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MANAGING VISION

Flood Risk Assessment & Drainage Strategy

JD Sports Campus, Bury

Client: JD Sports PLC Date: 19/12/2025

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1 Document History and Validation

1.1 Revision History

Revision	Issue Date	Reason for Issue
Rev A	27 May 2022	First Issue
Rev B	19 December 2025	Updated Site Layout and Proposals

1.2 Document Validation (Latest Issue)

Principal Author	Checked By	Verified By
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2 Executive Summary

This Flood Risk Assessment (FRA) has been prepared for JD Sports PLC to inform the proposed development of their Proposed Campus Hub building. In addition to the Hub building, the site comprises of staff/visitor parking and soft landscaped gardens and recreational space.

This report has been written to meet the requirements of a site-specific FRA in accordance with the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG).

The development site lies adjacent to Pilsworth Road and directly west of Hollins Brook Way, Bury, BL9 8RR

The development will see the construction of a single storey Hub building for JD Sports. A central feature of the development will be sports pitches.

A review of the flood risk in the area has been carried out. It has been found that the development site is located within a Flood Zone 1 area.

This FRA has identified that the overall flood risk from all sources is low.

As with every development there are residual risks of flooding. With prudent design and construction and by enacting regular inspection and maintenance of infrastructure, these risks can be minimised. As it is proposed to restrict surface water flows off-site and attenuate flows on-site, the probability of flooding, both on site and downstream of the site will be reduced as a result of the proposed development.

Under these conditions, the flood risk posed to the development is deemed to be acceptable.

The surface water outfall for the site has been constructed as part of the Phase 1 works, the outfall was determined following a review of the drainage hierarchy. Phase 2 of the development has a restricted surface water discharge rate of 9 l/s. To achieve this whilst ensuring no flooding during a 1 in 30 year + CC event and limited flooding in a 1 in 100 year + CC event attenuation will be provided by a below ground attenuation tank, porous paving and rain gardens.

Foul flows will discharge to the adjacent United Utilities sewers.

The proposed drainage systems will be subject to a maintenance plan which should be carried out by an appointed management company. This will ensure adequate maintenance of the infrastructure in the future.

3 Introduction

3.1 Reason for Report

This Flood Risk Assessment (FRA) has been prepared for JD Sports PLC to inform the development of their Proposed Campus Hub. In addition to the Hub building, the site comprises of staff/visitor parking and soft landscaped gardens and recreational space.

This report has been produced to establish the risk of flooding to the proposed development location. It will also identify aspects requiring further study, if any.

3.2 Scope of Report

This report has been written to meet the requirements of a site-specific FRA in accordance with the NPPF paragraphs 170-182, and its associated Planning Practice Guidance (PPG) and includes the following:

- An appraisal of the availability and adequacy of existing information on flood risk.
- An appraisal of the flood risk posed to the site, and potential impact of the development on flood risk elsewhere.
- An appraisal of the scope of possible measures to reduce the flood risk to acceptable levels, if necessary.

3.3 Policy Review

3.3.1 National Planning Policy Framework (NPPF)

The government's national policy on development and flood risk is covered by the NPPF and the associated Planning Practice Guidance (PPG). The principal aim of the NPPF for flood risk is that:

"Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere." (Department for Communities and Local Government, 2012).

3.3.2 Development vulnerability classification

Table 2 of the PPG, enclosed in Appendix A (Department for Communities and Local Government, 2014), identifies the development vulnerability classification for various development types. The primary purpose of the development is to construct new building housing a restaurant and gym which, under Table 2 is classified as *'less vulnerable development'.*

3.3.3 Sequential test

The sequential test aims to steer new development towards areas with the lowest probability of flooding. The sequential test matrix, enclosed in Appendix A (Department for Communities and Local Government, 2014), indicates '*less vulnerable*' developments are appropriate in Flood Zones 1 and 2.

The development fulfils the sequential test, as the area considered for development lies within a Flood Zone 1.

3.3.4 Exception test

An exception test is carried out where a development does not meet the sequential test categories, requiring a demonstration that the benefits of the development outweigh the flood risk. An exception test is not required for this development as it is located within Flood Zone 1 and therefore fulfils the requirements of the Sequential test (refer to Table 3 enclosed in Appendix A).

3.4 Significance criteria

Risk is defined as the combination of the impact and probability of a flood event. The following significance criteria has been used in this report to quantify the severity of flood risk. If any sources of flooding are deemed to pose anything above a low risk to the site, the location and severity of the potential flooding will be examined in more detail to determine whether this is an acceptable risk or whether mitigation measures will be required to ensure that the risk is reduced.

RISK ASSESSMENT MATRIX				
	Impact →			
Probability of Event ↓		Low	Medium	High
	Low	Low	Medium-Low	Medium
	Medium	Medium-Low	Medium	Medium-High
	High	Medium	Medium-High	High

3.5 Local Literature

3.5.1 Bury Council Preliminary Flood Risk Assessment, May 2011

In May 2011, JBA Consulting produced a Preliminary Flood Risk Assessment (PFRA) on behalf of Bury Council. The report was produced to meet the council's duties, as a Lead Local Flood Authority (LLFA) in accordance with the NPPF, using the most up to date flood risk information and planning policy.

The document provides an overview of the historical flood data collated, as well as how existing and potential future flood risk has been assessed. This PFRA has been reviewed to identify key points relevant to the area local to the JD Sports site (PFRA 1km^2 tile location reference X381 Y408).

- Bury Council is the lead local flood authority for the site. United Utilities are the Statutory Sewers Undertaker.

- The PFRA applies the Defra and WAG pre-determined thresholds criteria for human health and economic activity impacted by future flooding as follows:

  – 200 people at risk

  – 20 businesses at risk, or

  – 1 critical service at risk

- The site is located within an area whereby the above pre-determined thresholds have been exceeded; therefore, the development is classed as lying in a Flood Risk Area. The following exceedances have been recorded against the pre-determined threshold data:

  – Number of people at risk – 5 (205)

  – Number of Non-Residential Properties (businesses) at risk – 30 (50)

  – Number of critical services at risk - 0 (0)

- Flood risk maps contained within the PFRA indicate that the development area is in a Flood Zone 1.
- No United Utilities Sewer Incident Recording System (S.I.R.S) or Wastewater Incident Register System (W.I.R.S) records have been identified in the area.
- 1No United Utilities External DG5 property is recorded approximately 900m south of the development location.
- The Environment Agency identifies 49No areas of record flood events within the wider Bury Council. 2No of these incidents were attributed to flooding of drainage networks with the remainder being from Main Rivers or incidents with an unknown source.
- The Environment Agency, National Dataset, Areas Susceptible to Groundwater flooding (AStGWF) indicates the area is at the lowest risk of groundwater flooding (<25% Risk).
- United Utilities modelling data indicates the sewer discharge volume for a 30yr rainfall event within the developments 1km grid square is 5,297m^3, representing a midrange volume within the dataset.
- The development site lies approximately 250m north of the east/west flowing Hollins Brook and approximately 400m east of the north/south flowing River Roch (each classed as Main Rivers).
- Hollins Brook and the River Roch converge approximately 800m west-west-south of the development. East of the River Roch, this convergence forms a localised Flood Zone 2 and 3 area remote of the development. This is the closest flood zone 2/3 to the development area.
- By the 2080s, it is plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance, or rarer) could increase locally by 40%.

3.5.2 Bury Local Plan, Topic Paper 6, Flood Risk, October 2018

The Bury Topic Paper 6 document sets out key policies, plans and strategies relating to flood risk that form the framework for the development of the Local Plan current at the time of publication.

The intention of the Topic Paper is that it can be maintained as a live document that can be updated, if necessary to reflect the most up-to-date circumstances. It should be noted that the document contains more recent updates suggesting that the accuracy of information is being maintained.

The Topic Paper has been reviewed to identify key points applicable to the development site. These are summarised as follows:

- The Greater Manchester Surface Water Management Plan (SWMP), 2012 identified 37 hotspot areas in Bury, representing 8% of the Greater Manchester total. None of these hotspot locations are within the proximity of the development site.
- The Boxing Day 2015 severe flooding event did not affect any area within close proximity of the development site.
- The River Roch is one of two major watercourses in the borough.
- Many sewers discharge directly into open watercourses prone to flooding and in general there is insufficient capacity in the sewers and drainage network to accommodate increasing amounts of surface water. This is largely due to the hilly topology of Bury.

3.5.3 Bury, Rochdale and Oldham Strategic Flood Risk Assessment Volume II – Level 1 SFRA, November 2009

In November 2009, JBA Consulting produced a Level 1 Strategic Flood Risk Assessment (SFRA) for key urban areas within the Bury, Rochdale and Oldham.

The Level 1 SFRA has been reviewed to identify key points applicable to the development site. These are summarised as follows:

- According to the Greater Manchester sub-regional SFRA, the principal source of flood risk across the region is from fluvial flooding.
- Hollins Brook is identified as a smaller watercourse, but this is not discussed in greater detail in terms of flood risk.
- The development site is not within close proximity to the two main areas considered at risk from flooding as a result of the River Roch and associated tributaries catchment area.

3.5.4 Bury, Rochdale and Oldham Strategic Flood Risk Assessment Volume III – Level 2 SFRA, November 2009

In November 2009, JBA Consulting produced a Level 2 Strategic Flood Risk Assessment (SFRA) for key urban areas within the Bury, Rochdale and Oldham.

Following a review of this Level 2 SFRA, there is no information relating to the local area of the development site.

3.6 Correspondence with Local Authorities

At this time, no local authorities have been contacted.

3.7 Site Overview

3.7.1 Existing Site

The development site lies adjacent to Pilsworth Road and directly west of Hollins Brook Way, Bury, BL9 8RR.

A portion of the development site has been constructed, it comprises of landscape, access road and car park areas (herein referred to as 'Phase 1'). The development portion being proposed for construction comprises of the main building, further parking allocation, sports pitches and landscaping (herein referred to as 'Phase 2'). A satellite image showing the site location can be found enclosed in Appendix B.

The site has an area of approximately 1.672ha, of which Phase 2 is approximately 0.90ha. This is made up of approximately 0.87ha of hardstanding.

3.7.2 Surrounding Area

The site is bounded by Pilsworth Road to the north and Hollins Brook Way to the east. A small residential development lies adjacent to the site in the west and to the south lies Hollins Vale Local Nature Reserve.

Vehicular access is from Hollins Brook Way.

3.7.3 Topography

The topographical survey can be found enclosed in Appendix C.

The site falls generally from northeast to southwest with an approximate maximum level of 89.98m AOD along the northeast boundary and a minimum level of 87.45m AOD in the southwest corner.

3.7.4 Hydrogeology

There are no watercourses on site or directly adjacent to the development.

The closest river is the Hollins Brook located approximately 250m to the south.

A man-made lagoon/SuDS pond lies within the Hollins Vale Local Nature Reserve between Hollins Brook and the site in the north.

3.7.5 Geology

Phase 2 site investigation data issued in December 2021 by RoC Consulting for the proposed road widening of Hollins Brook Way suggests that the site comprises of a mean 0.75m thickness of made ground from former development.

Underlying the made ground are glacial deposits of sands and sandy/gravelly clays. No sources of ground contamination were encountered during the investigation.

No ground water was encountered during the investigation which involved drilling works to a maximum depth of 5.45m BGL.

A more comprehensive site investigation was undertaken in March 2022 by Groundtech Consulting Ltd which found that the made ground across the wider site was encountered generally to the same depths as previously reported, but in some areas, this was as deep as 1.8m BGL.

Natural superficial deposits in the form of soft to firm sandy clays and silty clayey sands were encountered below the made ground up to depths of between 15.5m BGL and 17.0m BGL. Below this, firm to stiff sandy slightly gravelly clay was encountered.

Sandstone bedrock was present at depths ranging between 23.5m and 27.3m BGL.

Unlike the initial RoC site investigation, groundwater was encountered by Groundtech at depths ranging between 1.6m and 6.5m BGL.

The Groundtech report concluded that the risk to controlled waters from the site was considered to be low and initial infiltration testing was carried out within the natural sands in accordance with BRE 365, which found infiltration rates ranging between 2.17×10^{-5} and 4.37×10^{-5}m/s which are considered good drainage conditions for the promotion of SuDS solutions.

3.7.6 Existing Drainage

The existing drainage on site has been constructed as part of the Phase 1 works. A drawing showing Phase 1 drainage and a copy of the United Utilities Sewer Records can be found enclosed in Appendix D. The recently constructed drainage includes an outfall on to the public surface water sewer. A Hydrobrake at this outfall restricts discharge from the site to 25 l/s.

3.7.7 Proposed Development

The development proposals can be found enclosed in Appendix E.

The development will see the construction of a new single storey building for JD Sports. The proposed building will house a café, canteen and gym for company staff.

Externally, the development shall comprise of a series of pedestrian footpaths, internal circulation and parking provision. Access to the proposed site will be from both Hollins Brook Way in the east and Pilsworth Road in the north.

A central feature of the development will be sports pitches.

The development will not affect the total site area.

4 Flood Risk Assessment

4.1 Tidal & Fluvial

The EA Flood maps characterise the risk of flooding due to tidal and fluvial sources as follows:

- Flood Zone 1 – Land having less than 1 in 1,000 annual probability of river or sea flooding (low risk)
- Flood Zone 2 – Land having between a 1 in 100 and 1 in 1000 annual probability of river flooding, or, land having between a 1 in 200 and 1 in 1000 annual probability of sea flooding (medium risk)
- Flood Zone 3 – Land having a 1 in 100 or greater annual probability of river flooding, or land having a 1 in 200 or greater annual probability of sea flooding (High risk)

Due to the Site location, there is no risk of tidal flooding.

The flood maps, enclosed in Appendix F, shows that the entire development site is located in a Flood Zone 1.

The closest flood zone 2 and 3 areas are shown approximately 0.8km to the west-south-west of the site where the Hollins Brook and River Roch converge.

Due to the distance from the development location and the local topography, the risk of fluvial flooding is considered low.

Assessment of Impact: LOW

Assessment of Probability: LOW

The overall risk posed due to tidal and fluvial flooding is therefore considered **low.**

4.2 Surface water

The GOV.UK Long Term Flood website map, enclosed in Appendix F, shows that the existing site is susceptible to minor, localised surface water flooding along the southern boundary of the site. In the existing case, this is most likely due to insufficient private drainage infrastructure along the low point of the site. Through the development of detailed design, any risk of surface water flooding will be mitigated by developing a levels strategy to ensure positive discharge of all surface water and a means of draining low points. Based on the small degree of localised flooding indicated, and considering that the site topology will be fully remodelled, the risk of surface water flooding is considered low.

Assessment of Impact: LOW

Assessment of Probability: LOW

The overall flood risk due to surface water is therefore considered **low.**

4.3 Groundwater

Groundwater flooding occurs when water levels in the ground rise above surface elevations. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises.

As discussed in Section 3.5, the JBA Consulting preliminary flood risk assessment indicates that the location of the development is at low risk (less than 25%) of groundwater flooding.

The initial site investigation carried out adjacent to Hollins Brook Way did not encounter any groundwater following intrusive drilling works up to 5.45m BGL. The more comprehensive site investigation carried out by Groundtech Consulting did encounter groundwater at depths ranging from 1.6m and 6.5m BGL.

There are currently no plans to construct basements or partially buried areas as part of the development.

Based on the topography of the site, which is located several meters above the location of the River Roch to the west and Hollins Brook to the south, the probability and impact of any groundwater flooding occurring on site can be considered low.

Assessment of Impact: LOW

Assessment of Probability: LOW

The overall risk posed to the site due to groundwater flooding is therefore considered **low.**

4.4 Artificial drainage

All existing drainage recently constructed within the site as part of the Phase 1 works has been designed to modern standards and is equipped with the required capacity to manage surface water runoff generated on site.

Assessment of Impact: Low

Assessment of Probability: Low

The overall risk posed to the due to existing artificial drainage flooding is therefore **low.**

4.4.1 Proposed drainage

The proposed drainage strategy for the site has been designed in accordance with the relevant design standards, industry guidance and government guidance.

Surface water discharge from Phase 2 will be restricted to 9 l/s before it is discharge into the recently constructed Phase 1 development. Attenuation has been provided within Phase 2 via a below ground attenuation tank, porous paving and rain gardens. Traditional drainage infrastructure such as channel drains, gullies and kerb drains have been proposed to intercept surface water runoff.

The capacity of any proposed drainage system will be set to ensure no flooding occurs in a 1 in 30 rainfall event and any flooding from a 1 in 100 (+40% allowance for climate change) rainfall event will be contained within the site boundary and will not flood any structures or properties.

Any discharge into public sewers will be agreed with United Utilities.

Additionally, a robust drainage maintenance strategy will ensure risk of flooding from any proposed drainage system will be low. Should the above action be taken, this will reduce the risk of flooding from the proposed drainage system.

Assessment of Impact: LOW

Assessment of Probability: LOW

The overall risk posed due to proposed drainage flooding is therefore considered **low.**

4.5 Infrastructure failure

4.5.1 Reservoir failure

The GOV.UK Long Term Flood Map (extract enclosed in Appendix F) shows that the site is not at risk of flooding from reservoir failure.

Assessment of Impact: LOW

Assessment of Probability: LOW

4.5.2 Canal failure

There are no canals near the site and it therefore safe to assume that there is a negligible risk of canal flooding on site.

Assessment of Impact: LOW

Assessment of Probability: LOW

The overall risk posed to the site due to infrastructure flooding is therefore considered **low.**

4.6 Flood risk summary

A summary of the flood risks identified in Section 2 are shown in the table below.

RISK ASSESSMENT MATRIX				
	Impact →			
Probability of Event ↓		Low	Medium	High
	Low	A, B, C, D, E, F, G		
	Medium			
	High			

Key:

- A: Tidal and Fluvial Flooding – (Section 4.1)
- B: Surface Water/Pluvial/Overland Flow – (Section 4.2)
- C: Groundwater Flooding – (Section 4.3)
- D: Artificial Drainage: Existing Drainage: Existing Site Drainage – (Section 4.4.1)
- E: Artificial Drainage: Proposed Drainage – (Section 4.4.2)
- F: Infrastructure Failure: Reservoirs – (Section 4.5.1)
- G: Infrastructure Failure: Canals – (Section 4.5.2)

5 Flood Risk Analysis & Mitigation

5.1 Mitigation

Surface water flooding from all sources is considered to be low risk.

It should be noted that the type of development itself is 'less vulnerable', meaning the impact of flooding occurring will have a lesser consequence due to the proposed use within the building.

The recent construction of the Phase 1 drainage system designed to current standards will offer a good management of surface water on site. Combined with the proposed development of the Phase 2 works, assuming maintenance/repairs carried out, then the development has done everything possible to reduce the risk of surface water flooding.

5.2 Residual Risk

Whilst the risk of flooding to the development is low, it should be acknowledged that there is potential for residual risks. The residual risk comes from the failure or blockage of site drains and sewers, or lack of maintenance of nearby infrastructure. Prudent design and planning will mitigate the potential impact these could have on the development. Enacting regular inspection and maintenance regimes and careful working practices should reduce the potential of failures of infrastructure. The utilisation of building finished floor levels above the surrounding area will prevent inflow into the buildings.

Designing in allowances for climate change provides extra capacity and so provides a level of future proofing in the drainage system for the potential changes to the climate over the design life of the development.

5.3 Access & Egress

Access and egress to the site should be properly managed in the event of flooding occurring on site. External levels should be developed to ensure safe routes for site users even during extreme rainfall events.

6 Drainage Strategy

This section of report will provide information used in the development of the drainage design and the principles that were followed. The drainage strategy uses sustainable principles and will aim to promote approaches in keeping with the nature of the existing site and current legislation.

This section should be read in conjunction with proposed drainage layout enclosed in Appendix G.

6.1 Design standards and guidance

The following (current revisions at the time of issue) design standards, industry guidance, government guidance and literature are used in the development of this drainage strategy.

British Standards and European Norms (BS EN)

- BS EN 752: Drain and sewer systems outside buildings
- BS EN 12056: Gravity drainage systems inside buildings

Construction Industry Research and Information Association (CIRIA)

- C753: The SuDS manual

Department of Communities and Local Government (DCLG)

- Building Regulations Approved Document H: drainage and waste disposal
- National Planning Policy Framework (NPPF)
- Flood risk and coastal change Planning Policy Guidance
- Climate Change Planning Policy Guidance
- Water supply, wastewater and water quality Planning Policy Guidance

Department of Environment, Food and Rural Affairs (DEFRA)

- Non-Statutory Technical Standards for Sustainable Drainage – Practice Guidance

Water Research Centre

- Sewerage Sector Guidance Appendix C – Design And Construction Guidance

6.2 Proposed Surface Water Drainage

6.2.1 Method of Surface Water Discharge From Site

The location of surface water discharge for this site has already been determined and constructed as part of the Phase 1 development works for this site. However, it is important to demonstrate through this FRA and Drainage Strategy how the decision to discharge surface water from the site was made.

All proposed surface water drainage systems should give preference to the SuDS hierarchy, which sets out that schemes should aim to mimic natural drainage as closely as possible, and that discharge of surface water runoff should be dealt with in the following ways (in order of preference):

- Collection for non-potable use
- Infiltration to ground
- To a above ground surface water body
- To a surface water sewer or other piped surface water drainage system
- To a combined sewer

When the first phase of this development was constructed the preference of collection of rainwater for non-potable use was not included in the hierarchy and therefore not considered as an option on site. Although not used as a form of discharge, the use of this as a form of SuDS has been discussed and is included further down in this section of the report.

The second preference of the drainage hierarchy proposes drainage to be discharged via infiltration to ground. Although initial proposals in Rev A of this document outlined potential for this to be a viable option this was later found not to be true. In a drainage strategy addendum written for the previous proposal testing by Groundtech Consulting was shown. The tests carried out on the 18/07/2022 demonstrated that results offered very low permeability in the ground and therefore deem the site unsuitable for the use of infiltration as a form of discharge. Additionally this site investigation encountered groundwater in some locations as shallow as 1.6m deep, which would limit the potential for infiltration SuDS.

Hollins Brook is located 200m south of the proposed development and presents itself as a possible connection to discharge surface water from the site too. As this option was assessed further it was deemed unsuitable, in between the brook and the site is Hollins Vale Local Nature Reserve, a Site of Biological Importance. Constructing through this area was therefore not feasible so this option was not progressed with.

Shown in the previous revision and the addendum submitted, a 300mm diameter public surface water sewer located on Pilsworth road was identified as a point of connection for surface water to discharge to from site. This was the option that was chosen and constructed during the phase 1 works. A discharge rate from the site was proposed at 25.0 l/s and received the required agreements.

As this development is being carried out in two phases the flow rate from phase 2 is restricted to 9 l/s before flowing in to Phase 1 to which that is then limited to 25.0 l/s when connecting to the public sewer. Therefore, the drainage strategy for Phase 2 of the project must provide enough attenuation to allow this reduced discharge rate.

6.2.2 Climate Change and Flooding Allowance

In line with the NPPF and Bury Council planning guidance, climate change should be considered for all developments. In accordance with this guidance, a climate change factor of 40% will be assessed for the 1 in 100-year event for the proposed surface water drainage system. For the 1 in 30-year event a climate change factor of 35% will be applied to the rainfall data.

Incorporating this into the drainage strategy there will be no flooding for a 1 in 30 year plus climate change storm event. However, for the 1 in 100 year plus climate change storm event small amounts of localised flooding to landscaping and sports pitches will be allowed. This flooding will not affect any buildings on site or access to the site.

6.2.3 Surface Water Drainage Proposals

To allow for a discharge rate from Phase 2 at 9 l/s whilst also preventing all flooding up to and including a 1 in 30 year + CC event and allowing small amounts of flooding for 1 in 100 year + CC events SuDS that provide attenuation must be proposed.

Initially blue and green SuDS where proposed but due to constraints on site most where not feasible. Spatial constraints meant that bioretention ponds and swales could not be proposed on site, whilst blue or green roofs where not feasible due to the required pitch of the roof. However, rain gardens have been adopted around the site as they can be proposed in smaller locations where other SuDS cannot fit.

Four rain gardens have been proposed within Phase 2 of the development however the attenuation provided by these would not be sufficient to prevent flooding when restricting the site discharge rate. To provide the required attenuation as well as the rain gardens, 2120 m^2 of porous paving and a geocellular attenuation tank with a volume of 320m^3 have been proposed. The porous paving will cover car parking bays (excluding electric vehicle charging bays), the padel courts and the MUGA pitch. The geocellular attenuation tank has been proposed under the carpark to the north of the building.

Traditional drainage infrastructure is proposed immediately around the new building to manage the collection of surface water. Channel drains are positioned at all building entrances to prevent runoff from entering the internal areas. The roadway will be drained by kerb drains and gullies designed to capture and discharge surface water efficiently. All flows from these traditional drainage features will discharge into the surface water network where they will be attenuated within the below ground attenuation tank and porous paving.

6.2.4 InfoDrainage Models

The above proposals where modelled in InfoDrainage using FEH rainfall data and climate change allowances specified in Section 6.2.2 of this report. The results of the InfoDrainage model can be found in Appendix I.

The modelled impermeable area for the Phase 2 development was 0.872 ha. Flat areas of soft landscaping where not included in the catchment as runoff from these can be assumed as negligible. Also, the bin store was omitted from the catchment too as the gully here will be connected into the foul drainage system.

The results of the InfoDrainage model have shown that there is no flooding during any storm events up to the 1 in 30 years + 35% climate change storm events. A small negligible amount of flooding occurs at the 1 in 100 years + 40% climate change storm events. In the eastern most rain garden flooding of 3m^3 occurs, this small flooding amount will stay on site in a low point and will not enter any building on site.

The model shows the below ground attenuation tank is fully utilised when attenuating water during storm events. Attenuation is provided else where via porous paving in sports pitches and car parking, during the most critical storm events 40m^3 of storm water is attenuated in porous paving across the site.

6.3 Proposed Foul Water Drainage

6.3.1 Strategy

A new drainage system will be constructed for the proposed development in accordance with BS EN 752 and Approved Document H. The foul flows will be collected in a separate gravity foul water drainage system. The pipework will be 150mm diameter and laid at falls to suit self-cleansing velocities. The foul water will drain to a sump pump, this will pump the foul water to FW11a where a gravity connection can then be made under Pilsworth Road into an existing public combined sewer.

A below ground foul attenuation tank is also proposed to provide 24 hours of emergency attenuation in the event of a pump failure. Currently the tank is sized for foul flows from the previous Phase 2 proposals, the tank has yet to be reduced in size. Once more accurate information is available regarding the new foul flows from the Phase 2 development the tank will be made smaller to suit.

The gravity connection under Pilsworth road will connect into a United Utilities combined sewer with a diameter that is yet to be confirmed. Immediately downstream of the proposed connection point the public sewer joins a 300mm diameter combined sewer. Therefore, it is assumed that the diameter of pipe the proposed connection will be made in to will be adequate for taking the required flows from the development.

All connections will be subject to agreement with United Utilities, including a S106 agreement.

6.3.2 Proposed flow rates

The drainage system has been designed to achieve a target self-cleansing velocity of 0.75m/s, but as a minimum have a gradient of no flatter than 1 in 40 when the peak flow is less than 1l/s and no flatter than 1 in 150 provided there are at least 5No. toilets connected to the pipe, in accordance with Approved Document Part H.

Once the internal design flows have been determined through detailed design, peak foul water flows will be calculated using BS EN 12056-2 and the proposed foul fixtures within the building.

7 Maintenance

Maintenance of the foul and surface water drains for the development will fall under a private maintenance plan and be the responsibility of the site owner.

A maintenance regime should be enacted regularly as part of the normal facilities management duties. A maintenance schedule should be established following construction and updated as necessary throughout the lifetime of the building. A record maintenance log should be kept and updated accordingly.

The following schedule should be used as the basis of maintenance at the site.

	Maintenance Activity	Frequency of activity (months)				
		1	3	6	12	A/R
	Manholes (General)					
1	Check cover is not damaged and fits securely			X		
2	Check inlet and outlet are free flowing and not obstructed			X		
3	Check security of fitting for all manhole ironmongery			X		
4	Check benching for scour or build-up of debris			X		
5	Check joints in construction for damage or inflow				X	
6	Record maintenance inspection in log book			X		
	Gullies & drainage channels					
7	Check grating is undamaged and fits securely	X				
8	Inspect internal gully/sump chamber, remove debris from traps and check outfall is clear and free flowing			X		
9	Record maintenance inspection in log book	X				
	Conveyance Pipes					
10	Carry out flow test between manholes to ensure free flow of system				X	
11	Jetting and clearance of blockages, debris or silt					X
12	Inspection by CCTV – should problem arise as a result of the flow test					X
13	Cutting of growth into pipe					X
14	Record maintenance inspection in log book				X	X
	Flow Controls					
15	Check flow control mount to ensure secure fitting		X			
16	Check inlet to flow control is free flowing and not obstructed		X			
17	Remove silt from the sump			X		

18	Record maintenance inspection in log book		X			
	Attenuation Structure					
19	Inspect inlet/outlet chambers for evidence of poor operation, and clear when necessary.			X		
20	Visual inspection of overflow pipes and vent pipes				X	
21	Remove sediment from pre-treatment sump chamber			X		
22	Monitor any inspection chambers. Check for water level and silt at base of tank				X	
23	Record maintenance inspection in log book			X		
	Bioretention/Trees					
39	Inspection	X				
40	Litter and debris removal	X				X
41	Grass cutting					X
42	Weed and invasive plant control	X				X
43	Shrub management (including pruning)	X				X
44	Sediment management		X			
45	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required.					X
46	Structure rehabilitation / repair					X
47	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours.	X				X
48	Repair erosion or other damage by re-turfing or reseeding					X
49	Inspect vegetation coverage			X		
50	Relevel uneven surfaces and reinstate design levels					X
51	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface					X
52	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip					X
53	Remove and dispose of oils or petrol residues using safe standard practices					X
54	Inspect inlets, outlets and overflows for blockages, and clear if required.	X				
55	Record maintenance inspection in log book	X				X

8 Conclusion & Recommendations

8.1 Conclusion

This FRA has considered the flood risk posed to the site by tidal and fluvial sources, surface water, groundwater, artificial drainage and infrastructure sources. The FRA has identified that the overall flood risk is low.

The risk posed by the proposed drainage will be minimised by ensuring the site is adequately drained under controlled conditions and, where possible, ensure that the ground slopes away from any structures within the development to assist in mitigating flood risk from surface water exceedance flows.

Any proposed surface water drainage strategy for the site has been designed in accordance with the relevant design standards, industry guidance and government guidance. Flows from Phase 2 discharge in to Phase 1 at a pre-agreed 9 l/s. The network is designed to not flood for a 1 in 30 year + 35% climate change event and allow small amounts of flooding for a 1 in 100 year + 40% climate change event. An attenuation tank, of 320m^3 in volume, has been proposed along with 2120m^2 of porous paving and 4 rain gardens. Together this achieves the criteria for no flooding at a 1 in 35 + CC year event and small amounts for a 1 in 100 + 40%CC year event.

8.2 Further Recommendations

Further discussion should be had with the relevant authorities as design develops to ensure any proposed surface water drainage system, including flow rates, are acceptable by the LLFA (Bury Council), United Utilities and the existing drainage asset management team.

Appendix A – NPPF Technical Guidance

Table 2: Flood risk vulnerability classification

Essential infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly vulnerable • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use[3]. • Installations requiring hazardous substances consent[4]. (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")[5].
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[6]. • Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*[7]
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,

[3] For any proposal involving a change of use of land to a caravan, camping or chalet site, or to a mobile home site or park home site, the Sequential and Exception Tests should be applied.
[4] See Circular 04/00: *Planning controls for hazardous substances* (paragraph 18) at: www.communities.gov.uk/publications/planningandbuilding/circularplanningcontrols
[5] In considering any development proposal for such an installation, local planning authorities should have regard to planning policy on pollution in the National Planning Policy Framework.
[6] For definition, see *Planning for Sustainable Waste Management: Companion Guide to Planning Policy Statement 10* at www.communities.gov.uk/publications/planningandbuilding/planningsustainable
[7] See footnote 3.

restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in "more vulnerable", 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).
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 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.*

Notes to table 2:

a. This classification is based partly on Department for Environment, Food and Rural Affairs and Environment Agency research on *Flood Risks to People* (*FD2321/TR2*)[8] and also on the need of some uses to keep functioning during flooding.

b. Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.

c. The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
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	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

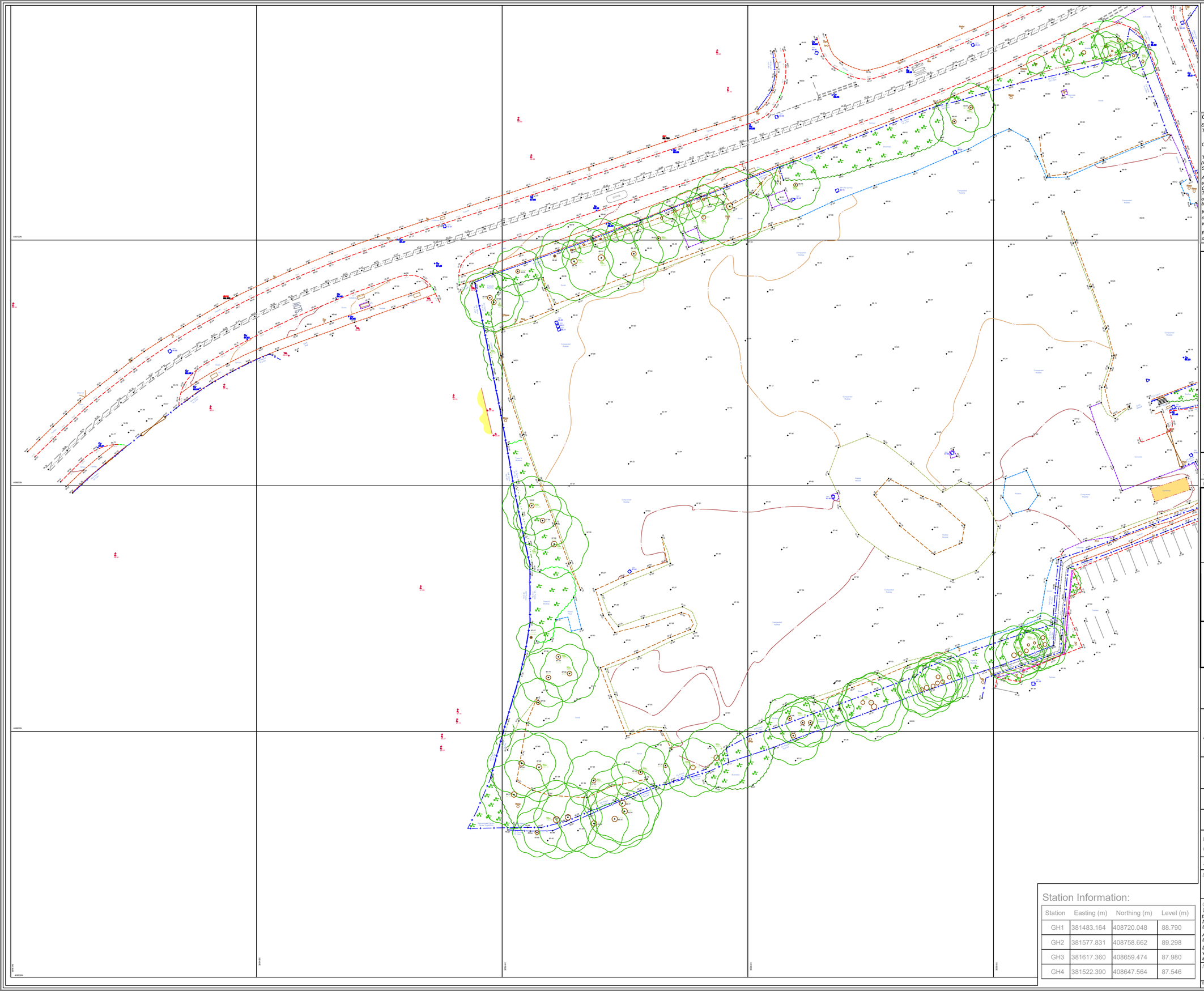
Notes to table 3:
This table does not show:

a. the application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2, and then Zone 3;
b. flood risk assessment requirements; or
c. the policy aims for each flood zone.

Appendix B – Site Location Plan

Pilsworth Rd
Pilsworth Way
Pilsworth Rd
Pilsworth Rd
Hollins Brook Way
Hollins Brook Way
Just Health Bury
HGV Medical Clinic
Fire 2000
JD Group
Brasher
Beech wood Apartments
Hollins Vale Local
Nature Reserve

Appendix C – Topographical Survey



N

OS Note:

Some services may have been omitted due to parked vehicles. The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.
The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid and datum.

Legend:

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge

1 100.000 Station and Name, Station Level

Tree / Bush / Sapling, Area of Undergrowth, Woodland

R: Ridge Level
E: Eaves Level
F: Flat Roof Level
TWL: Top of Wall Level

Gate

Fence types:

INV	Intervoven	IC	Inspection chamber
IR	Iron Railings	Pinv	Pipe invert
WM	Wire Mesh	Gy	Gully
PR	Post & Rail	Bg	Back gully
PW	Post & Wire	Dp	Down pipe
CL	Chain Link	Pipe	Pipe above ground
WP	Wooden Panels	MH	Manhole
CP	Concrete Panels	WL	Water level
SP	Steel Palisade	Fl	Flood light
		Lp	Lamp post
		Tp	Telegraph post
		Ep	Electricity post
		Tl	Traffic light
		Bus	Bus stop
		Sv	Stop valve
		St	Stop tap
		Er	Earth rod
		Wm	Water meter
		Gas	Gas valve
		Av	Air valve
		ICU	Underfilled inspection
		Wo	Wash out
		Re	Rodding eye
		BB	Belisha beacon
		CTV	Cable tv
		Mkr	Marker post
		Gmkr	Gas marker post
		So	Soffit
		Bs	Bollard
		IB	Illuminated bollard
		Bin	Rubbish bin
		Vp	Vent pipe
		Grl	Ground light
		Lbox	Letter box
		Ldr	Ladder
		Sty	Stile
		IFL	Internal floor level
		THL	Threshold level
		Sp	Sign post
		TH	Trailhole
		BH	Borehole
		ELC	Electric
		BT	British Telecom
		Cbox	Control box
		TT	Tactile
		BP	Brick paved
		CPS	Concrete paving slabs
		CVR	Cover
		IC	Inspection chamber
		Rwall	Retaining wall
		UTR	Unable to raise
		TCL	Tree canopy level
		G:	Girth
		MG	Multi girth
		Stmp	Tree Stump
		CL:	Cover level
		IL:	Invert level

Rev	Date	Description	Drawn	Q. Ref
1	05.05.22	External road & post-demo	JC	GH13638

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Topographical Survey

SCALE	DATE
A2@ 1: 500	23.02.22
DRAWN	**QUALITY REF**
JC	GH12966

Level datum	See notes
Grid orientation	See notes
Job number	42997

Drawing No.	Rev.
42997_T	1

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Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	381483.164	408720.048	88.790
GH2	381577.831	408758.662	89.298
GH3	381617.360	408659.474	87.980
GH4	381522.390	408647.564	87.546

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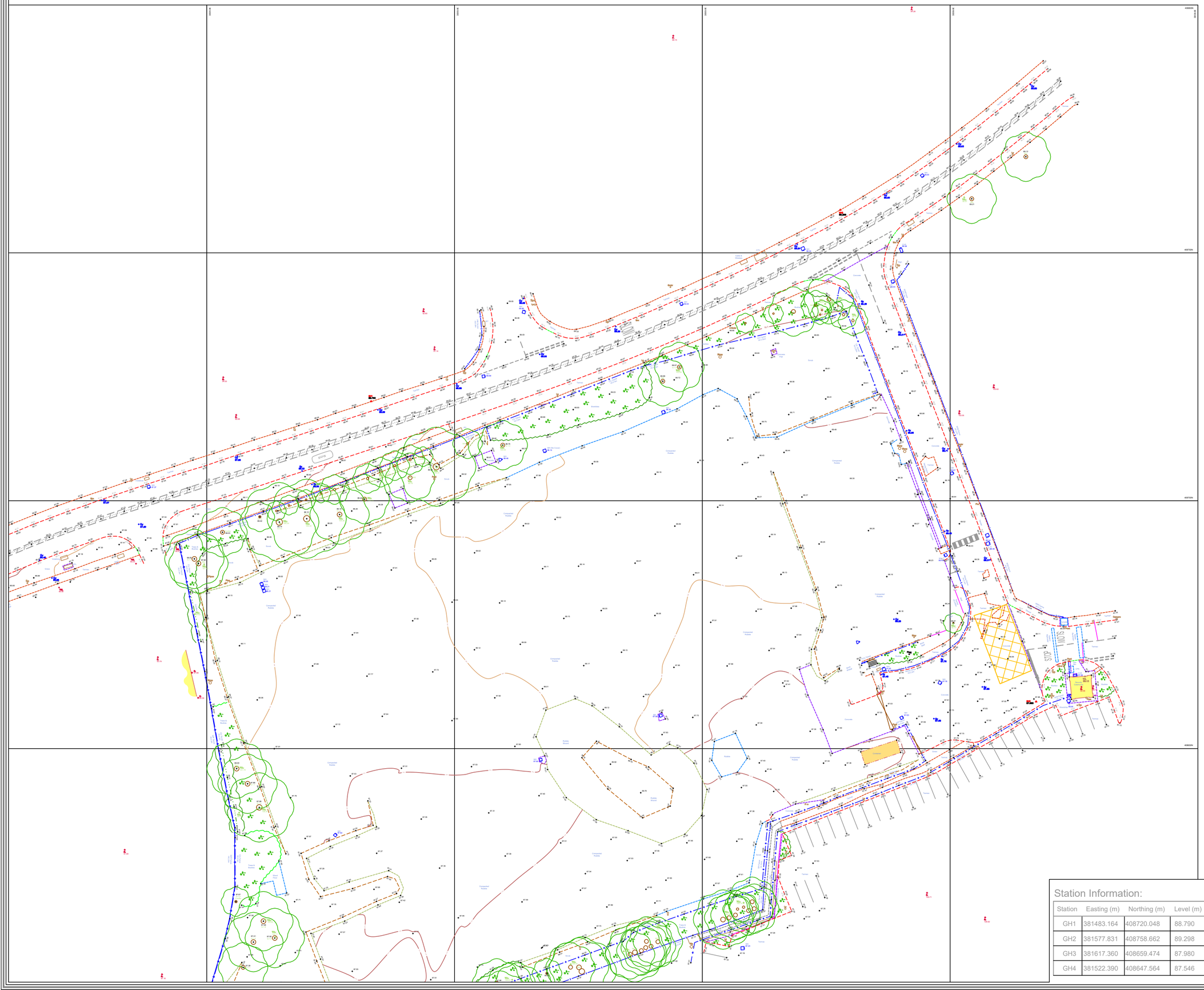

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1 100.000 Station and Name, Station Level

Tree / Bush / Sapling, Area of Undergrowth, Woodland

R: Ridge Level
E: Eaves Level
F: Flat Roof Level
TWL: Top of Wall Level

Gate

Fence types:
FW Interwoven
IR Iron Railings
WM Wire Mesh
PR Post & Rail
PW Post & Wire
CL Chain Link
WP Wooden Panels
CP Concrete Panels
SP Steel Palisade

IC	Inspection chamber	Bo	Bollard		
PInv	Pipe invert	IB	Illuminated bollard		
Gly	Gully	Bin	Rubbish bin		
Bg	Back gully	Vp	Vent pipe		
Dp	Down pipe	Grl	Ground light		
Pipe	Pipe above ground	Lbox	Letter box		
MH	Manhole	Ldr	Ladder		
WL	Water level	Sty	Stile		
Fl	Flood light	IFL	Internal floor level		
Lp	Lamp post	THL	Threshold level		
Tp	Telegraph post	Sp	Sign post		
Ep	Electricity post	TH	Trialhole		
Tl	Traffic light	BH	Borehole		
Bus	Bus stop	ELC	Electric		
Sv	Stop valve	BT	British Telecom		
St	Stop tap	Cbox	Control box		
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A2@ 1: 500	23.02.22
DRAWN	**QUALITY REF**
JC	GH12966

Level datum	See notes
Grid orientation	See notes
Job number	42997

Drawing No.	Rev.
42997_T	1

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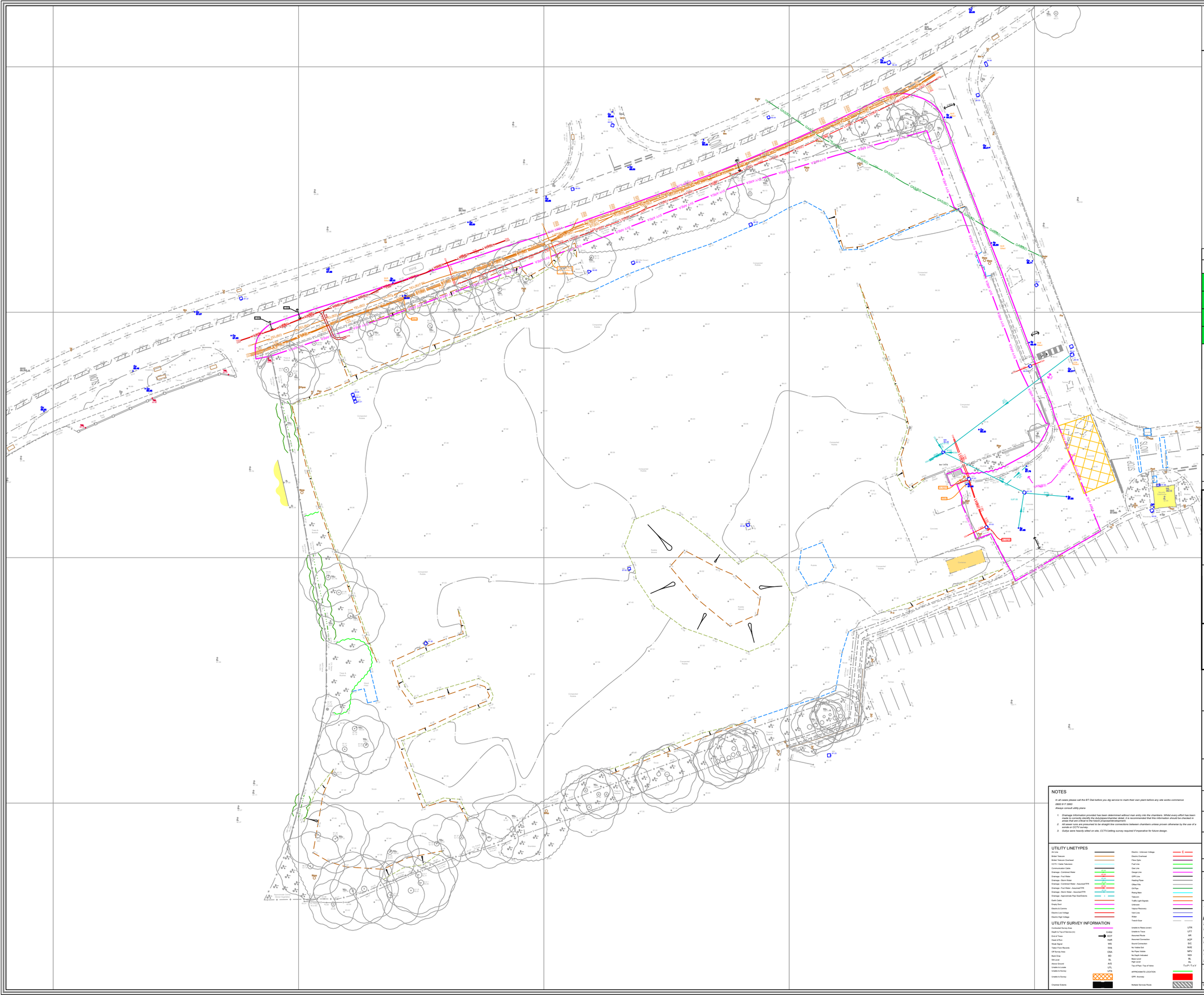

N

LEGEND

Buildings	Overhead Cable	IC	Inspection chamber	Bo	Bollard
Wall	Concrete edge	Pinv	Pipe invert	IB	Illuminated bollard
Kerb line	Tarmac edge	Gy	Gully	Bin	Rubbish bin
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		Gmkr	Gas marker post	CL:	Cover level
		So	Soffit	IL:	Invert level
		Fh	Fire hydrant	UTL	Unable to locate

Fence types:

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WM	Wire Mesh		
PR	Post & Rail		
PW	Post & Wire		
CL	Chain Link		
WP	Wooden Panels		
CB	Close Boarded		
SP	Steel Palisade		

PAS 128 : 2014 LEVEL B SURVEY

QUALITY LEVEL	CRITERIA USED IN THE DETERMINATION OF QUALITY LEVEL	ACCURACY
QL-D4	A UTILITY SEGMENT WHICH IS SUSPECTED TO EXIST BUT HAS NOT BEEN DETECTED AND THEREFORE DEPICTED AS AN ASSUMED ROUTE. (NO DETECTION POSSIBLE)	UNDEFINED
QL-B3SOP	POSITION OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES. (EML OR GPR DETECTION WITH LIMITED CONFIDENCE IN DEPTH)	+/- 300mm HORIZONTAL UNDEFINED VERTICAL
QL-B2SOP	POSITION AND DEPTH OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES. (EML OR GPR DETECTION WITH CONFIDENCE IN DEPTH)	+/- 250mm OR +/- 40% OF DETECTED DEPTH, WHICHEVER IS HIGHER HORIZONTAL & +/- 40% OF DETECTED DEPTH VERTICAL
QL-B1SOP	POSITION AND DEPTH OF THE UTILITY DETECTED BY MORE THAN ONE OF THE GEOPHYSICAL TECHNIQUES. (EML + GPR DETECTION)	+/- 150mm OR +/- 15% OF DETECTED DEPTH, WHICHEVER IS HIGHER HORIZONTAL & +/- 15% OF DETECTED DEPTH VERTICAL

DISCLAIMER

Whilst every effort has been taken in the preparation of this drawing, the original land marks/apparatus configuration may have been altered since the survey/drawing was produced. The user shall make further enquiries and investigations to satisfy himself as to the accuracy of this drawing and position of the apparatus. The exact positions of the apparatus should be verified by the use of suitable detection devices and safe digging practices in accordance with HSG47, further advice on the location of apparatus should be recommended by the owner. No representation is made by Greenhatch Group, its agents or servants as to the accuracy, completeness, and sufficiency or otherwise of this drawing and the position of the apparatus.

All apparatus shall be treated as live unless proved otherwise by the owner. It is the users responsibility to ensure that the information on the location of apparatus is provided to all persons (either direct labour or contractors) working in proximity to the apparatus.

Rev	Date	Description	Drawn	Q. Ref.

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Bury, BL9 8RR

TITLE
Utility Survey

SCALE	DATE
A2@ 1: 500	23.02.22
DRAWN	**QUALITY REF**
JAM	GH13074

Level datum	See notes
Grid orientation	See notes
Job number	42997

Drawing No.	Rev.
42997_T_UG	0

Comments
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All dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

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NOTES

In all cases please call the BT Dial before you dig service to mark their own plant before any site works commence
0800 917 5893
Always consult utility plans

1. *Drainage information provided has been determined without man entry into the chambers. Whilst every effort has been made to correctly identify the duty/pipes/chamber detail, it is recommended that this information should be checked in advance of any works to ensure its accuracy.*
2. *All sewer runs are presumed to be straight line connections between chambers unless proven otherwise by the use of a sonde or CCTV survey.*
3. *Duty/s were heavily silted on site, CCTV/jetting survey required if imperative for future design.*

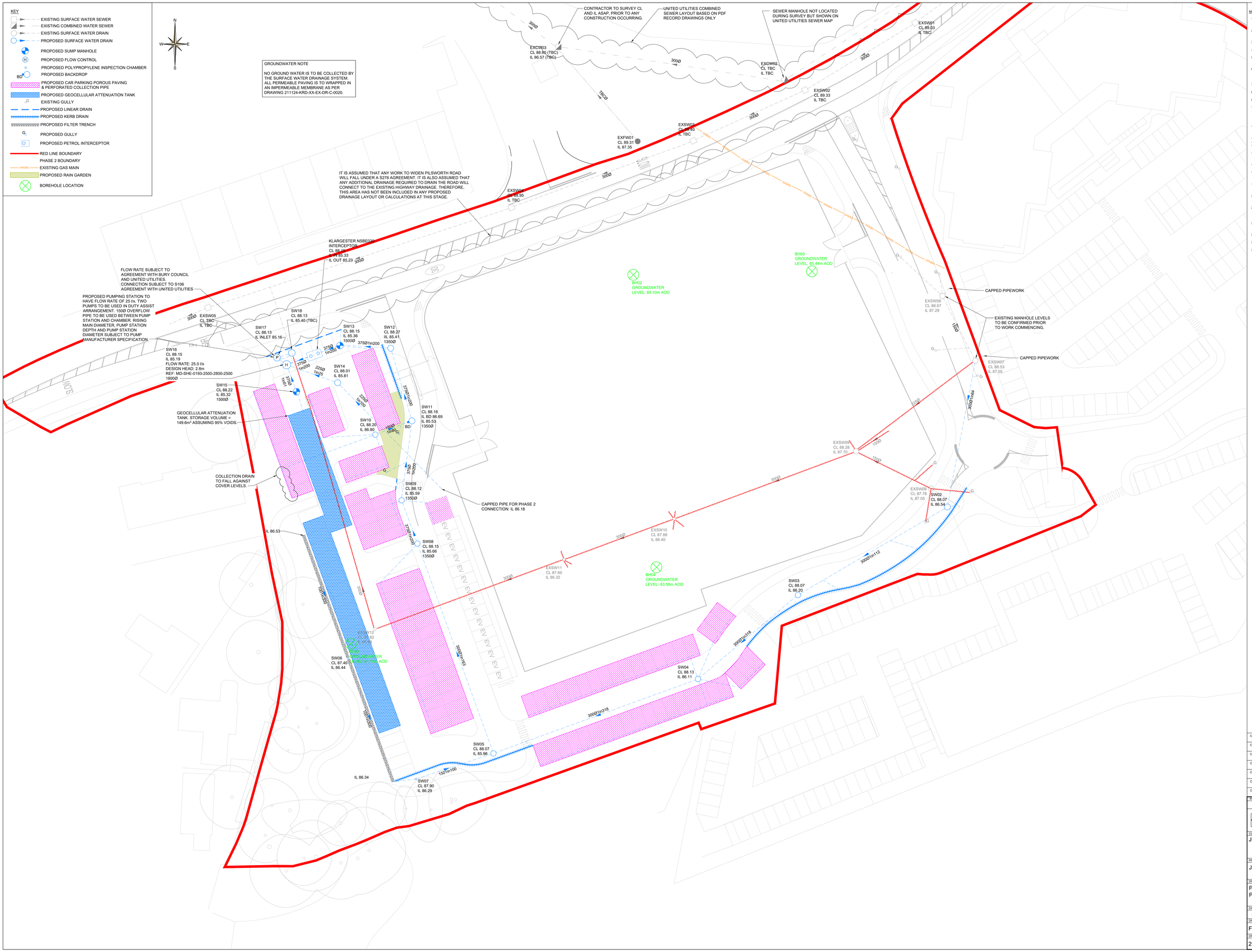
UTILITY LINETYPES

Kerb Line		Electric - Unknown Voltage	E
Metal Hydrants		Electric Overhead	
British Telecom Overhead		Fibre Optic	
CCTV / Cable Television		Fuel Line	
Communication Cable		Gas Line	
Drainage - Combined Water		Google Line	
Drainage - Foul Water		GPR Line	
Drainage - Storm Water		Heating Pipes	
Drainage - Combined Water - Assumed/TYPE		Oil/gas Pipe	
Drainage - Foul Water - Assumed/TYPE		Oil Pipe	
Drainage - Storm Water - Assumed/TYPE		Rising Main	
Drainage - Approximate Pipe Size/Extents	1	Telecom	
Audio Cable		Traffic Light Signals	
Empty Duct		Unknown	
Electric & Comms		Vapore Recovery	
Electric Low Voltage		Vent Line	
Electric High Voltage		Water	
		Trench Scar	

UTILITY SURVEY INFORMATION

Centerlined Survey Area		Unable to Raise (cover)	UTR
Depth to Top of Service (m)	0.400	Unable to Trace	UTT
End of Trace	EOT	Assumed Node	AN
Head of Run	HoR	Assumed Connection	ACP
Weak Signal	WS	Sound Connection	SC
Cable From Records	SRR	Non Entry Shft	NNE
Off Survey Area	OSA	No Pipe Visible	NPV
Rate Drop	BD	No Depth Obtained	NOD
Dbl Level	DL	Base Level	BL
Above Ground	AG	High Level	HL
Unable to Locate	UTL	Top of Pipe / Top of Valve	T.o.P / T.o.V
Unable to Survey	UTS	APPROXIMATE LOCATION	
Unable to Survey		GPR Anomaly	
Chamber Entents		Multiple Services Route	

Appendix D – Existing Drainage & Sewer Map



NOTES

1. DRAINAGE PIPE SIZES AND LEVELS BASED ON AS-BUILT INFORMATION PROVIDED BY CADDICK CONSTRUCTION VIA EMAIL ON 18/06/2024.
2. THIS DRAWING IS BASED ON THE ARCHITECTS REVISED PHASE 1 SITE PLAN 11302-ADW-XX-SI-DR-A-1002-C03.
3. TO BE READ IN CONJUNCTION WITH ALL RELEVANT KENNEDY REDFORD DRAWINGS.
4. PRIVATE DRAINS TO BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS.
5. EXISTING SEWER AND DRAINAGE LOCATIONS AND LEVELS TO BE CONFIRMED BY CONTRACTOR ON SITE, PRIOR TO WORK COMMENCING.
6. ALL MANHOLE AND PIPE POSITIONS ARE APPROXIMATE AND MAY BE UPDATED FOLLOWING FURTHER DISCUSSIONS WITH THE RELEVANT AUTHORITIES.
7. ALL MANHOLE SIZES ARE 1200Ø UNLESS INDICATED OTHERWISE.
8. ALL INSPECTION CHAMBERS ARE 475Ø UNLESS INDICATED OTHERWISE.
9. UNLESS INDICATED OTHERWISE ALL PIPES TO BE LAID SOFFIT TO SOFFIT.
10. WHERE PROPOSED DRAINS ARE IN PROXIMITY TO PROPOSED FOUNDATIONS, THE FOUNDATIONS SHALL BE TAKEN DEEPER TO BELOW THE DRAINS OR THE DRAIN SHOULD BE PROTECTED WITH A FULL CONCRETE SURROUND.
11. PROPOSED PIPEWORK WITH LESS THAN THE FOLLOWING DEPTHS TO SOFFIT REQUIRES A CONCRETE SURROUND:
- 1.2m IN ROADS
- 0.6m UNDER FOOTPATHS AND UNDER BUILDINGS.
12. SETTING OUT OF RAINWATER PIPES AND FOUL CONNECTION LOCATIONS BY OTHERS.
13. LINEAR DRAIN AND GULLY LOCATIONS SUBJECT TO DETAILED LEVELS DESIGN AND THEREFORE NUMBERS ARE SUBJECT TO CHANGE.
14. ALL LINEAR DRAINAGE TO HAVE SILT BUCKETS ON OUTLETS.
18. ALL LINEAR DRAIN, GULLY AND PERFORATED PIPE CONNECTIONS TO BE 150mmØ LAID AT A MINIMUM GRADE OF 1in80 UNLESS STATED OTHERWISE.
19. DISCHARGE RATE AND CONNECTION TO SEWER SUBJECT TO AGREEMENT WITH BURY COUNCIL AND UNITED UTILITIES.
20. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND CONSTRUCTION PROCEDURES.
21. CONTRACTOR TO APPLY FOR SEWER PERMITS AND ROAD OPENING PERMITS AS NECESSARY FROM THE APPROPRIATE AUTHORITIES, PRIOR TO COMMENCING WORKS.
22. THE CONTRACTOR SHALL ALLOW FOR ALL TRAFFIC MANAGEMENT IN CONNECTION WITH ROAD AND SEWER WORKS.
23. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL VENT TO THE ATMOSPHERE.
25. ALL UNDERSLAB FOUL PIPES TO BE 100mmØ LAID AT A MAX 1:40 GRADIENT U.N.O.
26. ALL PRIVATE SURFACE WATER PIPES TO BE MIN 150mmØ LAID AT A MAX 1:80 GRADIENT U.N.O. UNLESS NOTED OTHERWISE.

REV	DATE	DESCRIPTION	DRN	CHK	APR
C07	15.01.25	SURFACE WATER PUMP ADDED	R.B	P.V	D.B
C06	20.06.24	AS-BUILT CONSTRUCTION ISSUE	R.B	P.V	D.B
C05	20.03.24	SITE LAYOUT UPDATED	R.B	P.V	D.B
C04	01.02.24	TANK LOCATION UPDATED	R.B	P.V	D.B
C03	05.12.23	UPDATED TO NEW FLOW RATE	R.B	P.V	D.B
C02	22.11.23	UPDATED TO NEW FLOW RATE	R.B	P.V	D.B
C01	13.11.23	CONSTRUCTION ISSUE	M.M	R.B	P.V

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Kennedy Redford
MANAGING VISION

CLIENT
JD SPORTS PLC

PROJECT NAME
JD SPORTS OFFICE BURY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT PHASE 1

DATE	SCALE	SHEET SIZE	REV
22.11.23	1:250	A0	C07

DRAWING STATUS
FC - FINAL CONSTRUCTION ISSUE

DRAWING NUMBER
211124 - KRD - XX - EX - DR - C - 0001

Water for the North West

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Kennedy Redford

20
Market Street,
Altrincham,
WA141PF

FAO:

Your Ref: JD Sport
Our Ref: UUPS-ORD-353445
Date: 20/12/2021

Dear Sirs

Location: JD Sports JD Sports Hollinsbrook Way, Bury, BL9 8RR

I acknowledge with thanks your request dated 16/12/2021 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Water for the North West

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

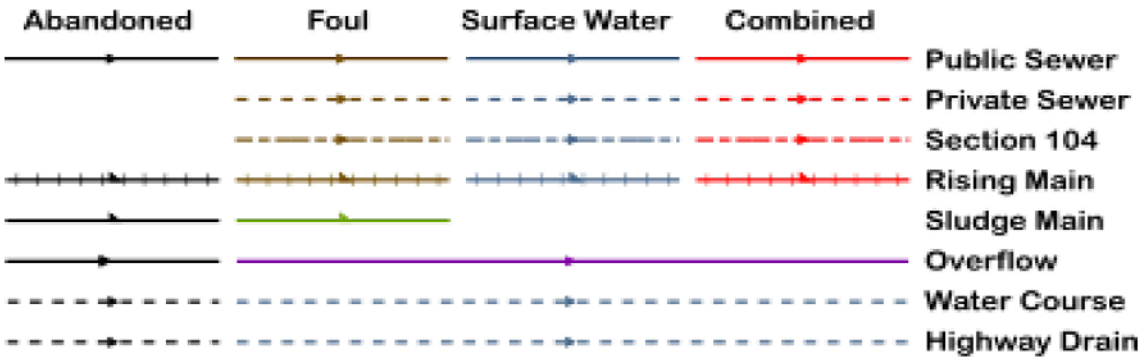
TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

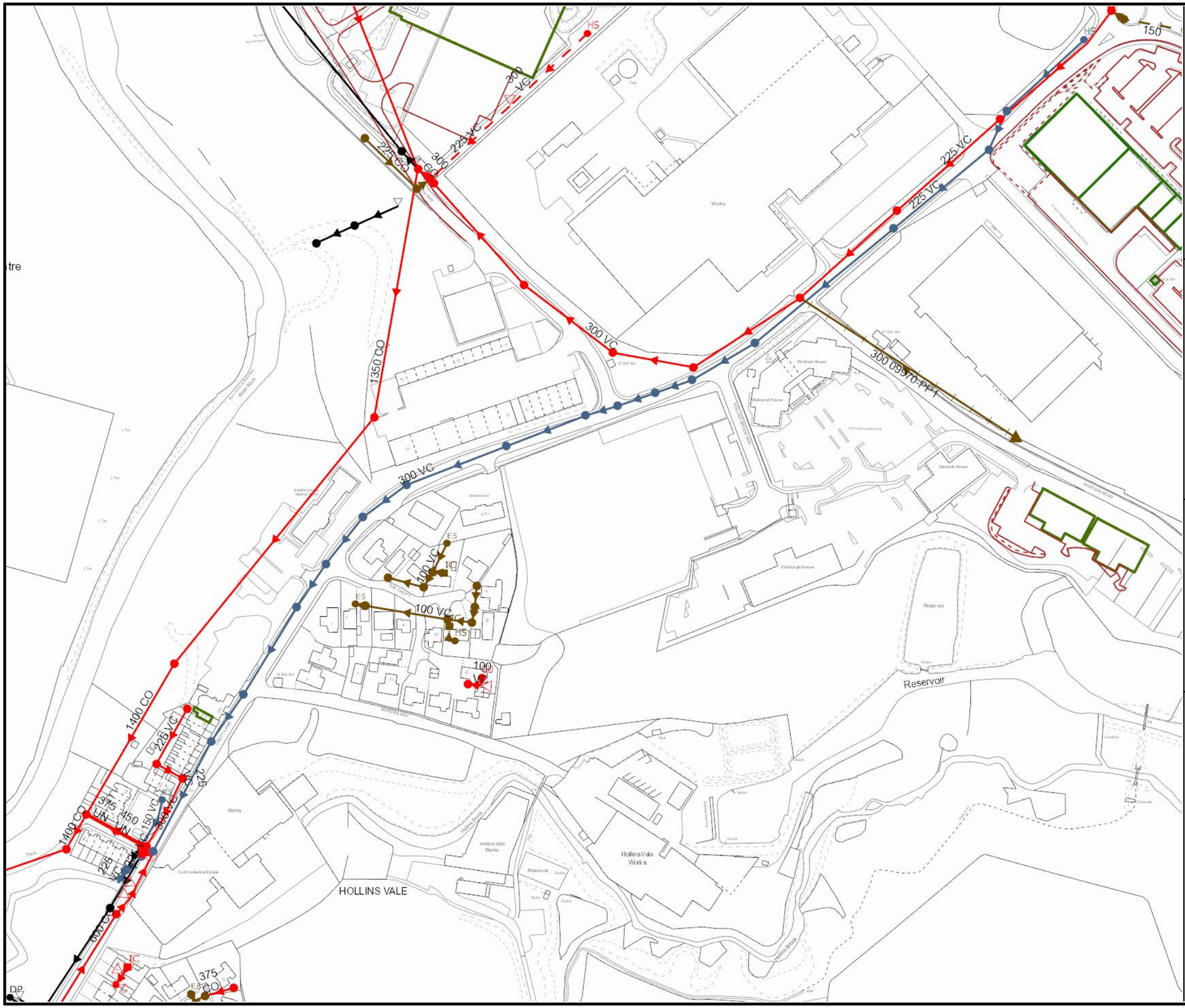
United Utilities
Water for the North West

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic



United Utilities

Water for the North West

SEWER RECORDS

Address or Site Reference

JD Sports JD Sports Hollinsbrook Way,
Bury,
BL9 8RR

Scale: 1:2500
Date: 20/12/2021

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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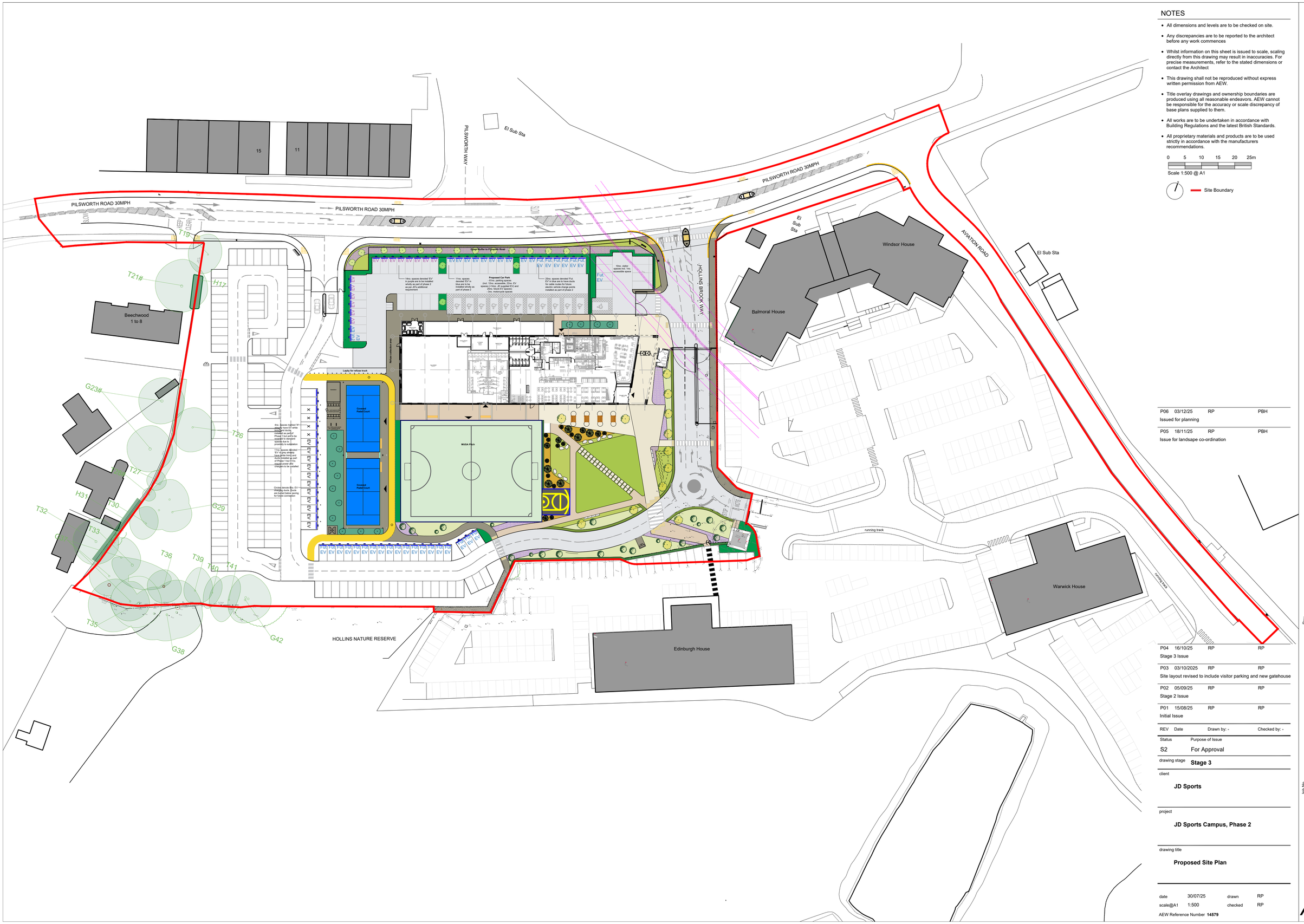
Appendix E – Proposed Site Plan



NOTES

- All dimensions and levels are to be checked on site.
- Any discrepancies are to be reported to the architect before any work commences
- Whilst information on this sheet is issued to scale, scaling directly from this drawing may result in inaccuracies. For precise measurements, refer to the stated dimensions or contact the Architect
- This drawing shall not be reproduced without express written permission from AEW.
- Title overlay drawings and ownership boundaries are produced using all reasonable endeavors. AEW cannot be responsible for the accuracy or scale discrepancy of base plans supplied to them.
- All works are to be undertaken in accordance with Building Regulations and the latest British Standards.
- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

0 5 10 15 20 25m

Scale 1:500 @ A1

Site Boundary

P06	03/12/25	RP	PBH
Issued for planning			
P05	18/11/25	RP	PBH
Issue for landsape co-ordination			
P04	16/10/25	RP	RP
Stage 3 Issue			
P03	03/10/2025	RP	RP
Site layout revised to include visitor parking and new gatehouse			
P02	05/09/25	RP	RP
Stage 2 Issue			
P01	15/08/25	RP	RP
Initial Issue			
REV	Date	Drawn by: -	Checked by: -

Status: S2
Purpose of Issue: For Approval
drawing stage: **Stage 3**
client: **JD Sports**
project: **JD Sports Campus, Phase 2**
drawing title: **Proposed Site Plan**

date 30/07/25 drawn RP
scale@A1 1:500 checked RP
AEW Reference Number **14579**

Rev **P06**
Job No **14579-AEW-XX-SI-DR-A-0502**

aew architects
0161 214 4370
www.aewarchitects.com

Appendix F – Flood Plans

This location is in flood zone 1

In your proposed development site there is a risk of flooding from:

- surface water

Flood risk assessments

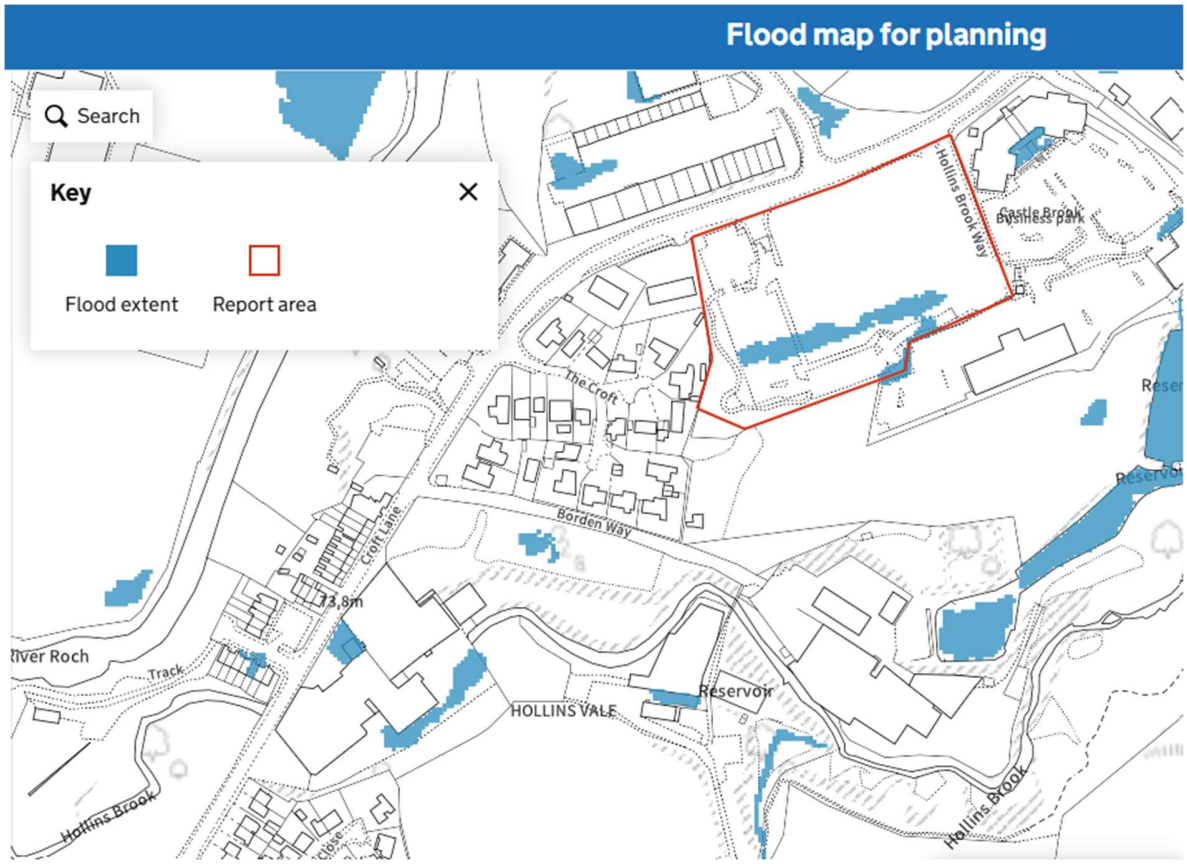
Developments in flood zone 1 that are less than 1 hectare (ha) only need a flood risk assessment (FRA) where:

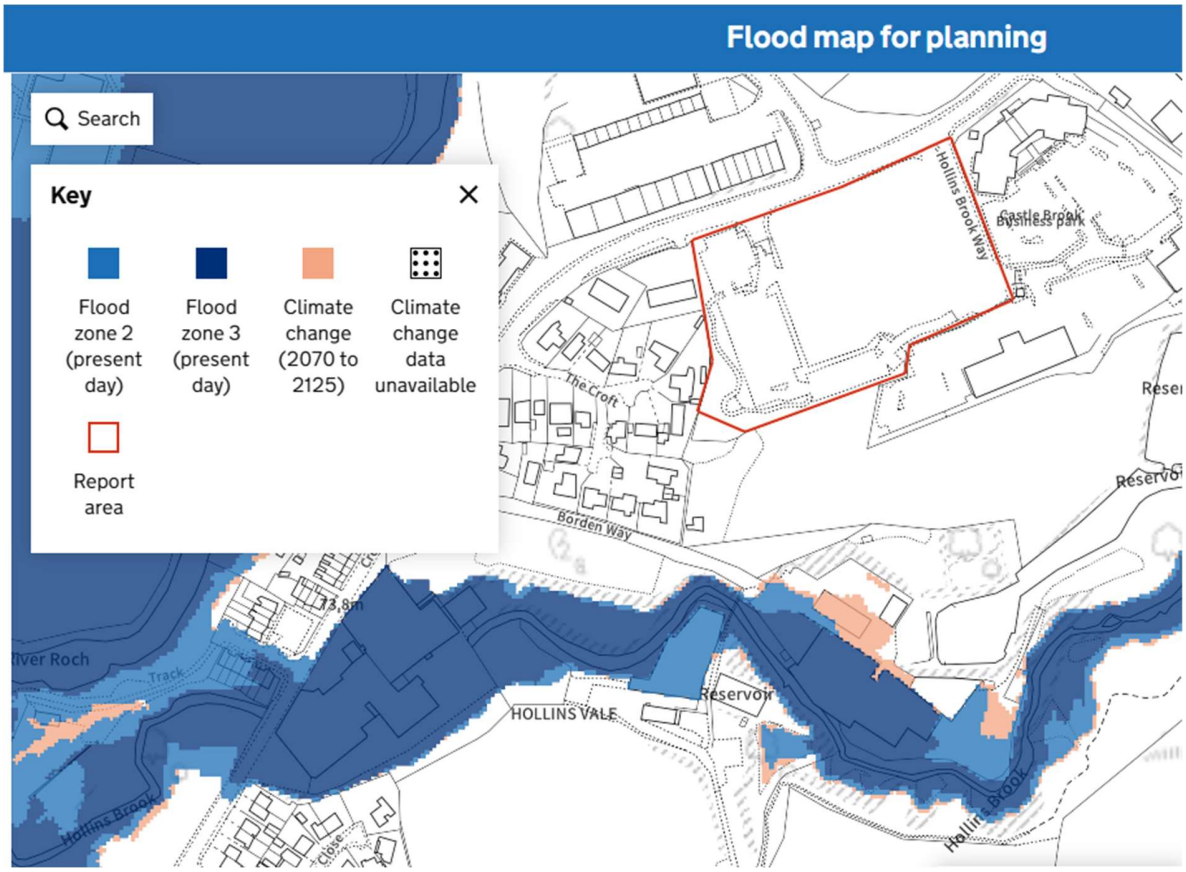
- land has been identified as having critical drainage problems
- land is identified in the local planning authority's (LPA) strategic flood risk assessment (SFRA) as being at increased flood risk in future
- it would increase the vulnerability classification and land may be subject to sources of flooding other than rivers or sea

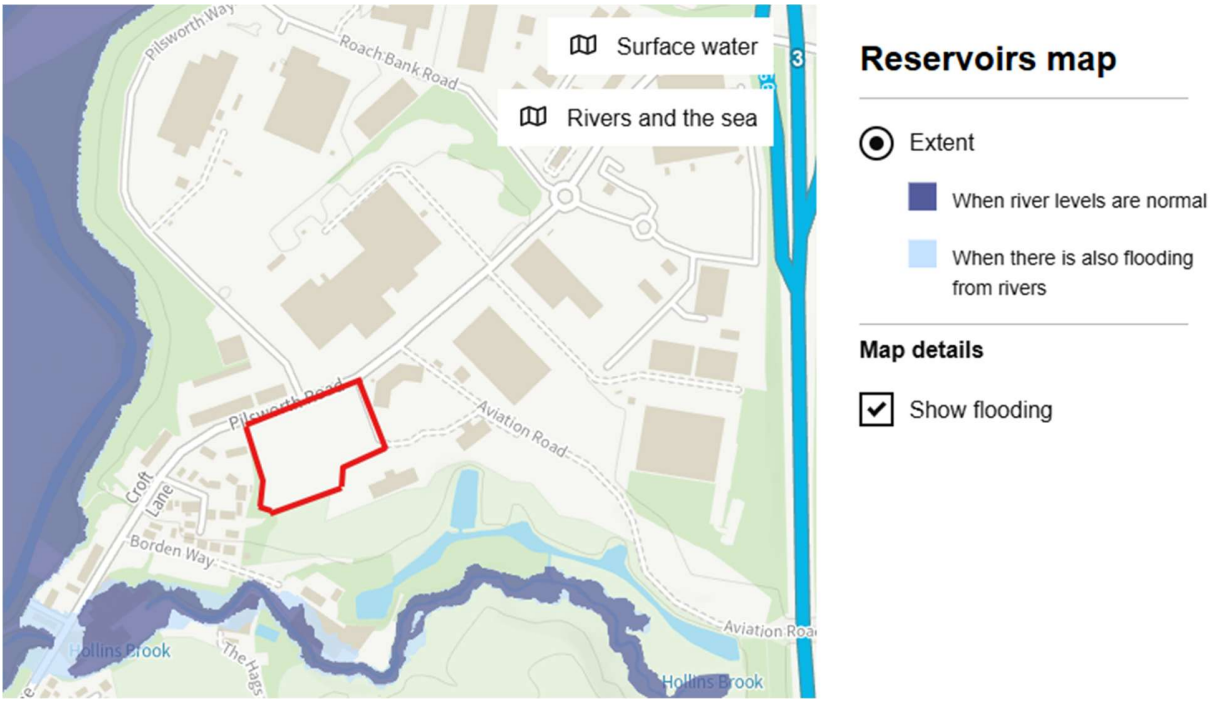
The site you have drawn is 0.79ha.

If the flood risk to your site is affected by flood defences, you will also need to assess residual risk from flood defence breach in this location. If available, we will provide breach hazard mapping data to help you do this.

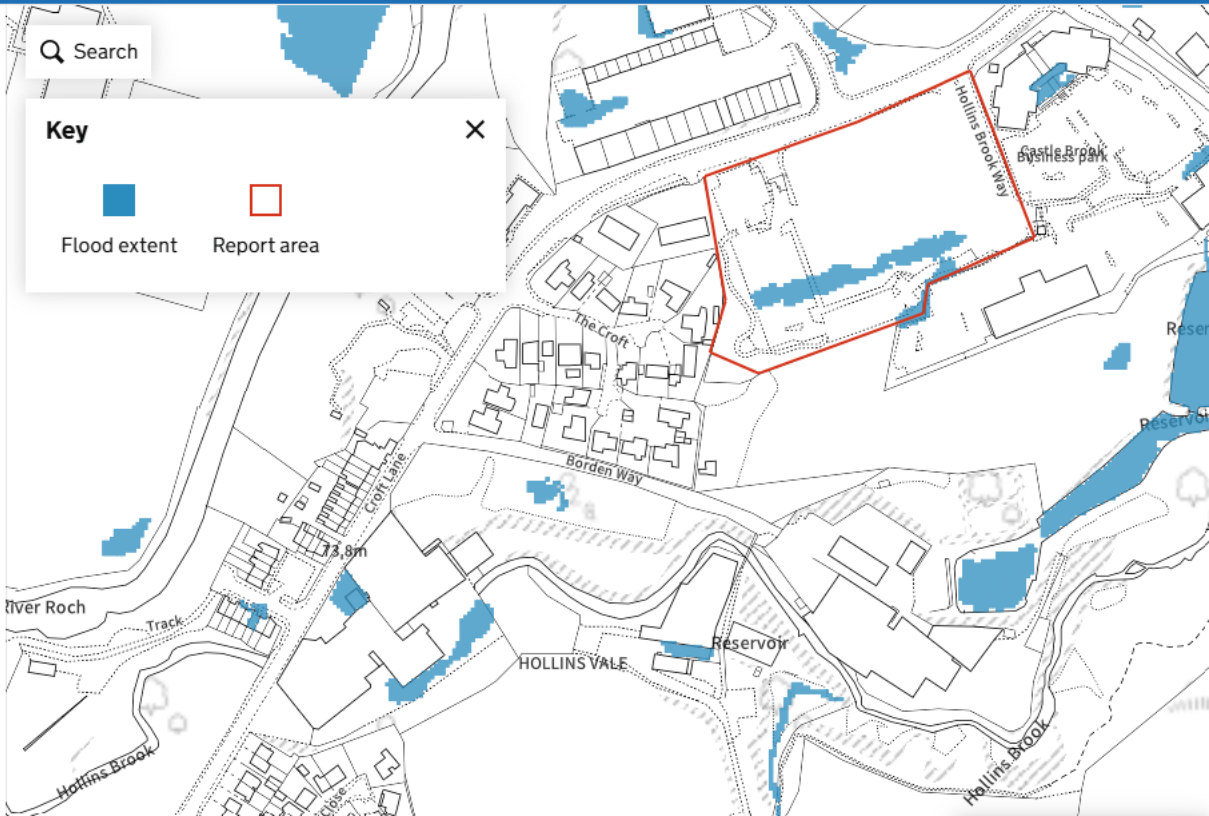
Review the flood risks for your location then complete the next steps for your planning application.


Flood map for planning
Search
Key
Flood extent
Report area
Hollins Brook Way
Castle Brook Business park
The Croft
Borden Way
Croft Lane
13,8m
Track
Reservoir
HOLLINS VALE
Hollins Brook


Flood map for planning
Search
Key
Flood zone 2 (present day)
Flood zone 3 (present day)
Climate change (2070 to 2125)
Climate change data unavailable
Report area
Hollins Brook Way
Castle Brook Business park
The Croft
Borden Way
HOLLINS VALE
Reservoir
Hollins Brook


Surface water
Rivers and the sea
Reservoirs map
Extent
When river levels are normal
When there is also flooding from rivers
Map details
Show flooding
Pilsworth Way
Roach Bank Road
Pilsworth Road
Aviation Road
Croft Lane
Borden Way
Hollins Brook
The Hags
Aviation Road
Hollins Brook

Flood map for planning



Flood map for planning

Your reference	Location (easting/northing)	Created
JD Sports	**381524/408676**	**26 May 2022 18:57**

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

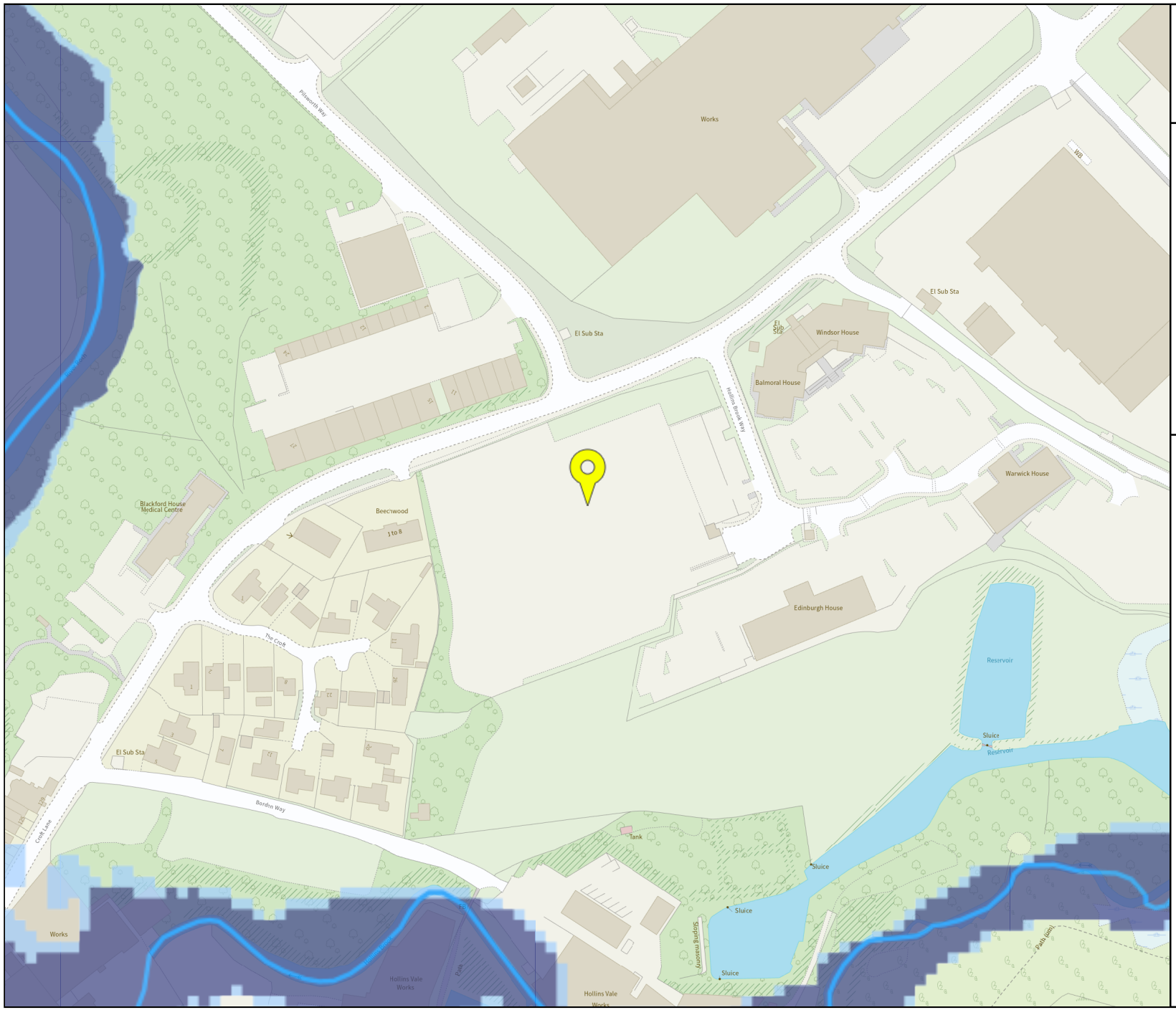
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. https://flood-map-for-planning.service.gov.uk/os-terms



Environment Agency

Flood map for planning

Your reference
JD Sports

Location (easting/northing)
381524/408676

Scale
1:2500

Created
26 May 2022 18:57

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

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Reservoirs map

Extent

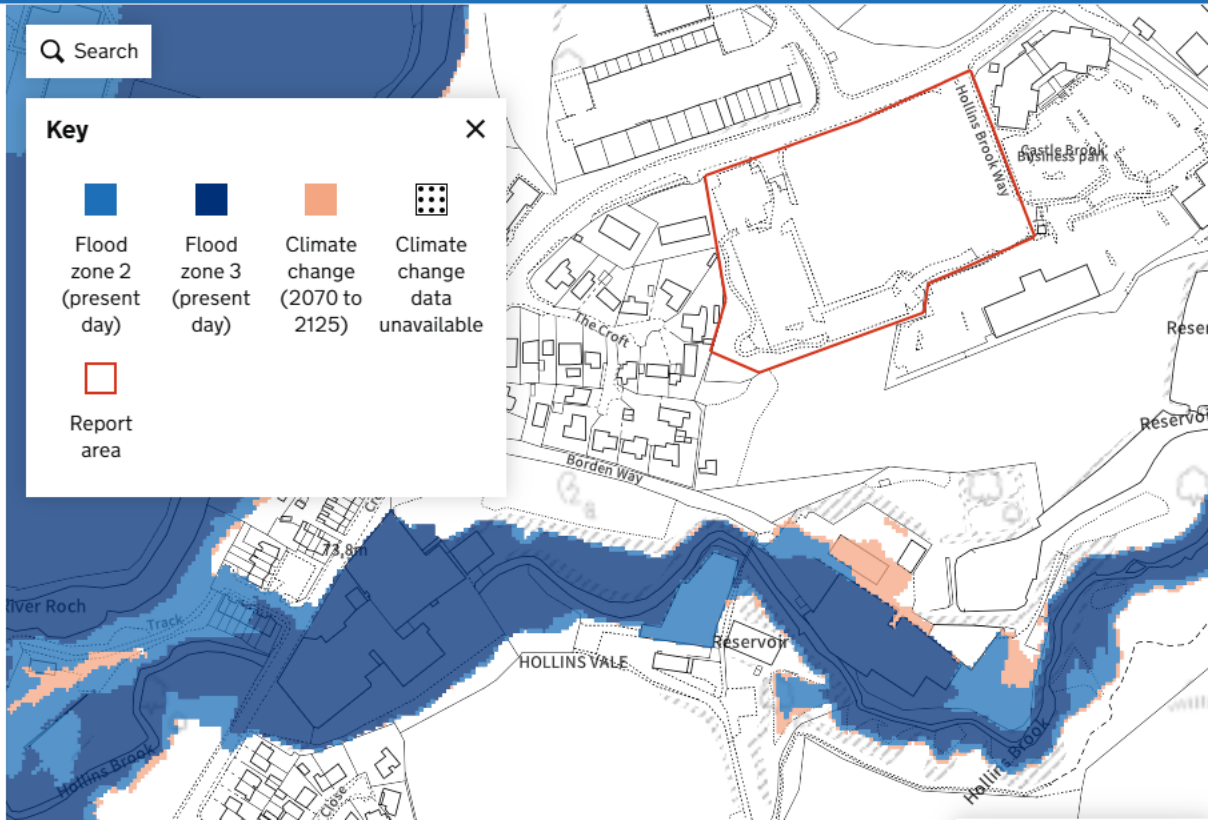
When river levels are normal

When there is also flooding from rivers

Map details

Show flooding

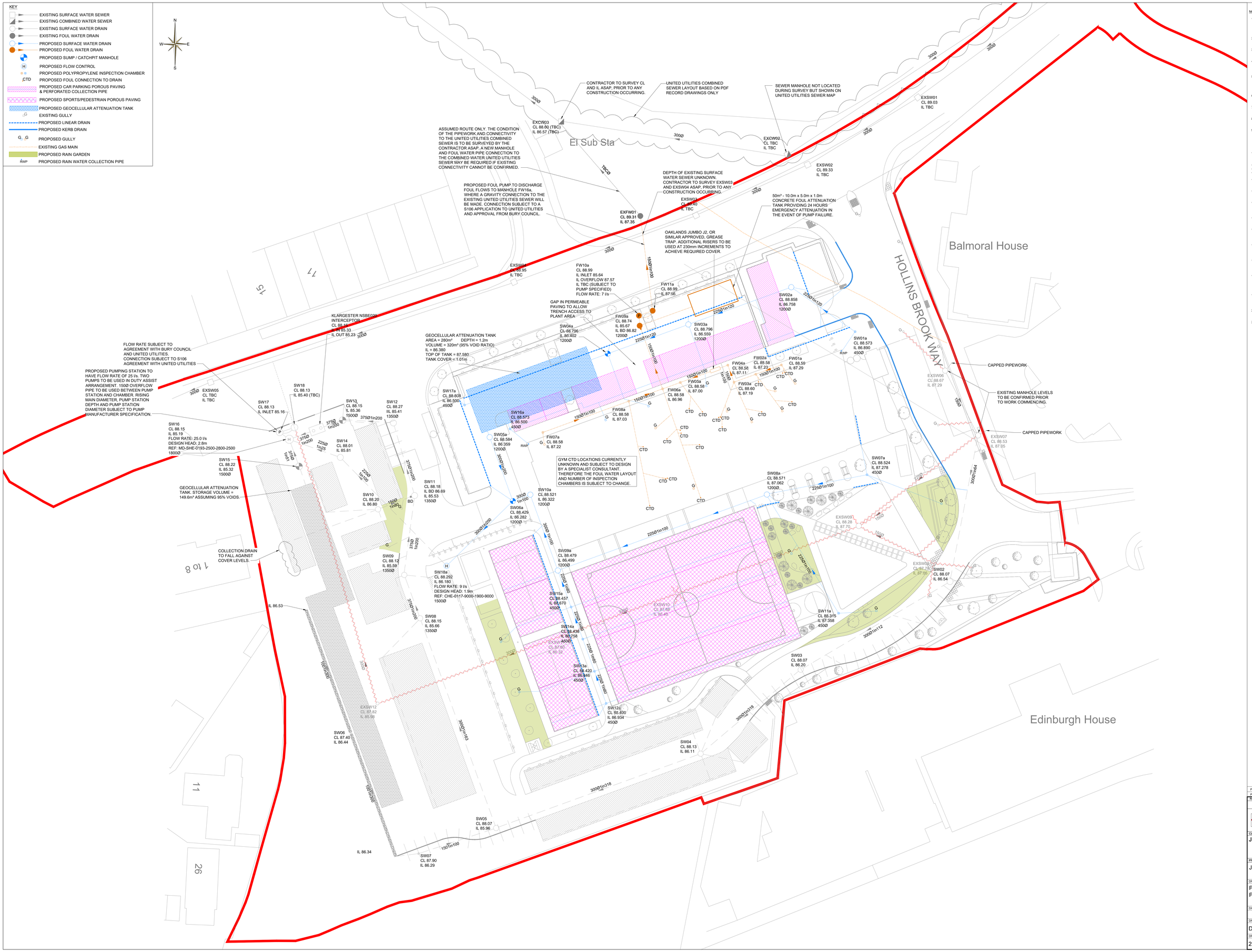
Flood map for planning



Appendix G – Proposed Drainage Layouts

KEY

- EXISTING SURFACE WATER SEWER
- EXISTING COMBINED WATER SEWER
- EXISTING SURFACE WATER DRAIN
- EXISTING FOUL WATER DRAIN
- PROPOSED SURFACE WATER DRAIN
- PROPOSED FOUL WATER DRAIN
- PROPOSED SUMP / CATCHPIT MANHOLE
- PROPOSED FLOW CONTROL
- PROPOSED POLYPROPYLENE INSPECTION CHAMBER
- CTD PROPOSED FOUL CONNECTION TO DRAIN
- PROPOSED CAR PARKING POROUS PAVING & PERFORATED COLLECTION PIPE
- PROPOSED SPORTS/PEDESTRIAN POROUS PAVING
- PROPOSED GEOCELLULAR ATTENUATION TANK
- EXISTING GULLY
- PROPOSED LINEAR DRAIN
- PROPOSED KERB DRAIN
- G G PROPOSED GULLY
- EXISTING GAS MAIN
- PROPOSED RAIN GARDEN
- RWP PROPOSED RAIN WATER COLLECTION PIPE



NOTES

1. THIS DRAWING IS PRELIMINARY AND IS SUBJECT TO CHANGE DEPENDING ON FURTHER DEVELOPMENT OF THE G.A., SITE LAYOUT, PROPOSED LEVELS, RWP LAYOUT AND FOUL CONNECTION LOCATIONS.
2. TO BE READ IN CONJUNCTION WITH ALL RELEVANT KENNEDY REDFORD DRAWINGS.
3. PRIVATE DRAINS TO BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS.
4. EXISTING SEWER AND DRAINAGE LOCATIONS AND LEVELS TO BE CONFIRMED BY CONTRACTOR ON SITE, PRIOR TO WORK COMMENCING.
5. ALL MANHOLE AND PIPE POSITIONS ARE APPROXIMATE AND MAY BE UPDATED FOLLOWING FURTHER DISCUSSIONS WITH THE RELEVANT AUTHORITIES.
6. ALL MANHOLE SIZES ARE 1200Ø UNLESS INDICATED OTHERWISE.
7. ALL INSPECTION CHAMBERS ARE 475Ø UNLESS INDICATED OTHERWISE.
8. UNLESS INDICATED OTHERWISE ALL PIPES TO BE LAID SOFFIT TO SOFFIT.
9. WHERE PROPOSED DRAINS ARE IN PROXIMITY TO PROPOSED FOUNDATIONS, THE FOUNDATIONS SHALL BE TAKEN DEEPER TO BELOW THE DRAINS OR THE DRAIN SHOULD BE PROTECTED WITH A FULL CONCRETE SURROUND.
10. PROPOSED PIPEWORK WITH LESS THAN THE FOLLOWING DEPTHS TO SOFFIT REQUIRES A CONCRETE SURROUND:
    - 1.2m IN ROADS
    - 0.9m IN LIGHTLY TRAFFICKED AREAS.
    - 0.6m UNDER FOOTPATHS AND UNDER BUILDINGS.
11. SETTING OUT OF RAINWATER PIPES AND FOUL CONNECTION LOCATIONS BY OTHERS.
12. LINEAR DRAINS NOT SIZED OR SPECIFIED AT THIS STAGE.
13. LINEAR DRAIN AND GULLY LOCATIONS SUBJECT TO DETAILED LEVELS DESIGN AND THEREFORE NUMBERS ARE SUBJECT TO CHANGE.
14. ALL LINEAR DRAINAGE TO HAVE SILT BUCKETS ON OUTLETS.
15. ALL LINEAR DRAIN, GULLY AND PERFORATED PIPE CONNECTIONS TO BE 150mmØ LAID AT A MINIMUM GRADE OF 1in80 UNLESS STATED OTHERWISE.
16. DISCHARGE RATE AND CONNECTION TO SEWER SUBJECT TO AGREEMENT WITH BURY COUNCIL AND UNITED UTILITIES.
17. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND CONSTRUCTION PROCEDURES.
18. CONTRACTOR TO APPLY FOR SEWER PERMITS AND ROAD OPENING PERMITS AS NECESSARY FROM THE APPROPRIATE AUTHORITIES, PRIOR TO COMMENCING WORKS.
19. THE CONTRACTOR SHALL ALLOW FOR ALL TRAFFIC MANAGEMENT IN CONNECTION WITH ROAD AND SEWER WORKS.
20. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL VENT TO THE ATMOSPHERE.
21. ALL UNDERSLAB FOUL PIPES TO BE 100mmØ LAID AT 1:40 GRADIENT U.N.O.

REV	DATE	DESCRIPTION	DRN	CHK	APR
P02	14.11.25	COST SAVING CHANGES	R.M	J.H	P.V
P01	17.10.25	FIRST ISSUE	R.M	J.H	P.V

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Kennedy Redford
MANAGING VISION

CLIENT
JD SPORTS PLC

PROJECT NAME
JD SPORTS P2 PAVILION

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT PHASE 2

DATE	SCALE	SHEET SIZE	REV
17.10.25	1:250	A0	P01

DRAWING STATUS
D1 - ISSUED FOR COSTING

DRAWING NUMBER
251009 - KRD - XX - XX - DR - C - 0500

Appendix H – Site Investigation

Geo-Environmental Appraisal by GroundTech – 31 March 2022 (162 pages)

Phase 2 Site Investigation by ROC Consulting – 1 December 2021 (59 pages)

GROUNDTECH
CONSULTING

Job title:	New Office Block, Bury
Report type:	Geo-Environmental Appraisal
Prepared for:	JD Sports
Date:	31 March 2022

GROUNDTECH
CONSULTING

Document Control Form	
PROJECT	*NEW OFFICE BLOCK, BURY*
REPORT NAME	*GEO-ENVIRONMENTAL APPRAISAL*
REPORT REFERENCE	*GRO-21438-3308*
STATUS	*FINAL*
ISSUE DATE	*31 MARCH 2022*
REVISION	
CLIENT	*JD SPORTS*
CLIENT CONTACT	-
For and Behalf of Groundtech Consulting	
SIGNATURE	
AUTHOR	Rebecca Rowlinson BSc (Hons)
SIGNATURE	
CHECKED	Callum Holden BSc (Hons) FGS
SIGNATURE	
REVIEWED	James Doyle BSc (Hons) CGeol FGS

SUMMARY

Site Details		
Site Location	*The site is located circa 2.4km south east of Bury Town Centre and is approximately centred on National Grid Reference 381527, 408662.*	
Site Area	*The site is relatively level across its footprint and roughly rectangular in shape, encompassing an area of approximately 1.5 Ha. The site is predominantly formed by concrete hardstanding and is generally featureless. Unsurfaced rough ground is present in the north east in the footprint of the former warehouse building.*	
Preliminary Risk Assessment		
Pollution Linkage (PL) Assessment	Human Health	*The risk to human health was considered to be Moderate to Low.*
	Controlled Waters	*The risk to controlled waters was considered to be Low.*
	Permanent Ground Gas	*The risk from permanent ground gases was considered to be Moderate to High.*
Ground Model		
Made Ground Soils	*Made Ground was encountered in all locations to a maximum depth of 1.8m bgl, although it was generally less than 1.0m thick and typically comprised concrete or tarmac overlying brown gravelly sand or sandy gravel.*	
Natural Soils	*The natural strata encountered generally comprised orange brown slightly gravelly occasionally clayey Sand which was encountered underlying the Made Ground to depths between 4.0m and 6.0m bgl.* *This was in turn generally underlain by interbedded soft to firm sandy Clay and silty clayey Sand to depths between 15.5m and 17.0m bgl where firm to stiff sandy slightly gravelly Clay was encountered to the base of the Cable Percussive boreholes that progressed to this depth.*	
Bedrock	*Sandstone bedrock was encountered within BH01 at 23.5m and BH04 at 27.3m bgl and was present to the base of the boreholes at 45.0m bgl.*	
Groundwater	*Groundwater strikes were observed within the natural sand across the site from depths between 1.6m and 6.5m bgl.*	
Ground Engineering Assessment		
Foundations	*The most suitable foundations for the proposed development are considered to be piles transferring loads to the underlying medium dense to dense Sand. Based on the proposed loadings provided, pile groups will be required.*	
Highways	*Plate load testing was undertaken at five locations across the site and CBR values ranged between 1.6% and 5.4%. Proof rolling of the subgrade will be required as a minimum.*	

SuDS	*Soil percolation testing was undertaken at a single location (SuDS1) within the natural Sand and infiltration rates recorded ranged between 2.17 x 10^{-5} and 4.37 x 10^{-5}m/s which are considered good drainage conditions and SuDS drainage is likely to be feasible for the proposed development.*
Constraints	*The main limitation of the site is the poor ground conditions observed to a maximum depth of 11.5m bgl in the form of loose to medium dense sand deposits overlying very soft to soft Low strength Clay in all boreholes. The loose Sand and low strength Clay are not considered a suitable bearing stratum for the proposed development which will exert high column loads.* *A high-pressure gas main is present in the north eastern corner of the site. An easement will be required in the vicinity of the gas main which should be accurately located prior to development.*
GQRA and Revised (PL) Assessment	
Human Health	*No elevated contamination has been detected, asbestos has been detected in two out of eight samples at low concentrations. Where present the proposed building and hardstanding will act as a cover layer for asbestos containing soils, in areas of soft landscaping a 600mm cover system should be in place. The risk to human health is considered to be Moderate prior to remedial action.*
Controlled Waters	*The risk to controlled waters is considered to be Low.*
Permanent Ground Gas	*A single gas monitoring visit has been undertaken to date and the site has been classified as CS1 and gas protection measures are not considered necessary at his stage. This will be confirmed or otherwise on completion of the monitoring programme.* *The site is not in an area affected by radon.*
Final Appraisal	

The following further work is considered necessary to progress the site to construction phase:

- *Completion of gas monitoring programme.*
- *Issue gas assessment.*
- *Detailed Foundation design.*
- *Confirmation of remedial recommendations with regulators.*

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GRO-21438-P01	-	*Project Location Plan*
GRO-21438-P04	-	*Exploratory Hole Location Plan*
GRO-21438-P05	-	*Generalised Ground Model*
GRO-21438-P06	-	*Revised Illustrative CSM*

1.0 INTRODUCTION

1.1 Project Objectives

Groundtech Consulting Limited have been instructed by Kennedy Redford on behalf of their client JD Sports to undertake a Geo-Environmental Appraisal for a site off Pilsworth Road in Bury.

A main investigation was undertaken in accordance with BS 5930:2015, BS 10175:2017, BS 8576:2013, CIRIA C758 and Eurocode 7 to revise the CSM and quantify the level of risk identified in the PRA. The Appraisal has been prepared in accordance with current UK Legislation and to discharge Land Quality pre-commencement planning conditions.

The following reports have previously been produced for the site:

- *Preliminary Risk Assessment referenced GRO-21438-3118, dated February 2022 produced by Groundtech Consulting Limited.*
- *Coal Mining Risk Assessment referenced GRO-21438-3119, dated 26 January 2022 produced by Groundtech Consulting Limited.*
- *Phase 2 Site Investigation referenced 4251-ROC-ZZ-XX-RP-ES-PH2SI, dated 01 December 2021 produced by RoC Consulting.*

1.2 Proposed Development

The proposed development is commercial end use comprising a three-storey office block with associated staff welfare facilities including two five-a-side football pitches.

Proposed Development

1.3 Limitations

Other conditions may exist on the site that have not been taken into account in this assessment as they are outside the scope of works. Groundtech Consulting are not responsible for these circumstances that are not outlined in the report.

The assessment has been prepared for the exclusive use of the client. No third parties may rely on or reproduce the contents of the report without the written permission of Groundtech Consulting Limited. If any unauthorised third party comes into possession of the report they rely on it at their own risk and Groundtech Consulting Limited will not be obliged to provide a duty of care.

2.0 SITE SETTING

2.1 Location

The site is located circa 2.4km south east of Bury Town Centre, as shown on the Project Location Plan *GRO-21438-P01*. The site is approximately centred on National Grid Reference 381527, 408662.

Project Location

Access to the site is gained off Pilsworth Road to the north east of the site.

2.2 Site Description

The site is relatively level across its footprint and roughly rectangular in shape, encompassing an area of approximately 1.5 hectares.

Site Features
The site was most recently occupied by a large warehouse unit which has recently been demolished. The footprint of the former building is surfaced with uneven ground with grass and some light vegetation. The remainder of the site is surfaced predominantly with concrete and is generally featureless.

A gas main crosses the north east corner of the site.

A vegetated strip is present along the sites northern boundary with some semi-mature and mature trees present.

Site Boundaries and Surrounding Features
The site boundaries are formed by metal fencing and trees are present close to the sites northern, eastern and southern boundaries.

The site is surrounded by the following features/land uses:

- *North - Pilsworth Road followed by light industrial/commercial units.*
- *East - Hollins Brook Way, commercial offices and an associated car park.*
- *South - Commercial office premises and Local Nature Reserve.*
- *West - Commercial buildings and residential housing estate.*

Site photographs are presented in *Appendix 2*.

3.0 PREVIOUS INVESTIGATIONS SUMMARY

3.1 Introduction

The following sections summarise the following reports previously completed for the site:

- *Preliminary Risk Assessment referenced GRO-21438-3118, dated February 2022 produced by Groundtech Consulting Limited.*
- *Coal Mining Risk Assessment referenced GRO-21438-3119, dated 26 January 2022 produced by Groundtech Consulting Limited.*
- *Phase 2 Site Investigation referenced 4251-ROC-ZZ-XX-RP-ES-PH2SI, dated 01 December 2021 produced by RoC Consulting.*

3.2 Site History and Consultations

Site History
The earliest historical records from 1848/51 indicate the site was formed by fields and was undeveloped. Six reservoirs were located between 80m and 150m south. The site remained undeveloped and formed by fields until the 1980s when a warehouse was constructed on the site which has been the only development on site until it was recently demolished.

3.3 Geology and Hydrogeology

Made Ground was not indicated to be present beneath the site, however Made Ground is thought to be present due to past development on the site.

The superficial deposits indicated to underly the site are Hummocky (moundy) Glacial Deposits which characteristically comprises clay, sand, and gravel and are classified as a Secondary A Aquifer.

The solid geology is indicated to be the Trencherbone Rock comprising Sandstone which is classified as a Secondary A Aquifer.

A coal seam is shown to subcrop on site striking north west to south east, dipping to the south west at an angle of 15°. The seam subcropping the site is not named on BGS geological maps.

3.4 Preliminary Conceptual Site Model

The following risks were identified by Groundtech Consulting Limited:

Receptor	Risk	Discussion
Site End Users from Contaminated Soils	*Moderate to Low*	*Made Ground is likely present associated with the previous demolished commercial building and may be contaminated with a range of CoC. Soft landscaping will be present as part of the development.*
Site End Users from Inhalation of Vapours	*Low*	*Gross hydrocarbon contamination from former plant hire yard not anticipated.*
Potable Water Supply Pipe	*Moderate to Low*	*Former plant hire yard may be a source of organic contamination at installation depths.*
Site End Users from Inhalation of Gas	*Moderate to High*	*Deep Made Ground may be present associated with demolition of previous building on site. Numerous*

		sources identified in vicinity of site including landfills, ponds and reservoirs.
Controlled Waters	*Low*	*Gross mobile contamination not anticipated and hardstanding across site will have restricted downward migration of contaminants.*

3.5 Coal Mining Risk Assessment

A Coal Mining Risk assessment was carried out by Groundtech Consulting which comprised a desk-based review of all available information related to coal mining at the site and should be read in conjunction with this report. The key findings are summarised below:

Recorded Coal Mining
The site is in an area requiring a Coal Mining Report. The Coal Authority Report confirms the property is not within a surface area that could be affected by any past recorded underground coal mining. However, the property is in an area where the Coal Authority believes there is coal which may have been worked at some time in the past.

There are no mine entries on or within 20m of the site and the site in not affected by recorded opencast coal mining.

No risk has been identified from recorded underground coal mine workings at the site.

Unrecorded Coal Mining
The southern half of the site, to the south of the coal seam bisecting the site is indicated to be within a Development High Risk Area and probable unrecorded coal mine workings are indicated in this area.

The coal seam subcropping at the site is anticipated to be the Blenfire Coal or Trencherbone Coal, both of which are recorded as being worked in the area.

A potential risk was identified from unrecorded mine workings and further investigation including intrusive boreholes was required.

3.6 Ground Model

RoC Consulting undertook a Ground Investigation at the site previously to inform proposed road widening works on Hollins Brook Way. The exploratory holes were resultantly localised to the eastern site boundary and are therefore not representative of wider site conditions.

The following scope of works was undertaken by RoC Consulting in October 2021:

- *3 No. windowless sample boreholes drilled to 5.45m bgl (WS101 to WS103).*
- *2 No. TRL DCP tests (DCP101 to DCP102).*
- *3 No. vacuum excavated slit trenches to locate the high pressure gas main (ST101 to ST103).*

Made Ground was encountered at surface level in WS101 and WS102 as tarmac ranging in thickness from 0.05 to 0.1m bgl which was underlain by a limestone gravel subbase to circa 0.2m bgl.

At WS103 Topsoil was encountered at the surface to 0.2m bgl and underlain by a granular demolition fill material containing brick and limestone to 0.8m bgl this was also encountered in WS101 and WS102 to 0.5 and 0.7m bgl respectively.

In WS101 a thin layer of demolition fill material contained within a clay matrix was encountered at 0.50 to 0.75m bgl.

Groundwater strikes were not recorded within the Made Ground.

Immediately underlying Made Ground deposits at all boreholes was interbedded Sand and Clay deposits. Clay was generally comprised of orangish brown sandy clay gravelly Clay. Sand deposits were found to comprise a light brown fine to medium sand/gravelly silty sand.

The Phase 2 site investigation undertaken by RoC Consulting states that SPT values ranged from 2 to 16 in Clay deposits and 2 to 16 in Sand deposits.

Groundwater was not encountered within Glacial Clay deposits or Sand deposits

No visual or olfactory evidence of contamination was observed during the site works.

3.7 Geo-Environmental Testing Results

Six samples were screened for a range of CoC associated with the sites former use. Results from chemical testing analysis indicate there were no exceedances of Contaminants of Concern when screened against a commercial end use scenario. As such the site is not considered to pose a risk toward future users or construction persons during the development process. No asbestos was detected in any of the samples.

Groundwater was not encountered during the investigation and therefore no groundwater testing was undertaken.

3.8 Ground Gas

Ground gas monitoring standpipes were not included as part of the RoC investigation as the proposed development was associated with highway works.

3.9 Remedial Strategy

No specific remedial measures were recommended with respect to contaminated soils at the site due to the lack of elevated contamination identified.

3.10 Geotechnical

The Phase 2 site investigation undertaken by RoC Consulting states that CBR values ranged between 1% and 33% at the two locations where tests were undertaken with less than 5% being acceptable.

The plasticity index range varied between 4 and 16% with a mean value of 11%. These results indicate the Clay to be of a low plasticity.

Two Glacial Clay samples were tested for the determination of undrained shear strength from a depth of 1.0m bgl. Shear strength results vary between 103 and 194kPa with a mean value of 148.5kPa. These results indicate shallow Clay strengths vary between high to very high.

3.11 Gas Main Delineation

The high-pressure gas main present below the site was exposed by vacuum and hand excavation techniques. It was discovered that a protective concrete slab (c.900m in width) was present above the pipe along the entirety of the proposed junction works and beyond.

4.0 SCOPE OF INVESTIGATION AND RATIONALE

4.1 Project Objectives

The aim of the fieldwork was to:

Determine the stratification beneath the site.
Maintain watching brief for visual and olfactory evidence of contamination.
Obtain samples using methodology in current guidance for contamination analysis.
Identify realistic pollution linkages to groundwater.
Determine the presence of unrecorded mine workings.
Calculate soil infiltration rates to determine feasibility of SuDS drainage.
Determine modulus of subgrade reaction to inform highway/pavement design.
Obtain relevant geotechnical parameters for preliminary foundation design to address both ULS and SLS conditions.
Determine if targeted supplementary investigation in areas of concern is required and for remedial design.
Install monitoring standpipes for gas and groundwater monitoring.
Assess the identified pollution linkages in the CSM.

4.2 Scope of Works

The following scope of works was completed between the dates of 24th January and 4th February 2022:

- *4 No. cable percussive boreholes (BH01 to BH04) were drilled to depths between 15m and 20m bgl.*
- *Follow on Rotary open hole drilling was carried out from the base of cable percussive boreholes (BH01 & BH04) to a final depth of 45.0m bgl.*
- *5 No. plate load tests were carried out at depths between 0.5m and 0.7m bgl.*
- *3 No. trial pits (TP01 to TP03) were carried out to a maximum depth of 3.0m bgl.*
- *1 No. soil percolation test (SuDS01) was carried out at a depth of 1.5m bgl.*

The exploratory hole locations are presented on Groundtech Plan *GRO-21438-P02* and the exploratory hole logs are in *Appendix 3.*

The exploratory holes were positioned to establish the stratification beneath the site, and target any areas of concern as summarised in the table below:

Location	Target Rationale
BH01 & BH04	*Potential coal mine workings and building footprints*
BH01 to BH04	*Proposed building footprints*
TP01 to TP03	*Proposed car park/ Highways & Former plant hire yard*
SuDS1	*Feasibility of SuDS drainage*
CBR1 to CBR5	*Proposed highways, car parks and landscaped areas*

The exploratory holes were logged by a suitably experienced geo-environmental engineer in general accordance with the following current guidance:

- *BS 5930 'Code of Practice for Site Investigations' 2015.*
- *BS EN 14688-1:2002 'Geotechnical Investigation and Testing – Identification and classification of soil'.*
- *BS EN ISO 14689:2002 "Geotechnical investigation and testing – Identification and classification of rock".*

4.3 Soil Sampling

During the intrusive investigation, representative samples were taken at regular intervals, changes of strata and where evidence of contamination existed. Laboratory analysis was scheduled on the samples obtained.

The samples obtained are summarised in the table below:

Soil Sample	Number
Environmental Sample	*22*
Disturbed Sample	*74*
Undisturbed U100 Sample	*9*

The samples have been obtained in accordance with current environmental and geotechnical guidance. The sampling plan has been designed obtain samples from all required strata using the correct methodology.

Disturbed samples of soil for geo-environmental testing were placed in the correct sampling containers as required by the laboratory in accordance with their MCERTS and UKAS Accreditation. Transportation was arranged in a timely manner and the samples were at the correct temperature

The sample locations and depths are recorded on the exploratory logs.

4.4 Geo-Environmental Testing

To inform the Generic Quantitative Risk Assessment, the following geo-environmental testing was scheduled to assess the risk from contamination on the site. The testing is based on the potential sources identified in the PRA and observations during the Ground Investigation.

Determinand	Matrix	Number
Arsenic, cadmium, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, zinc and pH.	*Soil*	*8*
Total Petroleum Hydrocarbons (TPH CWG)	*Soil*	*3*
Asbestos Screening	*Soil*	*8*
Asbestos Quantification	*Soil*	*2*
Waste Acceptance Criteria (WAC)	*Soil*	*2*

The Geo-Environmental Laboratory Testing Results are presented in *Appendix 4.*

Representative disturbed samples were obtained for all soil types encountered. Selected samples were scheduled for testing at an approved laboratory in accordance with BS 1377 'Method of Test for Soils for Civil Engineering Purposes' 1990. The following tests were scheduled:

BS 1377	Test Method	Number
Part 2	*Water Content*	*5*
Part 2	*Plasticity Index Analysis*	*5*
Part 2	*Particle Size Distribution*	*2*
Part 7	*Determination of Undrained Shear Strength in Triaxial Compression*	*8*
BRE	*BRE Full Suite*	*5*

The Geotechnical Laboratory Testing Results are presented in *Appendix 5.*

4.5 Gas and Groundwater Monitoring/Sampling

Gas and groundwater monitoring installations were constructed in the boreholes. The standpipes consisted of high-density polyethylene (HDPE) pipe - a bentonite seal was placed around the plain pipe and a clean gravel pack was placed around the slotted pipe. A summary of the installation construction is presented in the table below:

Location	Depth	Response Zone (m bgl)	Targeted Strata	Reason
BH01	*5.0*	*1.0 - 5.0*	*Sand*	*Ground Gas*
BH02	*5.0*	*1.0 - 5.0*	*Sand & Clay*	*Ground Gas*
BH04	*5.0*	*1.0 - 5.0*	*Gravel, Sand & Clay*	*Ground Gas*

Permanent gas and flow rate monitoring was carried out using GFM 436 infrared gas monitor with integral electronic flow analyser. The measurements taken are listed below:

- *Oxygen (O_2), carbon dioxide (CO_2) and methane (CH_4) as the percentage volume in air (%v/v).*
- *Hydrogen sulphide (H_2S) and carbon monoxide (CO) as the percentage volume in air (%v/v).*
- *Lower Explosive Limit (%LEL) of methane.*
- *Atmospheric and borehole pressure, including pressure trend.*
- *Flow measurements (l/hr).*
- *Weather and ground surface conditions.*

Both peak and steady state conditions were monitored to understand the behaviour of the permanent ground gas, the steady state conditions were recorded by allowing the gas monitor to run for a minimum of 3 minutes.

Interim permanent gas and groundwater monitoring results are presented in *Appendix 6.*

5.0 GROUND MODEL

5.1 Made Ground

Made Ground was encountered across the site to a maximum depth of 1.8m bgl and the surface of the site was almost entirely covered with concrete to a maximum depth of 0.3m bgl encountered at location SuDS1, TP01, TP02, TP03 and BH04.

Where the previously existing building had been demolished, the surface consisted of backfill material. In the east of the site. Where BH03 was drilled, there was tarmac surfacing to a depth of 0.15m bgl.

Three main Made Ground populations were encountered during the investigation and are described below:

- *Dark brown to black sandy gravel in SuDS1, TP01, TP03, BH03, and BH04 underlying the hardstanding from a minimum depth of 0.3m bgl to a maximum depth of 1.3m bgl.*
- *Dark brown clayey gravelly sand in TP02, BH01, and BH02 from a minimum depth at ground level to a maximum depth of 0.9m bgl.*
- *Orange brown sandy gravel in BH03 between depths of 0.4m and 1.8m bgl.*

Exploratory Hole Locations

5.2 Natural Ground

The natural strata encountered generally confirmed the published geological records and typically comprised orange brown slightly gravelly occasionally clayey Sand which was encountered underlying the Made Ground to depths between 4.0m and 6.0m bgl.

This was in turn generally underlain by interbedded soft to firm sandy Clay and silty clayey Sand to depths between 15.5m and 17.0m bgl where firm to stiff sandy slightly gravelly Clay was encountered to the base of the Cable Percussive boreholes.

Four main natural stratification encountered during the investigation and are described below:

- *Orange brown slightly gravelly locally clayey medium to coarse Sand in SuDS1, TP01, TP02, TP03, BH01, BH02, and BH03 between depths of 0.75m and 6.0m bgl.*
- *Very soft to soft brown sandy Clay was encountered in BH01 to BH04 from a minimum depth of 4.0m bgl to a maximum depth of 11.5m bgl.*
- *Firm to stiff brown locally gravelly sandy Clay was in BH01 to BH04 from a minimum depth of 6.0m bgl to a maximum depth of 20.0m bgl.*
- *Brown, occasionally silty, occasionally clayey Sand in BH01 to BH04 from a minimum depth of 7.5m bgl to a maximum depth of 17.5m bgl.*

5.3 Bedrock

Bedrock was encountered within BH01 and BH04 at 23.5m and 27.3m bgl respectively and consisted of Sandstone to the maximum investigation depth of 45.0m bgl where the boreholes were terminated.

5.4 Groundwater

Groundwater strikes were observed at locations TP01 to TP03, BH02 and BH03 at depths between 1.6m and 4.0m bgl and were observed within the natural Sand deposits.

5.5 Watching Brief

A watching brief was maintained during the ground investigation for visual and olfactory evidence of contamination.

Ash was encountered within the Made Ground in BH03 between the depths of 0.4m and 1.8m bgl. No other evidence of potential contamination was noted during the investigation.

5.6 Excavation Stability

Collapse was noted during excavation of all trial pits within the natural Sand deposits locally due to the presence of groundwater.

5.7 Excavation/ Borehole Progress

Slow progress while excavating the trial pits or advancing the boreholes was not experienced. No obstructions were noted during the investigation.

6.0 GROUND ENGINEERING

6.1 Geotechnical Testing Results

Comparison of water content and the value of 0.4 times the Liquid Limit in accordance with BRE Digest 412 'Desiccation in Clay Soils' suggests significant desiccation has taken place when 0.4 times the Liquid Limit is greater than the actual water measured water content. This is a rudimentary method but also a good guide.

Results of the plasticity testing and the volume change potential of the Clay is summarised in the table below:

Reference	Depth	Modified PI	Volume Change Potential	Dessicated Y/N
TP02	*0.70*	*23.00*	*Medium*	*No*
BH01	*6.00*	*19.00*	*Low*	*No*
BH02	*4.00*	*18.00*	*Low*	*No*
BH03	*6.50*	*20.68*	*Medium*	*No*
BH04	*4.00*	*19.40*	*Low*	*No*

Quick undrained triaxial testing was carried out on eight samples of natural undisturbed Clay and the results of the triaxial test are summarised in the table below:

Reference	Depth (m)	Undrained Shear Strength (kN/m^2)	Relative Strength
BH01	*6.5*	*24.0*	*Low*
BH01	*9.5*	*30.0*	*Low*
BH01	*12.5*	*89.0*	*High*
BH02	*6.5*	*23.0*	*Low*
BH02	*9.5*	*31.0*	*Low*
BH03	*5.0*	*23.0*	*Low*
BH03	*9.0*	*69.0*	*Medium*
BH04	*17.0*	*71.0*	*Medium*

Particle Size Distribution Testing was undertaken two samples of silty sandy Clay and the results are included within the strata descriptions on the exploratory hole logs presented in *Appendix 3*.

6.2 Assessment Background

Background

The ground engineering investigation has been undertaken to formulate an accurate ground model in order to undertake preliminary foundation design. The ground model has been constructed with a moderate to high level of confidence, the ground model has evolved from the information obtained by the PRA.

The site is flat lying and was most recently occupied by a large warehouse unit which has recently been demolished. The footprint of the former building is surfaced with uneven ground with grass and some light vegetation. The remainder of the site is surfaced predominantly with concrete and is generally featureless. A high pressure gas main crosses the north east corner of the site. The hardstanding across the site will require breaking out and crushing as part of the enabling works, any below ground substructure associated with the former building will require grubbing out, and also sorted and crushed for reuse.

It is proposed to develop a maximum 3-storey office block to the east of the site and separate Creche facility building on the western boundary of the site. The design of the superstructure elements has not yet been fully developed, but it is envisaged that a framed structure of beams and columns supporting upper floors and roof will be appropriate. It is anticipated that columns loads for the development will be in the order 500 to 2000 kN (SLS).

Ground Conditions

Made Ground was encountered across the entire site to a maximum depth of 1.8m bgl. However, Made Ground was generally present to less than 1.0m bgl. The Made Ground was almost entirely composed of granular material. Natural strata encountered generally comprised orange brown medium to coarse Sand between the depths of 0.75m and 6.0m bgl which was underlain by interbedded very soft to soft brown sandy Clay/brown locally clayey Sand. Firm to stiff dark brown sandy locally gravelly Clay was encountered to a maximum depth of 20.0m bgl in the cable percussive boreholes.

Bedrock was encountered within BH01 and BH04 at 23.5m and 27.3m bgl respectively and consisted of Sandstone to a maximum depth of 45.0m bgl where the boreholes were terminated. No coal seams or evidence of coal mine workings were encountered during the investigation.

Groundwater has been encountered across the site within the natural Sand deposits between depth of 1.6m and 4.0m bgl.

Limitations

The main limitation of the site is the poor ground conditions observed to a maximum depth of 11.5m bgl in the form of loose to medium dense sand deposits overlying very soft to soft Low strength Clay which was encountered in all boreholes. The loose Sand and low strength Clay is not considered a suitable bearing stratum for the proposed development which will exert high column loads.

Due to the proposed loadings it is anticipated that a deep foundation solution will be required, transferring loads to the underlying high strength Sand strata at depth. The depth to bedrock is another factor that will need to be taken into consideration for foundation design.

A high-pressure gas main is present in the north eastern corner of the site which has previously been located and exposed by RoC Consulting during a previous investigation. Where exposed the gas main had a protective concrete covering. However, this may not be present across the entire length of the gas main on site. An easement will be required in the vicinity of the gas main which should be accurately located prior to development and Cadent should be consulted and informed of the proposed development plans so that necessary mitigation measures can be implemented.

Groundwater has been encountered across the site between 1.6m and 4.0m bgl and dewatering of exactions may be required due to seasonal fluctuations or artificial ground levels caused by construction activities.

6.3 Geotechnical Parameters

The geotechnical test results have been evaluated to derive geotechnical parameters for the soils underlying the site. A '*Depth to C_u*' and '*Depth to SPT N*' value graph is presented on *GRO-21438-P05* to provide a generalised ground model for the site.

Characterization of the geotechnical parameters above has been undertaken to select a characteristic value, which is a cautious estimate of the value affecting the occurrence of the limit state.

- *For the loose Sand, a characteristic SPT 'N' value of 6 has been recorded and by correlation a ϕ' of 28° has been selected for ULS conditions.*
- *For the medium dense Sand, a characteristic SPT 'N' value of 11 has been recorded and by correlation a ϕ' of 30° has been selected for ULS conditions.*
- *For the dense Sand, a characteristic SPT 'N' value of 40 has been recorded and by correlation a ϕ' of 45° has been selected for ULS conditions.*
- *For the low strength Clay an undrained shear strength (C_u) characteristic value of 23kPa has been selected to satisfy ULS conditions based on direct measurement from laboratory testing.*
- *For the medium strength Clay an undrained shear strength (C_u) characteristic value of 69kPa has been selected to satisfy ULS conditions based on direct measurement from laboratory testing.*
- *For the high strength Clay an undrained shear strength (C_u) characteristic value of 89kPa has been selected to satisfy ULS conditions based on direct measurement from laboratory testing.*

6.4 Preliminary Foundation Design – Office Building

As loose Sand and soft low strength Clay has been encountered beneath the site to a maximum depth of 11.5m bgl, traditional shallow foundations are not considered suitable for the proposed commercial development. We understand that it is anticipated that columns loads for the development will be in the order 500 to 2000 kN (SLS). Preliminary design has been undertaken based on this criterion.

Loads will be transferred to the piles from ground beams, pile caps and floor slabs of the superstructure. Transverse loading on the piles and the requirement for reinforcement should be taken into consideration in the detailed design to satisfy Equilibrium Limit State conditions.

Pile Foundations

The most suitable foundations for the proposed development are considered to be piles end-bearing within the medium dense to dense Sand. Deepening the piles to the underlying Sandstone which has been encountered from depths between 23.5m and 27.3m bgl is also an option, however unlikely to be economical. End bearing in the firm to stiff Clay does not provide sufficient allowable load for a single pile.

Good workmanship will be required when installing the piles to ensure the assumptions in the design by calculation are met. The type of pile should provide sufficient lateral stability due to the poor ground conditions observed up to 11.5m bgl.

Both CFA and driven piles are considered to be suitable, the allowable loads for the different diameter and types of piles are discussed below.

A suitable working platform should be designed in accordance with BR470 in advance of the piling works.

Piled Solution – Design by Calculation

Preliminary design by calculation has been carried out using due skill and care using the global factor of safety method for pile design, a global factor of safety of 3 has been used. An allowable load has been calculated for a single pile for each cable percussive borehole and is summarised in the table below:

	BH01	BH02	BH03	BH04
CFA Pile (600mm 15-16m)	*1350kN**	*1550kN*	*1450kN*	*1320kN*
Driven Pile (300mm 15-16m)	*530kN**	*600kN*	*600kN*	*560kN*

**proposed creche area and piles unlikely to be required*

For a 600mm diameter pile 15m in length end bearing in the medium dense Sand, allowable loads between 1320kN and 1550kN can be achieved for a 600mm diameter CFA pile. Pile groups will be required for the proposed maximum allowable load of 2000kN. The allowable loads are based on the assumption the piles end bear in the medium dense to dense Sand.

The end bearing resistance of CFA piles will depend on the drilling technique and magnitude of disruption of the medium dense to dense Sand which may reduce the base resistance.

The variability of the Sand end bearing strata requires discussion with the piling contractor. In BH03 and BH04 the Sand strata was encountered shallower at between 7.5m and 10.3m bgl, the strata was in excess of 4.7m and 8m thick. The Sand was encountered between 14m and 17.5m bgl in BH02 (where the borehole was terminated) and was interbedded with stiff Clay. High SPT values of between 40 and 44 were recorded in this strata.

Based on the variability of the end bearing strata, driven piles may be a better solution as they can be driven to sett using pile driving formulae. This will allow the drilling process to determine the end bearing strata over the piling area and the design to be verified or revised accordingly. Relatively conservative Nq bearing capacity factors have been used for the Sand strata and driven piles would allow a more efficient design to produced if favourable ground conditions are encountered.

In BH03 and BH04 Clay strata beneath the Sand was circa 15m bgl, therefore piles should be shorter to ensure they end bear in the Sand strata and sufficient Sand for the depth of influence of the pile is beneath.

Deepening the piles to the Sandstone bedrock would provide consistent end bearing strata, however is unlikely to be cost beneficial.

Depending on the proposed finished site levels, the ground conditions indicate downdrag may be an issue and should be taken into consideration in the detailed design.

Design Validation

The piling type, length, depth of reinforcement and design should be discussed with a specialist piling contractor. They can then undertake the detailed design including drawings and specifications to provide fitness for purpose design. In accordance with EC7, static load testing is recommended to validate the design, static load testing may also a more efficient design to be produced. Static load testing can be undertaken on preliminary piles or more than 1% of working piles to 1.5 times the characteristic load.

The piling works should be carried out in accordance with Execution Standard EN 1536 for Bored Piles or BS EN 12699:2015 for Displacement Piles.

If the ground conditions encountered during the construction phase differ significantly to the conditions encountered during the Ground Investigation, work should cease and Groundtech Consulting contacted for further advice.

During the construction phase, supervision should be on a continuous basis to check the design assumptions are correct and construction conforms to design. Supervision should include inspections, Control Ground Investigations and monitoring.

6.5 Preliminary Foundation Design – Creche

The loadings of the proposed creche building is no greater than 250kN, BH01 was drilled in this area and encountered medium dense Sand between 0.9m and 5m bgl, the Sand became loose between 5m and 6m overlying the Soft Clay strata beneath. The Sand strata will provide a safe Allowable Bearing Pressure of 150kN/m^2 for a 1.5m square pad foundation. Using the bearing pressure the total settlement will be minimal and will be immediate occurring in the construction phase.

Only one exploratory location has been undertaken in this location of the site to obtain parameters for preliminary design, a watching brief should be maintained during the enabling works/removing slab to confirm the ground conditions are consistent. The watching brief will also confirm or otherwise if differential settlement is a potential issue.

If the ground conditions encountered during the construction phase differ significantly to the conditions encountered during the Ground Investigation, work should cease and Groundtech Consulting contacted for further advice.

During the construction phase, supervision should be on a continuous basis to check the design assumptions are correct and construction conforms to design. Supervision should include inspections, Control Ground Investigations and monitoring.

6.6 Building Near Trees

Trees and bushes are present along the site boundaries including mature trees, and some small bushes and trees are present in the north eastern corner of the site. Foundation excavations will not encounter cohesive strata in the vicinity of existing, proposed or recently removed trees and therefore foundation depths will not requires deepening in accordance with current guidance or heave precautions installed.

All foundations should be deepened below roots of greater than 5mm diameter during excavations for footings.

6.7 Floor Slabs

Made Ground is generally present in excess of 0.6m bgl and therefore a suspended floor slab is recommended. A suspended floor slab is considered to be suitable for the proposed development and is compatible with the proposed piled foundations.

6.8 Construction

The trial pits indicate that instability of excavations is anticipated within the natural Sand deposits where collapse of the trial pits has been observed. Instability of the Made Ground is a possibility and should be considered in the groundworks method statements.

Tracked high specification plant is recommended to maintain the build programme. Breaking equipment will also be required for the hardsurfacing and locally to penetrate obstructions associated with the former building on site. No notable obstructions have been encountered during the investigation, however they cannot be ruled out.

Groundwater has been encountered within the natural Sand deposits at depths between 1.6m and 4.0m bgl and dewatering of excavations may be required locally.

6.9 Concrete Classification

Made Ground
Water soluble sulphate testing was undertaken on eight samples of the Made Ground. The range of soluble sulphate (SO_4) recorded is 15.4mg/l to 1350mg/l. Associated pH values ranged between 7.6 and 10.8 indicating slightly alkaline to alkaline conditions.

For a dataset containing five to nine results, the mean of the highest two sulphate test results should be taken as the characteristic value along with the lowest of the pH results. For the Made Ground, the characteristic water soluble sulphate concentration is 1320mg/l and the pH value is 7.6.

Natural Strata
Water soluble sulphate testing was undertaken on 5 samples of the natural ground. The range of soluble sulphate (SO_4) recorded is 43.2mg/l to 413mg/l. Associated pH values ranged between 7.0 and 8.9 indicating neutral to slightly alkaline conditions.

For a dataset containing less than five results, the highest sulphate test result should be taken as the characteristic value along with the lowest of the pH results. For the natural strata, the characteristic water soluble sulphate concentration is 413mg/l and the pH value is 7.0.

Discussion and Assessment
Due to the granular deposits present beneath the site where groundwater has been encountered, the groundwater regime is considered to be mobile.

The results of laboratory pH and sulphate content indicate that ACEC Class AC-2 and sulphate class DS-2 conditions prevail within the Made Ground soils, and ACEC Class AC-1 and sulphate class DS-1[d] conditions prevail within the natural ground in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005. The specific concrete mixes (the Design Concrete Class) to be used on site will be determined by the site specific concrete requirements in terms of the durability and structural performance. These are assessed in terms of the Structural Performance Level (SPL) and any need for Additional Protective Measures (APM) detailed in Part D of BRE Special Digest 1 with further guidance in Pt E and F.

Pyritic Ground
To classify site locations where natural strata may contain sulphides, it is essential to take into account of the total potential sulphate content which may result from oxidation following ground disturbance.

The value of oxidisable sulphides has been calculated by subtracting the results of the acid-soluble sulphate test (AS % SO_4) from the results of the total potential sulphate (TPS % SO_4) and the results are below 0.3% indicating pyrite is not present and this does not affect the classification.

6.10 Highway Design

Five plate load tests were undertaken across the site and the results are presented in the table below. The CBR testing results are presented in *Appendix 7.*

Location	Depth	Strata	CBR Value (%)
CBR1	*0.5*	*Brown Clay*	*2.1*
CBR2	*0.5*	*MG: Dark brown sandy gravel*	*3.1*
CBR3	*0.5*	*Brown Clay*	*1.6*

CBR4	*0.7*	*MG: Dark brown sandy gravel*	*5.4*
CBR5	*0.6*	*Brown Clay*	*1.8*

CBR values of less than 5% were typically achieved for pavement design purposes, with exception of CBR4. As a minimum the subgrade should be proof rolled prior to construction. Some reengineering of the subgrade is required prior to highway construction to achieve the required design CBR value.

The soils are considered to be frost susceptible due to the fines content, highway construction should be a minimum thickness of 450mm to mitigate against the risk.

6.11 Sustainable Urban Drainage System (SuDS)

Soil percolation testing was carried out in general accordance with BRE Digest 365 at position SuDS1. The results are presented in *Appendix 8* and a summary is presented in the table below:

Location	Test No.	Depth (m bgl)	Stratum	Soil Infiltration Rate (m/sec)
SuDS1	*1*	*1.50*	*Sand*	*4.37×10^{-5}*
SuDS1	*2*	*1.50*	*Sand*	*3.03×10^{-5}*
SuDS1	*3*	*1.40*	*Sand*	*2.17×10^{-5}*

In SuDS1, the natural strata where the infiltration test was carried out consisted of orange brown slightly gravelly fine to coarse Sand. Three soil fills were carried out and soil infiltration rates of between 2.17×10^{-5} and 4.37×10^{-5}m/s were calculated. The first two tests were BRE compliant and the final test was not BRE compliant due to insufficient time to drain past 25% effective depth.

The results at this location and depth indicate that the use of a SuDS drainage scheme within the natural Sand deposits is a possibility as good drainage conditions have been recorded. Groundwater levels observed across the site were generally between 4.0m and 6.5m bgl. Locally, perched groundwater was present between the depths of 1.6m and 2.7m bgl within the trial pits. This will need to be considered within the design of SuDS drainage as the groundwater table should be below 1m of the base of SuDS drainage to account for seasonal variations.

6.12 Revised Coal Mining Risk Assessment

Recorded Coal Mining

No risk was identified by the Coal Authority Report and no further action was recommended at the preliminary stage.

Unrecorded Coal Mining

A potential risk from unrecorded shallow mine working was identified by the Coal Mining Risk Assessment undertaken by Groundtech Consulting. This was based on the coal outcrop beneath the southern area of the site and the uncertainty of depth to bedrock.

Sandstone bedrock has been encountered at locations BH01 and BH04 from depths between 23.5m and 27.3m bgl respectively. The Sandstone bedrock was present to the base of both boreholes at 45.0m bgl and no coal or evidence of coal mine workings was encountered.

The risk of unrecorded workings was within either the Blenfire Coal seam or Trencherbone Coal seam which had recorded thicknesses of 0.7m and 1.83m respectively.

The depth of superficial deposits and presence of groundwater indicates the presence of unrecorded mine entries or workings is highly unlikely. In addition, the depth of rock cover proves in excess of ten times the thickness of the coal seams in accordance with CIRIA C758, therefore the risk to the stability of the surface of the site is *Very Low* and no further action is required.

7.0 LAND QUALITY

7.1 Geo-Environmental Testing Results - Soils

Samples of Made Ground and natural strata have been tested for a range of relevant Contaminants of Concern. A Generic Quantitative Risk Assessment (GQRA) has been undertaken to determine the significance of the concentrations as derived through Geo-Environmental analysis.

The GQRA process comprises the comparison of the actual concentrations measured on site with Generic Assessment Criteria (GACs) for the protection of human health.

The GACs used for the assessment of soil concentrations have been derived using the CLEA model. The GACs used and their ranking of importance are listed below:

- *Soil Guideline Values (SGVs) which demonstrate minimal risk,*
- *LQM/CIEH S4ULs which use the same toxicological data as the SGVs but different exposure criteria.*
- *C4SLs which demonstrate low risk.*

In deriving the GACs for use on Brownfield sites we have assumed a 1% Soil Organic Matter, unless the results indicate otherwise.

The proposed end-use for the site is a commercial development comprising a maximum 3-storey office block to the east of the site and separate Creche facility building on the western boundary of the site. Areas of soft landscaping and two football pitches will also be included as part of the development. We have therefore undertaken the GQRA on the basis that the proposed development site falls under the Commercial land-use scenario as defined in SR3 (EA, 2009b).

The strata or sources of contamination targeted by the laboratory testing scheduled is summarised in the table below:

Strata	Number of Samples Tested	Locations
Granular Made Ground	*7*	*TP01 to TP03, BH01, BH03, BH04*
Natural Sand	*1*	*BH02*

A summary of the Geo-Environmental Testing results is presented below and the GQRA Screening Values are presented in *Appendix 9:*

Metals				
Contaminant	Range (mg/kg)	Commercial Screening Value	Exceedances	Locations
Arsenic	*6.6 - 11*	*640*	*0*	-
Cadmium	*<0.2 - 0.6*	*230*	*0*	-
Chromium	*10 - 28*	*8600*	*0*	-
Hexavalent Chromium	*<4.0*	*49*	*0*	-
Copper	*12 - 34*	*68000*	*0*	-
Lead	*14 - 110*	*2300*	*0*	-
Mercury	*<0.3*	*26*	*0*	-
Nickel	*13-37*	*1800*	*0*	-
Selenium	*<1.0*	*13000*	*0*	-

Zinc	*31-130*	*730000*	*0*	*-*
Polycyclic Aromatic Hydrocarbons (PAHs)				
Contaminant	Range (mg/kg)	Commercial Screening Values	Exceedances	Locations
Naphthalene	*<0.05*	*190*	*0*	*-*
Acenaphthylene	*<0.05*	*83000*	*0*	*-*
Acenaphthene	*<0.05 - 0.44*	*84000*	*0*	*-*
Fluorene	*<0.05 - 0.29*	*63000*	*0*	*-*
Phenanthrene	*<0.05 - 2.5*	*22000*	*0*	*-*
Anthracene	*<0.05 - 0.63*	*520000*	*0*	*-*
Fluoranthene	*<0.05 - 3.8*	*23000*	*0*	*-*
Pyrene	*<0.05 - 3.5*	*54000*	*0*	*-*
Benzo(a)anthracene	*<0.05 - 2.0*	*170*	*0*	*-*
Chrysene	*<0.05 - 1.4*	*350*	*0*	*-*
Benzo(b)fluoranthene	*<0.05 - 2.1*	*44*	*0*	*-*
Benzo(k)fluoranthene	*<0.05 - 0.86*	*1200*	*0*	
Benzo(a)pyrene	*<0.05 - 2.1*	*35*	*0*	*-*
Indeno(123cd)pyrene	*<0.05 - 1.0*	*500*	*0*	*-*
Dibenzo(ah)anthracene	*<0.05*	*3.5*	*0*	*-*
Benzo(ghi)perylene	*<0.05 - 1.3*	*3900*	*0*	*-*
TPH CWG – Aliphatics				
Contaminant	Range (mg/kg)	Commercial Screening Values	Exceedances	Locations
>C5-C6	*<0.001*	*3200*	*0*	*-*
>C6-C8	*<0.001*	*7800*	*0*	*-*
>C8-C10	*<0.001*	*2000*	*0*	*-*
>C10-C12	*<1.0*	*9700*	*0*	*-*
>C12-C16	*<2.0*	*59000*	*0*	*-*
>C16-C21	*<8.0*	*1600000*	*0*	*-*
>C21-C35	*<8.0*	*1600000*	*0*	*-*
Total aliphatics C5-35	*<10.0*		*0*	*-*
TPH CWG – Aromatics				
Contaminant	Range (mg/)	Commercial Screening Values	Exceedances	Locations
>C5-EC7	*<0.001*	*26000*	*0*	*-*
>EC7-EC8	*<0.001*	*56000*	*0*	*-*
>EC8-EC10	*<0.001*	*3500*	*0*	*-*
>EC10-EC12	*<1.0*	*16000*	*0*	*-*
>EC12-EC16	*<2.0*	*36000*	*0*	*-*
>EC16-EC21	*<10.0*	*28000*	*0*	*-*
>EC21-EC35	*<10.0 – 48.0*	*28000*	*0*	*-*
Total aromatics C5-35	*<10.0 – 53.0*	*-*	*-*	*-*
Total aliphatics and aromatics(C5-35)	*<10.0 – 53.0*	*-*	*-*	*-*
MTBE	*<1.00 ug/kg*	*7900*	*0*	*-*
Benzene	*<1.00 ug/kg*	*95*	*0*	*-*
Toluene	*<1.00 ug/kg*	*4400*	*0*	*-*

Ethylbenzene	*<1.00 ug/kg*	*2800*	*0*	*-*
m/p-Xylene	*<1.00 ug/kg*	*3200*	*0*	*-*
o-Xylene	*<1.00 ug/kg*	*2600*	*0*	*-*
Others				
Natural Moisture Content 5.9 – 15.0%				
pH value 7.6 – 10.8				
Organic Matter 0.6 – 3.0%				
Asbestos Screen				
Position	Depth (m bgl)	Asbestos Type	Quantification (mass%)	
TP01	*0.25*	*None Detected*	*-*	
TP01	*0.7*	*Amosite-Loose Fibres*	*<0.001*	
TP02	*0.35*	*None Detected*	*-*	
TP03	*0.55*	*Chrysotile-Loose Fibrous Debris*	*0.005*	
BH01	*0.5*	*None Detected*	*-*	
BH02	*1.0*	*None Detected*	*-*	
BH03	*1.0*	*None Detected*	*-*	
BH04	*0.5*	*None Detected*	*-*	

7.2 Generic Quantitative Risk Assessment - Soils

Made Ground was encountered beneath the site to a maximum depth of 1.8m bgl. However, it was generally present to depths of less than 1.0m bgl. Made Ground generally consisted of dark brown gravelly sand and dark brown sandy gravel. No evidence of contamination was noted during the investigation.

No elevated concentrations of metals, speciated Polycyclic Aromatic Hydrocarbons (PAHs) or hydrocarbons have been recorded by the laboratory testing based on the site having a commercial end use. Furthermore, TPH concentrations were almost entirely recoded at levels below the laboratory limits of detection.

A creche is to be included in the proposed development. Young children are a more sensitive receptor, therefore the samples tested were also screened against more stringent screening values of residential without plant uptake. No elevated concentrations of metals, speciated Polycyclic Aromatic Hydrocarbons (PAHs) or hydrocarbons were identified based on using more stringent CoC screening values.

Asbestos

Amosite loose fibres were detected at a trace concentration of <0.001 mass% in TP01 at a depth of 0.7m bgl in the west of the site. Chrysotile loose fibrous debris was detected at a concentration of 0.005 mass% in TP03 at a depth of 0.55m bgl in the south east of the site.

The asbestos was associated with black brown sandy gravel with fragments of brick and tarmac present at both locations. The source of the asbestos is likely to be the previously demolished commercial building. No other asbestos has been identified within the samples screened through laboratory testing. The source of the asbestos is likely the subgrade material imported historically to construct the hardsurfacing and warehouse, shown on historical maps in 1988/92, for use within the subbase. No other asbestos has been identified within the samples screened through laboratory testing, however should be assumed to be widespread as the Made Ground is similar in nature.

7.3 Permanent Ground Gases

Three standpipes were installed for gas monitoring within BH01, BH02 and BH04. One monitoring visit has been carried out to date on 28th February 2022 and a further three visits are planned.

Concentrations of methane (CH_4) were not recorded within any monitoring locations. Carbon dioxide (CO_2) has been recorded at a maximum concentration of 4.3% v/v within BH01. Detectable levels of oxygen (O_2) were recorded within the standpipes at a minimum level of 12.3% v/v.

No positive gas flow rates were detected during the monitoring visits.

The atmospheric pressure was 1008mb on the monitoring visit which was completed during a period of falling barometric pressure.

Groundwater was recorded within all standpipes, at depths of between 0.47m and 4.0m bgl.

Characterisation of the Gas Screening Value (GSV)

Based upon the initial results recorded, in accordance with CIRIA Report C665, the risk to the site from ground gases has been assessed by converting the results to gas screening values (GSVs), calculated by multiplying the typical maximum gas concentrations with the recorded maximum positive flow rates. In addition, individual "hazardous gas flow rates" (Qhg) have been derived for each monitoring point. As no levels of methane have been recorded, a GSV for carbon dioxide only has been calculated.

GSV (l/hr) = max borehole flow rate (l/hr) x max gas concentration (%)

For this assessment, the maximum recorded concentration of carbon dioxide of 4.3%v/v has been used. No positive gas flow rates have been detected therefore the limit of detection of the gas analyser of 0.1l/hr has been adopted to calculate the GSV.

Carbon Dioxide GSV = 0.043 (4.3%) x 0.1 = 0.0043 l/hr

Assessment

In order to assess the ground gas regime beneath the site and the need to incorporate ground gas precautions, guidance was taken from CIRIA C655 'Assessing risks posed by hazardous ground gases to buildings'. Based on the site having commercial end use, the Wilson and Card method has been used to carry out the assessment.

When considering the results to date in accordance with CIRIA C665 (Section A Development and Table 8.5 – Modified Wilson and Card Classification) it can be seen that the GSV value for carbon dioxide is below the assessment GSV of 0.07l/hr and typical carbon dioxide concentrations are generally less than 5% v/v , the site falls into CS1 based on the monitoring undertaken to date.

Characteristic Situation 1

The proposed development is classified as Building Type C in accordance with BS 8485:2015 and the site falls into CS1 in accordance with Table 2 of the above guidance and no gas protection measures are required.

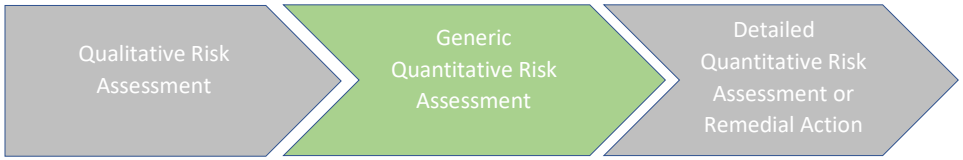
The above recommendations are based on the gas monitoring carried out to date and a full assessment will be provided upon completion of the gas monitoring programme.

Radon
The site is not located in an area where radon precautions are required within new structures.

7.4 Revised Pollution Linkage Assessment

A pollution linkage assessment has been revised based on the Ground Investigation and testing in accordance with LCRM and CIRA C552 as set out in *Appendix 10* to identify any realistic pollution linkages in order to quantify the risks to human health and controlled waters. The revised pollution linkages are displayed on *GRO-21438-P06* - Illustrative Revised CSM.

Human Health Pollution Linkage Assessment



- The table below represents the second stage in the land quality risk assessment process - **the Generic Quantitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

Conceptual Site Model						*Generic Quantitative Risk Assessment*
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	*Rationale and Action*
PL1	Contaminated Soils	Ingestion of soil and dust. Dermal contact with soil.	Unlikely to Low Likelihood	Medium	Moderate	*Pollution Linkage 1 refers to proposed site users coming into contact with contaminated soils on the site.* *The site is currently utilised as an overflow car park to the adjacent JD Sports offices to the east. Historically, there has been a warehouse located on the site which has now been demolished.* *Made Ground was present beneath the site, no evidence of contamination was noted. No elevated concentrations of metals, speciated PAHs or hydrocarbons were detected by the laboratory testing. Asbestos fibres were detected within TP01 at 0.7m bgl and TP03 at 0.55m bgl at concentrations between <0.001 mass% and 0.005 mass%. The source of the asbestos is likely to be demolition material from the previous warehouse. The JIWG Receptor tool concluded the overall ranking is Low.* *No elevated contamination or asbestos was detected in the previous investigation undertaken by RoC Consulting.*

Conceptual Site Model						*Generic Quantitative Risk Assessment*
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	*Rationale and Action*
						The proposed development is commercial end use comprising a three-storey office block in the east and separate Creche facility building on the western boundary of the site with associated staff welfare facilities including two five-a-side football pitches. *Asbestos has been detected in the west and east of the site and should be assumed to be site wide at low concentrations.* *In conclusion, Made Ground is present beneath the site however no elevated levels of CoC were detected within the samples tested. Asbestos has been detected and areas of soft landscaping are proposed. Therefore a pollution linkage has been identified.*
PL2	Contaminated Soils	Inhalation of vapour.	Unlikely	Medium to Severe	Low	*Pollution linkage 2 refers to vapours migrating into confined spaces within the proposed development. No significant sources of volatile contamination have been identified on the site and no visual or olfactory evidence of hydrocarbon contamination was noted during the Ground Investigation. No elevated concentrations of hydrocarbons were detected by the laboratory testing and recorded concentrations were predominantly below laboratory detection limits. Therefore, no plausible pollution linkage is considered to exist.*
PL3	Contaminated Soils	Inhalation of soil dust by adjacent site users.	Unlikely	Medium	Low	*Pollution Linkage 3 relates to contamination on the subject site affecting adjacent site users. No sources of mobile contamination have been identified on the site therefore a viable pollution linkage has not been identified.*

Conceptual Site Model						*Generic Quantitative Risk Assessment*
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	*Rationale and Action*
PL4	Contaminated Soils	Attacking potable water supply pipe.	Unlikely	Medium	Low	*Pollution Linkage 4 refers to the possible contaminants permeating potable water pipes and consumption by the future site end users of the tainted water supply. Made Ground is present at installation depths across the site. However, no evidence of organic contamination was noted during the investigation and hydrocarbon concentrations recorded were predominantly below laboratory detection limits. It is anticipated that standard PE pipes will be suitable. However, it would be prudent to undertake a local water company risk assessment to select the correct material.*
PL5	Ground Gas	Migration and accumulation of ground gas in internal spaces.	Unlikely	Medium to Severe	Low	*Made Ground is present beneath the site, it is generally present at shallow depths of less than 1.0m bgl. Deep Made ground was encountered at a single location to 1.8m bgl. Widespread demolition material does not appear to be present on site associated with the former warehouse.* *No methane has been detected by the monitoring undertaken to date and a maximum carbon dioxide concentration of 4.3%v/v has been recorded along with no positive flow rates. Interim gas monitoring results categorise the site as CS1 based on the GSV and therefore no gas protection measures are considered necessary at this stage.* *This will be confirmed upon completion of the gas monitoring programme.* *The site is not within an area requiring radon precautions within foundations.*

Conceptual Site Model						*Generic Quantitative Risk Assessment*
PL	Potential source	Pollution linkage	Likelihood	Severity	Level of risk	*Rationale*
PL7	Contaminated Soils	Migration of soil and groundwater contamination impacting surface waters.	Unlikely	Medium	Very Low	*Pollution Linkage 7 refers to the impaction of Hollins Brook 91m south of the site from contaminated soils and groundwater.* *No sources of mobile contamination have been identified through the Ground Investigation and a plausible pollution linkage does not exist.*

7.5 Outline Remedial Strategy

Soils

Made Ground was encountered beneath the entire site to a maximum depth of 1.8m bgl. No elevated concentrations of CoC above commercial screening values were detected by the laboratory testing. Asbestos was detected locally at concentrations between <0.001 mass% and 0.005 mass%.

The majority of the site will be covered with hardsurfacing which will break the pollution linkage to the Made Ground containing asbestos fibres. Where soft landscaping areas are present, it is recommended that 600mm of suitably clean topsoil is placed including a demarcation layer or a 100mm thick hard dig layer to mitigate the risk of asbestos fibres in the Made Ground.

Controlled Waters

No specific remedial measures are required with respect to controlled waters.

Permanent Ground Gasses

Based on the single gas monitoring visit undertaken to date the site falls into CS1 and gas protection measures are not considered necessary at this stage. This will be confirmed or otherwise on completion of the monitoring programme.

The site is not in an area requiring radon precautions.

Watching Brief and Regulatory Compliance

A watching brief is recommended during future ground works for any previously unseen contamination. If identified, work should cease in that area and advice sought from Groundtech Consulting Limited.

Approval from the regulators should be obtained prior to the development commencing to avoid any delays at the construction stage.

7.6 Asbestos in Soils

Asbestos fibres were detected within two out of eight samples of Made Ground that were screened. One of the samples had trace concentrations of <0.001 mass% and one sample had concentrations of 0.005 mass% where loose fibrous debris was present.

Where possible, it is advised that any Made Ground soils containing asbestos are left in the ground undisturbed.

Where soils will be disturbed as part of the ground works, in accordance with the Joint Industry Working Group (JIWG) decision support tool for CAR2012 work categories, the combined hazard and exposure ranking is Medium for the asbestos detected. The work is classified as non-licenced, and CAR does not apply.

The JIWG tables are presented in *Appendix 11*. This should be used as an aid to classify risk and recommend the level of protection required, the final decision on how asbestos within the soils should be managed should be made by the contractor.

7.7 Health and Safety - Construction and Ground Workers

During the reclamation and construction phases of the site development it will be necessary to protect the health and safety of site personnel. The risk to construction and ground workers is assessed in the table below:

PL Ref	Potential Source	Pollution Linkage	Likelihood	Severity	Level of Risk
PL8	*Made Ground*	*Ingestion, direct contact, inhalation of dusts.*	*Unlikely*	*Medium*	*Low*
PL8	*Asbestos*	*Inhalation of dusts*	*Low likelihood*	*Medium*	*Medium*

The risks from asbestos fibres and loose fibrous debris should be communicated to ground workers through a site induction and information on noticeboards.

General guidance on these matters is given in the Health and Safety Executive (HSE) document "Protection of Workers and the General Public during the Redevelopment of Contaminated Land". In summary, the following measures are suggested to provide a minimum level of protection:

- *All ground workers should be issued with the relevant protective clothing, footwear and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.*
- *Hand-washing and boot-washing facilities should be provided.*
- *Care should be taken to minimise the potential for off-site migration of contamination by the provision of dust suppression control and wheel cleaning equipment during the construction works.*
- *Good practices relating to personal hygiene should be adopted on the site.*
- *The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety and welfare of persons on the site.*

7.8 Waste Classification by Assessment

We have reviewed the testing results and inputted them into the HazWasteOnline model which allows users to code and classify waste as defined in the EWC (European Waste Catalogue 2002) based on EC Regulation 1272/2008 on the Classification, labelling and packaging of substances and mixtures (CLP) and latest Environment Agency guidance (WM3 "Guidance on the classification and assessment of waste (1st edition 2015)-Technical Guidance").

This is a useful tool as waste producers have the legal responsibility to classify any waste they produce.

Eight samples were tested to assess whether they contained any contaminants in the hazardous range when screened against assessment criteria within WM3. The results are in the Waste Classification Report presented in *Appendix 12*.

Location	Depth (m bgl)	Material	Classification	Hazardous Properties
TP01	*0.25*	*MG: Dark brown sandy gravel*	*Non-Hazardous*	-
TP01	*0.70*	*MG: Black clayey sandy gravel*	*Non-Hazardous*	-
TP02	*0.35*	*MG: Dark brown gravelly sand*	*Non-Hazardous*	-
TP03	*0.55*	*MG: Dark brown sandy gravel*	*Non-Hazardous*	-

BH01	*0.50*	*MG: Dark brown clayey gravelly sand*	*Non-Hazardous*	-
BH02	*1.00*	*Brown slightly gravelly clayey Sand*	*Non-Hazardous*	-
BH03	*1.00*	*MG: Orange brown sandy gravel*	*Non-Hazardous*	-
BH04	*0.50*	*MG: Brown sandy gravel*	*Non-Hazardous*	-

Asbestos fibres were detected at concentrations of less than 0.1 mass% and these concentrations therefore do not affect the classification.

7.9 Waste Acceptance Criteria (WAC) Results

The Landfill Directive (Directive 1999/31/EC on the landfilling of waste) led to the establishment of a methodology for classifying wastes. Wastes can only be accepted at a landfill if they meet the relevant Waste Acceptance Criteria (WAC) for that type of landfill. There are three different WAC, these are for:

- *Inert waste*
- *Non –hazardous waste*
- *Hazardous waste*

Wastes should first be classified based on their total concentrations as detailed in the previous section. WAC testing is then required if the end disposal route is a landfill.

Solid and eluate WAC analysis was undertaken on two samples, the findings of which are presented in the table below.

Reference	Depth (m)	Strata Type	Classification	WAC Analysis	Landfill Disposal
TP01	*0.25*	*MG: Dark brown sandy gravel*	*Non-Hazardous*	*SNR*	*Non-hazardous*
BH03	*1.0*	*MG: Brown sandy gravel*	*Non-Hazardous*	*Inert*	*Inert Landfill*

The WAC testing has revealed that if the end disposal route of the Made Ground is landfill the material would be accepted at an Inert or Non-Hazardous landfill.

The possibility of automatic inert classification of the natural soils should be explored in accordance with Section 4.3 of the EA guidance document. The Council Decision includes a list of wastes in Section 2.1.1 of the document that are assumed to be inert and therefore acceptable at a landfill for inert waste without testing, this is the case if:

- *They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source)*
  and
- *There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other their disposal in other classes of landfill.*

If any organic contaminated material is encountered during the construction phase, it is possible that this may be classified as hazardous and testing should be undertaken at that time.

Materials should segregated and where necessary sufficient time is allowed to further classify the material properly, including discussion with landfill sites and waste transfer stations to find the best disposal route. It

is recommended that where possible that the soils could be recycled at a suitable local waste treatment plant or transfer station rather than a landfill disposal route.

The reuse of soils on the site this should be done in accordance with the CL:AIRE "Development Industry Code of Practice for the Definition of Waste" (CL:AIRE CoP). Any re-use scheme should be designed to minimise disposal costs.

After a cut and fill balance plan/volume calculation has been carried out, a U1 and T5 exemption could be registered. This will allow the use of the following soils without a waste permit or under Dow CoP MMP:

- *1,000 tonnes (c. 600m^3) of non-hazardous soil*
- *5,000 tonnes (c. 3,000m^3) of natural sand and gravels.*
- *50,000 tonnes (c. 25,000m^3) of bituminous material to be used in roadways.*
- *5,000 tonnes (c. 3,000m^3) of crushed concrete / stone.*

8.0 FINAL APPRAISAL

8.1 Land Quality

Made Ground has been encountered across the site to a maximum depth of 1.8m bgl and generally consisted of either dark brown gravelly sand or sandy gravel. No visual or olfactory evidence of contamination has been noted.

Geo-Environmental testing indicates that there are no elevated concentrations of metals, speciated PAHs or hydrocarbons above commercial screening values. Asbestos fibres were detected within TP01 at 0.7m and TP03 at 0.55m bgl at concentrations of <0.001 mass% and 0.005 mass% respectively. No elevated contamination or asbestos was detected during the previous investigation of the site undertaken by RoC Consulting.

The risk from contaminated soils is considered to be *Moderate.* The majority of the redevelopment will be covered by hardsurfacing which will act as a cover system, in areas of soft landscaping a 600mm of suitably clean subsoil/topsoil and hard dig layer should be placed to mitigate the risk from asbestos fibres.

No evidence of hydrocarbon contamination has been observed or detected during the investigation and hydrocarbons were generally present at concentrations below laboratory detection limits. The risk from vapours is considered to be *Low.*

Based on the initial ground gas monitoring visits, the site falls into CS1 and gas protection measures are not considered necessary at this stage. This will be confirmed on completion of the gas monitoring programme. The site is not in an area affected by radon.

The risk to controlled water has been assessed as *Low.*

Eight samples of Made Ground/natural ground have been analysed and all have been classified as *Non-Hazardous* for waste disposal.

8.2 Ground Engineering

The most suitable foundations for the proposed development are considered to be piles transferring loads to the underlying medium dense to dense Sands. A range of allowable loads have been calculated for different types of piles and diameters. Based on the proposed loading provided, pile groups will be required.

Suspended floor slabs should be adopted at the site due to the compatibility with the proposed pile foundation solution and depth of Made Ground.

Three soil percolation tests were undertaken at a single location and the use of SuDS drainage is considered feasible within the natural Sand deposits where good soil infiltration rates have been calculated.

Five plate load tests have been undertaken across the site and CBR values for the underlying Clay ranged between 1.6% and 5.4%. Proof rolling of the subgerade will be required as a minimum.

Constraints
A high-pressure gas main is present in the north east of the site which has been located by slit trenches carried out in a previous investigation by RoC Consulting. An easement will be required around the gas main and its location need to be considered by the development layout.

8.3 Required Supplementary Investigation

The following further work is considered necessary to progress the site to construction phase:

Completion of gas monitoring programme.
Issue gas assessment.
Detailed foundation design.
Confirmation of remedial recommendations with regulators.

9.0 RELEVANT INDUSTRY REFERENCES

British Standards Institution. *Investigation of Potentially Contaminated sites - code of practice*. BS 10175:2017.

British Standards Institution '*Code of Practice for Site Investigations*' BS 5930:2015

British Standards Institution "*Geotechnical investigation and testing – Identification and classification of soil*" BS EN ISO 14688:2002.

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CIRIA 552 "Contaminated Land Risk Assessment – A guide to good practice" 2001.

CIRIA C665 "Assessing Risks Posed by Hazardous Ground Gases to Buildings" 2007.

Wilson & Card "*Proposed method classifying gassing sites*" Ground Engineering 1999.

Card & Steve Wilson in *"A pragmatic approach to ground gas risk assessment for the 21st Century"* - CIRIA/Environmental Protection UK Ground gas seminar 2011

BS 8576:2013 *'Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)'*

BS 8485:2015 *'Code of practise for the design of protective measures for methane and carbon dioxide ground gases for new buildings'*

The Hazardous Waste (England) Regulations 2005.

Environment Agency Hazardous Waste: *"Guidance on the classification and assessment of waste"* WM3 ver 1 May 2015.

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CL:AIRE, 2014 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination'.

Water Framework Directive.

Environmental Quality Standards.

UK Drinking Water Standards: Water Supply (Water Quality) Regulations 1989 (SI 1989/1147) and Water Supply (Water Quality) Regulations

UKWIR Report 10/WM/03/21 2010 "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites"

Health & Safety Executive, 1991. 'Protection of Workers & the General Public during the Development of Contaminated Land'.

Environment Agency & NHBC, 2000. R&D Publication 66. Guidance for the Safe Development of Housing on Land Affected by Contamination.

Environment Agency "Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3"

NHBC Standards 2019

CL:AIRE "*The Definition of Waste: Development Industry Code of Practice*" Version 2 March 2011.

CIRIA "*Asbestos in soil and made ground: a guide to understanding and managing risks*" C733 2014

Control of Asbestos Regulations (CAR) 2012

Harris, M R, Herbert, S. M, Smith, M A 'Remedial Treatment for Contaminated Land' (twelve volumes), special publications 101-112, CIRIA 1996.

Department of the Environment. 1995. Industry Profiles - 48 separate publications available from The Stationery Office, London

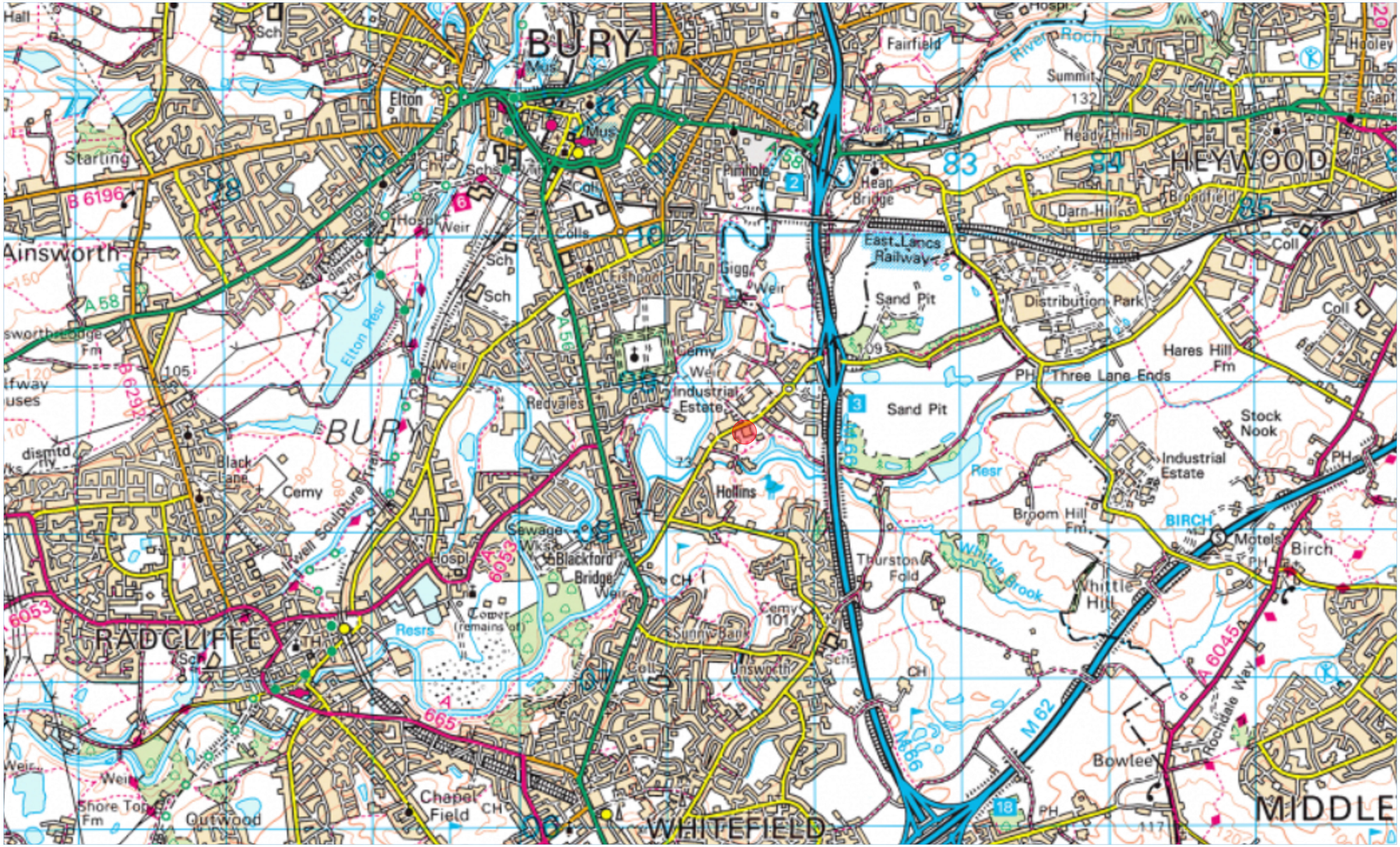
BRE Digest 365 "Soakaway Design" 2015.

Environment Agency. R&D Publication 20. Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources. 1999.

Environment Agency Technical Guidance Note 01. Hydrogeological Risk Assessment for Landfills.

Specification for Highways Works – Series 600 Earthworks November 2016

APPENDIX 1 - Plans



GROUNDTECH CONSULTING

CLIENT	DATE
JD SPORTS	JANUARY 2022
PROJECT TITLE	SCALE
NEW OFFICE BLOCK, BURY	NTS
PLAN TITLE	PLAN NUMBER
PROJECT LOCATION PLAN	GRO-21438-P01

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

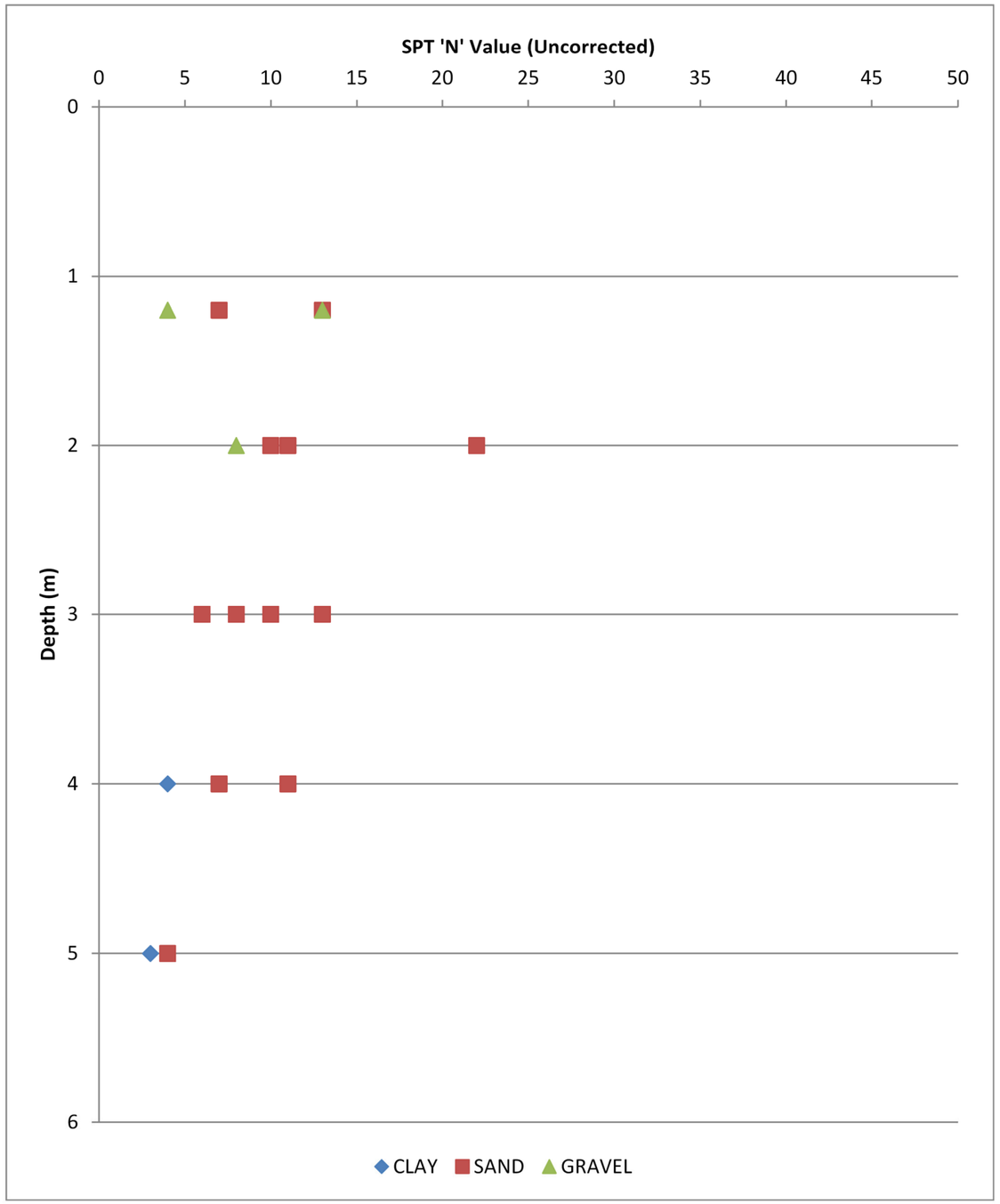
Notes

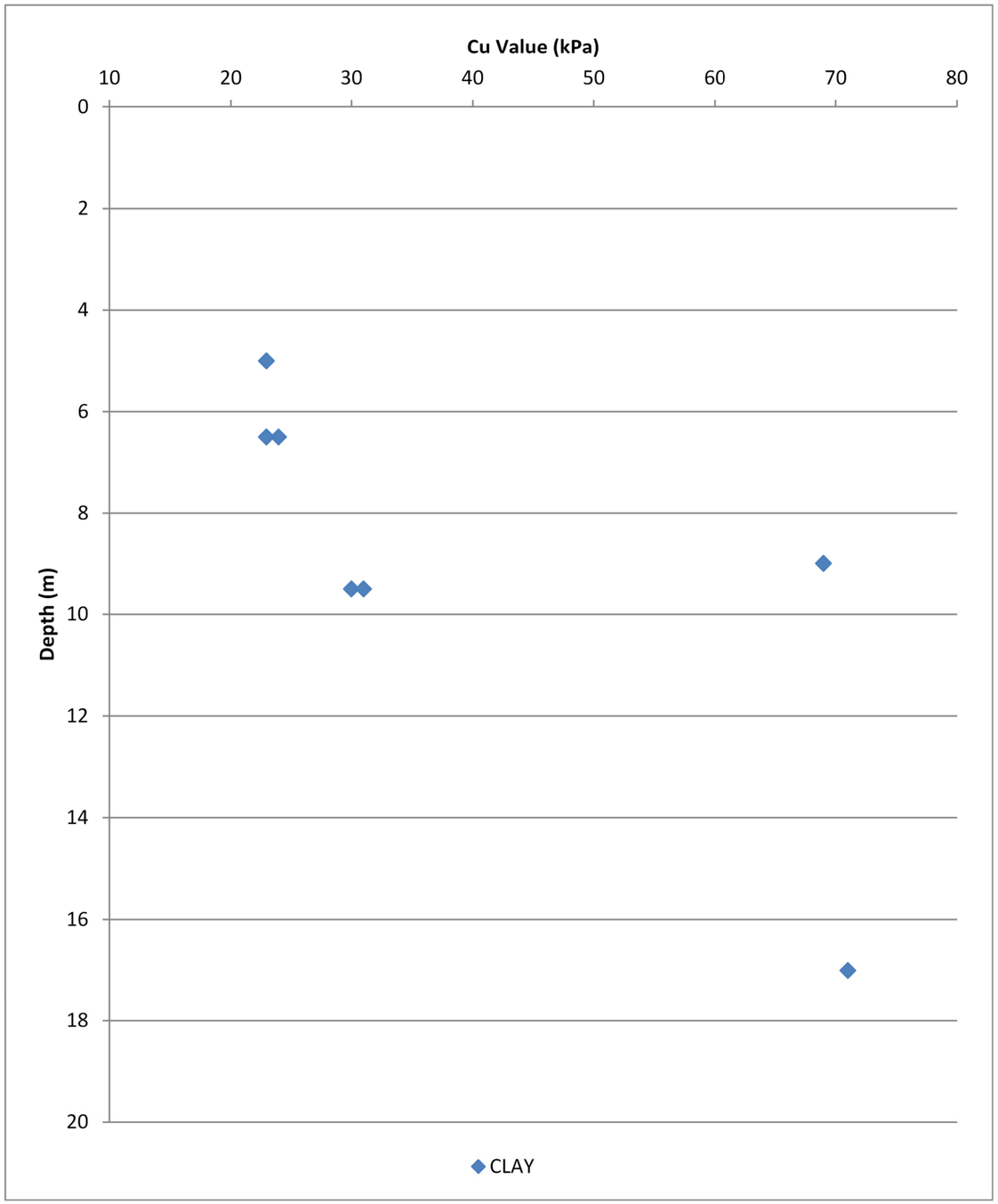
- Site Location

GROUNDTECH CONSULTING

CLIENT	DATE				Status
JD SPORTS	JANUARY 2022				Preliminary
PROJECT TITLE	SCALE				Draft
NEW OFFICE BLOCK, BURY	NTS				Issued ●
PLAN TITLE	PLAN NUMBER				For Comment
EXPLORATORY HOLE LOCATION PLAN	GRO-21438-P04	Rev.	Details	Date	Approved

Notes
- Site Location
- Borehole Location
- Trial Pit Location
- CBR Location





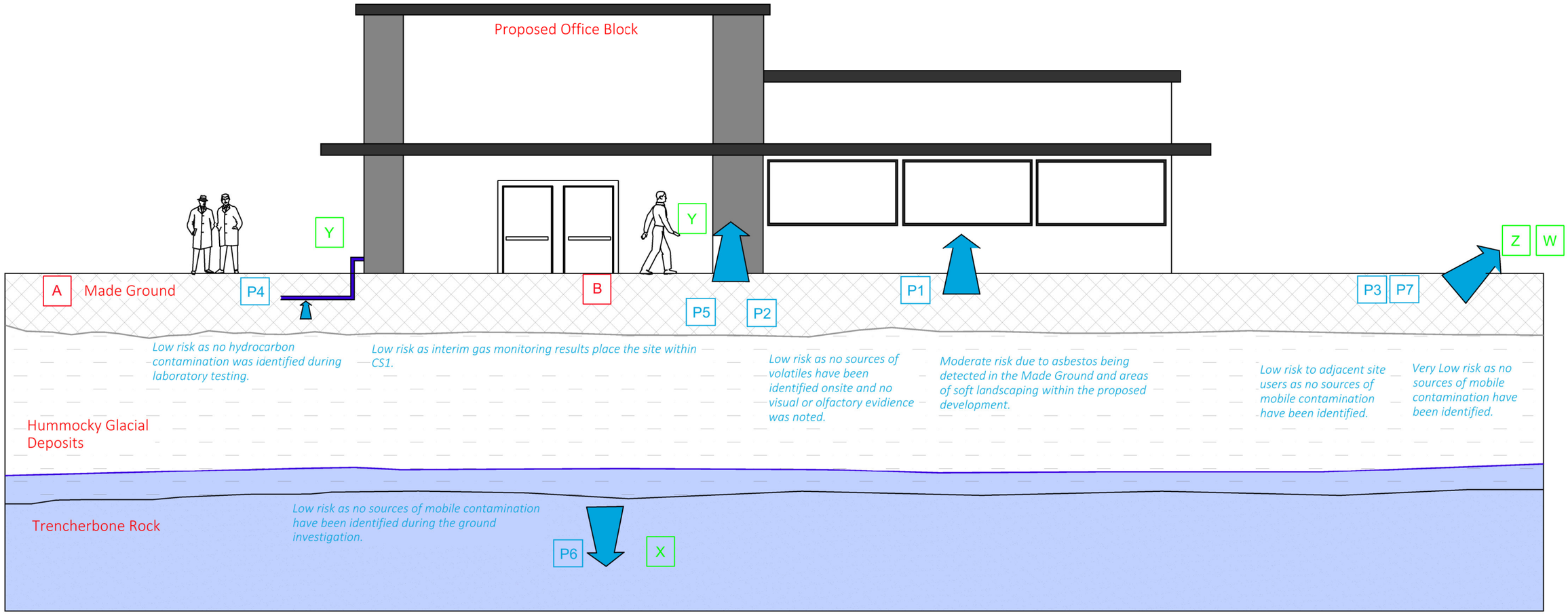
GROUNDTECH CONSULTING

CLIENT	DATE				
JD SPORTS	FEBRUARY 2022				
PROJECT TITLE	SCALE				
NEW OFFICE BLOCK, BURY	NTS				
PLAN TITLE	PLAN NUMBER				
GENERALISED GROUND MODEL	GRO-21438-P05	Rev.	Details	Date	

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

SOURCES	POLLUTION LINKAGES	RECEPTORS
A. Contaminated soils / Made ground. B. Ground gas.	P1. Ingestion of soil and dust. P2. Inhalation of vapour. P3. Inhalation of soil dust by adjacent site users. P4. Attacking of potable water supply pipe. P5. Migration and accumulation of ground gas in internal places. P6. Impaction of groundwater from soil contamination. P7. Migration of soil and groundwater contamination impacting surface waters.	W. Hollins Brook X. Groundwater within the Secondary A Aquifer. Y. Site end users. Z. Adjacent site users.



GROUNDTECH CONSULTING

CLIENT	DATE
JD SPORTS	JANUARY 2022
PROJECT TITLE	SCALE
NEW OFFICE BLOCK, BURY	NTS
PLAN TITLE	PLAN NUMBER
REVISED ILLUSTRATIVE CSM	GRO-21438-P06

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

APPENDIX 2 - Site Photographs

Photograph 1 – Site entrance.

Photograph 2 – Entrance area of site.

Photograph 3 – Tarmac area to the east of the site along with adjacent office block.

Photograph 4 - Area of former warehouse building.

Photograph 5 – Existing building on site.

Photograph 6 – Western part of the site.

APPENDIX 3 - Exploratory Hole Logs

Borehole Log

GROUNDTECH CONSULTING

Borehole No. **BH01**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 24/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.20	ES		0.30			Stone.	
		0.30	D					MADE GROUND: Dark brown clayey gravelly medium to coarse sand. Gravel is angular to subangular fine to medium of mixed lithologies including brick.	
		0.50	ES						
		1.00	ES		0.90			Medium dense orange brown slightly gravelly medium to coarse SAND. Gravel is angular to subangular fine to medium of mixed lithologies.	1
		1.20		N=13 (1,2/3,3,3,4)					
		1.20 - 1.65	D						
		2.00	ES						2
		2.00		N=11 (1,2/2,2,3,4)					
		2.00 - 2.45	D						
		2.00 - 5.45	D						
		3.00		N=10 (1,1/2,2,3,3)					3
		3.00 - 3.45	D						
		4.00		N=11 (1,2/2,3,3,3)					4
		4.00 - 4.45	D						
		5.00		N=4 (1,0/1,1,1,1)				*Becoming loose to very loose at 5.0m bgl.*	5
		6.00	D		6.00			Soft low strength brown sandy CLAY. Sand is fine to medium.	6
	▼	6.50 - 6.95	U						
		7.00	D						7
		8.00		N=4 (1,0/1,1,1,1)					8
		8.00 - 8.45	D						
									9
		9.50 - 9.95	U						
		10.00	D						10

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Hand dug pit to 1.20m bgl. 3. Groundwater encountered at 6.5m bgl. 4. Cable percussive drilling carried out from ground level to 20.0m bgl. 5. Rotary open hole drilling carried out from 20.0m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl, 1m plain and 4m slotted.

GROUNDTECH CONSULTING

Borehole Log

Borehole No. **BH01**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 24/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		11.00 - 11.45	D						11
		11.50		N=7 (1,1/1,2,2,2)	11.50			Soft brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is angular to subangular fine to medium of mixed lithologies.	
		12.00	D						12
		12.50 - 12.95	U		12.50			Firm to stiff high strength brown sandy CLAY. Sand is fine to medium.	
		12.50 - 12.95	U						
		13.00	D						13
		13.00	D						
		14.00		N=24 (3,4/4,5,7,8)					14
		14.00 - 14.45	D						
		15.00 - 17.50	D		15.00			Medium dense brown medium to coarse SAND.	15
		15.50		N=17 (1,2/3,4,5,5)					
		15.50 - 15.95	D						16
		17.00		N=23 (2,3/4,5,7,7)	17.00			Firm to stiff brown CLAY with bands of sand. Sand is fine to medium.	17
		17.00 - 17.50	D						
									18
		18.50		N=39 (4,5/7,8,10,14)					
		18.50 - 18.95	D						19
		20.00		N=31 (3,4/6,7,8,10)	20.00				20

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Hand dug pit to 1.20m bgl. 3. Groundwater encountered at 6.5m bgl. 4. Cable percussive drilling carried out from ground level to 20.0m bgl. 5. Rotary open hole drilling carried out from 20.0m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl, 1m plain and 4m slotted.

Borehole Log

GROUNDTECH CONSULTING

Borehole No. **BH01**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 24/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		20.00 - 20.45	D					Firm to stiff brown CLAY with boulders.	21, 22, 23, 24, 25
					25.30			Red sandstone.	26, 27, 28, 29, 30

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Hand dug pit to 1.20m bgl. 3. Groundwater encountered at 6.5m bgl. 4. Cable percussive drilling carried out from ground level to 20.0m bgl. 5. Rotary open hole drilling carried out from 20.0m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl, 1m plain and 4m slotted.

GROUNDTECH CONSULTING

Borehole Log

Borehole No. **BH01**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 24/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
									31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Hand dug pit to 1.20m bgl. 3. Groundwater encountered at 6.5m bgl. 4. Cable percussive drilling carried out from ground level to 20.0m bgl. 5. Rotary open hole drilling carried out from 20.0m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl, 1m plain and 4m slotted.

Borehole Log

GROUNDTECH CONSULTING

Borehole No. **BH01**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 24/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
									41
									42
									43
									44
					45.00			End of borehole at 45.00 m	45
									46
									47
									48
									49
									50

Remarks

1. Location cleared by utility clearance. 2. Hand dug pit to 1.20m bgl. 3. Groundwater encountered at 6.5m bgl. 4. Cable percussive drilling carried out from ground level to 20.0m bgl. 5. Rotary open hole drilling carried out from 20.0m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl, 1m plain and 4m slotted.

GROUNDTECH CONSULTING

Borehole Log

Borehole No. **BH02**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 27/01/2022 -	Logged By RR

Samples and In Situ Testing						
Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
0.50	D		0.80			MADE GROUND: Brown gravelly clayey medium to coarse SAND. Gravel is angular to subangular medium to coarse of mixed lithologies including brick.
1.00 1.00 1.20 1.20 - 1.65	D ES D	N=7 (1,1/1,2,2,2)				Loose orange brown slightly gravelly clayey medium to coarse SAND. Gravel is angular to subangular fine to medium of mixed lithologies.
2.00 2.00 - 2.45	 D	N=10 (1,2/1,3,3,3)				
3.00 3.00 - 3.45	 D	N=12 (2,3/2,3,3,4)				*Becoming medium dense at 3.0m bgl.*
4.00 4.00 - 4.45	 D	N=7 (1,1/1,2,2,2)	4.10			Soft to firm brown sandy CLAY. Sand is fine to medium.
5.00 5.00 - 5.45	 D	N=3 (1,0/0,1,1,1)				
			6.00			Firm dark brown gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of mixed lithologies including coal and sandstone.
6.50 - 6.95	U					
7.00	D					
8.00 8.00 - 8.45	 D	N=14 (2,2/2,3,4,5)				
9.50 - 9.95	U					*Becoming low strength at 9.5m bgl.*
10.00	D					

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Hand dug pit to 1.20m bgl. 3. Groundwater encountered at 4.00m bgl. 5. Hole terminated at 20.0m bgl. 6. Standpipe installed to 5.0m bgl, 1m plain and 4m slotted.

Borehole Log

GROUNDTECH CONSULTING

Borehole No. **BH02**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 27/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		11.00		N=32 (4,5/7,8,8,9)					11
									12
		12.50 - 12.95	U						13
		14.00		N=44 (4,5/7,10,12,15)	14.00			Very dense brown fine to medium SAND interbedded with firm to stiff dark brown sandy CLAY. Sand is fine to medium.	14
		14.00 - 14.45	D						
									15
		15.50		N=40 (3,5/8,10,10,12)					
		15.50 - 15.95	D						16
		17.00		N=40 (2,4/7,9,12,12)					17
		17.00 - 17.45	D						
					17.50			End of borehole at 17.50 m	
									18
									19
									20

Remarks

1. Location cleared by utility clearance. 2. Hand dug pit to 1.20m bgl. 3. Groundwater encountered at 4.00m bgl. 5. Hole terminated at 20.0m bgl. 6. Standpipe installed to 5.0m bgl, 1m plain and 4m slotted.

GROUNDTECH CONSULTING

Borehole Log

Borehole No. **BH03**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 26/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
					0.15			MADE GROUND: Tarmac.	
		0.30	D		0.40			MADE GROUND: Brown sandy angular to subangular fine to medium gravel of mixed lithologies including brick. Sand is medium to coarse.	
		0.50	ES						
		0.80	D					MADE GROUND: Orange brown sandy angular to subangular fine to medium gravel of mixed lithologies including ash and brick. Sand is medium to coarse.	1
		1.00	ES						
		1.20		N=13 (2,2/3,3,3,4)					
		1.20 - 1.65	D						
					1.80			Medium dense dark brown gravelly medium to coarse SAND. Gravel is angular to subangular fine to medium of mixed lithologies including sandstone.	2
		2.00	ES						
		2.00		N=22 (3,3/22 for 275mm)					
		2.00 - 2.45	D						
	▼							*Becoming loose at 3.0m bgl.*	3
		3.00		N=8 (1,2/1,2,2,3)					
		3.00 - 3.45	D						
		4.00		N=4 (1 for 125mm/4 for 235mm)	4.00			Very soft to soft low strength dark brown sandy CLAY. Sand is fine to medium.	4
		4.00 - 4.45	D						
		5.00 - 5.45	U						5
		5.50	D						
									6
		6.50		N=21 (2,3/3,5,6,7)					
		6.50 - 6.95	D						
					6.80			Firm to stiff medium strength sandy CLAY. Sand is fine to medium.	7
									8
		9.00 - 9.45	U						9
		9.50	D						
									10

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Tarmac broken out to 0.15m bgl. 3. Hand dug pit to 1.20m bgl. 4. Groundwater encountered at 3.00m bgl rising to 2.90m bgl after 20 minutes. 5. Hole terminated at 15.0m bgl. 6. Hole backfilled with arisings.

GROUNDTECH CONSULTING

Borehole Log

Borehole No. **BH03**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 26/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					10.30			Medium dense dark brown very clayey fine to medium SAND.
		10.50 10.50 - 10.95	D	N=30 (5,4/5,7,8,10)				
		12.00 12.00 - 12.45	D	N=26 (5,5/5,6,7,8)				
		13.50 13.50 - 13.95	D	N=39 (3,5/7,10,10,12)				*Becoming dense from 13.5m bgl.*
		15.00 15.00 - 15.45	D	N=47 (5,6/8,10,14,15)	15.00			End of borehole at 15.00 m

Remarks

1. Location cleared by utility clearance. 2. Tarmac broken out to 0.15m bgl. 3. Hand dug pit to 1.20m bgl. 4. Groundwater encountered at 3.00m bgl rising to 2.90m bgl after 20 minutes. 5. Hole terminated at 15.0m bgl. 6. Hole backfilled with arisings.

Borehole Log

GROUNDTECH CONSULTING

Borehole No. **BH04**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 26/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.20 0.30 0.50	ES D ES		0.30			MADE GROUND: Grey concrete.	
		1.00 1.20 1.20 - 1.65	ES D	N=4 (1,1/1,1,1,1)	1.20			MADE GROUND: Brown sandy angular to subangular fine to medium gravel of mixed lithologies including brick. Sand is medium to coarse.	1
		2.00 2.00 2.00 - 2.45	ES D	N=8 (1,2/2,2,2,2)	2.00			Loose brown clayey sandy angular to subangular fine to medium GRAVEL of mixed lithologies including sandstone. Sand is medium to coarse.	2
		3.00 3.00 3.00 - 3.45	ES D	N=6 (1,1/1,1,2,2)				Loose brown slightly gravelly silty fine to medium SAND. Gravel is angular to subangular fine to medium of mixed lithologies.	3
		4.00 4.00 - 4.45	 D	N=7 (1,1/1,2,2,2)	4.00			Soft brown sandy CLAY. Sand is fine to medium.	4
		5.00 - 5.45	U						5
		6.00	D						6
		6.50 6.50 - 6.95	 D	N=8 (1,1/2,2,2,2)					7
		8.00 8.00 - 8.45	 D	N=15 (2,2/3,3,4,5)	7.50			Medium dense brown fine to medium silty SAND.	8
		9.50		N=13 (1,2/3,3,3,4)					9
					10.00			Continued on next sheet	10

Remarks

1. Location cleared by utility clearance. 2. Concrete cored out to 0.30m bgl. 3. Groundwater encountered at 5.8m bgl 4. Cable percussive drilling undertaken to 18.5m bgl. 5. Rotary open hole follow on undertaken from 18.5m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl., 1m plain and 4m slotted.

GROUNDTECH CONSULTING

Borehole Log

Borehole No. **BH04**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 26/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		11.00 11.00 - 11.45	D	N=30 (2,4/5,7,8,10)				Dark brown slightly gravelly clayey SAND. Sand is medium to coarse. Gravel is angular to subangular fine to medium of mixed lithologies incuding coal.	11
		12.50 12.50 - 12.95	D	N=29 (3,4/4,5,8,12)					12 13
		14.00 - 14.45	U		14.00			Medium dense dark brown very clayey fine to medium SAND.	14
		14.50 14.50 - 14.95	D	N=17 (2,3/4,4,4,5)					15
		15.50 15.50 - 15.95	D	N=30 (2,5/6,6,8,10)	15.50			Firm to stiff medium strength dark brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to medium of mixed lithologies.	16
		17.00 - 17.45	U						17
		17.50	D						18
		18.50 18.50 - 18.95	D	N=32 (4,5/7,8,8,9)	18.50			Firm to stiff brown CLAY with boulders.	19
									20

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Concrete cored out to 0.30m bgl. 3. Groundwater encountered at 5.8m bgl 4. Cable percussive drilling undertaken to 18.5m bgl. 5. Rotary open hole follow on undertaken from 18.5m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl., 1m plain and 4m slotted.

GROUNDTECH CONSULTING

Borehole Log

Borehole No. **BH04**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 26/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
									21
									22
									23
									24
									25
									26
									27
					27.50			Red sandstone.	28
									29
									30

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Concrete cored out to 0.30m bgl. 3. Groundwater encountered at 5.8m bgl 4. Cable percussive drilling undertaken to 18.5m bgl. 5. Rotary open hole follow on undertaken from 18.5m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl., 1m plain and 4m slotted.

Borehole Log

GROUNDTECH CONSULTING

Borehole No. **BH04**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 26/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
									31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Continued on next sheet

Remarks

1. Location cleared by utility clearance. 2. Concrete cored out to 0.30m bgl. 3. Groundwater encountered at 5.8m bgl 4. Cable percussive drilling undertaken to 18.5m bgl. 5. Rotary open hole follow on undertaken from 18.5m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl., 1m plain and 4m slotted.

Borehole Log

GROUNDTECH CONSULTING

Borehole No. **BH04**

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: -	Hole Type CP
Location: BURY		Level:	Scale 1:50
Client: JD SPORTS		Dates: 26/01/2022 -	Logged By RR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					45.00			End of borehole at 45.00 m	41, 42, 43, 44, 45, 46, 47, 48, 49, 50

Remarks

1. Location cleared by utility clearance. 2. Concrete cored out to 0.30m bgl. 3. Groundwater encountered at 5.8m bgl 4. Cable percussive drilling undertaken to 18.5m bgl. 5. Rotary open hole follow on undertaken from 18.5m bgl to 45.0m bgl. 6. Standpipe installed to 5.0m bgl., 1m plain and 4m slotted.

Trial Pit Log

GROUNDTECH CONSULTING

Trialpit No **TP01**

Sheet 1 of 1

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: - Level:	Date 25/01/2022
Location: BURY		Dimensions (m): Depth 3.00	Scale 1:25
Client: JD SPORTS			Logged RR

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Grey concrete.
	0.25	ES		0.25			MADE GROUND: Dark brown sandy angular to subangular fine to medium gravel of mixed lithologies including brick. Sand is medium to coarse.
	0.70	ES		0.65			MADE GROUND: Black clayey sandy subangular to subrounded fine to medium gravel of mixed lithologies including tarmac and brick. Sand is medium to coarse.
	1.20	ES		1.10			Orange brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium of mixed lithologies including coal.
	1.30	D					
	1.90	D					
	2.00	D					
	2.50	D					
▼	3.00	D		3.00			End of pit at 3.00 m

1 2 3 4 5

Remarks: 1. Groundwater encountered at 2.7m bgl 2. Pit sides unstable 3. Pit backfilled with arisings

Stability:

Trial Pit Log

GROUNDTECH CONSULTING

Trialpit No **TP02**

Sheet 1 of 1

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: - Level:	Date 25/01/2022
Location: BURY		Dimensions (m): Depth 2.50	Scale 1:25
Client: JD SPORTS			Logged RR

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Grey concrete.
	0.35	ES		0.30			MADE GROUND: Dark brown gravelly medium to coarse sand with pockets of clay. Gravel is angular to subangular fine to coarse of mixed lithologies including brick and sandstone.
	0.70 0.70	D ES		0.70			Soft orange brown sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of mixed lithologies including sandstone.
	1.40 1.45	ES D		1.25			Orange brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium of mixed lithologies including sandstone and coal.
▼	2.00	D					
	2.50	D		2.50			End of pit at 2.50 m

1 2 3 4 5

Remarks: 1. Groundwater encountered at 2.0m bgl 2. Pit sides unstable 3. Pit backfilled with arisings

Stability:

GROUNDTECH CONSULTING

Trial Pit Log

Trialpit No **TP03**

Sheet 1 of 1

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: - Level:	Date 24/01/2022
Location: BURY		Dimensions (m): Depth 3.00	Scale 1:25
Client: JD SPORTS			Logged RR

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Grey concrete.
				0.30			MADE GROUND: Dark brown sandy angular to subangular fine to medium gravel of mixed lithologies including brick. Sand is medium to coarse.
	0.55	ES					
	0.80	ES		0.75			Orange brown clayey slightly gravelly medium to coarse SAND with bands of grey. Gravel is angular to subangular fine to medium of mixed lithologies including sandstone and coal.
	1.00	D					
▼	1.50	D					
	1.90	ES		1.90			Orange brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium of mixed lithologies including sandstone and coal.
	2.00	D					
	2.50	D					
				3.00			End of pit at 3.00 m

1 2 3 4 5

Remarks: 1. Groundwater encountered at 1.6m bgl 2. Pit sides unstable 3. Pit backfilled with arisings

Stability:

APPENDIX 4 - Geo-Environmental Testing

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Analytical Report Number : 22-37451

Replaces Analytical Report Number: 22-37451, issue no. 1
Additional analysis undertaken.

Project / Site name:	New Office Block, Bury	**Samples received on:**	28/01/2022
Your job number:	GRO-21438	**Samples instructed on/ Analysis started on:**	04/02/2022
Your order number:	ORD-21438-2294	**Analysis completed by:**	17/03/2022
Report Issue Number:	2	**Report issued on:**	21/03/2022
Samples Analysed:	8 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
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: 22-37451
Project / Site name: New Office Block, Bury
Your Order No: ORD-21438-2294

Lab Sample Number				2160716	2160717	2160718	2160719	2160720
Sample Reference				TP01	TP01	TP02	TP03	BH01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	0.70	0.35	0.55	0.50
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
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	38	35	56	36	< 0.1
Moisture Content	%	0.01	NONE	7.6	13	12	5.9	12
Total mass of sample received	kg	0.001	NONE	0.9	1	1	0.9	0.9

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Amosite	-	Chrysotile	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	0.005	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	0.005	-
Asbestos Analyst ID	N/A	N/A	N/A	SCA	SCA	SCA	SCA	SCA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	10.8	7.6	9.6	9.6	8
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	2600	2700	1300	230	45
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.3	1.3	0.67	0.12	0.023
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1290	1350	666	117	22.5
Organic Matter (automated)	%	0.1	MCERTS	1.8	3	1.8	1.1	1.1

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.29	0.44	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.29	0.22	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	2.5	0.62	0.66	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.63	0.23	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	3.8	0.93	0.83	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	3.5	0.8	0.82	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2	0.48	0.43	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	1.4	0.36	0.41	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.1	0.47	0.33	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.86	0.27	0.23	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.1	0.43	0.41	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1	0.24	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.3	0.26	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	21.8	5.75	4.12	< 0.80	< 0.80

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.4	11	7.1	7.3	6.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.6	< 0.2	0.4	< 0.2
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	18	17	28	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	34	27	15	28	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	53	75	110	24	14
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	15	13	36	15
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	130	86	79	93	60

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

Analytical Report Number: 22-37451
Project / Site name: New Office Block, Bury
Your Order No: ORD-21438-2294

Lab Sample Number				2160716	2160717	2160718	2160719	2160720
Sample Reference				TP01	TP01	TP02	TP03	BH01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.25	0.70	0.35	0.55	0.50
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	< 2.0	-	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	-	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	< 8.0	-	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	10	MCERTS	< 10	-	-	< 10	-
TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	< 2.0	-	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	< 10	-	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	48	-	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	10	MCERTS	53	-	-	< 10	-

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

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Analytical Report Number: 22-37451
Project / Site name: New Office Block, Bury
Your Order No: ORD-21438-2294

Lab Sample Number				2160721	2160722	2160723
Sample Reference				BH02	BH03	BH04
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	0.50
Date Sampled				Deviating	Deviating	Deviating
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	44	< 0.1
Moisture Content	%	0.01	NONE	15	7.4	9.5
Total mass of sample received	kg	0.001	NONE	1	0.9	1

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	8.9	8.9
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	97	31	94
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.049	0.015	0.047
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	48.7	15.4	47.1
Organic Matter (automated)	%	0.1	MCERTS	1.4	0.6	0.9

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.9	3.4	6.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.5
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	10	12	28
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	12	23
Lead (aqua regia extractable)	mg/kg	1	MCERTS	15	42	21
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	13	37
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	31	52	96

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Analytical Report Number: 22-37451
Project / Site name: New Office Block, Bury
Your Order No: ORD-21438-2294

Lab Sample Number				2160721	2160722	2160723
Sample Reference				BH02	BH03	BH04
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	1.00	0.50
Date Sampled				Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Monoaromatics & Oxygenates						
Benzene	µg/kg	1	MCERTS	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 $_{HS_1D_AL}$	mg/kg	0.001	MCERTS	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS_1D_AL}$	mg/kg	0.001	MCERTS	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS_1D_AL}$	mg/kg	0.001	MCERTS	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH_CU_1D_AL}$	mg/kg	1	MCERTS	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH_CU_1D_AL}$	mg/kg	2	MCERTS	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH_CU_1D_AL}$	mg/kg	8	MCERTS	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH_CU+HS_1D_AL}$	mg/kg	10	MCERTS	-	< 10	-

TPH-CWG - Aromatic >EC5 - EC7 $_{HS_1D_AR}$	mg/kg	0.001	MCERTS	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 $_{HS_1D_AR}$	mg/kg	0.001	MCERTS	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 $_{HS_1D_AR}$	mg/kg	0.001	MCERTS	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 $_{EH_CU_1D_AR}$	mg/kg	1	MCERTS	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16 $_{EH_CU_1D_AR}$	mg/kg	2	MCERTS	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35 $_{EH_CU_1D_AR}$	mg/kg	10	MCERTS	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC35) $_{EH_CU+HS_1D_AR}$	mg/kg	10	MCERTS	-	< 10	-

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

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 22-37451
Project / Site name: New Office Block, Bury
Your Order No: ORD-21438-2294

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

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

Quantitative Analysis

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

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

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

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2160717	TP01	0.70	121	Loose Fibres	**Amosite**	< 0.001	**< 0.001**
2160719	TP03	0.55	143	Loose Fibrous Debris	**Chrysotile**	0.005	**0.005**

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

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 : 22-37451
Project / Site name: New Office Block, Bury

* 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 *
2160716	TP01	None Supplied	0.25	Brown sandy clay with stones.
2160717	TP01	None Supplied	0.7	Brown clay and loam with stones.
2160718	TP02	None Supplied	0.35	Brown clay and loam with stones.
2160719	TP03	None Supplied	0.55	Grey clay and sand with stones.
2160720	BH01	None Supplied	0.5	Brown sand with gravel.
2160721	BH02	None Supplied	1	Brown sand with gravel.
2160722	BH03	None Supplied	1	Brown clay and sand with stones.
2160723	BH04	None Supplied	0.5	Grey clay and sand with gravel.

Analytical Report Number : 22-37451
Project / Site name: New Office Block, Bury

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 disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Organic matter (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
Sulphate, water soluble, in soil	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

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.

Analytical Report Number : 22-37451
Project / Site name: New Office Block, Bury

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

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

Sample Deviation Report

Analytical Report Number : 22-37451
Project / Site name: New Office Block, Bury

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
BH01	None Supplied	S	2160720	a	None Supplied	None Supplied	None Supplied
BH02	None Supplied	S	2160721	a	None Supplied	None Supplied	None Supplied
BH03	None Supplied	S	2160722	a	None Supplied	None Supplied	None Supplied
BH04	None Supplied	S	2160723	a	None Supplied	None Supplied	None Supplied
TP01	None Supplied	S	2160716	a	None Supplied	None Supplied	None Supplied
TP01	None Supplied	S	2160717	a	None Supplied	None Supplied	None Supplied
TP02	None Supplied	S	2160718	a	None Supplied	None Supplied	None Supplied
TP03	None Supplied	S	2160719	a	None Supplied	None Supplied	None Supplied

Key: **a** - No sampling date **b** - Incorrect container
c - Holding time **d** - Headspace **e** - Temperature

APPENDIX 5 - Geotechnical Testing

LABORATORY REPORT

4043

Contract Number: PSL22/0922

Report Date: 09 March 2022

Client's Reference: ORD-21438

Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Rebecca Rowlinson

Contract Title: New Office Block, Bury

Date Received: 7/2/2022
Date Commenced: 7/2/2022
Date Completed: 9/3/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

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

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP02		D	0.70		Brown sandy CLAY
BH01		D	6.00		Brown sandy CLAY
BH02		D	4.00		Brown sandy CLAY
BH03		D	6.50		Brown slightly gravelly sandy CLAY
BH04		D	4.00		Brown slightly gravelly sandy CLAY
BH01		U	6.50		Soft brown sandy CLAY
BH01		U	9.50		Soft brown slightly gravelly sandy CLAY
BH01		U	12.50		Stiff brown slightly gravelly sandy CLAY
BH02		U	6.50		Soft brown slightly gravelly sandy CLAY
BH02		U	9.50		Soft brown sandy CLAY
BH03		U	5.00		Soft brown slightly gravelly sandy CLAY
BH03		U	9.00		Firm brown very sandy CLAY
BH04		U	17.00		Firm brown slightly gravelly sandy CLAY
BH02		AMAL	14.00	17.00	Brown slightly gravelly slightly sandy CLAY
BH03		AMAL	10.50	13.50	Brown slightly gravelly very sandy CLAY

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
TP02		D	0.70		39			47	24	23	100	Intermediate Plasticity CI
BH01		D	6.00		32			40	21	19	100	Intermediate Plasticity CI
BH02		D	4.00		27			37	19	18	100	Intermediate Plasticity CI
BH03		D	6.50		25			42	20	22	94	Intermediate Plasticity CI
BH04		D	4.00		26			39	19	20	97	Intermediate Plasticity CI

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

UKAS TESTING 4043

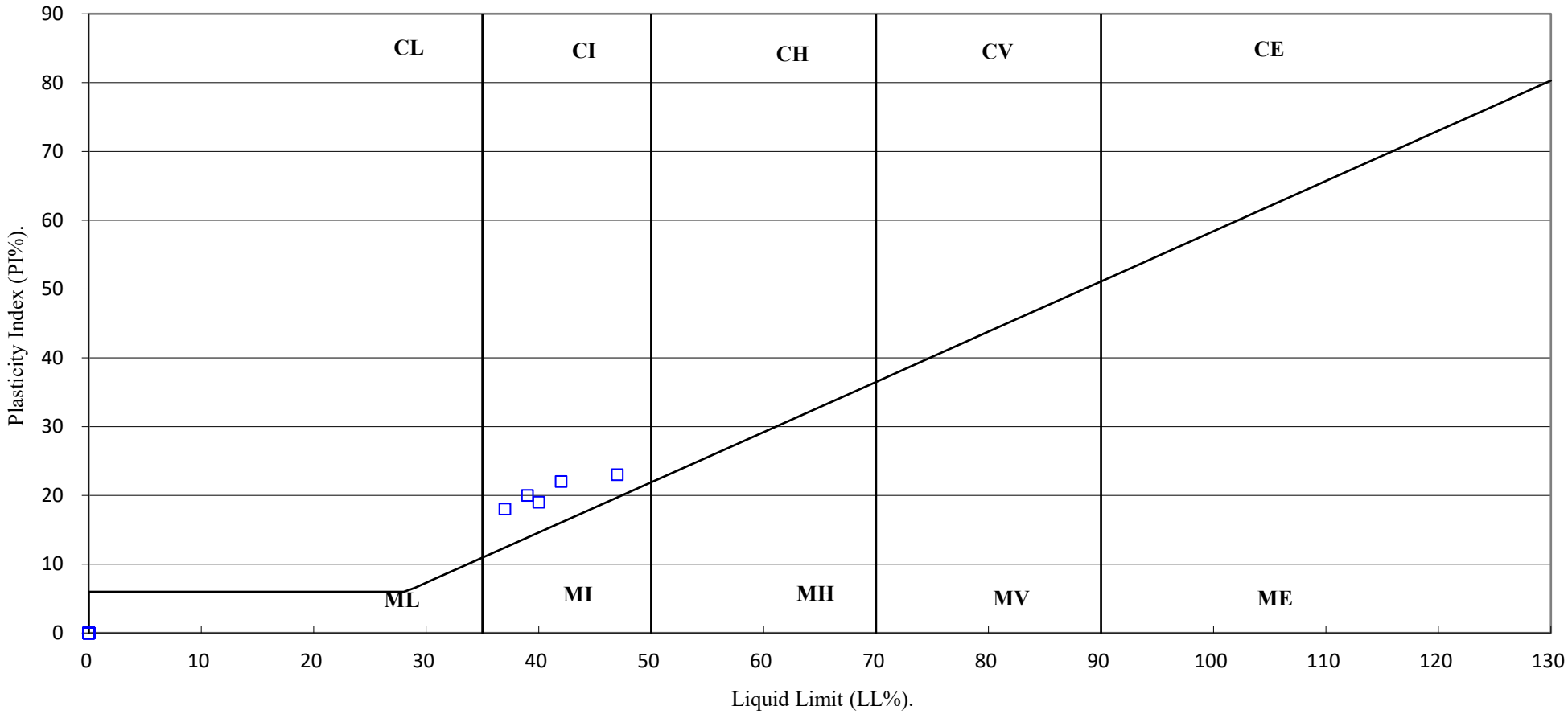
PSL Professional Soils Laboratory

New Office Block, Bury

Contract No: PSL22/0922

Client Ref: 21438

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	Contract No: PSL22/0922
			Client Ref: 21438

PARTICLE SIZE DISTRIBUTION TEST

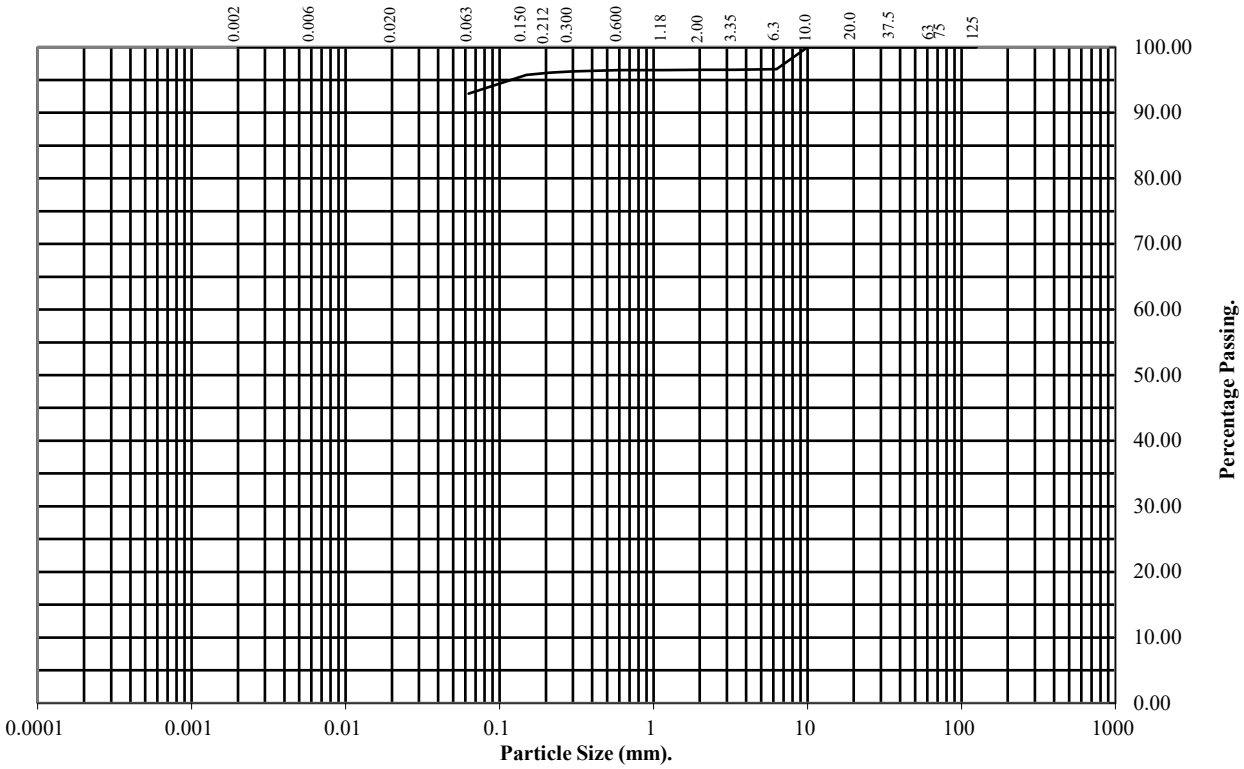
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH02** **Top Depth (m):** **14.00**

Sample Number: **Base Depth(m):** **17.00**

Sample Type: **AMAL**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	97
3.35	97
2	97
1.18	97
0.6	97
0.3	96
0.212	96
0.15	96
0.063	93

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	4
Silt/Clay	93

Remarks:

See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**New Office Block, Bury**	**Contract No:** PSL22/0922 **Client Ref:** 21438

PARTICLE SIZE DISTRIBUTION TEST

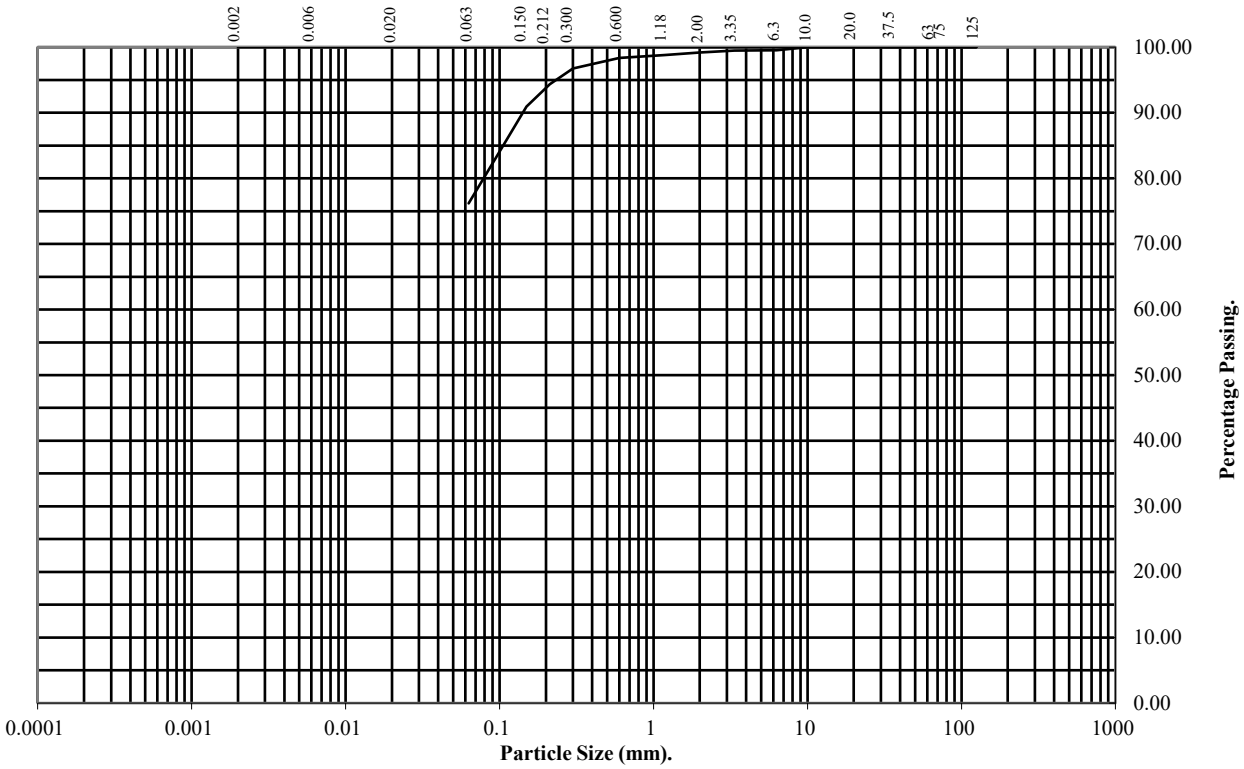
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **BH03** **Top Depth (m):** **10.50**

Sample Number: **Base Depth(m):** **13.50**

Sample Type: **AMAL**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	98
0.3	97
0.212	94
0.15	91
0.063	76

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	23
Silt/Clay	76

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	**Contract No:** PSL22/0922 **Client Ref:** 21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

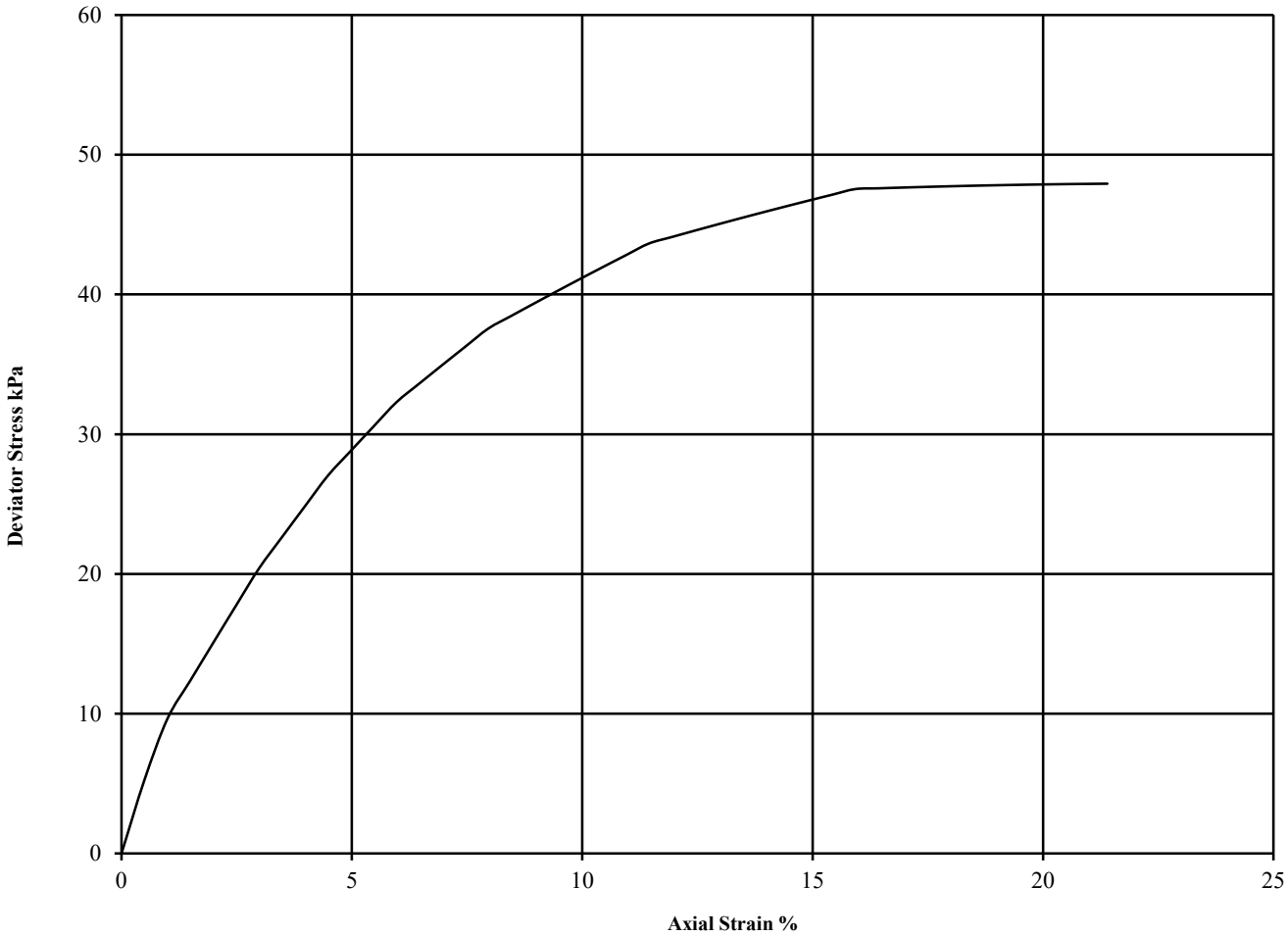
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH01 **Top Depth (m):** 6.50

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

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33
1	30	1.96	1.51	130	48	24	21.4	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	Contract No: PSL22/0922 Client Ref: 21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

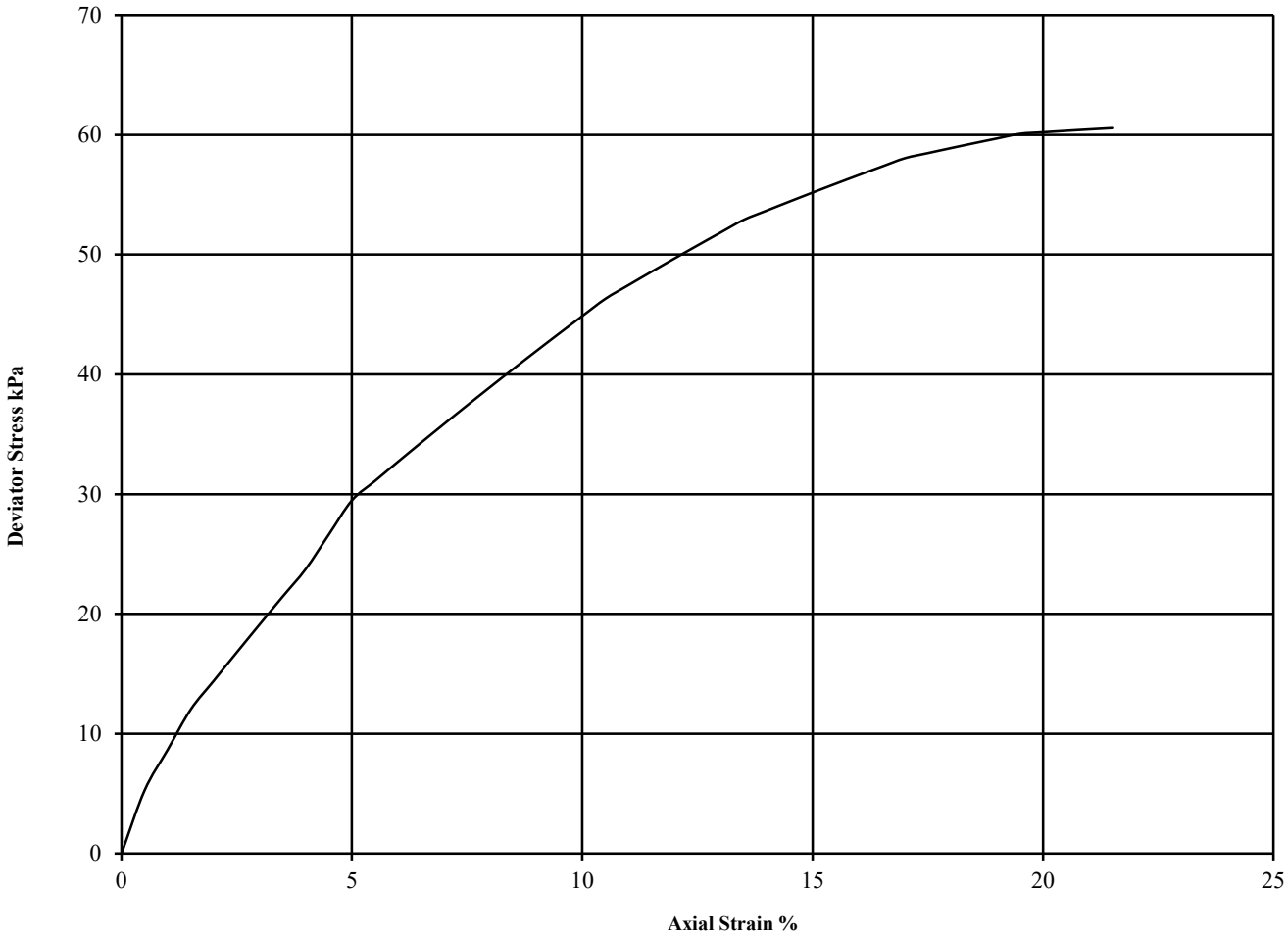
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH01 **Top Depth (m):** 9.50

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

Sample Type U



Diameter (mm):		103	Height (mm):		206	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33
1	25	2.05	1.64	190	61	30	21.5	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	**Contract No:** PSL22/0922 **Client Ref:** 21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

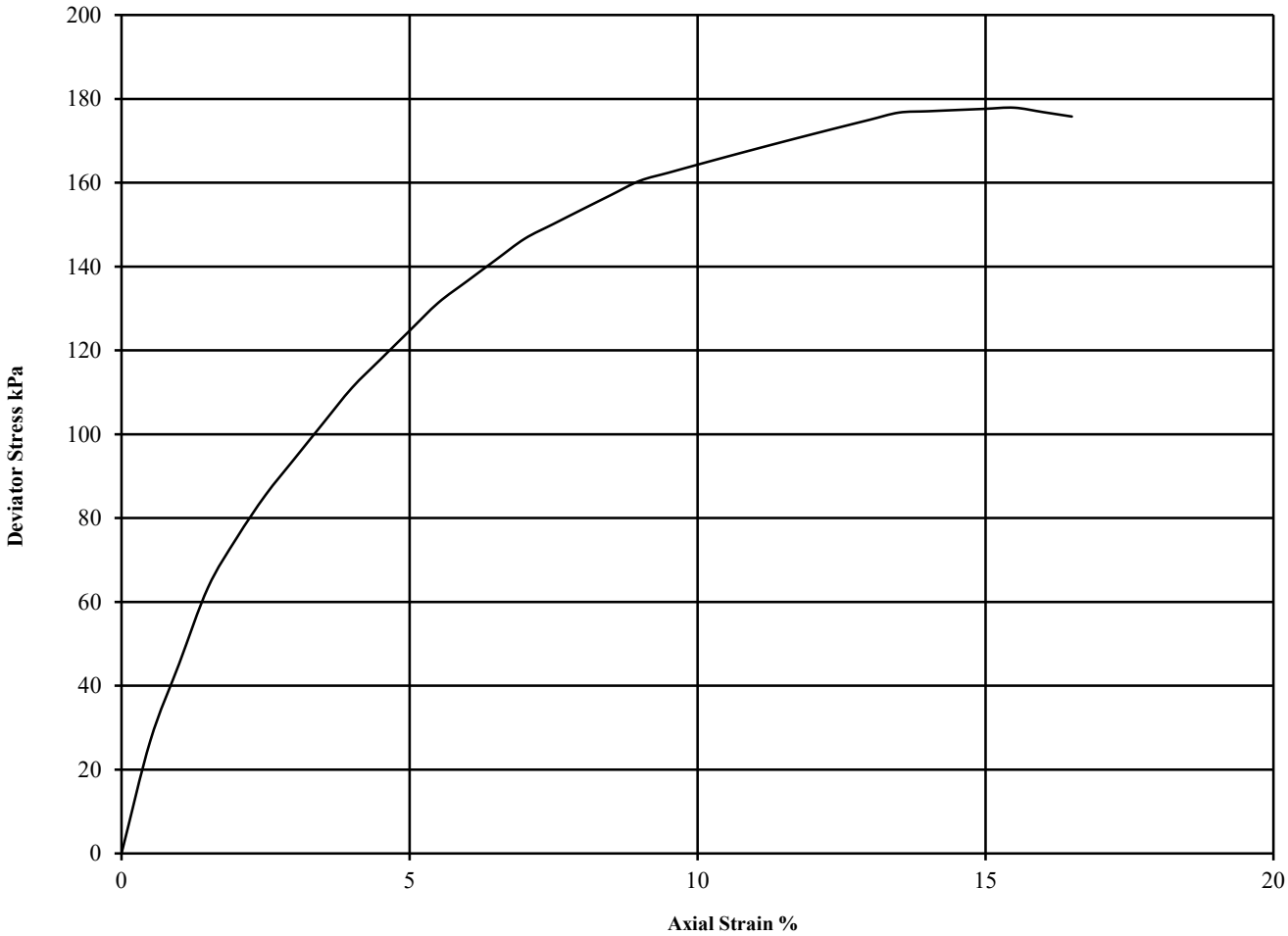
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH01 **Top Depth (m):** 12.50

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

Sample Type U



Diameter (mm):		38	Height (mm):		76	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.77
1	20	2.10	1.74	250	178	89	15.5	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	**Contract No:** PSL22/0922 **Client Ref:** 21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

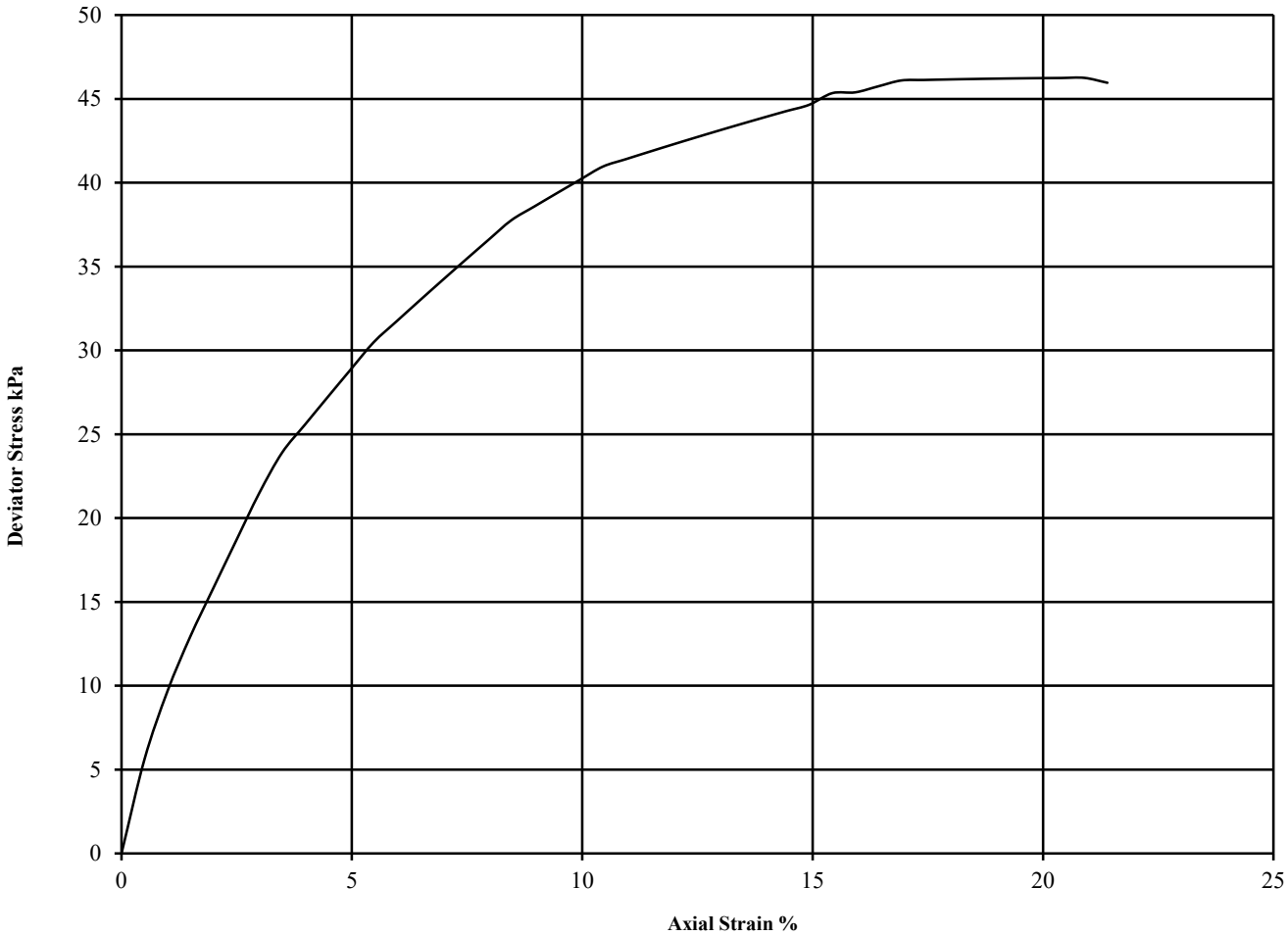
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH02 **Top Depth (m):** 6.50

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

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33
1	29	1.97	1.53	130	46	23	20.9	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	Contract No: PSL22/0922 Client Ref: 21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

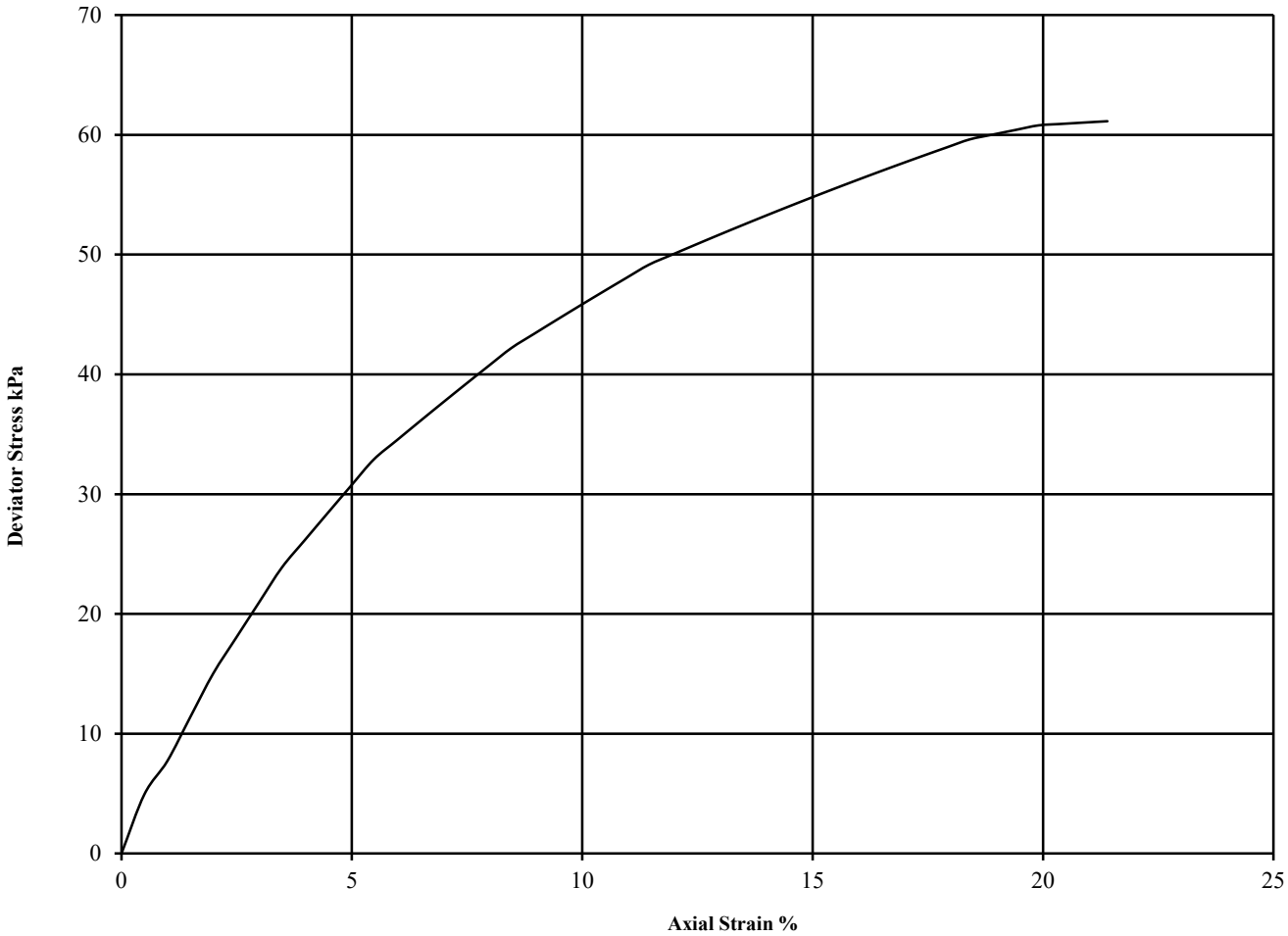
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH02 **Top Depth (m):** 9.50

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

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33
1	29	1.98	1.53	190	61	31	21.4	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	**Contract No:** PSL22/0922 **Client Ref:** 21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

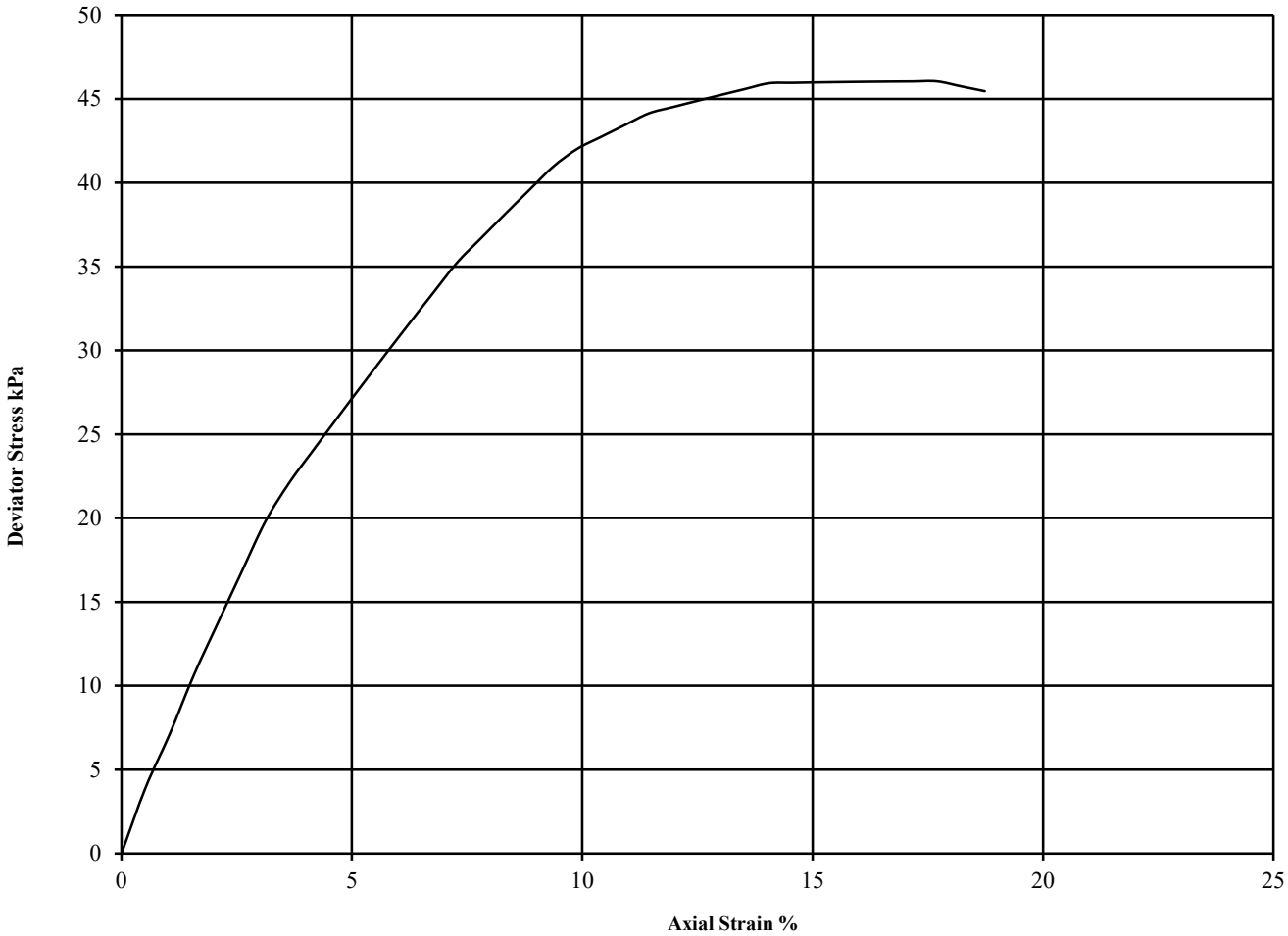
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH03 **Top Depth (m):** 5.00

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

Sample Type U



Diameter (mm):		102	Height (mm):		196	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34
1	27	1.95	1.54	100	46	23	17.7	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	**Contract No:** PSL22/0922 **Client Ref:** 21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

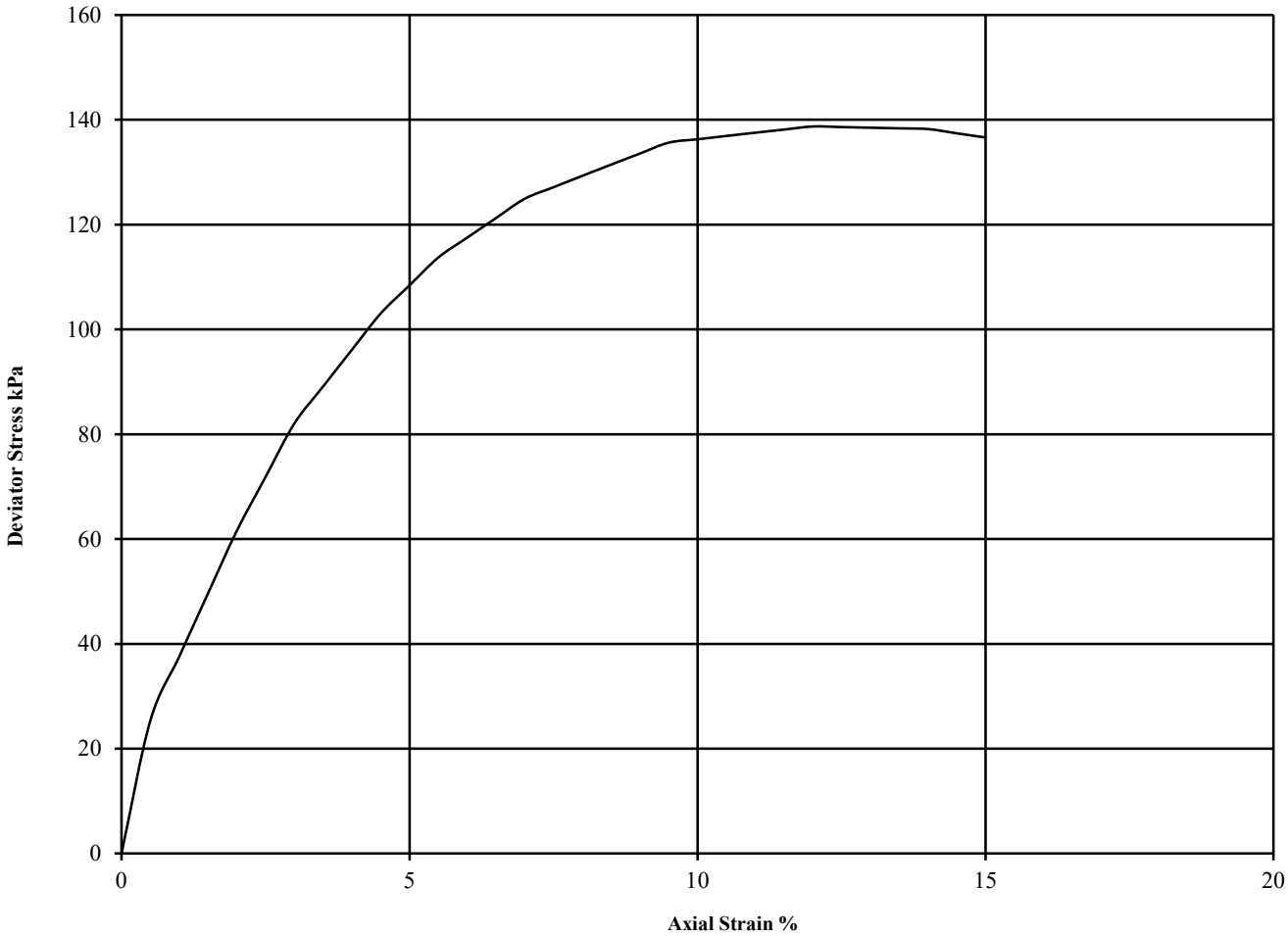
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH03 **Top Depth (m):** 9.00

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

Sample Type U



Diameter (mm):		38	Height (mm):		76	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.83
1	14	2.18	1.92	180	139	69	12.0	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	Contract No: PSL22/0922 Client Ref: 21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

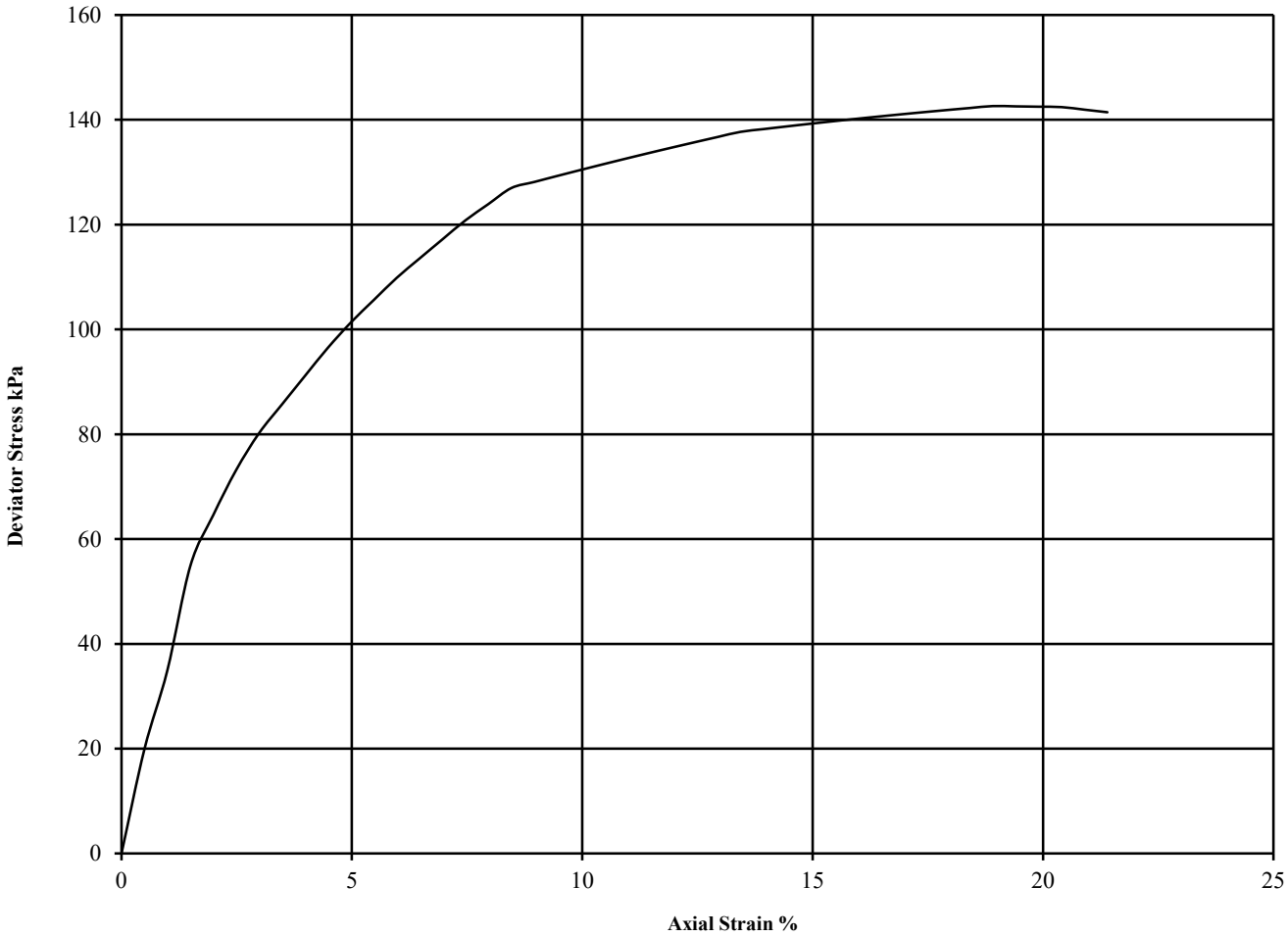
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: BH04 **Top Depth (m):** 17.00

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

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33
1	26	1.99	1.58	340	143	71	18.9	Plastic	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	New Office Block, Bury	Contract No: PSL22/0922 Client Ref: 21438

APPENDIX 6 - Interim Permanent Gas Monitoring Results

PERMANENT GROUND GAS MONITORING FORM

GROUNDTECH CONSULTING

SITE NAME:	*NEW OFFICE BLOCK, BURY*	**ENGINEER:**	*Josh Turton*
CLIENT:	*JD SPORTS*	**DATE:**	*28/02/2022*
JOB NO:	*GRO-21438*		

Pressure Trend:	*Falling*	**Weather:**	*Rain*	**Equipment:**	*GFM 436*

Ambient:	O_2 (%v/v)	CH_4 (%v/v)	CO_2 (%v/v)	LEL	H_2S (ppm)	CO (ppm)
Start	20.5	0.0	0.0	0.0	0.0	0.0
Finish	20.6	0.0	0.0	0.0	0.0	0.0

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q_{hg} CO_2 (l/hr)	Q_{hg} CH_4 (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady						
BH01	0.0	0.0	0.00	0.0	0.0	0.0	4.3	3.3	12.3	14.8	0.0	0.0	0.0	0.0	0.0043	0.0000	1008	-	N	4.00
BH02	0.0	0.0	0.00	0.0	0.0	0.0	0.5	0.3	17.0	17.1	0.0	0.0	0.0	0.0	0.0005	0.0000	1008	-	N	0.47
BH04	0.0	0.0	0.00	0.0	0.0	0.0	1.2	0.8	15.7	17.2	0.0	0.0	0.0	0.0	0.0012	0.0000	1008	-	N	0.86

Notes:

APPENDIX 7 - Plate Load Testing Results

LABORATORY REPORT

4043

Contract Number: PSL22/0517

Report Date: 25 January 2022

Client's Reference:

Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Rebecca Rowlinson

Contract Title: Pilsworth Road, Bury

Date Received: 24/1/2022
Date Commenced: 24/1/2022
Date Completed: 25/1/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Senior Technician)	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: awatkins@prosoils.co.uk
rberriman@prosoils.co.uk

VERTICAL DEFORMATION TESTS.

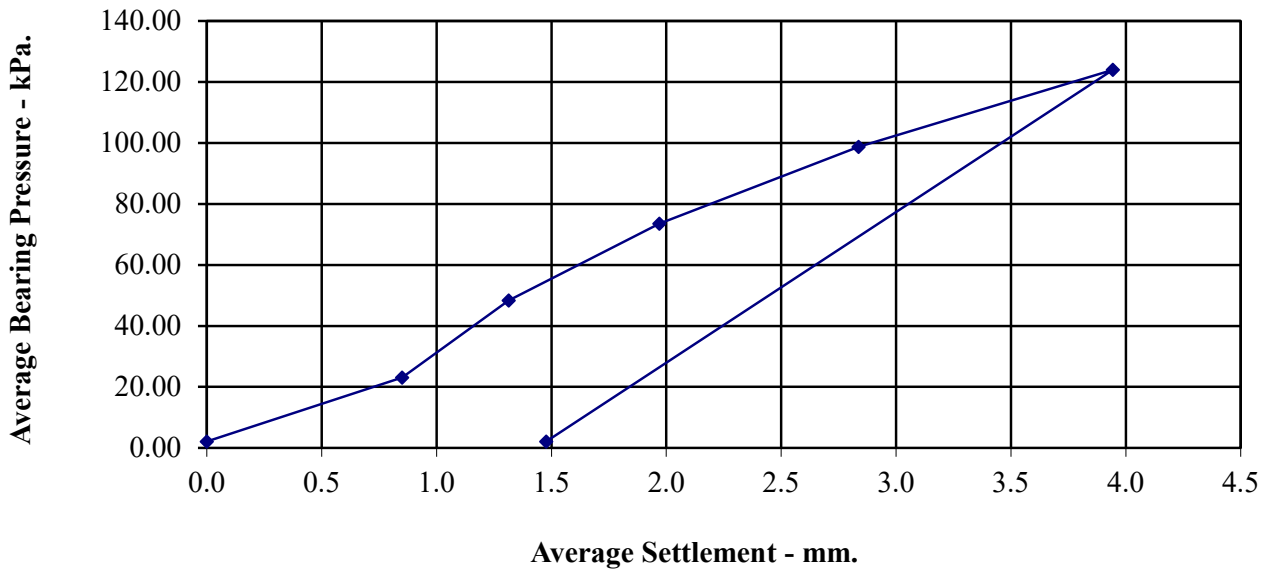
BS 1377 : Part 9 : 1990.

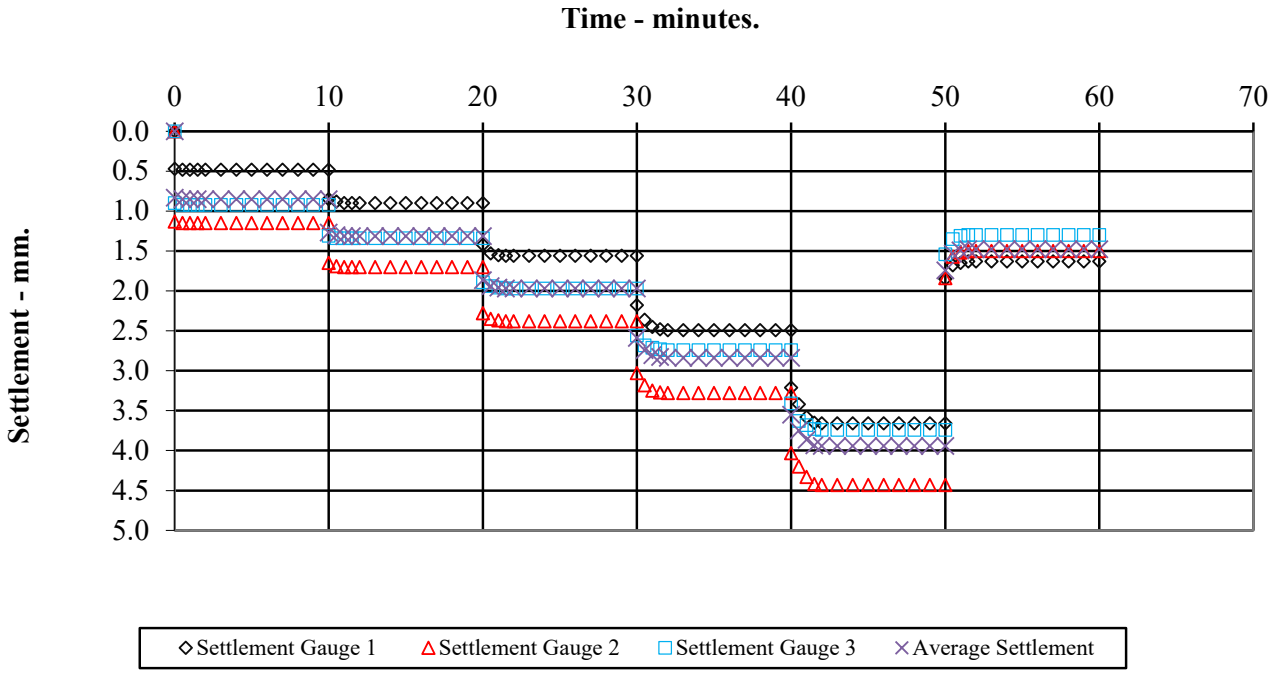
Date of Test: 24-Jan-22

Test Position: PBT 1 **Depth (m):** 0.50

Plate Area (m2): 0.1625971 **Type of Kentledge:** Wheeled

Maximum Applied Pressure (kPa): 123.97
Maximum Deformation (mm): 3.94
Description: Brown CLAY.





UKAS TESTING 4043 — PSL Professional Soils Laboratory	**Pilsworth Road, Bury**	**Contract No:** PSL22/0517
		Client Ref:

Calculation of Equivalent CBR Value from Plate Bearing Test

Design Manual for Roads and Bridges Volume 7 Section 2 Chapter 4
Incorporating IAN 73/06

Date of Test	**24-Jan-22**	
Test Position	**PBT 1**	
Depth (m)	**0.50**	
Description	**Brown CLAY.**	
Maximum Deflection	**3.94**	**mm**
Deflection required for CBR value	**1.25**	**mm**
Load at 1.25mm	**45**	**kN/m^2**
Plate diameter	**455**	**mm**
Conversion factor for plate diameter	**0.629**	
K_{762}(modulus of subgrade reaction) calculated using 1.25mm settlement	**22.6**	**$kN/m^2/mm$**
CBR Value	**2.1**	**%**

VERTICAL DEFORMATION TESTS.

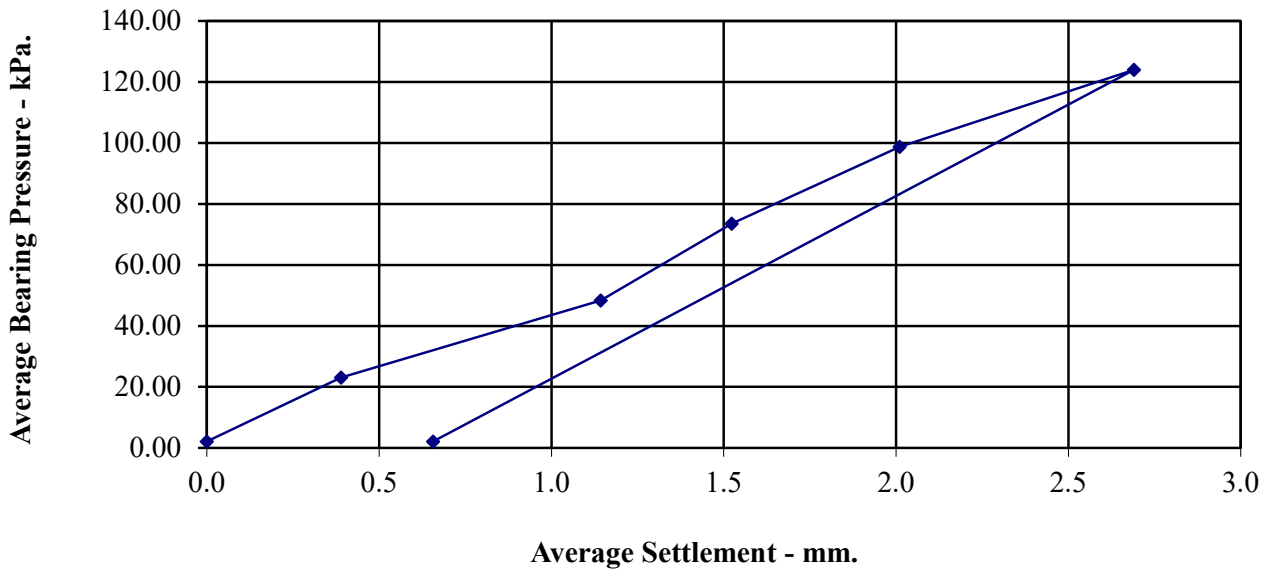
BS 1377 : Part 9 : 1990.

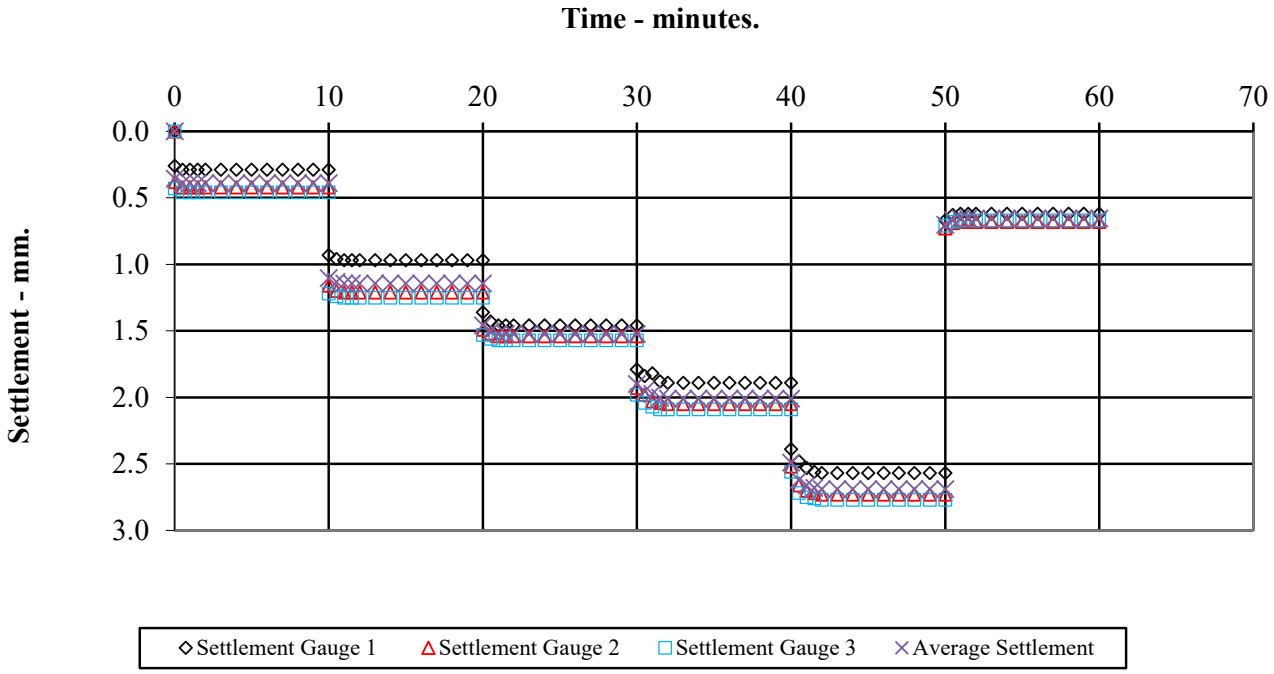
Date of Test: 24-Jan-22

Test Position: PBT 2 **Depth (m):** 0.50

Plate Area (m2): 0.1625971 **Type of Kentledge:** Wheeled

Maximum Applied Pressure (kPa): 123.97
Maximum Deformation (mm): 2.69
Description: Brown sandy CLAY.





UKAS TESTING 4043 — PSL Professional Soils Laboratory	**Pilsworth Road, Bury**	**Contract No:** PSL22/0517
		Client Ref:

Calculation of Equivalent CBR Value from Plate Bearing Test

Design Manual for Roads and Bridges Volume 7 Section 2 Chapter 4
Incorporating IAN 73/06

Date of Test	**24-Jan-22**	
Test Position	**PBT 2**	
Depth (m)	**0.50**	
Description	**Brown sandy CLAY.**	
Maximum Deflection	**2.69**	**mm**
Deflection required for CBR value	**1.25**	**mm**
Load at 1.25mm	**55**	**kN/m^2**
Plate diameter	**455**	**mm**
Conversion factor for plate diameter	**0.629**	
K_{762}(modulus of subgrade reaction) calculated using 1.25mm settlement	**27.9**	**$kN/m^2/mm$**
CBR Value	**3.1**	**%**

VERTICAL DEFORMATION TESTS.

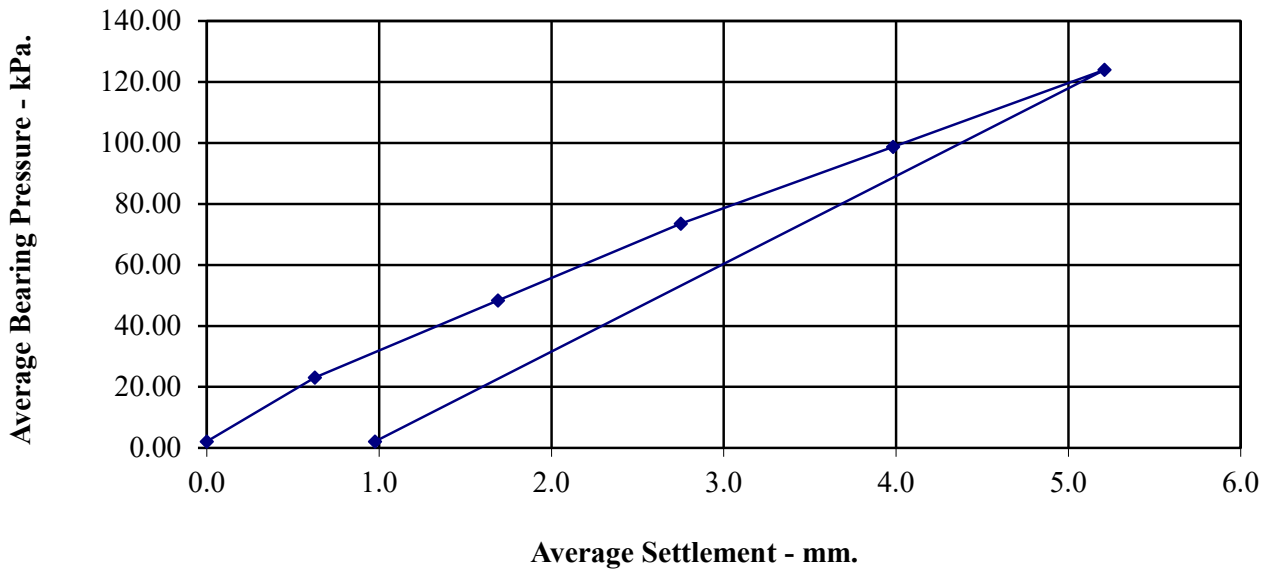
BS 1377 : Part 9 : 1990.

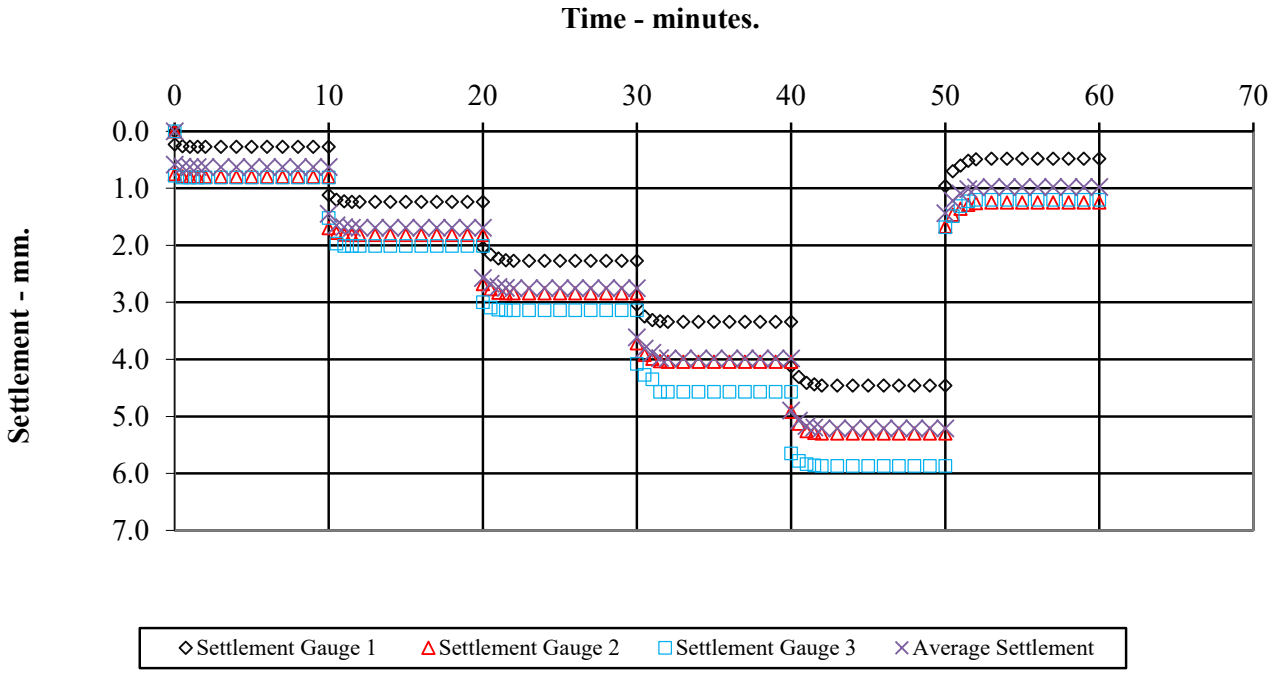
Date of Test: 24-Jan-22

Test Position: PBT 3 **Depth (m):** 0.50

Plate Area (m2): 0.1625971 **Type of Kentledge:** Wheeled

Maximum Applied Pressure (kPa): 123.97
Maximum Deformation (mm): 5.21
Description: Brown CLAY.





UKAS TESTING 4043 — PSL Professional Soils Laboratory	**Pilsworth Road, Bury**	**Contract No:** PSL22/0517
		Client Ref:

Calculation of Equivalent CBR Value from Plate Bearing Test

Design Manual for Roads and Bridges Volume 7 Section 2 Chapter 4
Incorporating IAN 73/06

Date of Test	**24-Jan-22**	
Test Position	**PBT 3**	
Depth (m)	**0.50**	
Description	**Brown CLAY.**	
Maximum Deflection	**5.21**	**mm**
Deflection required for CBR value	**1.25**	**mm**
Load at 1.25mm	**38**	**kN/m^2**
Plate diameter	**455**	**mm**
Conversion factor for plate diameter	**0.629**	
K_{762}(modulus of subgrade reaction) calculated using 1.25mm settlement	**19.1**	**$kN/m^2/mm$**
CBR Value	**1.6**	**%**

VERTICAL DEFORMATION TESTS.

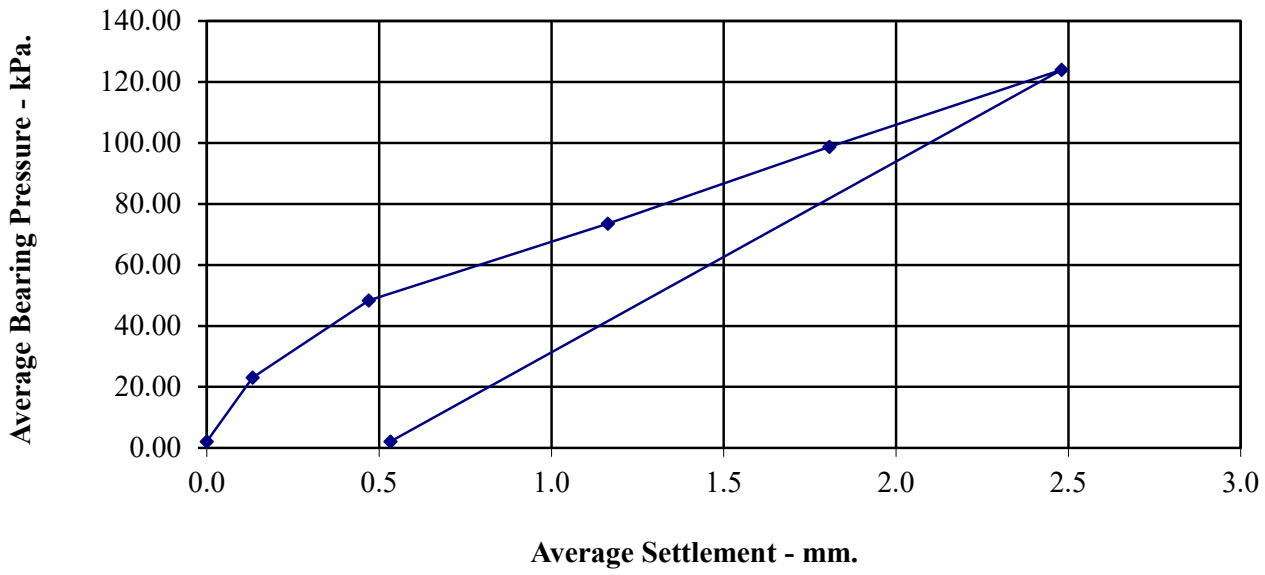
BS 1377 : Part 9 : 1990.

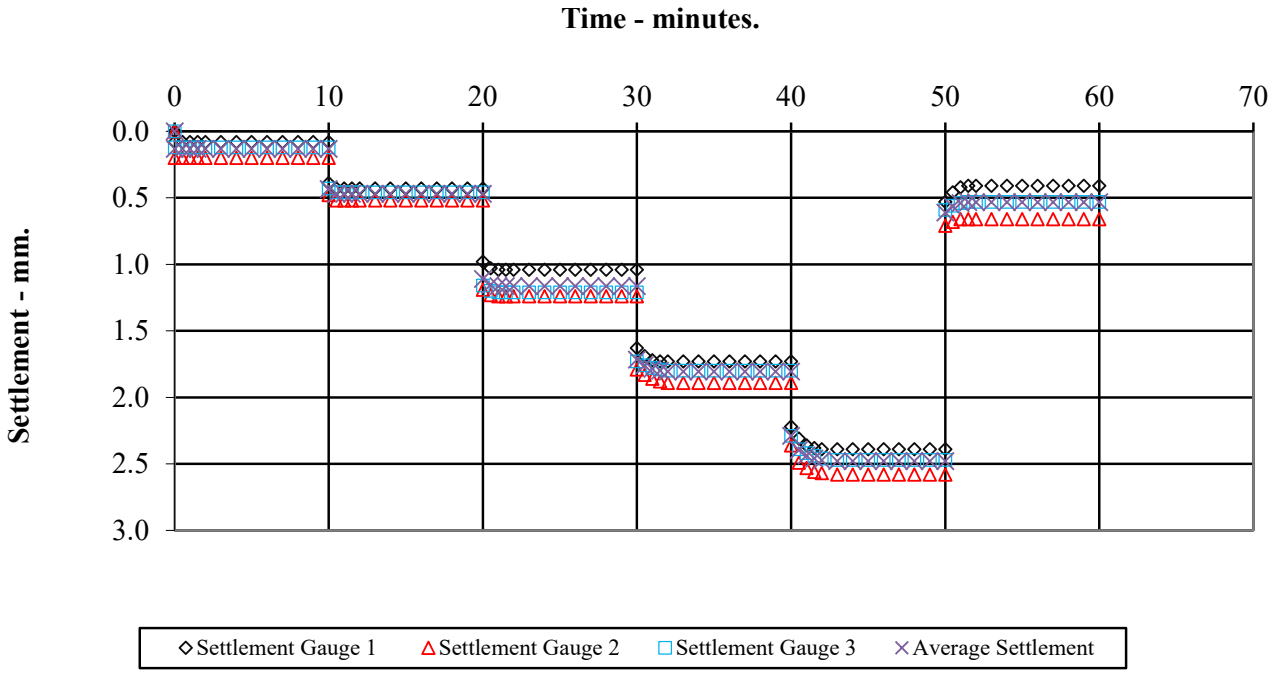
Date of Test: 24-Jan-22

Test Position: PBT 4 **Depth (m):** 0.70

Plate Area (m2): 0.1625971 **Type of Kentledge:** Wheeled

Maximum Applied Pressure (kPa): 123.97
Maximum Deformation (mm): 2.48
Description: Brown sandy CLAY.





UKAS TESTING 4043 — PSL Professional Soils Laboratory	**Pilsworth Road, Bury**	**Contract No:** PSL22/0517 **Client Ref:**

Calculation of Equivalent CBR Value from Plate Bearing Test

Design Manual for Roads and Bridges Volume 7 Section 2 Chapter 4
Incorporating IAN 73/06

Date of Test	**24-Jan-22**	
Test Position	**PBT 4**	
Depth (m)	**0.70**	
Description	**Brown sandy CLAY.**	
Maximum Deflection	**2.48**	**mm**
Deflection required for CBR value	**1.25**	**mm**
Load at 1.25mm	**77**	**kN/m^2**
Plate diameter	**455**	**mm**
Conversion factor for plate diameter	**0.629**	
K_{762}(modulus of subgrade reaction) calculated using 1.25mm settlement	**38.7**	**kN/m^2/mm**
CBR Value	**5.4**	**%**

VERTICAL DEFORMATION TESTS.

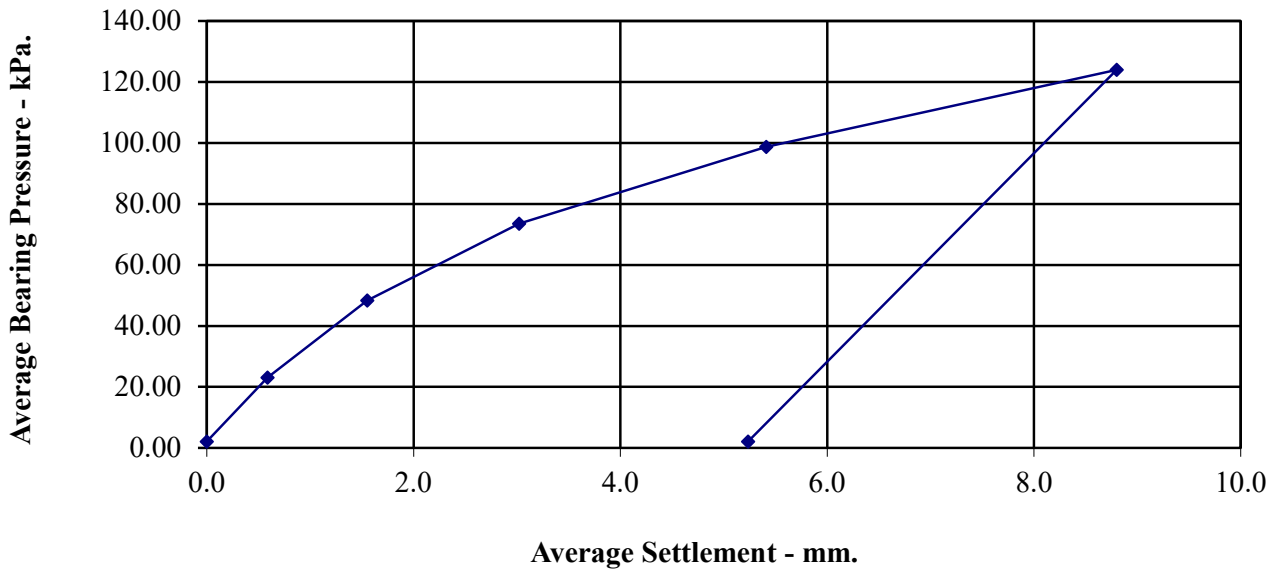
BS 1377 : Part 9 : 1990.

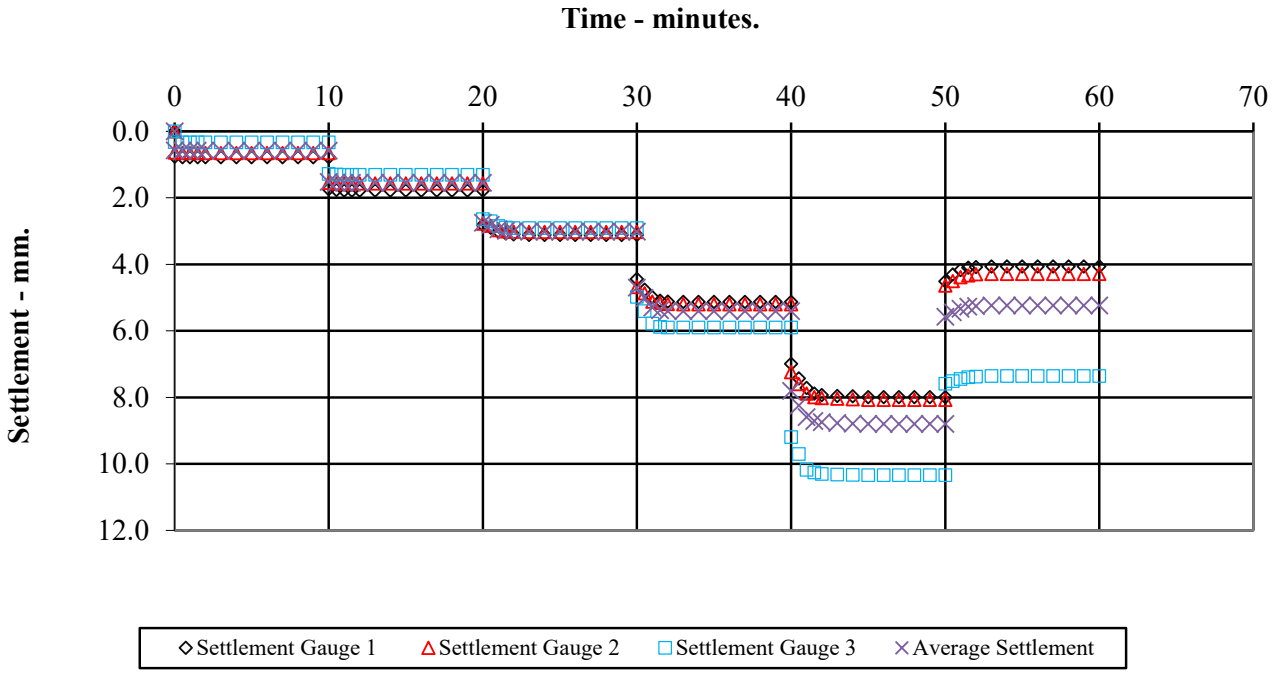
Date of Test: 24-Jan-22

Test Position: PBT 5 **Depth (m):** 0.60

Plate Area (m2): 0.1625971 **Type of Kentledge:** Wheeled

Maximum Applied Pressure (kPa): 123.97
Maximum Deformation (mm): 8.80
Description: Brown CLAY.





UKAS TESTING 4043 — PSL Professional Soils Laboratory	**Pilsworth Road, Bury**	**Contract No:** PSL22/0517
		Client Ref:

Calculation of Equivalent CBR Value from Plate Bearing Test

Design Manual for Roads and Bridges Volume 7 Section 2 Chapter 4
Incorporating IAN 73/06

Date of Test	**24-Jan-22**	
Test Position	**PBT 5**	
Depth (m)	**0.60**	
Description	**Brown CLAY.**	
Maximum Deflection	**8.80**	**mm**
Deflection required for CBR value	**1.25**	**mm**
Load at 1.25mm	**40**	**kN/m^2**
Plate diameter	**455**	**mm**
Conversion factor for plate diameter	**0.629**	
K_{762}(modulus of subgrade reaction) calculated using 1.25mm settlement	**20.3**	**$kN/m^2/mm$**
CBR Value	**1.8**	**%**

APPENDIX 8 - Soil Percolation Testing Results

NEW OFFICE BLOCK, BURY
GRO-21438
AVID

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

Sheet 1 of 2

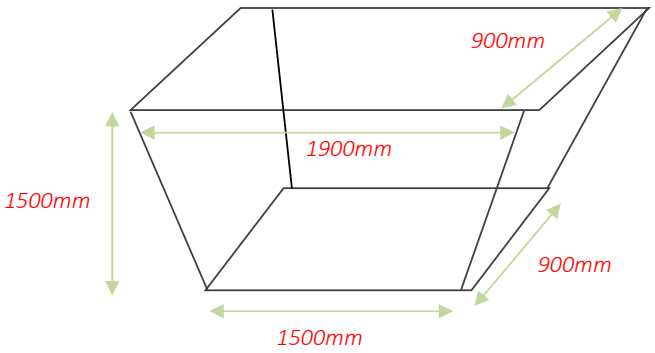
Date of Test: 25/01/2022

POSITION: SuDS1
TEST 1

Weather: Sunny, clear

Engineer: *R Rowlinson*
Checked: *R Wyatt*

Trial Pit Measurements



Pit Depth (mm):	1500
Pit Details:	Open with no stone filling
Groundwater Level:	NGW

Test Data

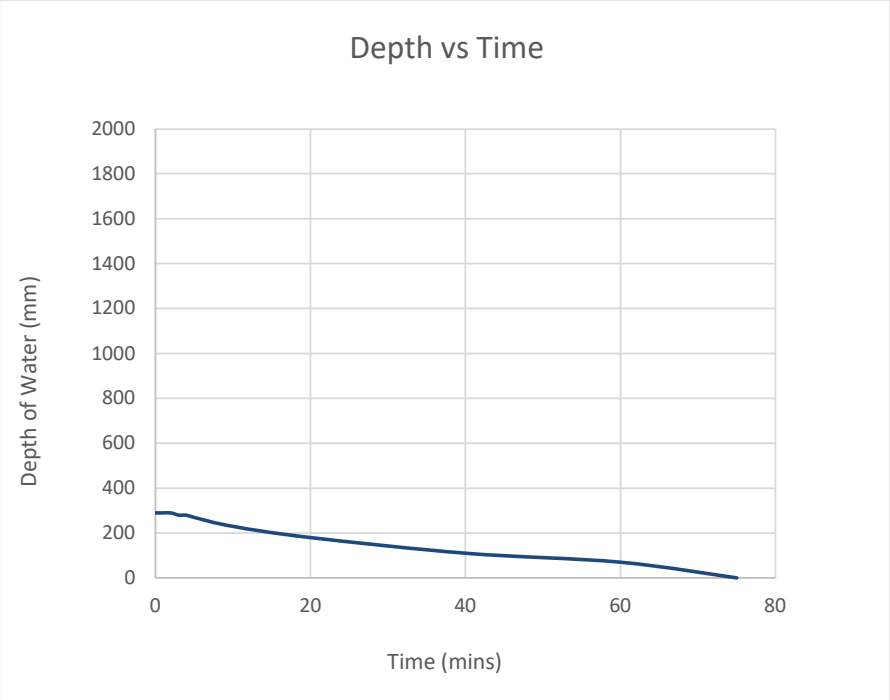
Time Elapsed (mins)	Depth to Water Level (mm)
0	1210
1	1210
2	1210
3	1220
4	1220
5	1230
10	1270
20	1320
40	1390
60	1430
75	1500

NEW OFFICE BLOCK, BURY
GRO-21438
AVID

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

POSITION: SuDS1
TEST 1



Volume of Pit (m^3)	2.565
Void Ratio of Infill	1
Volume of Infill (m^3)	N/A
Volume of Water in Pit (m^3)	0.4959

Compliancy Check:

Water Level at 75% effective depth (mm)	217.5
Water Level at 25% effective depth (mm)	72.5

Compliant with BRE 365

Soil Infiltration Rate Calculation

Water Level 1	290
Water Level 2	0
Time to Drain from Level 1 to Level 2 (mins)	75
Volume of water discharged (m^3)	0.4959

Discharge Area (m^2)	2.522
Soil Infiltration Rate (m/min)	0.0026217
Soil Infiltration Rate (m/sec)	***4.37E-05***

NEW OFFICE BLOCK, BURY
GRO-21438
AVID

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

Sheet 1 of 2

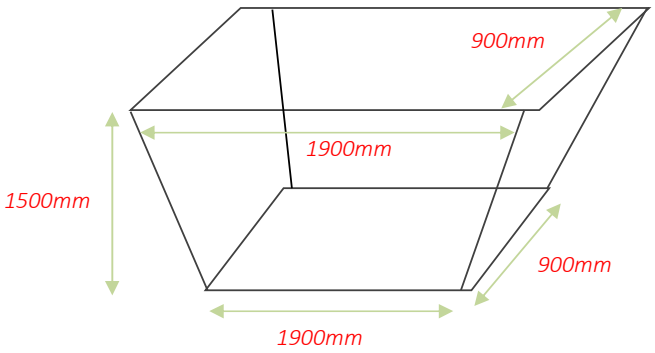
Date of Test: 26/01/2022

POSITION: SuDS1
TEST 2

Weather: Sunny, clear

Engineer: *R Rowlinson*
Checked: *R Wyatt*

Trial Pit Measurements



Pit Depth (mm):	1500
Pit Details:	Open with no stone filling
Groundwater Level:	NGW

Test Data

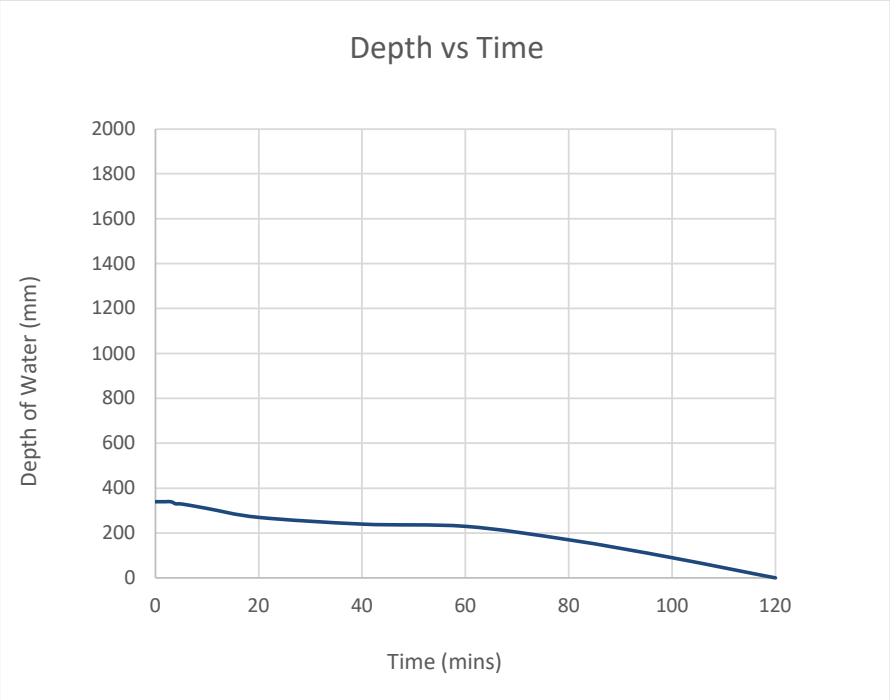
Time Elapsed (mins)	Depth to Water Level (mm)
0	1160
1	1160
2	1160
3	1160
4	1170
5	1170
10	1190
20	1230
40	1260
60	1270
80	1330
100	1410
120	1500

NEW OFFICE BLOCK, BURY
GRO-21438
AVID

Sheet 2 of 2

SOIL PERCOLATION TEST

POSITION: SuDS1
TEST 2



Volume of Pit (m^3)	2.565
Void Ratio of Infill	1
Volume of Infill (m^3)	N/A
Volume of Water in Pit (m^3)	0.5814

Compliancy Check:

Water Level at 75% effective depth (mm)	255
Water Level at 25% effective depth (mm)	85

Compliant with BRE 365

Soil Infiltration Rate Calculation

Water Level 1	340
Water Level 2	0
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m^3)	0.5814

Discharge Area (m^2)	2.662
Soil Infiltration Rate (m/min)	0.0018201
Soil Infiltration Rate (m/sec)	***3.03E-05***

NEW OFFICE BLOCK, BURY
GRO-21438
AVID

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

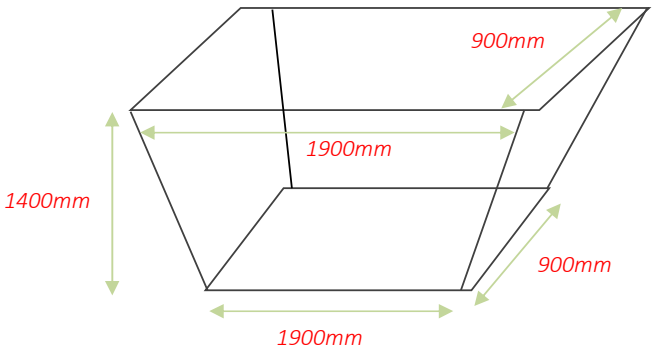
Date of Test: 25/01/2022

POSITION: SuDS1
TEST 3

Weather: Sunny, clear

Engineer: *R Rowlinson*
Checked: *R Wyatt*

Trial Pit Measurements



Pit Depth (mm):	1400
Pit Details:	Open with no stone filling
Groundwater Level:	NGW

Test Data

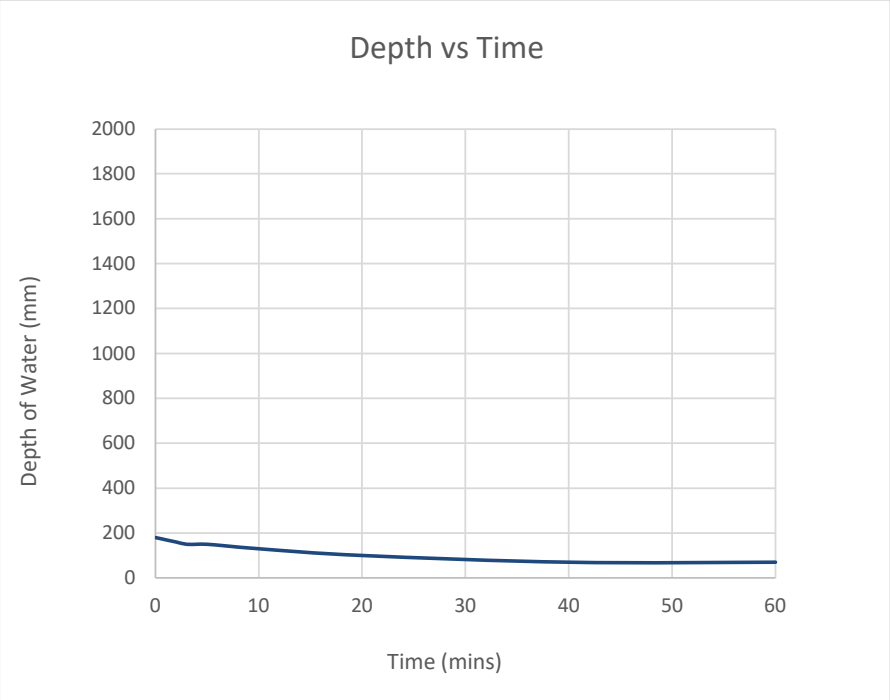
Time Elapsed (mins)	Depth to Water Level (mm)
0	1220
1	1230
2	1240
3	1250
4	1250
5	1250
10	1270
20	1330
40	1330
60	1330

NEW OFFICE BLOCK, BURY
GRO-21438
AVID

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

POSITION: SuDS1
TEST 3



Volume of Pit (m^3)	2.394
Void Ratio of Infill	1
Volume of Infill (m^3)	N/A
Volume of Water in Pit (m^3)	0.3078

Compliancy Check:

Water Level at 75% effective depth (mm)	135
Water Level at 25% effective depth (mm)	45

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	180
Water Level 2	70
Time to Drain from Level 1 to Level 2 (mins)	60
Volume of water discharged (m^3)	0.1881

Discharge Area (m^2)	2.41
Soil Infiltration Rate (m/min)	0.0013008
Soil Infiltration Rate (m/sec)	***2.17E-05***

MARIAN DRIVE, CHESTER
GRO-21456
HARRY PHIPPS AND COMPANY LTD

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

Sheet 1 of 2

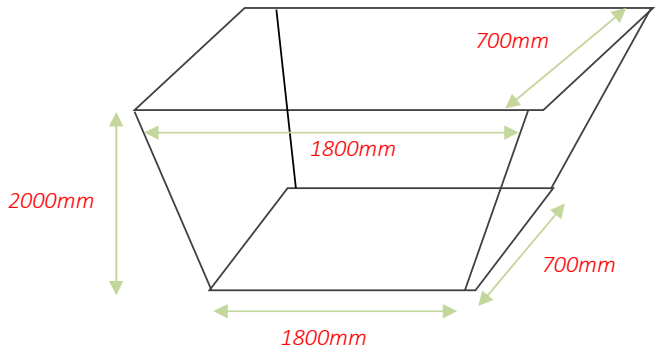
Date of Test: 18/01/2022

POSITION: SuDS2
TEST 1

Weather: Sunny, clear

Engineer: *R Rowlinson*
Checked: *R Wyatt*

Trial Pit Measurements



Pit Depth (mm):	2000
Pit Details:	Open with no stone filling
Groundwater Level:	NGW

Test Data

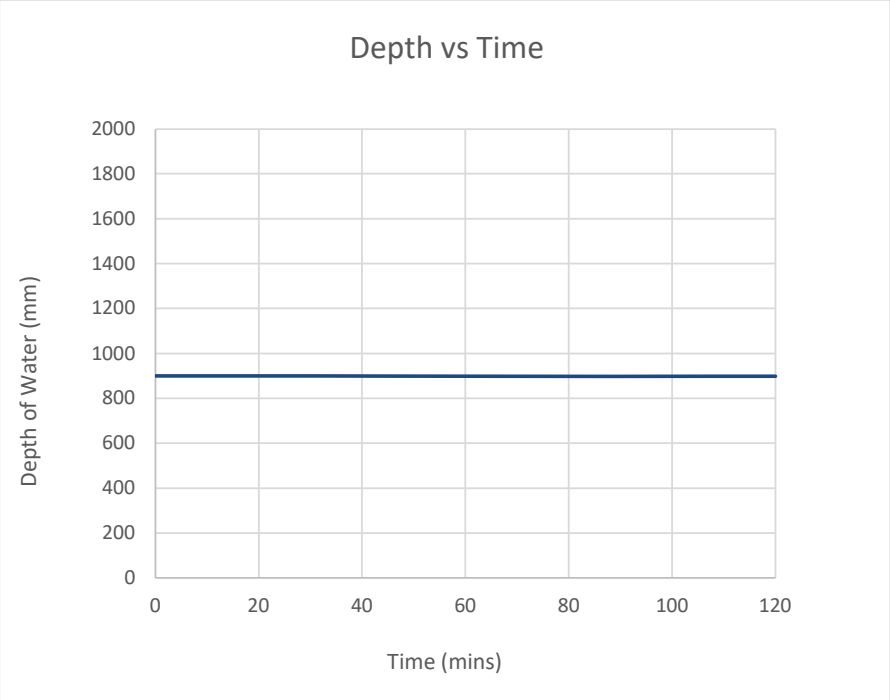
Time Elapsed (mins)	Depth to Water Level (mm)
0	1100
1	1100
2	1100
3	1100
4	1100
5	1100
10	1100
18	1100
30	1100
64	1102
108	1102
120	1102

MARIAN DRIVE, CHESTER
GRO-21456
HARRY PHIPPS AND COMPANY LTD

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

POSITION: SuDS2
TEST 1



Volume of Pit (m^3)	2.52
Void Ratio of Infill	1
Volume of Infill (m^3)	N/A
Volume of Water in Pit (m^3)	1.134

Compliancy Check:

Water Level at 75% effective depth (mm)	675
Water Level at 25% effective depth (mm)	225

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	900
Water Level 2	898
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m^3)	0.00252

Discharge Area (m^2)	5.76
Soil Infiltration Rate (m/min)	3.646E-06
Soil Infiltration Rate (m/sec)	***6.08E-08***

MARIAN DRIVE, CHESTER
GRO-21456
HARRY PHIPPS AND COMPANY LTD

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

Sheet 1 of 2

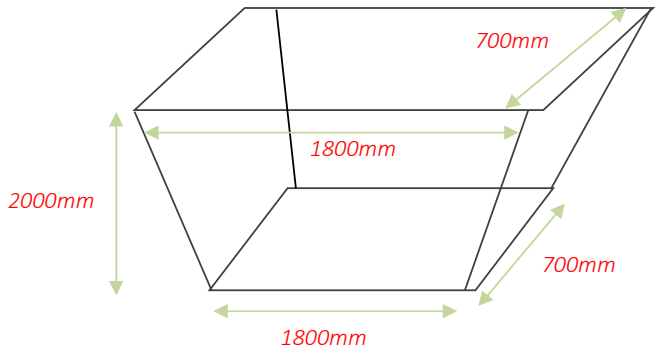
Date of Test: 18/01/2022

POSITION: SuDS2
TEST 2

Weather: Sunny, clear

Engineer: *R Rowlinson*
Checked: *R Wyatt*

Trial Pit Measurements



Pit Depth (mm):	2000
Pit Details:	Open with no stone filling
Groundwater Level:	NGW

Test Data

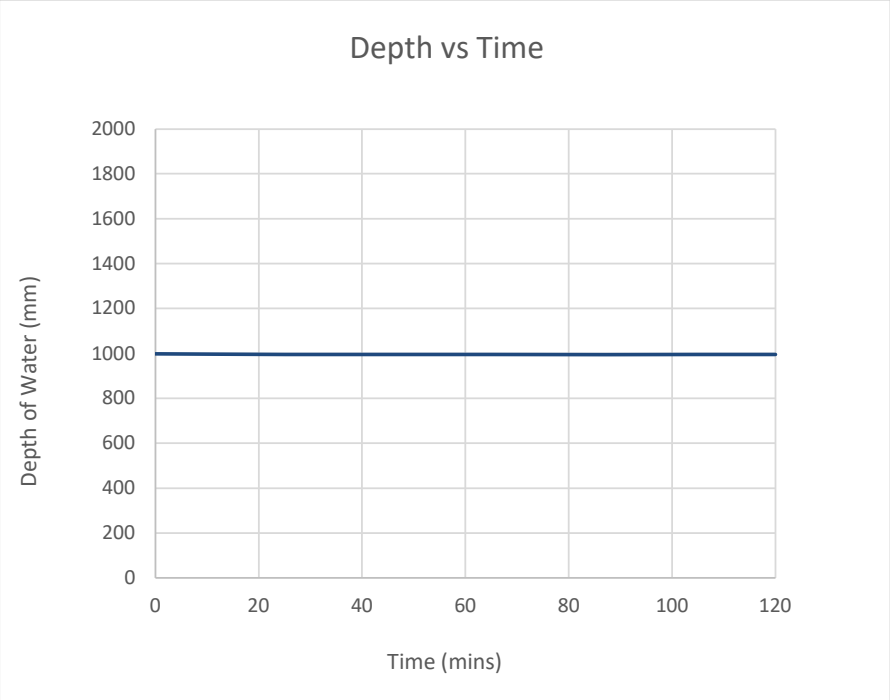
Time Elapsed (mins)	Depth to Water Level (mm)
0	1002
25	1004
65	1005
105	1005
120	1005

MARIAN DRIVE, CHESTER
GRO-21456
HARRY PHIPPS AND COMPANY LTD

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

POSITION: SuDS2
TEST 2



Volume of Pit (m^3)	2.52
Void Ratio of Infill	1
Volume of Infill (m^3)	N/A
Volume of Water in Pit (m^3)	1.25748

Compliancy Check:

Water Level at 75% effective depth (mm)	748.5
Water Level at 25% effective depth (mm)	249.5

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	998
Water Level 2	995
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m^3)	0.00378

Discharge Area (m^2)	6.25
Soil Infiltration Rate (m/min)	5.04E-06
Soil Infiltration Rate (m/sec)	***8.40E-08***

TURPINS HOLLOW, BOWDON
GRO-21404
MR RIZWAN ALI

SOIL PERCOLATION TEST

GROUNDTECH CONSULTING

Sheet 1 of 2

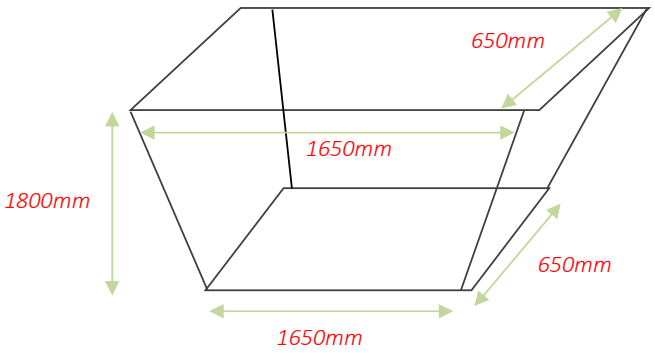
Date of Test: 30/11/2021

POSITION: SuDS2
TEST 3

Weather: Sunny, clear

Engineer: *L Harrison*
Checked: *R Wyatt*

Trial Pit Measurements



Pit Depth (mm):	1800
Pit Details:	Open with no stone filling
Groundwater Level:	NGW

Test Data

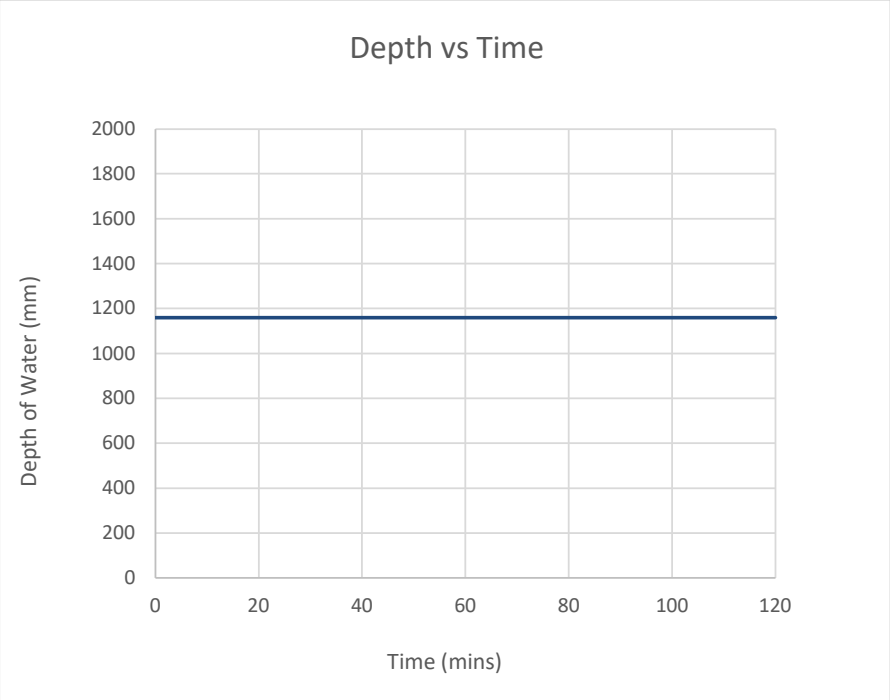
Time Elapsed (mins)	Depth to Water Level (mm)
0	640
60	640.5
120	641

TURPINS HOLLOW, BOWDON
GRO-21404
MR RIZWAN ALI

Sheet 2 of 2

SOIL PERCOLATION TEST

POSITION: SuDS2
TEST 3



Volume of Pit (m^3)	1.9305
Void Ratio of Infill	1
Volume of Infill (m^3)	N/A
Volume of Water in Pit (m^3)	1.2441

Compliancy Check:

Water Level at 75% effective depth (mm)	870
Water Level at 25% effective depth (mm)	290

Test not BRE 365 compliant with BRE 365 - insufficient time to drain past 25% effective depth

Soil Infiltration Rate Calculation

Water Level 1	1160
Water Level 2	1159
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m^3)	0.0010725

Discharge Area (m^2)	6.4085
Soil Infiltration Rate (m/min)	1.395E-06
Soil Infiltration Rate (m/sec)	***2.32E-08***

APPENDIX 9 - Generic Screening Values (Commercial End Use)

GROUNDTECH CONSULTING

Generic Tier I Generic Assessment Criteria (GAC)

Proposed End Use	Unit	Residential with Plant Uptake			Commercial			Source
SOM	%	1	2.5	6	1	2.5	6	
Arsenic	mg/kg	32	32	32	640	640	640	SGVs
Beryllium	mg/kg	1.7	1.7	1.7	12	12	12	LQM S4ULs
Boron (water soluble)	mg/kg	290	290	290	240000	240000	240000	LQM S4ULs
Cadmium	mg/kg	10	10	10	230	230	230	SGVs
Chromium (Total)	mg/kg	910	910	910	8600	8600	8600	LQM S4ULs
Chromium (VI)	mg/kg	21	21	21	49	49	49	DEFRA C4SLs
Copper	mg/kg	2400	2400	2400	68000	68000	68000	LQM S4ULs
Lead	mg/kg	200	200	200	2300	2300	2300	DEFRA C4SLs
Organic Mercury	mg/kg	1.2	1.2	1.2	26	26	26	LQM S4ULs
Nickel	mg/kg	130	130	130	980	980	980	LQM S4ULs
Selenium	mg/kg	350	350	350	13000	13000	13000	SGVs
Vanadium	mg/kg	410	410	410	9000	9000	9000	LQM S4ULs
Zinc	mg/kg	3700	3700	3700	730000	730000	730000	LQM S4ULs
Aliphatic EC 5 - 6	mg/kg	42	78	160	3200 (304) sol	5900 (558) sol	12000 (1150) sol	LQM S4ULs
Aliphatic EC 6 - 8	mg/kg	100	230	530	7800 (144) sol	17000 (322) sol	40000 (736) sol	LQM S4ULs
Aliphatic EC 8 - 10	mg/kg	27	65	150	2000 (78) sol	4800 (190) sol	11000 (451) vap	LQM S4ULs
Aliphatic EC 10 - 12	mg/kg	130 (48) vap	330 (118) vap	760 (283) vap	9700 (48) sol	23000 (118) vap	47000 (283) vap	LQM S4ULs
Aliphatic EC 12 - 16	mg/kg	1100 (24) sol	2400 (59) sol	4300 (142) sol	59000 (24) sol	82000 (59) sol	90000 (142) sol	LQM S4ULs
Aliphatic EC 16 - 35	mg/kg	65000 (8.48) f,sol	92000 (21) f,sol	110000 f	1600000 f	1700000 f	1800000 f	LQM S4ULs
Aliphatic EC 35 - 44	mg/kg	65000 (8.48) f,sol	92000 (21) f,sol	110000 f	1600000 f	1700000 f	1800000 f	LQM S4ULs
Aromatic EC 5 - 7	mg/kg	70	140	300	26000 (1220) sol	46000 (2260) sol	86000 (4710) sol	LQM S4ULs
Aromatic EC 7 - 8	mg/kg	130	290	660	56000 (869) vap	110000 (1920)	180000 (4360)	LQM S4ULs
Aromatic EC 8 - 10	mg/kg	34	83	190	3500 (613) vap	8100 (1500) vap	17000 (3580)	LQM S4ULs
Aromatic EC 10 - 12	mg/kg	74	180	380	16000 (364) sol	28000 (899) sol	34000 (2150) sol	LQM S4ULs
Aromatic EC 12 -16	mg/kg	140	330	660	36000 (169) sol	37000	38000	LQM S4ULs
Aromatic EC 16 - 21	mg/kg	260 f	540 f	930 f	28000 f	28000 f	28000 f	LQM S4ULs
Aromatic EC 21 - 35	mg/kg	1100 f	1500 f	1700 f	28000 f	28000 f	28000 f	LQM S4ULs
Aromatic EC 35 - 44	mg/kg	1100 f	1500 f	1700 f	28000 f	28000 f	28000 f	LQM S4ULs
Benzene	mg/kg	0.33	0.33	0.33	95	95	95	SGVs
Toluene	mg/kg	610	610	610	4400	4400	4400	SGVs
Ethyl Benzene	mg/kg	350	350	350	2800	2800	2800	SGVs
Xylene - o	mg/kg	250	250	250	2600	2600	2600	SGVs
Xylene - m	mg/kg	240	240	240	3500	3500	3500	SGVs
Xylene - p	mg/kg	230	230	230	3200	3200	3200	SGVs
MTBE (methyl tert-butyl ether)	mg/kg	49	84	160	7900	13000	24000	CL:AIRE 2010
Acenaphthene	mg/kg	210	510	1100	84000 (57) sol	97000 (141) sol	100000	LQM SAULs
Acenaphthylene	mg/kg	170	420	920	83000 (86.1) sol	97000 (212) sol	100000	LQM S4ULs
Anthracene	mg/kg	2400	5400	11000	520000	540000	540000	LQM S4ULs
Benz(a)anthracene	mg/kg	7.2	11	13	170	170	180	LQM S4ULs
Benzo(a)pyrene	mg/kg	2.2	2.7	5*	35	35	77*	DEFRA C4SL*/LQM
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	44	44	45	LQM S4ULs
Benzo(ghi)perylene	mg/kg	320	340	350	3900	4000	4000	LQM S4ULs
Benzo(k)fluoranthene	mg/kg	77	93	100	1200	1200	1200	LQM S4ULs
Chrysene	mg/kg	15	22	27	350	350	350	LQM S4ULs
Dibenz(ah)anthracene	mg/kg	0.24	0.28	0.3	3.5	3.6	3.6	LQM S4ULs
Fluoranthene	mg/kg	280	560	890	23000	23000	23000	LQM S4ULs
Fluorene	mg/kg	170	400	860	63000 (30.9) sol	68000	71000	LQM S4ULs
Indeno(123-cd)pyrene	mg/kg	27	36	41	500	510	510	LQM S4ULs
Naphthalene	mg/kg	2.3 f	5.6 f	13 f	190 f (76.4) sol	460 f (183) sol	1100 f (432) sol	LQM S4ULs
Phenanthrene	mg/kg	95	220	440	22000	22000	23000	LQM S4ULs
Pyrene	mg/kg	620	1200	2000	54000	54000	54000	LQM S4ULs

GROUNDTECH CONSULTING

Generic Tier I Generic Assessment Criteria (GAC)

Proposed End Use	Unit	Residential with Plant Uptake			Commercial			Source
SOM	%	1	2.5	6	1	2.5	6	
Phenol	*mg/kg*	*420*	*420*	*420*	*3200*	*3200*	*3200*	*SGVs*
Chlorophenols	*mg/kg*	*0.87* [g]	*2*	*4.5*	*3500*	*4000*	*4300*	*LQM S4ULs*
Pentachlorophenol	*mg/kg*	*0.22*	*0.52*	*1.2*	*400*	*400*	*400*	*LQM S4ULs*
Carbon disulphide	*mg/kg*	*0.14*	*0.29*	*0.62*	*11*	*22*	*47*	*LQM S4ULs*
Hexachlorobutadiene	*mg/kg*	*0.29*	*0.7*	*1.6*	*31*	*66*	*120*	*LQM S4ULs*
1,1,1,2 Tetrachloroethane	*mg/kg*	*1.6*	*3.4*	*7.5*	*270*	*550*	*1100*	*LQM S4ULs*
1,1,1 Trichloroethane	*mg/kg*	*8.8*	*18*	*39*	*660*	*1300*	*3000*	*LQM S4ULs*
Trichloroethene	*mg/kg*	*0.016*	*0.034*	*0.075*	*1.2*	*2.6*	*5.7*	*LQM S4ULs*
Tetrachoromethane (Carbon Tetrachloride)	*mg/kg*	*0.026*	*0.056*	*0.13*	*2.9*	*6.3*	*14*	*LQM S4ULs*
1,2-Dichloroethane	*mg/kg*	*0.0071*	*0.011*	*0.019*	*0.67*	*0.97*	*1.7*	*LQM S4ULs*
Chloroethene (Vinyl chloride)	*mg/kg*	*0.00064*	*0.00087*	*0.0014*	*0.059*	*0.077*	*0.12*	*LQM S4ULs*
Trichloromethane (Chloroform)	*mg/kg*	*0.91*	*1.7*	*3.4*	*99*	*170*	*350*	*LQM S4ULs*
Tetrachloroethene	*mg/kg*	*0.18*	*0.39*	*0.9*	*19*	*42*	*95*	*LQM S4ULs*
Hexachlorobenzene	*mg/kg*	*1.8 (0.2)* [vap]	*3.3 (0.5)* [vap]	*4.9*	*110 (0.2)* [vap]	*120*	*120*	*LQM S4ULs*
Pentachlorobenzene	*mg/kg*	*5.8*	*12*	*22*	*640 (43)* [sol]	*770 (107)* [sol]	*830*	*LQM S4ULs*
1,2,4,5-Tetrachlorobenzene	*mg/kg*	*0.33*	*0.77*	*1.6*	*42 (19.7)* [sol]	*72 (49.1)* [sol]	*96*	*LQM S4ULs*
1,2,3,5-Tetrachlorobenzene	*mg/kg*	*0.66*	*1.69*	*3.7*	*49 (39.4)* [vap]	*120 (98.1)* [vap]	*240 (235)* [vap]	*LQM S4ULs*
1,2,3,4-Tetrachlorobenzene	*mg/kg*	*15*	*36*	*78*	*1700 (122)* [vap]	*3080 (304)* [vap]	*4400 (728)* [vap]	*LQM S4ULs*
1,3,5-Trichlorobenzene	*mg/kg*	*0.33*	*0.81*	*1.9*	*23*	*55*	*130*	*LQM S4ULs*
1,2,4-Trichlorobenzene	*mg/kg*	*2.6*	*6.4*	*15*	*220*	*530*	*1300*	*LQM S4ULs*
1,2,3-Trichlorobenzene	*mg/kg*	*1.5*	*3.6*	*8.6*	*102*	*250*	*590*	*LQM S4ULs*
1,4-dichlorobenzene	*mg/kg*	*61* [f]	*150* [f]	*350* [f]	*4400* [f] *(224)* [vap]	*10000* [f] *(540)*	*25000* [f] *(1280)*	*LQM S4ULs*
1,3-dichlorobenzene	*mg/kg*	*0.4*	*1*	*2.3*	*30*	*73*	*170*	*LQM S4ULs*
1,2-Dichlorobenzene	*mg/kg*	*23*	*55*	*130*	*2000 (571)* [sol]	*4800 (1370)* [sol]	*11000 (3240)* [sol]	*LQM S4ULs*
Chlorobenzene	*mg/kg*	*0.46*	*1*	*2.4*	*56*	*130*	*290*	*LQM S4ULs*
Gamma-Hexachlorocyclohexane	*mg/kg*	*0.06*	*0.14*	*0.33*	*67*	*69*	*70*	*LQM S4ULs*
Beta-Hexachlorocyclohexane	*mg/kg*	*0.085*	*0.2*	*0.46*	*65*	*65*	*65*	*LQM S4ULs*
Alpha -Hexachlorocyclohexane	*mg/kg*	*0.23*	*0.55*	*1.2*	*170*	*180*	*180*	*LQM S4ULs*
Beta -Endosulfan	*mg/kg*	*7*	*17*	*39*	*6300 (0.00007)*	*7800 (0.0002)*	*8700*	*LQM S4ULs*
Alpha-Endosulfan	*mg/kg*	*7.4*	*18*	*41*	*5600 (0.003)* [vap]	*7400 (0.007)* [vap]	*8400 (0.016)* [vap]	*LQM S4ULs*
Dichlorvos	*mg/kg*	*0.032*	*0.066*	*0.14*	*140*	*140*	*140*	*LQM S4ULs*
Atrazine	*mg/kg*	*3.3*	*7.6*	*17.4*	*9300*	*9400*	*9400*	*LQM S4ULs*
Dieldrin	*mg/kg*	*0.97*	*2*	*3.5*	*170*	*170*	*170*	*LQM S4ULs*
Aldrin	*mg/kg*	*5.7*	*6.6*	*7.1*	*170*	*170*	*170*	*LQM S4ULs*
HMX	*mg/kg*	*5.7*	*13*	*26*	*110000*	*110000*	*110000*	*LQM S4ULs*
2,4,6-Trinitrotoulene	*mg/kg*	*1.6*	*3.7*	*8.1*	*1000*	*1000*	*1000*	*LQM S4ULs*
RDX	*mg/kg*	*120*	*250*	*540*	*210000*	*210000*	*210000*	*LQM S4ULs*

[sol] S4UL exceeds the solubility saturation limit (which is presented in brackets)

[vap] S4ULS presented exceeds the vapour saturation limit, which is presented in brackets

[f] For naphthalene, the S4UL is based on a comparison of inhalation exposure with the TDI_{inhal} for localised affects

[f] S4UL based on comparison of inhalation exposure with inhalation TDI for localised effects

[dir] S4ULs based on a threshold protecive direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustation only

APPENDIX 10 - CIRIA Risk Assessment Methodology

Contaminated Land Risk Assessment

Contaminated Land Risk Assessment is a technique that identifies and considers the associated risk, determines whether the risks are significant and whether action needs to be taken. The four main stages of risk assessment are:

Hazard Identification ⇨ Hazard Assessment ⇨ Risk Estimation ⇨ Risk Evaluation

LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. The starting point of the risk assessment is to identify the context of the problem and the objectives of the process.

Formulating and developing a conceptual model for the site is an important requirement of risk assessment, this supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process.

Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk.

The risk assessment process needs to take into account the degree of confidence required in decisions. Identification of uncertainties is an essential step in risk assessment.

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552:

- High likelihood: There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;

- Likely: There is a pollution linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;

- Low likelihood: There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain even over a longer period such event would take place, and is less likely in the short term;

- Unlikely: There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.

The severity is also classified using a system based on CIRIA C552. The terms and definitions are:

- Severe: Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. A short-term risk to a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);
  Examples – High concentrations of contaminant on surface of recreation area, major spillage of contaminants from site into controlled waters, explosion causing building to collapse;

- **Medium**: Chronic damage to human health ('significant harm' as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);
  Examples - Concentrations of contaminants exceed the generic assessment criteria, leaching of contaminants from a site to a Principal or Secondary Aquifer, death of species within a designated nature reserve;

- **Mild**: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures, services or the environment;
  Examples – Pollution of non-classified groundwater or damage to buildings rendering it unsafe to occupy.

- **Minor**: harm, not necessarily significant harm, which may result in financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by use of personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.
  Examples – Presence of contaminants at such concentrations PPE is required during site work, loss of plants in landscaping scheme or discolouration of concrete.

Once the likelihood and severity have been determined, a risk category can be assigned using the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very Low	Very low

Definitions of the risk categories obtained from the above table are as follows together with an assessment of the further work that might be required:

- **Very high**: There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability. Urgent investigation and remediation are likely to be required;

- **High**: Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the longer term;

- **Moderate**: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it would be more likely to be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term;

- **Low**: It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild;

- **Very Low**: There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

APPENDIX 11 - JIWG Receptor Decision Tool

Decision Support Tool for Receptor Risk Ranking

Stage 1

Hazard Identification		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Loose fibrous asbestos debris	3
Extent of degradation of ACMs	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not firmly linked in a matrix	2
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Asbestos fibre type	Chrysotile alone	0
Sub-total		9
Hazard ranking		Low

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

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Stage 2

Emission Factors		Score
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Very Low quantities - 0.001 to 0.01 %wt/wt	1
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Medium	3
Activity type and effect on deterioration of ACMs	Low disturbance, minimal deterioration expected	2
Best description of primary host material matrix	Coarse to Fine Gravel	3
Sub-total		9
Exposure ranking		Low

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Stage 3

Pathway and Receptor Sensitivity		Score	
Receptor category	Construction	No score required	
Age of Receptor	Infant (under 5)	4	
Duration of exposure/site occupancy	> 1hr <10 hr daily exposure (e.g. part-time to full time occupational exposure or extended daily recreational exposure)	3	
Receptor ranking		7	High
Combined hazard, exposure and receptor ranking			Medium
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material buried at shallow depth, potential to be disturbed by excavation	C	
Pathway ranking		4C	Low
Overall ranking			Low

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Project Reference	

Site Name	NEW OFFICE BLOCK, BURY
Client	

Run by	CALLUM HOLDEN
Date	23-Mar-22
Reviewed by	

Characterisation of scenario being evaluated	

Interpretation of scenario ranking by DST	

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APPENDIX 12 - Waste Classification Report

HazWasteOnline™

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

8SSFK-H0JF0-HOEN2

Job name

22-37451_HWOL_Results

Description/Comments

Project

GRO-21438

Site

NEW OFFICE BLOCK, BURY

Classified by

Name:
Bradley Massey
Date:
28 Feb 2022 08:49 GMT
Telephone:
01618 201368

Company:
Groundtech Consulting Limited
First Floor, Lloyd House, Orford Court, Greenfold Way
Leigh
WN7 3XJ

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: -

Course	Date
Hazardous Waste Classification	-

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP01---0.25		Non Hazardous		2
2	TP01---0.70		Non Hazardous		4
3	TP02---0.35		Non Hazardous		6
4	TP03---0.55		Non Hazardous		8
5	BH01---0.50		Non Hazardous		10
6	BH02---1.00		Non Hazardous		12
7	BH03---1.00		Non Hazardous		14
8	BH04---0.50		Non Hazardous		16

Related documents

#	Name	Description
1	22-37451_HWOL_Results.hwol	.hwol file used to create the Job

Report

Created by: Bradley Massey

Created date: 28 Feb 2022 08:49 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	18
Appendix B: Rationale for selection of metal species	19
Appendix C: Version	20

Classification of sample: TP01---0.25

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

Sample details

Sample name:
TP01---0.25
Moisture content:
7.6%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 7.6% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		pH			PH		10.8	pH		10.8	pH	10.8 pH		
2		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		**<LOD**
3		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
5		acenaphthene		201-469-6	83-32-9		0.29	mg/kg		0.268	mg/kg	0.0000268 %	✓	
6		fluorene		201-695-5	86-73-7		0.29	mg/kg		0.268	mg/kg	0.0000268 %	✓	
7		phenanthrene		201-581-5	85-01-8		2.5	mg/kg		2.31	mg/kg	0.000231 %	✓	
8		anthracene		204-371-1	120-12-7		0.63	mg/kg		0.582	mg/kg	0.0000582 %	✓	
9		fluoranthene		205-912-4	206-44-0		3.8	mg/kg		3.511	mg/kg	0.000351 %	✓	
10		pyrene		204-927-3	129-00-0		3.5	mg/kg		3.234	mg/kg	0.000323 %	✓	
11		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		2	mg/kg		1.848	mg/kg	0.000185 %	✓	
12		chrysene	601-048-00-0	205-923-4	218-01-9		1.4	mg/kg		1.294	mg/kg	0.000129 %	✓	
13		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		2.1	mg/kg		1.94	mg/kg	0.000194 %	✓	
14		indeno[123-cd]pyrene		205-893-2	193-39-5		1	mg/kg		0.924	mg/kg	0.0000924 %	✓	
15		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16		benzo[ghi]perylene		205-883-8	191-24-2		1.3	mg/kg		1.201	mg/kg	0.00012 %	✓	
17		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				9.4	mg/kg	1.895	16.455	mg/kg	0.00165 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
18		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		**<LOD**
19		copper { copper(II) chloride dihydrate }		231-210-2	10125-13-0		34 mg/kg	2.683	84.282 mg/kg	0.00843 %	✓	
20		mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		**<LOD**
21		nickel { nickel diiodide }	028-029-00-4	236-666-6	13462-90-3		14 mg/kg	5.324	68.875 mg/kg	0.00689 %	✓	
22		lead { lead di(acetate) }	082-005-00-8	206-104-4	301-04-2	1	53 mg/kg	1.57	76.881 mg/kg	0.0049 %	✓	
23		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		**<LOD**
24		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		130 mg/kg	4.398	528.279 mg/kg	0.0528 %	✓	
25		benzene	601-020-00-8	200-753-7	71-43-2		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
26		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
27		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
28		toluene	601-021-00-3	203-625-9	108-88-3		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
29		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18 mg/kg	1.462	26.308 mg/kg	0.00263 %		
30		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		2.96 mg/kg		2.735 mg/kg	0.000274 %	✓	
31		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2 µg/kg		<0.002 mg/kg	<0.0000002 %		**<LOD**
									Total:	0.0806 %		

Key

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

Classification of sample: TP01---0.70

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

Sample details

Sample name:
TP01---0.70
Moisture content:
13%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		pH			PH		7.6	pH		7.6	pH	7.6 pH		
2		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		**<LOD**
3		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
5		acenaphthene		201-469-6	83-32-9		0.44	mg/kg		0.383	mg/kg	0.0000383 %	✓	
6		fluorene		201-695-5	86-73-7		0.22	mg/kg		0.191	mg/kg	0.0000191 %	✓	
7		phenanthrene		201-581-5	85-01-8		0.62	mg/kg		0.539	mg/kg	0.0000539 %	✓	
8		anthracene		204-371-1	120-12-7		0.23	mg/kg		0.2	mg/kg	0.00002 %	✓	
9		fluoranthene		205-912-4	206-44-0		0.93	mg/kg		0.809	mg/kg	0.0000809 %	✓	
10		pyrene		204-927-3	129-00-0		0.8	mg/kg		0.696	mg/kg	0.0000696 %	✓	
11		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.48	mg/kg		0.418	mg/kg	0.0000418 %	✓	
12		chrysene	601-048-00-0	205-923-4	218-01-9		0.36	mg/kg		0.313	mg/kg	0.0000313 %	✓	
13		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.43	mg/kg		0.374	mg/kg	0.0000374 %	✓	
14		indeno[123-cd]pyrene		205-893-2	193-39-5		0.24	mg/kg		0.209	mg/kg	0.0000209 %	✓	
15		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16		benzo[ghi]perylene		205-883-8	191-24-2		0.26	mg/kg		0.226	mg/kg	0.0000226 %	✓	
17		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				11	mg/kg	1.895	18.131	mg/kg	0.00181 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
18		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.6 mg/kg		0.522 mg/kg	0.0000522 %	✓	
19		copper { copper(II) chloride dihydrate }		231-210-2	10125-13-0		27 mg/kg	2.683	63.018 mg/kg	0.0063 %	✓	
20		mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		**<LOD**
21		nickel { nickel diiodide }	028-029-00-4	236-666-6	13462-90-3		15 mg/kg	5.324	69.482 mg/kg	0.00695 %	✓	
22		lead { lead di(acetate) }	082-005-00-8	206-104-4	301-04-2	1	75 mg/kg	1.57	102.436 mg/kg	0.00653 %	✓	
23		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		**<LOD**
24		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		86 mg/kg	4.398	329.053 mg/kg	0.0329 %	✓	
25		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18 mg/kg	1.462	26.308 mg/kg	0.00263 %		
26		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		0.74 mg/kg		0.644 mg/kg	0.0000644 %	✓	
									Total:	0.0589 %		

Key

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

Classification of sample: TP02---0.35

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

Sample details

Sample name:
TP02---0.35
Moisture content:
12%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		pH			PH		9.6	pH		9.6	pH	9.6 pH		
2		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		**<LOD**
3		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
5		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
6		fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
7		phenanthrene		201-581-5	85-01-8		0.66	mg/kg		0.581	mg/kg	0.0000581 %	✓	
8		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
9		fluoranthene		205-912-4	206-44-0		0.83	mg/kg		0.73	mg/kg	0.000073 %	✓	
10		pyrene		204-927-3	129-00-0		0.82	mg/kg		0.722	mg/kg	0.0000722 %	✓	
11		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.43	mg/kg		0.378	mg/kg	0.0000378 %	✓	
12		chrysene	601-048-00-0	205-923-4	218-01-9		0.41	mg/kg		0.361	mg/kg	0.0000361 %	✓	
13		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.41	mg/kg		0.361	mg/kg	0.0000361 %	✓	
14		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
17		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.1	mg/kg	1.895	11.837	mg/kg	0.00118 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
18		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		**<LOD**
19		copper { copper(II) chloride dihydrate }		231-210-2	10125-13-0		15 mg/kg	2.683	35.412 mg/kg	0.00354 %	✓	
20		mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		**<LOD**
21		nickel { nickel diiodide }	028-029-00-4	236-666-6	13462-90-3		13 mg/kg	5.324	60.91 mg/kg	0.00609 %	✓	
22		lead { lead di(acetate) }	082-005-00-8	206-104-4	301-04-2	1	110 mg/kg	1.57	151.966 mg/kg	0.00968 %	✓	
23		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		**<LOD**
24		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		79 mg/kg	4.398	305.744 mg/kg	0.0306 %	✓	
25		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17 mg/kg	1.462	24.846 mg/kg	0.00248 %		
26		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		0.56 mg/kg		0.493 mg/kg	0.0000493 %	✓	
									Total:	0.0552 %		

Key

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

Classification of sample: TP03---0.55

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

Sample details

Sample name:
TP03---0.55
Moisture content:
5.9%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 5.9% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		pH			PH		9.6	pH		9.6	pH	9.6 pH		
2		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		**<LOD**
3		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
5		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
6		fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
7		phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
8		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
9		fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
10		pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
11		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
12		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
13		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
14		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
17		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.3	mg/kg	1.895	13.014	mg/kg	0.0013 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
18		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.4 mg/kg		0.376 mg/kg	0.0000376 %	✓	
19		copper { copper(II) chloride dihydrate }		231-210-2	10125-13-0		28 mg/kg	2.683	70.685 mg/kg	0.00707 %	✓	
20		mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		**<LOD**
21		nickel { nickel diiodide }	028-029-00-4	236-666-6	13462-90-3		36 mg/kg	5.324	180.366 mg/kg	0.018 %	✓	
22		lead { lead di(acetate) }	082-005-00-8	206-104-4	301-04-2	1	24 mg/kg	1.57	35.455 mg/kg	0.00226 %	✓	
23		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		**<LOD**
24		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		93 mg/kg	4.398	384.876 mg/kg	0.0385 %	✓	
25		benzene	601-020-00-8	200-753-7	71-43-2		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
26		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
27		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
28		toluene	601-021-00-3	203-625-9	108-88-3		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
29		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		28 mg/kg	1.462	40.924 mg/kg	0.00409 %		
30		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
31		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2 µg/kg		<0.002 mg/kg	<0.0000002 %		**<LOD**
									Total:	0.0726 %		

Key

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

Classification of sample: BH01---0.50

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

Sample details

Sample name:
BH01---0.50
Moisture content:
12%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		pH			PH		8	pH		8	pH	8pH		
2		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		**<LOD**
3		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
5		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
6		fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
7		phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
8		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
9		fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
10		pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
11		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
12		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
13		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
14		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
17		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.9	mg/kg	1.895	11.504	mg/kg	0.00115 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
18		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		**<LOD**
19		copper { copper(II) chloride dihydrate }		231-210-2	10125-13-0		24 mg/kg	2.683	56.66 mg/kg	0.00567 %	✓	
20		mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		**<LOD**
21		nickel { nickel diiodide }	028-029-00-4	236-666-6	13462-90-3		15 mg/kg	5.324	70.281 mg/kg	0.00703 %	✓	
22		lead { lead di(acetate) }	082-005-00-8	206-104-4	301-04-2	1	14 mg/kg	1.57	19.341 mg/kg	0.00123 %	✓	
23		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		**<LOD**
24		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		60 mg/kg	4.398	232.21 mg/kg	0.0232 %	✓	
25		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		14 mg/kg	1.462	20.462 mg/kg	0.00205 %		
26		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
									Total:	0.0416 %		

Key

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

Classification of sample: BH02---1.00

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

Sample details

Sample name:
BH02---1.00
Moisture content:
15%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		pH			PH		7.8	pH		7.8	pH	7.8 pH		
2		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		**<LOD**
3		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
5		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
6		fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
7		phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
8		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
9		fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
10		pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
11		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
12		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
13		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
14		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
17		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.9	mg/kg	1.895	11.111	mg/kg	0.00111 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
18		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		**<LOD**
19		copper { copper(II) chloride dihydrate }		231-210-2	10125-13-0		17 mg/kg	2.683	38.766 mg/kg	0.00388 %	✓	
20		mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		**<LOD**
21		nickel { nickel diiodide }	028-029-00-4	236-666-6	13462-90-3		10 mg/kg	5.324	45.257 mg/kg	0.00453 %	✓	
22		lead { lead di(acetate) }	082-005-00-8	206-104-4	301-04-2	1	15 mg/kg	1.57	20.016 mg/kg	0.00128 %	✓	
23		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		**<LOD**
24		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		31 mg/kg	4.398	115.885 mg/kg	0.0116 %	✓	
25		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		10 mg/kg	1.462	14.616 mg/kg	0.00146 %		
26		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
									Total:	0.0251 %		

Key

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

Classification of sample: BH03---1.00

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

Sample details

Sample name:
BH03---1.00
Moisture content:
7.4%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 7.4% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		pH			PH		8.9	pH		8.9	pH	8.9 pH		
2		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		**<LOD**
3		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
5		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
6		fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
7		phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
8		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
9		fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
10		pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
11		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
12		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
13		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
14		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
17		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				3.4	mg/kg	1.895	5.965	mg/kg	0.000596 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
18		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		**<LOD**
19		copper { copper(II) chloride dihydrate }		231-210-2	10125-13-0		12 mg/kg	2.683	29.811 mg/kg	0.00298 %	✓	
20		mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		**<LOD**
21		nickel { nickel diiodide }	028-029-00-4	236-666-6	13462-90-3		13 mg/kg	5.324	64.094 mg/kg	0.00641 %	✓	
22		lead { lead di(acetate) }	082-005-00-8	206-104-4	301-04-2	1	42 mg/kg	1.57	61.056 mg/kg	0.00389 %	✓	
23		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		**<LOD**
24		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		52 mg/kg	4.398	211.769 mg/kg	0.0212 %	✓	
25		benzene	601-020-00-8	200-753-7	71-43-2		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
26		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
27		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
28		toluene	601-021-00-3	203-625-9	108-88-3		<1 µg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
29		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		12 mg/kg	1.462	17.539 mg/kg	0.00175 %		
30		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
31		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<2 µg/kg		<0.002 mg/kg	<0.0000002 %		**<LOD**
									Total:	0.0381 %		

Key

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

Classification of sample: BH04---0.50

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

Sample details

Sample name:
BH04---0.50
Moisture content:
9.5%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9.5% Wet Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		pH			PH		8.9	pH		8.9	pH	8.9 pH		
2		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		**<LOD**
3		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
4		acenaphthylene		205-917-1	208-96-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
5		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
6		fluorene		201-695-5	86-73-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
7		phenanthrene		201-581-5	85-01-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
8		anthracene		204-371-1	120-12-7		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
9		fluoranthene		205-912-4	206-44-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
10		pyrene		204-927-3	129-00-0		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
11		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
12		chrysene	601-048-00-0	205-923-4	218-01-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
13		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
14		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
15		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
16		benzo[ghi]perylene		205-883-8	191-24-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		**<LOD**
17		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.6	mg/kg	1.895	11.316	mg/kg	0.00113 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
18		cadmium { cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex }	048-001-00-5			1	0.5 mg/kg		0.453 mg/kg	0.0000453 %	✓	
19		copper { copper(II) chloride dihydrate }		231-210-2	10125-13-0		23 mg/kg	2.683	55.842 mg/kg	0.00558 %	✓	
20		mercury { mercury difulminate }	080-005-00-2	211-057-8	628-86-4		<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		**<LOD**
21		nickel { nickel diiodide }	028-029-00-4	236-666-6	13462-90-3		37 mg/kg	5.324	178.284 mg/kg	0.0178 %	✓	
22		lead { lead di(acetate) }	082-005-00-8	206-104-4	301-04-2	1	21 mg/kg	1.57	29.836 mg/kg	0.0019 %	✓	
23		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		**<LOD**
24		zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		96 mg/kg	4.398	382.092 mg/kg	0.0382 %	✓	
25		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		28 mg/kg	1.462	40.924 mg/kg	0.00409 %		
26		benzo[bk]fluoranthene		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
									Total:	0.0701 %		

Key

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

Appendix A: Classifier defined and non GB MCL determinands

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

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

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

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

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex**

GB MCL index number: 048-001-00-5
Description/Comments: Worst Case: IARC considers cadmium compounds Group 1; Carcinogenic to humans
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

- **copper(II) chloride dihydrate** (EC Number: 231-210-2, CAS Number: 10125-13-0)

Description/Comments: C&L for copper (II) chloride (anhydrous) CAS 7447-39-4
Data source:
Data source date: 03 Nov 2016
Hazard Statements: Skin Irrit. 2; H315 , Acute Tox. 4; H302 , Eye Dam. 1; H318 , Acute Tox. 4; H312 , STOT SE 3; H335 , Eye Irrit. 2; H319 , Acute Tox. 3; H301 , Acute Tox. 4; H332 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **lead di(acetate)** (EC Number: 206-104-4, CAS Number: 301-04-2)

GB MCL index number: 082-005-00-8
Description/Comments: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers many simple lead compounds to be Carcinogenic category 2.
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

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

GB MCL index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

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

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **benzo[bk]fluoranthene** (EC Number: [1] 205-911-9 [2] 205-916-6, CAS Number: [1] 205-99-2 [2] 207-08-9)

Description/Comments: Combined data from harmonised entries in CLP for benzo[b] and benzo[k]fluoranthene; C&L Inventory Database
Data source: https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 02 Mar 2017
Hazard Statements: Carc. 1B; H350 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

Appendix B: Rationale for selection of metal species

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case scenario

arsenic {arsenic acid and its salts with the exception of those specified elsewhere in this Annex}

Worst case scenario

cadmium {cadmium compounds, with the exception of cadmium sulphoselenide (xCdS.yCdSe), reaction mass of cadmium sulphide with zinc sulphide (xCdS.yZnS), reaction mass of cadmium sulphide with mercury sulphide (xCdS.yHgS), and those specified elsewhere in this Annex}

Worst case scenario

copper {copper(II) chloride dihydrate}

Worst case scenario

mercury {mercury difulminate}

Worst case scenario

nickel {nickel diiodide}

Worst case scenario

lead {lead di(acetate)}

Worst case scenario

selenium {nickel selenate}

Worst case scenario

zinc {zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2]}

Worst case scenario

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

Worst case scenario

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2022.25.4995.9469 (25 Jan 2022)
HazWasteOnline Database: 2022.25.4995.9469 (25 Jan 2022)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021

APPENDIX 13 - Contaminated Land Legislative Background

Legislative Background

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

- The 1995 Environment Act;
- The Contaminated Land (England) Regulations 2000;
- The DETR circular 02/2000 Environmental Protection Act 1990: Part IIA Contaminated Land.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

1) Significant harm is being caused or there is a significant possibility of such harm being caused;
2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

- **Source** - substances that are potential contaminants or pollutants that may cause harm;
- **Pathway** - a potential route by which contaminants can move from the source to the receptor;
- **Receptor** - a receptor that may be harmed, for example the water environment, humans and water.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused. The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the SPR approach is 'suitable for use' criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

Relevant Guidance Documents

This report has been prepared in accordance with the list of guidance below however the list is not exhaustive:

- CLR11 – Model Procedures;
- Contamination and Environmental Matters - Their implications for Property Professionals (2nd Edition RICS Nov 2003);
- Brownfields – Managing the development of previously developed land – A client's guide, CIRIA 2002;
- DEFRA and Environment Agency publications CLR7 – 10, supported by the TOX guides and SGV guides, dated March 2002;
- DETR Circular 02/2000, Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990;
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002;

Relevant Legislative Documents

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environment Act (1995);
- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012);
- The Environment Protection Act (1990);
- The Contaminated Land (England) Act (2000);
- Contaminated Land (England) Regulations (2012);
- The Water Resources Act (1991);
- The Pollution Prevention and Control (England and Wales) Regulations (2000);
- The Landfill Regulations (England and Wales) Regulations (2002);
- The Landfill (England and Wales) (Amendment) Regulations (2004);
- Health and Safety at Work Act;

APPENDIX 14 - Limitations

Limitations

This contract was completed by Groundtech Consulting on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with due skill and care, taking into consideration the project brief provided, project objectives, agreed scope of works, prevailing site conditions and budget allocation.

Other than that defined in the paragraph above, Groundtech Consulting provides no other accountability or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted industry practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Groundtech Consulting. A third party who relies on this report, does so at their own and sole risk and no liability to such parties is provided by Groundtech Consulting.

It is the understanding of Groundtech Consulting that this report is to be used for the intended purpose as set out in the introduction. The purpose was instrumental in determining the scope and level of the services provided. Should the purpose of the report or the proposed end use of the site change, this report will no longer be directly applicable, and its validity readdressed. No reliance upon the report in the revised situation should be assumed by the client without the permission of Groundtech Consulting.

The report was written in 2022, later changes in legislation, statutory requirements and industry best practices have not been considered and this should be allowed for. Ground conditions can also change and should be investigated if there is any significant delay in acting on the findings of this report. The period of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions in this report should not be relied upon in the future without the written confirmation from Groundtech Consulting that it is safe to do so.

The observations and conclusions outlined in this report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting.

Groundtech Consulting are not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The services provided are based upon Groundtech Consulting observations of existing physical conditions at the site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and Groundtech Consulting assume the information to be correct.

No responsibility can be accepted for errors for third party information presented in this report. Groundtech Consulting were not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Groundtech Consulting are not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting and forms the contract with the client.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable due to its heterogeneous

properties and as investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. Geo-Environmental testing was carried out for a limited number of parameters [as stipulated in the contract] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawings provided in this report are not meant to be an accurate base plan, but are preliminary and used to present the general relative locations of features on, and surrounding, the site.

Phase 2 Site Investigation

Hollins Brook Way Junction, Bury

for

JD Plc

01/12/2021

COMPLEX CHALLENGES ...
MADE SIMPLE

Phase 2 Site Investigation

Hollins Brook Way Junction Expansion, Bury

DESCRIPTION	DATE	AUTHOR	REVIEWED BY	APPROVED BY
Phase 2 Site Investigation Report	01/12/21	Reece McGuinness	Alex Smiles	Alex Smiles
REVISION	**DESCRIPTION**	**DATE**	**AUTHOR**	**APPROVED BY**
REV 1.				
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COMPLEX CHALLENGES ...
MADE SIMPLE

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1.0 Introduction

1.1 Background

1.1.1 RoC Consulting has been appointed by JD Plc to conduct a Phase 2 Site Investigation at Hollins Brook Way, Bury (the site). It is understood that the site is to form part of a road widening works in accordance with Eddisons drawings (ref: 3288-F01) provided within Appendix A.

1.1.2 The following assessment has been completed to support design and planning requirements for the site's future use as a highway.

1.1.3 The scope of the report and its assessment has been based around the site's redevelopment proposals as outlined in the Eddisons Potential Site Access plans. It should be noted that any subsequent revision of the proposed redevelopment or site boundary away from the above-mentioned drawing may result in the full or partial re-interpretation of this report and assessment.

1.2 Terms of Reference

1.2.1 The Phase 2 Site Investigation was carried out following receipt of an instruction from Giles Selby of JD Plc.

1.3 Objectives

1.3.1 The scope of works has been tailored to meet both planning and design requirements to assist with the site's redevelopment. These considerations include:

1) Design a programme of site investigation works to establish ground conditions beneath the site and target known or suspected sources of contamination.

2) Completion of site investigation field works including the formation of x3 window sample boreholes to establish the site's geology, as well as 2 TRLDCP tests to inform road and pavement design.

3) Completion of x3 vacuum excavated / hand dug slit trenches to locate the high-pressure gas main beneath the site.

4) Completion of geo-environmental and geotechnical laboratory analysis of soil samples to determine physical and chemical characteristics.

5) Completion of a detailed geotechnical assessment of site conditions to inform road design.

6) Completion of a geo-environmental assessment utilising information provided by both the current phase of site investigation works sufficient in its scope to assist with the discharge of contaminated land related planning conditions.

2.0 Limitations of Study Assessment

2.0.1 The report has been produced by RoC Consulting for the client solely for the purposes of a review of information for the above-mentioned site. It may not be used by any person for any other purpose other than that specified without the express written permission of RoC Consulting. Any liability arising out of its use by a third party for purposes not wholly connected with the above shall be the responsibility of that party who shall indemnify RoC Consulting against all claims, costs, damages and losses arising out of such use.

2.0.2 This report is written in the context of an agreed scope of work and should not be used in a different context. The report should be read in its entirety. Furthermore, new information, improved practices and changes in legislation may require re-interpretation of this report in whole or in part after its original issue. RoC Consulting reserve the right to alter their conclusions and recommendations in the light of further information that may become available.

2.0.3 Ground conditions can change rapidly, especially in areas of made ground, however, it is assumed that the ground conditions observed are typical and representative of the site as a whole. The ground conditions have been determined from a limited number of exploratory holes formed across the property, therefore, only a small percentage of the total area of the property has been investigated. Interpolation between exploratory holes has enabled a general picture of the subsurface conditions to be produced.

2.0.4 Conclusions drawn from the ground investigation should be read in this context. RoC Consulting cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.

2.0.5 RoC Consulting has exercised all reasonable due skill, care and diligence when collating the design and subsequent execution of ground investigation works. It should be noted we cannot anticipate the requirements and actions of the regulatory authorities when designing and implementing ground investigation works and, whilst thorough consideration has been given to all geo-environmental and geotechnical concerns; further additional fieldworks or assessment may be required at their request.

3.0 Background Information

3.0.1 The overview below outlines the most salient points / considerations.

3.1 Site Description

3.1.1 The site is located circa 2.40km to the south east of Bury town centre on the Pilsbury Industrial Estate. The northern portion of the site is comprised of rough vegetated land and the rest of the site comprises disused asphalt car parking. Surrounding land use is predominantly commercial with the site being surrounded by the JD Campus offices to the south and east, residential housing to the west and various other commercial uses to the north. Photographs of the site are provided within Appendix A.

3.2 Geological Characteristics

3.2.1 Review of publicly available BGS geological map records indicate the site is underlain by the following:

Drift Geology: Hummocky (Moundy) Glacial Deposits.

Solid Geology: Trencherbone Rock - Sandstone

3.3 Site History and Environmental Characteristics

3.3.1 Historical records dated 1844 to 1846 indicate the site was occupied by fields and a bleach works and print works are located circa 220m to the south of the site. The site remained as fields until some time between 1964-2000 when a warehouse was constructed adjacent the site and the site became a car park and area of soft landscaping associated with the warehouse. In 2020 the warehouse was demolished however the car park and area of soft landscaping remain.

3.3.2 The MAGIC Map Groundwater Vulnerability Map indicates the drift geology is classified as a Secondary A Aquifer with the underlying sandstone bedrock also classed as a Secondary A Aquifer. The site is not said to be located within any Environment Agency Source Protection Zones or close proximity to any sensitive water abstraction points.

3.3.3 The nearest surface water feature is indicated 210m to the south in the form of Hollins Brook. No measurable water quality or flow rates are available for this feature. There is also a lake / pond like feature 120m to the southeast of the site.

3.3.4 There is a historic landfill site located circa 200m to the north east of the site known as Roach Bank. The license for the site was issued in 1991 and surrendered in 2002. Records indicate the landfill was only permitted to receive inert waste. There are two landfills of significant size ~500m to the east of the site, namely the Pilsworth North and Pilsworth South Landfill Sites operated by Viridor Waste Management Ltd.

3.3.5 The site is not said to be located in an area deemed to be at risk from flooding or extreme flooding events from either land or sea.

4.0 Site Investigation Design

General

4.0.1 The RoC intrusive investigation was designed and completed to investigate any potential geo-environmental issues as well as provide geotechnical information to facilitate new road design.

4.0.2 The site investigation works comprised the formation of three window sample boreholes to a depth of 5.45mbgl, two TRLDCP tests and three slit trenches.

4.0.3 Window sample boreholes and TRLDCP tests were located within the footprint of the proposed road widening works to establish ground conditions and support road design. The three slit trenches were located to delineate the location of the high-pressure gas main beneath the site.

4.0.4 Samples of soil collected during the investigation works are to be analysed for a variety of determinants associated with the pattern of current / historic industrial activity across the site as outlined within the preliminary conceptual site model.

4.0.5 Table 4.0 provided below provides location justification for each exploratory hole formed during the site investigation fieldworks. The purposes of this table are to illustrate the targeting of potential sources of contamination during the Phase 2 site investigation works.

Table 4.0: Borehole Locations & Justification

BH/WS ID.	Reason for selection
WS101	Provide information on ground conditions in the area of the proposed road widening works.
WS102	
WS103	
DCP101	
DCP102	
ST101	Locate and confirm the alignment of the high-pressure gas main through the site.
ST102	
ST103	

4.0.6 Exploratory hole locations are shown on RoC Consulting drawing ES101 (Current Site) and ES102 (Prop Development) provided within Appendix A.

5.0 Site Investigation Fieldworks

5.0.1 Site investigation fieldworks were completed on the 27th of October 2021 by drilling contractors Earth Engineering. Boreholes were formed using a Competitor 150, while slit trenches were formed by vacuum excavation or hand dug.

5.0.2 Information with respect to buried services was obtained from relevant providers prior to commencement of the investigation works. However, as a precautionary measure all exploratory hole locations were scanned with a Cable Avoidance Tool prior to the commencement of works. In addition, hand dug service pits were completed to a depth of 1.2mbgl at all borehole locations deemed to fall in close proximity to the suspected location of possible buried service runs / infrastructure.

5.0.3 An engineer from cadent was present to trace the high-pressure gas main and perform a watching brief on the slit trenching works to expose the gas main.

5.0.4 Soil samples were collected for subsequent chemical and geotechnical laboratory analysis. Soil samples used for geotechnical analysis were collected in 500g plastic sample tubs and U70 sample tubes. Samples collected for chemical testing were collected in 300g glass jars and 500g plastic sample tubs. Samples were obtained from both made ground and natural strata to assess the overall quality of underlying soils. In situ soil strength was investigated using Standard Penetration Tests (SPT).

5.0.5 The shallow soils encountered during construction of the boreholes were described and logged by a suitably qualified engineer in accordance with BS 5930: Code of Practice for Site Investigations (the log sheets for which have been provided within Appendix B).

6.0 Encountered Ground Conditions

6.0.1 The following ground conditions are summarised from the exploratory holes formed during the RºC Consulting site investigation. The following represents an overview of encountered ground conditions and it is recommended reference be made to the borehole and trial pit log sheets provided within Appendix B for a detailed strata description; all depths shown are given in metres below ground level (mbgl) unless otherwise stated).

6.1 Ground Conditions Overview

Made Ground

6.1.1 Made ground was reported at all exploratory hole locations the details of which is provided in table 6.1 below:

Table 6.1: Made Ground Strata Description

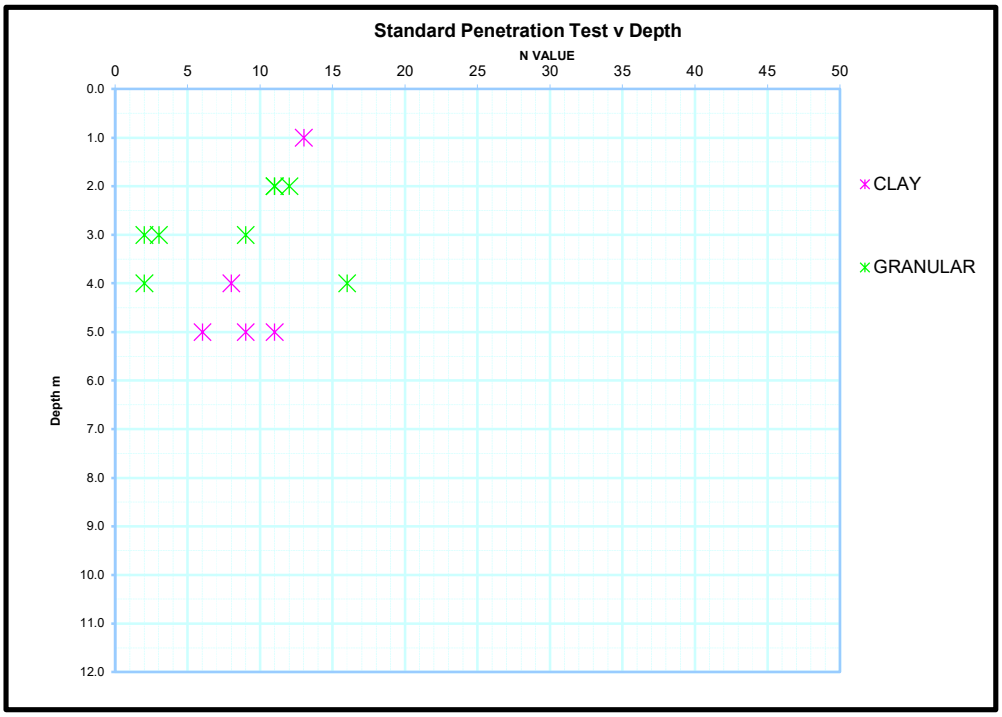
Strata description	Made ground was encountered at surface level in WS101 and WS102 as asphalt ranging in thickness from 0.05 to 0.10mbgl. Asphalt was underlain by a limestone gravel subbase to circa 0.20mbgl. At WS103 Topsoil was encountered at the surface to 0.20mbgl and underlain by a granular demolition fill material containing brick and limestone to 0.80mbgl this was also encountered in WS101 and WS102 to 0.50 and 0.70mbgl respectively. In WS101 a thin layer of demolition fill material contained within a clay matrix was encountered at 0.50 to 0.75mbgl. No SPTs were undertaken within demolition fill material, however anecdotally there was difficulty in forming handpits through the made ground. No groundwater strikes were encountered within the made ground deposits.		
Max Depth	0.80mbgl	**Min Depth**	0.60mbgl
Mean Depth	0.75mbgl	**SPT Range**	N/A

Hummocky Glacial Deposits Sand / Clay

6.1.2 Natural soils were reported at the base of made ground deposits at all exploratory hole locations clay and sand deposits were found to alternate throughout the borehole as described in Table 6.2 and table 6.3.

Table 6.2 Hummocky Glacial Deposits

Strata description	Immediately underlying made ground deposits at all boreholes was interbedded sand and clay deposits. Clay was generally comprised of and orangish brown / brown sandy clay / gravelly clay. Sand deposits were found to comprise a light brown / brown fine to medium sand / gravelly silty sand. SPT values ranged from 2 to 16 in clay deposits and 2 to 16 in sand deposits. Figure 6.1 below indicates SPT N values in both clay and granular material correlated to depth. It can be seen there is no correlation between strength of soils and depth. Groundwater was not encountered within glacial clay deposits / sand deposits.		
Max Depth	5.45mbgl (unproven)	**Min Depth**	N/A
Mean Depth	N/A	**SPT Range**	2-16



Weathered Bedrock

6.1.3 Weathered bedrock was not encountered during the site investigation works.

6.2 Groundwater & Contamination Observations

6.2.1 No visual or olfactory evidence of contamination was encountered during the site investigation works.

6.2.2 Groundwater not encountered during the site investigation works.

6.3 Below ground obstructions

6.3.1 No below ground obstruction were encountered during the site investigation works.

6.4 TRLDCP Testing

6.4.1 DCP testing was conducted through the dropping of an 8kg hammer from a height of 575mm and recording the resulting penetration of a 20mm cone through the ground. CBR values have been calculated from the number of blows per millimetre. The reported CBR values are banded based on the number of blows recorded for each increment.

6.4.2 The tests, which were completed in accordance with the method detailed in the Design Manual for Roads and Bridges Volume 7 Section 3 Part 2 HD29/08 and were extended to depths between 0.050 – 0.950m through the ground.

6.4.3 Table 6.4 below summarises calculated CBR values for ranges of depths recorded at each location within proposed areas of redevelopment (excluding existing structure), with >5% CBR being acceptable.

Table 6.4: Dynamic Cone Penetrometer Analysis and Calculated CBR%

Location ID	Start Depth (mm)	End Depth (mm)	Calculated CBR%
Proposed Staff Car Park and Access Route			
DCP101	0	460	1
	460	709	5
	709	950	2
DCP102	0	295	3
	295	481	12
	481	570	33
	570	830	13
	830	950	22

6.5 Gas Main Delineation.

6.5.1 The high-pressure gas main present below the site was exposed by vacuum and hand excavation techniques. It was discovered that a protective concrete slab (c.900m in width) was present above the pipe along the entirety of the proposed junction works and beyond.

6.5.2 While the detailed design of the proposed junction widening is yet to be finalised anecdotally it is evident that the made ground and deleterious material present on site will be removed with an increase in level required to tie the future junction works in with the existing Hollinsbrook Way. This will serve to increase the existing depth of cover to the gas main and it is unlikely there will be an increase in overburden pressure due to the presence of the concrete protection pad.

6.5.3 Images of the slit trenching works are available in Appendix A along with sections and plans of the gas main construction in drawing ES103 and ES104.

7.0 Laboratory Testing

7.0.1 To establish the physical and chemical properties of underlying soils, a programme of laboratory analysis was completed utilising samples obtained during site investigation works. This analysis comprised the testing of soil samples to assist with the estimation of risks posed by contaminated land related concerns.

Chemical Testing

7.0.2 RoC Consulting submitted a total of 6 soil samples to a UKAS accredited testing facility for analysis against a range of determinands synonymous with the site's former industrial activity.

Determinands	No. of Tests
Toxic and phytotoxic metals and metalloids	6
Total & Speciated Polycyclic Aromatic Hydrocarbons (PAH),	6
Other inorganic substances (e.g. Sulphate, Cyanide etc)	6
Asbestos ID	6
Hydrocarbons	3
Water Soluble Sulfate & pH	6

7.0.3 Copies of chemical testing results have been provided within Appendix C.

Geotechnical Testing

7.0.4 A programme of geotechnical laboratory analysis was also completed on tub and undisturbed soil samples obtained during site investigation works.

Plasticity Index

7.0.5 A total of 3 soil samples were tested for the determination of the clay / silt's plasticity index. The depth range of samples tested varied from 0.80 to 1.00m with a mean depth of 0.87mbgl. The plasticity index range varied between 4 and 16% with a mean value of 11%. These results indicate clays to be of a low plastic nature.

Undrained Shear Strength

7.0.6 A total of 2 glacial clay samples were tested for the determination of undrained shear strength from a depth of 1.00mbgl. Shear strength results vary between 103 and 194kPa with a mean value of 148.5kPa. These results indicate shallow clay strengths vary between high to very high strength

7.0.7 Results from geotechnical laboratory testing have been provided within Appendix D.

8.0 Geo-Environmental Assessment

8.0.1 The results from the intrusive Phase 2 ground investigation have been used to complete a refined assessment of risks posed by ground contamination and ground stability issues beneath the site. The assessment considers these risks both in terms of the site's current arrangement and usage, as well as any potential future development (and associated construction process).

8.0.2 The assessment has been collated with reference to various statutory and non-statutory guidance documents relating to land contamination and ground stability. Specifically, the assessment has been conducted in accordance with the Environment Agency Land Contamination Risk Management (LCRM) guidance relating to the "Tier 2 Generic Quantitative Risk assessment" process (revised April 2021).

8.0.3 In accordance with this method, a Refined Conceptual Model has been collated for the site based on the results of the desktop review. This model is based around the Source / Pathway / Receptor methodology as outlined in Fig 8.0.

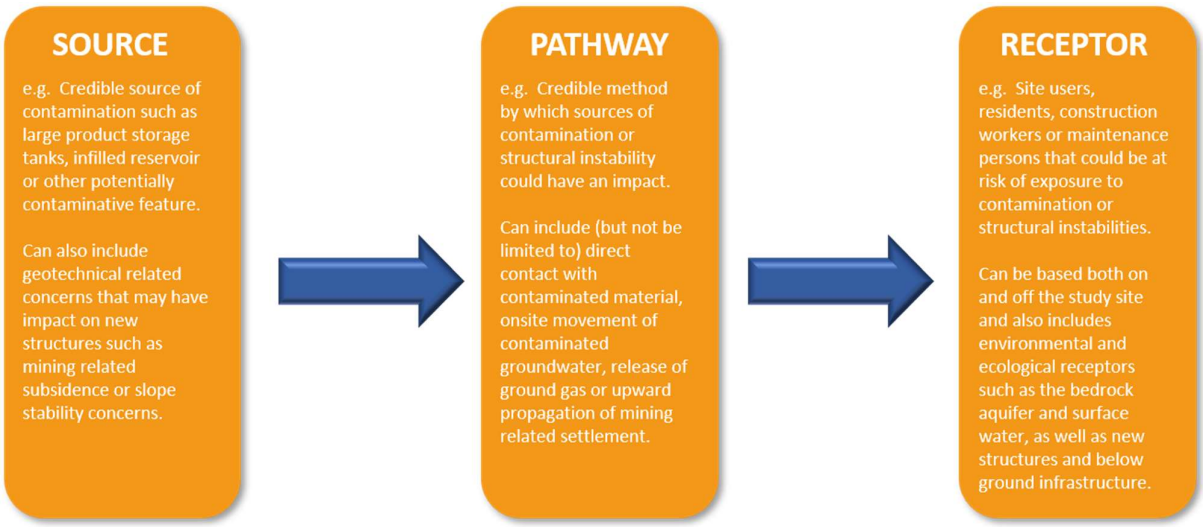


Figure 8.0 Source Pathway Receptor Diagram

8.0.4 Risk assessment is the process of collating known information on a hazard or set hazards in order to establish actual or potential risks to receptors. The receptor may be human health, controlled waters, a sensitive local ecosystem or even construction materials. Receptors can be connected with the hazard under consideration via one or several exposure pathways (e.g., the pathway of direct skin contact and oral exposure).

8.0.5 Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there is deemed to be no risk. In other words, the mere presence of a hazard at a site does not mean that there will necessarily be risks.

8.0.6 Potential sources of contamination have been identified across the site, where applicable, based on observations and information obtained during the desktop review. These sources are defined based on the results from site investigation fieldworks and subsequent laboratory analysis of samples / monitoring works.

8.0.7 The risk assessment has been completed with reference to the guidance outlined within CIRIA 552 "Contaminated land risk assessment. A good practice guide". This risk assessment methodology considers the potential consequence / severity of risks that may be present within soils in comparison with the likelihood of exposure to or and occurrence of said risk. A range of risk classifications are provided within CIRIA 552 further details of which are provided in Table 8.0 below.

Table 8.0: Definition of risk class and consequence

Risk Class	Definition	Example
Minor	Potential for harm, although not significant, which may result in financial loss to resolve. Ground conditions where the use of PPE would readily mitigate risks posed to human health.	Low level contamination hotspots within made ground / demolition fill materials. Stunted or impeded plant growth due to poor soil quality.
Mild	Pollution of non-sensitive water resources or damage to crops, plant growth, below ground utilities or structures.	Perched groundwater contamination overlying low permeability aquifer or aggressive sulphate concentrations in soils.
Medium	Sources of contamination identified on site have the potential to cause both long and short-term health effects on site residents / users. Alternatively (or in conjunction with) sources of contamination may have the potential to impact surface or groundwater quality or impede vegetation growth.	Elevated concentrations of hydrocarbon contamination reported within topsoil tested within residential gardens as a result of inadequate or incomplete previous remediation works. Movement of contaminated groundwater from leaking below ground storage tank into adjacent surface water course.
Severe	Sources of contamination pose a credible and acute risk to human health with potential for "Significant Harm" occurring as defined by the Part IIA of the Environmental Protection Act (1990). Alternatively (or in conjunction with risks posed to human health) sources of contamination may pose an immediate risk to controlled water resources or ecosystems.	Grossly contaminated soils are encountered or disturbed during excavation works, causing an immediate release of toxic soil vapour and leachate / contaminated groundwater flow across adjacent land.

8.0.8 As previously discussed the contaminated land risk assessment model evaluates the severity of risks that may be present within soils / groundwaters in the context of threats posed to identified receptors before deriving the actual risk rating based on the probability of occurrence. Table 8.1 (provided overleaf) outlines the range likelihood of risk.

Table 8.1: Probability Assessment

Classification	Definition
High likelihood	A credible pollutant linkage has been identified and it is very likely contaminants will impact identified receptors in both the short or long term (or is already actively doing so). The potential for harm to be caused is thus highly likely.
Likely	Pollutant linkages between the sources of contamination and identified receptors are present and it is considered likely they will become active given the right set of circumstances (e.g. contaminants currently buried below ground that are likely to be exposed or disturbed during construction / excavation works. The circumstances are such that an event is not inevitable, however it is possible in the short term and likely over the longer term.
Low likelihood	A theoretical pollutant linkage has been identified that has the potential to exposure receptors to contaminates under the correct circumstances. However, the likelihood of such an event occurring is not a certainty, even in the long term
Unlikely	There is no / minimal likelihood a pollutant linkage would occur, even over the long term.

8.0.9 The risk assessment process is a combination of probability and consequence, recognising that it may be possible to have a significant source of contamination beneath a site (such as a large below ground chemical storage tank) that may only present a relatively moderate to low risk (owing to the fact it may be contained within a secure concrete bund). Table 8.2 indicates how the actual nature of risk is established with Table 8.3 illustrating how the risk is interpreted in the context of contaminated land risk assessment.

Table 8.2: Risk Definition

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

Table 8.3: Description of risks posed

Risk Definition	Description
Very High	Active pollutant linkages between a significant source of contamination and identified receptors have been establish and there is a high likelihood of severe harm occurring to said receptors unless immediate investigation and remediation action is not taken.
High Risk	Harm is likely to arise to receptors from an identified hazard in the short and long term. Urgent investigation of the contaminant issue will be required, and remedial treatment is likely.
Moderate Risk	The possibility of harm has been identified toward receptors under the right circumstances, although the severity of harm would be relatively mild. Further investigation of identified issues would be prudent and possible need for remedial measures in the long term.
Low Risk	It is possible harm could arise to a designated receptor from identified hazard, but it is likely (if realised) any harm would be (at worst) mild.
Very Low Risk	No significant pollutant linkages have been identified and the possibly of harm occurring to receptors is low.

8.0.10 The Tier 2 risk assessment process can be divided based on the receptor group in question between:

1) Risks posed to human health by soil contamination (both construction persons and future site users).

2) Risks posed to human health by hazardous ground gas ingress (both construction persons and future site users).

3) Risks posed to controlled waters by soil or groundwater contamination (both surface water features and bedrock aquifers).

4) Risks posed to new building construction by aggressive ground conditions (namely elevated sulphate concentrations).

8.0.11 It is noted the site is to be used as part of a road widening scheme. This future use creates limited potential for contaminant exposure pathways with the only credible receptors being construction workers during the construction of the road widening scheme.

8.0.12 Appropriate assessment have been completed for each of the above utilising the latest statutory and non-statutory guidance documents; for details of risks posed to human health refer to Section 8.1 (soils) and Section 8.2 (ground gas), for details of risks posed to controlled waters refer to Section 8.3 and risks posed to new structures refer to Section 8.4.

8.1 Assessment of Soil Contamination

8.1.1 In order to estimate the risks posed to human health from soil contamination, a quantitative risk assessment has been completed utilising the latest Environment Agency CLEA methodology. The assessment utilises the chemical testing results obtained during the site investigation fieldworks to characterise site conditions and facilitate the completion of the risk assessment process.

8.1.2 The assessment is based on the comparison of soil chemical testing results with published Environment Agency Category Four Screening Levels (C4SL's) under the proposed end use scenario to determine the sites suitability for use. C4SL values represent the highest acceptable values for contaminants within site soils under the proposed end use and are derived using the Environment Agency CLEA risk assessment methodology. A result in exceedance of a C4SL level may indicate the presence of contaminants within site soils and require further assessment.

8.1.3 It is noted only a limited number of C4SL values have been derived by the Environment Agency for use and reference has been made to LQM/CIEH Suitable For Use Values (S4UL's) for a wider range of other contaminants (Heavy Metals, Poly Aromatic Hydrocarbons, TPH, SVOC and VOC's) to increase the depth and robustness of our assessment.

8.1.4 Chemical testing results are compared against C4SL and S4UL values for each determinant with any results reported in exceedance of screening criteria identified and their significance reviewed. When determining the significance of any exceedances within the dataset the magnitude and frequency of the exceedance need to be considered, for example, a single exceedance of a screening value may be considered a localised hotspot whereas consistently elevated levels of a substance at multiple locations across the site may indicate a more prevalent contamination issue.

8.1.5 In addition to this assessment, an Asbestos Identification test (via the visual inspection method) has been completed on all samples of made ground obtained during the investigation to determine risks posed. Any positive occurrences of Asbestos will be subject to quantification analysis to further assess the extent and significance of risks posed.

8.1.6 As required, for each exceedance reference will be made to the Conceptual Site Model to establish the most likely source of contaminants and initial commentary given as to the likely scope of remedial measures. In addition, reference will also be made to the assumptions used to derive generic assessment criteria (C4SL and S4UL values) to determine their comparability with the proposed end use.

8.1.7 For the purposes of this assessment we have assumed a "Commercial" end use scenario when reviewing chemical testing data against C4SL / S4UL values; a "worst case" Soil Organic Matter content value of 1% has been assumed for the initial assessment.

Summary and Assessment of Risks Posed by Soil Contamination

8.1.8 Results from chemical testing analysis indicate there were no exceedances of determinands when screened against a commercial end use scenario. As such the site is not considered to pose a risk toward future users or construction persons during the development process.

8.2 Ground Gas Risk Assessment

8.2.1 As the future site is to form part of a road it has not been deemed necessary to complete a ground gas risk assessment. However, it is advised that during the construction works any construction workers working below ground or within enclosed spaces carry suitable personal ground gas monitoring equipment and wear appropriate PPE as a precaution.

8.3 Controlled Waters

8.3.1 It is understood the site is underlain by a Secondary A Aquifer and is not said to be located within any Environment Agency Zone source protection zones or in close proximity to sensitive groundwater abstraction boreholes. The nearest surface water feature is indicated 210m to the south and is not considered to be at risk of contaminant migration from the study site due to the lack of any sources of contamination encountered on site.

8.4 Below Ground Concrete Construction

8.4.1 Peak potential sulphate concentrations range between <10 and 457 with soil pH values ranging between 8.01 and 8.99. Based on these results, it is considered that well compacted buried concrete should be designed in accordance with Class DS-1 AC1s requirements as specified in BRE Digest Special Digest 1:2005 *Concrete in aggressive ground: Version 3*.

8.5 Below Ground Utilities and Service Runs

8.5.1 The precise location of below ground utilities has not currently been defined. Given that no sources of contamination were encountered within site soils it is deemed unlikely that protective barrier pipes will be required.

9.0 Refined Conceptual Site Model

9.0.1 The Environmental Protection Act Part IIA: 1990, defines contamination as land containing levels of contamination which form a risk to human health, controlled waters or other ecosystems. Therefore, contamination in exceedance of the relevant screening values is considered a source. Table 9.0 assesses and summarises the sources, pathways and receptors that may exist at the site;

Table 9.0: Refined Conceptual Site Model

Table 9.0		Refined Conceptual Site Model					
	Source	Pathway	Receptor	Severity	Probability	Risk definition	Comments
On Site	Current Ground Conditions, including Made Ground	Dermal contact and / or ingestion; inhalation of vapours / dusts	Current Site Users	Minor	Unlikely	Very Low	Given the site is currently disused and the absence of any sources of contamination within site soils when screened against a “commercial” end use it is deemed there is a very low level of risk to current site users.
			Construction workers	Minor	Low Likelihood	Very Low	Given the absence of any sources of contamination within site soils when screened against a “commercial” end use, it is considered the risks posed to construction personnel, by exposure to site soils, can be adequately mitigated against via the use of full PPE and the adoption of good hygiene and site practices.* Appropriate personal ground gas detection equipment should be deployed by all site operatives when working in below ground or confined spaces.
			Future Site Users	Minor	Unlikely	Very Low	The site is to be developed to comprise an area of highway and it is considered future site users are not at risk of exposure to sources of contamination as outlined above. Therefore the risk to future site users is deemed to be very low.
			Ecological	Minor	Unlikely	Very Low	There is likely to be minimal soft landscaping adjacent the proposed area of highway and given the absence of any contamination within sampled soils it is deemed there is very low risk to any

Table 9.0		Refined Conceptual Site Model					
Source		Pathway	Receptor	Severity	Probability	Risk definition	Comments
							potential ecological receptors e.g. plants and trees planted adjacent the highway.
On site	Current Ground Conditions	Leaching of contaminated soil & impact beneath site	Controlled Waters: Aquifer	Minor	Unlikely	Very Low	The underlying drift and bedrock aquifers are both classed as Secondary B Aquifers. There are no SPZs or surface water features that are deemed to be at risk of contaminant ingress due to no contaminants being encountered during the site investigation works.
			Adjacent Sites	Minor	Unlikely	Very Low	There are no identified sensitive land uses in close vicinity to the site, nor were any sources of contamination identified during site investigation works. Therefore the risk to adjacent sites is deemed to be very low.
		Below ground service runs	Below ground infrastructure & construction	Minor	Unlikely	Very Low	All below ground concrete structures to be designed in accordance with a Class DS-1 AC-1s requirements as specified in BRE Digest Special Digest 1:2005 Concrete in aggressive ground: Version 3.
Off site	Potentially Contaminative Sources; Controlled waters and ground gas generation [adjacent landfills, peat bogs etc]	Leaching of contaminated soil onto site	Controlled Waters: Aquifer	Medium	Unlikely	Very Low	There is not deemed to be any potentially contaminative land uses in close proximity to the site that may leach into site soil and impact upon the underlying Secondary A aquifer.
			Controlled Waters: Surface Water	Minor	Unlikely	Very Low	No surface water features are located on site.
			Current Site Users	Minor	Unlikely	Very Low	No significant sources of offsite contamination have been identified.
			Construction Workers	Minor	Unlikely	Very Low	
			Future Site Users	Minor	Unlikely	Very Low	

Table 9.0		Refined Conceptual Site Model					
Source		Pathway	Receptor	Severity	Probability	Risk definition	Comments
		Ground Gas Migration / Accumulation	Current Site Users	Minor	Unlikely	Very Low	No significant sources of offsite ground gas generation have been identified.
			Construction Workers	Minor	Unlikely	Very Low	
			Future Site Users	Minor	Unlikely	Very Low	

*Any sources of contamination uncovered during site development works should be brought to the immediate attention of RoC Consulting for consideration and comment.

Soil Contamination Remedial Requirements

9.0.2 Following completion of investigation works chemical testing of site soils has failed to reveal any specific sources of contamination that could require specific remedial measures.

9.0.3 It is recommended all construction contractors take reasonable precautions to control environmental impacts that may occur as a result of redevelopment works with respect of soil and groundwater quality. These measures should include (and not be limited to):

1) Any sources of contamination uncovered during site development works should be brought to the immediate attention of RoC Consulting for consideration and comment. As required, the findings and recommendations of the current assessment may require amendment to reflect changes in site condition.

2) The operation of plant, refuelling facilities and general basement excavation works should include appropriate provision to reduce the risk of leakage / spillage, particularly into the site's groundwater table or exposed natural soils.

3) Appropriate dust mitigation measures should be deployed during basement excavation works, particularly when handling and excavating made ground deposits.

4) All excavated materials stockpiled should be periodically dampened down to control dust release. Similarly, the disposal of any material from site should be completed using covered wagons.

Ground Water Remedial Requirements

9.0.4 No sources of soil contamination have been revealed during ground investigation works. Given the sites locality and proximity to sensitive water / ground water receptors it is not considered any risks are posed to controlled water resources.

Ground Gas Protection Measures

9.0.5 As the proposals for the site are for the widening of Hollins Brook Way there are no requirements for ground gas protection measures.

10.0 Geotechnical & Foundation Design Assessment

Background Information

10.0.1 It is understood the site is to form part of proposed widening works for Hollins Brook Way.

10.0.2 Site investigations indicate made ground was encountered at all 3 locations comprising asphalt and car park built up underlain by demolition fill at 0.70mbgl at WS101 and WS102 respectively. At WS103 topsoil underlain by demolition fill was encountered to a depth of 0.80mbgl. Natural soils were found underlying made ground material and comprised alternating bands of clay and granular material (predominantly sand).

10.0.3 SPT tests in natural strata varied from 2 to 16. Samples were taken from the first metre of natural soils for geotechnical testing including Atterberg 1 Point and Undrained Triaxial testing. The plasticity of shallow cohesive soils was found to be low while the shear strength as indicated by the Undrained Triaxial tests was deemed to be high to very high. groundwater was encountered during site investigation works.

10.0.4 TRL DCP testing has established CBR values within the upper 1.0m ranging between 1 and 33% with values typically around 3-5%.

10.1 New Road Design

10.1.1 It is not recommended the proposed road be constructed on top of made ground deposits. The variable composition and in situ strength of these materials is such that unacceptable levels of total and differential settlement will occur as a result.

10.1.2 It is noted the proposed junction expansion will likely require an increase in site levels over and above those currently noted on site to tie into existing levels at Hollins Brook Way to the north. This will require the stripping of topsoil, vegetation and other deleterious material from the site surface in the area of new highway with any increase in levels completed using suitable granular engineering fill material.

10.1.3 The aforementioned High Pressure gas main is present beneath the road alignment and is covered with a concrete protection slab. The trial holes formed to date indicate this slab is present across the entire area of the proposed new expansion, although this will need to be confirmed and agreed with Cadent Gas as part of any build over agreement. Given the junction construction will require an increase in cover over the top of this asset, and assuming Cadent Gas can consent with a build over agreement, we consider it is unlikely the new road construction requires the diversion or any further protective measures to be employed over this asset.

10.1.4 Any upfilling and road construction should be rolled and compacted in accordance with the Series 600 specification for earthworks and subject to confirmatory CBR testing at regular intervals throughout. A minimum 5% CBR should be attained at the formation level.

10.1.5 Peak potential sulphate concentrations range between <10 and 457 with soil pH values ranging between 8.01 and 8.99. Based on these results, it is considered that well compacted buried concrete should be designed in accordance with Class DS-1 AC1s requirements as specified in BRE Digest Special Digest 1:2005 *Concrete in aggressive ground: Version 3*.

10.2 General Comments

10.2.1 No entry should be permitted into excavations exceeding 1.2m depth without appropriate risk assessments, shoring and support. Whilst groundwater was not encountered in significant volumes during site investigation works the presence of a perched water table cannot be precluded. Appropriate provisions should be made to dewater excavations as and when required.

10.2.2 Similarly it is not recommended foundation excavations to underlying clay be left open and exposed to the elements as rainwater ingress will damage and reduce its strength (and subsequent bearing capacity). Similarly, no vehicular movements should be permitted within exposed foundation locations.

10.2.3 The geotechnical assessment has been collated based on the proposed development type, layout and likely loadings at the time of report publication. It should be noted that future alterations to these proposals or loadings (including alterations in the site layout or new building scale) will require the re-interpretation of the current assessment. In such an instance updated design information should be provided to RoC Consulting and the current assessment updated accordingly.

11.0 Conclusions & Recommendations

11.0.1 The site is to form part of the proposed road widening works for Hollins Brook Way.

11.0.2 Site investigations have revealed made ground present at all 3 locations comprising asphalt and car park built up underlain by demolition fill at 0.70mbgl at WS101 and WS102 respectively. At WS103 topsoil underlain by demolition fill was encountered to a depth of 0.80mbgl. Natural soils were found underlying made ground material and comprised alternating bands of clay and granular material (predominantly sand).

11.0.3 SPT tests in natural strata varied from 2 to 16. Samples were taken from the first metre of natural soils for geotechnical testing including Atterberg 1 Point and Undrained Triaxial testing. The plasticity of shallow cohesive soils was found to be low while the shear strength as indicated by the Undrained Triaxial tests was deemed to be high to very high. groundwater was encountered during site investigation works.

11.0.4 Chemical assessment of site soils has failed to reveal any sources of soil contamination when compared against a *"Commercial"* end use scenario. Due care and attention should be taken at all times when excavating site soils and any suspected sources of contamination identified brought to the immediate attention of RoC Consulting.

11.0.5 It is not recommended the proposed road be constructed on top of made ground deposits as differential settlement may occur as a result. Site levels are likely to be increase to tie site levels into those on Hollins Brook Way. This should be carried out using suitable granular engineering fill; with the removal of deleterious materials / topsoil and a minimum 5% CBR value attained at formation level.

11.0.6 A High-Pressure gas main is present beneath the road alignment and is covered with a concrete protection slab across the entirety of the proposed works. Given the junction construction will require an increase in cover over the top of this asset, and assuming Cadent Gas can consent with a build over agreement, we consider it is unlikely the new road construction requires the diversion or any further protective measures to be employed over this asset.

11.0.7 As required, any suspected sources of contamination discovered during the site development (outside those discussed in this report) should be brought to the attention of RoC Consulting and their implications assessed. Depending on the extent and severity, the findings and assessment of the current study may require re-interpretation and a remediation strategy proposed to support the sites development.

11.0.8 Copies of the current report should be submitted to the local planning authority for consideration and comment. As required, any feedback received from the local authority should be passed back to RoC Consulting for review.

APPENDIX A – Site Drawings

Photo No. 1: ST102 and ST101

Photo No. 2: View northwest from ST101

Client:	JD Plc	Commercial Wharf, 6 Commercial Street, Manchester, M15 4PZ **T** 0161 214 5390 **W** rocconsulting.com
Project Name:	Hollinsbrook Way, Bury	
Project No.:	4251	

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Photo No. 3: ST101

Photo No. 4: ST101

Client:	JD Plc	Commercial Wharf, 6 Commercial Street, Manchester, M15 4PZ **T** 0161 214 5390 **W** rocconsulting.com
Project Name:	Hollinsbrook Way, Bury	
Project No.:	4251	

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Photo No. 5: ST102

Photo No. 6: ST102

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Project Name:	Hollinsbrook Way, Bury		
Project No.:	4251		

Photo No. 7: ST103

Photo No. 8: ST103

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Project Name:	Hollinsbrook Way, Bury	
Project No.:	4251	

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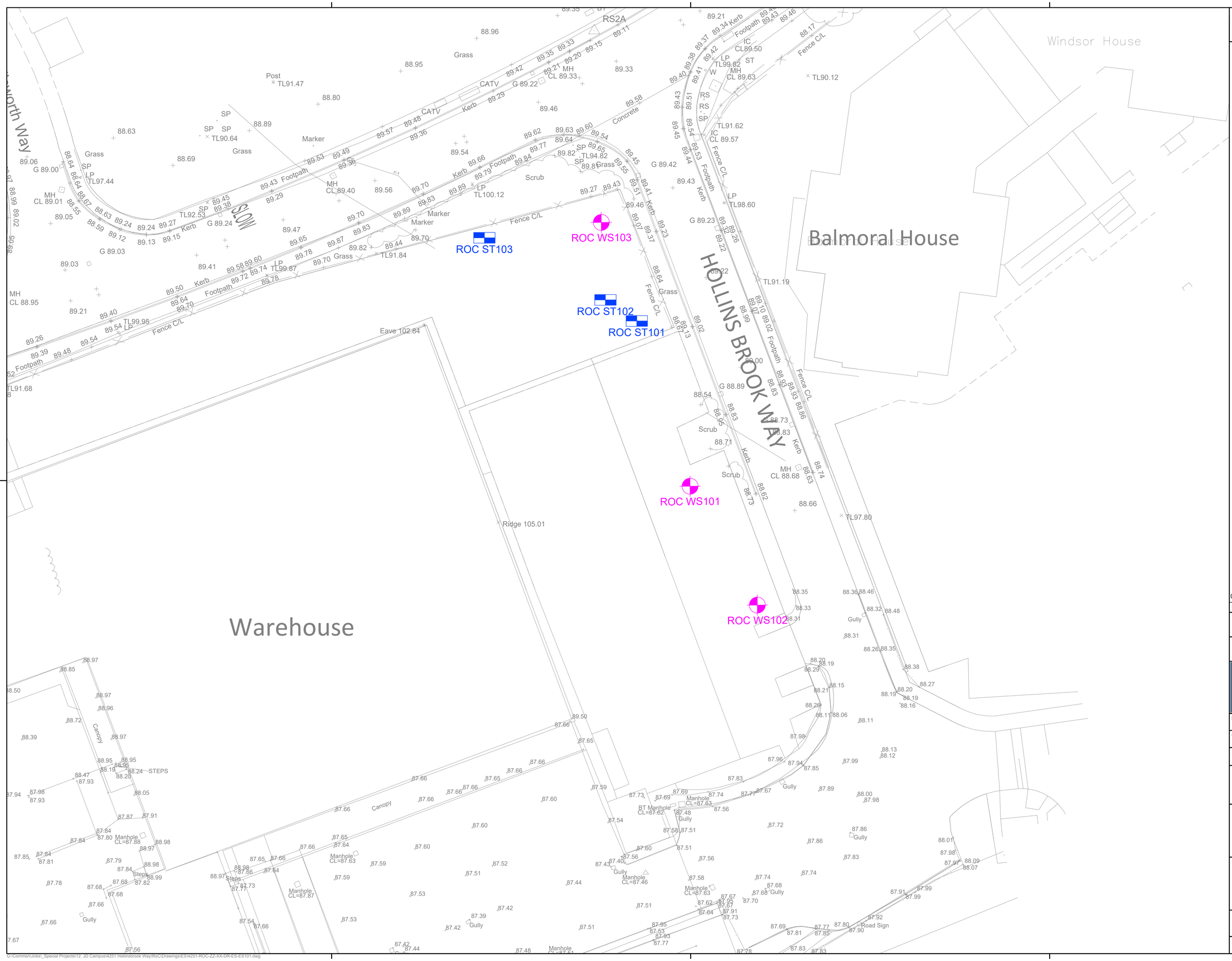

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NOTES

ES101 DRAWING NOTES

ROC WS101 — ROC WINDOW SAMPLE BOREHOLE LOCATION

ROC TP101 — ROC SLIT TRENCH LOCATION

DRAWING NOTES

1) EXPLORATORY HOLE LOCATIONS SHOWN AT APPROXIMATE EXTENTS.

2) PROPOSED DEVELOPMENT ARRANGEMENT TAKEN FROM EDDISONS PLANS AND MAY BE SUBJECT TO AMENDMENT OR REVIEW.

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CLIENT
JD PLC

PROJECT TITLE
HOLLINS BROOK WAY, BURY

DRAWING TITLE
SITE INVESTIGATION LAYOUT PLAN

DRAWING No. 4251-ROC-ZZ-XX-DR-ES-ES101
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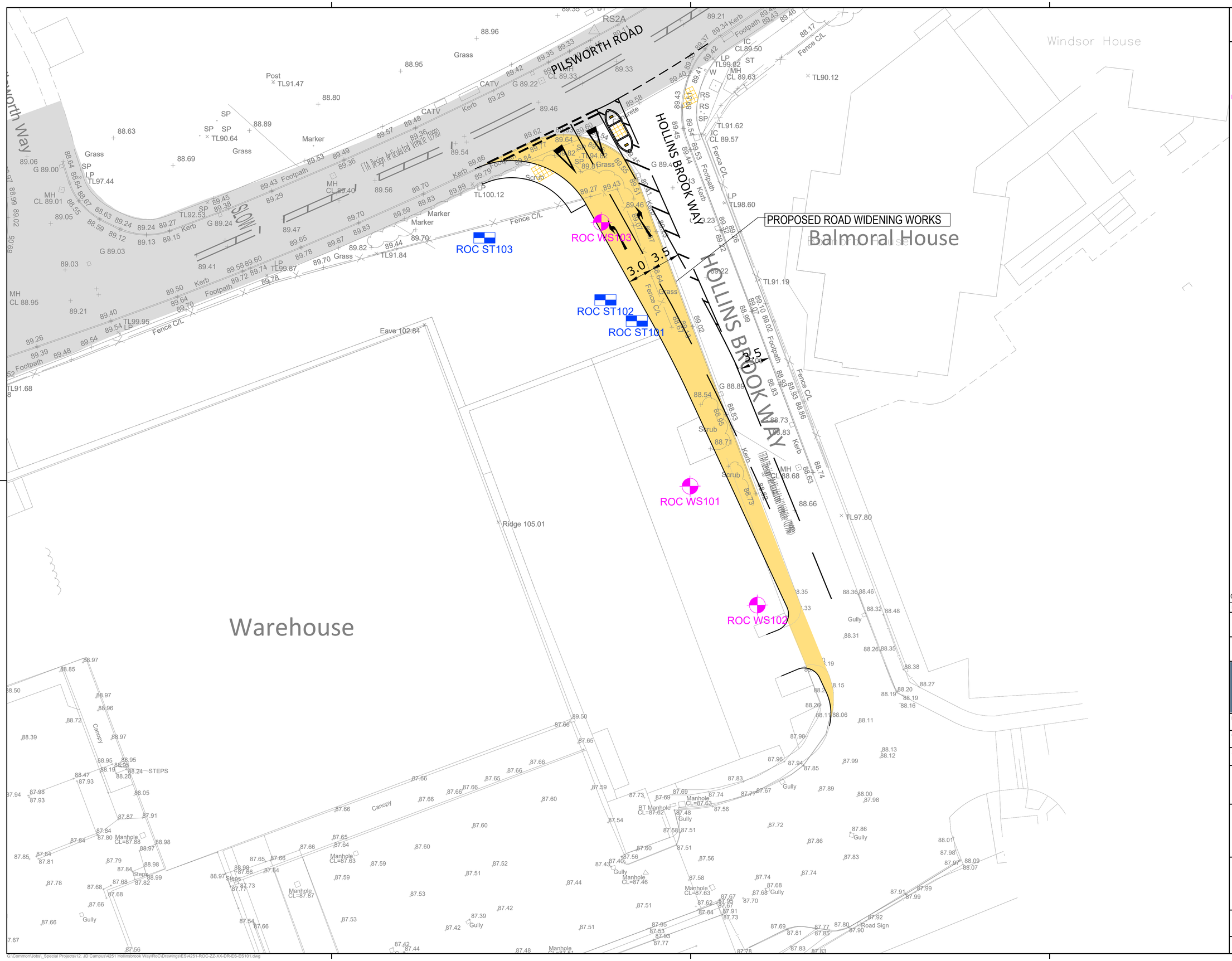

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JD PLC

PROJECT TITLE
HOLLINS BROOK WAY, BURY

DRAWING TITLE
SITE INVESTIGATION LAYOUT PLAN (PROPOSED SITE)

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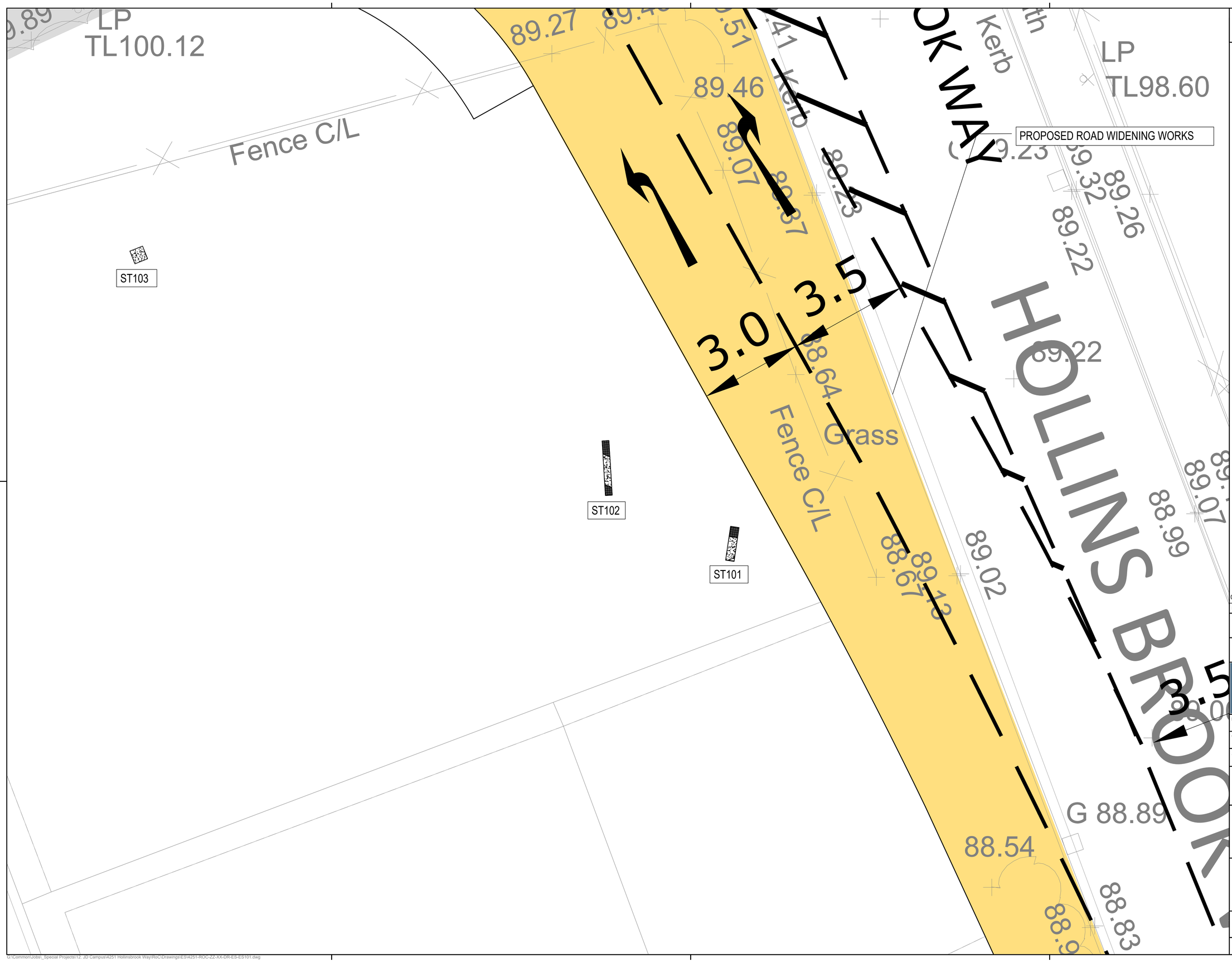

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NOTES

ES103 DRAWING NOTES

ROC SLIT TRENCH CONCRETE

ROC SLIT TRENCH SOIL

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PROJECT TITLE
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DRAWING TITLE
SITE INVESTIGATION SLIT TRENCH PLAN (PROPOSED SITE)

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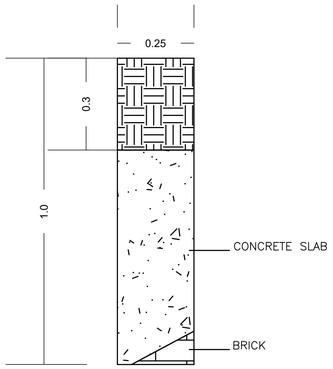

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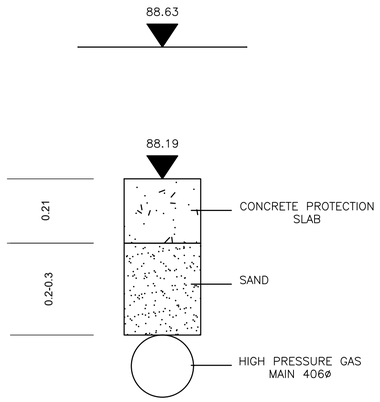

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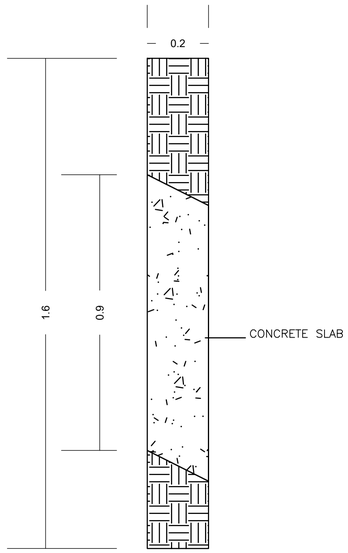

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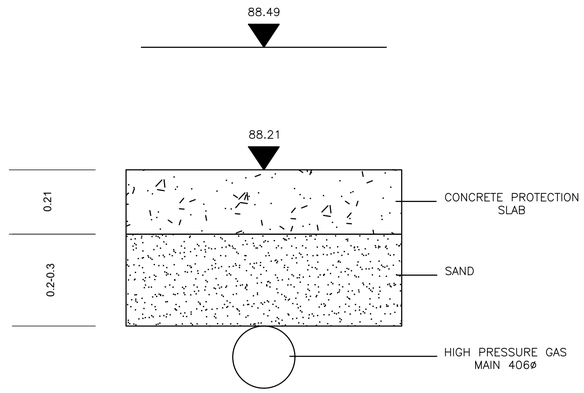

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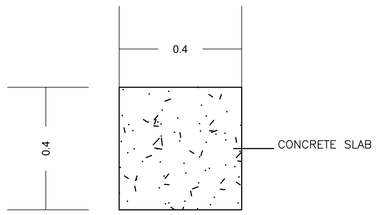

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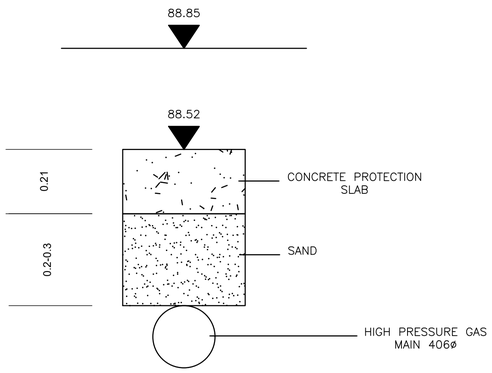

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2) PROPOSED DEVELOPMENT ARRANGEMENT TAKEN FROM EDDISONS PLANS AND MAY BE SUBJECT TO AMENDMENT OR REVIEW.

3) ROC CONSULTING ACCEPTS NOT RESPONSIBILITY FOR ANY DAMAGES OR LOSS ARISING AS A RESULT OF THE USE OF THIS DRAWING

4) PLEASE REFER TO ROC CONSULTING PHASE 2 SITE INVESTIGATION REPORT DATED XX/11/2021 (REF:4251-ROC-ZZ-XX-RP-ES-PH2SI) FOR FINDINGS OF SITE INVESTIGATION WORKS.

REV.	DATE	DETAILS	DRN.	CHK.
01	01.11.21	FIRST ISSUE	RM	AS

DRAWING STATUS
INFORMATION

RIBA STAGE

RoC CONSULTING
Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
W rocconsulting.com

DRAWN	DATE	SCALES
RM	29/10/2021	1:10
CHECKED AS	DATE 29/10/2021	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE –DO NOT SCALE–
APPRVD. AS	DATE 29/10/2021	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
JD PLC

PROJECT TITLE
HOLLINS BROOK WAY, BURY

DRAWING TITLE
GAS MAIN PLANS & SECTIONS

DRAWING No. 4251-ROC-ZZ-XX-DR-ES-ES104
REV. 01

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COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX B – Exploratory Hole Logsheets

Percussion Drilling Log

Project Name: Hollins Brook Way	Client: JD Plc	Date: 27/10/2021
Location: Bury	Contractor: Earth Engineering	
Project No. : 4251	Crew Name: G.P, L.S	Drilling Equipment: Competitor 150

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS101	WS		RM	1:25	Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
					0.05			Asphalt (MADE GROUND)	
		0.20	ES		0.18			Greyish brown sandy angular fine to medium GRAVEL of limestone (MADE GROUND)	
					0.40			Reddish brown slightly clayey sandy sub angular to angular fine to coarse GRAVEL of brick. Occassional red brick cobbles. (MADE GROUND)	
		0.60	ES		0.50			Brown gravelly SAND. Gravel is fine to coarse sub angular of sandstone, brick and limestone. Occassional wood fragments (MADE GROUND)	
		0.80	D		0.75			Firm reddish brown sandy gravelly CLAY. Gravel is sub angular to angular of brick and limestone (MADE GROUND)	
		1.00 - 1.40	U					Stiff brown mottled orangish brown slightly gravelly CLAY. Gravel is sub rounded to rounded fine of sandstone and coal (HUMMOCKY GLACIAL DEPOSITS)	1
					1.20			Medium dense light brown fine to medium SAND (HUMMOCKY GLACIAL DEPOSITS)	
								…at 1.55mbgl becoming brown	
								…at 1.80mbgl becoming gravelly. Gravel is sub angular to rounded fine to medium of sandstone and siltstone	
		2.00	SPT	N=11 (2,2/3,3,2,3)					2
								…at 2.40mbgl greyish brown sub angular to rounded fine to medium gravel of sandstone and siltstone	
								…at 2.70mbgl becoming slightly clayey	
		3.00	SPT	N=2 (1,1/0,0,0,2)					3
					3.20			Very soft brown slightly sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	
								…at 3.20mbgl becoming wet	
		4.00	SPT	N=2 (0,0/0,0,1,1)	4.00			Very loose brown slightly clayey slightly gravelly SAND. Gravel is rounded of various lithologies (HUMMOCKY GLACIAL DEPOSITS)	4
								…at 4.00 to 4.80mbgl no recovery	
					4.80			Soft brown very sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	
		5.00	SPT	N=6 (2,1/1,1,2,2)					5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00	300							0.00	5.45		
1.20	300										
2.00	97										
3.00	87										
4.00	77										

Remarks

1. Inspection pit dug to 1.00mbgl prior to drilling. 2. Groundwater was not observed. 3. Upon completion borehole was backfilled with arisings and surfacing reinstated with concrete.

Percussion Drilling Log

Project Name: Hollins Brook Way	Client: JD Plc	Date: 27/10/2021
Location: Bury	Contractor: Earth Engineering	
Project No. : 4251	Crew Name: G.P, L.S	Drilling Equipment: Competitor 150

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS101	WS		RM	1:25	Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Soft brown very sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)
					5.45			End of Borehole at 5.450m

6
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Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
1.00	300							0.00	5.45		
1.20	300										
2.00	97										
3.00	87										
4.00	77										

Remarks

1. Inspection pit dug to 1.00mbgl prior to drilling. 2. Groundwater was not observed. 3. Upon completion borehole was backfilled with arisings and surfacing reinstated with concrete.

Percussion Drilling Log

Project Name: Hollins Brook Way	Client: JD Plc	Date: 27/10/2021
Location: Bury	Contractor: Earth Engineering	
Project No. : 4251	Crew Name: G.P, L.S	Drilling Equipment: Competitor 150

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS102	WS		RM	1:25	Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
					0.10			Asphalt (MADE GROUND)	
					0.20			Greyish brown sandy subangular to angular fine to medium GRAVEL of limestone (MADE GROUND)	
		0.40	ES					Brown sandy subangular to angular fine to medium GRAVEL of limestone and brick. Rare sandstone cobble (MADE GROUND)	
					0.70			Soft brown mottled orangish brown sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	
		0.80	D						
		0.80	ES						
		1.00 - 1.40	U		1.00			Very soft brown mottled orangish brown slightly gravelly CLAY. Gravel is sub rounded to rounded fine of sandstone and coal (HUMMOCKY GLACIAL DEPOSITS)	1
					1.50			Soft brown very clayey SAND (HUMMOCKY GLACIAL DEPOSITS)	
					1.70			Medium dense brown fine to medium SAND (HUMMOCKY GLACIAL DEPOSITS)	
		2.00	SPT	N=11 (2,1/3,2,3,3)					2
								…at 2.20mbgl becoming dark brown	
								…at 2.50mbgl to 2.60mbgl fine angular band of coal gravel	
		3.00	SPT	N=3 (1,1/1,0,1,1)	3.00			Very loose dark brown silty SAND (HUMMOCKY GLACIAL DEPOSITS)	3
					3.50			Soft brown very sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	
		4.00	SPT	N=16 (4,3/4,4,4,4)	4.00			Medium dense dark brown medium SAND (HUMMOCKY GLACIAL DEPOSITS)	4
		5.00	SPT	N=11 (1,2/2,3,3,3)					5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
								0.00	5.45		

Remarks

1. Inspection pit dug to 1.00mbgl prior to drilling. 2. Groundwater was not observed. 3. Upon completion borehole was backfilled with arisings and surfacing reinstated with concrete.

Percussion Drilling Log

Project Name: Hollins Brook Way	Client: JD Plc	Date: 27/10/2021
Location: Bury	Contractor: Earth Engineering	
Project No. : 4251	Crew Name: G.P, L.S	Drilling Equipment: Competitor 150

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS102	WS		RM	1:25	Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					5.15			Medium dense dark brown medium SAND (HUMMOCKY GLACIAL DEPOSITS)
					5.45			Firm brown CLAY (HUMMOCKY GLACIAL DEPOSITS)
								End of Borehole at 5.450m

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Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
								0.00	5.45		

Remarks

1. Inspection pit dug to 1.00mbgl prior to drilling. 2. Groundwater was not observed. 3. Upon completion borehole was backfilled with arisings and surfacing reinstated with concrete.

Percussion Drilling Log

Project Name: Hollins Brook Way	Client: JD Plc	Date: 27/10/2021
Location: Bury	Contractor: Earth Engineering	
Project No. : 4251	Crew Name: G.P, L.S	Drilling Equipment: Competitor 150

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS103	WS		RM	1:25	Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
								Dark brown sandy organic SILT. Frequent roots and rootlets (TOPSOIL)	
					0.20			Brown gravelly fine SAND. Gravel is angular fine to medium of limestone and brick (MADE GROUND)	
		0.30	ES						
		0.70	ES						
					0.80			Firm brown mottled orange slightly gravelly CLAY. Gravel is sub rounded to rounded fine to medium (HUMMOCKY GLACIAL DEPOSITS)	1
		1.00	D						
		1.00	SPT	N=13 (4,4/4,3,3,3)					
					1.70			Medium dense light brown fine to medium SAND (HUMMOCKY GLACIAL DEPOSITS)	
		2.00	SPT	N=12 (2,2/3,2,3,4)					2
								...at 2.90mbgl fine angular band of coal gravel	
		3.00	SPT	N=9 (2,2/3,1,2,3)	3.00			Loose brown slightly gravelly silty SAND. Gravel is rounded fine to medium of quartz (HUMMOCKY GLACIAL DEPOSITS)	3
					3.80			Firm brown CLAY (HUMMOCKY GLACIAL DEPOSITS)	
		4.00	SPT	N=8 (1,2/1,2,2,3)					4
		5.00	SPT	N=9 (1,1/1,1,2,5)					5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
								0.00	5.45		

Remarks

1. Inspection pit dug to 1.20mbgl prior to drilling. 2. Groundwater was not observed. 3. Upon completion borehole was backfilled with arisings and surfacing reinstated with arising.

Percussion Drilling Log

Project Name: Hollins Brook Way	Client: JD Plc	Date: 27/10/2021
Location: Bury	Contractor: Earth Engineering	
Project No. : 4251	Crew Name: G.P, L.S	Drilling Equipment: Competitor 150

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS103	WS		RM	1:25	Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Firm brown CLAY (HUMMOCKY GLACIAL DEPOSITS)
					5.45			End of Borehole at 5.450m

6
7
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9
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Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
								0.00	5.45		

Remarks

1. Inspection pit dug to 1.20mbgl prior to drilling. 2. Groundwater was not observed. 3. Upon completion borehole was backfilled with arisings and surfacing reinstated with arising.

APPENDIX C – Chemical Testing Results

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

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/11842
Issue Number: 1 **Date:** 08 November, 2021

Client: ROCP LIMITED
Commercial Wharf 6 Commercial Street
Castlefield
Manchester
M15 4PZ

Project Manager: Reece McGuinness; Alex Smiles
Project Name: Hollinsbrook Way Bury
Project Ref: 4251
Order No: 1685
Date Samples Received: 29/10/21
Date Instructions Received: 01/11/21
Date Analysis Completed: 08/11/21

Approved by:

Richard Wong
Client Manager

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

Envirolab Job Number: 21/11842

Client Project Name: Hollinsbrook Way Bury

Client Project Ref: 4251

Lab Sample ID	21/11842/1	21/11842/2	21/11842/3	21/11842/4	21/11842/5	21/11842/6		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS102	WS102	WS103	WS103				
Depth to Top	0.20	0.60	0.40	0.80	0.30	0.70				
Depth To Bottom										
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	4ABE	4ABE	4AB	6A	4A	4ABE				
% Stones >10mm$_{A}$	12.7	16.5	25.6	14.9	12.7	13.6		% w/w	0.1	A-T-044
pH$_{D}^{M\#}$	8.50	8.71	8.99	8.01	8.13	8.13		pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_{D}^{M\#}$	457	191	25	<10	25	16		mg/l	10	A-T-026s
Cyanide (total)$_{A}^{M\#}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC$_{A}$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		mg/kg	0.2	A-T-050s
Fraction of organic carbon$_{D}^{\#}$	0.0082	0.0110	0.0051	0.0040	0.0176	0.0142		N/A	0.0003	A-T-032 FOC
Antimony$_{D}$	<5	<5	<5	<5	<5	<5		mg/kg	5	A-T-024s
Arsenic$_{D}^{M\#}$	2	<1	<1	<1	3	3		mg/kg	1	A-T-024s
Barium$_{D}$	189	87	71	39	70	86		mg/kg	1	A-T-024s
Beryllium$_{D}$	<0.5	<0.5	<0.5	<0.5	<0.5	0.5		mg/kg	0.5	A-T-024s
Boron (water soluble)$_{D}$	1.1	<1.0	<1.0	<1.0	<1.0	<1.0		mg/kg	1	A-T-027s
Cadmium$_{D}^{M\#}$	0.5	<0.5	0.5	<0.5	<0.5	0.6		mg/kg	0.5	A-T-024s
Copper$_{D}^{M\#}$	17	9	9	13	17	20		mg/kg	1	A-T-024s
Chromium$_{D}^{M\#}$	13	13	16	14	13	17		mg/kg	1	A-T-024s
Chromium (hexavalent)$_{D}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-040s
Chromium (trivalent)	13	13	16	14	13	17		mg/kg	1	Calc
Lead$_{D}^{M\#}$	100	46	19	11	31	30		mg/kg	1	A-T-024s
Mercury$_{D}$	0.82	<0.17	0.20	<0.17	<0.17	<0.17		mg/kg	0.17	A-T-024s
Molybdenum$_{D}^{M\#}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-024s
Nickel$_{D}^{M\#}$	13	10	17	9	11	15		mg/kg	1	A-T-024s
Selenium$_{D}^{M\#}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-024s
Vanadium$_{D}^{M\#}$	15	14	13	19	16	22		mg/kg	1	A-T-024s
Zinc$_{D}^{M\#}$	92	33	48	23	61	74		mg/kg	5	A-T-024s

Envirolab Job Number: 21/11842

Client Project Name: Hollinsbrook Way Bury

Client Project Ref: 4251

Lab Sample ID	21/11842/1	21/11842/2	21/11842/3	21/11842/4	21/11842/5	21/11842/6		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS102	WS102	WS103	WS103				
Depth to Top	0.20	0.60	0.40	0.80	0.30	0.70				
Depth To Bottom										
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	4ABE	4ABE	4AB	6A	4A	4ABE				
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}$ #	NAD	NAD	NAD	NAD	NAD	NAD				A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-				A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-				A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A				A-T-045

Envirolab Job Number: 21/11842

Client Project Name: Hollinsbrook Way Bury

Client Project Ref: 4251

Lab Sample ID	21/11842/1	21/11842/2	21/11842/3	21/11842/4	21/11842/5	21/11842/6		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS102	WS102	WS103	WS103				
Depth to Top	0.20	0.60	0.40	0.80	0.30	0.70				
Depth To Bottom										
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	4ABE	4ABE	4AB	6A	4A	4ABE				
PAH-16MS										
Acenaphthene$_{A}^{M\#}$	0.08	0.03	0.76	<0.01	0.69	0.10		mg/kg	0.01	A-T-019s
Acenaphthylene$_{A}^{M\#}$	<0.01	<0.01	0.02	<0.01	0.02	0.02		mg/kg	0.01	A-T-019s
Anthracene$_{A}^{M\#}$	0.16	0.11	0.87	<0.02	2.12	0.20		mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	0.18	0.05	0.14	<0.04	4.57	0.90		mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.13	<0.04	0.04	<0.04	3.82	1.27		mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	0.16	<0.05	0.05	<0.05	3.87	1.29		mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	0.08	<0.05	<0.05	<0.05	1.42	0.73		mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	<0.07	<0.07	<0.07	<0.07	1.43	0.46		mg/kg	0.07	A-T-019s
Chrysene$_{A}^{M\#}$	0.20	<0.06	0.17	<0.06	3.68	0.85		mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	<0.04	<0.04	<0.04	<0.04	0.37	0.17		mg/kg	0.04	A-T-019s
Fluoranthene$_{A}^{M\#}$	1.05	0.51	3.85	<0.08	11.3	1.83		mg/kg	0.08	A-T-019s
Fluorene$_{A}^{M\#}$	0.14	0.05	1.17	<0.01	0.59	0.06		mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.08	<0.03	<0.03	<0.03	1.92	0.87		mg/kg	0.03	A-T-019s
Naphthalene $_{A}^{M\#}$	0.04	<0.03	<0.03	<0.03	0.17	0.04		mg/kg	0.03	A-T-019s
Phenanthrene$_{A}^{M\#}$	0.96	0.89	10.8	0.05	7.04	0.71		mg/kg	0.03	A-T-019s
Pyrene$_{A}^{M\#}$	0.67	0.33	2.19	<0.07	9.71	1.66		mg/kg	0.07	A-T-019s
Total PAH-16MS$_{A}^{M\#}$	3.93	1.97	20.1	<0.08	52.7	11.2		mg/kg	0.01	A-T-019s

Envirolab Job Number: 21/11842

Client Project Name: Hollinsbrook Way Bury

Client Project Ref: 4251

Lab Sample ID	21/11842/1	21/11842/2	21/11842/3	21/11842/4	21/11842/5	21/11842/6		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS102	WS102	WS103	WS103				
Depth to Top	0.20	0.60	0.40	0.80	0.30	0.70				
Depth To Bottom										
Date Sampled	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21	27-Oct-21				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	4ABE	4ABE	4AB	6A	4A	4ABE				
TPH UKCWG										
Ali >C5-C6$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
Ali >C6-C8$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
Ali >C8-C10$_{A}$	<2	-	<2	-	-	<2		mg/kg	1	A-T-055s
Ali >C10-C12$_{A}^{M\#}$	<1	-	<1	-	-	<1		mg/kg	1	A-T-055s
Ali >C12-C16$_{A}^{M\#}$	4	-	<1	-	-	<1		mg/kg	1	A-T-055s
Ali >C16-C21$_{A}^{M\#}$	10	-	1	-	-	<1		mg/kg	1	A-T-055s
Ali >C21-C35$_{A}^{M\#}$	37	-	7	-	-	4		mg/kg	1	A-T-055s
Ali >C35-C44$_{A}$	9	-	19	-	-	<1		mg/kg	1	A-T-055s
Total Aliphatics$_{A}$	60	-	28	-	-	4		mg/kg	1	A-T-055s
Aro >C5-C7$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
Aro >C7-C8$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
Aro >C8-C10$_{A}$	<4	-	<4	-	-	<4		mg/kg	1	A-T-055s
Aro >C10-C12$_{A}$	<1	-	<1	-	-	<1		mg/kg	1	A-T-055s
Aro >C12-C16$_{A}$	4	-	12	-	-	2		mg/kg	1	A-T-055s
Aro >C16-C21$_{A}^{M\#}$	16	-	53	-	-	4		mg/kg	1	A-T-055s
Aro >C21-C35$_{A}^{M\#}$	15	-	19	-	-	16		mg/kg	1	A-T-055s
Aro >C35-C44$_{A}$	3	-	4	-	-	2		mg/kg	1	A-T-055s
Total Aromatics$_{A}$	40	-	90	-	-	25		mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C44)$_{A}$	100	-	118	-	-	30		mg/kg	1	A-T-055s
BTEX - Benzene$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
BTEX - Toluene$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
BTEX - o Xylene$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s
MTBE$_{A}^{\#}$	<0.01	-	<0.01	-	-	<0.01		mg/kg	0.01	A-T-022s

REPORT NOTES

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

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

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

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

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

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

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

v1

Envirolab Deviating Samples Report

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

Client: ROCP LIMITED, Commercial Wharf 6 Commercial Street, Castlefield, Manchester, M15 4PZ

Project: Hollinsbrook Way Bury

Clients Project No: 4251

Project No: 21/11842

Date Received: 01/11/2021 (am)

Cool Box Temperatures (°C): 12.7

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

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

Envirolab Analysis Dates

Lab Sample ID	21/11842/1	21/11842/2	21/11842/3	21/11842/4	21/11842/5	21/11842/6
Client Sample No						
Client Sample ID/Depth	WS101 0.20m	WS101 0.60m	WS102 0.40m	WS102 0.80m	WS103 0.30m	WS103 0.70m
Date Sampled	27/10/21	27/10/21	27/10/21	27/10/21	27/10/21	27/10/21
A-T-019s	04/11/2021	04/11/2021	04/11/2021	04/11/2021	04/11/2021	04/11/2021
A-T-022s	04/11/2021		04/11/2021			04/11/2021
A-T-024s	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021
A-T-026s	04/11/2021	04/11/2021	04/11/2021	04/11/2021	04/11/2021	04/11/2021
A-T-027s	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
A-T-031s	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
A-T-032 FOC	04/11/2021	04/11/2021	04/11/2021	04/11/2021	04/11/2021	04/11/2021
A-T-040s	04/11/2021	04/11/2021	04/11/2021	04/11/2021	04/11/2021	04/11/2021
A-T-042sTCN	02/11/2021	02/11/2021	02/11/2021	02/11/2021	02/11/2021	02/11/2021
A-T-044	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021	05/11/2021
A-T-045	02/11/2021	02/11/2021	02/11/2021	02/11/2021	02/11/2021	02/11/2021
A-T-050s	03/11/2021	03/11/2021	03/11/2021	03/11/2021	03/11/2021	03/11/2021
A-T-055s	04/11/2021		04/11/2021			04/11/2021
Calc	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021	08/11/2021

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

End of Report

COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX D – Geotechnical Testing Results

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

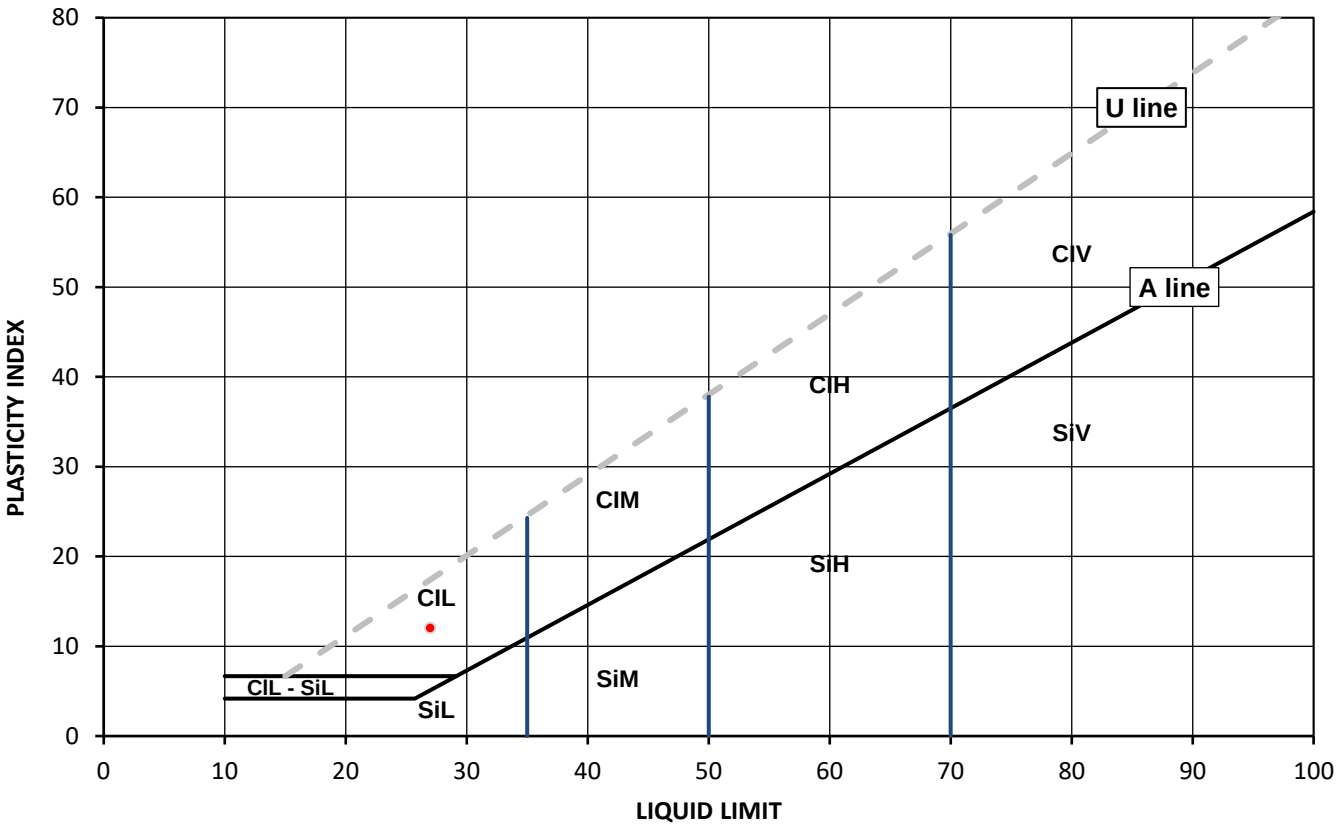
Client:	ROC Consulting Ltd	Client Reference:	4251
Client Address:	Commercial Wharf, 6 Commercial Street, Castlefield, Manchester, M15 4PZ	Job Number:	21-20214
		Date Sampled:	27/10/2021
		Date Received:	01/11/2021
Contact:	Reece McGuinnes	Date Tested:	10/11/2021
Site Address:	Hollinsbrook Way, Bury	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2068872	Depth Top [m]:	0.80
Hole No.:	WS101	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Yellowish brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
14	27	15	12	94



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed: Dudzińska Anna

Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

Date Reported: 24/11/2021

GF 232.11

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

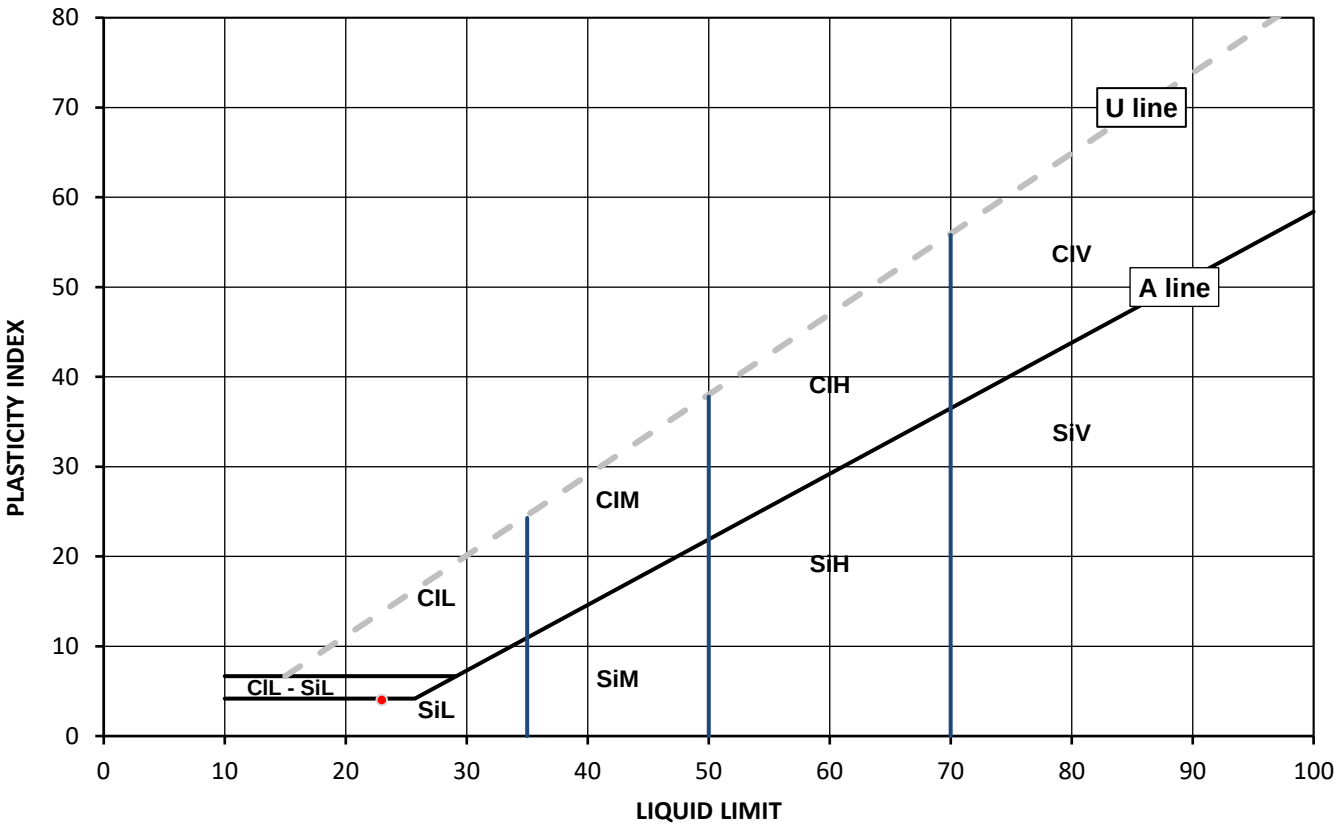
Client:	ROC Consulting Ltd	Client Reference:	4251
Client Address:	Commercial Wharf, 6 Commercial Street, Castlefield, Manchester, M15 4PZ	Job Number:	21-20214
		Date Sampled:	27/10/2021
		Date Received:	01/11/2021
Contact:	Reece McGuinnes	Date Tested:	10/11/2021
Site Address:	Hollinsbrook Way, Bury	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2068874	Depth Top [m]:	0.80
Hole No.:	WS102	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brownish grey slightly gravelly silty SAND		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	23	19	4	90



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
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		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

Date Reported: 24/11/2021

GF 232.11

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

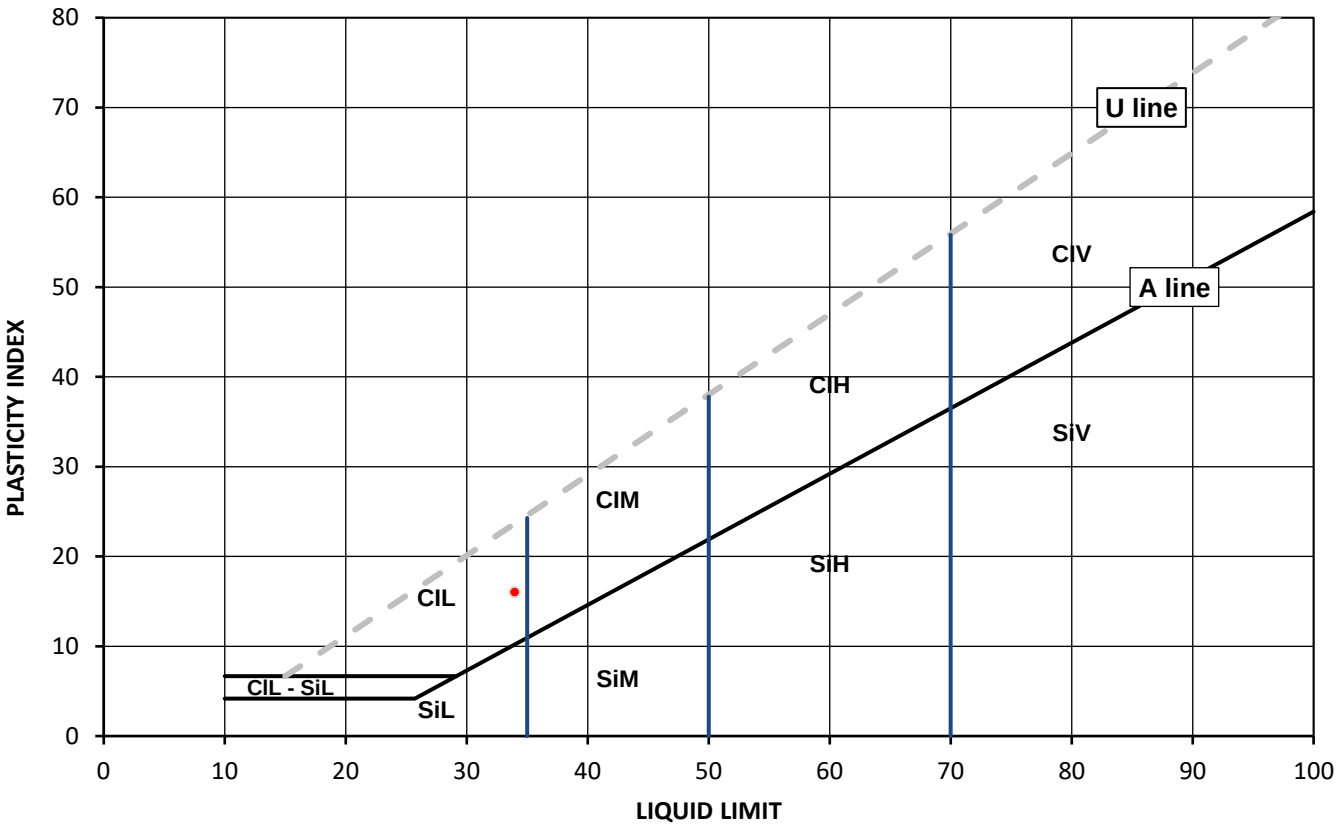
Client:	ROC Consulting Ltd	Client Reference:	4251
Client Address:	Commercial Wharf, 6 Commercial Street, Castlefield, Manchester, M15 4PZ	Job Number:	21-20214
		Date Sampled:	27/10/2021
		Date Received:	01/11/2021
Contact:	Reece McGuinnes	Date Tested:	10/11/2021
Site Address:	Hollinsbrook Way, Bury	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2068876	Depth Top [m]:	1.00
Hole No.:	WS103	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	34	18	16	95



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed: Dudzińska Anna

Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

Date Reported: 24/11/2021

GF 232.11

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: ROC Consulting Ltd

Client Address: Commercial Wharf, 6 Commercial Street, Castlefield, Manchester, M15 4PZ

Contact: Reece McGuinnes

Site Address: Hollinsbrook Way, Bury

Client Reference: 4251
Job Number: 21-20214
Date Sampled: 27/10/2021
Date Received: 01/11/2021
Date Tested: 10/11/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
2068872	WS101	Not Given	0.80	Not Given	D	Yellowish brown slightly gravelly very sandy CLAY	Atterberg 1 Point	14		94	27	15	12						
2068874	WS102	Not Given	0.80	Not Given	D	Brownish grey slightly gravelly silty SAND	Atterberg 1 Point	18		90	23	19	4						
2068876	WS103	Not Given	1.00	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	17		95	34	18	16						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

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Date Reported: 24/11/2021

GF 234.13

TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

UKAS TESTING 4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client:	ROC Consulting Ltd	Client Reference:	4251
Client Address:	Commercial Wharf, 6 Commercial Street, Castlefield, Manchester, M15 4PZ	Job Number:	21-20214
		Date Sampled:	27/10/2021
		Date Received:	01/11/2021
Contact:	Reece McGuinnes	Date Tested:	18/11/2021
Site Address:	Hollinsbrook Way, Bury	Sampled By:	Not Given

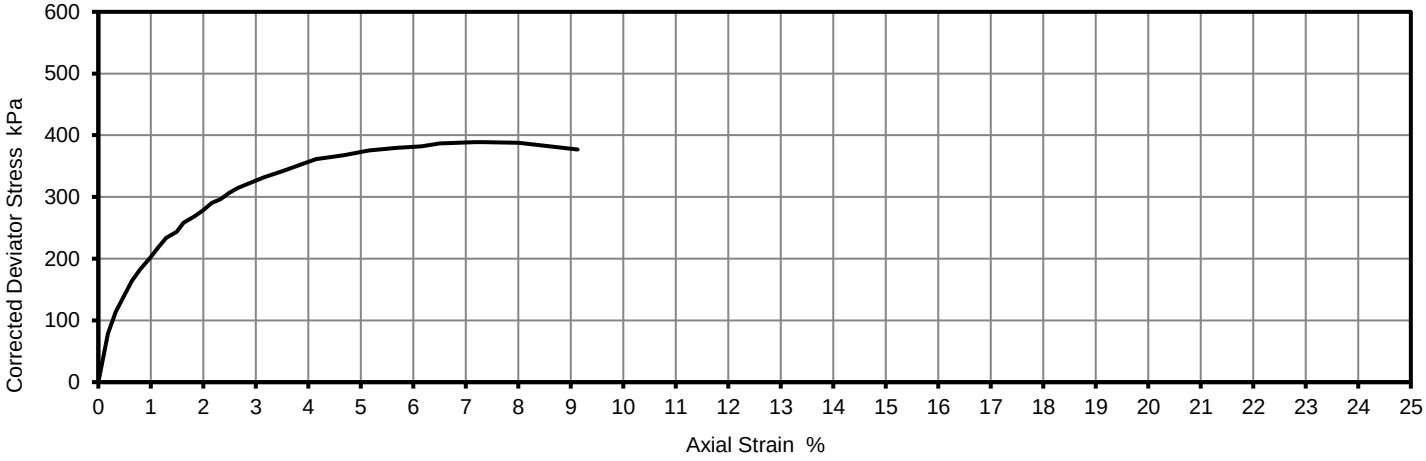
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

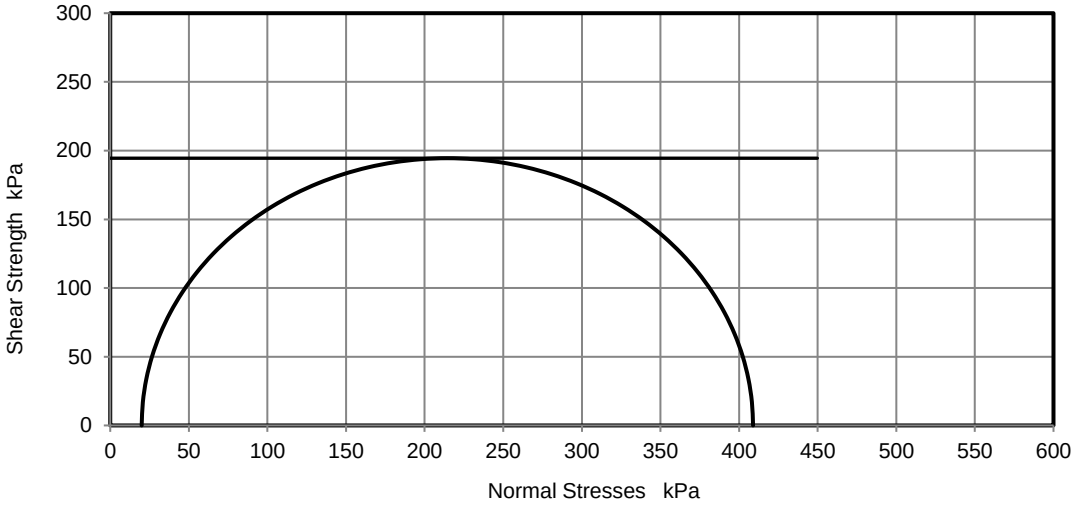
Laboratory Reference:	2068873	Depth Top [m]:	1.00
Hole No.:	WS101	Depth Base [m]:	1.40
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Yellowish brown and grey mottled slightly gravelly very sandy CLAY		

Test Number	1		Rate of Strain	2.00	%/min
Length	76.46	mm	Cell Pressure	20	kPa
Diameter	37.96	mm	Axial Strain at failure	7.3	%
Bulk Density	2.18	Mg/m3	Deviator Stress, (σ1 - σ3)f	389	kPa
Moisture Content	13	%	Undrained Shear Strength, cu	194	kPa ½(σ1 - σ3)f
Dry Density	1.92	Mg/m3	Mode of Failure	Compound	
Membrane Correction	0.99	kPa	Membrane thickness	0.21	mm

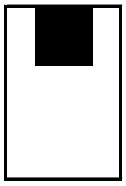
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks:

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Signed: Dudzińska Anna

Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

 Date Reported: 24/11/2021 **GF 184.11**

TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client:	ROC Consulting Ltd	Client Reference:	4251
Client Address:	Commercial Wharf, 6 Commercial Street, Castlefield, Manchester, M15 4PZ	Job Number:	21-20214
		Date Sampled:	27/10/2021
		Date Received:	01/11/2021
Contact:	Reece McGuinnes	Date Tested:	23/11/2021
Site Address:	Hollinsbrook Way, Bury	Sampled By:	Not Given

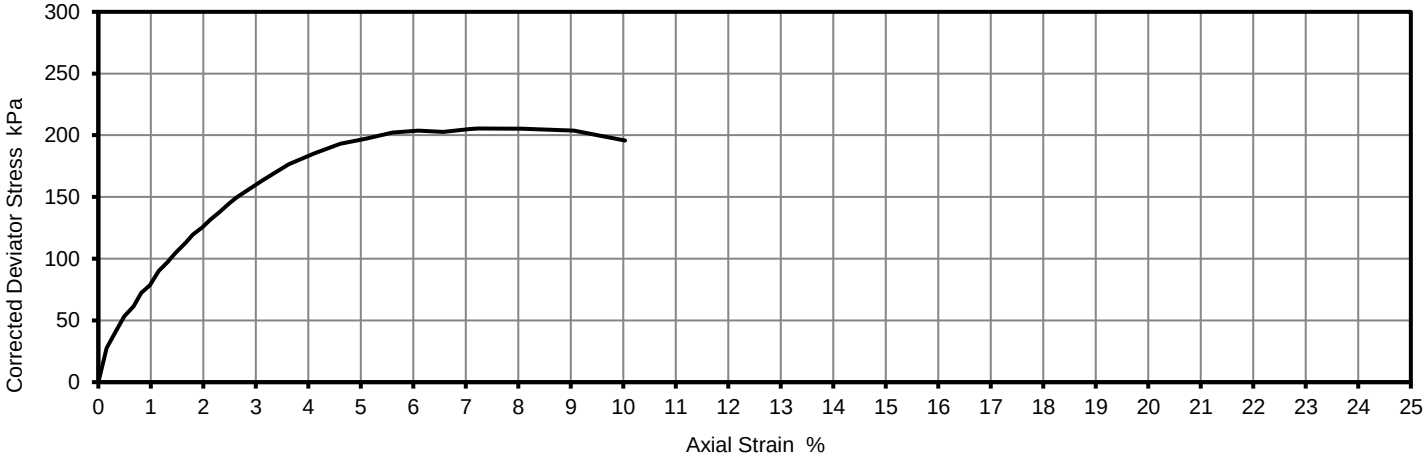
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

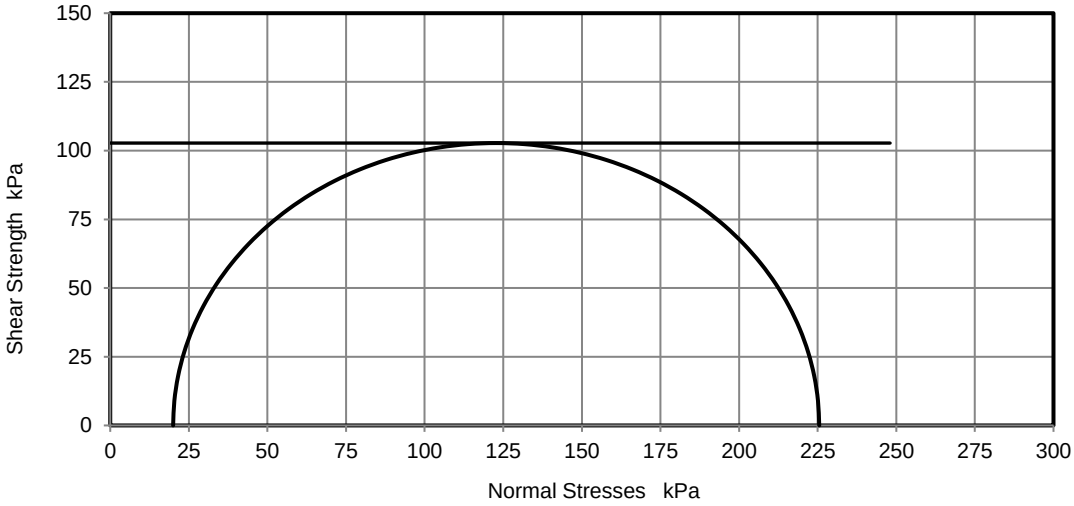
Laboratory Reference:	2068875	Depth Top [m]:	1.00
Hole No.:	WS102	Depth Base [m]:	1.40
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brownish grey very sandy CLAY		

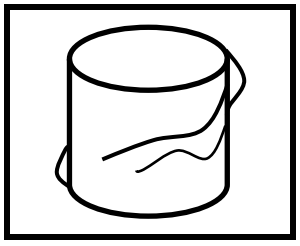
Test Number	1		Rate of Strain	2.00	%/min
Length	77.25	mm	Cell Pressure	20	kPa
Diameter	37.12	mm	Axial Strain at failure	7.2	%
Bulk Density	2.02	Mg/m3	Deviator Stress, (σ1 - σ3)f	205	kPa
Moisture Content	21	%	Undrained Shear Strength, cu	103	kPa ½(σ1 - σ3)f
Dry Density	1.68	Mg/m3	Mode of Failure	Compound	
Membrane Correction	1.05	kPa	Membrane thickness	0.22	mm

Deviator Stress v Axial Strain

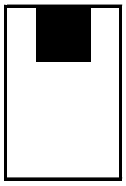


Mohr Circles





Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks: Unable to take a photo.

Signed: Dudzińska Anna

Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

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 Date Reported: 24/11/2021 **GF 184.11**

An award-winning practice serving the property and construction industry for more than 25 years

RoCP Ltd
(Trading as RoC Consulting)
Commercial Wharf
6 Commercial Street
MANCHESTER
M15 4PZ

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W | www.rocconsulting.com

Appendix I – InfoDrainage Calculations

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Connections Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
Pipe	15.102	Pipe	83.900		0.6	225	88.292	86.180
Pipe (2)	4.057	Pipe	100.000		0.6	300	88.521	86.322
Pipe (1)	17.695	Pipe	100.000		0.6	300	88.479	86.499
Pipe (3)	20.644	Pipe	120.000		0.6	225	88.600	86.930
Pipe (22)	5.696	Pipe	29.980		0.6	150	88.570	86.570
Pipe (5)	18.808	Pipe	120.000		0.6	225	88.796	86.559
Pipe (6)	23.995	Pipe	120.000		0.6	225	88.858	86.758
Pipe (8)	15.494	Pipe	200.000		0.6	300	88.596	86.359
Pipe (9)	48.788	Pipe	100.000		0.6	225	88.571	87.062
Pipe (21)	1.670	Pipe	80.240		0.6	300	88.580	86.380
Pipe (16)	32.010	Pipe	100.000		0.6	225	88.295	87.382
Pipe (10)	9.341	Pipe	5.898		0.6	150	88.579	88.083
Pipe (14)	5.130	Pipe	3.969		0.6	150	88.518	88.022
Pipe (12)	12.452	Pipe	80.000		0.6	225	88.447	86.730
Pipe (13)	21.601	Pipe	80.000		0.6	225	88.395	87.000
Pipe (11)	26.523	Pipe	100.043		0.6	225	88.480	87.327
Pipe (19)	20.343	Pipe	200.000		0.6	300	88.429	86.282
Pipe (23)	3.881	Pipe	3.695		0.6	150	88.464	88.050
Pipe (24)	3.764	Pipe	2.851		0.6	150	88.465	88.050
Pipe (25)	3.775	Pipe	2.434		0.6	150	88.465	88.050
Pipe (26)	3.574	Pipe	2.305		0.6	150	88.464	88.050
Pipe (20)	4.220	Pipe	4.687		0.6	150	88.396	87.900
Pipe (15)	12.039	Pipe	9.777		0.6	150	88.457	87.961
Pipe (4)	4.150	Pipe	190.610		0.6	225	88.796	86.402
Pipe (7)	1.716	Pipe	4.086		0.6	150	88.808	86.800
Pipe (31)	12.522	Pipe	7.732		0.6	150	88.823	88.178
Pipe (32)	10.230	Pipe	6.317		0.6	150	88.823	88.178
Pipe (33)	11.398	Pipe	6.417		0.6	150	88.791	88.178
Pipe (34)	10.472	Pipe	5.895		0.6	150	88.824	88.178
Pipe (35)	6.617	Pipe	4.170		0.6	150	88.805	88.157
Pipe (36)	3.945	Pipe	2.486		0.6	150	88.805	88.157
Pipe (38)	9.701	Pipe	6.683		0.6	150	89.103	88.210
Pipe (39)	10.302	Pipe	24.646		0.6	100	88.334	87.800
Pipe (40)	11.517	Pipe	24.349		0.6	150	88.317	87.800
Pipe (41)	10.652	Pipe	13.515		0.6	150	88.475	87.850
Pipe (17)	4.366	Pipe	-20.305		0.6	100	88.385	87.850
Pipe (18)	3.243	Pipe	-15.083		0.6	100	88.385	87.850

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Connections Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance	Wall Thickness (mm)
Pipe	88.300	86.000		All	9.5	(None)	(None)	0
Pipe (2)	88.429	86.282		All		(None)	(None)	0
Pipe (1)	88.521	86.322		All		(None)	(None)	0
Pipe (3)	88.858	86.758		None		(None)	(None)	0
Pipe (22)	88.580	86.380		None		(None)	(None)	0
Pipe (5)	88.796	86.402		None		(None)	(None)	0
Pipe (6)	88.796	86.559		None		(None)	(None)	0
Pipe (8)	88.429	86.282		All		(None)	(None)	0
Pipe (9)	88.479	86.574		All		(None)	(None)	0
Pipe (21)	88.596	86.359		None		(None)	(None)	0
Pipe (16)	88.571	87.062		None		(None)	(None)	0
Pipe (10)	88.479	86.499		None		(None)	(None)	0
Pipe (14)	88.447	86.730		None		(None)	(None)	0
Pipe (12)	88.479	86.574		All		(None)	(None)	0
Pipe (13)	88.447	86.730		All		(None)	(None)	0
Pipe (11)	88.571	87.062		None		(None)	(None)	0
Pipe (19)	88.292	86.180		All		(None)	(None)	0
Pipe (23)	88.395	87.000		None		(None)	(None)	0
Pipe (24)	88.447	86.730		None		(None)	(None)	0
Pipe (25)	88.479	86.499		None		(None)	(None)	0
Pipe (26)	88.479	86.499		None		(None)	(None)	0
Pipe (20)	88.395	87.000		None		(None)	(None)	0
Pipe (15)	88.447	86.730		None		(None)	(None)	0
Pipe (4)	88.580	86.380		None		(None)	(None)	0
Pipe (7)	88.580	86.380		None		(None)	(None)	0
Pipe (31)	88.796	86.559		None		(None)	(None)	0
Pipe (32)	88.796	86.559		None		(None)	(None)	0
Pipe (33)	88.796	86.402		None		(None)	(None)	0
Pipe (34)	88.796	86.402		None		(None)	(None)	0
Pipe (35)	88.570	86.570		None		(None)	(None)	0
Pipe (36)	88.570	86.570		None		(None)	(None)	0
Pipe (38)	88.858	86.758		None		(None)	(None)	0
Pipe (39)	88.295	87.382		None		(None)	(None)	0
Pipe (40)	88.480	87.327		None		(None)	(None)	0
Pipe (41)	88.571	87.062		None		(None)	(None)	0
Pipe (17)	88.465	88.065		None		(None)	(None)	0
Pipe (18)	88.465	88.065		None		(None)	(None)	0

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Connections Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

Name	Material	Trench Width (mm)	Bedding Material	Surrounding Material
Pipe		0		
Pipe (2)		0		
Pipe (1)		0		
Pipe (3)		0		
Pipe (22)		0		
Pipe (5)		0		
Pipe (6)		0		
Pipe (8)		0		
Pipe (9)		0		
Pipe (21)		0		
Pipe (16)		0		
Pipe (10)		0		
Pipe (14)		0		
Pipe (12)		0		
Pipe (13)		0		
Pipe (11)		0		
Pipe (19)		0		
Pipe (23)		0		
Pipe (24)		0		
Pipe (25)		0		
Pipe (26)		0		
Pipe (20)		0		
Pipe (15)		0		
Pipe (4)		0		
Pipe (7)		0		
Pipe (31)		0		
Pipe (32)		0		
Pipe (33)		0		
Pipe (34)		0		
Pipe (35)		0		
Pipe (36)		0		
Pipe (38)		0		
Pipe (39)		0		
Pipe (40)		0		
Pipe (41)		0		
Pipe (17)		0		
Pipe (18)		0		

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Inflow Summary Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Porous Paving		Time of Concentration	0.035	100	0	100	0.035
Catchment Area (1)	Porous Paving (1)		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (2)	Porous Paving (2)		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (3)	Porous Paving (3)		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (4)	Bioretention		Time of Concentration	0.016	100	0	100	0.016
Catchment Area (5)	Porous Paving (5)		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (6)	Porous Paving (6)		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (7)	Porous Paving (7)		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (8)	Porous Paving (8)		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (9)	Manhole (8)		Time of Concentration	0.012	100	0	100	0.012
Catchment Area (10)	Manhole (8)		Time of Concentration	0.006	100	0	100	0.006
Catchment Area (11)	Porous Paving (11)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (12)	Porous Paving (12)		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (13)	Manhole (8)		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (14)	Manhole (8)		Time of Concentration	0.014	100	0	100	0.014
Catchment Area (15)	Manhole (9)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (16)	Manhole (10)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (17)	Manhole (11)		Time of Concentration	0.006	100	0	100	0.006
Catchment Area (18)	Manhole (11)		Time of Concentration	0.006	100	0	100	0.006
Catchment Area (19)	Manhole (13)		Time of Concentration	0.001	100	0	100	0.001
Catchment Area (20)	Manhole (13)		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (21)	Manhole (9)		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (22)	Manhole (10)		Time of Concentration	0.012	100	0	100	0.012
Catchment Area (23)	Manhole (11)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (24)	Manhole (13)		Time of Concentration	0.013	100	0	100	0.013
Catchment Area (25)	Manhole (10)		Time of Concentration	0.015	100	0	100	0.015
Catchment Area (26)	Manhole (9)		Time of Concentration	0.014	100	0	100	0.014
Catchment Area (27)	Manhole (14)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (28)	Manhole (21)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (29)	Manhole (9)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (30)	Manhole (8)		Time of Concentration	0.015	100	0	100	0.015
Catchment Area (31)	Manhole (14)		Time of Concentration	0.011	100	0	100	0.011

Catchment Area (32)	Manhole (8)		Time of Concentration	0.018	100	0	100	0.018
Catchment Area (33)	Manhole (7)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (34)	Porous Paving		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (35)	Porous Paving		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (36)	Manhole (16)		Time of Concentration	0.013	100	0	100	0.013
Catchment Area (37)	Manhole (18)		Time of Concentration	0.010	100	0	100	0.010
Catchment Area (38)	Manhole (15)		Time of Concentration	0.008	100	0	100	0.008
Catchment Area (39)	Bioretention		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (40)	Bioretention		Time of Concentration	0.004	100	0	100	0.004
Catchment Area (41)	Porous Paving (3)		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (42)	Bioretention (1)		Time of Concentration	0.013	100	0	100	0.013
Catchment Area (45)	Bioretention (2)		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (46)	Bioretention (3)		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (48)	Manhole (7)		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (51)	Manhole (4)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (52)	Bioretention (2)		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (53)	Bioretention (1)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (54)	Manhole (5)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (55)	Manhole (5)		Time of Concentration	0.020	100	0	100	0.020
Catchment Area (56)	Bioretention (3)		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (57)	Bioretention (3)		Time of Concentration	0.012	100	0	100	0.012
Catchment Area (58)	Manhole (6)		Time of Concentration	0.008	100	0	100	0.008
Catchment Area (59)	Manhole (8)		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (60)	Manhole (21)		Time of Concentration	0.073	100	0	100	0.073
Catchment Area (61)	Manhole (10)		Time of Concentration	0.017	100	0	100	0.017
Catchment Area (62)	Manhole (7)		Time of Concentration	0.075	100	0	100	0.075
Catchment Area (65)	Bioretention (1)		Time of Concentration	0.004	100	0	100	0.004
Catchment Area (66)	Manhole (11)		Time of Concentration	0.014	100	0	100	0.014
Catchment Area (67)	Porous Paving (13)		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (68)	Porous Paving (14)		Time of Concentration	0.006	100	0	100	0.006
Catchment Area (69)	Porous Paving (15)		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (70)	Porous Paving (16)		Time of Concentration	0.004	100	0	100	0.004
Catchment Area (71)	Porous Paving (17)		Time of Concentration	0.004	100	0	100	0.004
TOTAL		**0.0**		**0.823**				**0.823**

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Outfall Details Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
Manhole (20)	Free Discharge			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH

Type: FEH

Site Location	GB 382000 409000 SD 82000 09000
Rainfall Version	2022
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	35.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Junctions Summary Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Manhole (18)	FEH: 2 years: +0 %: 60 mins: Winter	88.395	87.000	87.034	0.034	3.0	0.039	0.000	3.0	6.321	OK
Manhole (17)	FEH: 2 years: +0 %: 60 mins: Winter	88.447	86.730	86.781	0.051	6.1	0.058	0.000	6.1	13.477	OK
Manhole (16)	FEH: 2 years: +0 %: 240 mins: Winter	88.479	86.499	86.681	0.182	8.2	0.206	0.000	8.1	56.411	OK
Manhole (15)	FEH: 2 years: +0 %: 240 mins: Winter	88.292	86.180	86.680	0.500	16.6	0.566	0.000	7.7	140.331	Surcharged
Manhole (14)	FEH: 2 years: +0 %: 240 mins: Winter	88.521	86.322	86.681	0.359	8.8	0.406	0.000	8.6	61.975	Surcharged
Manhole (13)	FEH: 2 years: +0 %: 240 mins: Winter	88.429	86.282	86.680	0.399	12.4	0.451	0.000	16.6	149.312	Surcharged
Manhole (12)	FEH: 2 years: +0 %: 240 mins: Winter	88.596	86.359	86.681	0.322	7.7	0.364	0.000	7.5	90.520	Surcharged
Manhole (11)	FEH: 2 years: +0 %: 15 mins: Winter	88.808	86.800	86.826	0.026	5.3	0.004	0.000	5.2	2.432	OK
Manhole (10)	FEH: 2 years: +0 %: 240 mins: Winter	88.796	86.402	86.681	0.279	10.7	0.315	0.000	10.4	61.198	Surcharged
Manhole (9)	FEH: 2 years: +0 %: 15 mins: Winter	88.796	86.559	86.699	0.141	31.2	0.159	0.000	29.1	16.047	OK
Manhole (8)	FEH: 2 years: +0 %: 15 mins: Winter	88.858	86.758	86.879	0.121	25.1	0.137	0.000	23.7	12.255	OK
Manhole (7)	FEH: 2 years: +0 %: 15 mins: Winter	88.600	86.930	87.013	0.083	13.9	0.094	0.000	13.5	6.425	OK
Manhole (6)	FEH: 2 years: +0 %: 240 mins: Winter	88.480	87.327	87.349	0.022	1.0	0.025	0.000	1.0	5.262	OK
Manhole (5)	FEH: 2 years: +0 %: 15 mins: Winter	88.571	87.062	87.102	0.040	4.6	0.045	0.000	3.5	2.164	OK
Manhole (4)	FEH: 2 years: +0 %: 360 mins: Winter	88.295	87.382	87.395	0.013	0.4	0.015	0.000	0.4	2.503	OK
Manhole (20)	FEH: 2 years: +0 %: 120 mins: Summer	88.300	86.000	86.057	0.057	7.9	0.000	0.000	8.0	75.069	OK
Manhole (21)	FEH: 2 years: +0 %: 240 mins: Winter	88.570	86.570	86.681	0.111	3.1	0.018	0.000	3.1	18.110	OK

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Junctions Summary Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Manhole (18)	FEH: 30 years: +35 %: 360 mins: Winter	88.395	87.000	87.464	0.464	3.8	0.525	0.000	3.8	33.618	Surcharged
Manhole (17)	FEH: 30 years: +35 %: 360 mins: Winter	88.447	86.730	87.463	0.734	8.9	0.830	0.000	8.5	78.339	Surcharged
Manhole (16)	FEH: 30 years: +35 %: 360 mins: Winter	88.479	86.499	87.465	0.965	20.8	1.092	0.000	20.5	176.770	Surcharged
Manhole (15)	FEH: 30 years: +35 %: 360 mins: Winter	88.292	86.180	87.464	1.284	7.9	1.452	0.000	7.7	265.420	Surcharged
Manhole (14)	FEH: 30 years: +35 %: 360 mins: Winter	88.521	86.322	87.470	1.148	21.7	1.298	0.000	21.6	180.709	Surcharged
Manhole (13)	FEH: 30 years: +35 %: 360 mins: Winter	88.429	86.282	87.462	1.181	23.1	1.335	0.000	7.7	347.352	Surcharged
Manhole (12)	FEH: 30 years: +35 %: 360 mins: Winter	88.596	86.359	87.466	1.107	17.4	1.252	0.000	8.0	230.208	Surcharged
Manhole (11)	FEH: 30 years: +35 %: 360 mins: Winter	88.808	86.800	87.466	0.666	2.3	0.106	0.000	2.2	19.457	Surcharged
Manhole (10)	FEH: 30 years: +35 %: 360 mins: Winter	88.796	86.402	87.466	1.065	18.7	1.204	0.000	18.5	164.367	Surcharged
Manhole (9)	FEH: 30 years: +35 %: 15 mins: Winter	88.796	86.559	87.468	0.910	80.3	1.029	0.000	72.9	46.389	Surcharged
Manhole (8)	FEH: 30 years: +35 %: 15 mins: Winter	88.858	86.758	87.793	1.035	66.8	1.171	0.000	56.7	36.183	Surcharged
Manhole (7)	FEH: 30 years: +35 %: 15 mins: Winter	88.600	86.930	87.881	0.951	41.0	1.075	0.000	30.4	18.941	Surcharged
Manhole (6)	FEH: 30 years: +35 %: 360 mins: Winter	88.480	87.327	87.464	0.137	2.4	0.155	0.000	2.4	19.131	OK
Manhole (5)	FEH: 30 years: +35 %: 360 mins: Winter	88.571	87.062	87.464	0.402	6.2	0.455	0.000	6.2	48.099	Surcharged
Manhole (4)	FEH: 30 years: +35 %: 360 mins: Winter	88.295	87.382	87.464	0.082	1.1	0.093	0.000	1.1	8.512	OK
Manhole (20)	FEH: 30 years: +35 %: 960 mins: Summer	88.300	86.000	86.056	0.056	7.9	0.000	0.000	7.9	518.678	OK
Manhole (21)	FEH: 30 years: +35 %: 360 mins: Winter	88.570	86.570	87.466	0.896	5.8	0.143	0.000	5.7	49.541	Surcharged

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Junctions Summary Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Manhole (18)	FEH: 100 years: +40 %: 480 mins: Winter	88.395	87.000	88.114	1.115	10.1	1.261	0.000	3.7	68.204	Flood Risk
Manhole (17)	FEH: 100 years: +40 %: 480 mins: Winter	88.447	86.730	88.114	1.384	14.9	1.566	0.000	9.3	135.376	Surcharged
Manhole (16)	FEH: 100 years: +40 %: 240 mins: Winter	88.479	86.499	88.114	1.615	34.3	1.827	0.000	34.0	229.919	Surcharged
Manhole (15)	FEH: 100 years: +40 %: 240 mins: Winter	88.292	86.180	88.135	1.955	10.7	2.211	0.000	9.0	208.976	Flood Risk
Manhole (14)	FEH: 100 years: +40 %: 240 mins: Winter	88.521	86.322	88.117	1.795	36.0	2.030	0.000	35.7	220.631	Surcharged
Manhole (13)	FEH: 100 years: +40 %: 240 mins: Winter	88.429	86.282	88.118	1.837	38.2	2.077	0.000	10.6	328.569	Surcharged
Manhole (12)	FEH: 100 years: +40 %: 240 mins: Winter	88.596	86.359	88.126	1.767	31.7	1.999	0.000	17.8	217.665	Surcharged
Manhole (11)	FEH: 100 years: +40 %: 240 mins: Winter	88.808	86.800	88.134	1.334	6.8	0.212	0.000	4.5	24.660	Surcharged
Manhole (10)	FEH: 100 years: +40 %: 240 mins: Winter	88.796	86.402	88.126	1.724	33.3	1.950	0.000	32.9	190.209	Surcharged
Manhole (9)	FEH: 100 years: +40 %: 240 mins: Winter	88.796	86.559	88.130	1.571	26.1	1.777	0.000	25.7	149.143	Surcharged
Manhole (8)	FEH: 100 years: +40 %: 15 mins: Winter	88.858	86.758	88.438	1.680	90.3	1.900	0.000	70.3	47.840	Surcharged
Manhole (7)	FEH: 100 years: +40 %: 15 mins: Winter	88.600	86.930	88.601	1.670	53.5	1.913	0.024	46.2	24.839	Flood
Manhole (6)	FEH: 100 years: +40 %: 480 mins: Winter	88.480	87.327	88.108	0.781	5.7	0.883	0.000	5.7	59.718	Surcharged
Manhole (5)	FEH: 100 years: +40 %: 480 mins: Winter	88.571	87.062	88.109	1.048	7.9	1.185	0.000	7.9	110.719	Surcharged
Manhole (4)	FEH: 100 years: +40 %: 480 mins: Winter	88.295	87.382	88.109	0.727	2.3	0.822	0.000	2.6	25.801	Flood Risk
Manhole (20)	FEH: 100 years: +40 %: 960 mins: Winter	88.300	86.000	86.060	0.060	9.0	0.000	0.000	9.0	726.224	OK
Manhole (21)	FEH: 100 years: +40 %: 360 mins: Winter	88.570	86.570	88.126	1.556	7.5	0.247	0.000	7.3	63.649	Surcharged

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving (5)	FEH: 2 years: +0 %: 60 mins: Winter	88.089	88.059	0.025	0.009	0.8	0.425	0.000	0.000	0.7	1.101	93.348	OK
Porous Paving (6)	FEH: 2 years: +0 %: 960 mins: Winter	88.085	88.055	0.020	0.005	0.2	0.357	0.000	0.000	0.3	5.159	94.863	OK
Porous Paving (7)	FEH: 2 years: +0 %: 1440 mins: Winter	88.085	88.055	0.020	0.005	0.2	0.346	0.000	0.000	0.3	6.327	95.033	OK
Porous Paving (8)	FEH: 2 years: +0 %: 30 mins: Winter	88.089	88.057	0.025	0.007	1.0	0.403	0.000	0.000	0.7	0.780	93.687	OK
Bioretention	FEH: 2 years: +0 %: 960 mins: Winter	88.199	88.085	0.314	0.235	0.4	6.241	0.000	0.000	0.2	3.515	80.223	OK
Bioretention (1)	FEH: 2 years: +0 %: 240 mins: Winter	88.286	87.854	0.311	0.004	0.7	3.774	0.000	0.000	0.1	1.149	86.599	OK
Bioretention (2)	FEH: 2 years: +0 %: 360 mins: Winter	88.159	87.811	0.324	0.011	0.4	2.527	0.000	0.000	0.3	1.854	84.951	OK
Bioretention (3)	FEH: 2 years: +0 %: 240 mins: Winter	88.140	87.816	0.323	0.016	1.1	3.970	0.000	0.000	0.8	3.709	82.529	OK
Porous Paving (11)	FEH: 2 years: +0 %: 30 mins: Winter	88.737	88.221	0.024	0.011	0.9	0.379	0.000	0.000	0.9	0.811	93.297	OK
Porous Paving (12)	FEH: 2 years: +0 %: 30 mins: Winter	88.446	88.187	0.013	0.009	0.7	0.188	0.000	0.000	0.6	0.613	95.553	OK
Porous Paving (13)	FEH: 2 years: +0 %: 30 mins: Winter	88.446	88.188	0.013	0.010	0.7	0.190	0.000	0.000	0.6	0.613	95.511	OK
Porous Paving (14)	FEH: 2 years: +0 %: 30 mins: Winter	88.413	88.187	0.012	0.009	0.6	0.146	0.000	0.000	0.5	0.512	95.875	OK
Porous Paving (15)	FEH: 2 years: +0 %: 30 mins: Winter	88.447	88.187	0.013	0.009	0.7	0.188	0.000	0.000	0.6	0.611	95.566	OK
Porous Paving (16)	FEH: 2 years: +0 %: 15 mins: Winter	88.426	88.164	0.011	0.007	0.6	0.067	0.000	0.000	0.4	0.243	97.087	OK
Porous Paving (17)	FEH: 2 years: +0 %: 15 mins: Winter	88.426	88.163	0.011	0.006	0.6	0.064	0.000	0.000	0.4	0.243	97.207	OK
Porous Paving	FEH: 2 years: +0 %: 60 mins: Winter	88.213	88.103	0.033	0.020	4.2	2.954	0.000	0.000	2.9	5.832	86.308	OK
Porous Paving (1)	FEH: 2 years: +0 %: 60 mins: Winter	88.143	88.035	0.025	0.013	2.4	1.930	0.000	0.000	1.4	3.268	90.250	OK
Porous Paving (2)	FEH: 2 years: +0 %: 60 mins: Winter	88.082	87.978	0.025	0.017	2.4	1.973	0.000	0.000	1.4	3.234	90.036	OK
Porous Paving (3)	FEH: 2 years: +0 %: 60 mins: Winter	88.034	87.915	0.038	0.015	2.9	2.457	0.000	0.000	1.8	4.014	87.601	OK
Cellular Storage	FEH: 2 years: +0 %: 240 mins: Winter	86.681	86.681	0.301	0.301	16.0	80.010	0.000	0.000	7.7	82.349	75.013	OK

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

FEH: 30 years: Increase Rainfall (%): +35: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving (5)	FEH: 30 years: +35 %: 30 mins: Winter	88.114	88.068	0.050	0.018	3.1	0.810	0.000	0.000	2.8	2.638	87.315	OK
Porous Paving (6)	FEH: 30 years: +35 %: 120 mins: Winter	88.117	88.062	0.052	0.012	1.8	0.816	0.000	0.000	1.6	7.245	88.277	OK
Porous Paving (7)	FEH: 30 years: +35 %: 120 mins: Winter	88.116	88.061	0.051	0.011	1.8	0.807	0.000	0.000	1.6	7.218	88.397	OK
Porous Paving (8)	FEH: 30 years: +35 %: 30 mins: Winter	88.114	88.064	0.049	0.014	3.1	0.784	0.000	0.000	2.8	2.647	87.722	OK
Bioretention	FEH: 30 years: +35 %: 120 mins: Winter	88.231	88.118	0.346	0.268	3.5	8.605	0.000	0.000	2.1	5.402	72.731	OK
Bioretention (1)	FEH: 30 years: +35 %: 60 mins: Winter	88.310	87.875	0.335	0.025	4.6	5.388	0.000	0.000	3.1	3.454	80.867	OK
Bioretention (2)	FEH: 30 years: +35 %: 60 mins: Winter	88.204	88.103	0.369	0.303	3.5	4.092	0.000	0.000	2.1	3.444	75.638	OK
Bioretention (3)	FEH: 30 years: +35 %: 60 mins: Winter	88.170	87.840	0.353	0.040	7.0	5.824	0.000	0.000	5.8	7.732	74.371	OK
Porous Paving (11)	FEH: 30 years: +35 %: 15 mins: Winter	88.763	88.229	0.050	0.019	4.1	0.732	0.000	0.000	2.6	1.796	87.068	OK
Porous Paving (12)	FEH: 30 years: +35 %: 15 mins: Winter	88.457	88.195	0.024	0.017	3.1	0.354	0.000	0.000	2.3	1.346	91.633	OK
Porous Paving (13)	FEH: 30 years: +35 %: 15 mins: Winter	88.457	88.196	0.024	0.018	3.1	0.358	0.000	0.000	2.3	1.346	91.545	OK
Porous Paving (14)	FEH: 30 years: +35 %: 15 mins: Winter	88.424	88.194	0.022	0.016	2.5	0.275	0.000	0.000	2.0	1.132	92.208	OK
Porous Paving (15)	FEH: 30 years: +35 %: 15 mins: Winter	88.459	88.195	0.024	0.017	3.1	0.355	0.000	0.000	2.3	1.354	91.639	OK
Porous Paving (16)	FEH: 30 years: +35 %: 15 mins: Winter	88.437	88.169	0.022	0.012	1.7	0.129	0.000	0.000	1.4	0.748	94.403	OK

Porous Paving (17)	FEH: 30 years: +35 %: 15 mins: Winter	88.437	88.168	0.022	0.011	1.7	0.124	0.000	0.000	1.4	0.749	94.624	OK
Porous Paving	FEH: 30 years: +35 %: 30 mins: Winter	88.264	88.121	0.085	0.038	16.3	6.215	0.000	0.000	11.2	13.743	71.193	OK
Porous Paving (1)	FEH: 30 years: +35 %: 30 mins: Winter	88.172	88.048	0.054	0.026	9.5	3.965	0.000	0.000	6.3	7.798	79.968	OK
Porous Paving (2)	FEH: 30 years: +35 %: 30 mins: Winter	88.111	87.994	0.054	0.033	9.5	4.056	0.000	0.000	6.2	7.775	79.519	OK
Porous Paving (3)	FEH: 30 years: +35 %: 30 mins: Winter	88.080	87.930	0.084	0.030	11.5	5.039	0.000	0.000	7.3	9.538	74.574	OK
Cellular Storage	FEH: 30 years: +35 %: 360 mins: Winter	87.466	87.466	1.086	1.086	42.6	288.920	0.000	0.000	15.0	144.112	9.769	OK

JD Sports Campus:	Date: 15/10/2025		
	Designed by: RM	Checked by: JH	Approved By: PV
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Kennedy Redford: 20 Market Street Altrincham WA14 1PF		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving (5)	FEH: 100 years: +40 %: 480 mins: Winter	88.115	88.115	0.051	0.065	0.8	1.187	0.000	0.000	0.7	8.044	81.411	OK
Porous Paving (6)	FEH: 100 years: +40 %: 480 mins: Winter	88.116	88.114	0.051	0.064	1.5	1.291	0.000	0.000	1.5	15.494	81.441	OK
Porous Paving (7)	FEH: 100 years: +40 %: 480 mins: Winter	88.116	88.115	0.051	0.065	1.5	1.295	0.000	0.000	1.5	15.773	81.394	OK
Porous Paving (8)	FEH: 100 years: +40 %: 480 mins: Winter	88.114	88.115	0.050	0.065	1.4	1.175	0.000	0.000	0.8	8.610	81.597	OK
Bioretention	FEH: 100 years: +40 %: 60 mins: Winter	88.251	88.139	0.366	0.289	7.6	9.958	0.000	0.000	3.6	6.215	68.441	OK
Bioretention (1)	FEH: 100 years: +40 %: 60 mins: Winter	88.314	87.883	0.339	0.033	6.1	6.002	0.000	0.000	5.5	5.782	78.688	OK
Bioretention (2)	FEH: 100 years: +40 %: 360 mins: Winter	88.276	88.275	0.441	0.475	1.8	12.138	0.000	0.000	2.1	16.127	27.729	OK
Bioretention (3)	FEH: 100 years: +40 %: 360 mins: Winter	88.340	88.340	0.523	0.540	4.2	25.994	3.376	0.000	5.8	36.541	-14.390	Flood
Porous Paving (11)	FEH: 100 years: +40 %: 15 mins: Winter	88.772	88.294	0.059	0.084	20.5	1.236	0.000	0.000	6.3	3.500	78.148	OK
Porous Paving (12)	FEH: 100 years: +40 %: 15 mins: Winter	88.461	88.198	0.028	0.020	4.0	0.417	0.000	0.000	3.2	1.774	90.159	OK
Porous Paving (13)	FEH: 100 years: +40 %: 15 mins: Winter	88.461	88.200	0.028	0.022	4.0	0.421	0.000	0.000	3.2	1.773	90.056	OK
Porous Paving (14)	FEH: 100 years: +40 %: 15 mins: Winter	88.427	88.197	0.026	0.019	3.3	0.321	0.000	0.000	2.8	1.483	90.911	OK
Porous Paving (15)	FEH: 100 years: +40 %: 15 mins: Winter	88.463	88.198	0.028	0.020	4.0	0.417	0.000	0.000	3.2	1.783	90.175	OK
Porous Paving (16)	FEH: 100 years: +40 %: 15 mins: Winter	88.440	88.171	0.025	0.014	2.2	0.149	0.000	0.000	1.9	0.976	93.539	OK

Porous Paving (17)	FEH: 100 years: +40 %: 15 mins: Winter	88.440	88.169	0.026	0.012	2.2	0.143	0.000	0.000	1.9	0.976	93.786	OK
Porous Paving	FEH: 100 years: +40 %: 30 mins: Winter	88.294	88.128	0.115	0.045	21.6	7.821	0.000	0.000	15.1	18.521	63.751	OK
Porous Paving (1)	FEH: 100 years: +40 %: 30 mins: Winter	88.187	88.052	0.069	0.030	12.6	4.805	0.000	0.000	8.8	10.587	75.727	OK
Porous Paving (2)	FEH: 100 years: +40 %: 480 mins: Winter	88.116	88.115	0.059	0.154	5.5	6.783	0.000	0.000	2.1	26.654	65.751	OK
Porous Paving (3)	FEH: 100 years: +40 %: 480 mins: Winter	88.115	88.115	0.119	0.215	11.4	10.687	0.000	0.000	3.5	34.687	46.070	OK
Cellular Storage	FEH: 100 years: +40 %: 240 mins: Winter	88.136	88.136	1.756	1.756	77.2	319.822	0.000	0.000	17.3	104.411	0.118	OK