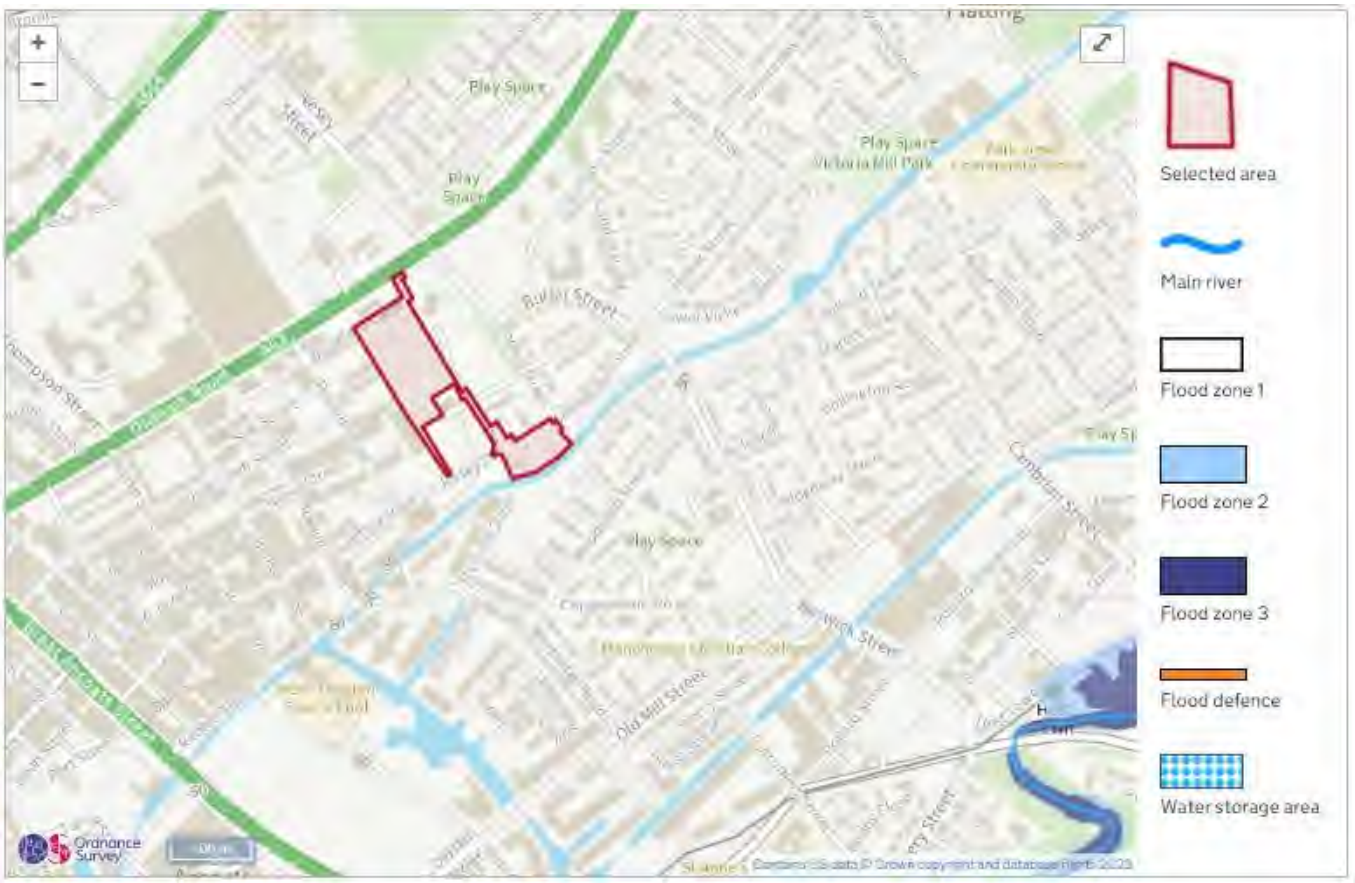


Figure 2 – Rivers and Seas Flood Map

3.4 Manchester City Council Strategic Flood Risk Assessment (SFRA) and Manchester Core Strategy 2012

Manchester City Council SFRA states:

"Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, considering climate change.

Development should be designed so that there is no flooding to the development in a 1 in 30 year event and so that there is no property flooding in a 1 in 100 year plus climate change event."

Policy EN 14 (Flood Risk) of the Manchester Core Strategy requires that:

- In line with the risk-based sequential approach contained within PPS25, development should be directed away from sites at the greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA).

- In addition to the requirements for site-specific Flood Risk Assessments (FRAs) set out in PPS25, an appropriate FRA will also be required for all development proposals, including changes of use, on sites greater than 0.5ha within Critical Drainage Areas (CDAs) and Canal Hazard Zones identified in the SFRA.

- All new development should minimise surface water run-off, including through Sustainable Drainage Systems (SuDS) and the appropriate use of Green Infrastructure.

- Developers should have regard to the surface water run-off rates in the SFRA User Guide. In CDAs, evidence to justify the surface water run-off approach / rates will be required.

- The City of Manchester contains many sections of rivers which are culverted or 'hidden'. Where these are indicated in the SFRA beneath the proposed development site, further investigation will be required and the development proposal should take this into account; where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure.

4. Flood Risk Assessment

The potential sources of flooding to the development have been assessed and are discussed below.

4.1 Tidal/ Fluvial Flooding (Rivers and Sea)

From the Government flood map for planning:

- Where a site is located in a dark blue shaded zone, this indicates that the site is within Flood Zone 3 where there is a chance of flooding of 1 in 100 (1%) or greater.
- Where a site is located in a light blue shaded zone; this indicates that the site is within Flood Zone 2 where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Where a site is located in a white (unshaded) area, it is generally deemed to be classified as Flood Zone 1 where there is a chance of flooding of less than 1 in 1000 (0.1%).

From the 'Flood Map for Planning', shown below in Figure 2, it can be seen that the proposed sites and the surrounding area are entirely located within an area classified as Flood Zone 1 (low risk of flooding from rivers or sea). For Flood Zone 1 all development is deemed to be appropriate and neither the sequential nor the exception test is required (refer to Table 1 in section 3.1, taken from Annex 3 of the NPPF).

4.2 Reservoir Flooding

Reservoir flooding is extremely unlikely to happen and there has been no recorded loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

4.3 Public Sewers, Highway Drainage Flooding and Infrastructure Failure

There are no known cases of the site flooding as a result of surcharged public sewers or highway drainage.

Providing United Utilities and Manchester City Council maintain their drainage assets in the surrounding area of the site, the risk of flooding to the proposed development site from public sewer or highway drainage is low.

4.4 Surface Water Flooding to the Site

Surface water flooding can be caused when rainwater, during extreme rainfall events, does not drain away through the normal drainage system or soak into the ground. Surcharging sewers can result in overland flows which if originating at a higher elevation than a development site can potentially pose a flood risk.

Surface water flooding is dependant primarily on topography which dictates either the flow path of overland flow which is not contained within public sewers, or areas in which ponding may occur. Surface water flooding is more difficult to predict than the risk of flooding from Rivers or Sea as it is dependent on the amount of rain which will fall in a very localised area, the specific topography of that region and the capacity and functionality of the drainage network within that section.

From the UK Government's Flood Risk from Surface Water (extent of flooding) map.

- Where a site is in a dark blue shaded zone, this indicates that the site is at high risk of flooding where there is a chance of flooding of greater than 1 in 30 (3.3%).
- Where a site is in a mid-blue shaded zone, this indicates that the site is at medium risk of flooding where there is a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).
- Where a site is in a light blue shaded zone; this indicates that the site is at low risk of flooding where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Where a site is in a white (unshaded) area; this indicates that the site is at very low risk of flooding where there is a chance of flooding of less than 1 in 1000 (0.1%).

The extent of flooding to the site from surface water is indicated in Figure 3. It shows that small portions of the site to be at risk of surface water flooding. These areas are located within the proposed Prussia Walkway section of the Ancoats Green area.



Figure 3: Surface Water Flood Risk Map

4.5 Surface Water Flooding from the Site

Developers are responsible for ensuring that new development does not increase the flood risk elsewhere. The proposed surface water drainage network shall be designed to not flood for the critical 1 in 30-year storm event and flood water generated up to the critical 1 in 100-year plus climate change storm event shall be constrained within areas on site so as not to cause damage to buildings, essential services or adjoining developments and services.

The redevelopment of the park slightly increases the amount of impermeable area within the Ancoats Green site, however, SuDS are incorporated in the design which will ensure the potential to increase flood risk to the surrounding area is low. A detailed assessment of the proposed surface flows is carried out within the drainage strategy within Section 5 of this report.

4.6 Summary of Flood Risk

From the evidence collated and subsequent negotiations, the flood risk proposed to the development can be summarised as follows:

- Rivers and Sea – Very low risk
- Reservoir – Very low Risk
- Groundwater – Medium/Low risk
- Public Sewers – Low risk
- Surface Water – High / Medium

5. Surface Water Management Strategy

5.1 Existing Site/Pre-development Runoff

The Ancoats Green site is currently a cordoned off space consisting of both hard and soft landscaping. Approximately 0.14Ha of the Ancoats Green site is covered in man-made impermeable surface, 0.94Ha is grassy areas.

The site currently drains via road gullies and infiltration through the existing grassy soft landscaping.

Pre-development run off rates have been calculated Causeway Flow software are included in Appendix E. Based on the existing site's impermeable area 0.14 hectares, the existing/predevelopment runoff rate is 16.3 l/s for the 1:1 year return period rainfall event.

5.2 Drainage Hierarchy Points of Discharge

The NPPF Planning Practice Guidance Paragraph 080 states that:

"Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

1. into the ground (infiltration).
2. to a surface water body.
3. to a surface water sewer, highway drain, or another drainage system.
4. to a combined sewer."

Infiltration Potential Sustainable Drainage Systems (SuDS) Features to be Considered

Intrusive site investigations were carried out by E3P on the week commencing 12th December 2022. Due to the cohesive deposits on site the soak away tests did not drain away, and an infiltration rate

could not be calculated. This confirms that the ground conditions are not favorable for the use of soak aways. The site investigation results report can be found in Appendix D.

Water Body

The nearest surface water body is the Rochdale Canal located approximately 105m to the south of the proposed Ancoats Green site. The proposed strategy would be to discharge into this canal, however, following discussions with the Canal & Rivers trust, we are unable to discharge into this area of canal.

Surface Water Sewer

Existing gullies are available on Portugal road, however, these are positioned at the higher level areas of site. proves to be unfeasible.

Combined Sewer

A 450mmx x 675mm combined water sewer is located running below Wadeford Close and down into Jersey Street to the east of the site. Correspondence with United Utilities (UU) to discharge into this combined sewer has been submitted and UU have agreed a discharge rate into this sewer at a rate not exceeding 5l/s.

Summary

The surface water discharge options are summarised below in Table 4.

Table 2: Summary of Surface Water Disposal

Surface Water Disposal Method	Potential	Description
Infiltration	x	Due to the cohesive deposits on site the soakway tests did not drain away and an infiltration rate could not be calculated. This confirms that the ground conditions are not favourable for the use of soakaways.
Water Body	x	The Canals and Rivers Trust have ruled out the possibility of discharging surface water to the Rochdale Canal.
Surface Water Sewer	x	No sufficient surface water sewers within reasonable proximity to the site.
Combined Water Sewer	✓	Agreed with UU a discharge at a rate no larger than 5 l/s into existing combined sewer on Wadeford Close.

5.3 Proposed Surface Water Drainage Design

As the Ancoats Green was previously developed, surface water drainage from the main development site will be restricted such that it does not exceed the pre-development run off rates, with the aim of achieving at least a 50% reduction in accordance with the recommendations as set out in the Manchester, Salford & Trafford SFRA. However, in addition to this requirement, guidance within the northwest SuDS proforma, introduces a requirement to achieve greenfield run-off rates where a site is to be developed entirely, even if classified as brownfield. The area of Prussia Walkway in the north of the site is included within the Ancoats Green drainage design.

As part of the proposals the area of soft landscaping (permeable area) will decrease, and man-made impermeable areas will increase as illustrated in Table 2 below.

Table 3: Pre-development and Post- development Impermeable Area Comparison

Phase	Description	Pre-development areas (Ha)	Post-development areas (Ha)	Increase/ Decrease (Ha)
Ancoats Green	Impermeable	0.140	0.268	+0.128
	Permeable	0.94	0.812	-0.128

In February 2016, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Table 3 demonstrates the climate change allowances with central and upper end allowances being considered.

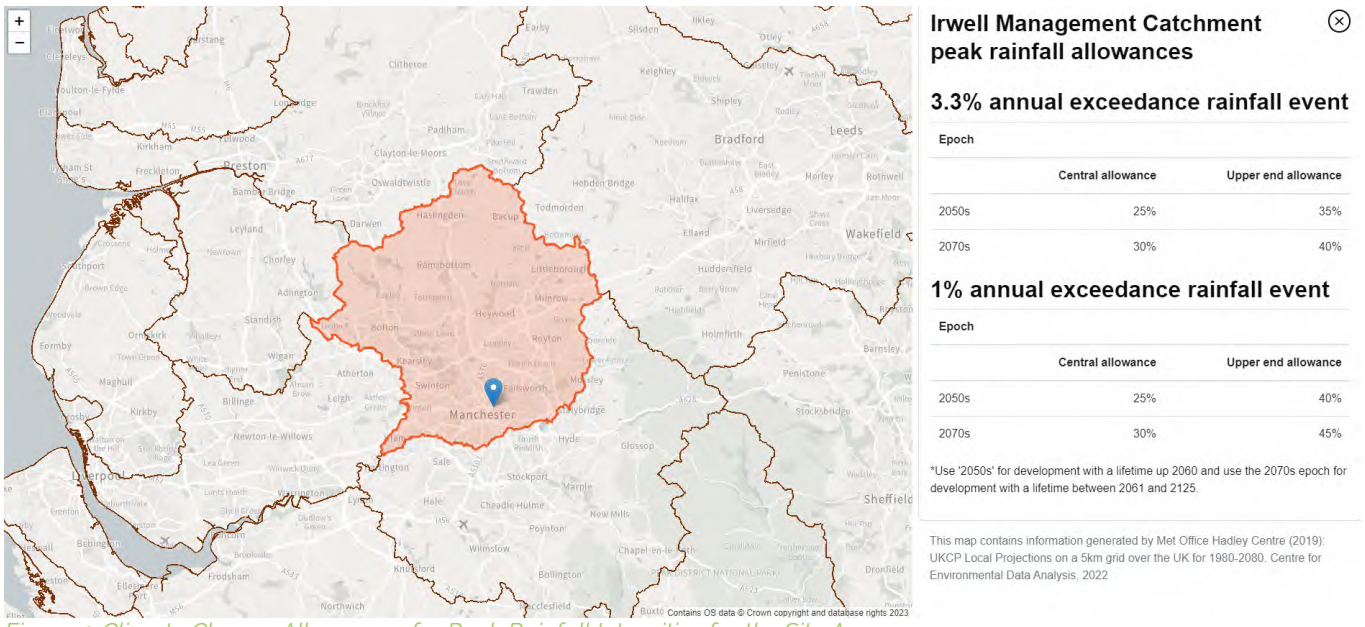


Figure 4: Climate Change Allowances for Peak Rainfall Intensities for the Site Area

Based on the nature of the development, a lifespan up to 25 years is anticipated. The potential climate change allowance for the 2050s advises:

- 25% to 35% for a 3.3% annual exceedance rainfall event;

- 25% to 40% for a 1% annual exceedance rainfall event.

As such, the design will consider an allowance of 35% climate change on peak rainfall intensity for 1:30 year return period storm and 40% for 1:100 year return period storms within the calculations.

In restricting the flows from the development site to the QBar rate there will be a requirement to provide attenuation to accommodate flows up to the critical 1 in 100-year event with a climate change allowance of 40%. The purpose of the attenuation being to maintain operation of the system during the 1 in 1yr, 1 in 30yr and the 1 in 100yr (plus climate change) storm events.

The required volume of attenuation has been calculated using Causeway Flow based on the proposed Ancoats Green development. Surface Water Calculations are included in Appendix E and propose a restricted rate of 5 l/s and an estimated required storage volume of 119.5m^3. The storage volume is required is achieved with a combination of pipes, chambers and permeable sub-bases.

The proposed drainage strategy has been developed to include SuDS features as a primary method of surface water management. Permeable paving and raingardens underlain with a sub-base material

with a 30% voids ratio has been proposed widely across the site for its at source runoff treatment and storage capability. Runoff from private highways, accesses and footpaths will be attenuated within the subbase and flows will be restricted at the end of each catchment via a flow control device.

A pre-development enquiry has been submitted to United Utilities and they have advised that evidence should be provided to discount other options for surface water discharge prior to disposal to the public sewer. Provided UU accept the evidence, surface water can be discharged into the 450mm x 675mm combined water sewer running below Wadeford Close and to the east of the site. The discharge rate should be restricted to 5l/s. This will be subject to the sewer having a suitable line and level and condition. The discharge rate will also be subject to the approval of the LLFA.A drainage strategy drawing has been produced and is included in Appendix E of this report showing the proposed drainage connection point, an indicative piped drainage network and areas of attenuation.

In order to provide a functional landscape and to provide the necessary water treatment plus amenity and biodiversity benefits it is proposed that the planters in the proposed scheme are designed as bioretention planters or raingardens which will intercept initial rainfall and will attenuate and filter run-off from more extreme events prior to discharging to the existing public sewer. Sustainable urban Drainage Systems (SuDS)

Where possible the site drainage will look to utilise SuDS features. Section 1.1 of the SuDS Manual (Ciria C753) states the following:

"Sustainable drainage systems (SuDS) can deliver multiple benefits.

Surface water is a valuable resource, and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate.

The philosophy of sustainable drainage systems is about maximising the benefits and minimising the negative impacts of surface water run-off from developed areas.

The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff causing pollution. This is achieved by harvesting, infiltrating, slowing, storing, conveying and treating runoff on site and, where possible, on the surface rather than underground. Water then becomes a much more visible and tangible part of the built environment, which can be enjoyed by everyone."

The SuDS Manual describes the four pillars of SuDS design as Water Quality, Water Quantity, Amenity and Biodiversity as illustrated in Figure 11.

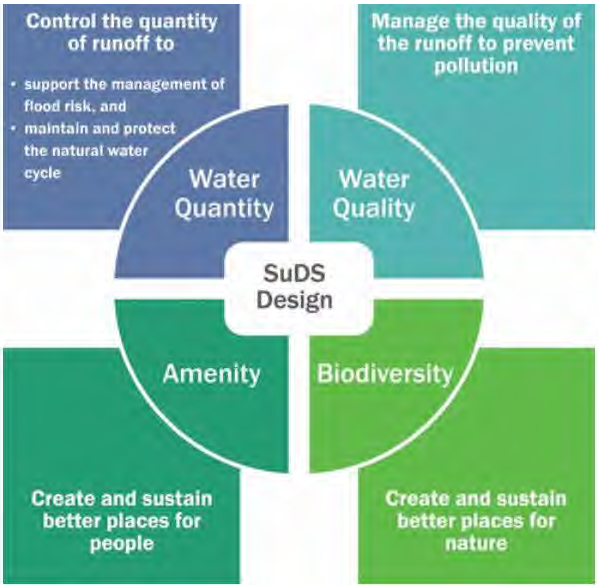


Figure 11: Sustainable Development Objectives (Representation of Figure 2.1 of the SuDS Manual)

Minimising the Impact of the Development on the Quantity of Surface Water Run-off

In order to minimise the impact of the development on existing infrastructure and to reduce the risk of downstream flooding it is important to manage the rate and volume of surface water discharge such that it does not exceed the pre-developed condition and where practicable achieves a betterment.

Surface water drainage from the built development site will be restricted such that it does not exceed the pre-development run off rates, with the aim of achieving a 50% reduction in accordance with the recommendations as set out in the Manchester, Salford & Trafford SFRA.

Where possible SuDS are to be incorporated into the post development design to provide attenuation and ensure that runoff from the site does not exceed predevelopment runoff rates.

Varied SuDS methods have been summarised in the table below to assess and establish which are most feasible for the proposed post development site.

Table 4: SuDS Suitability Assessment – Ancoats Green

SuDS Method	Feasibility, Given Site and Project
Green & Blue Roofs	There are no buildings located on site and therefore this method is not available to this project.
Basins and Ponds – Above Ground storage	Basins and ponds increase biodiversity and amenity of the area; provide attenuation; and improve water quality. This method does occupy large areas of developable land and needs to be constructed at the lower levels of the site. Due to the proposed layout, dry basins and ponds have been excluded from the proposals.

Filter Strips, Swales and Raingardens	Filter strips, swales and raingardens can be used within private or public areas to reduce and treat runoff. Raingardens are recommended where possible for runoff treatment and storage volume. Rain gardens are included within the drainage strategy for the project.
Permeable Paving	Permeable paving provides at source runoff treatment and surface water storage when combined with a voided aggregate. Permeable paving with a 30% voids aggregate is proposed within the site within public and private footpaths.
Infiltration Devices	Infiltration isn't possible within this site.
Tanked/Geocellular Attenuation systems	Tanked/geocellular attenuation systems provide high storage capacity and can be incorporated within road pavements and under landscaping. Geocellular storage structures aren't proposed on this site as storage is provided by the permeable paving and raingardens.

Minimising the Impact of the Development on the Quality of Surface Water Run-off

To protect the water quality of receiving surface waters and groundwaters effectively, run off discharged from the site should be of an acceptable water quality.

The surface water run-off from the site will predominantly be from areas which will be subject to occasional vehicular and pedestrian traffic and would be classified as having a low "pollution hazard level" in Table 4.3 of the SuDS Manual and as such a "simple index approach" to treatment should be adopted. The raingardens incorporated into the proposed drainage strategy should sufficiently treat the pollutants from the surrounding area. Table 26.2 of the SuDS Manual describes the "pollution hazard indices" for different land use classes and Figure 12 below is an excerpt from that table that relates to the proposed scheme.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

Figure 12 :Excerpt of SuDS Manual Table 26.2 Pollution hazard indices for different use classes

Table 26.3 (represented in Figure 13 below) illustrates the "indicative SuDS mitigation indices for discharge to surface waters" and can be used to inform the SuDS strategy at the site.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Figure 13: Representation of SuDS Manual Table 26.3 SuDS mitigation indices (for notes refer to source material)

Maximise Amenity and Biodiversity Opportunities

Improvements to the area and new areas of soft landscape and planting, including SuDS, will provide significant opportunities for improved amenity and enhanced biodiversity.

6. Proposed Foul Water Drainage

There is no foul water discharge proposed for the site.

7. Conclusion

The proposed development is located within Flood Zone 1 and is considered "water compatible" as such is appropriate for development in the Flood Zone.

Flood risk from all sources has been considered and it shows that various small portions of the site to be at low risk of surface water flooding.

Surface Water discharge for the Ancoats Green development will be limited to greenfield run-off rates for the equivalent site area at 5 l/s. Attenuation will be provided for a 1 in 100-year storm event including a 40% climate change allowance. Where possible SuDS will be incorporated to further improve the water quality and encourage infiltration.

As per the pre-development enquiry response from United Utilities, surface water will likely be discharged into an existing combined sewer located on Wadeford Close.

With incorporation of the proposed mitigation measures, as described above, the proposed development will comply with National and Local Planning Policy. The surface water connection and discharge rate will also be subject to agreement with the LLFA.

There will be no official drainage proposal and cut and fill within the Jersey Green area. Similarly, Prussia Walkway will contain little cut and fill but to the north of the site it will contain a rain garden which will form part of the drainage system for Ancoats Green.

Appendix A: Proposed Site Plan

HATCHED AREAS INDICATE LEVELS TO REMAINING AS EXISTING. THIS IS TO AVOID DAMAGING THE ROOTS OF THE EXISTING TREES TO REMAIN.

LEVELS TIED INTO EXISTING LEVELS OF THE BACK OF THE PARK AND FOOTPATH (WADEFORD CLOSE) INTERFACE.

BOUNDARY TIE INTO EXISTING LEVELS

MOUND FORMED FROM SURPLUS CUT MATERIAL FROM THE SITE EARTHWORKS. PROPOSED PLATO LEVEL 52.350m

EARTHBANK FORMED TO PROVIDE ACCESSIBLE ROUTE TO UPPER LEVEL OF TOWER.

REINFORCED AREA IN THE PARK TO ALLOW FOR FOOTPATH ACCESS ONTO CLIMBING TOWER. PLEASE REFER TO PLANIT DRAWING 2895-PLA-XX-XX-DR-L-7005 FOR FURTHER DETAILS.

STANDARD NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATIONS.
2. THIS DRAWING SHOULD NOT BE SCALED.
3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.
4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.A./E.A. PRIOR TO THE COMMENCEMENT OF WORKS.

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KEY

- RED LINE BOUNDARY
- 51.224m — PROPOSED LEVEL
- 1:60 — SURFACE GRADIENT
- AREA TO REMAIN AT EXISTING LEVELS
- MAJOR CONTOUR 0.5m INTERVALS
- MINOR CONTOUR 0.1m INTERVALS

THIRD PARTY INFORMATION REFERENCED IN THIS DRAWING INCLUDES

TOPOGRAPHICAL SURVEY DATED FEBRUARY 2022 UNDERTAKEN BY MALCOLM HUGHES CHARTERED LAND SURVEYORS

ORDNANCE SURVEY BACKGROUND SUPPLIED BY AECOM RECEIVED 21.06.2021

UTILITY SURVEY RECEIVED SUPPLIED BY CORNERSTONE PROJECTS RECEIVED 04.01.2022

CIVIC ENGINEERS DO NOT GUARANTEE THE ACCURACY OF THESE FILES AND WOULD RECOMMEND SITE VERIFICATION PRIOR TO THE COMMENCEMENT OF CONSTRUCTION PHASE.

DATE	REV	DESCRIPTION	DRAWN	CHKD
30.01.23	P02	RED LINE BOUNDARY UPDATED	BW	CK
16.12.22	P01	FOR INFORMATION	BW	CK

MANCHESTER Carver's Warehouse, 77 Dale Street, Manchester, M1 2HG. Tel: 0161 228 6773
LONDON Reeds Wharf, 33 Mill Street, London SE1 2AX. Tel: 020 7253 2977
LEEDS Tower Works, Unit D2.01, Globe Road, Leeds, LS11 5QG. Tel: 0113 2025 130
GLASGOW Gresham Chambers, 45 West Nile St, Glasgow, G1 2PT. Tel: 0141 370 1829
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PROJECT

POLAND STREET ZONE

TITLE

ANCOATS GREEN
PROPOSED LEVELS SHEET 1

DRAWING STATUS: FOR INFORMATION — STATUS CODE: -

CE PROJECT No.	SCALE @ A1	DATE CREATED	DRAWN	CHECKED
1826-01	1:200	DEC'22	BW	CK

DRAWING No.: 1826-01-CIV-XX-XX-D-C-20001 — REV: P02

EARTHBANK FORMED TO PROVIDE ACCESSIBLE ROUTE TO UPPER LEVEL OF TOWER.

REINFORCED AREA IN THE PARK TO ALLOW FOR FOOTPATH ACCESS ONTO CLIMBING TOWER. PLEASE REFER TO PLANIT DRAWING 2895-PLA-XX-XX-DR-L-7005 FOR FURTHER DETAILS.

LANDSCAPE MOUNDS

RAISED WALKWAY

HATCHED AREAS INDICATE LEVELS TO REMAIN AS EXISTING. THIS IS TO AVOID DAMAGING THE ROOTS OF THE EXISTING RETAINED TREES.

MOUNDS FORMED FROM SURPLUS CUT MATERIAL FROM THE SITE EARTHWORKS.

BOUNDARY TIE INTO EXISTING LEVELS

51.802m

HARRIETT STREET

Poland Street

Industrial Estate

City Court

STANDARD NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATIONS.
2. THIS DRAWING SHOULD NOT BE SCALED.
3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.
4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.A./E.A. PRIOR TO THE COMMENCEMENT OF WORKS.

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KEY

- RED LINE BOUNDARY
- 51.224m — PROPOSED LEVEL
- 1:60 — SURFACE GRADIENT
- AREA TO REMAIN AT EXISTING LEVELS
- MAJOR CONTOUR 0.5m INTERVALS
- MINOR CONTOUR 0.1m INTERVALS

THIRD PARTY INFORMATION REFERENCED IN THIS DRAWING INCLUDES

TOPOGRAPHICAL SURVEY DATED FEBRUARY 2022 UNDERTAKEN BY MALCOLM HUGHES CHARTERED LAND SURVEYORS

ORDNANCE SURVEY BACKGROUND SUPPLIED BY AECOM RECEIVED 21.06.2021

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DATE	REV	DESCRIPTION	DRAWN	CHKD
30.01.23	P02	RED LINE BOUNDARY UPDATED	BW	CK
16.12.22	P01	FOR INFORMATION	BW	CK

MANCHESTER Carver's Warehouse, 77 Dale Street, Manchester, M1 2HG. Tel: 0161 228 6717
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GLASGOW Grosvenor Chambers, 45 West Nile St, Glasgow, G1 2PT. Tel: 0141 370 1829
www.civicengineers.com

PROJECT
POLAND STREET ZONE

TITLE
ANCOATS GREEN
PROPOSED LEVELS SHEET 2

DRAWING STATUS: FOR INFORMATION
STATUS CODE: -

CE PROJECT No.	SCALE @ A1	DATE CREATED	DRAWN	CHECKED
1826-01	1:200	DEC'22	BW	CK

DRAWING No.: 1826-01-CIV-XX-XX-D-C-20002
REV: P02

Appendix B: Existing Drainage Plan



Standard Notes

1. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.
2. This drawing should not be scaled.
3. All dimensions are to be verified by the contractor on site.
4. All discrepancies should be reported to the C.A. prior to the commencement of the works.

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Notes and Keys

Line	Key
	EXTENT OF WORKS BOUNDARY
	GAS
	WATER
— WA— WA— WA— WA—	WATER ABANDONED
— WP— WP— WP— WP—	WATER PROPOSED
— SS — SS — SS — SS —	SURFACE SEWER
	FOUL SEWER
— — — — —	COMBINED SEWER
— SA — SA — SA — SA —	ABANDONED SEWER
	BT
— BTO — BTO — BTO —	BT OVERHEAD
— BTP— BTP— BTP— BTP—	BT PLANNED
	ELECTRICITY
	VODAFONE
	VIRGIN
	SKY
— CF — CF — CF — CF —	CITY FIBRE
	EU NETWORKS
	ZAYO
— ITM — ITM — ITM —	INSTALCOM
ESP-G — ESP-G —	ESP GAS

THIRD PARTY INFORMATION REFERENCED IN THIS DRAWING INCLUDES

TOPOGRAPHICAL SURVEY DATED FEBRUARY 2022 UNDERTAKEN BY MALCOLM HUGHES CHARTERED LAND SURVEYORS

ORDNANCE SURVEY BACKGROUND SUPPLIED BY AECOM RECEIVED 21.06.2021

PARK LAYOUT MASTERPLAN SUPPLIED BY PLANIT RECIEVED 29.11.22

UTILITY SURVEY RECEIVED SUPPLIED BY CORNERSTONE PROJECTS RECEIVED 04.01.2022

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Date	Rev	Description	Drawn	Chkd
16.12.22	P01	FOR INFORMATION	BW	CK

MANCHESTER Carver's Warehouse, 77 Dale Street, Manchester, M1 2HG. Tel: 0161 228 6757
LONDON Reeds Wharf, 33 Mill Street, London SE1 2AX. Tel: 020 7253 2977
LEEDS Tower Works, Unit 02-01, Globe Road, Leeds, LS11 5QG. Tel: 0113 2025 130
GLASGOW Gresham Chambers, 45 West Nile St, Glasgow, G1 2PT. Tel: 0141 370 1829
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Project
POLAND STREET ZONE

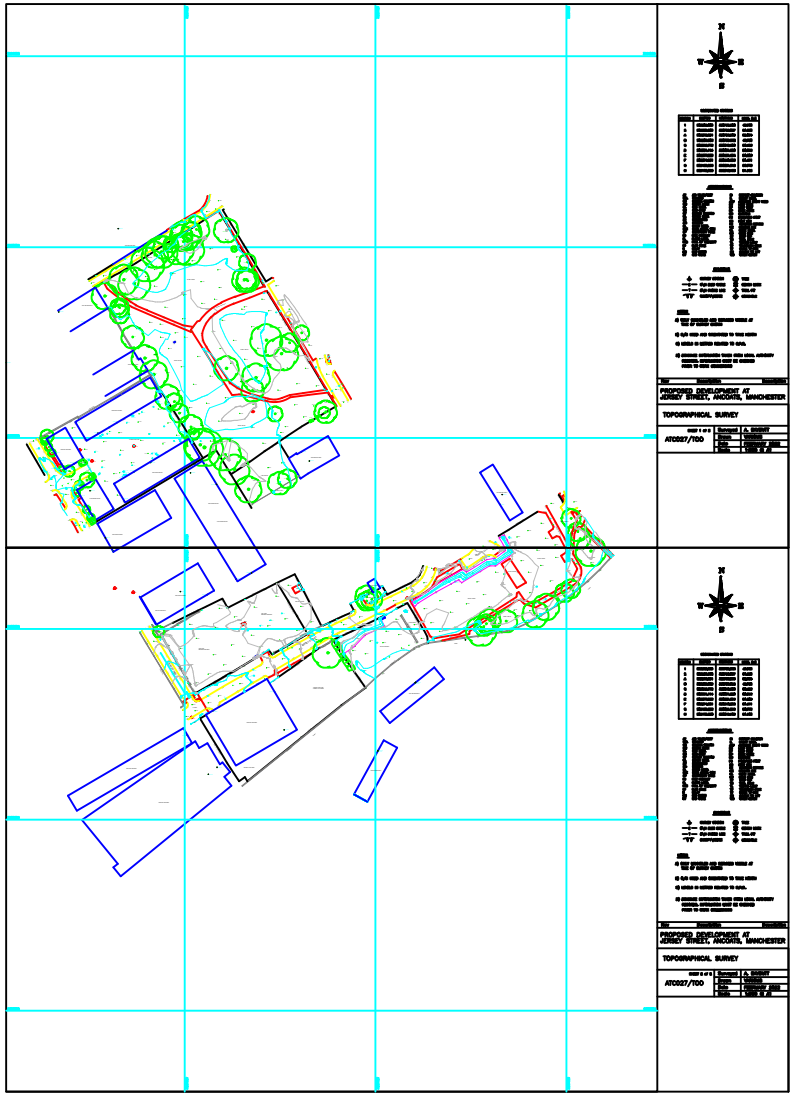
Title
EXISTING UTILITIES PLAN
ANCOATS GREEN

Status
FOR INFORMATION

Scale @ A1	Date Created	Drawn	Checked
1:500	DEC'22	BW	CK

Project Number	Originator	Discipline	Drawing Number	Revision
1826-01	CIVIC	C	10002	P01

Appendix C: Topographical Survey



PROPOSED DEVELOPMENT AT
JERSEY STREET, ANCOATS, MANCHESTER

TOPOGRAPHICAL SURVEY

ATC027/TOO

PROPOSED DEVELOPMENT AT
JERSEY STREET, ANCOATS, MANCHESTER

TOPOGRAPHICAL SURVEY

ATC027/TOO

Phase II Geoenvironmental Site Assessment
Ancoats Green, Jersey Green and Prussia Street Arm Greenway Public Realm Improvements

Reference:15-798-R2-1
Date: January 2023

PHASE II GEOENVIRONMENTAL SITE ASSESSMENT

Ancoats Green, Jersey Green and Prussia Street Arm Greenway Public Realm Improvements
Ancoats
Manchester
M4 6JW

Prepared for:

Civic Engineers

Report Ref: 15-798-r1
Date Issued: January 2023

E3P

Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

+ 44 (0) 161 707 9612
https://e3p.co.uk

Registered in England
CRN: 08725262

QUALITY ASSURANCE

PROJECT NUMBER	15-798		
VERSION	Version 1		
REMARKS	Draft for comment		
DATE	January 2023		
PREPARED BY	H Mason		
QUALIFICATIONS	BSc (Hons), FGS		
CHECKED BY	P Winstanley		
QUALIFICATIONS	MGeol, FGS		
AUTHORISED BY	M. Dyer		
QUALIFICATIONS	BSc(Hons), FGS, AIEMA, MIEnvSc, CEnv		

EXECUTIVE SUMMARY

Site Address	Poland Street Zone area - with specific focus on 3 character areas - Ancoats Green, Jersey Green and Prussia Street Arm Greenway, Ancoats, Manchester
Grid Reference	E 385241 N 398913
Site Area	1.81 Ha.
Proposed Development	E3P understands that Civic Engineers are instructing works on behalf of Manchester City Council. The application site is bounded by Portugal Street to the north, Wadeford Close to the east, and the Rochdale Canal to the south in Ancoats, Manchester. The proposals involve City Council improvements to the public realm within the Poland Street Zone as defined by the Poland Street Zone NDF and the Poland Street Zone Public Realm Strategy.
Current Site Use	The Site comprises three 'character areas': **Ancoats Green**: The northern portion of the Site currently consists of Ancoats Green which comprises lawn and trees, and a series of paths which link Portugal Street and Wadeford Close. The northern and western boundaries of Ancoats Green benefit from a series of mature trees which create a sense of enclosure. Currently, Ancoats Green is partially fenced to the north along Portugal Street and east in front of Tribe residences. **Prussia Street Arm Greenway**: The centre of the Site currently contains the historic infilled Prussia Street canal arm, which crosses under the original stone bridge on Jersey Street. An application was made in April 2022 for the re-levelling of the bridge and removal of the black poplar tree as part of the wider public realm initiatives in the Poland Street Neighbourhood Development Framework (NDF) area (application ref. 133406/VO/2022). **Jersey Green**: Land at the southeast of the Site is Jersey Green which is situated to the east of the Jersey Wharf Site which was granted approval in January 2022 (application ref: 133769/FO/2022). To the west of the Site also lies two other previously approved schemes the Ancoats Mobility Hub approved July 2021 (application ref: 130627/FO/2021) and Eliza Yard approved July 2021 (application ref: 130354/FO/2021). This area was not investigated as the proposed works are non-intrusive, mainly redressing.
Site History	**Ancoats Green** From the earliest mapping (1848) the site is mainly open greenspace with structures in the north and east. The canal arm is clearly noted along the western boundary and continuing north terminating at Oldham Road. By 1891 much of the site is developed leaving green space in the north. Prussia street is now marked along the eastern boundary. By 1905 the site is mostly unchanged however the canal arm is no longer marked and presumed infilled. The space in the north is later marked as a recreation ground. By 1966 signs of demolition are apparent with structures no longer marked in the center of the site. Remaining buildings in the south were demolished to slab level post 2005 and the area has been utilised as car parking since. **Prussia Street Arm Greenway** Prussia street is originally unnamed until 1891 and is later renamed Kemp Street from circa 1931. Redevelopment to the north east in part closes kemp street and utilises the jersey street name as a continuation from the south.

<table>
<tr><td>Site History</td><td colspan="2">Jersey Green
Jersey green has been the location of an industrial unit from the earliest mapping until 1966 when it was redeveloped into a residential building which remains to present day.

Jersey Street
No significant changes to Jersey Street have occurred since the earliest historical mapping records, with the jersey street bridge infilled circa 1955. From 1948, Jersey Street comprises the main carriageway running east-west with adjacent pavements. The Rochdale Canal runs parallel to the south of the road. The Jersey Street area is surrounded by significant industrial development, including the sheet metal works to the south-east, ironworks to the north-west and the waste paper factory to the south-west. Terraced residential housing is present to the east of jersey street. By 1963, significant further industrial development occurred surrounding jersey street occurs, surrounded by several various works and factories. By 2003, the majority of structures surrounding Jersey Street had been demolished and repurposed as car parking.</td></tr>
<tr><td rowspan="6">Environmental Setting</td><td>Drift Geology</td><td>Devensian Till - Diamicton</td></tr>
<tr><td>Bedrock Geology</td><td>Manchester Marls Formation – MUDSTONE

Collyhurst Sandstone Formation – SANDSTONE

Chester Sandstone Formation - SANDSTONE</td></tr>
<tr><td>Faults</td><td>A geological fault trending northwest-southeast runs cuts through the site in the northern section.</td></tr>
<tr><td>Hydrogeology</td><td>Principal and Secondary B bedrock aquifer with a Secondary Undifferentiated superficial aquifer recorded. No active or historical abstraction points are located within 1 km of the site.</td></tr>
<tr><td>Hydrology</td><td>The nearest surface water feature is the Rochdale Canal, located adjacent to the southern boundary of the site. Due to the local topography, any shallow groundwater if present will likely flow in a south-easterly direction towards the canal.</td></tr>
<tr><td>Flood Risk</td><td>Unaffected by flooding from rivers.</td></tr>
<tr><td>Natural Landform and Geomorphology</td><td colspan="2">A review of relevant records indicates that the site has been subject to significant anthropogenic changes, including the construction of the Rochdale Canal. The site, therefore, indicates only minor undulations in topography, with most of the wider site levelled for development platforms. Across Jersey Street, a gradual slope is present up to the Jersey Street Bridge from the west, with a gradual fall past the bridge to the east.</td></tr>
<tr><td>Utility Locations</td><td colspan="2">• A Low pressure (LP) gas main is present within the site boundary along Jersey Street to the south and Harriet Street to the east outside the site boundary. LP mains also branch from Poland Street into the industrial park that borders the east of the site.
• A Low Voltage (LV) main is present on site and branches across Ancoats Green from the northeast, and a second LV cable runs along Wadeford Close which borders the site to the east. LV mains also branch from Poland Street into the industrial park that borders the east of the site.</td></tr>
</table>

	• An LV and 6kv main run along Portugal Street, bordering the site to the north. A 33KV main, a 6Kv-6.6 Kv main and an LV main run along Jersey Street. The LV and 6Kv main branch to the North across Jersey Street. • Water mains run along Portugal Street to the north, Wadeford Close to the east, Harriet Street to the east and Jersey Steet (on-site to the south). • Sewer mains run along Portugal Street to the north, Wadeford Close to the east, Harriet Street to the east and Jersey Steet (on-site to the south). • Overhead BT enters Ancoats Green to the southwest from Harriet Street. BT runs along Jersey Street to the southeast of the site. • Overhead BT also runs along Portugal Street to the north of the site (outside the site boundary). • BT borders the north east corner of the site.
Landfill Sites and Ground Gases	No landfill sites (current or historic) are located within 250 m of the site. The site has undergone some historic development and ground working, the Made Ground associated with the historic development may produce hazardous ground gases such as methane and carbon dioxide.
Radon	Unaffected – no special precautions required.
Coal Mining/Land Stability	It has been deemed by E3P that the site is at low risk of shallow coal mining beneath the site, and no further assessment is required.
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential dwellings have been identified within influencing distance of the subject site.
Initial Conceptual Site Model	**Sources - Jersey Green** • Made Ground associated with multiple phases of development. Borehole data suggests an average of 2.50 m of Made Ground across the site - Heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), sulphates, Asbestos Containing Materials (ACM), TPHs and ground gas (carbon dioxide and methane). • Made Ground and possible organic peat deposits associated with infilling of historical canal features. Heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), TPHs, Volatile contaminants, sulphates, Asbestos Containing Materials (ACM) and potential for ground gas (carbon dioxide and methane). • Electricity Substations - Polychlorinated Biphenyls (PCBs) - Multiple have been identified across the site. **Source - Poland Street Zone Area** • Multiple Mill Buildings – Cotton Industry - Ground gases (carbon dioxide and methane). • Volatile Contaminants associated with localised fuel spillages in the car parks within the site - Hydrocarbons, solvents. • Iron Works - Metals and Metalloids (Iron, Manganese, Aluminium, Arsenic, Nickel, Chromium, Vanadium, etc), Inorganic compounds (Phosphates, sulphates, sodium, cyanide, sulphides, etc), Acids,

	Alkalis, Organic compounds (fuels and oils, tar, PAH, Phenols), and Solvents. - Flint Glass Works - Heavy metals (Lead and Lead oxides). **Pathways** The identified plausible pathways are dermal contact and ingestion, inhalation, accumulation, vertical and lateral migration and corrosion of subsurface concrete. **Receptors** Construction workers and proposed end users have been identified as critical human health receptors while the underlying principal bedrock aquifer, secondary undifferentiated superficial and off-site surface water features have been identified as controlled waters receptors. There is a potential for sulphate attack on subsurface concrete foundations.

GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising: - 7 x mechanically excavated trial pits, - 6 x window sample boreholes, - 4 x In-situ California bearing ratio (CBR), - 3 x BRE365 Soakaways - Construction of environmental monitoring installations.
Ground Conditions	Made Ground was encountered within all exploratory hole locations from ground level to a maximum depth of 3.80 m bgl. The Made Ground was shallowest on the eastern boundary and became deeper to the west. The deepest Made Ground was encountered along the western boundary, likely associated with the former canal. The base of Made Ground could not be proven within WS105, TP103, and TP104 due to obstructions. Made Ground encountered along the western boundary in association with the former infilled canal (WS101, WS102, WS103, WS104, and WS106) comprised of reworked topsoil overlying interlayered gravelly sands and reworked gravelly clay. In WS105, also located along the western boundary, Made Ground comprised a grey gravel was encountered overlying gravels and reworked gravelly clay. Gravels of sandstone, mudstone, slate, brick, and concrete were encountered as well as fragments of glass, ceramic, tar, ash, and clinker were also encountered throughout the Made Ground. Hydrocarbon odours and sheens were encountered between 0.50 – 3.70 m bgl in WS101 to WS104. The rest of the site (central and eastern section) encountered shallower Made Ground and generally comprised a reworked topsoil overlying a sandy gravel followed by a reworked gravelly clay. Gravels of sandstone, mudstone, limestone, brick and concrete were encountered as well as fragments of glass, ceramic, metal, timber, and plastic throughout this layer. A slight sheen was encountered within perched water in TP104. No other odours were encountered. **Road Cores** All four road cores completed along Jersey street to the south of the site comprise a layer of asphalt from 0.00 – 0.20 m bgl.

Controlled Waters	The controlled waters assessment has identified elevated heavy metals, PAH and TPHs within the leachate and water samples taken from the site. The primary receptors are identified as the canal to the south and the underlying principal aquifer. The site is not located within a Groundwater Source protection zone and there are no abstraction points within 1km of the site, reducing the sensitivity of the receptor. Due to the exceedances of hydrocarbons noted in the soil, leachate and water samples, the risk to controlled waters is considered to be moderate. The identified contamination is likely associated with the infilled canal which is in conductivity with the surface water network. It is recommended that further sampling is undertaken to inform a detailed controlled waters risk assessment to further assess the risk. Further groundwater sampling will be required.
Ground Gas	No significantly elevated levels of ground gas have been recorded, and Gas monitoring to date shows the site to be CS1. Sources of ground gases are likely in association with the infilled canal and deep Made Ground, however, due to the variability of the soils risk of significant gassing will likely vary. The Made Ground is predominantly underlain by low-permeability cohesive deposits (Glacial Till) at depths between 1.00 m bgl and in excess of 5.45 m bgl. In the first instance, further ground gas monitoring is recommended due to exceedances of volatile contamination identified within the site investigation, soil and water samples, as well as to fully characterise the risk of ground gas generation over representative conditions.
Potable Water Infrastructure	Based on the assessment of current site conditions, it is likely that a barrier pipe will be required at the proposed development. This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.

GEOTECHNICAL ASSESSMENT

Underground Obstructions & Hazards	Significant concrete and brick obstructions have been encountered within the Made Ground, indicative of relic foundations from the former buildings. The infilled canal will comprise deleterious materials which are likely to be geotechnically and chemically unsuitable. It is also understood that relict drainage infrastructure allows a flow of water into the infilled canal. Further detailed site investigation is required comprising a series of trial trenching to further understand the ground conditions and nature of infilled material within the infilled canal. During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.
Allowable Bearing Pressure	Stiff CLAY identified between 4.00 – 5.00 m bgl has been assessed as having a net allowable bearing pressure (ABP) of 121 – 136 kN/m^2. Very stiff CLAY identified between 4.00 – 5.00 m bgl has been assessed as having a net ABP of 156 – 191 kN/m^2.

Foundation Options	Foundation depths should take account of the presence of existing and proposed trees, with foundations deepened locally to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards. It is recommended that at working drawing stage a foundation schedule is prepared for the development, taking account of the physical change of natural clay soils and the current/proposed locations of trees. At this time it is not possible to accurately define the foundation types due to the absence of a formal proposed development plan, however, due to the likely high rise developments a piled solution is likely required. The use of driven piles may be limited due to the encountered obstructions on site. A specialist piling contractor should be contacted concerning the selection of the appropriate pile design and construction method. Any piling works undertaken from existing ground levels will require a suitable piling mat/platform constructed in accordance with BRE Report 470 (2004).
Building Floor Slabs	Ground-bearing floor slabs are unlikely to be viable given the anticipated depths or reworked Made Ground > 600 mm and shallow cohesive soils.
Heave Precautions	Given that the underlying clay is of low to medium volume change potential, heave precautions will be required for the internal face of a foundation less than 1.5 m in depth. Heave precautions will be required to the underside of floor slabs (where there is no 200 mm void) and pile ground beams are required within the modelled influencing distance of trees.
Soakaway Drainage	The Made Ground and underlying granular soils are cohesive in nature and impacted by low-level inorganic and hydrocarbon compounds which would preclude the use of infiltration drainage systems.
Sulphate Assessment	The concrete classification will be DS1 AC1s. Elevated sulphate concentrations meeting Class DS-2, AC-1s were noted within the Made Ground deposits in WS102 and in WS105 it met DS-3, AC-1s also within Made Ground deposits at 1.20 m bgl.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favourable climatic conditions. Natural clay soils will provide a CBR in the order of 3–5% during drier climatic periods. However, if water is allowed to shed onto the formation, the CBR will reduce to < 2%, which will require specialist engineering of the subgrade.
Cut/Fill	Development levels are unknown at this time; however, some cut-and-fill work will be required to prepare the development platform.
Civil Engineering Excavations	The E3P Intrusive Ground Investigation has identified soft CLAYS within SA102 and TP105.
Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: *Waste Classification – Guidance on the classification and assessment of waste*.

RECOMMENDATIONS

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

- Detailed Vapour Risk Assessment to characterise the risk from encountered site-wide hydrocarbon contamination.
- Further site investigation (trial/slit trenching) of the infilled canal.
- Further groundwater sampling to form a detailed controlled waters risk assessment.
- Plot-specific foundation schedule (upon receipt of the final development levels).
- Arboricultural survey.
- Settlement Analysis for earthworks design.
- Geotechnical earthworks strategy (infrastructure).
- Remediation and enabling works strategy.

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DRAWING LIST

15-798-001 - Site Location Plan
15-798-003 - Historical Features Plan
15-798-004 - Site Features Plan
15-798-005 - Exploratory Hole Location Plan
15-798-006 - Depth of Made Ground Plan
15-798-008 - Depth to Founding Strata Plan
15-798-010 - Conceptual Site Model
15-798-010 - Conceptual Site Model (Controlled Waters)
15-798-015 - Development Constraints Plan
15-798-018 - Contamination Issues Plan
15-798-018 - Contamination Exceedance Plan (Controlled Waters)

1. INTRODUCTION

1.1. BACKGROUND

E3P Ltd has been commissioned by Civic Engineers on behalf of Manchester City Council to undertake a Phase II Geoenvironmental Site Assessment of Ancoats Green, Jersey Green and Prussia Street Arm Greenway and associated Public Realm Improvements, which will herein be referred to as the 'Poland Street Zone area'. Specific interest is paid to an area of Jersey Street including the Jersey Street Bridge and further road sections East and West.

This report is required to determine potential contaminated land liabilities and geotechnical constraints as part of potential future site redevelopment.

1.2. PROPOSED DEVELOPMENT

E3P understands that Civic Engineers are instructing works on behalf of Manchester City Council. The application site is bounded by Portugal Street to the north, Wadeford Close to the east, and the Rochdale Canal to the south in Ancoats, Manchester.

The proposals involve City Council improvements to the public realm within the Poland Street Zone as defined by the Poland Street Zone NDF and the Poland Street Zone Public Realm Strategy.

1.3. OBJECTIVES

The objectives of the geoenvironmental assessment are as follows:

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

1.4. SCOPE OF WORKS

The scope of work includes the following elements:

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

1.5. LIMITATIONS

The limitations of this report are presented in Appendix I.

1.6. CONFIDENTIALITY

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

2. GROUND INVESTIGATION

2.1. GENERAL OVERVIEW

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

An initial phase of exploratory fieldwork was completed on the 26th of July 2022, and further investigation was completed on 13th of December 2022. The works are summarised in Table 2.1.

2.2. SCOPE OF INVESTIGATION

TABLE 2.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
Investigation along the historic infilled canal (Western boundary)	WS101	Window Sample Probehole	5.45	0.50 – 3.00
	WS102		5.45	0.50 – 3.00
	WS103		5.45	1.00 – 3.50
	WS104		5.45	0.50 – 3.50
	WS105		1.50	0.50 – 1.50
	WS106		5.45	1.00 – 3.00
Historical housing (Central east)	TP101	Mechanically Excavated Trial Pit	2.20	N/A
	TP102		2.20	
Former Recreation Ground (North of site)	TP103		1.00	
	TP104		2.40	
General Ground Conditions Including the Presence/Nature of Obstructions	TP105		3.00	
Former Wharf (Central West)	TP106		2.40	
	TP107		1.90	
Investigation of Jersey Street (South)	RC01 – RC04	Road Core	0.70	N/A
BRE 365 Soakaway Testing	SA101 - SA103	Mechanically Excavated Trial Pit	2.40	N/A

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

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

Road cores were advanced to investigate the road arisings to the south.

The sampling locations are illustrated in Drawing 15-798-004 (Appendix III). The ground conditions encountered are indicated on the logs, which are provided in Appendix V.

Return visits were made to monitor installations for groundwater level and gas concentrations. In addition, selected wells were purged and samples of groundwater were recovered for chemical analysis.

2.3. IN-SITU STANDARD PENETRATION TESTING (SPT)

In-situ geotechnical testing was conducted using the standard penetration test (SPT) and, where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix IV and presented in Table 3.5 and discussed in Section 3.

2.4. IN-SITU CALIFORNIA BEARING RATIO (CBR)

The California bearing ratio (CBR) for the soils was measured by Plate Load Test. The tests were carried out at 0.40 m bgl within the Made Ground following the excavation of the reworked topsoil material. The results are summarised in Table 3.10.

2.5. PERMEABILITY TESTS

Three in-situ BRE 365 Soakaway tests were undertaken over a 48 hour period within trial pits completed as SA101 – SA103. The results are presented in Table 3.8 and the test certificates are included within Appendix IX.

2.6. LABORATORY ANALYSIS

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

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

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

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

- Atterberg limits determinations; and
- Particle Size Distributions

Laboratory analysis sheets are included in Appendix VIII and are summarised in Section 5.

3. GROUND AND GROUNDWATER CONDITIONS

3.1. SUMMARY OF GROUND CONDITIONS

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

TABLE 3.1 SUMMARY OF STRATA

HOLE	DEPTH TO STRATUM (m bgl)			
	MADE GROUND	STIFF CLAY	FIRM CLAY	SOFT CLAY
WS101	0.00 – 3.80	3.80 – 5.45	-	-
WS102	0.00 – 3.70	3.70 – 5.45	-	-
WS103	0.00 – 3.70	3.70 – 5.45	-	-
WS104	0.00 – 3.70	3.70 – 5.45	-	-
WS105	0.00 – 1.50*	-	-	-
WS106	0.00 – 3.30	3.30 – 4.00	-	-
TP101	0.00 – 1.10	-	1.10 – 2.20	-
TP102	0.00 – 1.10	1.10 – 2.20	-	-
TP103	0.00 – 1.00*	-	-	-
TP104	0.00 – 2.40*	-	-	-
TP105	0.00 – 2.20	-	-	2.20 – 3.00
TP106	0.00 – 1.80	-	1.90 – 2.40	-
TP107	0.00 – 1.70	-	1.70 – 1.90	-
SA101	0.00 – 1.30	-	1.30 – 2.00	-
SA102	0.00 – 1.70	-	2.20 – 2.40	1.80 – 2.20
SA103	0.00 – 1.00	-	1.00 – 2.00	-
RC01	0.00 – 0.70	-	-	-
RC02	0.00 – 0.50	-	-	-
RC03	0.00 – 0.35	-	-	-
RC04	0.00 – 0.60	-	-	-

**Denotes base of Made Ground not encountered*

3.2. MADE GROUND

Made Ground was encountered within all exploratory hole locations from ground level to a maximum depth of 3.80 m bgl. The Made Ground was shallowest on the eastern boundary and became deeper to the west. The deepest Made Ground was encountered along the western boundary, likely associated with the former canal. The base of Made Ground could not be proven within WS105, TP103, and TP104 due to obstructions.

Made Ground encountered along the western boundary in association with the former infilled canal (WS101, WS102, WS103, WS104, and WS106) comprised of reworked topsoil overlying interlayered gravelly sands and reworked gravelly clay. In WS105, also located along the western boundary, Made Ground comprised a grey gravel was encountered overlying gravels and reworked gravelly clay. Gravels of sandstone, mudstone, slate, brick, and concrete were encountered as well as fragments of glass, ceramic, tar, ash, and clinker were also encountered throughout the Made Ground. Hydrocarbon odours and sheens were encountered between 0.50 – 3.70 m bgl in WS101 to WS104. Due to limitations in access, the infilled canal was not fully investigated during the works and therefore the nature is not fully understood and further investigation is required.

The rest of the site (central and eastern section) encountered shallower Made Ground and generally comprised a reworked topsoil overlying a sandy gravel followed by a reworked gravelly clay. Gravels of sandstone, mudstone, limestone, brick and concrete were encountered as well as fragments of glass, ceramic, metal, timber, and plastic throughout this layer. A slight sheen was encountered within perched water in TP104. No other odours were encountered.

Road Cores
All four road cores completed along Jersey street to the south of the site comprise a layer of asphalt from 0.00 – 0.20 m bgl. Asphalt was predominantly underlain by brown sandy gravel, with the exception of RC03 which was underlain by grey sandy gravel of concrete. The gravel consisted of sandstone, mudstone, coal, brick and concrete with fragments of ceramic and glass also being identified within this layer.

A Depth of Made Ground Plan is presented as Drawing 15-798-005 in Appendix III.

3.3. DRIFT DEPOSITS

Drift deposits were encountered within the majority of exploratory locations with the exception of three locations where the full depth of Made Ground could not be proven. The drift deposits generally comprise a firm to stiff brown gravelly CLAY, with interbedded gravels of sandstone and mudstone.

In two locations (TP105 and SA102) soft brown gravelly CLAY was identified.

3.4. SOLID GEOLOGY

Solid bedrock geology was not encountered in this investigation. The nearest BGS borehole 300 m northeast of the site records a Red, brown and grey MUDSTONE at 36.88 m bgl.

3.5. GROUNDWATER

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

TABLE 3.2 SUMMARY GROUNDWATER STRIKES

LOCATION	DEPTH TO STRIKE (m)	NOTES
WS104	3.00	Made Ground - Perched
WS106	1.50	Made Ground - Perched
TP104	2.30	Made Ground - Perched
TP107	1.70	Made Ground - Perched in Land Drain

3.6. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

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

TABLE 3.3 SUMMARY OF VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

LOCATION	DEPTH (m)	STRATUM	NOTES
WS101	2.40 – 3.50	Made Ground (infilled canal)	Strong hydrocarbon odour and black sheen
WS102	0.50 – 1.50	Made Ground (infilled canal)	Slight hydrocarbon odour
WS102	2.90 – 3.70	Made Ground (infilled canal)	Strong hydrocarbon odour and black sheen
WS103	2.90 – 3.70	Made Ground (infilled canal)	Strong hydrocarbon odour and black sheen
WS104	3.00 – 3.70	Made Ground (infilled canal)	Strong hydrocarbon odour and black sheen
TP104	2.30	Made Ground	Slight sheen

3.7. SOIL CONSISTENCY

Undrained shear strength values were measured using field hand shear vane tests. Results of the test are presented in Table 3.4 which indicates the clay soils to vary between firm and very stiff. Strength test data is generally consistent with the field descriptions of the aforementioned soils.

TABLE 3.4 SUMMARY OF HAND SHEAR VANE TESTS

LOCATION	DEPTH	SHEAR STRENGTH (kPA)	CALCULATED ALLOWABLE BEARING PRESSURE (kN/m^2)
SA101	1.50	69	158.70
SA102	1.80	32	73.60
SA102	2.20	64	147.20
SA103	1.50	61	140.30
TP101	1.50	53	121.90
TP101	2.00	65	149.50

LOCATION	DEPTH	SHEAR STRENGTH (kPA)	CALCULATED ALLOWABLE BEARING PRESSURE (kN/m^2)
TP102	1.50	79	181.70
TP105	2.50	31	71.30
TP105	2.90	34	78.20

Notes
ABP Calculated using Stroud and Butler et al 1974.

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 3.5.

3.8. SIDE STABILITY AND EASE OF EXCAVATION

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

The presence of brick and concrete cobbles within the Made Ground deposits meant that in certain places, excavation was slow through the Made Ground and in some places, Made Ground could not be fully penetrated. The natural strata was excavated with relative ease.

TABLE 3.5 STANDARD/CONE PENETRATION TEST RESULTS

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS101	1.00	Made Ground: gravelly sand	13	13.11	Medium Dense	N/A	N/A	N/A	131.06
WS101	2.00	Made Ground: gravelly silty reworked clay	2	1.83	N/A	Very Soft	Extremely Low Strength	9.4	18.78
WS101	3.00	Made Ground: gravelly silty reworked clay	1	0.87	N/A	Very Soft	Extremely Low Strength	4.35	8.94
WS101	4.00	CLAY	14	11.83	N/A	Stiff	Medium Strength	59.14	121.59
WS101	5.00	CLAY	16	13.27	N/A	Stiff	Medium Strength	66.37	136.46
WS102	1.00	Made Ground: gravelly sandy reworked clay	17	17.14	N/A	Very Stiff	High Strength	85.69	176.18
WS102	2.00	Made Ground: clayey gravelly sand	5	4.57	Loose	N/A	N/A	N/A	45.68
WS102	3.00	Made Ground: gravelly reworked clay	3	2.61	N/A	Soft	Very Low Strength	13.04	26.82
WS102	4.00	CLAY	14	11.83	N/A	Stiff	Medium Strength	59.14	121.59

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS102	5.00	CLAY	19	15.76	N/A	Very Stiff	High Strength	78.81	162.04
WS103	1.00	Made Ground: clayey gravelly sand	14	14.11	Medium Dense	N/A	N/A	N/A	141.14
WS103	2.00	Made Ground: clayey gravelly sand	10	9.14	Loose	N/A	N/A	N/A	91.35
WS103	3.00	Made Ground: gravelly reworked clay	2	1.74	N/A	Very Soft	Extremely Low Strength	8.70	17.88
WS103	4.00	CLAY	22	18.59	N/A	Very Stiff	High Strength	92.93	191.07
WS103	5.00	CLAY	22	18.25	N/A	Very Stiff	High Strength	91.26	187.63
WS104	1.00	Made Ground: clayey gravelly sand	20	20.16	Medium Dense	N/A	N/A	N/A	201.63
WS104	2.00	Made Ground: sandy gravelly reworked clay	10	9.14	N/A	Stiff	Medium Strength	45.68	93.91
WS104	3.00	Made Ground: gravelly reworked clay	1	0.87	N/A	Very Soft	Extremely Low Strength	4.35	8.94
WS104	4.00	CLAY	18	15.21	N/A	Very Stiff	High Strength	76.04	156.33
WS104	5.00	CLAY	20	16.59	N/A	Very Stiff	High Strength	82.96	170.57



BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS105	1.00	Made Ground: gravelly reworked clay	12	12.10	N/A	Stiff	Medium Strength	60.49	124.37
WS106	1.00	Made Ground: sandy gravel	21	19.18	Medium Dense	N/A	N/A	N/A	191.84
WS106	2.00	Made Ground: sandy gravel	23	21.01	Medium Dense	N/A	N/A	N/A N/A	210.11
WS106	3.00	Made Ground: gravelly clay	10	8.70	N/A	Medium strength	Stiff	43.48	89.40
WS106	4.00	Gravelly CLAY	15	12.44	N/A	Stiff	Medium Strength	62.22	127.93
WS106	5.00	Gravelly CLAY	17	14.10	N/A	Stiff	Medium Strength	60.49	124.37

NOTES
* The Allowable Bearing Pressure (ABP) should be considered indicative.
The interpretation of in situ mass undrained shear strength (cu) data from SPT Blow Count (N) results and the influence of the Plasticity Index (PI) was reported in Standard Penetration Test in Insensitive Clays and Soft Rocks. Stroud (1974). The standard penetration test and the engineering properties of glacial materials subsequently. Stroud and Butler (1975) and (1989).
Allowable bearing pressure on sands. Soil Mechanics in Engineering Practice Terzaghi, K. & Peck, R.B. 1996.

3.9. PARTICLE SIZE DISTRIBUTION

Particle Size Distribution Tests have been undertaken on selected samples of granular material via wet sieve to obtain information on the soil fractions. The results are included in Table 3.6. The full results can be found in Appendix VIII.

TABLE 3.6 SUMMARY OF PARTICLE SIZE DISTRIBUTION TEST RESULTS

LOCATION	DEPTH (m)	SOIL FRACTION (%)			
		COBBLES	GRAVEL	SAND	SILT/CLAY
WS104	2.60 (Made Ground)	5	45	32	18
WS105	1.50 (Made Ground)	0	60	22	18

3.10. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density/moisture content relationship analysis has been conducted on soils using via utilising proctor compaction tests utilising a 2.5kg rammer. The results of the tests have been summarised in Table 3.7. The full test results can be found in Appendix VIII.

TABLE 3.7 SUMMARY DRY DENSITY AND MOISTURE CONTENT

LOCATION	LABORATORY DESCRIPTION	TOP DEPTH (m)	METHOD OF COMPACTION	INITIAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	MATERIAL RETAINED ON 37.5 mm SIEVE (%)	MAX DRY DENSITY (mg/m³)	MATERIAL RETAINED ON 20.0 mm TEST SIEVE (%)
WS104	MADE GROUND brown very sandy very clayey gravel with cobbles	2.60	2.5kg	14	14	16	1.69	7
WS105	MADE GROUND brown very sandy very clayey gravel	1.50	2.5kg	16	16	21	1.70	12

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

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

3.11. SOIL INFILTRATION

In-situ BRE 365 Soakaway tests were undertaken over a 48-hour period within trial pits completed as SA101-SA103.

The results are presented in Table 3.8 below and the test certificates are included within Appendix XI.

TABLE 3.8 BRE365 SOAKAWAY TESTING RESULTS

LOCATION	DEPTH (m)	MATERIAL	TEST NO.	SOIL INFILTRATION RATE (m/s)
SA101	2.00	Brown slightly gravelly CLAY	Test No.1	N/A
SA102	2.40	Brown slightly gravelly CLAY	Test No.1	N/A
SA103	2.00	Brown gravelly CLAY	Test No.2	N/A

The tests taken out within the trial pits did not reach the 25% adequate storage depth. Therefore, the tests have failed; this is due to the cohesive deposits on-site.

Therefore, considering the significant volumes of impermeable clay on the site, it is considered that soakaway drainage is not suitable for the proposed development. However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. All soakaways should be designed in accordance with BRE Special Digest 365 – *Soakaway Design*.

3.12. SOIL PLASTICITY

The Atterberg limits determinations, summarised in Table 3.9, show the clay to be of predominantly low plasticity with discrete areas of moderate plasticity clay.

TABLE 3.9 SUMMARY OF PLASTICITY INDEX TEST RESULTS

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS101	4.00	22	21	44	23	98	22.54	Medium
WS102	4.00	25	22	46	24	96	23.04	Medium
WS103	5.00	18	19	40	21	99	20.79	Medium
WS104	4.00	17	16	34	18	97	17.46	Low

The results of the Atterberg limits testing confirmed that the soils would be deemed to be “Low and Medium Volume Change Potential” in accordance with the classification system utilised by the LABC/NHBC industry guidance.

3.13. CALIFORNIA BEARING RATIO

The California bearing ratio (CBR) for the soils were measured by Plate Load Test. The tests were carried out at 0.40 m bgl within the Made Ground following the excavation of the reworked topsoil material. The results are summarised in Table 3.10.

The result sheets are included in Appendix X and the locations are shown on Drawing 10-470-004 (Appendix III).

TABLE 3.10 SUMMARY OF CBR RESULTS

LOCATION	DEPTH (m)	STRATA	PLATE DIAMETER	CBR (%)
CBR101	0.40	Made Ground	450	8
CBR102	0.40	Made Ground	450	15
CBR103	0.40	Made Ground	450	10
CBR104	0.40	Made Ground	450	19

It should be noted that the reported CBR results were obtained from soils in a highly undisturbed state. If, however, the topsoil and surface cover is removed during periods of wetter climatic condition, the formation will soften, reducing the CBR.

3.14. pH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in Appendix V (summarised in Table 3.11), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).

Elevated sulphate concentrations meeting Class DS-2, AC-1s were noted within the Made Ground deposits in WS102 and in WS105 it met DS-3, AC-1s also within Made Ground deposits at 1.20 m bgl.

TABLE 3.11 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO_4 IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
WS101	0.20	0.025	6.8	DS-1, AC-1s
WS101	1.80	0.16	7.4	DS-1, AC-1s
WS102	0.70	0.049	8.9	DS-1, AC-1s
WS102	3.00	0.57	6.9	**DS-2, AC-1s**
WS103	0.30	0.015	6.8	DS-1, AC-1s
WS103	3.80	0.078	8.7	DS-1, AC-1s
WS104	3.00	0.44	7	DS-1, AC-1s
WS105	1.20	1.6	7.4	**DS-3, AC-1s**
WS106	1.20	0.054	8.1	DS-1, AC-1s
TP102	0.05	0.012	7.8	DS-1, AC-1s
TP105	1.50	0.1	8	DS-1, AC-1s
TP106	1.00	0.2	7.7	DS-1, AC-1s

LOCATION	DEPTH (m)	SO_4 IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
SA101	0.60	0.023	7.1	DS-1, AC-1s
SA103	0.40	0.21	7.7	DS-1, AC-1s

4. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

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

4.1. HUMAN HEALTH RISK ASSESSMENT

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

Where Tier 1 screening values are not provided by LQM, other screening values have been used and these are referenced in Table 4.1.

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

TABLE 4.1 SUMMARY OF INORGANIC AND HYDROCARBON TOXICITY ASSESSMENT FOR A RESIDENTIAL WITHOUT PLANT UPTAKE END USE

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Arsenic	mg/kg	40	14	150 100 92 55 54 41	WS102 3.00m SA101 0.60m WS104 3.00m WS101 0.70m TP106 1.00m WS105 1.20m	1	Further Action
Cadmium	mg/kg	85	14	4.6	-	1	No Further Action
Chromium (VI)	mg/kg	6	14	4.6	-	1	No Further Action
Lead	mg/kg	310	14	980 840 780 500 470 370	WS104 3.00m WS101 1.80m WS102 3.00m SA103 0.40m WS105 1.20M TP106 1.00m	1	Further Action
Mercury	mg/kg	1.2	14	3.1 3	WS102 3.00m WS101 1.80m	4	Further Action
Nickel	mg/kg	180	14	57	-	1	No Further Action
Selenium	mg/kg	430	14	<1.0	-	1	No Further Action
Copper	mg/kg	7100	14	670	-	1	No Further Action
Zinc	mg/kg	40000	14	1300	-	1	No Further Action
Cyanide – Total	mg/kg	791	14	530	-	1	No Further Action
Phenols – Total	mg/kg	210	14	9.5	-	1	No Further Action
Asbestos	Fibres	NFD	13	NFD	-	3	No Further Action
Naphthalene	mg/kg	2.3	12	1300 1000 12 11 9.5 5.5 5.3	WS104 3.00m WS102 3.00m WS101 0.20m WS101 1.80m SA101 0.60m TP106 1.00m TP105 1.50 m	4	Further Action
Acenaphthylene	mg/kg	2900	12	29	-	2	No Further Action

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Acenaphthene	mg/kg	3000	12	21	-	1	No Further Action
Fluorene	mg/kg	2800	12	23	-	1	No Further Action
Phenanthrene	mg/kg	1300	12	2400 2400	WS102 3.00m WS104 3.00m	2	Further Action
Anthracene	mg/kg	31000	12	53	-	2	No Further Action
Fluoranthene	mg/kg	1500	12	1600	WS102 3.00m	2	Further Action
Pyrene	mg/kg	3700	12	120	-	2	No Further Action
Benzo(a)Anthracene	mg/kg	11	12	730 630 110 42 41 18 15	WS102 3.00m WS104 3.00m WS101 1.80m SA101 0.60m WS106 1.20m TP106 1.00m TP105 1.50m	2	Further Action
Chrysene	mg/kg	30	12	530 510 99 39 32	WS102 3.00m WS104 3.00m WS101 1.80m SA101 0.60m WS106 1.20m	2	Further Action
Benzo(b)Fluoranthene	mg/kg	3.9	12	340 310 100 9.4 7.7 5.5	WS102 3.00m WS104 3.00m WS101 1.80m WS102 0.70m WS105 1.20m WS101 0.20m	2	Further Action
Benzo(k)Fluoranthene	mg/kg	110	12	310 280	WS102 3.00m WS104 3.00m	2	Further Action
Benzo(a)Pyrene	mg/kg	3.2	12	480 470 110 38 31 16 11 7.3 7.2 6.8 5.6	WS102 3.00m WS104 3.00m WS101 1.80m SA101 0.60m WS106 1.20m TP106 1.00m TP105 1.50m WS105 1.20m WS102 0.70m WS101 0.20m TP102 0.05m	2	Further Action
Indeno(123-cd)Pyrene	mg/kg	45	12	160 150 48	WS104 3.00m WS102 3.00m WS101 1.80m	2	Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.31	12	56 11 4.8 3.7 2.1 1.5 0.88 0.77 0.45	WS102 3.00m WS101 1.80m SA101 0.60m WS106 1.20m TP106 1.00m TP105 1.50m WS105 1.20m WS102 0.70m TP102 0.05m	2	Further Action

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Benzo(ghi)Perylene	mg/kg	360	12	56	-	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	14	2.5	-	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	14	6	-	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	14	18	-	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	250	14	1600 970	WS102 3.00m WS104 3.00m	4	Further Action
TPH C12-C16 (aromatic)*	mg/kg	1800	14	2700 2600	WS102 3.00m WS104 3.00m	4	Further Action
TPH C16-C21 (aromatic)*	mg/kg	1900	14	4800 4000	WS102 3.00m WS104 3.00m	1	Further Action
TPH C21-C35 (aromatic)*	mg/kg	1900	14	7700 7000 6200	WS102 3.00m WS104 3.00m WS106 1.20m	1	Further Action

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

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

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

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

- Heavy Metals: Arsenic, Lead, Mercury,
- Speciated non-volatile Polycyclic aromatic hydrocarbons (PAHs): Phenanthrene, Fluoranthene, Benzo(a)Anthracene, Chrysene, Benzo(b)Fluoranthene, Benzo(k)Fluoranthene, Benzo(a)pyrene, Indeno(123-cd)pyrene, Dibenzo(a,h)Anthracene.
- Naphthalene
- TPH Fractions: TPH C10 – C12, TPH C12 – C16,TPH C16 – C21.

TPH C21 – C35.The laboratory analysis confirms the assessment within the initial conceptual site model that the main constituents of concern were likely to be asbestos, PAHs, hydrocarbon compounds and heavy metals.

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

- The main exposure pathways based on the Tier I exceedances are:
  - Soil ingestion;
  - Vapour inhalation (indoor);
  - Dermal contact and ingestion;
  - Consumption of homegrown vegetables

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

The Tier 1 Soil assessment has identified exceedances in heavy metals, PAH's and TPH fractions within the Made Ground to a maximum depth of 3.80 mbgl (WS101).

The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils, inhalation of particulate and consumption of homegrown vegetables. The risk to chronic human health associated with the elevated concentrations of inorganic heavy metals and non-volatile PAH compounds can be mitigated through either hardstanding or the installation of a suitable cover system in all proposed landscaped areas and public open space to remove any potential for direct exposure to impacted soils.

The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy.

With regards to the naphthalene and TPH fractions encountered, these present a potential volatilisation to indoor air risk. TPH fractions have been identified within Made Ground deposits in WS102, WS104 and WS106 likely in association with the infilled former canal along the western boundary. Naphthalene has been encountered within the deeper Made Ground deposits of WS101, WS102, WS104, SA101, TP106, and TP105. As contaminants have been identified across a number of locations across the site, this will need to be considered as widespread contamination. Therefore further remediation will be required.

It is recommended that in the first instance, a detailed vapour risk assessment is completed across the site to fully characterise the risk to end users. Where the significant TPH and PAH is present, soils will likely require ex-situ treatment to reduce the contamination load and prepare the site for residential end use. Further investigation is required to inform the risk assessment and determine remediation options.

Asbestos was not identified within any of the 13 samples sent for analysis.

There are no suitable sources of topsoil available on the site.

Six samples of Made Ground from depths between 0.20 – 3.00 m bgl were sent for waste classification. Three samples (WS101 0.20, WS102 0.70 and WS103 0.30) were non-hazardous and 3 samples (WS101 1.80, WS104 3.00 and WS105 1.20) were hazardous. The deeper deposits were hazardous compared to shallower deposits which came back non-hazardous.

4.2. CONTROLLED WATERS RISK ASSESSMENT

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

TABLE 4.2 CONTROLLED WATERS CONCEPTUAL MODEL AND SENSITIVITY PROFILE

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground Heavy metals and PAH contamination is present within Made Ground across the site as a result of infill material from historical features on-site Including the former canal, housing and Wharf.		**High**
Infilled Canal The infilled canal along the western boundary of the site has exceedances of heavy metals, PAH, TPH, Naphthalene, VOCs and SVOCs.		**High**
Former Recreation Ground A former recreation ground was present within the northern section of the site. Exceedances of heavy metals, PAH, TPH and Naphthalene have been found within Made Ground within this area.		**High**
Former Wharf A former Wharf was present in the western section of the site within this area exceedances of heavy metals, PAH and naphthalene associated with the Made Ground.		**High**
Pathway		
Vertical Migration The site is underlain by cohesive CLAY deposits. The presence of this low permeability drift will offer some protection to the underlying aquifer and inhibit the lateral migration of any contaminants towards the canal.		**Low**
Lateral migration The site is underlain by cohesive CLAY deposits restricting lateral migration of contaminants across the site.		**Low**
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary undifferentiated	**Low**
Aquifer Classification in Bedrock	Principal aquifer Secondary B	**High**
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected	**Low**
Distance to the Closest Groundwater Abstraction Point	None were identified within a 1 km radius.	**Low**
Is the Site Located Within 50 m of a Surface Watercourse?	The Rochdale canal is 30 m south of the site.	**High**

The ICSM developed within the context of the site setting has a viable pollutant pathway, which would be the downward migration of potentially mobile phase-soluble contaminants towards the underlying principal and secondary B aquifer and the lateral migration towards the Rochdale Canal, which lies circa 30 m south of the site.

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

TABLE 4.3 QUALITATIVE RISK TO CONTROLLED WATERS FROM SOIL ANALYTICAL RESULTS

CONTAMINANT	ASSESSMENT RATING	DISCUSSION
BTEX > 1 mg/kg	VOC analysis recorded concentrations above the laboratory LOD across the site.	Further discussion
Total VOC > 1 mg/kg		
Total SVOC > 1 mg/kg	SVOC analysis recorded concentrations above the laboratory LOD, across the site.	Further discussion
C5-C10 > 5 mg/kg	Concentrations of C5 – C12 have been recorded above 5 mg/kg in WS102 and WS104.	Further discussion
C10-C12 > 10 mg/kg	Concentrations of C10-C12 have been recorded above 10 mg/kg throughout the site and the maximum concentration was recorded in WS102 at 3.00 m bgl with a concentration 1600 mg/kg.	Further discussion
C12-C16 > 50 mg/kg	Concentrations of C12-C16 have been recorded throughout the site and the maximum concentration was recorded within WS102 3.00 at 1.60 m bgl with a concentration 2700 mg/kg.	Further discussion
Phenols > 2 mg/kg	All concentrations are below the laboratory LOD.	None
Naphthalene > 2 mg/kg	Concentrations of naphthalene above 2 mg/kg have been recorded above 2 mg/kg across the site. The maximum concentration was recorded within WS104 at 3.00 m with a concentrations of1300 mg/kg	Further discussion
Total PAH > 10 mg/kg	Total concentrations of low-solubility PAH compounds greater than 10 mg/kg have been detected throughout the site, with a maximum concentration recorded in WS101 at 1.80 m bgl with a concentration of 1090 mg/kg.	Further discussion
PCB > 1 mg/kg	No potential sources of PCB have been identified	None
Heavy metals > 500 mg/kg	Concentrations of heavy metals above 500 mg/kg have been recorded in WS101, WS102, WS104, WS105 AND SA103.	Further discussion

The Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards and environmental quality standards (EQS) and Drinking Water Standards (DWS). The table below includes site investigation data from E3P from 2022 and updated data from water samples collected in January 2023.

These are presented in Table 4.4.

TABLE 4.4 COMPARISON OF GROUNDWATER AND LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINAND	UNIT	EQS [1, 2] AA	DWS [3,4]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
Arsenic	µg/l	50	10	2	10.1	WS104	2	22	WS104	Further Action
Cadmium	µg/l	0.08-0.25	5	2	0.11	WS106	2	<0.08	-	Further Action
Chromium (VI)	µg/l	3.4	–	2	<5.0	-	2	<5.0	-	No Further Action
Chromium (III)	µg/l	4.7	50	2	0.3	-	2	3.1	-	No Further Action
Copper	µg/l	1	2000	2	3.7 1.6	WS106 WS104	2	42 9.8	WS101 WS104	Further Action
Total Cyanide	µg/l	1	50	2	130	WS104	2	2900	WS101	Further Action
Lead	µg/l	1.2	10	2	18 1.3	WS106 WS104	2	5.5 2.1	WS101 WS104	Further Action
Mercury	µg/l	–	1.0	2	<0.05	-	2	<0.5	-	No Further Action
Nickel	µg/l	4	20	2	10	WS106	2	7.8 4.9	WS104 WS101	Further Action
Selenium	µg/l	–	10	2	<0.6	-	2	<4.0	-	No Further Action
Zinc	µg/l	10.9	–	2	85 14	WS106 WS104	2	31 11	WS104 WS101	Further Action
pH	6–9			2	7.3	-	2	6.9	-	No Further Action
Polycyclic Aromatic Hydrocarbons										
Naphthalene	µg/l	2	10*	2	110 6.5	WS104 WS106	2	<0.01	-	Further Action
Anthracene	µg/l	0.1	10*	2	12 2.2	WS106 WS104	2	6	WS104	Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	2	19	WS106	2	<0.01	-	Further Action

DETERMINAND	UNIT	EQS [1,2] AA	DWS [3,4]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
					0.46	WS104				
Benzo[k]fluoranthene	µg/l	0.00017*	10*	2	6.1 0.22	WS106 WS104	2	<0.01	-	Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	2	17 0.36	WS106 WS104	2	<0.01	-	Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	2	7	WS106	2	<0.01	-	Further Action
Fluoranthene	µg/l	0.0063	10*	2	37 3	WS106 WS104	2	3.2	WS104	Further Action
Benzo(ghi)perylene	µg/l	1.7–4	10*	2	8.3	WS106	2	<0.01	-	Further Action
Aromatic Hydrocarbon										
TPH C5-C7 (benzene)	µg/l	10	1	2	<1.0	-	2	34	WS104	Further Action
TPH C7-C8 (toluene)	µg/l	74	700	2	<1.0	-	2	17	-	No Further Action
TPH C8-C10 (xylene)	µg/l	30	300	2	<1.0	-	2	30	-	No Further Action
TPH C10-C12 (naphthalene)	µg/l	2	90	2	310 77	WS104 WS106	2	1100	WS104	Further Action
TPH C12-C16	µg/l	–	90	2	720 280	WS106 WS104	2	4600	WS104	Further Action
TPH C16-C35	µg/l	–	90	2	2500 240	WS106 WS104	2	5000	WS104	Further Action
Aliphatic Hydrocarbon										
TPH C5-C6	µg/l	–	1000[5]	1	<1.0	-	2	<1.0	-	No Further Action
TPH C6-C8	µg/l	–	1000[5]	1	<1.0	-	2	<1.0	-	No Further Action
TPH C8-C10	µg/l	–	300	1	<1.0	-	2	<1.0	-	No Further Action

DETERMINAND	UNIT	EQS [1, 2] AA	DWS [3,4]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
TPH C10-C12	µg/l	–	300	1	37	-	2	<10	-	No Further Action
TPH C12-C16	µg/l	–	300	1	400	WS106	2	<10	-	Further Action
TPH C16-C21	µg/l	–	300**	1	6300	WS106	2	<10	-	Further Action
TPH C21-C35	µg/l	–	300**	1	31000	WS106	2	<10	-	Further Action
Volatile Organic Compounds										
Tetrachloroethylene	µg/l	0.4	10	2	<1.0	-	2	-	-	-
Trichloroethylene	µg/l	10	10	2	<1.0	-	2	-	-	-
Trichlorobenzene	µg/l	0.4	–	2	<1.0	-	2	-	-	-
Trichloromethane	µg/l	2.5	–	2	<1.0	-	2	-	-	-
Dichloromethane	µg/l	20	200	2	<1.0	-	2	-	-	-
Carbon Tetrachloride	µg/l	12	3	2	<1.0	-	2	-	-	-
Vinyl Chloride	µg/l	–	0.3	2	<1.0	-	2	-	-	-

Notes

Solubility <0.01µg/l
AA – Annual Average
* Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water
** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.

1. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (legislation.gov.uk)
2. The Water Supply (Water Quality) Regulations 2018 (legislation.gov.uk)
3. Guidelines for drinking-water quality, 4th edition, incorporating the 1st addendum (who.int)
4. CL:AIRE publishes Petroleum Hydrocarbons in Groundwater guidance (claire.co.uk)
5. A total TPH criteria of 1000 mg/kg will act as a surrogate criterion for remaining aliphatic and aromatic TPH fractions.

4.2.1. CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

This comparison indicates that the date exceeds the DWS values for the following contaminants:

- Arsenic (Water and Leachate)
- Cyanide (Water and Leachate)
- Naphthalene (Water)
- Anthracene (Water and Leachate)
- Benzo(b)fluoranthene (Water)
- Benzo(k)fluoranthene (Water)
- Benzo(a)pyrene (Water)
- Indeno(123-cd)pyrene (Water)
- Fluoranthene (Water)
- TPH C5 - C7 (Leachate)
- TPH C10 – C12 (aromatic) (Water and Leachate)
- TPH C12 – C16 (aromatic) (Water and Leachate)
- TPH C16 – C35 (aromatic) (Water and Leachate)

This comparison indicates that the date exceeds the EQS values for the following contaminants:

- Cadmium (Water)
- Copper (Water and Leachate)
- Cyanide (Water and Leachate)
- Lead (Water and Leachate)
- Nickel (Water)
- Zinc (Water and Leachate)
- Naphthalene (Water)
- Anthracene (Water and Leachate)
- Benzo(b)fluoranthene (Water)
- Benzo(b)fluoranthene (Water)
- Benzo(a)pyrene (Water)

- Indeno(123-cd)pyrene (Water)
- Fluoranthene (Water and Leachate)
- TPH C5 - C7 (Leachate)
- TPH C10 – C12 (aromatic) (Water and Leachate)
- TPH C12 – C16 (aliphatic) (Water)
- TPH C16 – C21 (aliphatic) (Water)
- TPH C21 – C35 (Water)

4.2.2. DISCUSSION OF CONTROLLED WATERS RISK ASSESSMENT

Historically, the site has been subjected to extensive infilling and former housing, recreation grounds and Wharf were present. Chemical by-products of manufacturing processes and compounds within the Made Ground may have subsequently leached down into the underlying ground and contaminated groundwater both within Made Ground and natural drift deposits.

Beneath the deep Made Ground, the site is predominantly underlain by cohesive natural strata which will act to inhibit vertical migration of mobile contaminants to the underlying principal aquifers in the bedrock. The sensitivity of the aquifer is also reduced given there are no potable groundwater abstractions within 2 km.

Widespread heavy metal and PAH contamination and TPH contamination has been identified in the soil, leachate and groundwater analysis at the site within the area of the infilled canal.

It is noted that where there are exceedances in soils, there are not exceedances within leachates in those locations, and, where there are exceedances within leachates, exceedances within soils are absent. Thus, the source of the contaminants cannot be attributed to one area or point source and the majority of the contamination is considered present on a site-wide basis.

As the site is currently open, public space, with little hardstanding surface cover, rainfall is not being intercepted and subsequently infiltrates freely into the underlying Made Ground, potentially mobilising the identified contaminants.

The proposed development will create hardstanding cover across the site, thus reducing the amount of infiltration generated. This will, in turn, reduce the number of contaminants present in leachate off the site and reduce the risk further to the underlying aquifer and adjacent canal. Given that the site is underlain by low permeability clay, the leaching of contaminants in this sector will be significantly reduced as the Made Ground will be contained beneath the impermeable surface covering.

It must be noted that boreholes have not been advanced into the principal aquifer (bedrock) and so, it is not yet proven whether the source-pathway-receptor linkage is complete. Without samples of the principal aquifer, the extent, if any, of metalloid and PAH impact cannot be proven.

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

- The primary receptors are identified as the canal to the south and the underlying principal aquifer. It is understood that the infilled canal on site is in hydraulic conductivity with the off-site canal therefore increased risk. The infilled canal on-site will need to be isolated to prevent ingress of water during further investigation and remediation works to reduce the spread of contamination.

- The controlled waters assessment has identified elevated heavy metals, PAH and TPH within the leachate and water samples taken from the site.

- The site is not located within a Groundwater Source protection zone and there are no abstraction points within 1km of the site.

- The site is a public open space consisting of soft standing surface cover which allows for extensive infiltration of rainfall into underlying Made Ground soils.

- The proposed development will create hardstanding cover across the site, thus reducing the amount of infiltration generated. This will, in turn, reduce the number of contaminants present in leachate off the site and reduce the risk further to the underlying aquifer and adjacent canal.

- The presence of Glacial Till underneath the Made Ground across the site will restrict vertical migration towards the Secondary A aquifer, as well as the lateral migration towards the adjacent canal.

- Due to the exceedances of hydrocarbons noted in the soil, leachate and water samples, the risk to controlled waters is considered to be moderate. It is recommended that further investigation including trial trenching along the infilled canal to inform a detailed controlled waters risk assessment to further assess the risk. Further water sampling is likely required.

4.3. GROUND GAS RISK ASSESSMENT METHODOLOGY

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

- CIRIA Report 665 – Assessing risks posed by hazardous ground gases to buildings (2007)

- BS8485:2015+A1:2019 – Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

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

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

The following equation should be utilised:

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

Where:
q is the measured flow rate (in litres per hour) of combined gases from the monitoring standpipe

C_{hg} is the measured hazardous gas concentration (in percentage volume/volume).

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

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

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

TABLE 4.5 SITE CHARACTERISATION BY GSV (BS8485:2015)

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

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

4.4. MONITORING METHODOLOGY

Concentrations of methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) (hydrogen sulphide) were measured using a calibrated infrared gas analyser (GFM435) with gas flow rates measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 500 seconds at each location, at which point the maximum concentration of CH_4 and CO_2, together with the lowest concentration of O_2 were recorded.

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

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

TABLE 4.6 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	STRATA	DATE	CH_4 PEAK (%V/V)	CH_4 STEADY (%V/V)	CH_4 Q_{hg} (l/hr)	CO_2 PEAK (%V/V)	CO_2 STEADY (%V/V)	CO_2 Q_{hg} (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS101	Made Ground	29/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1011	Steady	0.1	0.1	0.50 – 3.00	2.85	2.71
		10/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1020	Steady	0.1	0.1		2.85	2.75
		30/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1018	Steady	0.1	0.1		2.85	Dry
		13/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1010	Falling	0.1	0.1		2.85	Dry
		28/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.0	994	Steady	0.1	0.1		2.85	2.77
		14/10/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.0	1001	Steady	0.1	0.1		2.85	2.43
WS102	Made Ground	29/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1012	Steady	0.1	0.1	0.50 – 3.00	2.89	2.66
		10/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1021	Steady	0.1	0.1		2.89	2.72
		30/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1018	Steady	0.1	0.1		2.89	Dry
		13/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1009	Falling	0.1	0.1		2.90	Dry
		28/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.0	994	Steady	0.1	0.1		2.89	Dry
		14/10/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.0	1001	Steady	0.1	0.1		2.89	2.29
WS103	Made Ground	29/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1012	Steady	0.1	0.1	1.00 – 3.50	3.39	3.28
		10/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1021	Steady	0.1	0.1		3.40	2.93
		30/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1019	Steady	0.1	0.1		3.40	3.28
		13/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1009	Falling	0.1	0.1		3.40	3.00
		28/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.0	994	Steady	0.1	0.1		3.39	2.75
		14/10/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.0	1001	Steady	0.1	0.1		3.39	2.26
WS104	Made Ground	29/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1012	Steady	0.1	0.1	0.50 – 3.50	3.14	2.70
		10/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1020	Steady	0.1	0.1		3.14	2.65
		30/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1019	Steady	0.1	0.1		3.13	2.85
		13/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1008	Falling	0.1	0.1		3.15	2.60
		28/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.1	994	Steady	0.1	0.1		3.13	2.55

WELL	STRATA	DATE	CH_4 PEAK (%V/V)	CH_4 STEADY (%V/V)	CH_4 Q_{hg} (l/hr)	CO_2 PEAK (%V/V)	CO_2 STEADY (%V/V)	CO_2 Q_{hg} (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
		14/10/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.1	1001	Steady	0.1	0.1		3.12	2.38
WS105	Made Ground	29/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1012	Steady	0.1	0.1	0.50 – 1.50	1.46	Dry
		10/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1020	Steady	0.1	0.1		1.46	Dry
		30/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1020	Steady	0.1	0.1		1.46	Dry
		13/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1008	Falling	0.1	0.1		1.45	Dry
		28/09/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.1	994	Steady	0.1	0.1		1.46	Dry
		14/10/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.1	1000	Steady	0.1	0.1		1.46	Dry

Notes

CIRIA Characteristic Situation	Q_{hg}		
CS1	<0.07	Typical Max CO2 <5 % Typical Max CH4 <1 %	Values in **BOLD** exceed CS1 Thresholds
CS2	<0.7	Flow rate not to exceed 70 l/hr otherwise consider increase to CS3	Values in BLUE denote water above level of response zone (flooded)
CS3	<3.5		
CS4	<15	Quantitative Risk Assessment required to evaluate scope of protective measures	

4.5. SUMMARY OF MONITORING RESULTS

4.5.1. GROUNDWATER

The water level within the wells remained similar throughout the monitoring period, with water strikes encountered between 2.71 m bgl and 3.28 m bgl. Water strikes are likely perched water within the Made Ground, and not in hydraulic continuity with the wider environ.

Wells in WS101 and WS102 became dry during rounds 3 and 4 of monitoring. WS105 remained dry throughout the monitoring period.

4.5.2. BAROMETRIC PRESSURE

The majority of visits were undertaken during periods of steady pressure, with the exception of Visit 4 which was undertaken during a period of falling pressure.

Visit 5 was undertaken during a time of relatively low pressure (994 mbar), however further visits may be required to fully characterise the risk of ground gas generation over representative conditions.

4.5.3. GAS FLOW

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

4.5.4. GAS CONCENTRATIONS

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

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

4.6. CONCLUSION

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

TABLE 4.7 GAS RISK PROFILE AND LOCATION

WELL	DATE	DEPTH TO WATER (m bgl)	MAX FLOW (l/hr)	MAX CH_4 (%V/V)	MAX CH_4 Q_{hg} (l/hr)	MAX CO_2 (%V/V)	MAX CO_2 Q_{hg} (l/hr)	CHARACTERISTIC SITUATION	NHBC TRAFFIC LIGHT
WS101	29/07/2022	2.71	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	10/08/2022	2.75	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	30/08/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	13/09/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	28/09/2022	2.77	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	14/10/2022	2.43	0.1	0.1	0.0001	0.1	0.0001	CS1	Green

WELL	DATE	DEPTH TO WATER (m bgl)	MAX FLOW (l/hr)	MAX CH_4 (%V/V)	MAX CH_4 Q_{hg} (l/hr)	MAX CO_2 (%V/V)	MAX CO_2 Q_{hg} (l/hr)	CHARACTERISTIC SITUATION	NHBC TRAFFIC LIGHT
WS102	29/07/2022	2.66	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	10/08/2022	2.72	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	30/08/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	13/09/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	28/09/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	14/10/2022	2.29	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
WS103	29/07/2022	3.28	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	10/08/2022	2.93	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	30/08/2022	3.28	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	13/09/2022	3.00	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	28/09/2022	2.75	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	14/10/2022	2.26	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
WS104	29/07/2022	2.70	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	10/08/2022	2.65	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	30/08/2022	2.85	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	13/09/2022	2.60	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	28/09/2022	2.55	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	14/10/2022	2.38	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
WS105	29/07/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	10/08/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	30/08/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	13/09/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	28/09/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green
	14/10/2022	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1	Green

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

- Ground gas monitoring to date suggests that the site can be predominantly classified as CS1, and in these areas, it is considered that gas protection measures will not be required.
- Made Ground has been encountered across the site to a maximum depth of 3.80 m bgl.
- Sources of ground gases are likely in association with the infilled canal and deep Made Ground, however, due to the variability of the soils risk of significant gassing will likely vary.
- The Made Ground is predominantly underlain by low-permeability cohesive deposits (Glacial Till) at depths between 1.00 m bgl and in excess of 5.45 m bgl.
- In the first instance, further ground gas monitoring is recommended due to exceedances of volatile contamination identified within the site investigation, soil and water samples, as well as to fully characterise the risk of ground gas generation over representative conditions.

It is recommended that the full ground gas assessment and recommended protection measures (if applicable) are agreed upon with the local authority prior to their adoption on-site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

4.6.1. BUILDING GAS RISK MITIGATION

British standard BS8485 (2015)+A1 (2019)

British Standard BS8485:2015+A1(2019) provides different types of property that require assessment. These building types are:

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

Type B Building – Private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium sized rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.

Based on the ground gas risk assessment and the proposed Type A Building, it is envisaged that a point score of 3.5 will be required for affected properties, as summarised in Table 4.8.

TABLE 4.8 BS8485 (2015)+A1(2019) POINTS REQUIRED FOR TYPE A AND TYPE B BUILDINGS

Characteristic Situation	Minimum gas protection score (points)	
	HIGH SENSITIVITY	
	TYPE A BUILDING	TYPE B BUILDING
1	0	0
2	3.5	3.5
3	4.5	4
4	6.5 A)	5.5 A)
5	– B)	6
6	– B)	– B)

BS8485 (2015)+A1(2019) Notes
A) Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.
B) The gas hazard is too high for this empirical method to be used to define the gas protection measures.

CHARACTERISTIC SITUATION	MINIMUM GAS PROTECTION SCORE (POINTS)			
	HIGH RISK		MEDIUM RISK	LOW RISK
	TYPE A BUILDING	TYPE B BUILDING	TYPE C BUILDING	TYPE D BUILDING
1	0	0	0	0
2	3.5	3.5	2.5	1.5
3	4.5	4	3	2.5
4	6.5 A)	5.5 A)	4.5	3.5
5	– B)	6	5.5	4.5
6	– B)	– B)	– B)	6

Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, for example, high performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system such as in institutional and/or fully serviced contractual situations.

TABLE 4.9 SUMMARY OF GROUND GAS MITIGATION MEASURES – BS8485 (2015)+A1(2019)

GAS PROTECTION SCORES FOR THE STRUCTURAL BARRIER	SCORE[A]
Floor and Substructure Design	
Precast Suspended Segmental Subfloor (Beam and Block)	0
Cast in Situ Ground Bearing Floor Slab (With Only Nominal Mesh Reinforcement)	0.5
Cast in Situ Monolithic Reinforced Ground Bearing Raft or Reinforced Cast in Situ Suspended Floor Slab With Minimal Penetrations	1 or 1.5[B]
Basement Floor and Walls Conforming to BS 8102:2009, Grade 2 Waterproofing[C D]	2
Basement Floor and Walls Conforming to BS 8102:2009, Grade 3 Waterproofing[C D]	2.5

Notes
A) The scores are conditional on breaches of floor slabs, etc., being effectively sealed.
B) To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast in (see A.2.2.2).
C) The score is conditional on the waterproofing being provided by a suitable structural barrier with the design and detailing of the walls and floor meeting the requirements for Type B protection. The score cannot be assigned for Type A (waterproof membrane) or Type C (drained cavity wall).
D) If a membrane is installed beneath and around the basement to provide Type A waterproofing (BS 8102:2009), it can be assigned a gas protection score in accordance with Table 7, if it meets all the criteria for a gas resistant membrane in that table.
When practical, utilities should enter the building above floor level with any conduit or meter housing being properly vented outside of the building.

PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
Gas protection scores for ventilation protection measures		
(a) Pressure Relief Pathway – Usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building.	0.5	Whenever possible a pressure relief pathway (as a minimum) should be installed in all gas protection measures systems.

PROTECTION ELEMENT SYSTEM		SCORE	COMMENTS
			If the layer has a low permeability and/or is not terminated in a venting trench (or similar), then the score is 0.
(b) Passive Subfloor Dispersal Layer – Media used to provide the dispersal layer are: • Clear void; • Polystyrene void former blanket; • Geocomposite void former blanket; • No fines gravel layer with gas drains; and • No fines gravel layer.	Very good performance	2.5	The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium, the width of the building, the side ventilation spacing and type and the thickness of the layer. The selected score should be assigned taking into account the recommendations in Annex B of BS 8485 (2015). Passive ventilation should be designed to meet at least "good performance".
	Good performance	1.5	
(c) Active Dispersal Layer – Usually comprising fans with active abstraction (suction) from a subfloor dilution layer with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers.		1.5 to 2.5	This system relies on continued serviceability of the pumps, therefore alarm and response systems should be in place. There should be robust management systems in place to ensure the continued maintenance of the system, including pumps and vents. Active ventilation should always be designed to meet at least "good performance".
(d) Active Positive Pressurisation – Provided by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket.		1.5 to 2.5	This system relies on continued operation of the pumps, therefore alarm and response systems should be in place. The score assigned should be based on the efficient "coverage" of the building footprint and the redundancy of the system. Active ventilation should always be designed to meet at least "good performance".
(e) Ventilated Car Park – Floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park.		4	Assumes that the car park is vented to deal with car exhaust fumes, designed to Buildings Regulations 2000, Approved Document F [9].
Gas Protection Score for the Gas Resistant Membrane			

PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
Gas resistant membrane meeting all of the following criteria: • Sufficiently impervious to the gases with a methane gas transmission rate < 40 ml/day/m^2/atm (average) for sheet and joints (tested in accordance with BS ISO 151051 manometric method); • Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; • Sufficiently strong to withstand in service stresses (e.g. settlement if placed below a floor slab); • Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools); • Capable, after installation, of providing a complete barrier to the entry of the relevant gas; and • Verified in accordance with CIRIA C735.	2	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints. If a membrane is installed that does not meet all the criteria opposite then the score is zero.
A) Membrane with a methane gas transmission rate < 40.0 ml/day/m2/atm (average) for sheets and joints (tested in accordance with BS ISO 151051:2007 manometric method) is regarded as sufficiently impervious. B) For example, reinforced LDPE (virgin polymer) membranes having a minimum mass per unit area of 370 g/m^2 and not significantly less than 0.4 mm thickness between the reinforcement scrim (tested in accordance with Procedure D (2 mm diameter tip) of BS EN ISO 98631:2016) installed above floor slabs are considered sufficiently strong to meet the performance criteria (see also C.3). Thicker and more robust membranes or an additional membrane protection layer should be installed directly beneath cast in situ floor slabs.		

4.7. POTABLE WATER SUPPLY

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

TABLE 4.10 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold (mg/kg)	Concentrations at Current pipeline depth (mg/kg)
Total VOC	0.5	<1.0
Total BTEX And MTBE	0.1	N/A
Total SVOCs (Excluding PAH and those substances marked with an *)	2	N/A
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	18
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	2700
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	7700
Phenols (From SVOC Analysis)*	2	N/A
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	NA
Ethers*	0.5	NA
Nitrobenzene*	0.5	NA
Ketones*	0.5	NA
Aldehydes*	0.5	NA
Amines	Fail	NA
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	Yes	
Is free product present in soil and groundwater?	None	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	No- groundwater has been identified at depths in excess of 2.00 m bgl to date.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	No	
Will soils be imported to site as part of any future earth works	Currently unknown, however it is unlikely soils will be required to be imported to site.	

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

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

4.8. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table. 4.11 has been prepared for the site.

TABLE 4.11 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Heavy Metals, non-volatile PAH (Made Ground in association with historic development)	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Likely	High	LOW
Discussion: Elevated concentrations of heavy metals (arsenic, lead and mercury) and non-volatile PAH have been identified site-wide in Made Ground soils to a maximum proven depth of 3.70 m bgl (WS102). **Recommendation:** Risk can be mitigated through either hardstanding or the installation of a suitable cover system in all proposed landscaped areas and public open spaces to remove any potential for direct exposure to impacted soils and prevent exposure to future site users. Construction works should be completed with PPE and provision of welfare.						
PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Off-site land users.	Unlikely	Negligible	Negligible
Assessment: Asbestos has not been identified within samples tested and compared to Tier 1 assessment and so the probability of any future risk is considered to be unlikely. Should any ACM be identified during the enabling works, these should be dealt with in accordance with protocol specified within the Control of Asbestos Regulations (2012) and industry best practice as detailed in CIRIA733 (Asbestos in Soil and Made Ground: A guide to understanding risk). **Recommendation:**						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
No further assessment is required.						
PL4	Volatile Contaminants such as hydrocarbons, solvents, antifreeze (Made Ground)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Likely	Moderate	LOW
Assessment: Elevated concentrations of TPH C10-C12, C12–C16, C16-C21 and C21-C35 and naphthalene have been identified within the Made Ground across the site to a maximum proven depth of 3.70 m bgl (WS102). Visual and olfactory evidence of contamination has also been identified across the site. As contaminants have been identified across a number of locations across the site, this will need to be considered as widespread contamination. Therefore further remediation will be required. **Recommendation:** It is recommended that in the first instance, a detailed vapour risk assessment is completed across the site to fully characterise the risk to end users. Visual and olfactory evidence of contamination has been identified in several locations, therefore a watching brief should be completed during remediation works to monitor the locations where visual or olfactory hydrocarbon impact has been identified during all phases of investigation completed to date.						
PL4	Methane, carbon dioxide (Made Ground, potentially infilled features on and within 250 m of the site)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Low likelihood	Moderate	LOW
Assessment: Ground gas monitoring to date suggests that the site can be predominantly classified as CS1.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
Sources of ground gases are likely in association with the infilled canal and deep Made Ground, however, due to the variability of the soils risk of significant gassing will likely vary. The Made Ground is predominantly underlain by low-permeability cohesive deposits (Glacial Till) at depths between 1.00 m bgl and in excess of 5.45 m bgl. **Recommendation:** In the first instance, further ground gas monitoring is recommended due to exceedances of volatile contamination identified within the site investigation, soil and water samples, as well as to fully characterise the risk of ground gas generation over representative conditions.						
PL5	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (Made Ground)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (Principal and Secondary B aquifer). Surface water (Rochdale Canal).	Likely	Moderate	**LOW**
Assessment: The primary receptors are identified as the canal to the south and the underlying principal aquifer. The controlled waters assessment has identified elevated heavy metals, PAH and TPH within the leachate and water samples taken from the site. The site is not located within a Groundwater Source protection zone and there are no abstraction points within 1km of the site. The site is a public open space consisting of soft standing surface cover which allows for extensive infiltration of rainfall into underlying Made Ground soils. The proposed development will create hardstanding cover across the site, thus reducing the amount of infiltration generated. This will, in turn, reduce the amount of contaminants present in leachate off the site and reduce the risk further to the underlying aquifer and adjacent canal. The presence of Glacial Till underneath the Made Ground across the site will restrict vertical migration towards the Secondary A aquifer, as well as the lateral migration towards the adjacent canal. **Recommendation:** Further sampling of groundwater and surface water is required to form a detailed controlled water assessment.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Moderate/High	LOW
Assessment: Generally, soils at the site meet class DS-1, AC-1s. Elevated sulphate concentrations meeting Class DS-2, AC-1s were noted within the Made Ground deposits in WS102 and in WS105 it met DS-3, AC-1s also within Made Ground deposits at 1.20 m bgl. **Recommendation:** Concrete should be designed in accordance with the chemical testing results.						
PL7	Organic contaminants such as hydrocarbons, solvents (Made Ground, scrap yards, mills and works)	Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Moderate	LOW
Assessment: Elevated concentrations of TPH have been identified at the proposed pipeline depth (0.75 m – 1.35 m). **Recommendation:** Based on the assessment of current site conditions, it is likely that barrier pipe will be required. This will need to be confirmed with a UKWIR risk assessment post-remediation.						
PL8	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Likely	Low	LOW
Assessment: Contamination has been encountered within shallow Made Ground across the site which may be taken up by flora in soft landscaping. **Recommendation:**						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
Installation of a clean cover system within any areas of soft landscaping to prevent plant uptake of contaminants.						

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

5. GEOTECHNICAL ASSESSMENT

5.1. PROPOSED DEVELOPMENT

E3P understands that Civic Engineers are instructing works on behalf of Manchester City Council. The application site is bounded by Portugal Street to the north, Wadeford Close to the east, and the Rochdale Canal to the south in Ancoats, Manchester.

The proposals involve City Council improvements to the public realm within the Poland Street Zone as defined by the Poland Street Zone NDF and the Poland Street Zone Public Realm Strategy.

5.2. SUMMARY OF GROUND CONDITIONS

Made Ground
Made Ground was encountered within all exploratory hole locations from ground level to a maximum depth of 3.80 m bgl. The Made Ground was shallowest on the eastern boundary and became deeper to the west. The deepest Made Ground was encountered along the western boundary, likely associated with the former canal. The base of Made Ground could not be proven within WS105, TP103, and TP104 due to obstructions.

Made Ground encountered along the western boundary in association with the former infilled canal (WS101, WS102, WS103, WS104, and WS106) comprised of reworked topsoil overlying interlayered gravelly sands and reworked gravelly clay. In WS105, also located along the western boundary, Made Ground comprised a grey gravel was encountered overlying gravels and reworked gravelly clay. Gravels of sandstone, mudstone, slate, brick, and concrete were encountered as well as fragments of glass, ceramic, tar, ash, and clinker were also encountered throughout the Made Ground. Hydrocarbon odours and sheens were encountered between 0.50 – 3.70 m bgl in WS101 to WS104. Further investigation is required including trial/slit trenching within the infilled canal to fully understand the ground conditions and materials within this area. It is anticipated that the infilled material will comprise detritus materials which pose a risk to the proposed development due to both chemical and geotechnical unsuitability.

The rest of the site (central and eastern section) encountered shallower Made Ground and generally comprised a reworked topsoil overlying a sandy gravel followed by a reworked gravelly clay. Gravels of sandstone, mudstone, limestone, brick and concrete were encountered as well as fragments of glass, ceramic, metal, timber, and plastic throughout this layer. A slight sheen was encountered within perched water in TP104. No other odours were encountered.

<u>Road Cores</u>
All four road cores completed along Jersey street to the south of the site comprise a layer of asphalt from 0.00 – 0.20 m bgl. Asphalt was predominantly underlain by brown sandy gravel, with the exception of RC03 which was underlain by grey sandy gravel of concrete. The gravel consisted of sandstone, mudstone, coal, brick and concrete with fragments of ceramic and glass also being identified within this layer.

Drift
Drift deposits were encountered within the majority of exploratory locations with the exception of three locations where the full depth of Made Ground could not be proven. The drift deposits generally comprise a firm to stiff brown gravelly CLAY, with gravels of sandstone and mudstone.

In two locations (TP105 and SA102) soft brown gravelly CLAY was identified.



Solid
Solid bedrock geology was encountered within this investigation. The nearest BGS borehole 300 m northeast of the site records Red, brown and grey MUDSTONE at 36.88 m bgl.

Groundwater

Groundwater was encountered in the site investigation between 1.50 – 3.00 m bgl as perched water within the Made Ground deposits. Throughout the monitoring period, water strikes were encountered between 2.71 m bgl and 3.28 m bgl. Water strikes are likely perched water within the Made Ground, and not in hydraulic continuity with the wider environ.

5.3. SITE PREPARATION

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

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

5.4. FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

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

TABLE 5.1 SUMMARY OF ABP

COHESIVE SOILS			
Description	**Depth (range m bgl)**	**Undrained Shear Strength (Cu) (kN/m^2)**	**Allowable Bearing Pressure (kN/m^2)**
Stiff CLAY	4.00 – 5.00	59 - 66	121 - 136
Very stiff CLAY	4.00 – 5.00	76 - 92	156 - 191

Based on the assessment of the relative undrained shear strength, and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying stiff to very stiff glacial clays.

Stiff CLAY identified between 4.00 – 5.00 m bgl has been assessed as having a net allowable bearing pressure (ABP) of 121 – 136 kN/m^2. Very stiff CLAY identified between 4.00 – 5.00 m bgl has been assessed as having a net ABP of 156 – 191 kN/m^2.

Foundation depths should take account of the presence of existing and proposed trees, with foundations deepened locally to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.

It is recommended that at working drawing stage a foundation schedule is prepared for the development, taking account of the physical change of natural clay soils and the current/proposed locations of trees.

At this time it is not possible to accurately define the foundation types due to the absence of a formal proposed development plan, however, due to the likely high rise developments a piled solution is likely required.

The use of driven piles may be limited due to the encountered obstructions on site.

A specialist piling contractor should be contacted concerning the selection of the appropriate pile design and construction method. Any piling works undertaken from existing ground levels will require a suitable piling mat/platform constructed in accordance with BRE Report 470 (2004).

A summary of anticipated foundations is presented in Table 5.3.

TABLE 5.3 ANTICIPATED FOUNDATIONS

LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	FOUNDATION TYPE	TYPE OF CONCRETE
WS101	4.25	-	Stiff CLAY	Y	Piled	DS-1 AC-1s
WS102	4.15	-	Stiff CLAY	Y	Piled	**DS-2, AC-1**
WS103	4.15	-	Stiff CLAY	Y	Piled	DS-1 AC-1s
WS104	4.15	3.00	Very Stiff CLAY	Y	Piled	DS-1 AC-1s
WS105	>1.50	-	TBC. Assumed stiff CLAY	Y	Piled	**DS-3, AC-1**
WS106	3.75	1.50	Stiff CLAY	Y	Piled	DS-1 AC-1s
TP101	1.55	-	Firm CLAY	Y	Piled	-
TP102	1.55	-	Stiff CLAY	Y	Piled	DS-1 AC-1s
TP103	>1.00	-	TBC. Assumed stiff CLAY	Y	Piled	-
TP104	>2.40	-	TBC. Assumed stiff CLAY	Y	Piled	-
TP105	>3.00	-	TBC.	Y	Piled	DS-1 AC-1s

			Assumed stiff CLAY			
TP106	2.35	-	Firm CLAY	Y	Piled	DS-1 AC-1s
TP107	>1.90	1.70	Firm CLAY	Y	Piled	-
SA101	1.75	-	Firm CLAY	Y	Piled	DS-1 AC-1s
SA102	>2.40	-	Firm CLAY	Y	Piled	-
SA103	1.45	-	Firm CLAY	Y	Piled	DS-1 AC-1s

It is recommended that, at working drawing stage, a foundation schedule is prepared for the development taking account of the physical change of natural clay soils and the current/proposed locations of trees.

5.5. GROUND FLOOR SLABS

Current building control regulations require that where infilled ground is present to depths in excess of 600 mm, or where the substratum is variable in terms of the structure and settlement potential, or where clay soils are present within the influence of existing or proposed trees, a suspended floor slab is required.

In this instance, it is considered that for the majority of substructures, the underlying stratum would have in excess of 600 mm of infill and, as such, a suspended floor slab will be required.

Where a cast in-situ suspended slab is utilised with no subfloor void, appropriate compressible material (heave precautions) will be required in the construction of the substructure.

5.6. HEAVE PRECAUTIONS

The site has been proven to be underlain by clay soils, which are susceptible to volumetric instability due to fluctuations in moisture content, particularly within influencing distance of trees as per the NHBC/LABC conjectured zones of influence.

As the clay is deemed to be low-medium plasticity, heave precautions are required to the internal face of the external load-bearing walls (outside or within tree influence).

If a ground beam is to be constructed within the zone of tree influence, heave precautions are required to the underside of this and edge beams.

If the ground floor slab is to be constructed with a beam and block floor, a minimum subfloor void of 250 mm is required within any structures located in the zone of conjectured tree influence.

If the ground floor slab is constructed with a cast in-situ suspended floor slab, then heave precautions that can tolerate 50 mm of clay swelling are required within any part of the floor slab to be located within the zone of influence of a tree.

A summary of heave precautions is presented in Table 5.4.

TABLE 5.4 SUMMARY OF HEAVE PRECAUTIONS

		MINIMUM VOID DIMENSION FOR FOUNDATIONS, GROUND BEAMS AND SUSPENDED IN-SITU CONCRETE GROUND FLOORS		MINIMUM VOID DIMENSIONS UNDER PRECAST CONCRETE AND SUSPENDED TIMBER FLOORS
Plasticity Index of Soil	**Required Foundation Depth (m)**	**Thickness of Void Former Against Side of Foundation or Ground Beam (mm)**	**Thickness of Void Former on Underside of Edge Beam and Floor Slab (mm)**	**Void Dimension (mm)**
High Plasticity (> 40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	35	150	300
	1.5–2.0	25	75	
Moderate Plasticity (20–40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	25	100	250
	1.5–2.0	25	50	
Low Plasticity (< 20)	2.0–2.5	N/A	50	200
	> 2.0	No Special Precautions		

5.7. HIGHWAYS CONSTRUCTION

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

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

Four CBR tests were undertaken on Made Ground in TP101, TP102, TP105 and TP107 with end CBR results ranging from 8% to 19%.

5.8. DRAINAGE

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

Furthermore, the site is predominantly underlain by low-permeability gravelly CLAY. Therefore, the use of soakaway drainage will be limited, and as the lateral continuity of the Made Ground cannot be assured, it is not recommended that soakaways are utilised for disposal of surface water runoff.

If soakaway drainage is to be considered, full BRE 365 testing must be completed to inform the detailed design.

5.9. CONCRETE DURABILITY

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

Elevated sulphate concentrations meeting Class DS-2, AC-1s were noted within the Made Ground deposits in WS102 and in WS105 it met DS-3, AC-1s also within Made Ground deposits at 1.20 m bgl.

5.10. EXCAVATIONS

Trial pits were generally stable in both granular Made Ground and natural strata; as such, it is considered that near-surface excavations will be feasible. In areas where Made Ground exceeded 1.00 m, excavations were generally less stable.

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

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

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

TABLE 5.5 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sand has been identified.
Minor Water Ingress	No	Minor water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure.
Shallow Bedrock	No	Shallow bedrock has not been identified.

5.11. CONSTRUCTION ACTIVITY AND INSPECTION

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

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

5.12. GEOTECHNICAL RISK REGISTER

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils	All	100	The site will likely require remediation in the form of the removal of deleterious material and potential groundwater remediation.
Obstructions	All	100	The site has been subject to significant historical development and, while above-ground structures have been removed, subsurface obstruction from relict foundations and slabs remain.
Infilled Canal	West	15	A formerly infilled canal is present along the west of the site which has been proven to comprise significant contamination. Due to limited access during the site investigation, the detailed nature of materials within the canal are not full understood. It is likely that the infill materials comprise deleterious materials which will be geotechnically unsuitable. Further investigation is required to confirm the nature of the ground conditions in this area to inform remediation requirements.
Artificially levelled and filled platforms	All	100	The site appears to have been levelled and artificially backfilled.
Trench collapse	All	100	Made Ground present beneath the site is likely to be loosely compacted and possibly prone to collapse.
Mature trees	All	100	An Arboriculture survey is required to determine areas of potential tree influence. The site is predominantly surfaced by soft standing, however, some semi-mature trees are present.
Volume change potential clay	On site	All	The site has been assessed to be underlain by low to medium-volume change potential clays. A conservative approach should be followed and the site should be deemed to be of medium-volume change potential therefore heave precautions are required to the internal face of the external load-bearing walls (within tree influence).

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Running sands	N/A	N/A	Data searches indicate low risk.
Ground dissolution	N/A	N/A	Data searches indicate no hazard.
Concrete design	All	10	The concrete classification will be DS1 AC1s. Elevated sulphate concentrations meeting Class DS-2, AC-1s were noted within the Made Ground deposits in WS102 and in WS105 it met DS-3, AC-1s also within Made Ground deposits at 1.20 m bgl.
Low-permeability ground	N/A	N/A	Soakaways conducted at the site have confirmed that soakaway drainage will not be viable on site due to the underlying cohesive deposits.
Services/sensitive structures	-	-	A review of online services has identified several electric and cable services within the site boundary. Piling may not be possible within close proximity to any sensitive infrastructure.
Abnormal foundation solutions	On site	10	Soft CLAY has been identified within SA102 and TP105 which may require an abnormal foundation solution.

5.13. FURTHER WORKS

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

- Detailed Vapour Risk Assessment to characterise the risk from encountered site-wide hydrocarbon contamination.
- Further site investigation (trial/slit trenching) of the infilled canal.
- Further groundwater sampling to form a detailed controlled waters risk assessment.
- Plot-specific foundation schedule (upon receipt of the final development levels).
- Arboricultural survey.
- Settlement Analysis for earthworks design.
- Geotechnical earthworks strategy (infrastructure).
- Remediation and enabling works strategy.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONTAMINATED LAND ASSESSMENT

Human Health	The Tier 1 Soil assessment has identified exceedances in heavy metals, PAH's and TPH fractions within the Made Ground to a maximum depth of 3.80 mbgl (WS101). The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils, inhalation of particulate and consumption of homegrown vegetables. The risk to chronic human health associated with the elevated concentrations of inorganic heavy metals and non-volatile PAH compounds can be mitigated through either hardstanding or the installation of a suitable cover system in all proposed landscaped areas and public open space to remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy. With regards to the naphthalene and TPH fractions encountered, these present a potential volatilisation to indoor air risk. TPH fractions have been identified within Made Ground deposits in WS102, WS104 and WS106 likely in association with the infilled former canal along the western boundary. Naphthalene has been encountered within the deeper Made Ground deposits of WS101, WS102, WS104, SA101, TP106, and TP105. As contaminants have been identified across a number of locations across the site, this will need to be considered as widespread contamination. Therefore further remediation will be required. It is recommended that in the first instance, a detailed vapour risk assessment is completed across the site to fully characterise the risk to end users. Asbestos was not identified within any of the 13 samples sent for analysis. Six samples of Made Ground from depths between 0.20 – 3.00 m bgl were sent for waste classification. Three samples (WS101 0.20, WS102 0.70 and WS103 0.30) were non-hazardous and 3 samples (WS101 1.80, WS104 3.00 and WS105 1.20) were hazardous. The deeper deposits were hazardous compared to shallower deposits which came back non-hazardous.
Controlled Waters	The controlled waters assessment has identified elevated heavy metals, PAH and TPH within the leachate and water samples taken from the site. The primary receptors are identified as the canal to the south and the underlying principal aquifer. The site is not located within a Groundwater Source protection zone and there are no abstraction points within 1km of the site, reducing the sensitivity of the receptor.

	Due to the exceedances of hydrocarbons noted in the soil, leachate and water samples, the risk to controlled waters is considered to be moderate. It is recommended that a detailed controlled waters risk assessment is completed to further assess the risk. Further water sampling is likely required. The infilled canal on-site will need to be isolated to prevent ingress of water during further investigation and remediation works to reduce the spread of contamination to the wider environ.
Ground Gas	No significantly elevated levels of ground gas have been recorded, and Gas monitoring to date shows the site to be CS1. Sources of ground gases are likely in association with the infilled canal and deep Made Ground, however, due to the variability of the soils risk of significant gassing will likely vary. The Made Ground is predominantly underlain by low-permeability cohesive deposits (Glacial Till) at depths between 1.00 m bgl and in excess of 5.45 m bgl. In the first instance, further ground gas monitoring is recommended due to exceedances of volatile contamination identified within the site investigation, soil and water samples, as well as to fully characterise the risk of ground gas generation over representative conditions.
Potable Water	Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development. This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.

6.2. GEOTECHNICAL ASSESSMENT

Made Ground was encountered within all exploratory hole locations from ground level to a maximum depth of 3.80 m bgl. The Made Ground was shallowest on the eastern boundary (TP101 1.10 m bgl) and became deeper to the west. The deepest Made Ground was encountered along the western boundary, likely associated with the former canal.

Significant concrete and brick obstructions have been encountered within the Made Ground.

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

The underlying natural clay drift deposits have been assessed as being stiff medium strength to very stiff, high-strength with a net ABP in the order of 121 kN/m2 increasing to 191 kN/m2 at circa 4.00 – 5.00 m bgl.

Foundation depths should take account of the presence of existing and proposed trees, with foundations deepened locally to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.

It is recommended that at working drawing stage a foundation schedule is prepared for the development, taking account of the physical change of natural clay soils and the current/proposed locations of trees.

At this time it is not possible to accurately define the foundation types due to the absence of a formal proposed development plan, however, due to the likely high rise developments a piled solution is likely required.

The use of driven piles may be limited due to the encountered obstructions on site.

A specialist piling contractor should be contacted concerning the selection of the appropriate pile design and construction method. Any piling works undertaken from existing ground levels will require a suitable piling mat/platform constructed in accordance with BRE Report 470 (2004).

END OF REPORT

APPENDIX I
LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.

5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.

8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

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10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II
GLOSSARY

TERMS

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

MIBK	Methyl isobutyl ketone	**WTE**	Water table elevation
m	Metres	**ppm**	Parts per million
km	Kilometres	**mg/m^3**	Milligram per metre cubed
% v/v	Percent volume in air	**m bgl**	Metres below ground level
mb	Millibars (atmospheric pressure)	**m bcl**	Metre below cover level
l/hr	Litres per hour	**mAOD**	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	**kN/m^2**	Kilonewtons per metre squared
ppb	Parts per billion	**µm**	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	**SSRT**	Site Specific Remediation Target
PSD	Particle Size Distribution	**DD**	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	**Mc**	Moisture Content
ρ	Bulk Density	**GPR**	Ground Penetrating Radar
NDP	Nuclear Density Probe	**FFL**	Finished Floor Level
LEL	Lower Explosive Limit	**UKWIR**	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	**LOD**	Limit of Detection

APPENDIX III
DRAWINGS

DRAWING 15-798-001 – SITE LOCATION PLAN





Site Features

- Former Canal
- Former Recreation Ground
- Former Chimney
- Former Housing
- Former Warf

Notes:

P1	REVA	09.01.2023	OW	HM
Phase	Issue	Date	Drawn	Checked

Client: Civic Engineers

Job No: 15-798

Date: 09.01.2023

Drawing No: 003

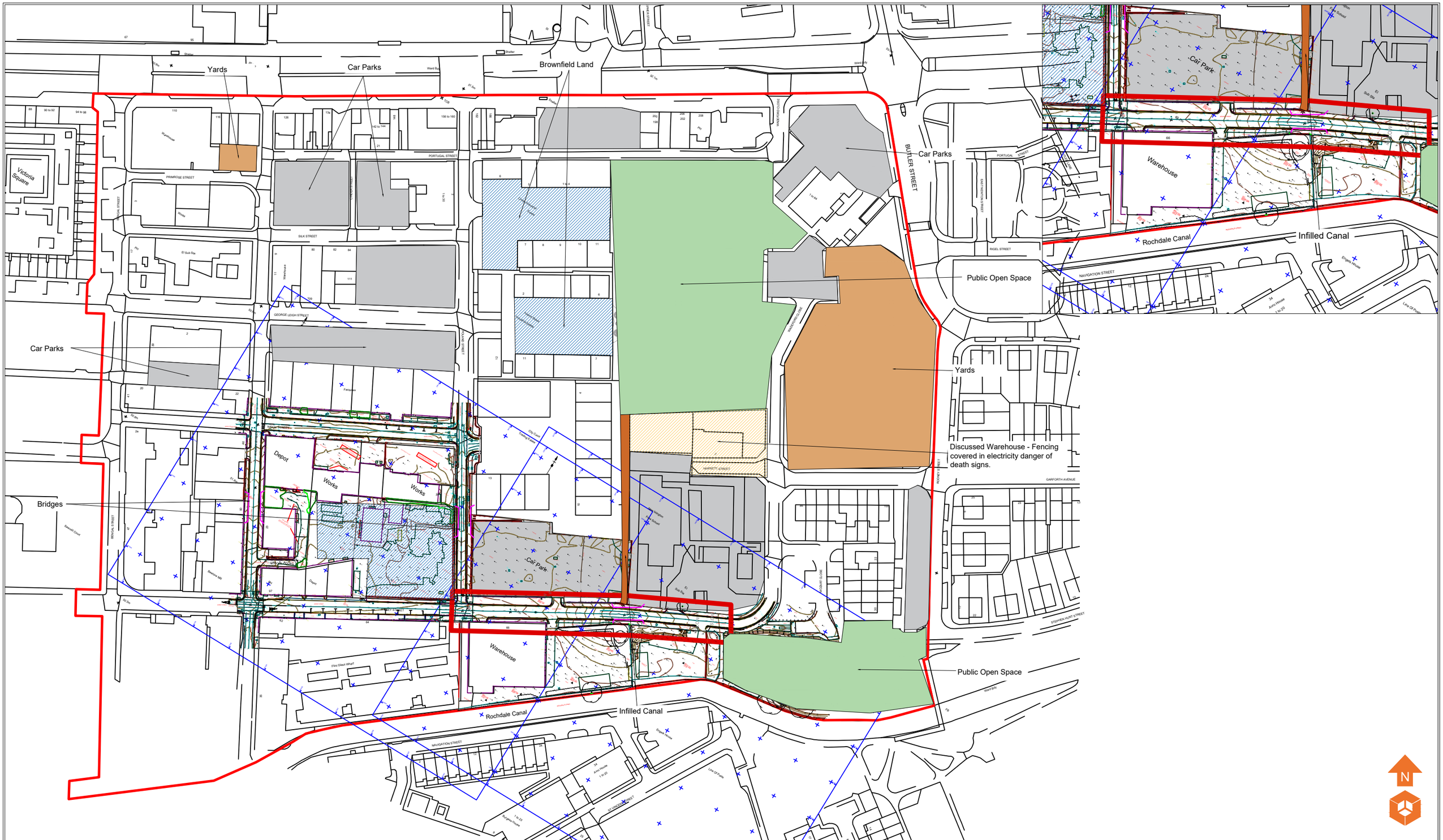
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Job Title: Jersey Street, Ancoats

Drawing Title: Historical Features Plan

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

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Site Features

- Infilled Canal
- Car Parking
- Public Open Space
- Yards
- Brownfield Land
- Discussed Warehouse

Notes:

P1	REVA	18.03.2022	EB	PW
Phase	Issue	Date	Drawn	Checked

Client: Civic Engineers

Job No: 15-798

Date: 18.03.2022

Drawing No: 004

Scale: NTS@ A3

Job Title: Jersey Street, Ancoats

Drawing Title: Site Features Plan

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Location Symbols

- WS101 — Approximate Window Sample Probehole Location
- TP101 — Approximate Trial Pit Location
- SA101 — Approximate Soakaway Test Location
- RC101 — Approximate Rotary Borehole Location
- CBR101 — Approximate California Bearing Ratio Test Location

Notes:

Client: Civic Engineers

Job No: 15-798

Date: 24.01.2023

Drawing No: 005

Scale: NTS@ A3

Phase	Issue	Date	Drawn	Checked
P1	REVB	24.01.2023	OW	HM
P1	REVA	06.01.2023	OW	HM

Job Title: Jersey Street, Ancoats

Drawing Title: Exploratory Hole Plan

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

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

Made Ground Depth (m)

- Depth of Made Ground 0.90 - 1.19m
- Depth of Made Ground 1.20 - 1.49m
- Depth of Made Ground 1.50 - 1.79m
- Depth of Made Ground 1.80 - 2.09m
- Depth of Made Ground 2.10 - 2.39m
- Depth of Made Ground >2.40m

Notes:

Client: Civic Engineers

Job No: 15-798

Date: 09.01.2023

Drawing No: 006

Scale: NTS@ A3

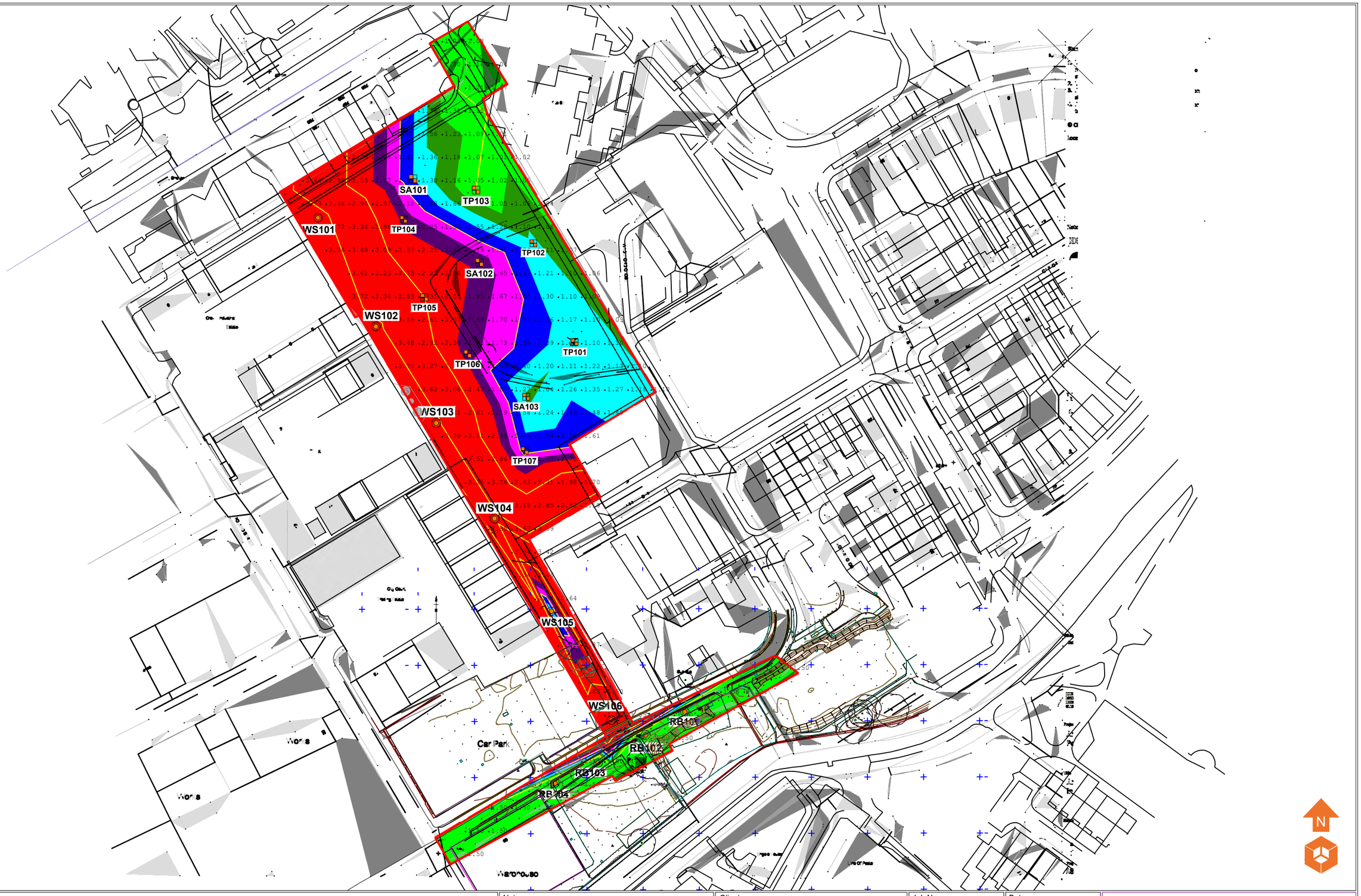
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P1	REVA	06.01.2023	EB	HM

Job Title: Jersey Street, Ancoats

Drawing Title: Depth of Made Ground Plan

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Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
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Location Symbols

- WS101 — Approximate Window Sample Probehole Location
- TP101 — Approximate Trial Pit Location
- SA101 — Approximate Soakaway Test Location
- RB101 — Approximate Rotary Borehole Location

Shallow Spread Footings

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

Mass Trench Fill Footings

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

Engineered Footings

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

Notes:

Client: Civic Engineers

Job No: 15-798

Date: 16.01.2023

Drawing No: 008

Scale: NTS@ A3

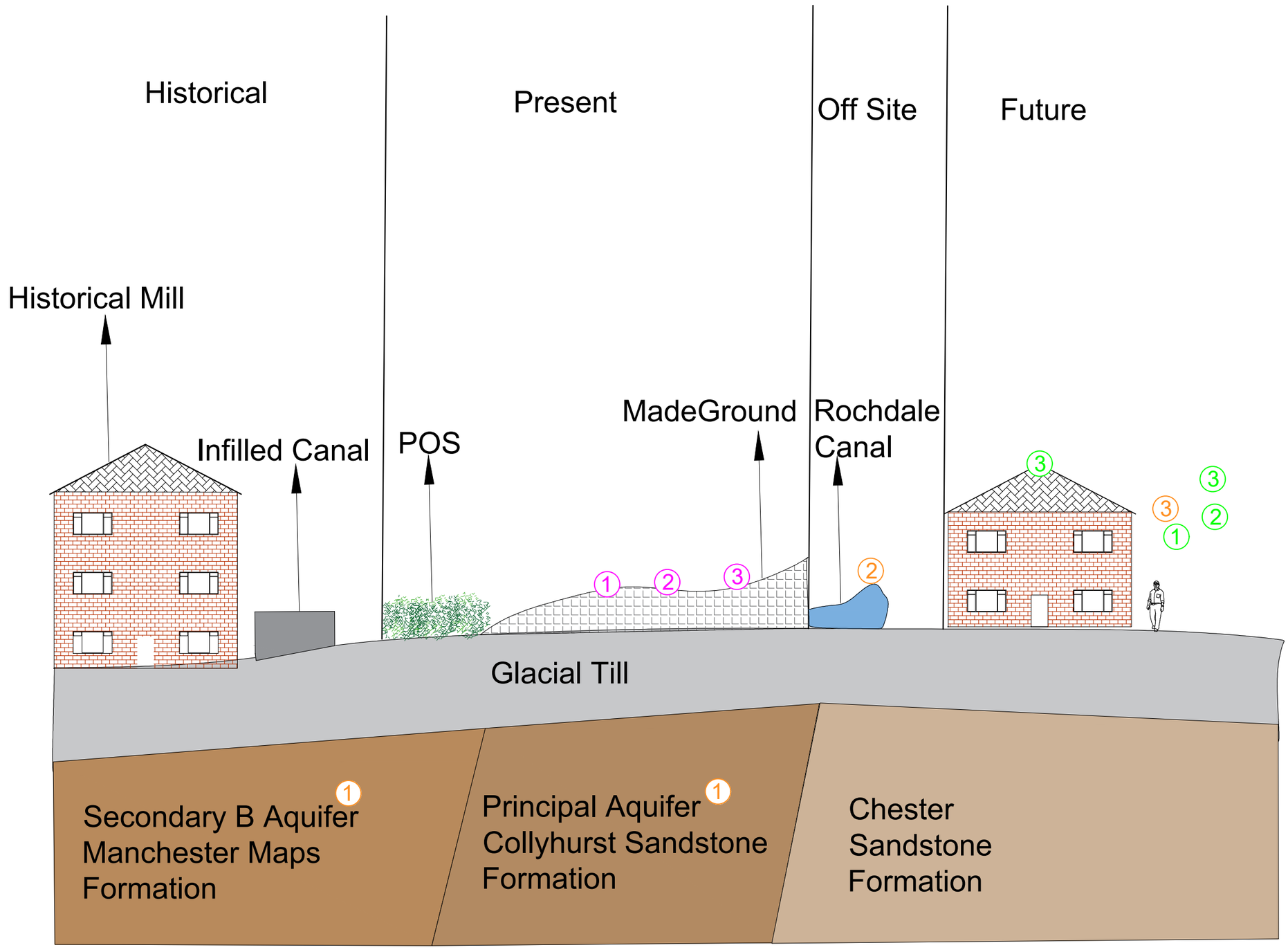
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P1	REVA	16.01.2023	OW	HM

Job Title: Jersey Street, Ancoats

Drawing Title: Depth of Founding Strata Plan

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Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
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Geology Key

- Glacial Till
- Made Ground
- Secondary B Aquifer
- Principal Aquifer
- Chester Sandstone Formation

Sources

1. Heavy Metals
2. TPH
3. Naphthalene

Pathways

1. Soil Ingestion
2. Dermal Contact and Ingestion
3. Vapour Gas Inhalation

Receptor

1. Bedrock Aquifer
2. Rochdale Canal
3. Future Site Users

Notes:

P1	REVA	16.01.2023	OW	HM
Phase	Issue	Date	Drawn	Checked

Client: Civic Engineers

Job No: 15-798

Date: 16.01.2023

Drawing No: 010

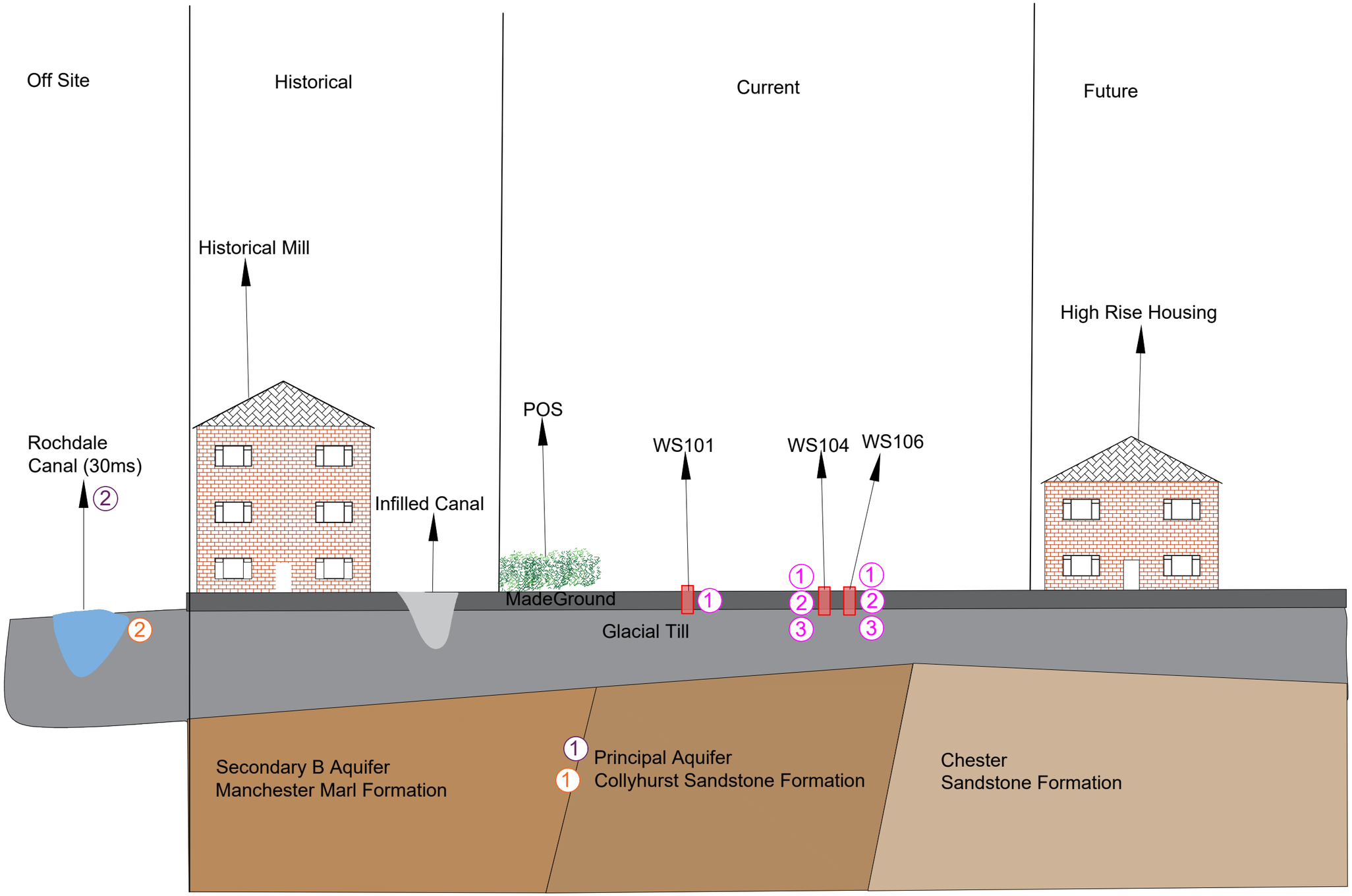
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Job Title: Jersey Street, Ancoats

Drawing Title: Conceptual Site Model

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

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Geology Key
- Glacial Till
- Made Ground
- Secondary B Aquifer
- Principal Aquifer
- Chester Sandstone Formation

Sources
1. Heavy Metals
2. PAH
3. TPH

Pathways
1. Vertical Migration
2. Lateral Migration

Receptor
1. Aquifer
2. Rochdale Canal

Notes:

P1	REVA	31.01.2023	OW	HM
Phase	Issue	Date	Drawn	Checked

Client: Civic Engineers

Job No: 15-798

Date: 31.01.2023

Drawing No: 010

Scale: 1:1000 @ A3

Job Title: Jersey Street, Ancoats

Drawing Title: Conceptual Site Model - Controlled Waters

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

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Location Symbols

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

Development Constraints

- Concrete Obstruction
- Soft Clay
- Made Ground Refusal

Notes:

Client:
Civic Engineers

Job No: 15-798

Date: 16.01.2023

Drawing No: 015

Scale: NTS@ A3

Phase	Issue	Date	Drawn	Checked
P1	REVA	16.01.2023	OW	HM

Job Title:
Jersey Street, Ancoats

Drawing Title:
Development Constraints Plan

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

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Location Symbols

- WS101 — Approximate Window Sample Probehole Location
- TP101 — Approximate Trial Pit Location
- SA101 — Approximate Soakaway Test Location
- RB101 — Approximate Rotary Borehole Location

Contamination Issues - Controlled Waters

- Heavy Metals
- PAH
- TPH (Aromatic)
- TPH (Aliphatic)

Notes:

Client: Civic Engineers

Job No: 15-798

Date: 31.01.2023

Drawing No: 018

Scale: NTS@ A3

Phase	Issue	Date	Drawn	Checked
P1	REVA	31.01.2023	OW	HM

Job Title: Jersey Street, Ancoats

Drawing Title: Contamination Issues Plan - Controlled Waters

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

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Location Symbols

- WS101 Approximate Window Sample Probehole Location
- TP101 Approximate Trial Pit Location
- SA101 Approximate Soakaway Test Location
- RB101 Approximate Rotary Borehole Location

Development Constraints

- Heavy Metals
- PAH
- TPH
- Napthalene
- VOCs
- SVOCs

Notes:

Client: Civic Engineers

Job No: 15-798

Date: 16.01.2023

Drawing No: 018

Scale: NTS@ A3

Phase	Issue	Date	Drawn	Checked
P1	REVA	16.01.2023	OW	HM

Job Title: Jersey Street, Ancoats

Drawing Title: Contamination Issues Plan

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Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

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APPENDIX IV
PHOTOGRAPHS

PLATE 1 ANCOATS AREA



PLATE 2 JERSEY STREET



PLATE 3 WS101 ARSINGS



PLATE 4 TP106 EXCAVATION



APPENDIX V
E3P EXPLORATORY HOLE LOGS

Borehole Log

Borehole No. **WS101**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385169.00 - 398968.00	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 26/07/2022 -	Logged By E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.30			MADE GROUND: Brown slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine subangular of brick. (Reworked Topsoil).
					0.55			MADE GROUND: Brick.
		1.00		N=13 (3,4/3,3,3,4)				MADE GROUND: Blackish brown gravelly fine to medium sand. Gravel is fine to coarse subangular to angular of sandstone and slate with occasional brick and clinker.
					1.50			
		1.80	ES					MADE GROUND: Very soft blackish grey slightly gravelly silty reworked clay with occasional rootlets. Gravel is fine to medium subangular of coal with occasional tar and glass.
		2.00		N=2 (1,2/1,0,0,1)				
		2.50	ES		2.40			MADE GROUND: Very soft black slightly gravelly silty reworked clay. Gravel is fine to medium subangular of glass. (Strong hydrocarbon odour and black sheen)
		3.00		N=1 (0,0/0,0,0,1)				
					3.50			MADE GROUND: Soft brownish grey slightly gravelly reworked clay. Gravel is medium to coarse subangular of brick.
					3.80			Stiff medium strength brown CLAY.
		4.00	SPT					
		4.00		N=14 (2,3/3,3,4,4)				
		5.00	SPT					
		5.00		N=16 (3,3/4,4,4,4)				
					5.45			End of borehole at 5.45 m

Remarks

1. Complete 2. Monitoring well installed (response zone: 0.50m-3.00m bgl) 3. Strong hydrocarbon odour and black sheen encountered from 2.40-3.50m bgl

Borehole Log

Borehole No. **WS102**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385187.00 - 398938.00	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 26/07/2022 -	Logged By E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			MADE GROUND: Brown slightly gravelly fine to medium sand with occasional rootlets. Gravel is fine to coarse subangular to angular of brick and sandstone with occasional fragments of glass. (Topsoil)
		0.70	ES		0.50			
		1.00		N=17 (3,4/3,4,6,4)	0.65 0.80			MADE GROUND: Dark brown gravelly fine to medium sand with occasional cobbles. Gravel is fine to coarse subangular to angular of brick, sandstone and concrete. Cobbles are concrete at 0.35m bgl and sandstone at 0.45m bgl.
		1.50	ES		1.50			MADE GROUND: Firm brown slightly sandy gravelly reworked clay. Gravel is fine to medium subangular to angular of brick with ash. (Slight hydrocarbon odour)
		2.00		N=5 (2,2/1,3,1,0)	1.90 2.00			MADE GROUND: Brownish grey slightly gravelly fine to medium sand. Gravel is fine to medium subangular to angular of mudstone with clinker.
					2.90			MADE GROUND: Very stiff brown slightly gravelly sandy reworked clay with cobble at 1.45m bgl. Gravel is fine to medium subangular of sandstone with ash. Cobble is subangular of concrete.
		3.00 3.00	ES	N=3 (0,0/0,1,1,1)				
					3.70			MADE GROUND: Blackish brown gravelly fine to medium sand with cobble at 0.75 - 0.80m bgl. Gravel is fine to coarse subangular to angular of brick and sandstone with ash. Cobble is subangular of brick. (Slight hydrocarbon odour)
		4.00 4.00	SPT	N=14 (3,4/3,4,3,4)				MADE GROUND: Very stiff brown slightly silty slightly gravelly reworked clay with occasional rootlets. Gravel is fine to medium subangular to angular of brick.
		5.00 5.00	SPT	N=19 (3,4/4,4,5,6)				MADE GROUND: Blackish brown clayey fine to medium gravelly sand. Gravel is fine to medium subangular to angular of sandstone and brick.
					5.45			MADE GROUND: Soft black slightly gravelly reworked clay. Gravel is fine to coarse subangular to angular of sandstone with occassional fragments of glass and tar. (Strong hydrocarbon odour and black sheen)
								Stiff medium strength brown CLAY. Becomes very stiff high strength circa 5.00m bgl.
								End of borehole at 5.45 m

Remarks

1. Complete 2. Monitoring well installed (response zone: 0.50m-3.00m bgl) 3. Slight hydrocarbon odour encountered at 0.50m bgl and 1.50m bgl and strong hydrocarbon odour and black sheen encountered from 2.90-3.70m bgl

Borehole Log

Borehole No. **WS103**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385205.00 - 398911.00	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 26/07/2022 -	Logged By E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.45			MADE GROUND: Brown slightly gravelly fine to medium sand with occasional rootlets with cobble at 0.45m bgl. Gravel is fine to medium subangular to angular of brick and concrete. Cobble is subangular of brick. (Topsoil)
		1.00		N=14 (3,3/4,3,3,4)	0.70 0.80			MADE GROUND: Greyish brown mottled orange gravelly fine to medium sand. Gravel is fine to coarse subangular to angular of sandstone and concrete with occasional clinker and tar.
		2.00		N=10 (1,1/1,3,3,3)	1.40 1.75			MADE GROUND: Firm greyish brown gravelly reworked clay. Gravel is fine to medium subangular of brick with occasional tar. MADE GROUND: Brown slightly clayey slightly gravelly medium to coarse sand. Gravel is fine to medium subangular to subrounded of sandstone with ash. MADE GROUND: Brick.
		2.80 3.00	ES	N=2 (1,0/1,0,1,0)	2.90			MADE GROUND: Blackish brown slightly gravelly clayey fine to medium sand. Gravel is fine to medium subangular to angular of brick with occasional clinker.
		3.80 4.00 4.00	ES SPT	N=22 (3,4/5,6,5,6)	3.70			MADE GROUND: Very soft black slightly gravelly reworked clay. Gravel is fine to coarse subangular to angular of mudstone, brick, and sandstone with tar. (Strong hydrocarbon odour and black sheen) Very stiff high strength brown CLAY.
		5.00 5.00	SPT	N=22 (3,4/5,5,6,6)	5.45			End of borehole at 5.45 m

Remarks

1. Complete 2. Monitoring well installed (response zone: 1.00m-3.50m bgl) 3. Strong hydrocarbon odour and black sheen encountered from 2.90-3.70m bgl

Borehole Log

Borehole No. **WS104**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385229.00 - 398881.00	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 26/07/2022 -	Logged By E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			MADE GROUND: Brown clayey fine to medium sand with frequent rootlets. (Topsoil)
					0.40			MADE GROUND: Yellowish brown very gravelly reworked clay. Gravel is fine to coarse subangular to subrounded of concrete and brick with plastic sheeting.
		1.00		N=20 (10,10/7,5,4,4)	1.00			MADE GROUND: Brick fill.
					1.30			MADE GROUND: Yellowish brown slightly clayey gravelly fine to medium sand. Gravel is fine to coarse subangular to angular of concrete, sandstone and brick.
		1.50	ES					
		2.00		N=10 (3,3/4,2,2,2)				MADE GROUND: Stiff blackish brown slightly sandy gravelly reworked clay with cobble at 0.85m bgl. Gravel is fine to coarse subangular to angular of brick with occasional clinker, ash and tar.
					2.60			No recovery- inferred as (MADE GROUND: Stiff blackish brown slightly sandy gravelly reworked clay with cobble at 0.85m bgl. Gravel is fine to coarse subangular to angular of brick with occasional clinker, ash and tar.
	▼				2.60			
		3.00	ES		3.00			MADE GROUND: Blackish brown slightly sandy gravel. Gravel is fine to coarse subangular to angular of concrete with occasional clinker.
		3.00		N=1 (2,2/1,0,0,0)				
					3.70			MADE GROUND: Very soft black slightly gravelly reworked clay. Gravel is fine to medium subangular of brick with occasional tar. (Strong hydrocarbon odour and black sheen).
		4.00	SPT					Very stiff high strength brown CLAY.
		4.00		N=18 (2,3/4,4,5,5)				
		5.00	SPT					
		5.00		N=20 (3,4/4,5,5,6)				
					5.45			End of borehole at 5.45 m

Remarks

1. Complete 2. Water strike encountered at 3.00 m bgl. 3. Monitoring well installed (response zone: 0.50m-3.50m bgl) 4. Strong hydrocarbon odour and black sheen encountered from 3.00-3.70m bgl

Borehole Log

Borehole No. **WS105**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385244.00 - 398842.00	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 26/07/2022 -	Logged By E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05			MADE GROUND: Grey gravel. Gravel is fine to coarse subangular to angular of concrete.
					0.30			MADE GROUND: Yellowish brown very gravelly reworked clay. Gravel is fine to coarse subangular of sandstone.
					0.40			Concrete.
					0.60			MADE GROUND: Brownish grey sandy gravel. Gravel is fine to coarse subangular of concrete.
					0.80			MADE GROUND: Blackish grey gravelly reworked clay. Gravel is fine to coarse subangular to angular of brick and sandstone with ash.
		1.00		N=12 (2,2/4,4,2,2)	1.00			MADE GROUND: Brick.
		1.20	ES					MADE GROUND: Stiff brownish grey, black and orange gravelly reworked clay. Gravel is fine to coarse subangular to angular of brick and sandstone with occasional fragments of wire, ash, and clinker.
					1.45			MADE GROUND: Black slightly clayey gravel. Gravel is tar.
					1.50			End of borehole at 1.50 m

Remarks

1. Refusal in Made Ground on suspected cobble 2. Monitoring well installed (response zone: 0.50m-1.50m bgl)

Trial Pit Log

TrialPit No SA101 Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385202.19 - 398985.72 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): 1.50 x 0.80 Depth 2.00	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.60	ES		0.20			MADE GROUND: Dark brown slightly gravelly clay with frequent rootlets. Gravel is fine to coarse, subangular to subrounded of sandstone with occassional fragments of ceramic.
				0.80			MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and brick with occasional fragments of ceramic and metals.
	1.50	HVP	69	1.30			MADE GROUND: Brown gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, and brick, with occasional fragments of ceramic and metal.
				2.00			Firm brown slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone.
							End of Pit at 2.00m

1 2 3 4

Remarks: 1. Complete. 2. BRE 365 Soakaway Testing undertaken in Trial Pit.

Stability: Stable

Trial Pit Log

TrialPit No SA102
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385224.62 - 398961.40 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): 1.50 × 0.80 Depth 2.40	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Dark brown clay with frequent rootlets (Reworked Topsoil).
							MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone with occasional fragments of brick, glass, and ceramic.
				1.10			MADE GROUND: Dark brown gravelly clay. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and brick.
	1.80	ES		1.70			Soft to firm brown slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone.
	1.80	HVP	32				
	2.20	HVP	64				
				2.40			End of Pit at 2.40m

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Remarks: 1. Complete. 2. BRE 365 Soakaway Testing undertaken in Trial Pit.

Stability: Stable

Trial Pit Log

TrialPit No SA103
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385236.36 - 398907.21 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): 1.50 × 0.80 Depth 2.00	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Dark brown clay with frequent rootlets (Rewored Topsoil).
	0.40	ES					MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone with occasional fragments of brick, glas, and ceramic.
				0.60			MADE GROUND: Brown gravelly clay. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone with occasional fragments of brick, glass, and ceramic.
				1.00			Firm brown gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of mudstone.
	1.50	HVP	61				
				2.00			End of Pit at 2.00m

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Remarks: 1. Complete. 2. BRE 365 Soakaway Testing undertaken in Trial Pit.

Stability: Stable

Trial Pit Log

TrialPit No: TP101
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385255.11 - 398933.29 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): 1.50 × 0.80 Depth 2.20	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Dark brown clay with frequent rootlets (Reworked Topsoil).
							MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone with occasional fragments of brick, ceramic, and timber.
				0.70			MADE GROUND: Reworked brown gravelly clay. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, and brick.
				1.10			Firm brown slightly gravelly slightly silty CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone.
	1.50 1.50	ES HVP	53				
	2.00	HVP	65				
				2.20			End of Pit at 2.20m

Remarks: 1. Complete.

Stability: Stable

Trial Pit Log

TrialPit No: TP102
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385244.25 - 398966.44 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): Depth 2.20 — 1.50 × 0.80	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.05	ES		0.10			MADE GROUND: Dark brown gravelly clay with frequent rootlets. Gravel is fine to coarse, subangular to subrounded of mudstone and brick with occasional fragments of glass and ceramic. (Reworked Topsoil).
				0.60			MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of concrete, brick, sandstone, and mudstone with occasional fragments of glass and ceramic.
				1.10			MADE GROUND: Dark brown gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and brick.
	1.50	HVP	79				Stiff brown slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone.
				2.20			End of Pit at 2.20m

Remarks: 1. Complete.

Stability: Stable

Trial Pit Log

TrialPit No: TP103
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385222.30 - 398990.45 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): 1.50 × 0.80 Depth 1.00	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.50	ES		0.10			MADE GROUND: Dark brown gravelly clay. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, and brick (Reworked Topsoil).
							MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse subangular to subrounded of sandstone, mudstone, brick, and concrete with occasional fragments of wood and ceramic.
				1.00			End of Pit at 1.00m

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Remarks: 1. Terminated at 1.00 m bgl due to solid base.

Stability: Stable

Trial Pit Log

TrialPit No: TP104
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385196.42 - 398969.86 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): 1.50 × 0.80 Depth 2.40	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Dark brown clay with frequent rootlets (Reworked Topsoil).
	2.00	ES					MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone and brick with occasional fragments of ceramic, plastic, and timber.
▼ 2.30							
				2.40			End of Pit at 2.40m

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Remarks: 1. Terminated at 2.40 m bgl due to collapse. 2. Water strike encountered at 2.30 m bgl.

Stability: Unstable

Trial Pit Log

TrialPit No: TP105
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385194.90 - 398943.26 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): Depth 3.00 — 1.50 × 0.80	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Dark brown clay with frequent rootlets (Reworked Topsoil).
				0.20			MADE GROUND: Grey gravel. Gravel is fine to coarse, subangular to subrounded of limestone and concrete.
							MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone.
				1.30			
	1.50	ES					MADE GROUND: Brown gravelly sand. Gravel is fine to coarse, subangular to subrounded of sandstone and brick.
				2.20			
	2.50	HVP	31				Soft brown slightly silty slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone.
	2.90	HVP	34				
				3.00			End of Pit at 3.00m

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Remarks: 1. Complete.

Stability: Stable

Trial Pit Log

TrialPit No: TP106
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385213.22 - 398919.43 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): 1.50 × 0.80 Depth 2.40	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Dark brown gravelly clay with frequent rootlets (topsoil). Gravel is fine to coarse, subangular to subrounded of sandstone and brick.
				0.20			MADE GROUND: Grey sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone and limestone.
	1.00	ES					MADE GROUND: Dark brown blackish sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, brick, concrete, and mudstone with occasional fragments of ceramic.
				1.50			MADE GROUND: Greyish brown slightly gravelly clay. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, and brick.
				1.90			Firm greyish brown slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of sandstone and mudstone.
				2.40			End of Pit at 2.40m

Remarks: 1. Complete. 2. Stable

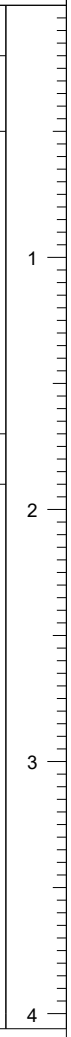
Stability: Stable

Trial Pit Log

TrialPit No: TP107
Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385213.22 - 398919.43 Level:	Date 13/12/2022
Location: Ancoats		Dimensions (m): 2.00 × 0.80 Depth 1.90	Scale 1:30
Client: Civic Engineers			Logged H.Mason

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.05	ES		0.20			MADE GROUND: Dark brown clay with frequent roots and rootlets (Reworked Topsoil).
				0.50			MADE GROUND: Concrete cobbles.
▼ 1.70				1.70			MADE GROUND: Dark brown gravelly clay. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, brick and concrete with occasional fragments of timber and ceramic.
				1.90			Firm brown CLAY.
							End of Pit at 1.90m



Remarks: 1. Terminated due to ingress of water. 2. Water strike encountered at 1.70 m bgl.

Stability: Stable

Borehole Log

Borehole No. **WS106**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385264.79 - 398802.03	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 13/12/2022 -	Logged By H.Mason

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05			MADE GROUND: Dark brown clay with some rootlets (topsoil).
					0.50			MADE GROUND: Dark brown gravelly clay. Gravel is fine to coarse, subangular to subrounded of brick, sandstone, mudstone, and concrete.
					0.70			
		1.00		N=21 (8,7/4,4,4,9)	1.00			MADE GROUND: Brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of concrete and limestone.
	▼	1.20	ES					MADE GROUND: Brown gravelly clay. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, concrete, and brick.
		2.00		N=23 (2,2/2,8,10,3)				MADE GROUND: Brown blackish sandy gravel. Gravel is fine to coarse, subangular to subrounded of brick and sandstone.
		3.00		N=10 (2,2/2,2,3,3)	3.00			MADE GROUND: Dark brown blackish gravelly clay. Gravel is fine to coarse, subangular to subrounded of brick and sandstone.
					3.30			Stiff brown slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of coal.
		3.60	ES					
		4.00		N=15 (2,3/3,4,4,4)	4.00			No Recovery.
		5.00		N=17 (3,3/4,5,4,4)				
					5.45			End of borehole at 5.45 m

Remarks

1. Complete. 2. Water strike encountered at 1.50 m bgl. 3. Monitoring well installed (response zone from 1.00 - 3.00 m bgl).

Borehole Log

Borehole No. **RC101**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385283.97 - 398800.87	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 13/12/2022 -	Logged By H.Mason

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	B		0.20			Asphalt.
		0.60	B		0.50			MADE GROUND: Brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, and brick with occassional fragments of ceramic.
					0.70			MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, and brick with some fragments of ceramic.
								End of borehole at 0.70 m

Remarks
1. Complete.

Borehole Log

Borehole No. **RC102**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385279.11 - 398798.38	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 13/12/2022 -	Logged By H.Mason

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.20			Asphalt.
		0.50	ES		0.40			MADE GROUND: Brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, asphalt, and concrete with occassional fragments of ceramic.
					0.60			MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, and brick with occassional fragments of glass.
								End of borehole at 0.60 m

Remarks
1. Complete.

Borehole Log

Borehole No. **RC103**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385271.13 - 398794.50	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 13/12/2022 -	Logged By H.Mason

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	B		0.20 0.35			Asphalt. MADE GROUND: Grey sandy gravel. Gravel is fine to coarse, subangular to subrounded of concrete. End of borehole at 0.35 m

Remarks
1. Terminated at 0.35 m bgl due to possible bridge structure.

Borehole Log

Borehole No. **RC104**

Sheet 1 of 1

Project Name: Jersey Street	Project No. 15798	Co-ords: 385263.43 - 398789.78	Hole Type WS
Location: Ancoats		Level:	Scale 1:50
Client: Civic Engineers		Dates: 13/12/2022 -	Logged By H.Mason

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40	B		0.20			Asphalt.
		0.60	ES		0.50			MADE GROUND: Brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, brick, and coal with occassional fragments of ceramic.
					0.60			MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse, subangular to subrounded of sandstone, mudstone, brick, and coal with occassional fragments of ceramic.
								End of borehole at 0.60 m

Remarks
1. Complete.

APPENDIX VI
CHEMICAL TESTING RESULTS

Eleanor Canham
e3p
Taylor Road
Urmston
Manchester
M41 7JQ

e:

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 22-74321

Project / Site name:	Jersey Street	**Samples received on:**	27/07/2022
Your job number:	15-938	**Samples instructed on/ Analysis started on:**	27/07/2022
Your order number:	002359	**Analysis completed by:**	05/08/2022
Report Issue Number:	1	**Report issued on:**	05/08/2022
Samples Analysed:	2 leachate samples - 8 soil samples		

Signed:

Martyna Langer
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 22-74321
Project / Site name: Jersey Street
Your Order No: 002359

Lab Sample Number				2367514	2367515	2367516	2367517	2367518
Sample Reference				WS101	WS101	WS102	WS102	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.80	0.70	3.00	0.30
Date Sampled				26/07/2022	26/07/2022	26/07/2022	26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	4.1	17	4.5	34	3.4
Total mass of sample received	kg	0.001	NONE	0.5	1.2	0.5	0.5	0.5
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KSZ	SFS	SFS	KSZ	KSZ

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.8	7.4	8.9	6.9	6.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	530	< 1.0	13	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	580	15000	350	2300	690
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.025	0.16	0.049	0.57	0.015
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	50	310	99	1100	31
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	25.2	157	49.4	574	15.4
Sulphide	mg/kg	1	MCERTS	16	8.8	22	260	5.6
Total Sulphur	mg/kg	50	MCERTS	620	10000	390	13000	490
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	3	6.5	2	-	2.7
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	-	-	-	11	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	4.5	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	11	12	0.54	-	0.65
Acenaphthylene	mg/kg	0.05	MCERTS	1.6	29	0.23	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	7.4	21	0.96	-	0.26
Fluorene	mg/kg	0.05	MCERTS	7.4	23	0.63	-	0.21
Phenanthrene	mg/kg	0.05	MCERTS	19	100	6	-	2.7
Anthracene	mg/kg	0.05	MCERTS	6.1	53	1.6	-	0.66
Fluoranthene	mg/kg	0.05	MCERTS	15	120	13	-	4.5
Pyrene	mg/kg	0.05	MCERTS	15	120	12	-	4.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	9.2	110	7.3	-	2.3
Chrysene	mg/kg	0.05	MCERTS	5.4	99	6.2	-	2
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.5	100	9.4	-	2.1
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.4	63	2.6	-	1
Benzo(a)pyrene	mg/kg	0.05	MCERTS	6.8	110	7.2	-	2.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.3	48	3.2	-	0.97
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.7	11	0.77	-	0.25
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.7	56	4.2	-	1.1

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	119	1090	76.2	-	25.1

Analytical Report Number: 22-74321
Project / Site name: Jersey Street
Your Order No: 002359

Lab Sample Number				2367514	2367515	2367516	2367517	2367518
Sample Reference				WS101	WS101	WS102	WS102	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.80	0.70	3.00	0.30
Date Sampled				26/07/2022	26/07/2022	26/07/2022	26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	30	55	16	150	32
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.4	< 0.2	0.8	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	4.6
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	80	50	25	61	37
Copper (aqua regia extractable)	mg/kg	1	MCERTS	92	180	56	670	88
Lead (aqua regia extractable)	mg/kg	1	MCERTS	240	840	170	780	260
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	3	< 0.3	3.1	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	34	44	57	31
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	180	100	150	660	150
Petroleum Hydrocarbons								
TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	6	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	3.8	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	54	< 2.0	1600	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	45	110	16	2700	5.5
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	72	330	43	4800	9.8
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	110	790	150	7700	19
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	39	150	73	1300	< 10
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	MCERTS	270	1400	280	18000	34
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	-	-	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	-	-	-	530	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	-	1200	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-

Analytical Report Number: 22-74321
Project / Site name: Jersey Street
Your Order No: 002359

Lab Sample Number				2367514	2367515	2367516	2367517	2367518
Sample Reference				WS101	WS101	WS102	WS102	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.80	0.70	3.00	0.30
Date Sampled				26/07/2022	26/07/2022	26/07/2022	26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	850	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	2000	-
Styrene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	-	-	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	1900	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	120	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	1100	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	2600	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	170	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	< 1.0	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	< 0.1	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	< 0.2	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	< 0.05	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	< 0.2	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	1000	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	450	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	180	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	250	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	1000	-

Analytical Report Number: 22-74321
Project / Site name: Jersey Street
Your Order No: 002359

Lab Sample Number				2367514	2367515	2367516	2367517	2367518
Sample Reference				WS101	WS101	WS102	WS102	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.80	0.70	3.00	0.30
Date Sampled				26/07/2022	26/07/2022	26/07/2022	26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	420	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	< 0.3	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	940	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	2400	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	850	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	130	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	< 0.2	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	< 0.3	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	1600	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	1600	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	730	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	530	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	340	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	310	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	480	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	150	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	56	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	210	-

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

Analytical Report Number: 22-74321
Project / Site name: Jersey Street
Your Order No: 002359

Lab Sample Number				2367519	2367520	2367521
Sample Reference				WS103	WS104	WS105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				3.80	3.00	1.20
Date Sampled				26/07/2022	26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	23	18
Total mass of sample received	kg	0.001	NONE	0.5	1.1	1.1
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	N/A	KSZ	SFS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.7	7	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0	200	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	330	1300	13000
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.078	0.44	1.6
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	160	880	3100
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	77.8	441	1560
Sulphide	mg/kg	1	MCERTS	8.9	490	120
Total Sulphur	mg/kg	50	MCERTS	270	8300	8000
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.7	-	1.8
Total Organic Carbon (TOC) – Manual	%	0.1	MCERTS	-	9.2	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	1.1	9.5	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.92	-	2.2
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	0.36
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	2.4
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	1.4
Phenanthrene	mg/kg	0.05	MCERTS	0.66	-	12
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	2.9
Fluoranthene	mg/kg	0.05	MCERTS	0.51	-	17
Pyrene	mg/kg	0.05	MCERTS	0.53	-	14
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	8.1
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	6.5
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	7.7
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	3.6
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	7.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	2.9
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.88
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	3.4

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.62	-	93.1

Analytical Report Number: 22-74321
Project / Site name: Jersey Street
Your Order No: 002359

Lab Sample Number				2367519	2367520	2367521
Sample Reference				WS103	WS104	WS105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				3.80	3.00	1.20
Date Sampled				26/07/2022	26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.6	92	41
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	4.6	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	52	34
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	440	220
Lead (aqua regia extractable)	mg/kg	1	MCERTS	16	980	470
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1	0.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30	50	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	1300	1000
Petroleum Hydrocarbons						
TPH (C5 - C6) $_{HS\_1D\_TOTAL}$	mg/kg	1	NONE	< 1.0	2.5	< 1.0
TPH (C6 - C8) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	MCERTS	< 0.1	3	< 0.1
TPH (C8 - C10) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	MCERTS	< 0.1	18	< 0.1
TPH (C10 - C12) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	2	MCERTS	< 2.0	970	2.2
TPH (C12 - C16) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	4	MCERTS	< 4.0	2600	15
TPH (C16 - C21) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	< 1.0	4000	71
TPH (C21 - C35) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	< 1.0	7000	160
TPH (C35 - C40) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	10	MCERTS	< 10	1300	53
TPH Total C5 - C40 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	MCERTS	< 10	16000	300
VOCs						
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-
Benzene	µg/kg	1	MCERTS	-	2500	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	3000	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-

Analytical Report Number: 22-74321
Project / Site name: Jersey Street
Your Order No: 002359

Lab Sample Number				2367519	2367520	2367521
Sample Reference				WS103	WS104	WS105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				3.80	3.00	1.20
Date Sampled				26/07/2022	26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Ethylbenzene	µg/kg	1	MCERTS	-	3600	-
p & m-Xylene	µg/kg	1	MCERTS	-	5900	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	-
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	-	3600	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	-	350	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	1300	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	3200	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	< 0.1	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-
Naphthalene	mg/kg	0.05	MCERTS	-	1300	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	-	650	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	520	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	180	-
Acenaphthene	mg/kg	0.05	MCERTS	-	900	-

Analytical Report Number: 22-74321
Project / Site name: Jersey Street
Your Order No: 002359

Lab Sample Number				2367519	2367520	2367521
Sample Reference				WS103	WS104	WS105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				3.80	3.00	1.20
Date Sampled				26/07/2022	26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	380	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-
Fluorene	mg/kg	0.05	MCERTS	-	660	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-
Phenanthrene	mg/kg	0.05	MCERTS	-	2400	-
Anthracene	mg/kg	0.05	MCERTS	-	740	-
Carbazole	mg/kg	0.3	MCERTS	-	140	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-
Fluoranthene	mg/kg	0.05	MCERTS	-	1500	-
Pyrene	mg/kg	0.05	MCERTS	-	1500	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	630	-
Chrysene	mg/kg	0.05	MCERTS	-	510	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	310	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	280	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	470	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	160	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	190	-

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

Analytical Report Number: 22-74321
Project / Site name: Jersey Street

Your Order No: 002359

Lab Sample Number				2367522	2367523
Sample Reference				WS101	WS104
Sample Number				None Supplied	None Supplied
Depth (m)				1.80	3.00
Date Sampled				26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
General Inorganics					
pH (automated)	pH Units	N/A	ISO 17025	6.8	6.9
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	2900	< 1.0
Total Phenols					
Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	100
Speciated PAHs					
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	1.1
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	46
Fluorene	µg/l	0.01	ISO 17025	< 0.01	26
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	21
Anthracene	µg/l	0.01	ISO 17025	< 0.01	6
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	3.2
Pyrene	µg/l	0.01	ISO 17025	< 0.01	2.6
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	0.56
Chrysene	µg/l	0.01	ISO 17025	< 0.01	0.4
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01
Total PAH					
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	110
Heavy Metals / Metalloids					
Arsenic (dissolved)	µg/l	1	ISO 17025	3.4	22
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	U/S*	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	3.1	0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	42	9.8
Lead (dissolved)	µg/l	1	ISO 17025	5.5	2.1
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	4.9	7.8
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	11	31

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 22-74321
Project / Site name: Jersey Street

Your Order No: 002359

Lab Sample Number				2367522	2367523
Sample Reference				WS101	WS104
Sample Number				None Supplied	None Supplied
Depth (m)				1.80	3.00
Date Sampled				26/07/2022	26/07/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Monoaromatics & Oxygenates					
Benzene	µg/l	1	ISO 17025	< 1.0	34
Toluene	µg/l	1	ISO 17025	< 1.0	17
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	11
p & m-xylene	µg/l	1	ISO 17025	< 1.0	4.8
o-xylene	µg/l	1	ISO 17025	< 1.0	3.8
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10
Petroleum Hydrocarbons					
TPH1 (C10 - C40) EH_1D_TOTAL_#1_#2_MS	µg/l	10	NONE	< 10	12000
TPH-CWG - Aliphatic >C5 - C6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C5 - C7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	34
TPH-CWG - Aromatic >C7 - C8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	17
TPH-CWG - Aromatic >C8 - C10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	30
TPH-CWG - Aromatic >C10 - C12 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	1100
TPH-CWG - Aromatic >C12 - C16 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	4600
TPH-CWG - Aromatic >C16 - C21 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	5000
TPH-CWG - Aromatic >C21 - C35 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	1300
TPH-CWG - Aromatic (C5 - C35) HS+EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	12000

U/S = Unsuitable Sample I/S = Insufficient Sample
*Analysis could not be completed due to sample matrix.

Analytical Report Number : 22-74321
Project / Site name: Jersey Street

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2367514	WS101	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2367515	WS101	None Supplied	1.8	Brown loam and sand with gravel and vegetation.
2367516	WS102	None Supplied	0.7	Brown loam and sand with gravel and rubble.
2367517	WS102	None Supplied	3	Black clay and loam with oil / petroleum.
2367518	WS103	None Supplied	0.3	Brown loam with gravel and vegetation.
2367519	WS103	None Supplied	3.8	Brown clay and sand.
2367520	WS104	None Supplied	3	Black clay and loam with oil / petroleum.
2367521	WS105	None Supplied	1.2	Brown loam and clay with gravel and vegetation.

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Analytical Report Number : 22-74321
Project / Site name: Jersey Street

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

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

Analytical Report Number : 22-74321
Project / Site name: Jersey Street

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis

Analytical Report Number : 22-74321
Project / Site name: Jersey Street

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

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

Analytical Report Number : 22-74321
Project / Site name: Jersey Street

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS102	None Supplied	S	2367517	b	Volatile organic compounds in soil	L073B-PL	b

Harriet Mason
e3p
Taylor Road
Urmston
Manchester
M41 7JQ

e: hmason@e3p.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 22-13637

Project / Site name:	Jersey Street Ancoats	**Samples received on:**	14/12/2022
Your job number:	15-798	**Samples instructed on/ Analysis started on:**	16/12/2022
Your order number:		**Analysis completed by:**	30/12/2022
Report Issue Number:	1	**Report issued on:**	30/12/2022
Samples Analysed:	6 soil samples		

Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 22-13637
Project / Site name: Jersey Street Ancoats

Lab Sample Number				2535805	2535806	2535807	2535808	2535809
Sample Reference				TP102	SA103	SA101	TP106	TP105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05	0.40	0.60	1.00	1.50
Date Sampled				13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	26	14	16	19
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.3	0.3	0.3
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SFS	SFS	SFS	SFS	SFS
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.8	7.7	7.1	7.7	8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	1.1	< 1.0	6.3
Total Sulphate as SO4	mg/kg	50	MCERTS	650	1600	990	1400	2600
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.012	0.21	0.023	0.2	0.1
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	23	420	47	400	200
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	11.7	210	23.4	200	102
Sulphide	mg/kg	1	MCERTS	7.1	820	6.6	29	180
Total Sulphur	mg/kg	50	MCERTS	290	2900	550	1600	2200
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.5	4.3	3.5	3.6	1.9
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.22	0.17	9.5	5.5*	5.3*
Acenaphthylene	mg/kg	0.05	MCERTS	0.12	0.1	4.8	1.4*	1.6*
Acenaphthene	mg/kg	0.05	MCERTS	0.78	0.2	7.4	5.9*	2.6*
Fluorene	mg/kg	0.05	MCERTS	0.46	0.17	9.3	6.7*	4*
Phenanthrene	mg/kg	0.05	MCERTS	5.1	1.6	74	38*	23*
Anthracene	mg/kg	0.05	MCERTS	1.3	0.35	18	9.5*	5.5*
Fluoranthene	mg/kg	0.05	MCERTS	12	3.3	85	36*	26*
Pyrene	mg/kg	0.05	MCERTS	11	3.8	94	39*	29*
Benzo(a)anthracene	mg/kg	0.05	MCERTS	5.7	1.9	42	18*	15*
Chrysene	mg/kg	0.05	MCERTS	5	1.9	39	18*	11*
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	6.4*	2.1*	38	18*	15*
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	2.9	1.1	14*	7.1*	3.3*
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.6	2	38	16*	11*
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.2	0.78	16	7*	4.7*
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.45	0.19	4.8	2.1*	1.5*
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.6	0.89	20	8.8*	5.9*
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	61.6	20.3	513	238*	165*

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 22-13637
Project / Site name: Jersey Street Ancoats

Lab Sample Number				2535805	2535806	2535807	2535808	2535809
Sample Reference				TP102	SA103	SA101	TP106	TP105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05	0.40	0.60	1.00	1.50
Date Sampled				13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	36	100	54	38
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.1	2.6	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	36	23	22	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	94	130	130	180	94
Lead (aqua regia extractable)	mg/kg	1	MCERTS	290	500	280	370	220
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	< 0.3	0.6	0.4	0.7
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	45	42	51	28
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	260	2600	130	150	76
Petroleum Hydrocarbons								
TPH (C5 - C6) $_{HS\_1D\_TOTAL}$	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	2	MCERTS	< 2.0	< 2.0	11	5.2	5
TPH (C12 - C16) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	4	MCERTS	5.1	< 4.0	58	31	17
TPH (C16 - C21) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	30	18	270	120	71
TPH (C21 - C35) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	78	48	330	160	84
TPH (C35 - C40) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	10	MCERTS	15	< 10	29	11	< 10
TPH Total C5 - C40 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	NONE	130	66	700	330	180

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

*Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted and the failure justified as having no significant impact on sample data reported.

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Analytical Report Number: 22-13637
Project / Site name: Jersey Street Ancoats

Lab Sample Number				2535810
Sample Reference				WS101
Sample Number				None Supplied
Depth (m)				1.20
Date Sampled				13/12/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	7.1
Total mass of sample received	kg	0.001	NONE	0.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SFS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1
Total Cyanide	mg/kg	1	MCERTS	3.1
Total Sulphate as SO4	mg/kg	50	MCERTS	770
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.054
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	110
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	53.8
Sulphide	mg/kg	1	MCERTS	21
Total Sulphur	mg/kg	50	MCERTS	720
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	5.2

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.9*
Acenaphthylene	mg/kg	0.05	MCERTS	1.1*
Acenaphthene	mg/kg	0.05	MCERTS	9.7*
Fluorene	mg/kg	0.05	MCERTS	6.1*
Phenanthrene	mg/kg	0.05	MCERTS	57*
Anthracene	mg/kg	0.05	MCERTS	16*
Fluoranthene	mg/kg	0.05	MCERTS	82*
Pyrene	mg/kg	0.05	MCERTS	71*
Benzo(a)anthracene	mg/kg	0.05	MCERTS	41*
Chrysene	mg/kg	0.05	MCERTS	32*
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	47*
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	9.4*
Benzo(a)pyrene	mg/kg	0.05	MCERTS	31*
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	15*
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	3.7*
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	19*

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	441*

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Analytical Report Number: 22-13637
Project / Site name: Jersey Street Ancoats

Lab Sample Number				2535810
Sample Reference				WS101
Sample Number				None Supplied
Depth (m)				1.20
Date Sampled				13/12/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	23
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	82
Lead (aqua regia extractable)	mg/kg	1	MCERTS	78
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	70
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	190
Petroleum Hydrocarbons				
TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	17
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	200
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	1200
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	6200
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	3300
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	11000

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 22-13637
Project / Site name: Jersey Street Ancoats

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2535805	TP102	None Supplied	0.05	Brown loam and sand with gravel and vegetation.
2535806	SA103	None Supplied	0.4	Brown loam and clay with gravel and vegetation.
2535807	SA101	None Supplied	0.6	Brown loam and sand with gravel.
2535808	TP106	None Supplied	1	Brown loam and sand with gravel and clinker
2535809	TP105	None Supplied	1.5	Brown clay and sand with gravel.
2535810	WS101	None Supplied	1.2	Brown loam and sand with gravel.

Analytical Report Number : 22-13637
Project / Site name: Jersey Street Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS

Analytical Report Number : 22-13637
Project / Site name: Jersey Street Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

Harriet Mason
e3p
Taylor Road
Urmston
Manchester
M41 7JQ

e: hmason@e3p.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 23-10336

Project / Site name:	Jersey St	**Samples received on:**	04/01/2023
Your job number:	15978	**Samples instructed on/ Analysis started on:**	04/01/2023
Your order number:	003860	**Analysis completed by:**	11/01/2023
Report Issue Number:	1	**Report issued on:**	11/01/2023
Samples Analysed:	1 water sample		

Signed: Izabela Wójcik

Izabela Wójcik
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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Analytical Report Number: 23-10336
Project / Site name: Jersey St

Your Order No: 003860

Lab Sample Number				2546011
Sample Reference				WS6
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				03/01/2023
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	7.2
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	21.7
Total Phenols				
Total Phenols (monohydric)	µg/l	1	ISO 17025	1.8
Heavy Metals / Metalloids				
Calcium (dissolved)	mg/l	0.012	ISO 17025	150
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Arsenic (dissolved)	µg/l	0.15	ISO 17025	3.8
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.11
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.9
Copper (dissolved)	µg/l	0.5	ISO 17025	3.7
Lead (dissolved)	µg/l	0.2	ISO 17025	18
Manganese (dissolved)	µg/l	0.05	ISO 17025	1300
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	10
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.8
Zinc (dissolved)	µg/l	0.5	ISO 17025	85
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
Petroleum Hydrocarbons				
TPH1 (C10 - C40) $_{EH\_1D\_TOTAL\_MS}$	µg/l	10	ISO 17025	41000
TPH-CWG - Aliphatic >C5 - C6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	37
TPH-CWG - Aliphatic >C12 - C16 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	400
TPH-CWG - Aliphatic >C16 - C21 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	6300
TPH-CWG - Aliphatic >C21 - C35 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	31000
TPH-CWG - Aliphatic (C5 - C35) $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	38000
TPH-CWG - Aromatic >C5 - C7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	77
TPH-CWG - Aromatic >C12 - C16 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	720
TPH-CWG - Aromatic >C16 - C21 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	2500
TPH-CWG - Aromatic >C21 - C35 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35) $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	3300

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Analytical Report Number: 23-10336
Project / Site name: Jersey St

Your Order No: 003860

Lab Sample Number	2546011
Sample Reference	WS6
Sample Number	None Supplied
Depth (m)	None Supplied
Date Sampled	03/01/2023
Time Taken	None Supplied

Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
VOCs				
Chloromethane	µg/l	1	ISO 17025	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0

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Analytical Report Number: 23-10336
Project / Site name: Jersey St

Your Order No: 003860

Lab Sample Number				2546011
Sample Reference				WS6
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				03/01/2023
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05
4-Methylphenol	µg/l	0.05	NONE	1.5
Isophorone	µg/l	0.05	NONE	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	0.59
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	6.5
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	1.5
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	0.86
Acenaphthene	µg/l	0.01	ISO 17025	24
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Dibenzofuran	µg/l	0.05	NONE	12
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05
Fluorene	µg/l	0.01	ISO 17025	16
Azobenzene	µg/l	0.05	NONE	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	38
Anthracene	µg/l	0.01	ISO 17025	12
Carbazole	µg/l	0.05	NONE	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	37
Pyrene	µg/l	0.01	ISO 17025	31

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Analytical Report Number: 23-10336
Project / Site name: Jersey St

Your Order No: 003860

Lab Sample Number				2546011
Sample Reference				WS6
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				03/01/2023
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	15
Chrysene	µg/l	0.01	ISO 17025	14
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	19
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	6.1
Benzo(a)pyrene	µg/l	0.01	ISO 17025	17
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	7
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	2
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	8.3

3&4-Methylphenol	µg/l	0.1	NONE	1.5

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 23-10336
Project / Site name: Jersey St

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	ISO 17025

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector

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Analytical Report Number : 23-10336
Project / Site name: Jersey St

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

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

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Roy Walker
e3p
Taylor Road
Urmston
Manchester
M41 7JQ

e: rwalker@e3p.co.uk

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 22-77515

Project / Site name:	Jersey Street	**Samples received on:**	11/08/2022
Your job number:	15 798	**Samples instructed on/ Analysis started on:**	11/08/2022
Your order number:	002531	**Analysis completed by:**	18/08/2022
Report Issue Number:	1	**Report issued on:**	18/08/2022
Samples Analysed:	1 water sample		

Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 22-77515
Project / Site name: Jersey Street

Your Order No: 002531

Lab Sample Number				2385058
Sample Reference				WS104
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				10/08/2022
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	7.3
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	130
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	7.2
Total Phenols				
Total Phenols (monohydric)	µg/l	1	ISO 17025	9.5
Heavy Metals / Metalloids				
Calcium (dissolved)	mg/l	0.012	ISO 17025	160
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Arsenic (dissolved)	µg/l	0.15	ISO 17025	10.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.3
Copper (dissolved)	µg/l	0.5	ISO 17025	1.6
Lead (dissolved)	µg/l	0.2	ISO 17025	1.3
Manganese (dissolved)	µg/l	0.05	ISO 17025	2000
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	3.7
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	14
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
Petroleum Hydrocarbons				
TPH1 (C10 - C40) $_{EH\_2D\_TOTAL\_\#1\_\#2}$	µg/l	10	ISO 17025	880
TPH-CWG - Aliphatic >C5 - C6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12 $_{EH\_1D\_AL\_\#1\_\#2\_MS}$	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16 $_{EH\_1D\_AL\_\#1\_\#2\_MS}$	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21 $_{EH\_1D\_AL\_\#1\_\#2\_MS}$	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35 $_{EH\_1D\_AL\_\#1\_\#2\_MS}$	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35) $_{HS+EH\_1D\_AL\_\#1\_\#2\_MS}$	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12 $_{EH\_1D\_AR\_\#1\_\#2\_MS}$	µg/l	10	NONE	310
TPH-CWG - Aromatic >C12 - C16 $_{EH\_1D\_AR\_\#1\_\#2\_MS}$	µg/l	10	NONE	280
TPH-CWG - Aromatic >C16 - C21 $_{EH\_1D\_AR\_\#1\_\#2\_MS}$	µg/l	10	NONE	240
TPH-CWG - Aromatic >C21 - C35 $_{EH\_1D\_AR\_\#1\_\#2\_MS}$	µg/l	10	NONE	50
TPH-CWG - Aromatic (C5 - C35) $_{HS+EH\_1D\_AR\_\#1\_\#2\_MS}$	µg/l	10	NONE	880

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Analytical Report Number: 22-77515
Project / Site name: Jersey Street

Your Order No: 002531

Lab Sample Number				2385058
Sample Reference				WS104
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				10/08/2022
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
VOCs				
Chloromethane	µg/l	1	ISO 17025	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0

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Analytical Report Number: 22-77515
Project / Site name: Jersey Street

Your Order No: 002531

Lab Sample Number				2385058
Sample Reference				WS104
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				10/08/2022
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Butylbenzene	µg/l	1	ISO 17025	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	4.5
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	110
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	16
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	1.6
Acenaphthene	µg/l	0.01	ISO 17025	19
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05
Dibenzofuran	µg/l	0.05	NONE	5.6
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05
Fluorene	µg/l	0.01	ISO 17025	8.5
Azobenzene	µg/l	0.05	NONE	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	11
Anthracene	µg/l	0.01	ISO 17025	2.2
Carbazole	µg/l	0.05	NONE	4.7
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	3
Pyrene	µg/l	0.01	ISO 17025	2.6

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The results included within the report relate only to the sample(s) submitted for testing.

4041

Analytical Report Number: 22-77515
Project / Site name: Jersey Street

Your Order No: 002531

Lab Sample Number				2385058
Sample Reference				WS104
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				10/08/2022
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	0.62
Chrysene	µg/l	0.01	ISO 17025	0.55
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	0.46
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	0.22
Benzo(a)pyrene	µg/l	0.01	ISO 17025	0.36
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01
3&4-Methylphenol	µg/l	0.1	NONE	< 0.10

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

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The results included within the report relate only to the sample(s) submitted for testing.

4041

Analytical Report Number : 22-77515
Project / Site name: Jersey Street

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions

4041

Analytical Report Number : 22-77515
Project / Site name: Jersey Street

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

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

CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	2014 LQM/CIEH S4ULs
Cadmium	2014 LQM/CIEH S4ULs
Chromium	2014 LQM/CIEH S4ULs
Lead	2014 LQM/CIEH S4ULs
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene [iii]	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C_5-C_6 (aliphatic)	
TPH C_6-C_8 (aliphatic)	
TPH C_8-C_{10} (aliphatic)	
TPH C_{10}-C_{12} (aliphatic)	
TPH C_{12}-C_{16} (aromatic)	
TPH C_{16}-C_{21} (aromatic)	
TPH C_{21}-C_{35} (aromatic)	

APPENDIX VII
GEOTECHNICAL TESTING RESULTS

LABORATORY REPORT

Contract Number: PSL23/0024

Report Date: 11 January 2023

Client's Reference: 15-798

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Eleanor Canham

Contract Title: Jersey Street

Date Received: 23/12/2022
Date Commenced: 23/12/2022
Date Completed: 11/1/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technician)	T Watkins (Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098
Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
RC01 (subbase)			0.30		Class 1A
RC02 (subbase)			0.30		Class 1A
RC03 (subbase)			0.30		Class 1A
RC04 (subbase)			0.40		Class 1A

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHIENNA GROUP COMPANY

Jersey Street	Contract No:
	PSL23/0024
	Client Ref:
	15-798

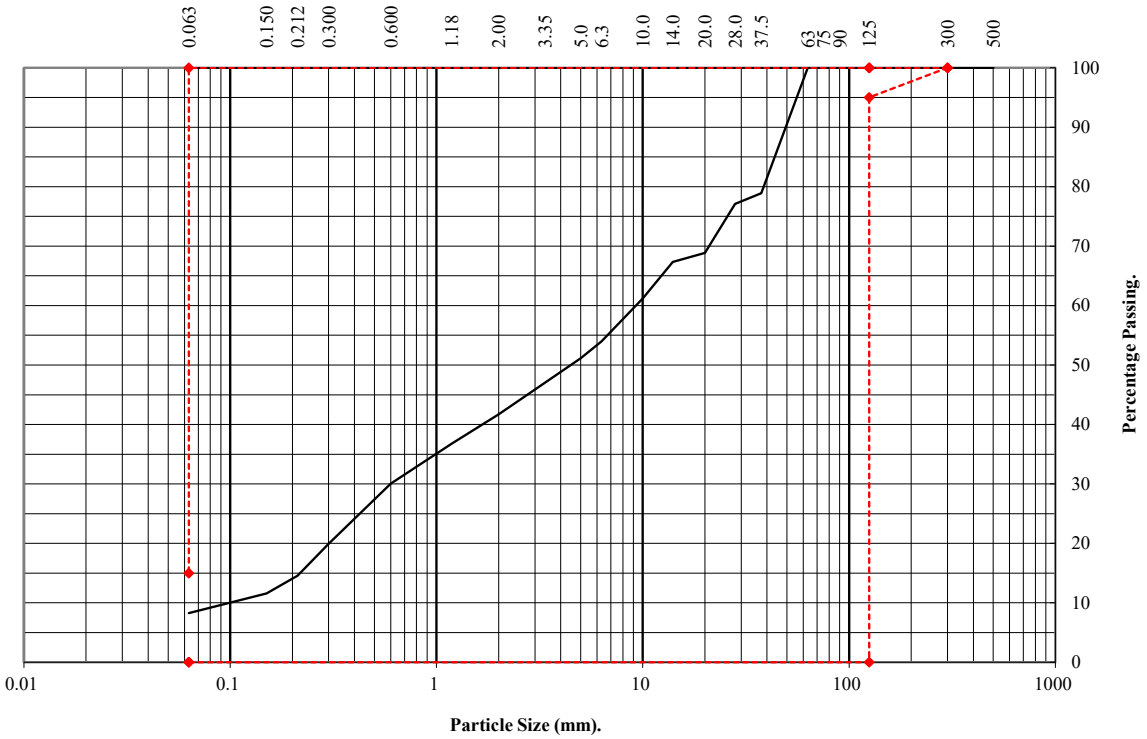
PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

Classification for Acceptable Earthworks Materials

Sample Reference **RC01 (subbase)** **Classification Type:** **1A**



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements Lower	Upper
500	100		
300	100	100	100
125	100	95	100
90	100		
75	100		
63	100		
37.5	79		
28	77		
20	69		
14	67		
10	61		
6.3	54		
5	51		
3.35	47		
2	42		
1.18	37		
0.6	30		
0.3	20		
0.212	15		
0.15	12		
0.063	8	0	15

Remarks:
SHW Series 600 Table 6/2 :
Class 1A

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Jersey Street

Contract No.:
PSL23/0024
Client Ref:
15-798

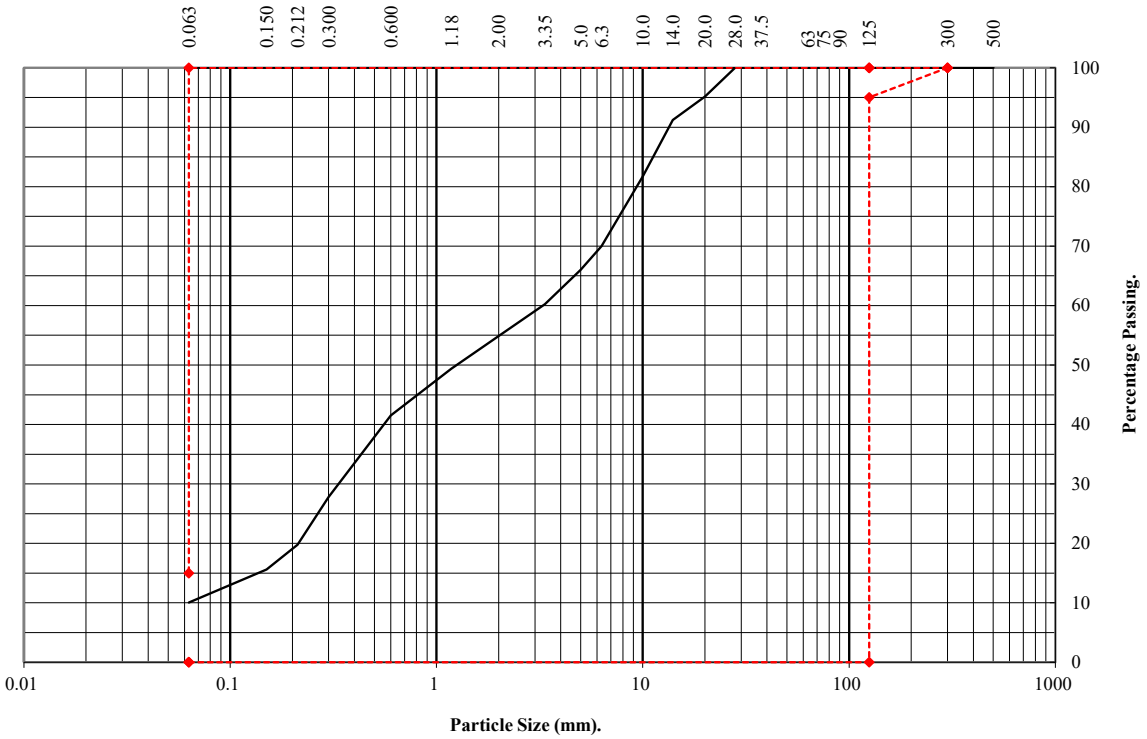
PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

Classification for Acceptable Earthworks Materials

Sample Reference **RC02 (subbase)** **Classification Type:** **1A**



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements Lower	Upper
500	100		
300	100	100	100
125	100	95	100
90	100		
75	100		
63	100		
37.5	100		
28	100		
20	95		
14	91		
10	82		
6.3	70		
5	66		
3.35	60		
2	55		
1.18	49		
0.6	42		
0.3	28		
0.212	20		
0.15	16		
0.063	10	0	15

Remarks:
SHW Series 600 Table 6/2 :
Class 1A

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Jersey Street

Contract No.:
PSL23/0024
Client Ref:
15-798

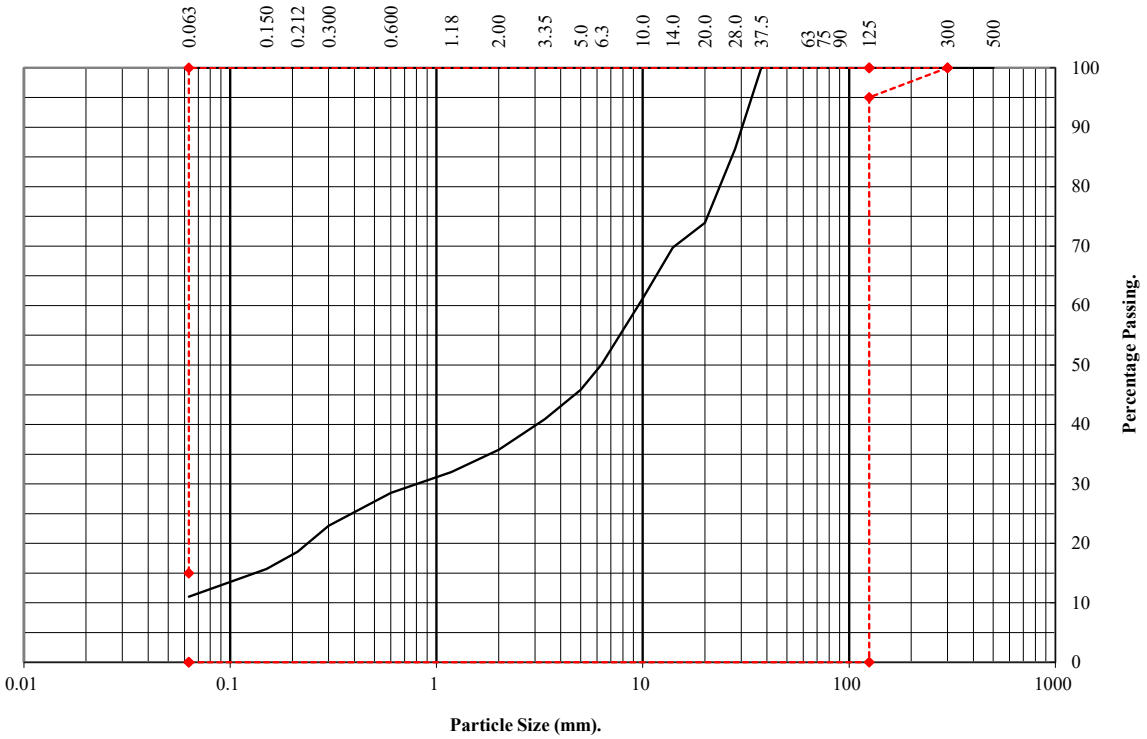
PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

Classification for Acceptable Earthworks Materials

Sample Reference **RC03 (subbase)** **Classification Type:** **1A**



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements Lower	Upper
500	100		
300	100	100	100
125	100	95	100
90	100		
75	100		
63	100		
37.5	100		
28	86		
20	74		
14	70		
10	61		
6.3	50		
5	46		
3.35	41		
2	36		
1.18	32		
0.6	28		
0.3	23		
0.212	19		
0.15	16		
0.063	11	0	15

Remarks:
SHW Series 600 Table 6/2 :
Class 1A

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Jersey Street

Contract No.:
PSL23/0024
Client Ref:
15-798

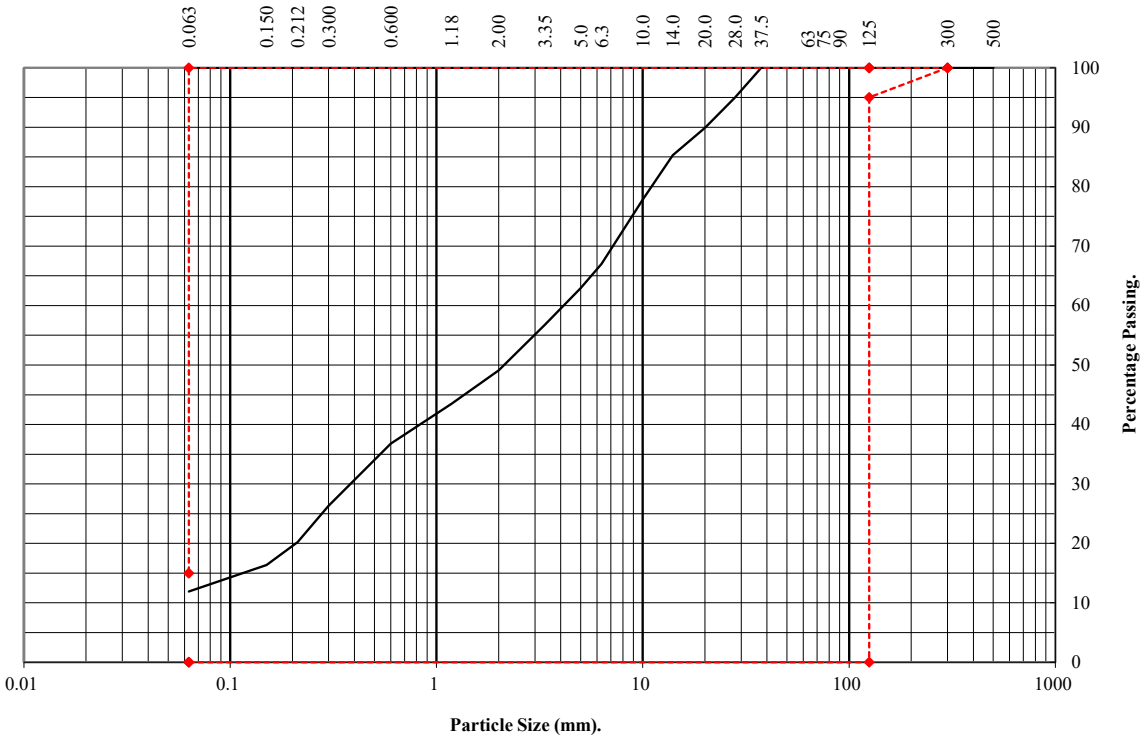
PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

Classification for Acceptable Earthworks Materials

Sample Reference **RC04 (subbase)** **Classification Type:** **1A**



BS Test Sieve mm	Percentage Passing %	Table 6/2 Grading Requirements Lower	Upper
500	100		
300	100	100	100
125	100	95	100
90	100		
75	100		
63	100		
37.5	100		
28	95		
20	90		
14	85		
10	78		
6.3	67		
5	63		
3.35	57		
2	49		
1.18	43		
0.6	37		
0.3	26		
0.212	20		
0.15	16		
0.063	12	0	15

Remarks:
SHW Series 600 Table 6/2 :
Class 1A

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Jersey Street

Contract No.:
PSL23/0024
Client Ref:
15-798

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
			Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RC01 (Asphalt Core)		I	Par	119	119	14161	18030.35	134.28	-	45.00	2.50	1.560	3.89	Valid	>Machine maximum
RC01 (Asphalt Core)		I	Perp	119	42	4998	6363.65	79.77	-	45.00	7.07	1.234	8.73	Valid	>Machine maximum
RC02 (Asphalt Core)		I	Par	82	82	6724	8561.26	92.53	-	45.00	5.26	1.319	6.93	Valid	>Machine maximum
RC02 (Asphalt Core)		I	Perp	82	48	3936	5011.47	70.79	-	45.00	8.98	1.169	10.50	Valid	>Machine maximum
RC04 (Asphalt Core)		I	Par	74	74	5476	6972.26	83.50	-	37.14	5.33	1.260	6.71	Valid	
RC04 (Asphalt Core)		I	Perp	74	31	2294	2920.81	54.04	-	22.12	7.57	1.036	7.84	Valid	

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

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PRENNA GROUP COMPANY

Jersey Street

Contract No:

PSL23/0024

Client Ref:

15-798

LABORATORY REPORT

4043

Contract Number: PSL22/4998

Report Date: 18 August 2022

Client's Reference: 15-798

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Eleanor Canham

Contract Title: Jersey Street

Date Received: 29/7/2022
Date Commenced: 29/7/2022
Date Completed: 18/8/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technician)	T Watkins (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS101		Tub	4.00		Brown slightly gravelly sandy CLAY.
WS102		Tub	4.00		Brown slightly gravelly sandy CLAY.
WS103		Tub	5.00		Brown slightly gravelly sandy CLAY.
WS104		Tub	4.00		Brown slightly gravelly very sandy CLAY.
WS104		Bulk	0.00	2.60	MADE GROUND brown very sandy very clayey gravel with cobbles.
WS105		Bulk	0.00	1.50	MADE GROUND brown very sandy very clayey gravel.

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS101		Tub	4.00		22			44	21	23	98	Intermediate Plasticity CI
WS102		Tub	4.00		25			46	22	24	96	Intermediate Plasticity CI
WS103		Tub	5.00		18			40	19	21	99	Intermediate Plasticity CI
WS104		Tub	4.00		17			34	16	18	97	Low Plasticity CL

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

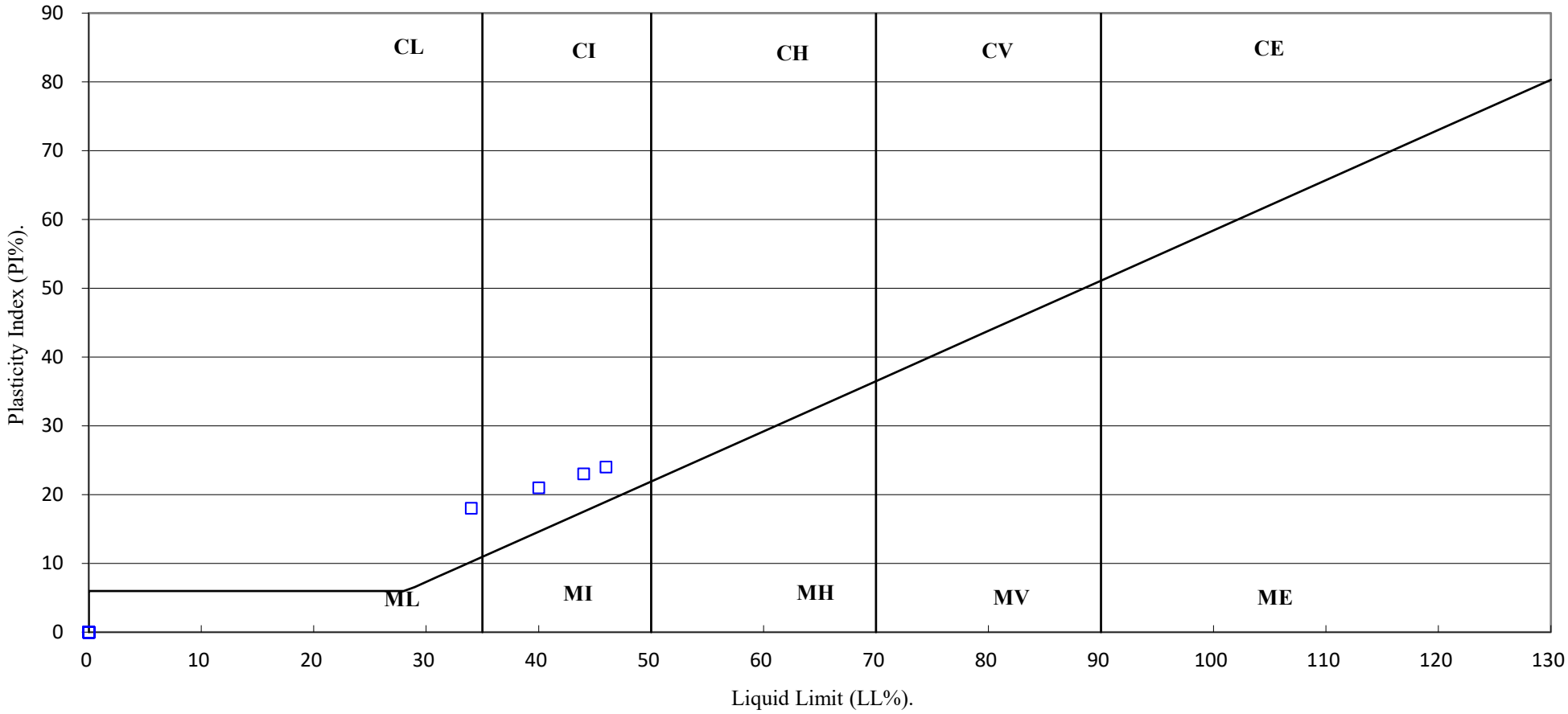
UKAS TESTING 4043

PSL Professional Soils Laboratory

Jersey Street

Contract No:
PSL22/4998
Client Ref:
15-798

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Jersey Street	Contract No: PSL22/4998 Client Ref: 15-798

PARTICLE SIZE DISTRIBUTION TEST

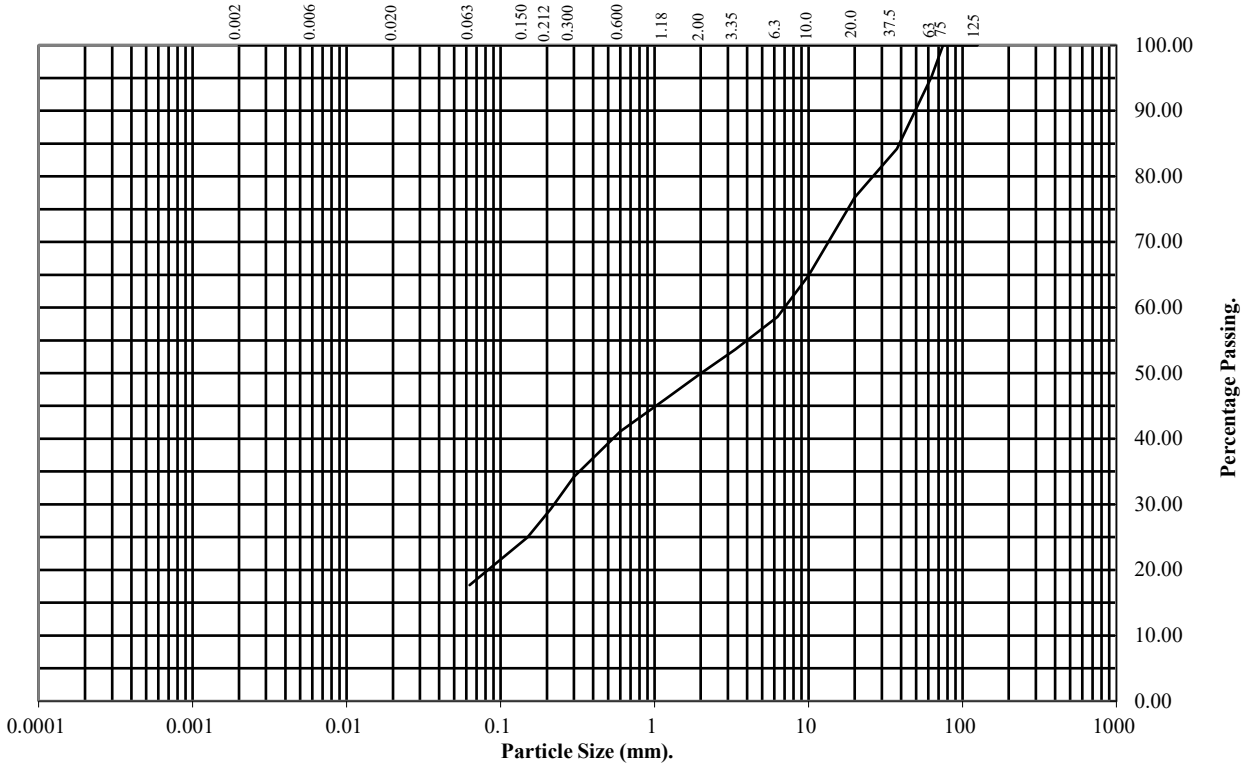
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS104** **Top Depth (m):** **0.00**

Sample Number: **Base Depth(m):** **2.60**

Sample Type: **Bulk**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	95
37.5	84
20	77
10	65
6.3	59
3.35	54
2	50
1.18	46
0.6	41
0.3	34
0.212	29
0.15	25
0.063	18

Soil Fraction	Total Percentage
Cobbles	5
Gravel	45
Sand	32
Silt/Clay	18

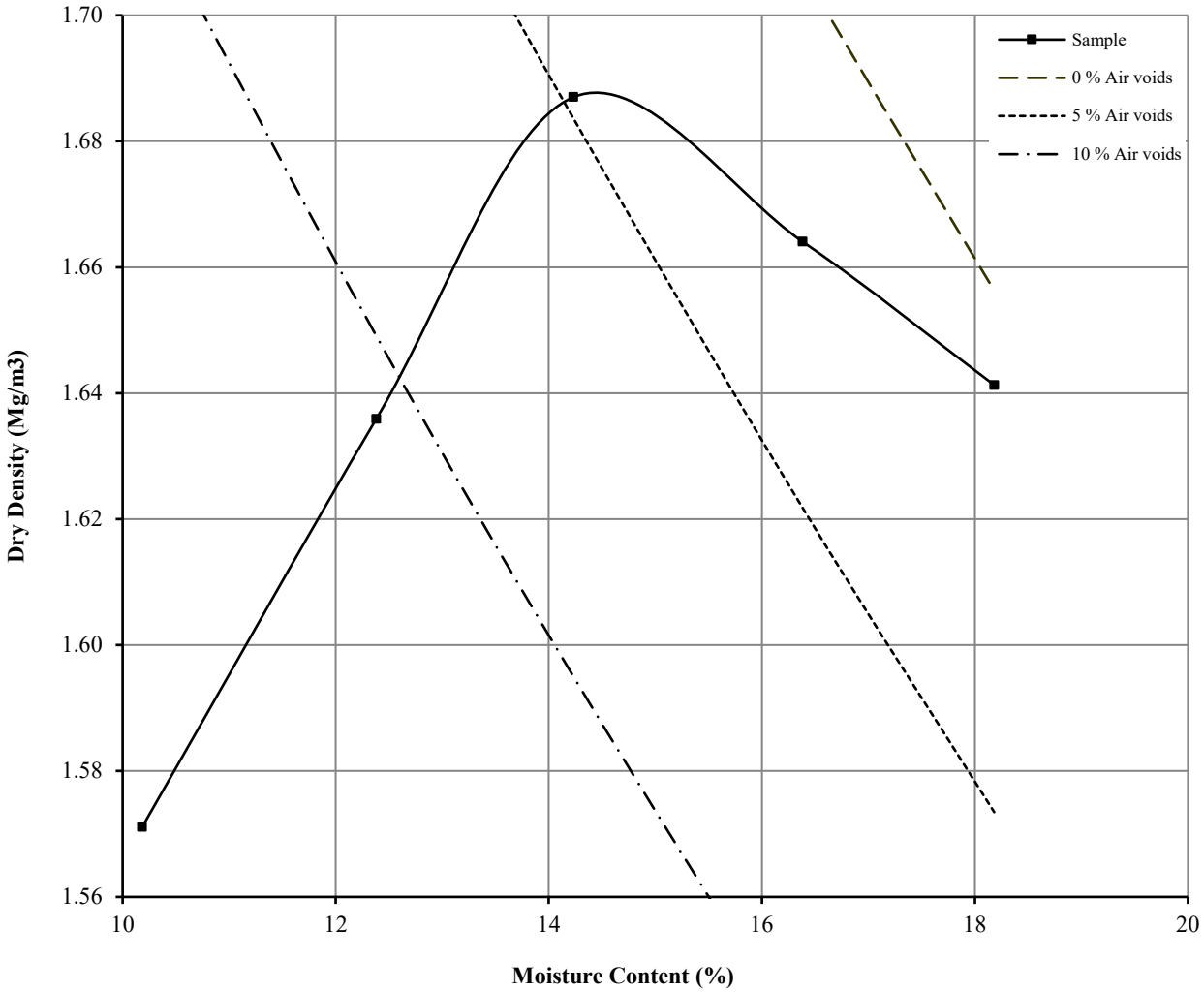
Remarks:

See Summary of Soil Descriptions

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.4 : 1990

Hole Number:	**WS104**	**Top Depth (m) :**	**0.00**
Sample Number:		**Base Depth (m) :**	**2.60**
Sample Type:	**B**		



Initial Moisture Content:		14	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.37	Assumed	Material Retained on 37.5 mm Test Sieve (%):		16
Maximum Dry Density (Mg/m3):		1.69	Material Retained on 20.0 mm Test Sieve (%):		7
Optimum Moisture Content (%):		14			
Remarks See summary of soil descriptions					

PARTICLE SIZE DISTRIBUTION TEST

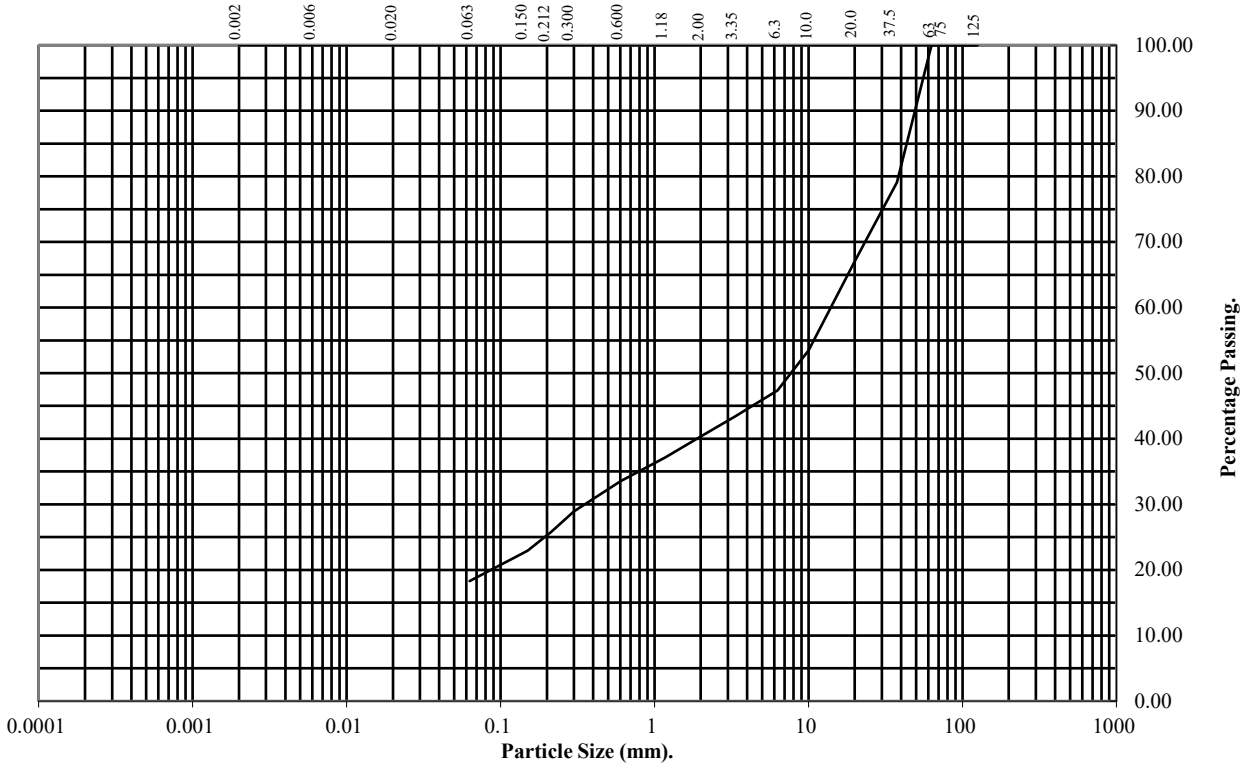
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS105** **Top Depth (m):** **0.00**

Sample Number: **Base Depth(m):** **1.50**

Sample Type: **Bulk**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	79
20	67
10	53
6.3	47
3.35	43
2	40
1.18	37
0.6	34
0.3	29
0.212	26
0.15	23
0.063	18

Soil Fraction	Total Percentage
Cobbles	0
Gravel	60
Sand	22
Silt/Clay	18

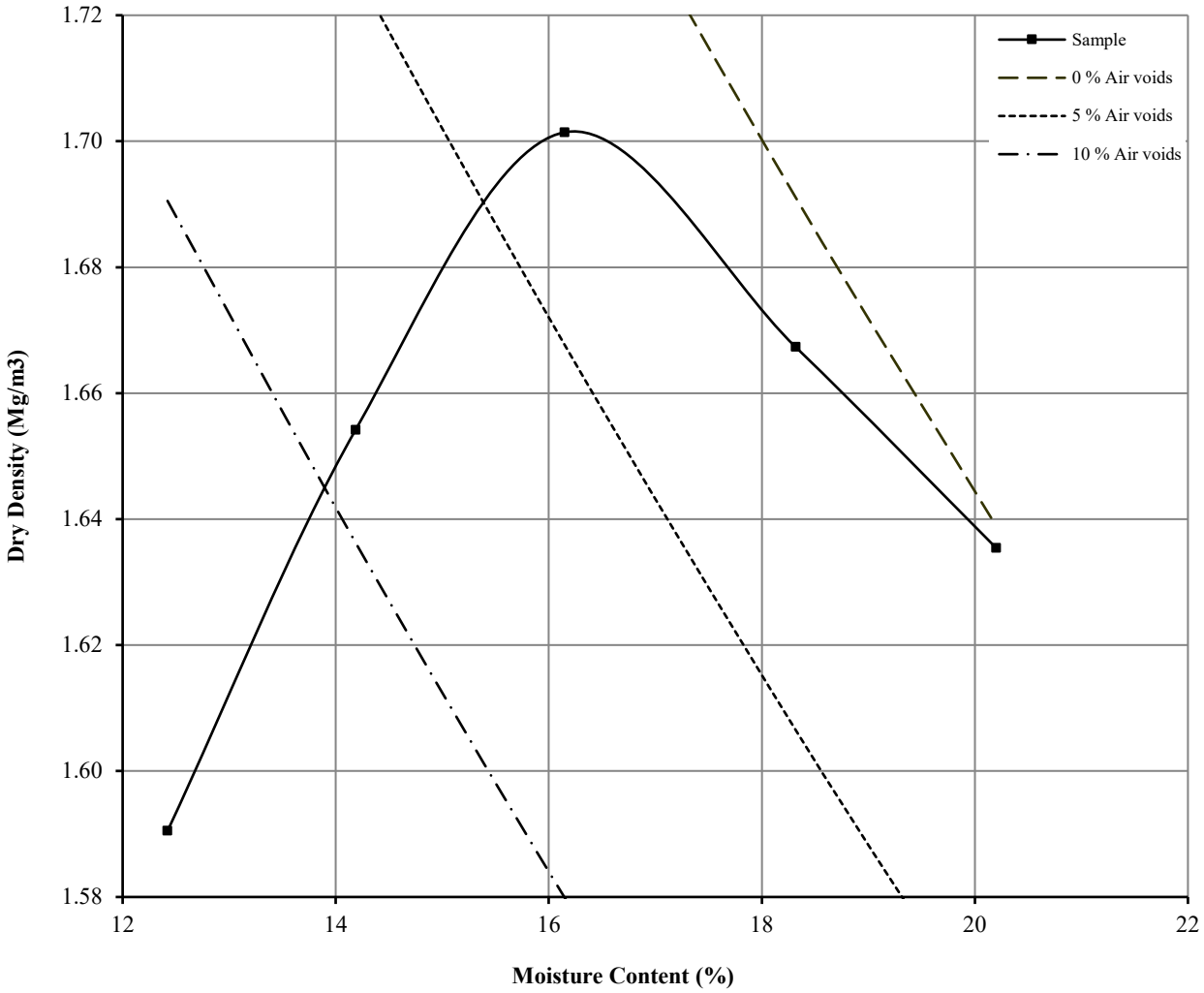
Remarks:

See Summary of Soil Descriptions

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.4 : 1990

Hole Number:	**WS105**	**Top Depth (m) :**	**0.00**
Sample Number:		**Base Depth (m) :**	**1.50**
Sample Type:	**B**		



Initial Moisture Content:		16	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.45	Assumed	Material Retained on 37.5 mm Test Sieve (%):		21
Maximum Dry Density (Mg/m3):		1.70	Material Retained on 20.0 mm Test Sieve (%):		12
Optimum Moisture Content (%):		16			
Remarks See summary of soil descriptions					

APPENDIX VIII
BRE 365 SOAKAWAY PERMEABILITY TEST CERTIFICATES

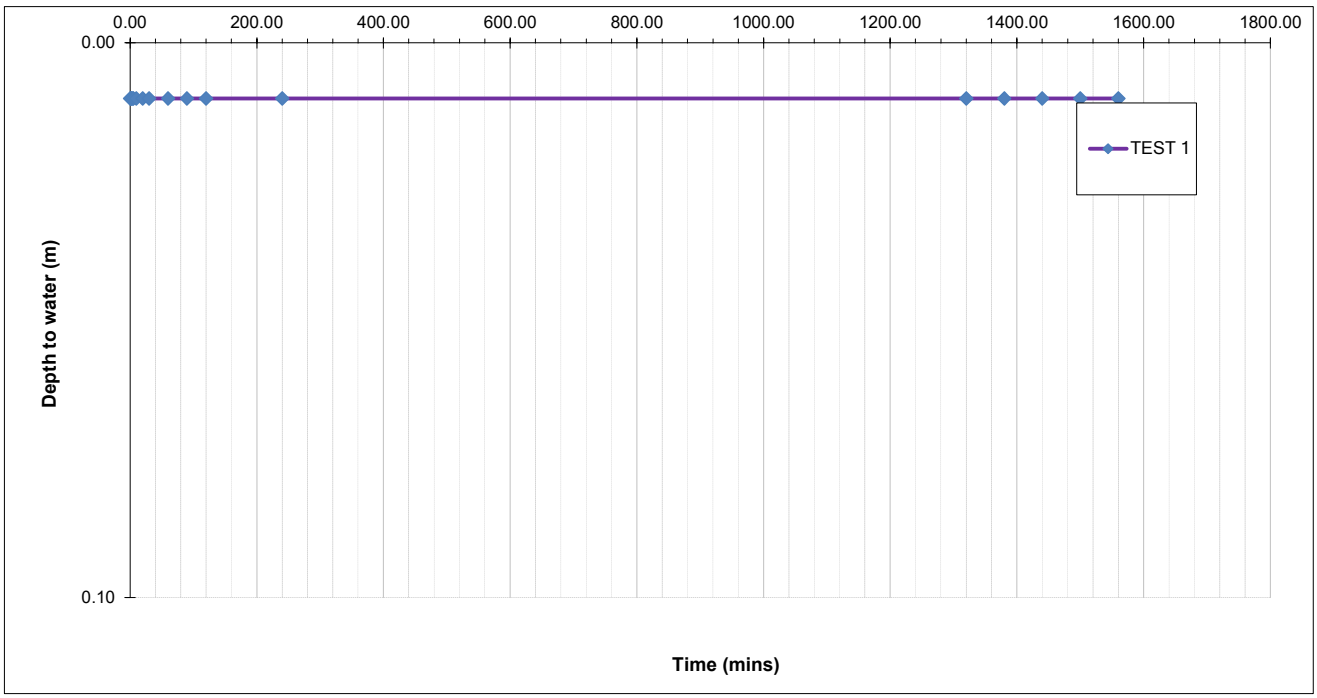
	Site: Jersey Street **Job Number:** 15-798 **Date of Test:** 13/12/2022	**Trial Pit Number:** SA101 **Length:** 2.00 m **Width:** 0.80 m **Depth:** 2.00 m **Groundwater Level:** m

Remarks - Test terminated due to lack of infiltration and the test did not reach 25% effective depth.

TEST 1		TEST 2		TEST 3	
Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
0.00	0.01				
1.00	0.01				
2.00	0.01				
3.00	0.01				
4.00	0.01				
5.00	0.01				
10.00	0.01				
20.00	0.01				
30.00	0.01				
60.00	0.01				
90.00	0.01				
120.00	0.01				
240.00	0.01				
1320.00	0.01				
1380.00	0.01				
1440.00	0.01				
1500.00	0.01				
1560.00	0.01				

Effective Storage Depth	m	1.99		
75% Effective Storage Depth	m	1.49		
(i.e. depth below GL)	m	0.51		
25% Effective Storage Depth	m	0.50		
(i.e. depth below GL)	m	1.50		
Effective Storage Depth 75%-25%	m	1.00		
Time to fall to 75% effective depth	mins	0.00		
Time to fall to 25% effective depth	mins	0.00		
V (75%-25%)	m3	1.59		
a (50%)	m2	7.17		
t (75%-25%)	mins	0.00		
SOIL INFILTRATION RATE	m/s	**N/A**	**N/A**	**N/A**

DESIGN SOIL INFILTRATION RATE, f	**N/A**



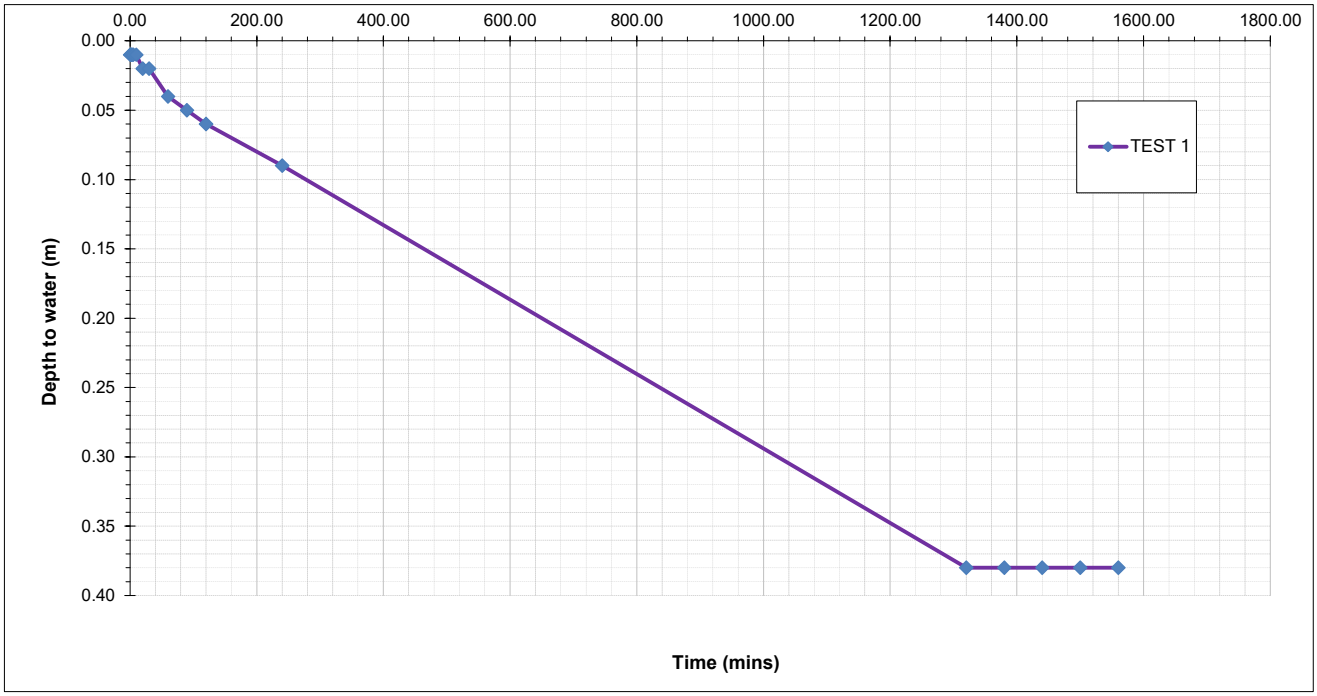
	Site: Jersey Street **Job Number:** 15-798 **Date of Test:** 13/12/2022	**Trial Pit Number:** TP102 **Length:** 2.00 m **Width:** 0.50 m **Depth:** 2.40 m **Groundwater Level:** m	

Remarks - Test terminated due to lack of infiltration and the test did not reach 25% effective depth.

TEST 1		TEST 2		TEST 3	
Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
0.00	0.01				
1.00	0.01				
2.00	0.01				
3.00	0.01				
4.00	0.01				
5.00	0.01				
10.00	0.01				
20.00	0.02				
30.00	0.02				
60.00	0.04				
90.00	0.05				
120.00	0.06				
240.00	0.09				
1320.00	0.38				
1380.00	0.38				
1440.00	0.38				
1500.00	0.38				
1560.00	0.38				

Effective Storage Depth	m	2.39		
75% Effective Storage Depth	m	1.79		
(i.e. depth below GL)	m	0.61		
25% Effective Storage Depth	m	0.60		
(i.e. depth below GL)	m	1.80		
Effective Storage Depth 75%-25%	m	1.20		
Time to fall to 75% effective depth	mins	0.00		
Time to fall to 25% effective depth	mins	0.00		
V (75%-25%)	m3	1.20		
a (50%)	m2	6.98		
t (75%-25%)	mins	0.00		
SOIL INFILTRATION RATE	m/s	**N/A**	**N/A**	**N/A**

DESIGN SOIL INFILTRATION RATE, f **N/A**



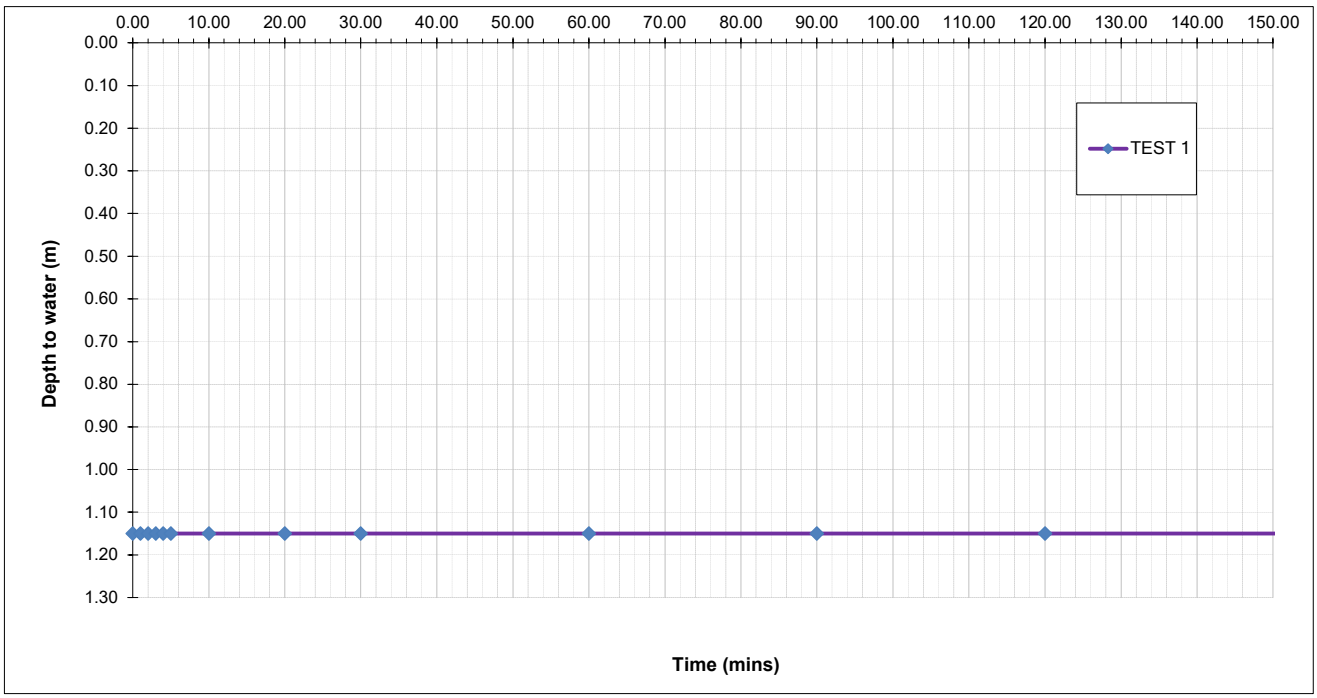
	Site: Jersey Street **Job Number:** 15-798 **Date of Test:** 13/12/2022	**Trial Pit Number:** SA103 **Length:** 2.00 m **Width:** 0.80 m **Depth:** 2.00 m **Groundwater Level:** m

Remarks - Test terminated due to lack of infiltration and the test did not reach 25% effective depth.

TEST 1		TEST 2		TEST 3	
Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
0.00	1.15				
1.00	1.15				
2.00	1.15				
3.00	1.15				
4.00	1.15				
5.00	1.15				
10.00	1.15				
20.00	1.15				
30.00	1.15				
60.00	1.15				
90.00	1.15				
120.00	1.15				
240.00	1.15				
1320.00	1.15				
1380.00	1.15				
1440.00	1.15				
1500.00	1.15				
1560.00	1.15				

Effective Storage Depth	m	0.85		
75% Effective Storage Depth	m	0.64		
(i.e. depth below GL)	m	1.36		
25% Effective Storage Depth	m	0.21		
(i.e. depth below GL)	m	1.79		
Effective Storage Depth 75%-25%	m	0.43		
Time to fall to 75% effective depth	mins	0.00		
Time to fall to 25% effective depth	mins	0.00		
V (75%-25%)	m3	0.68		
a (50%)	m2	3.98		
t (75%-25%)	mins	0.00		
SOIL INFILTRATION RATE	m/s	**N/A**	**N/A**	**N/A**

DESIGN SOIL INFILTRATION RATE, f **N/A**

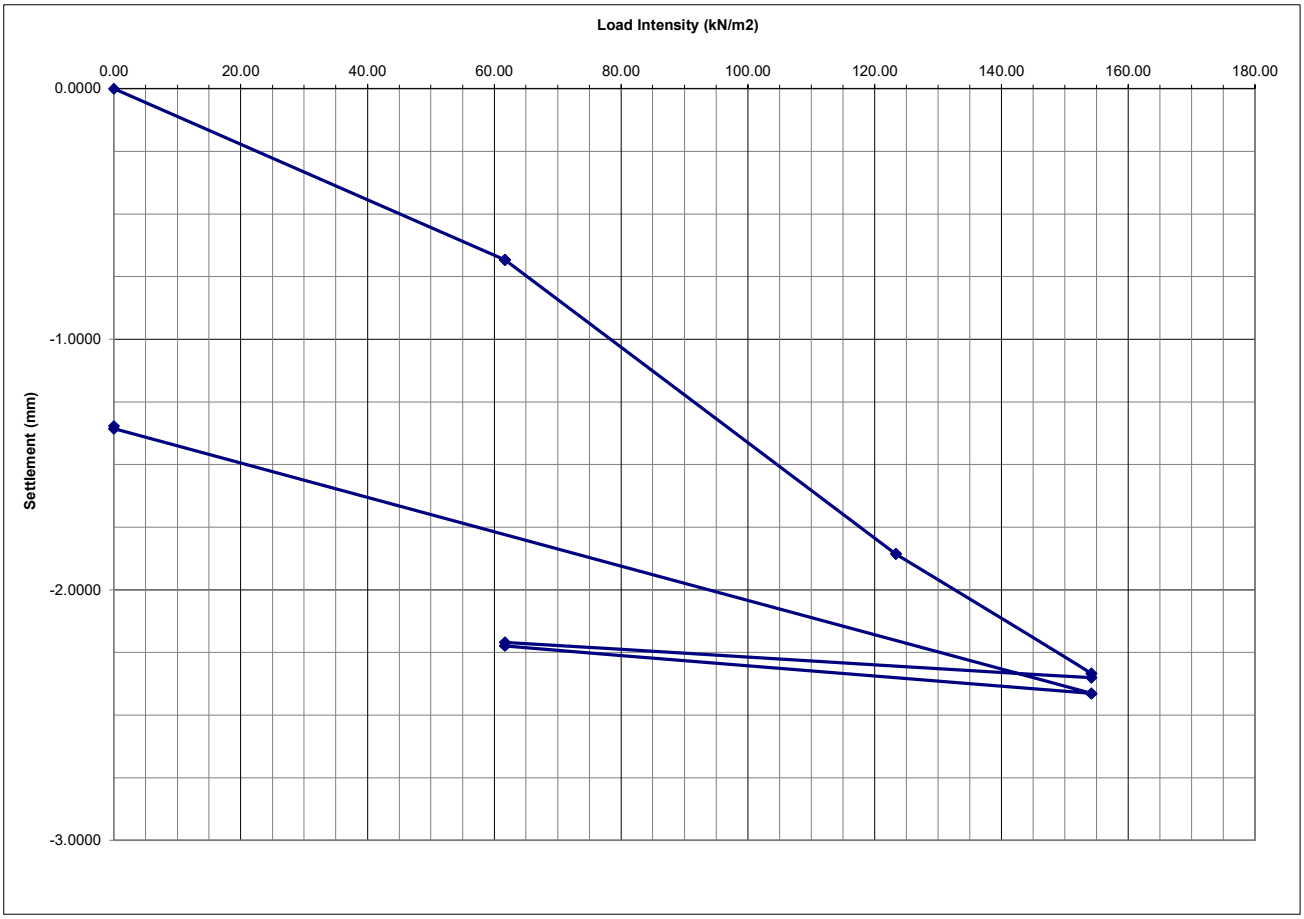


APPENDIX IX
CBR TEST CERTIFICATES

Vertical Deformation Test-Equivalent CBR Value

In Accordance with BS1377: Part 9:1990

Site Name:	**Jersey Street**	**Test Date:**	13/12/2022
Site Ref:	15-798	**Type of Kentledge:**	8Tonne Excavator
Test No.:	CBR101- TP105	**Test Depth (m bgl):**	0.40
Plate Diameter (mm)	450	**Easting:**	N/A
Maximum Applied Pressure (kN/m2):	154.20	**Northing:**	N/A
Maximum Deformation (mm):	-2.41	**Weather:**	Dry
Strata Description:	Made Ground		



Equivalent CBR Value of 8%

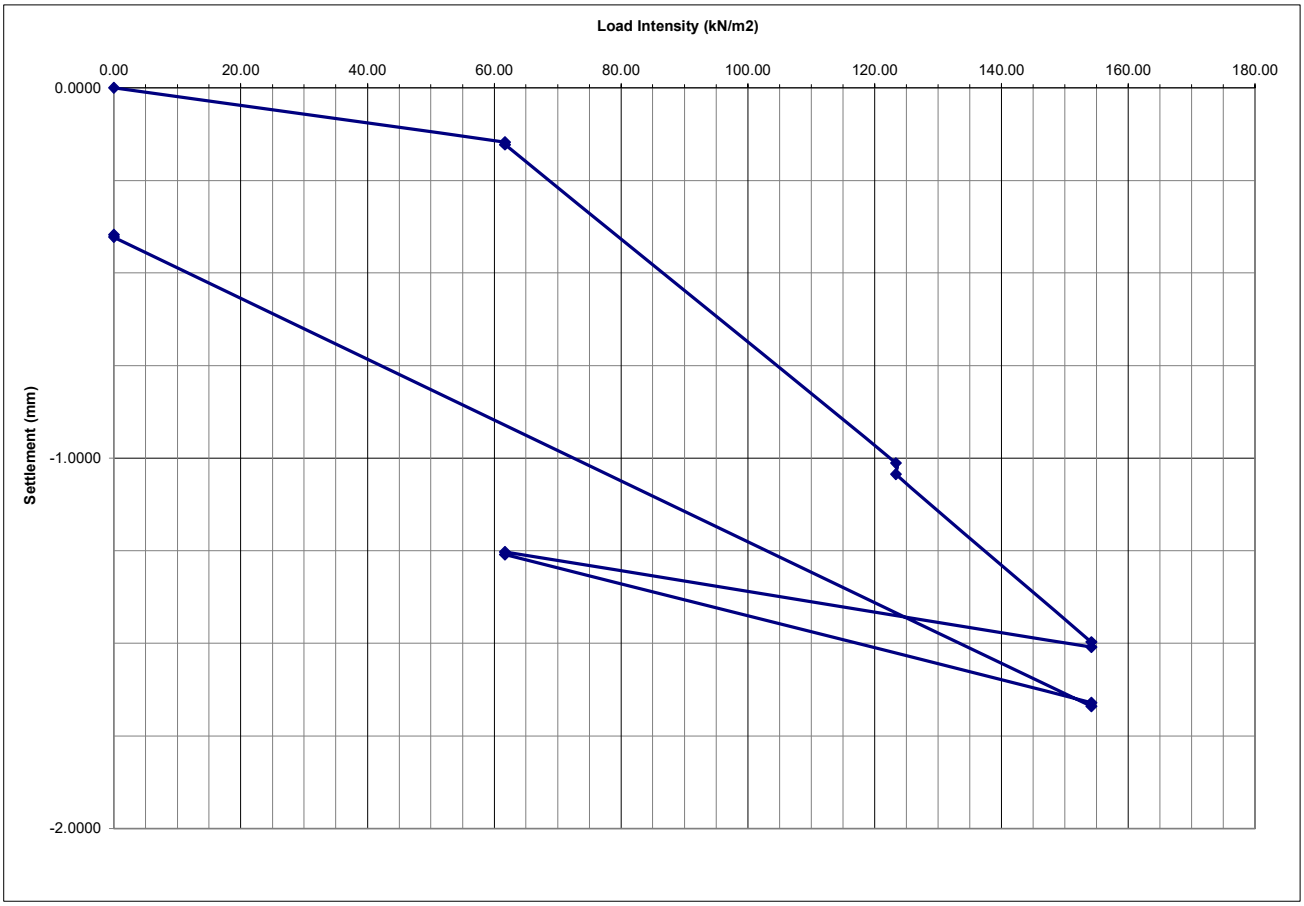
Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
R. Webster	N. Dawson	12/01/2023	N. Dawson	12/01/2023

Vertical Deformation Test-Equivalent CBR Value

In Accordance with BS1377: Part 9:1990

Site Name:	**Jersey Street**	**Test Date:**	13/12/2022
Site Ref:	15-798	**Type of Kentledge:**	8Tonne Excavator
Test No.:	CBR102-TP102	**Test Depth (m bgl):**	0.40
Plate Diameter (mm)	450	**Easting:**	N/A
Maximum Applied Pressure (kN/m2):	154.20	**Northing:**	N/A
Maximum Deformation (mm):	-1.67	**Weather:**	Dry
Strata Description:	Made Ground		



Equivalent CBR Value of 15%

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
R. Webster	N. Dawson	12/01/2023	N. Dawson	12/01/2023

Vertical Deformation Test-Equivalent CBR Value

In Accordance with BS1377: Part 9:1990

Site Name:	**Jersey Street**	**Test Date:**	13/12/2022
Site Ref:	15-798	**Type of Kentledge:**	8Tonne Excavator
Test No.:	CBR103-TP101	**Test Depth (m bgl):**	0.40
Plate Diameter (mm)	450	**Easting:**	N/A
Maximum Applied Pressure (kN/m2):	154.20	**Northing:**	N/A
Maximum Deformation (mm):	-2.24	**Weather:**	Dry
Strata Description:	Made Ground		



Equivalent CBR Value of 10%

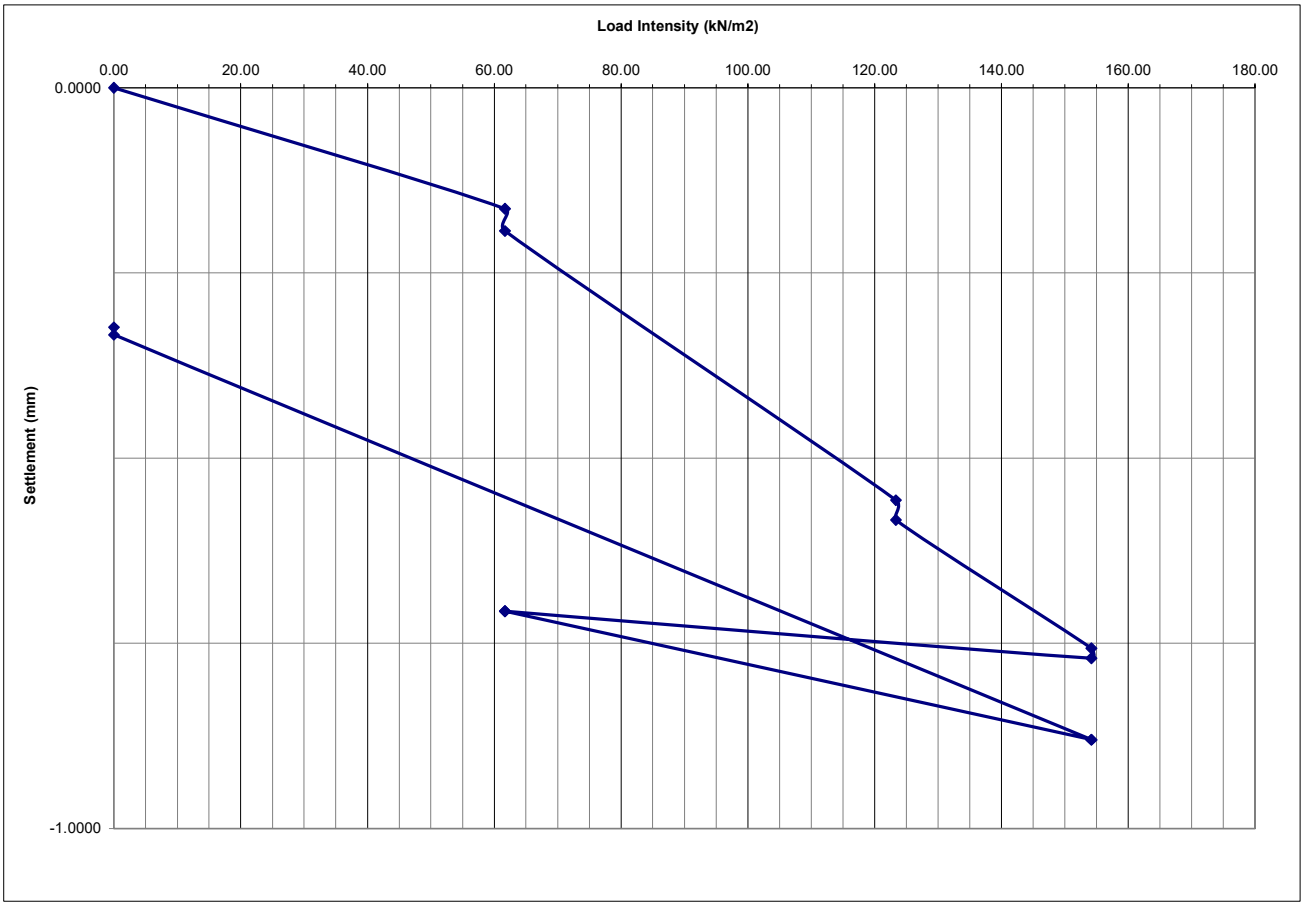
Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
R. Webster	N. Dawson	12/01/2023	N. Dawson	12/01/2023

Vertical Deformation Test-Equivalent CBR Value

In Accordance with BS1377: Part 9:1990

Site Name:	**Jersey Street**	**Test Date:**	13/12/2022
Site Ref:	15-798	**Type of Kentledge:**	8Tonne Excavator
Test No.:	CBR104-TP107	**Test Depth (m bgl):**	0.40
Plate Diameter (mm)	450	**Easting:**	N/A
Maximum Applied Pressure (kN/m2):	154.20	**Northing:**	N/A
Maximum Deformation (mm):	-0.88	**Weather:**	Dry
Strata Description:	Made Ground		



Equivalent CBR Value in excess of 19%

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
R. Webster	N. Dawson	12/01/2023	N. Dawson	12/01/2023

Appendix E: Surface Water Run-off & Attenuation Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
8	0.036	5.00	51.637	1200	385252.860	398955.346	1.300
7			51.282	1200	385277.726	398920.207	3.110
2	0.030	5.00	50.631	1200	385211.762	398897.512	1.464
3	0.058	5.00	50.520	1200	385215.115	398891.979	1.493
4	0.022	5.00	50.650	1200	385225.254	398905.003	1.721
5	0.030	5.00	51.150	1200	385256.151	398921.529	2.850
6			51.084	1200	385283.708	398919.833	2.948
9	0.017	5.00	50.893	1200	385201.728	398914.252	1.532
10			51.184	1200	385191.496	398931.137	1.627
11			51.155	1200	385181.264	398948.022	1.401
12			51.407	1200	385171.032	398964.906	1.456
13	0.047	5.00	51.513	1200	385159.972	398982.978	1.350
14		5.00	51.545	1200	385180.264	398966.714	1.300
15			51.267	1200	385186.655	398954.510	1.300
16	0.019	5.00	51.289	1200	385197.161	398932.005	1.570
17	0.009	5.00	50.860	1200	385211.624	398918.390	1.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
7	7	6	5.994	0.600	48.172	48.136	0.036	166.5	225	7.83	50.0
5	5	7	21.615	0.600	48.300	48.172	0.128	168.9	225	7.73	50.0
8	8	7	43.047	0.600	50.337	49.907	0.430	100.0	100	5.93	50.0
4	4	5	35.039	0.600	48.929	48.300	0.629	55.7	225	7.37	50.0
3	3	4	16.505	0.600	49.027	48.929	0.098	168.4	225	7.04	50.0
17	17	9	10.726	0.600	49.790	49.683	0.107	100.0	100	5.66	50.0
16	16	10	5.731	0.600	49.719	49.662	0.057	100.0	100	5.66	50.0
15	15	11	8.435	0.600	50.107	50.023	0.084	100.0	100	5.48	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
7	1.010	40.2	36.4	2.885	2.723	0.269	0.0	168	1.140
5	1.003	39.9	31.5	2.625	2.885	0.233	0.0	152	1.109
8	0.769	6.0	4.9	1.200	1.275	0.036	0.0	68	0.856
4	1.756	69.8	27.5	1.496	2.625	0.203	0.0	98	1.654
3	1.004	39.9	24.5	1.268	1.496	0.181	0.0	127	1.052
17	0.769	6.0	1.3	0.970	1.110	0.009	0.0	31	0.605
16	0.769	6.0	2.6	1.470	1.422	0.019	0.0	46	0.739
15	0.769	6.0	0.0	1.060	1.032	0.000	0.0	0	0.000

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
14	14	12	9.407	0.600	50.245	50.151	0.094	100.0	100	5.20	50.0
2	2	3	6.470	0.600	49.167	49.102	0.065	99.5	150	6.77	50.0
9	9	2	19.517	0.600	49.361	49.167	0.194	100.6	150	6.66	50.0
17a	17	4	19.105	0.600	49.560	49.369	0.191	100.0	100	5.41	50.0
10	10	9	19.743	0.600	49.557	49.361	0.196	100.7	150	6.34	50.0
16a	16	17	19.863	0.600	49.989	49.790	0.199	100.0	100	5.43	50.0
11	11	10	19.743	0.600	49.754	49.557	0.197	100.0	150	6.01	50.0
15a	15	16	24.836	0.600	49.967	49.719	0.248	100.0	100	5.54	50.0
12	12	11	19.742	0.600	49.951	49.754	0.197	100.0	150	5.68	50.0
14a	14	15	13.776	0.600	50.245	50.107	0.138	100.0	100	5.30	50.0
13	13	12	21.188	0.600	50.163	49.951	0.212	100.0	150	5.35	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
14	0.769	6.0	0.0	1.200	1.156	0.000	0.0	0	0.000
2	1.007	17.8	16.6	1.314	1.268	0.122	0.0	115	1.141
9	1.002	17.7	12.5	1.382	1.314	0.092	0.0	93	1.083
17a	0.769	6.0	0.0	1.200	1.181	0.000	0.0	0	0.000
10	1.001	17.7	8.9	1.477	1.382	0.066	0.0	75	1.003
16a	0.769	6.0	0.0	1.200	0.970	0.000	0.0	0	0.000
11	1.005	17.8	6.3	1.251	1.477	0.047	0.0	62	0.921
15a	0.769	6.0	0.0	1.200	1.470	0.000	0.0	0	0.000
12	1.005	17.8	6.3	1.306	1.251	0.047	0.0	62	0.921
14a	0.769	6.0	0.0	1.200	1.060	0.000	0.0	0	0.000
13	1.005	17.8	6.3	1.200	1.306	0.047	0.0	62	0.921

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
7	5.994	166.5	225	Circular	51.282	48.172	2.885	51.084	48.136	2.723
5	21.615	168.9	225	Circular	51.150	48.300	2.625	51.282	48.172	2.885
8	43.047	100.0	100	Circular	51.637	50.337	1.200	51.282	49.907	1.275
4	35.039	55.7	225	Circular	50.650	48.929	1.496	51.150	48.300	2.625
3	16.505	168.4	225	Circular	50.520	49.027	1.268	50.650	48.929	1.496
17	10.726	100.0	100	Circular	50.860	49.790	0.970	50.893	49.683	1.110
16	5.731	100.0	100	Circular	51.289	49.719	1.470	51.184	49.662	1.422
15	8.435	100.0	100	Circular	51.267	50.107	1.060	51.155	50.023	1.032
14	9.407	100.0	100	Circular	51.545	50.245	1.200	51.407	50.151	1.156

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
7	7	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
5	5	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
8	8	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
4	4	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
3	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
17	17	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
16	16	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
15	15	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
14	14	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable

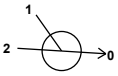
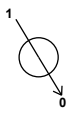
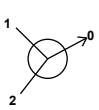
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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2	6.470	99.5	150	Circular	50.631	49.167	1.314	50.520	49.102	1.268
9	19.517	100.6	150	Circular	50.893	49.361	1.382	50.631	49.167	1.314
17a	19.105	100.0	100	Circular	50.860	49.560	1.200	50.650	49.369	1.181
10	19.743	100.7	150	Circular	51.184	49.557	1.477	50.893	49.361	1.382
16a	19.863	100.0	100	Circular	51.289	49.989	1.200	50.860	49.790	0.970
11	19.743	100.0	150	Circular	51.155	49.754	1.251	51.184	49.557	1.477
15a	24.836	100.0	100	Circular	51.267	49.967	1.200	51.289	49.719	1.470
12	19.742	100.0	150	Circular	51.407	49.951	1.306	51.155	49.754	1.251
14a	13.776	100.0	100	Circular	51.545	50.245	1.200	51.267	50.107	1.060
13	21.188	100.0	150	Circular	51.513	50.163	1.200	51.407	49.951	1.306

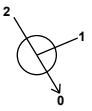
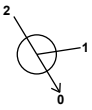
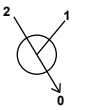
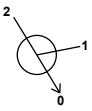
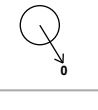
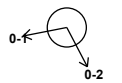
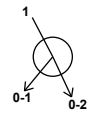
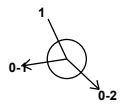
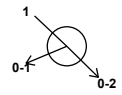
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
9	9	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
17a	17	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
10	10	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
16a	16	1200	Manhole	Adoptable	17	1200	Manhole	Adoptable
11	11	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
15a	15	1200	Manhole	Adoptable	16	1200	Manhole	Adoptable
12	12	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
14a	14	1200	Manhole	Adoptable	15	1200	Manhole	Adoptable
13	13	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
8	385252.860	398955.346	51.637	1.300	1200		0	8	50.337	100
7	385277.726	398920.207	51.282	3.110	1200		1	8	49.907	100
							2	5	48.172	225
							0	7	48.172	225
2	385211.762	398897.512	50.631	1.464	1200		1	9	49.167	150
							0	2	49.167	150
3	385215.115	398891.979	50.520	1.493	1200		1	2	49.102	150
							0	3	49.027	225
4	385225.254	398905.003	50.650	1.721	1200		1	17a	49.369	100
							2	3	48.929	225
							0	4	48.929	225
5	385256.151	398921.529	51.150	2.850	1200		1	4	48.300	225
							0	5	48.300	225

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
6	385283.708	398919.833	51.084	2.948	1200		1	7	48.136	225
9	385201.728	398914.252	50.893	1.532	1200		1 2 0	17 10 9	49.683 49.361 49.361	100 150 150
10	385191.496	398931.137	51.184	1.627	1200		1 2 0	16 11 10	49.662 49.557 49.557	100 150 150
11	385181.264	398948.022	51.155	1.401	1200		1 2 0	15 12 11	50.023 49.754 49.754	100 150 150
12	385171.032	398964.906	51.407	1.456	1200		1 2 0	14 13 12	50.151 49.951 49.951	100 150 150
13	385159.972	398982.978	51.513	1.350	1200		0	13	50.163	150
14	385180.264	398966.714	51.545	1.300	1200		0-1 0-2	14 14a	50.245 50.245	100 100
15	385186.655	398954.510	51.267	1.300	1200		1 0-1 0-2	14a 15 15a	50.107 50.107 49.967	100 100 100
16	385197.161	398932.005	51.289	1.570	1200		1 0-1 0-2	15a 16 16a	49.719 49.719 49.989	100 100 100
17	385211.624	398918.390	50.860	1.300	1200		1 0-1 0-2	16a 17 17a	49.790 49.790 49.560	100 100 100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node 7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	48.172	Product Number	CTL-SHE-0101-5000-1289-5000
Design Depth (m)	1.289	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	49.167
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	561.0	0.0	0.350	561.0	0.0	0.351	0.0	0.0

Node 5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	48.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	627.0	0.0	0.350	627.0	0.0	0.351	0.0	0.0

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	49.027
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	120

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	77.0	0.0	0.300	77.0	0.0	0.301	0.0	0.0

Node 8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.337
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	123.0	0.0	0.350	123.0	0.0	0.351	0.0	0.0

Node 16 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	49.719
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	366.0	0.0	0.300	366.0	0.0	0.301	0.0	0.0

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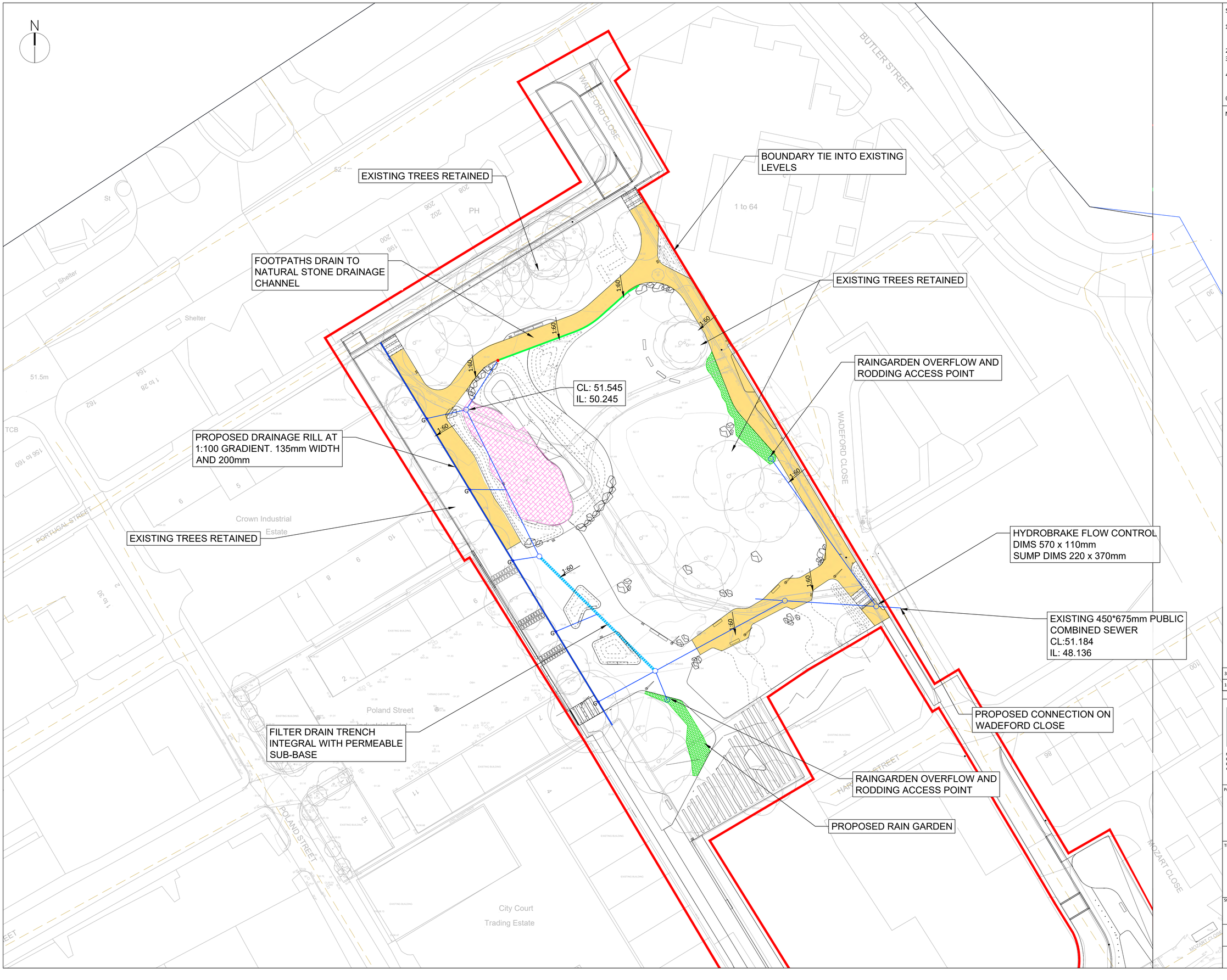
Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	8	23	50.484	0.147	15.3	5.6688	0.0000	SURCHARGED
180 minute winter	7	176	49.328	1.156	5.8	1.3072	0.0000	SURCHARGED
180 minute winter	2	176	49.333	0.166	13.6	28.2455	0.0000	SURCHARGED
180 minute winter	3	176	49.332	0.305	24.2	7.5248	0.0000	SURCHARGED
180 minute winter	4	176	49.331	0.402	21.8	0.5592	0.0000	SURCHARGED
180 minute winter	5	176	49.329	1.029	25.4	67.3085	0.0000	SURCHARGED
15 minute summer	6	1	48.136	0.000	5.0	0.0000	0.0000	OK
15 minute winter	9	11	49.694	0.333	21.6	0.4496	0.0000	SURCHARGED
15 minute winter	10	12	49.827	0.270	18.4	0.3053	0.0000	SURCHARGED
15 minute winter	11	12	50.079	0.325	18.4	0.3672	0.0000	SURCHARGED
15 minute winter	12	12	50.334	0.383	21.4	0.4330	0.0000	SURCHARGED
15 minute winter	13	12	50.694	0.531	25.4	0.9675	0.0000	SURCHARGED
15 minute winter	14	13	50.291	0.046	2.9	0.0521	0.0000	OK
15 minute winter	15	13	50.013	0.046	2.5	0.0522	0.0000	OK
15 minute winter	16	16	49.774	0.055	14.0	6.0628	0.0000	OK
15 minute winter	17	10	49.630	0.070	5.0	0.0894	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	8	8	7	6.6	0.876	1.095	0.3177	
180 minute winter	7	Hydro-Brake®	6	5.0				106.0
180 minute winter	2	2	3	11.5	1.010	0.644	0.1139	
180 minute winter	3	3	4	18.0	1.087	0.450	0.6564	
180 minute winter	4	4	5	21.7	1.157	0.311	1.3935	
180 minute winter	5	5	7	5.1	0.239	0.127	0.8597	
15 minute winter	9	9	2	21.8	1.570	1.232	0.2884	
15 minute winter	10	10	9	16.8	0.952	0.948	0.3476	
15 minute winter	11	11	10	18.4	1.097	1.035	0.3476	
15 minute winter	12	12	11	18.4	1.088	1.038	0.3476	
15 minute winter	13	13	12	21.4	1.217	1.207	0.3730	
15 minute winter	14	14	12	-2.9	-0.445	-0.480	0.0533	
15 minute winter	14	14a	15	2.5	0.731	0.421	0.0479	
15 minute winter	15	15	11	0.0	0.000	0.000	0.0189	
15 minute winter	15	15a	16	2.5	0.733	0.416	0.0851	
15 minute winter	16	16	10	-4.5	0.738	-0.739	0.0349	
15 minute winter	16	16a	17	0.0	0.000	0.000	0.0000	
15 minute winter	17	17	9	0.0	0.000	0.000	0.0024	
15 minute winter	17	17a	4	4.8	0.842	0.799	0.1095	

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Appendix F: Drainage Strategy Drawings



Standard Notes

1. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.
2. This drawing should not be scaled.
3. All dimensions are to be verified by the contractor on site.
4. All discrepancies should be reported to the C.A. prior to the commencement of the works.

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Notes and Keys

- RED LINE BOUNDARY
- 1:60 SLOPE GRADIENT
- PROPOSED RAIN GARDEN
- POROUS TARMACADAM WITH PERMEABLE SUB-BASE
- NATURAL STONE DRAINAGE CHANNEL
- PERMEABLE PAVING WITH PERMEABLE SUB-BASE
- EXISTING COMBINED SEWER
- PROPOSED HEADWALL
- PROPOSED MANHOLE

CATCHMENT INFORMATION

TOTAL SITE AREA	0.97 Ha
IMPERMEABLE AREA	0.26 Ha
PERMEABLE AREA	0.71 Ha
DISCHARGE RATE RESTRICTION	5 l/s
REQUIRED ATTENUATION VOLUME 1:100YR + 45%CC	118.5m³

SuDS ELEMENTS

RAINGARDENS WILL BE UNDERLAIN BY A 300mm THICK LAYER OF POROUS SUBBASE MATERIAL WITH A VOID RATIO OF 30% BELOW THE GROWING MEDIUM LAYER.

POROUS TARMACADAM WILL BE USED AT PERMEABLE AREAS AND WILL CONTAIN 350mm THICK SUBBASE OF 30% VOID MATERIAL LAID BELOW THE PERMEABLE SURFACE COURSE AND BEDDING LAYER.

SWALE PLANTING WILL BE PLANTED IN WITH NATIVE PLANTS.

PERMEABLE PAVING WILL BE USED AT PERMEABLE AREAS AND WILL CONTAIN 300mm THICK SUBBASE OF 30% VOID MATERIAL LAID BELOW THE PERMEABLE SURFACE COURSE AND BEDDING LAYER.

Date	Rev	Description	Drawn	Chkd
30.01.23	P02	REDLINE BOUNDARY UPDATED	BW	CK
16.12.22	P01	ISSUED FOR INFORMATION	BW	CK

MANCHESTER Carver's Warehouse, 77 Dale Street, Manchester, M1 2HG. Tel: 0161 228 6757
LONDON Reeds Wharf, 33 Mill Street, London SE1 2AX. Tel: 020 7253 2977
LEEDS Tower Works, Unit D2-01, Globe Road, Leeds, LS11 5QG. Tel: 0113 2025 130
GLASGOW Gresham Chambers, 45 West Nile St, Glasgow, G1 2PT. Tel: 0141 370 1829
www.civicengineers.com

Project

POLAND STREET ZONE

Title

ANCOATS GREEN
PROPOSED SuDS STRATEGY

Status

FOR INFORMATION

Scale @ A1	Date Created	Drawn	Checked
1:400	DEC'22	BW	CK

Project Number	Originator	Discipline	Drawing Number	Revision
1826-01	CIVIC	DR	30001	P02

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 09 December 2022 09:36
To: Bryn Webb
Subject: PDE Ancoats Green Pre development Enquiries - UU Ref. 02962844

Good Morning Bryn,

Thank you for your email.

A response was sent originally on 27 October and then resent on 22 November.

Please find copy of our engineers response below, please can you confirm receipt of this.

Thanks,

Louise.

Good afternoon Bryn,

Pre Development Enquiry for: Plot D, Jersey Street UU Reference Number : 02962844

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

https://www.unitedutilities.com/builders-developers/working-near-our-assets/

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 450*675mm public combined sewer within your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.
This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The **North West SuDS Pro-Forma** provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

https://www.gov.uk/government/publications/groundwater-protection-position-statements

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the canal located 1m South of the proposed site.

We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 450*675mm public combined sewer within the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the pubic sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.

Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/

Please refer to the link below to obtain full details of the processes involved with sewer closure:

https://www.unitedutilities.com/builders-developers/wastewater-services/close-a-sewer/sewer-closures/

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

Many thanks and kind regards,

Mohammed Aljafarawi (He/Him)
Developer Engineer
Developer Services & Metering
Customer Services
M: 07950474499
unitedutilities.com

If you have received a great service today why not tell us?
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---------- Original Message ----------
From: Bryn Webb [bryn.webb@civicengineers.com]
Sent: 08/12/2022 16:47
To: wastewaterdeveloperservices@uuplc.co.uk
Subject: RE: PDE Ancoats Green Pre development Enquiries - UU Ref. 02962844

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Hi Louise,

I don't think I received a reply from yourself on this enquiry. Please can you send it over if you have completed it.

Many thanks,

Bryn

Bryn Webb
Graduate Civil Engineer

Tel: 0161 228 6757
DDI: 0161 537 6634

Civic Engineers



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From: wastewaterdeveloperservices@uuplc.co.uk <wastewaterdeveloperservices@uuplc.co.uk>
Sent: 19 October 2022 09:15
To: Bryn Webb <bryn.webb@civicengineers.com>
Subject: PDE Ancoats Green Pre development Enquiries - UU Ref. 02962844

Good Morning Bryn,

Thank you for contacting United Utilities.

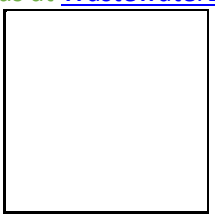
I have passed your details to our engineer who will respond in due course.

You reference number is 02962844.

Kind Regards,

Louise Dack
Customer Advisor Advanced
Developer Services & Metering
Customer Services
T: 01925 233063 (33063 internal)
unitedutilities.com

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http://www.unitedutilities.com/subsidiaries

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Civic Engineers

Manchester

Carver's Warehouse
77 Dale Street
Manchester M1 2HG

+44 (0)161 228 6757

London

Reeds Wharf
33 Mill Street
London SE1 2AX

+44 (0)20 7253 2977

Leeds

Unit 02/01 Tower Works
Globe Road
Leeds LS11 5QG

+44 (0)113 2025 130

Glasgow

Gresham Chambers
45 West Nile Street
Glasgow G1 2PT

+44 (0)141 370 1829

civicengineers.com