

Design Note

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Subject: JD Sports Office, Bury – Addendum to FRA & DS report REP-JDS-FRDS-RK-001-REV--
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INTRODUCTION

This design note has been produced as an addendum to the Kennedy Redford Flood Risk Assessment & Drainage Strategy (FRADS) report REP-JDS-FRDS-RK-001-REV--, dated 27/5/2022, which was produced to support the planning application for the proposed development of JD Sport's Campus Hub and Creche building located at the land to the west of Hollins Brook Way, Bury, BL9 8RR (herein referred to as 'the site').

The FRADS is appended to this document and both documents must be read in conjunction. Although the site works are split in two phases, for the purpose of the FRA, the development was treated as a single entity.

PURPOSE OF DOCUMENT

This design note summarizes the findings of the additional percolation testing carried out by Groundtech Consulting on the 18/7/2022, its implications on the proposed drainage strategy as set out in the FRADS and the proposed amendment to the drainage strategy approach for the site.

CURRENT DRAINAGE STRATEGY

BASIS FOR DESIGN PRINCIPLE

The surface water drainage strategy section of the FRADS report was written with basis on Groundtech Consulting's Geo-Environmental Appraisal report GRO-21438-3308, dated 31 March 2022; it includes results of one percolation test which confirmed the feasibility for the use of infiltration Sustainable Drainage Systems (SuDS) at the site.

The requirement for the additional testing was set out in the FRADS to validate the information available and reach an understanding of the representative rate of infiltration across the site.

DRAINAGE STRATEGY

The strategy for disposing of surface water generated within the site prioritized the use of infiltration SuDS which allow water to percolate into the strata below. These systems were proposed to take the form of permeable pavements (System A¹) in the parking areas and the MUGA pitch area, underlain by a shallow proprietary crate system to increase attenuating capacity of the network. This would have allowed for the disposal of all surface water generated in the site into the ground.

PROPOSED DRAINAGE STRATEGY

PERCOLATION TESTING RESULTS

The results of the additional testing carried out by Groundtech Consulting on the 18/7/2022 are summarized in Table 1 below, and are appended to this document.

LOCATION REFERENCE	INFILTRATION RATE (M/SEC)		
	TEST 1	TEST 2	TEST 3
SUDS101	4.09E ⁻⁰⁶	9.26E ⁻⁰⁷	3.90E ⁻⁰⁷
SUDS102	7.08E ⁻⁰⁶	4.99E ⁻⁰⁶	3.98E ⁻⁰⁶
SUDS103	3.30E ⁻⁰⁵	4.72E ⁻⁰⁶	5.03E ⁻⁰⁶
SUDS104	5.97E ⁻⁰⁶	4.87E ⁻⁰⁶	3.33E ⁻⁰⁶
SUDS105	3.03E ⁻⁰⁶	4.89E ⁻⁰⁶	3.00E ⁻⁰⁶

Table 1 – Percolation testing results

The results range from 3.30E⁻⁰⁵ to 3.90E⁻⁰⁷ m/sec, however, only one out of the fifteen tests conducted resulted in some permeability, this was achieved on the first test at the SUDS103 pit location. The following two tests at the same location resulted in low permeability which reflected the results at all other locations.

The results offered very low permeability and therefore deem the site unsuitable for the use of infiltration SuDS.

¹ Also known as 'Zero Discharge', this permeable pavement system manages totality of flows without the need for a positive discharge.

DRAINAGE STRATEGY

As consequence of the poor results achieved by the percolation testing, the discharge principles for the drainage strategy at the proposed development will now require a positive discharge off-site. Additionally, lime stabilization is proposed across the site to improve the ground conditions in preparation for the development. This will therefore further limit the permeability of the ground.

The FRADS has identified a 300mm diameter public stormwater a sewer located on Pilsworth Road, which the existing site drainage is connected to. Therefore, pending approval from United Utilities, this would be a feasible means of discharge for surface water from the site. Through further intrusive investigation carried out on the 8th February 2023, the existing connection has been identified, due to damage this will require reinstatement work to enable the proposed strategy.

The proposed strategy will retain the principle of using permeable pavements (System C²) as management SuDS structures whilst allowing water to discharge off-site at a controlled rate.

Micro Drainage software has been used to produce the hydraulic calculations to support the design. The summary of results output from the software is appended to this document, the following principles were followed.

1. No surcharge to the network during storms up to 1:2-year return period;
2. No flooding to the site during storms up to 1:30-year return period, and;
3. Allowable controlled flooding to take place within the site, with no impact to buildings and neighboring sites, during storms up to 1:100-year return period + 40% climate change allowance.

As the site is currently developed, the Modified Rational Method³ was used to calculate its current discharge rate. The calculation equates to a brownfield runoff rate of 193 l/s based on the 1.39 ha⁴ of existing impermeable surface.

Considering that the drainage strategy now proposes a positive discharge into a sewer, it is deemed suitable to propose a 70% reduction of the calculated brownfield rate, to a 57.9 l/s discharge. This rate will require the approval of United Utilities, however, as it will provide a betterment to the existing conditions it is anticipated that it will not cause flooding issue to the sewer.

Hollins Brook Way is the main access to the site and will be widened as part of the proposals, increasing its catchment by approximately 400m². The access' exiting drainage will be relocated to suit the new road layout whilst retaining the existing principle of the network.

² This permeable pavement system manages flows by attenuating within its subbase and delaying its discharge. No infiltration takes place in this system.

³ https://eprints.hrwallingford.com/37/2/Volume4_Modified_Rational_Method.pdf

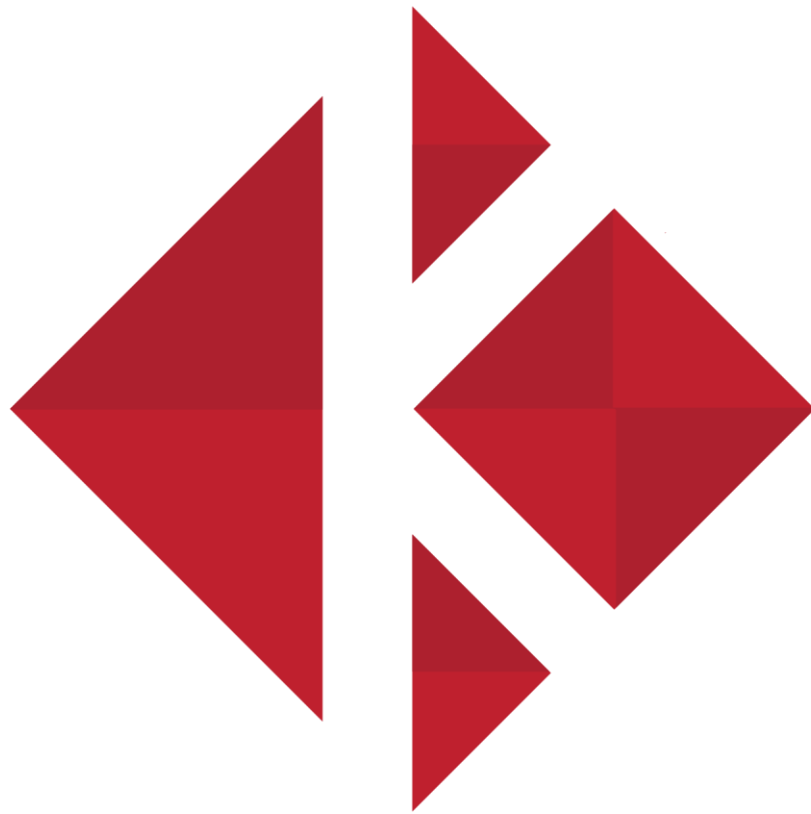
⁴ Catchment area noted in correction to the approximate 1.0 ha noted in section 3.7.1 of the FRADS.

Pollution control measures will still be applied in the form of porous paving and by-pass separator, as proposed in the FRADS.

The development will be delivered in two phases, as such, the drainage network has been developed to enable constructions in two stages aligning with the proposed phasing.

APPENDICES

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY



Flood Risk Assessment & Drainage Strategy

JD Sports Office, Bury

Client: JD Sports PLC Date: 27/5/2022

DOC TYPE				PROJECT				REPORT TITLE					AUTHOR				SEQ NO.				REVISION			
R	E	P	-	J	D	S	-	F	R	D	S	-	R	K	-	0	0	1	-	R	E	V	-	-

Contents

1	Document History and Validation.....	4
1.1	Revision History	4
1.2	Document Validation (Latest Issue).....	4
2	Executive Summary.....	5
3	Introduction	6
3.1	Reason for Report.....	6
3.2	Scope of Report.....	6
3.3	Policy Review	6
3.3.1	National Planning Policy Framework (NPPF)	6
3.3.2	Development vulnerability classification.....	6
3.3.3	Sequential test	7
3.3.4	Exception test	7
3.4	Significance criteria	7
3.5	Local Literature	7
3.5.1	Bury Council Preliminary Flood Risk Assessment, May 2011	7
3.5.2	Bury Local Plan, Topic Paper 6, Flood Risk, October 2018.....	9
3.5.3	Bury, Rochdale and Oldham Strategic Flood Risk Assessment Volume II – Level 1 SFRA, November 2009.....	9
3.5.4	Bury, Rochdale and Oldham Strategic Flood Risk Assessment Volume III – Level 2 SFRA, November 2009.....	10
3.6	Correspondence with Local Authorities	10
3.7	Site Overview.....	10
3.7.1	Existing Site.....	10
3.7.2	Surrounding Area.....	10
3.7.3	Topography.....	10
3.7.4	Hydrogeology	10
3.7.5	Geology.....	11
3.7.6	Existing Drainage.....	11
3.7.7	Proposed Development.....	11
4	Flood Risk Assessment	13
4.1	Tidal & Fluvial	13
4.2	Surface water	13

4.3	Groundwater.....	14
4.4	Artificial drainage	14
4.4.1	Proposed drainage	14
4.5	Infrastructure failure	15
4.5.1	Reservoir failure.....	15
4.5.2	Canal failure	15
4.6	Flood risk summary	16
5	Flood Risk Analysis & Mitigation.....	17
5.1	Mitigation.....	17
5.2	Residual Risk	17
5.3	Access & Egress.....	17
6	Drainage Strategy	18
6.1	Design standards and guidance.....	18
6.2	Proposed Surface Water Drainage	18
6.2.1	Climate Change	20
6.2.2	MicroDrainage Models.....	20
6.3	Proposed Foul Water Drainage.....	20
6.3.1	Strategy	20
6.3.2	Proposed flow rates.....	20
7	Maintenance.....	22
8	Conclusion & Recommendations.....	24
8.1	Conclusion	24
8.2	Further Recommendations	24
	Appendix A – NPPF Technical Guidance	25
	Appendix B – Site Location Plan	29
	Appendix C – Topographical Survey	30
	Appendix D – Sewer Map	34
	Appendix E – Proposed Site Plan.....	39
	Appendix F – Flood Plans	41
	Appendix G – Proposed Drainage Layouts	46
	Appendix H – Site Investigation	49

1 Document History and Validation

1.1 Revision History

Revision	Issue Date	Reason for Issue
Rev-	27 May 2022	First Issue

1.2 Document Validation (Latest Issue)



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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 and Creche buildings. In addition to the Hub building, the site comprises of a new creche building, 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 new four storey Hub building for JD Sports. It is also proposed to construct a two storey creche facility and plant room. A central feature of the development will be a MUGA pitch.

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, 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 infiltration tests discussed in Section 3.7.5 show rates of between 2.17×10^{-5} and 4.37×10^{-5} m/s. These infiltration rates are considered to be generally good for infiltration, and if proven to be representative of the overall site through further testing in accordance with BRE 365, the configuration of the site provides the opportunity to manage all surface water through infiltration.

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 proposed development of their Proposed Campus Hub and Creche buildings.. In addition to the Hub building, the site comprises of a new creche building, 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 2021 Edition paragraphs 159-169, 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 latest NPPF edition: Ministry of Housing, Communities & Local Government, 2021 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. Although the primary purpose of the development is to construct new offices which, under Table 2 would be classified as '*less vulnerable development*', the inclusion of a creche facility warrants that the site should be considered as a '*more vulnerable development*' as this represents the most onerous use for the development.

3.3.3 Sequential test

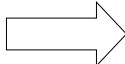
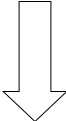
The sequential test aims to steer new development towards areas with the lowest probability of flooding. The sequential test matrix, enclosed in Appendix A (Department for Communities and Local Government, 2014), indicates '*more vulnerable*' developments are appropriate in Flood Zones 1 and 2. The development 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 1km² 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 5,297m³, 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 satellite image showing the site location can be found enclosed in Appendix B.

The site has an area of approximately 1.672ha. This is made up of approximately 1.0ha of hardstanding (asphalt and concrete slabs). The warehouse building has been demolished as part of an enabling works package.

The remaining approximately 0.7ha of the Site comprises of rough vegetation/soft landscaping.

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 north east to south west with an approximate maximum level of 89.98m AOD along the north east boundary and a minimum level of 87.45m AOD in the south west 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

A CCTV drainage survey has been carried out by Lanes for Drains in April 2022 which indicates that an existing private 300mm vitrified clay surface water network discharges to the north directly into a United Utilities adopted surface water sewer in Pilsworth Road via a Petrol Interceptor. A copy of the CCTV survey report excerpt plan and a copy of the United Utilities Sewer Records can be found enclosed in Appendix D.

3.7.7 Proposed Development

The development proposals can be found enclosed in Appendix E.

The development will see the construction of a new four storey headquarters office building for JD Sports. It is also proposed to construct a private two storey creche facility and plant room.

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 a MUGA pitch.

The development will not affect the full site area. The MUGA pitch will have an area of approximately 0.15ha.

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-west-south 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

Any private existing drainage within the site will be abandoned as part of the development. Therefore, there is no risk of flooding posed from this.

There are no records of historical flood events at the development location, within the reviewed literature. The adjacent adopted sewers should be adequately maintained by United Utilities and should therefore not pose a risk to the site flooding in the future.

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 will be designed in accordance with the relevant design standards, industry guidance and government guidance.

It is anticipated that the development will require the surface water discharge to be restricted to existing greenfield flowrates if possible. The use of SuDS will be necessary to attenuate and slow down surface water flows during storm events. By restricting existing flow rates, the flood risk downstream of the development will be reduced.

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.

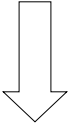
Assessment of Impact: LOW

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 'more vulnerable', meaning the impact of flooding occurring will be greater on account of the development including the construction of a private creche.

Following a review of the CCTV drainage survey, the existing surface water drainage system appears to be functioning as intended, notwithstanding any minor defects such as pipe fractures which could easily be repaired in situ through relining (although this will not be necessary as the existing drainage is to be abandoned as part of the development works).

The proposed development comprises of car parking in excess of 50 spaces and therefore any proposals to maintain a positive surface water discharge agreement will require a new interceptor.

If the proposed drainage is designed correctly and 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, particularly on account that the development is considered 'more vulnerable' due to the proposed creche. 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 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 published 2010
- National Planning Policy Framework (NPPF) published 2012
- Flood risk and coastal change Planning Policy Guidance, published 6 March 2014
- Climate Change Planning Policy Guidance, published 12 June 2014
- Water supply, wastewater and water quality Planning Policy Guidance, published 23 March 2015

Department of Environment, Food and Rural Affairs (DEFRA)

- Non-Statutory Technical Standards for Sustainable Drainage – Practice Guidance published 2015

Water Research Centre

- Sewers for Adoption 6th & 7th Edition

6.2 Proposed Surface Water Drainage

All proposed 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 runoff should be dealt with in the following ways (in order of preference) (Department for Communities and Local Government, 2014):

- Into the ground (infiltration).
- To a surface water body.
- To a surface water sewer, highway drain, or another drainage system.
- To a combined sewer.

The infiltration tests discussed in Section 3.7.5 show rates of between 2.17×10^{-5} and 4.37×10^{-5} m/s. These infiltration rates are considered to be generally good for infiltration, and if proven to be representative of the overall site through further testing in accordance with BRE 365, the configuration of the site provides the opportunity to manage all surface water through infiltration.

As discussed in Section 3.7.4, there are no waterbodies within the vicinity of the development.

Although United Utilities sewers are located within the vicinity of the development and these are currently utilised for receiving surface water flows from site, it is proposed to abandon this connection in favour of infiltration. This strategy would be subject to further infiltration testing to validate the initial testing already carried out by Groundtech, however as a minimum, the development proposals shall consider a maximum possible reduction of surface water discharge into the existing United Utilities sewer, with the aim to manage all surface water generated through infiltration.

The most advantageous means of enabling full infiltration would be to channel all surface water drainage toward the proposed MUGA pitch area, and to construct a large infiltration area using shallow proprietary crates. These crates have a high void ratio which provides the best opportunity of ensuring the area of infiltration remains sufficiently elevated from the highest ground water levels.

For a site with such extensive parking, it would be typical to incorporate permeable vehicle bays however in this instance, the use of a large infiltration area beneath the MUGA pitch would lower the amount of maintenance required and would also allow for any flood plains beyond a 1 in 100 year event to be localised to the MUGA, leaving the car parking areas clear of surface water and therefore promoting safe access and egress during extreme rainfall events.

Any surface water drainage generated from the access roads and car parking bays should connect into a new interceptor before entering into the infiltration area. This will ensure the risk of contamination in the ground is managed responsibly.

The drainage system will be designed so that there is no flooding to the development in a 1 in 30-year event and so that there is no property or off-site flooding in a 1 in 100 year plus 40% climate change event. This also applies in the event that the existing positive surface water connection into United Utilities sewers needs to be maintained due to lower than anticipated infiltration rates being encountered after further testing.

6.2.1 Climate Change

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.

6.2.2 MicroDrainage Models

During the development of the next stages of detailed design, Microdrainage models will be developed to demonstrate the proposed solution addresses the core issue of flooding.

Further infiltration testing will be carried out to allow for the Microdrainage calculations to be completed.

The results of the Microdrainage calculations will show that:

- No flooding occurs during any storm events up to 1in100 years + 40% climate change in duration.
- The surface water design is managed via full infiltration underneath the MUGA pitch or else by alternative means of infiltration as best can be achieved. Where infiltration results are less than anticipated, the Microdrainage model will demonstrate how surface water is managed using a part infiltration/part positive discharge solution.
- A very negligible volume of flooding occurs during the 1in100 year + 40% climate change events, this would not leave site or reach a building.

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.

It is proposed that the foul water will discharge into the new site foul water drainage. The exact discharge location for the existing drainage will be into the existing United Utilities 225mm/300mm combined sewer located in Pilsworth Road.

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

6.3.2 Proposed flow rates

The drainage system will be designed to achieve a target self-cleansing velocity of 0.75m/s, but as a minimum will 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 when there are at least 5No. toilets connected to the pipe, in accordance with Approved Document Part H.

Once the internal distribution and number of white goods has 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		

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 will be designed in accordance with the relevant design standards, industry guidance and government guidance. The new development will seek to utilise full infiltration if this is proven to be feasible following further soakaway testing, however where it is required to maintain the existing connection into the United Utilities sewer, the design will ensure the control of runoff rates into the existing system. A climate change factor of 40% will be applied to any surface water drainage system, in line with the NPPF and the PPG documents.

8.2 Further Recommendations

A full Microdrainage model is to be produced following the receipt of details levels design and further soakaway testing.

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), STW and the existing drainage asset management team.

Further soakaway testing should be carried out in accordance with BRE365 to further establish the infiltration rate at the development.

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 use³. • Installations requiring hazardous substances consent⁴. (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 waste⁶. • Sites used for holiday or short-let caravans and camping, <i>subject to a specific warning and evacuation plan</i>.⁷
Less vulnerable • Police, ambulance and fire stations which are <i>not</i> 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)*⁵ 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:

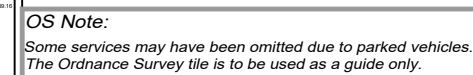
This table does not show:

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

Appendix B – Site Location Plan



Appendix C – Topographical Survey



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:

	Overhead Cable	IC	Intercom	IB	Interim
	Wall	PI	Pipe	IB	Insulated building
	Car icon	GY	Gully	VB	Vertical pipe
	Fence	Bg	Back gully	VB	Rubbish bin
	Litter marking	DO	Down pipe	GL	Ground line
	Grass line	Pipe	Pipe	LB	Litter box
	Vegetation	LA	Landscape	LB	Litter box
	Station and Name	WL	Water level	SI	Site
	Station and Name	FI	Flood light	IFL	Interim floor level
	Tree of Bush / Sapling	LP	Lamp post	TL	Threshold level
	Axe	TP	Telephone post	SG	Sign post
	Area of Undergrowth		Traffic light	TM	Telephone mast
	Woodland	TR	Traffic light	BH	Burrows
	Ridge Level	BS	Bus stop	EC	Electric
	Eaves Level	BS	Bus stop	BT	British Telecom
	First Floor Level	ST	Step	CB	Control box
	Top of Wall Level	ER	Earth rod	TL	Traffic
	Gate	WM	Waste master	GP	Ground point
	Fence types	GS	Gas valve	CP	Covered concrete
	Intervenor	AV	Air valve	ICV	Intercom
	Iron Railings	ICU	Underground	IC	Inspection chamber
	Wired Mesh	WO	Wash out	RT	Refining wall
	Pole & Rail	WR	Roofing wire	UL	Underline to raise
	Pole & Wire	IB	Interim building	EM	Energy meter
	Chain Link	CTV	Cable to	G	Grass
	Wooden Pallets	MR	Market post	MG	Multi grids
	Concrete Pavers	Gmk	Gas marker post	ST	Step
	Steel Pallet	SO	Soft	TS	Top of wall

1	05.05.22	External road & post-demo	JC	GH13
Rev	Date	Description	Drawn	Q. Rev



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CLIENT

AEW
Architects

PROJECT
Former A-Plant Site
JD Sports, Hollingsbrook Way
Bury, BL9 8RR

TITLE **Topographical
Survey**

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

Level datum	See notes
Grid orientation	See notes

Job number	42997
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Drawing No.	Rev.
42997 T	1

Comments
This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

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



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



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).

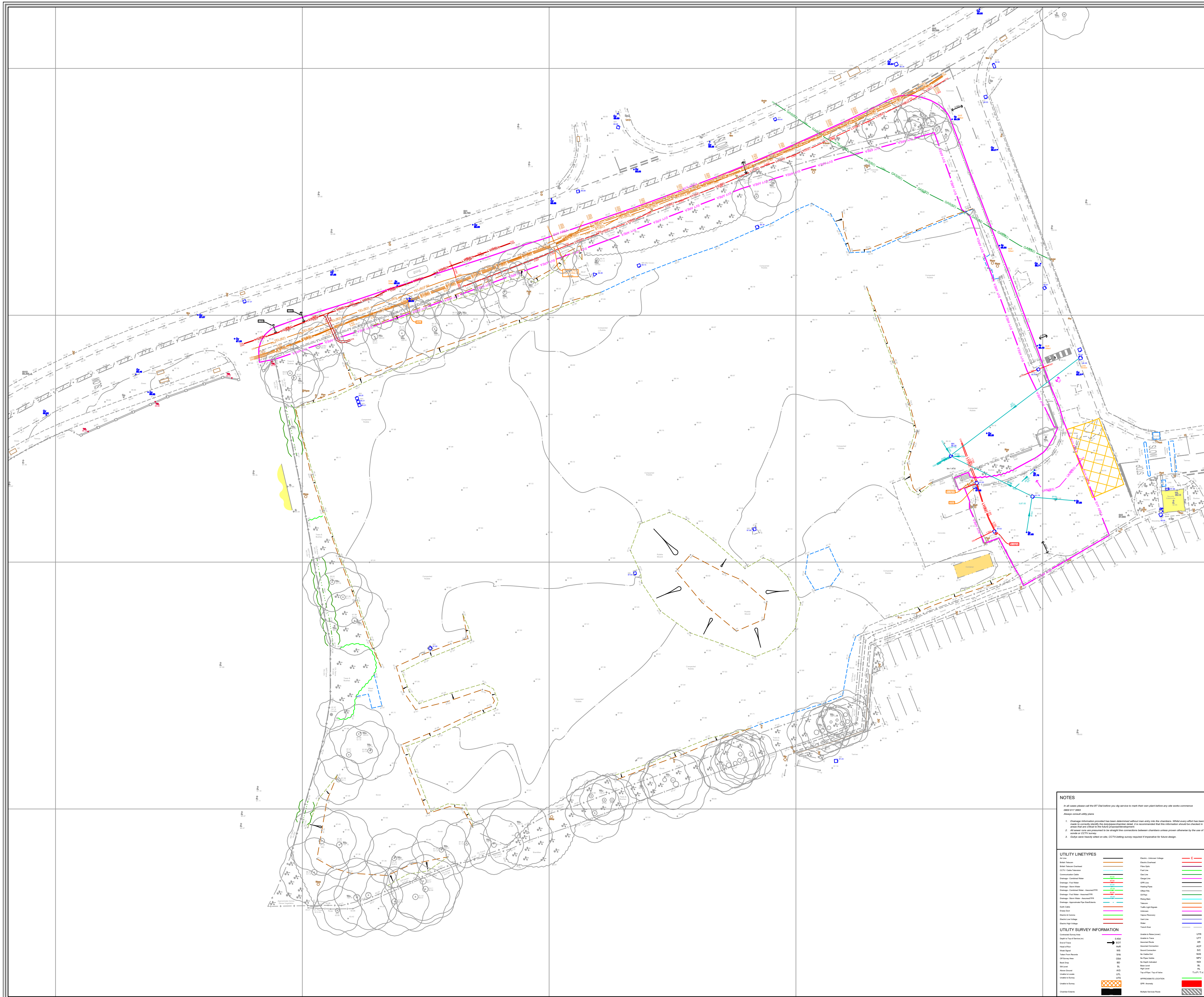
A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.
The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

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	 Overhead Cables	 IC	 Bo
 Kerb line	 Down-pipe	 Plw	 B
 Line marking	 Down-pipe	 Sy	 B
 Drop kerb	 Down-pipe	 Bg	 B
 Centre line	 Down-pipe	 Dp	 B
 Verge	 Down-pipe	 Pp	 B
 Area of Undergrowth	 Down-pipe	 Pp	 B
 Woodland	 Down-pipe	 Pp	 B
 Ridge Level	 Down-pipe	 Pp	 B
 Eaves Level	 Down-pipe	 Pp	 B
 Flat Roof Level	 Down-pipe	 Pp	 B
 TWL	 Down-pipe	 Pp	 B
 Gate	 Down-pipe	 Pp	 B
 Interwoven	 Down-pipe	 Pp	 B
 Iron Railings	 Down-pipe	 Pp	 B
 Wire Mesh	 Down-pipe	 Pp	 B
 Post & Rail	 Down-pipe	 Pp	 B
 Post & Wire	 Down-pipe	 Pp	 B
 Chain Link	 Down-pipe	 Pp	 B
 Wooden Panels	 Down-pipe	 Pp	 B
 Concrete Panels	 Down-pipe	 Pp	 B
 Steel Panels	 Down-pipe	 Pp	 B
 Inspection chamber	 Down-pipe	 Pp	 B
 Pipe insert	 Down-pipe	 Pp	 B
 Gully	 Down-pipe	 Pp	 B
 Block gully	 Down-pipe	 Pp	 B
 Down pipe	 Down-pipe	 Pp	 B
 Pipe above ground	 Down-pipe	 Pp	 B
 Manhole	 Down-pipe	 Pp	 B
 Water level	 Down-pipe	 Pp	 B
 Flood light	 Down-pipe	 Pp	 B
 Lamp post	 Down-pipe	 Pp	 B
 Telegraph post	 Down-pipe	 Pp	 B
 Electricity post	 Down-pipe	 Pp	 B
 Traffic light	 Down-pipe	 Pp	 B
 Bus stop	 Down-pipe	 Pp	 B
 Stop valve	 Down-pipe	 Pp	 B
 Stop tap	 Down-pipe	 Pp	 B
 Earth out	 Down-pipe	 Pp	 B
 Gate	 Down-pipe	 Pp	 B
 Water meter	 Down-pipe	 Pp	 B
 Gas valve	 Down-pipe	 Pp	 B
 Air valve	 Down-pipe	 Pp	 B
 Underside inspection	 Down-pipe	 Pp	 B
 Wash out	 Down-pipe	 Pp	 B
 Rodding eye	 Down-pipe	 Pp	 B
 Balustrade section	 Down-pipe	 Pp	 B
 Cable tie	 Down-pipe	 Pp	 B
 Marker post	 Down-pipe	 Pp	 B
 Gas marker post	 Down-pipe	 Pp	 B
 So	 Down-pipe	 Pp	 B
 Softs	 Down-pipe	 Pp	 B
 T	 Down-pipe	 Pp	 B
 T	 Down-pipe	 Pp	 B
 T	 Down-pipe	 Pp	 B
 T	 Down-pipe	 Pp	 B
 T	 Down-pipe	 Pp	 B
 T	 Down-pipe	 Pp	 B
 T	 Down-pipe	 Pp	 B



N

LEGEND

Railings	Overstreet Cables	IC Inspection chamber	Bt Buried
Wall	Tarmac edge strip	Flow Pipe invert	Illuminated bollard
Concrete edge strip	Traffic verge edge strip	Gully	Bollards bin
Line marking	Grass verge	Dg Down pipe	Vd Vent pipe
Green verge	Capacity/Drainage	Back gate	GL Ground light
Drainage	Sewer	Pz Plug above ground	Lr Letter box
Boundary of site	Manhole	Mh Manhole	Stp Stop Stamp
Station and house	Water level	WL Water level	Sty Style
100.00m Station Level	FI Flood light	FL Flood light	FHL Fire alarm floor level
Tree (Bark / Sapling)	LP Lamp post	LH Threshold level	RL Right point
Area of Unidentified Woodland	E Electricity pylon	RL Right point	TT Taster
Ridge Level	TS Telegraph post	BS Boneworks	ELC Electric
Eriw Level	Svs Stop sign	BT British Telecom	CS Control box
First Road Level	ST Step top	CB Cover level	Bps Bank paved
Gate	Wm Water meter	CPs Cables pressing bit	
Fence types:	GS Gas valve	CUS Concrete paving slab	
Interim fence	Au Air valve	CVR Cover	
HSB non-Railings	ICU Underdrain inspection	RW Railway wall	
Wire Mesh	Wn Waste rail	TRC Top of Rail Level	
Post & Rail	Rd Roofing tile	TOL Trenching wall	
Post & Timber	BB Ballistic beacon	G Grids	
Chain Link	CTC Cable post	MG Main gutter	
Wooden Panels	MR Master post	IC Inspection chamber	
Close Boarded	MS Meter socket	CL Cover level	
Steel Panels	GH Gate	IL Invert level	
	FH Fire hydrant	UTL Unable to locate	

PAS 128 : 2014 LEVEL 8 SURVEY

QUALITY LEVEL	CERTIFICATION OF THE INFORMATION	ACCURACY
NO SD	A FULLY TRAINED SURVEYOR HAS CONDUCTED A VISUAL CHECK AND NO SIGNIFICANT DISCREPANCIES HAVE BEEN IDENTIFIED (THIS DOES NOT IMPLY THAT THERE ARE NO DISCREPANCIES)	UNDEFINED
SD 10%	PORTION OF THE QUALITY CONTROLLED AND OF THE DATA HAS BEEN VERIFIED BY AN INDEPENDENT CERTIFIED SURVEYOR	± 30mm horizontal ± 100mm vertical
SD 20%	PORTION OF THE QUALITY CONTROLLED AND OF THE DATA HAS BEEN VERIFIED BY AN INDEPENDENT CERTIFIED SURVEYOR	± 30mm hor. + 40% of DISTANCE OFFSET Top of wall level
SD 30%	PORTION OF THE QUALITY CONTROLLED AND OF THE DATA HAS BEEN VERIFIED BY AN INDEPENDENT CERTIFIED SURVEYOR	± 30mm hor. + 40% of DISTANCE OFFSET DISTANCE BETWEEN POINTS IS PROPORTIONAL TO ± 30mm hor. + 40% of DISTANCE OFFSET

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/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 HSE47, 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	C. Ref.

☐ Topographical Surveys ☐ Measured Building Surveys

☐ Site Engineering ☐ 3D Laser Scanning

☐ Utility / CCTV Surveys ☐ Revit & BIM Models

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CLIENT

AEW Architects

PROJECT

Former A-Plant Site
JD Sports, Hollingsbrook Way
Bury, BL9 8RR

TITLE

Utility Survey

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

Level datum	See notes
Grid orientation	See notes
Job number	42997

Drawing No.	42997_T_UG	Rev.	0
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Comments

This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

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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Appendix D – Sewer Map

Kennedy Redford

**20
Market Street,
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WA141PF**

FAO:

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

**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

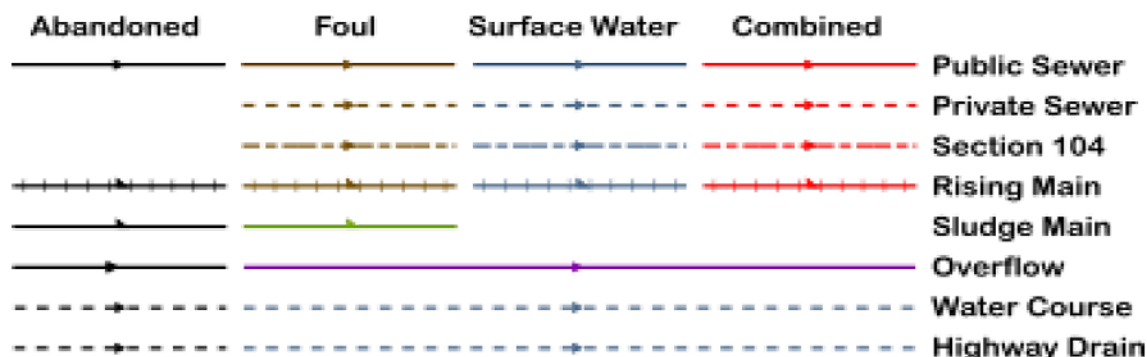
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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:

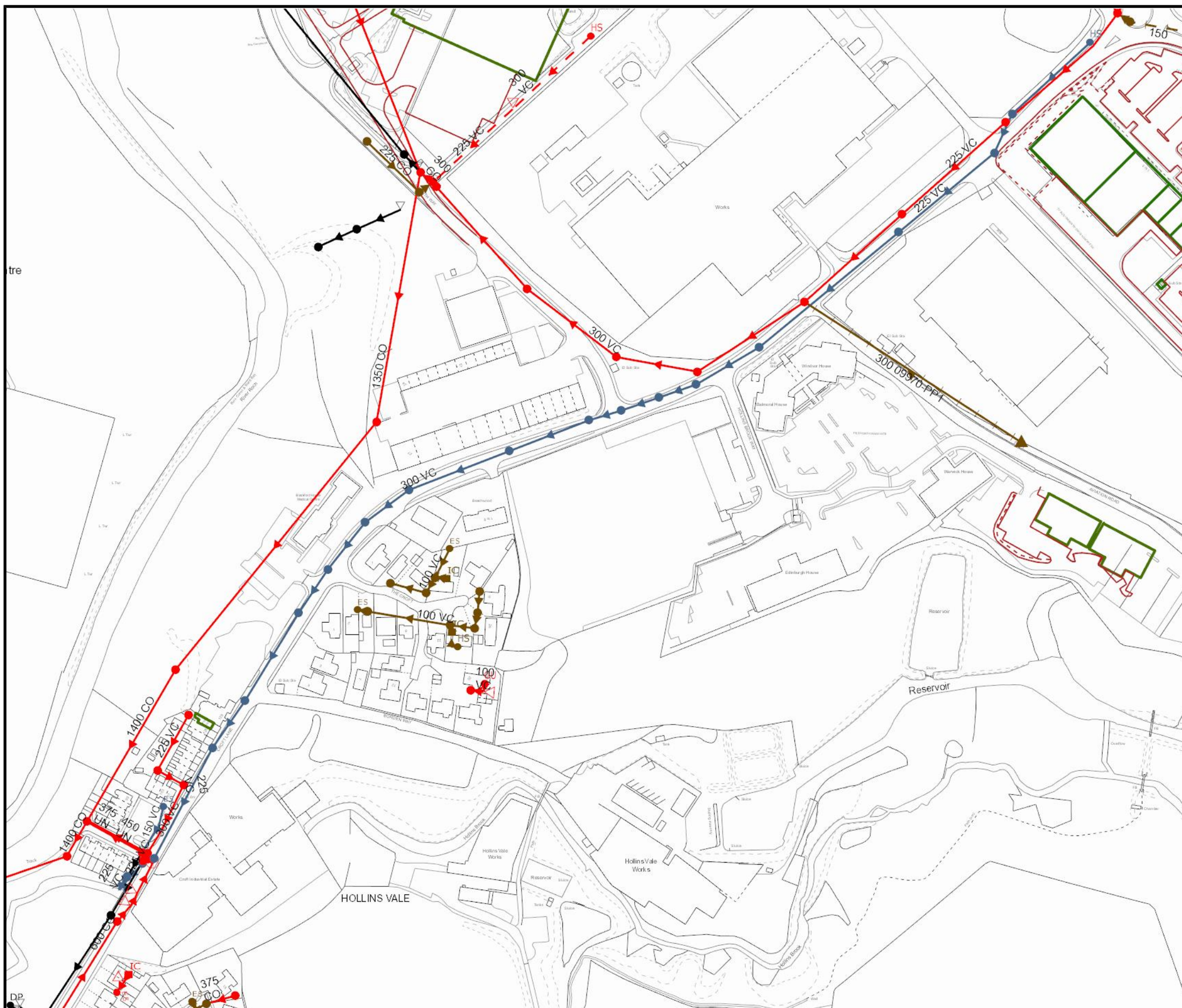
- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out 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.

Wastewater Symbolology



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

Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock Chamber
Soakaway	Network Storage Tank
Gully	Sewer Overflow
Cascade	Ww Treatment Works
Flow Meter	Ww Pumping Station
Hatch Box	Septic Tank
Oil Interceptor	Control Kiosk
Summit	
Drop Shaft	Change of Characteristic
Orifice Plate	



Water for the North West

SEWER RECORDS

Address or Site Reference

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

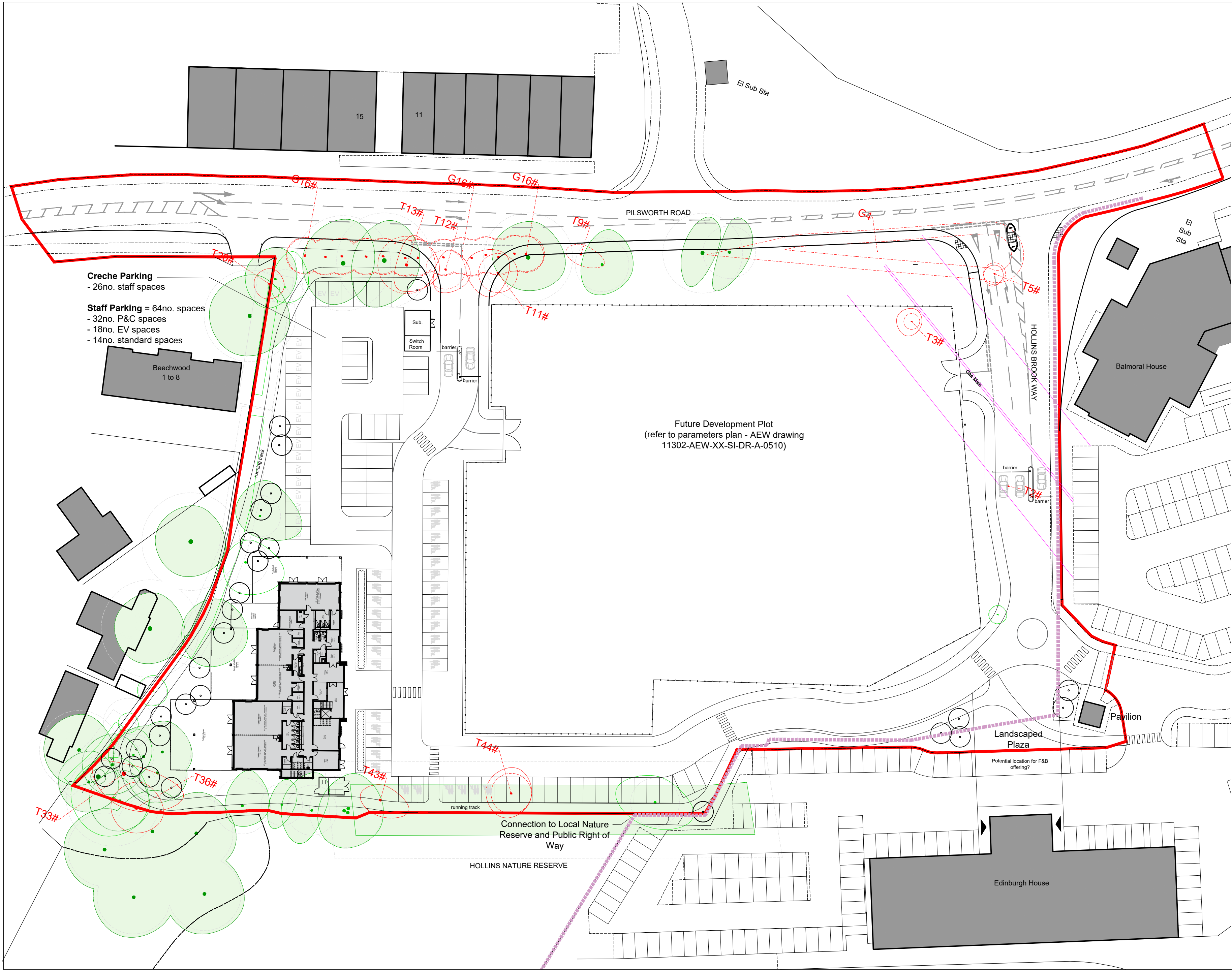
Scale: 1:2500
Date: 20/12/2021

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

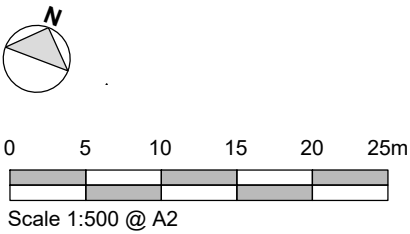


NOTES AEWTP027C

- All dimensions and levels are to be checked on site.
- Any discrepancies are to be reported to the architect before any work commences.
- This drawing shall not be scaled to ascertain any dimensions. Work to figured dimensions only.
- 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.

CDM 2015

Client notified of duties: 19/01/2022
Principal Designer: David M. Eagle Ltd.
Unless noted below, all known hazards have been highlighted on the drawing:



- Key:**
- Application Boundary
 - Existing Buildings
 - Proposed Buildings
 - Public Right of Way
 - Gas Main
 - Existing Trees to be retained
 - Existing Trees to be removed

P01	26/04/2022	RP	PBH
Initial Issue			
REV	Date	Drawn by: -	Checked by: -
Status	Purpose of Issue		
S2	For Approval		
drawing stage	Planning		
client			

JD Sports PLC

project
JD Sports Campus Hub
(Former A-Plant Site)

drawing title
Proposed Site Plan

date 24/04/2022 drawn RP
scale@A2 1:500 checked PBH

Rev P01

Job No 11302-AEW-XX-SI-DR-A-0504

aeuw architects
0161 214 4370
www.aeuarhitects.com

aeuw

Appendix F – Flood Plans



Flood map for planning

Your reference
JD Sports

Location (easting/northing)
381524/408676

Created
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 than 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)

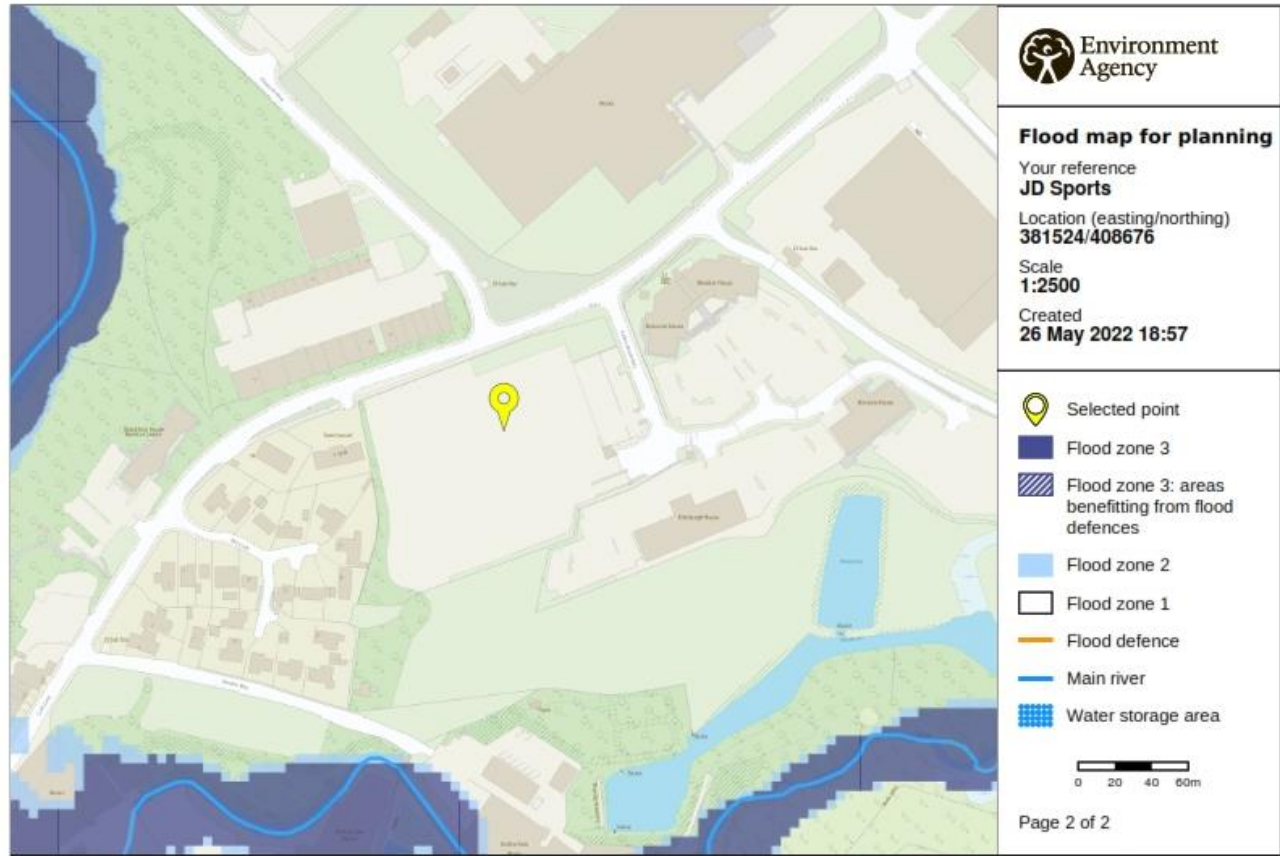
Notes

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>



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Flood risk

Extent of flooding

Location

BL9 8RR



Extent of flooding from surface water

High
 Medium
 Low
 Very low
 Location you selected

Flood risk

Extent of flooding

Location

BL9 8RR

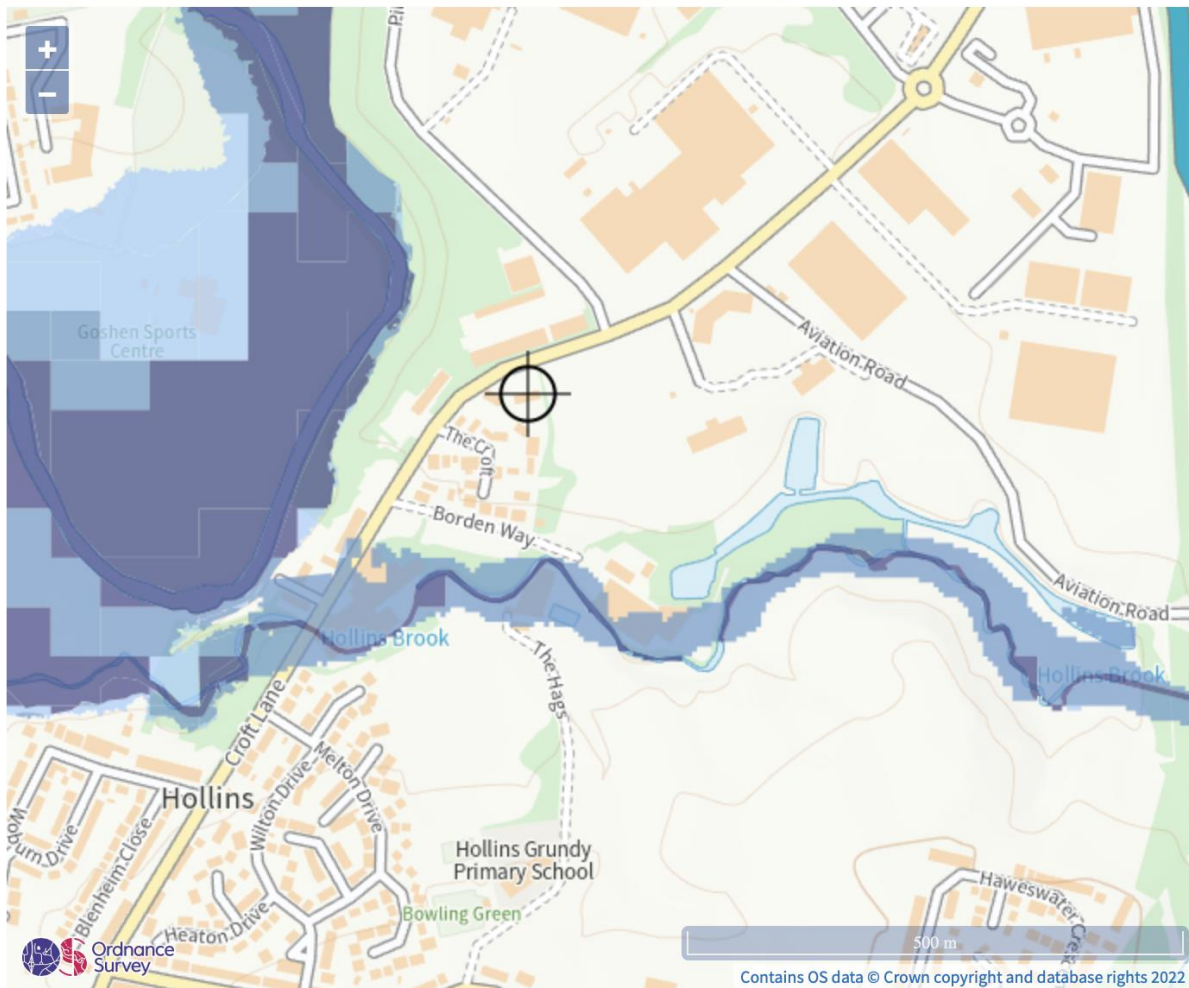


Flood risk

Location

Extent of flooding

BL9 8RR



Extent of flooding from rivers or the sea

High
 Medium
 Low
 Very low
 Location you selected

Appendix G – Proposed Drainage Layouts

KEY

EXISTING SURFACE WATER SEWER

EXISTING COMBINED WATER SEWER

EXISTING SURFACE WATER DRAIN

ABANDONED EXISTING DRAINAGE

PROPOSED SURFACE WATER DRAIN

PROPOSED FOUL WATER DRAIN

PROPOSED SUMP MANHOLE

PROPOSED POLYPROPYLENE INSPECTION CHAMBER

EXISTING GULLY

RED LINE BOUNDARY

PHASE 2 BOUNDARY

NOTES

1. THIS DRAINAGE DESIGN IS BASED ON AN INFILTRATION RATE OF 2.17 x 10⁻⁵ m/s AS TAKEN FROM THE GROUNDTECH REPORT. FURTHER SOAKAWAY TESTS WILL BE REQUIRED TO FINALISE THE DRAINAGE STRATEGY.

2. COVER LEVELS ARE CURRENTLY BASED ON THE EXISTING LEVELS ONLY.

3. DRAINAGE LAYOUT SUBJECT TO CHANGE DEPENDING ON:

- RWP AND FOUL CONNECTION LAYOUT
- PROPOSED LEVELS
- EXISTING DRAINAGE LEVELS
- INFILTRATION RATE

4. FOUL WATER DISCHARGE RATE AND CONNECTION SUBJECT TO AGREEMENT WITH BURY COUNCIL AND UNITED UTILITIES.

NOTES

1. THIS DRAWING IS PRELIMINARY AND IS SUBJECT TO CHANGE DEPENDING ON FURTHER DEVELOPMENT OF THE S.I.A. SITE LAYOUT, PROPOSED LEVELS, INFILTRATION RATES, RWP LAYOUT AND FOUL CONNECTION LOCATIONS.

2. THIS DRAWING IS BASED ON THE AEW ARCHITECTS PROPOSED SITE PLAN, DRAWING NO. 11302-AEW-XX-SI-DR-A-0004 REV P03.

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 1200MM UNLESS INDICATED OTHERWISE.

8. ALL INSPECTION CHAMBERS ARE 4750 UNLESS INDICATED OTHERWISE.

9. UNLESS INDICATED OTHERWISE ALL PIPES TO BE LAD SORTED TO SLOPE.

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 UNKNOWN AT PRESENT.

13. RAINWATER PIPE AND FOUL CONNECTION LOCATIONS UNKNOWN AT PRESENT.

14. LINEAR DRAIN AND GULLY LOCATIONS SUBJECT TO DETAILED LEVELS DESIGN AND NOT SHOWN AT THIS TIME.

15. DISCHARGE RATE AND CONNECTION TO SEWER SUBJECT TO AGREEMENT WITH BURY COUNCIL AND UNITED UTILITIES.

16. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND CONSTRUCTION PROCEDURES.

17. CONTRACTOR TO APPLY FOR SEWER PERMITS AND ROAD OPENING PERMITS AS NECESSARY FROM THE APPROPRIATE AUTHORITIES, PRIOR TO COMMENCING WORKS.

18. THE CONTRACTOR SHALL ALLOW FOR ALL TRAFFIC MANAGEMENT IN CONNECTION WITH ROAD AND SEWER WORKS.

19. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL VENT TO THE ATMOSPHERE.

REV	DATE	DESCRIPTION	DRN	CHK	APP
P02	27.05.22	UPDATED DRAINAGE LAYOUT	M.M.	R.B.	R.K.
P01	10.05.22	PRELIMINARY ISSUE	R.B.	D.B.	R.K.

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CLIENT
JD SPORTS PLC

PROJECT NAME
JD SPORTS OFFICE BURY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT
PHASE 1

DATE	SCALE	SHEET SIZE	REV
10.05.22	1:250	A0	P02

DRAWING STATUS

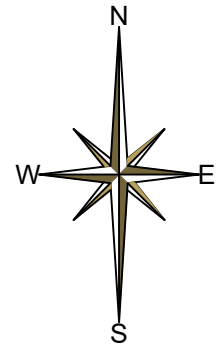
S1 - ISSUED FOR INFORMATION

DRAWING NUMBER

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

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 MANHOLE
- PROPOSED MUGA SOAKAWAY SYSTEM
- EXISTING GULLY
- RED LINE BOUNDARY
- PHASE 2 BOUNDARY



NOTES

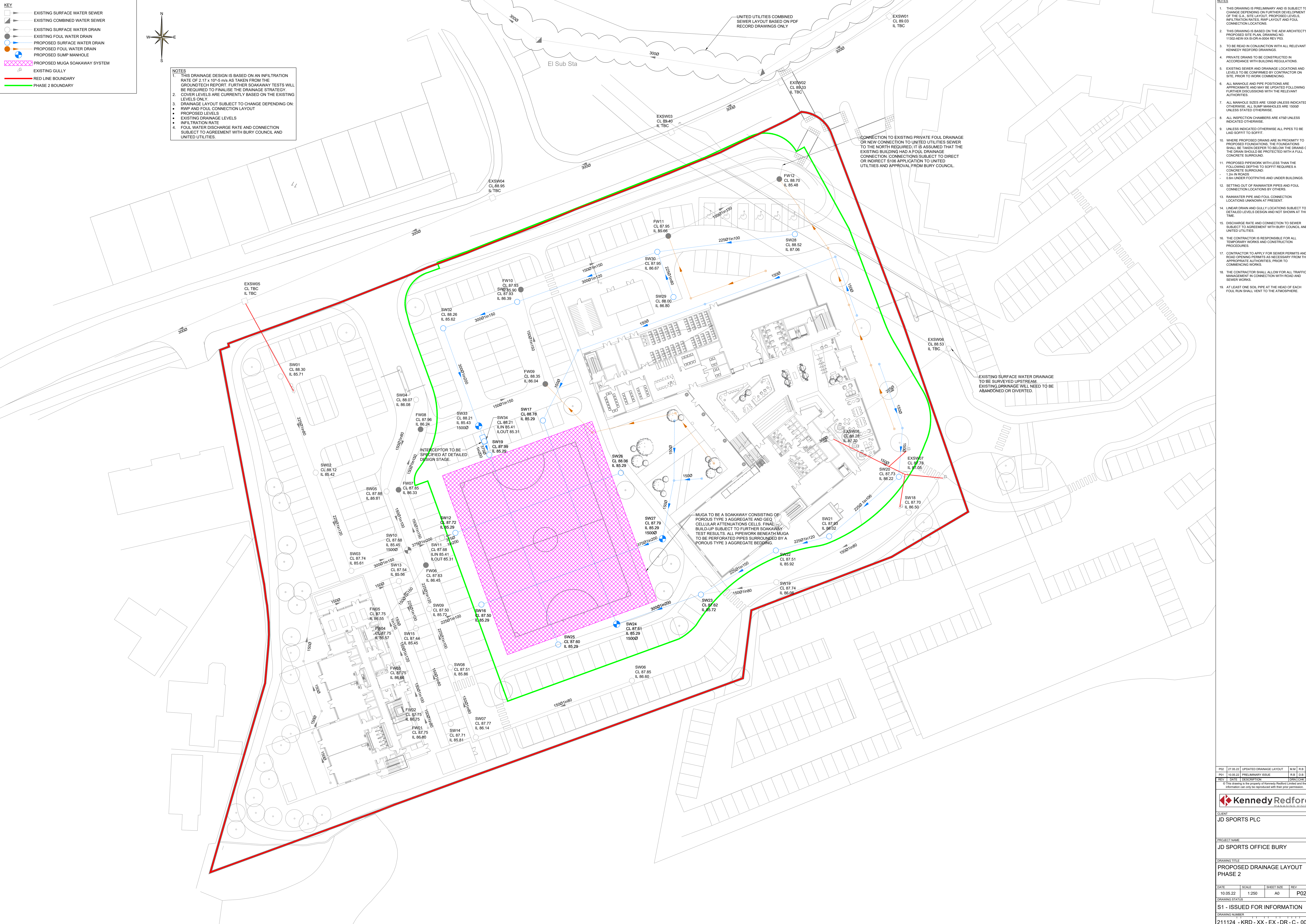
1. THIS DRAINAGE DESIGN IS BASED ON AN INFILTRATION RATE OF 2.17 x 10⁻⁵ m/s AS TAKEN FROM THE GROUNDTECH REPORT. FURTHER SOAKAWAY TESTS WILL BE REQUIRED TO FINALISE THE DRAINAGE STRATEGY.

2. COVER LEVELS ARE CURRENTLY BASED ON THE EXISTING LEVELS ONLY.

3. DRAINAGE LAYOUT SUBJECT TO CHANGE DEPENDING ON:

- RWP AND FOUL CONNECTION LAYOUT
- PROPOSED LEVELS
- EXISTING DRAINAGE LEVELS
- INFILTRATION RATE

4. FOUL WATER DISCHARGE RATE AND CONNECTION SUBJECT TO AGREEMENT WITH BURY COUNCIL AND UNITED UTILITIES.



- NOTES
- THIS DRAWING IS PRELIMINARY AND IS SUBJECT TO CHANGE DEPENDING ON FURTHER DEVELOPMENT OF THE D.A., SITE LAYOUT, PROPOSED LEVELS, INFILTRATION RATES, RWP LAYOUT AND FOUL CONNECTION LOCATIONS.
 - THIS DRAWING IS BASED ON THE AEW ARCHITECTS PROPOSED SITE PLAN, DRAWING NO. 11502-ARW-XS-SH08-A004 REV P03.
 - TO BE READ IN CONJUNCTION WITH ALL RELEVANT KENNEDY REDFORD DRAWINGS.
 - PRIVATE DRAINS TO BE CONSTRUCTED IN ACCORDANCE WITH BUILDING REGULATIONS.
 - EXISTING SEWER AND DRAINAGE LOCATIONS AND LEVELS TO BE CONFIRMED BY CONTRACTOR ON SITE PRIOR TO WORK COMMENCING.
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 - ALL INSPECTION CHAMBERS ARE 4750 UNLESS INDICATED OTHERWISE.
 - UNLESS INDICATED OTHERWISE ALL PIPES TO BE LAD SOFFIT TO SOFFIT.
 - 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.
 - PROPOSED PREWORK WITH LESS THAN THE FOLLOWING DEPTHS TO SOFFIT REQUIRES A CONCRETE SURROUND:
 - 1.3m IN ROADS
 - 0.6m UNDER FOOTPATHS AND UNDER BUILDINGS.
 - SETTING OUT OF RAINWATER PIPES AND FOUL CONNECTION LOCATIONS BY OTHERS.
 - RAINWATER PIPE AND FOUL CONNECTION LOCATIONS UNKNOWN AT PRESENT.
 - LINEAR DRAIN AND GULLY LOCATIONS SUBJECT TO DETAILED LEVELS DESIGN AND NOT SHOWN AT THIS TIME.
 - DISCHARGE RATE AND CONNECTION TO SEWER SUBJECT TO AGREEMENT WITH BURY COUNCIL AND UNITED UTILITIES.
 - THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND CONSTRUCTION PROCEDURES.
 - CONTRACTOR TO APPLY FOR SEWER PERMITS AND ROAD OPENING PERMITS AS NECESSARY FROM THE APPROPRIATE AUTHORITIES, PRIOR TO COMMENCING WORKS.
 - THE CONTRACTOR SHALL ALLOW FOR ALL TRAFFIC MANAGEMENT IN CONNECTION WITH ROAD AND SEWER WORKS.
 - AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL VENT TO THE ATMOSPHERE.

PO2	27.05.22	UPDATED DRAINAGE LAYOUT	M.M.	R.B.	R.K.
PO1	10.05.22	PRELIMINARY ISSUE	R.B.	D.B.	R.K.
REV	DATE	DESCRIPTION	DRN	CHK	APP

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CLIENT
JD SPORTS PLC

PROJECT NAME
JD SPORTS OFFICE BURY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT
PHASE 2

DATE	SCALE	SHEET SIZE	REV
10.05.22	1:250	A0	PO2

DRAWING STATUS
S1 - ISSUED FOR INFORMATION

DRAWING NUMBER
211124 - KRD - XX - EX - DR - C - 0002

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

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	<i>Soil percolation testing was undertaken at a single location (SuDS1) within the natural Sand and infiltration rates recorded ranged between 2.17×10^{-5} and 4.37×10^{-5} m/s which are considered good drainage conditions and SuDS drainage is likely to be feasible for the proposed development.</i>
Constraints	<i>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.</i> <i>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.</i>
GQRA and Revised (PL) Assessment	
Human Health	<i>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.</i>
Controlled Waters	<i>The risk to controlled waters is considered to be Low.</i>
Permanent Ground Gas	<i>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 this stage. This will be confirmed or otherwise on completion of the monitoring programme.</i> <i>The site is not in an area affected by radon.</i>
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.*

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	PROJECT OBJECTIVES	1
1.2	PROPOSED DEVELOPMENT	1
1.3	LIMITATIONS	1
2.0	SITE SETTING.....	3
2.1	LOCATION.....	3
2.2	SITE DESCRIPTION	3
3.0	PREVIOUS INVESTIGATIONS SUMMARY.....	5
3.1	INTRODUCTION	5
3.2	SITE HISTORY AND CONSULTATIONS	5
3.3	GEOLOGY AND HYDROGEOLOGY	5
3.4	PRELIMINARY CONCEPTUAL SITE MODEL.....	5
3.5	COAL MINING RISK ASSESSMENT.....	6
3.6	GROUND MODEL	6
3.7	GEO-ENVIRONMENTAL TESTING RESULTS.....	7
3.8	GROUND GAS.....	7
3.9	REMEDIAL STRATEGY	7
3.10	GEOTECHNICAL.....	7
3.11	GAS MAIN DELINEATION	8
4.0	SCOPE OF INVESTIGATION AND RATIONALE	9
4.1	PROJECT OBJECTIVES	9
4.2	SCOPE OF WORKS	9
4.3	SOIL SAMPLING	10
4.4	GEO-ENVIRONMENTAL TESTING.....	10
4.5	GAS AND GROUNDWATER MONITORING/SAMPLING	11
5.0	GROUND MODEL.....	12
5.1	MADE GROUND.....	12
5.2	NATURAL GROUND.....	12
5.3	BEDROCK.....	13
5.4	GROUNDWATER.....	13
5.5	WATCHING BRIEF.....	13
5.6	EXCAVATION STABILITY.....	13
5.7	EXCAVATION/ BOREHOLE PROGRESS	13
6.0	GROUND ENGINEERING.....	14
6.1	GEOTECHNICAL TESTING RESULTS.....	14
6.2	ASSESSMENT BACKGROUND	14
6.3	GEOTECHNICAL PARAMETERS	15
6.4	PRELIMINARY FOUNDATION DESIGN – OFFICE BUILDING	16
6.5	PRELIMINARY FOUNDATION DESIGN – CRECHE.....	18
6.6	BUILDING NEAR TREES	18
6.7	FLOOR SLABS	18
6.8	CONSTRUCTION	18
6.9	CONCRETE CLASSIFICATION	19
6.10	HIGHWAY DESIGN	19
6.11	SUSTAINABLE URBAN DRAINAGE SYSTEM (SUDS).....	20
6.12	REVISED COAL MINING RISK ASSESSMENT.....	20

7.0	LAND QUALITY.....	22
7.1	GEO-ENVIRONMENTAL TESTING RESULTS - SOILS	22
7.2	GENERIC QUANTITATIVE RISK ASSESSMENT - SOILS	24
7.3	PERMANENT GROUND GASES	25
7.4	REVISED POLLUTION LINKAGE ASSESSMENT	26
7.5	OUTLINE REMEDIAL STRATEGY	33
7.6	ASBESTOS IN SOILS	33
7.7	HEALTH AND SAFETY - CONSTRUCTION AND GROUND WORKERS	34
7.8	WASTE CLASSIFICATION BY ASSESSMENT	34
7.9	WASTE ACCEPTANCE CRITERIA (WAC) RESULTS.....	35
8.0	FINAL APPRAISAL.....	37
8.1	LAND QUALITY	37
8.2	GROUND ENGINEERING	37
8.3	REQUIRED SUPPLEMENTARY INVESTIGATION	38
9.0	RELEVANT INDUSTRY REFERENCES.....	39

APPENDIX 1 - PLANS
 APPENDIX 2 - SITE PHOTOGRAPHS
 APPENDIX 3 - EXPLORATORY HOLE LOGS
 APPENDIX 4 - GEO-ENVIRONMENTAL TESTING
 APPENDIX 5 - GEOTECHNICAL TESTING
 APPENDIX 6 - INTERIM PERMANENT GAS MONITORING RESULTS
 APPENDIX 7 - PLATE LOAD TESTING RESULTS
 APPENDIX 8 - SOIL PERCOLATION TESTING RESULTS
 APPENDIX 9 - GENERIC SCREENING VALUES (COMMERCIAL END USE)
 APPENDIX 10 - CIRIA RISK ASSESSMENT METHODOLOGY
 APPENDIX 11 - JIWG RECEPTOR DECISION TOOL
 APPENDIX 12 - WASTE CLASSIFICATION REPORT
 APPENDIX 13 - CONTAMINATED LAND LEGISLATIVE BACKGROUND
 APPENDIX 14 - LIMITATIONS

Plans		
<i>Plan Reference</i>	<i>Revision</i>	<i>Title</i>
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.



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.

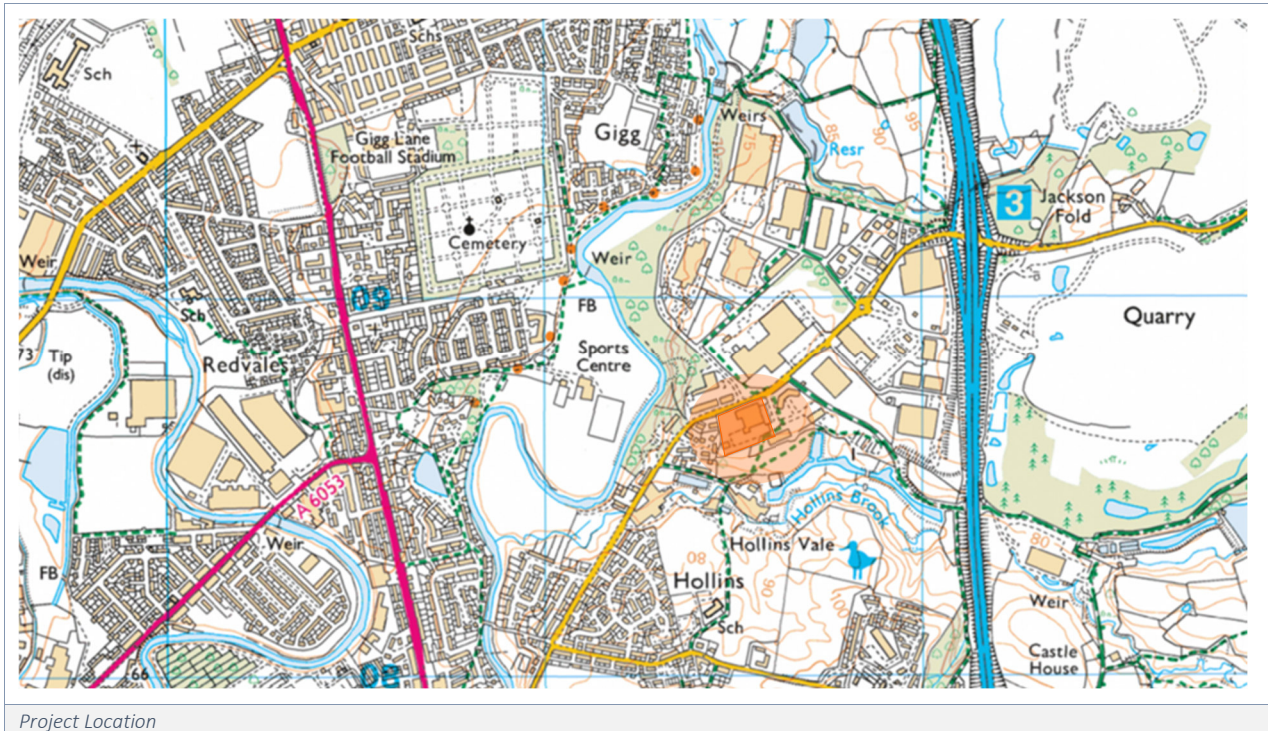


The assessment has been prepared for the exclusive use of the client. No third parties may rely on or reproduce the contents of the report without the written permission of Groundtech Consulting Limited. If any unauthorised third party comes into possession of the report they rely on it at their own 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.



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

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

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 is 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
<i>Environmental Sample</i>	<i>22</i>
<i>Disturbed Sample</i>	<i>74</i>
<i>Undisturbed U100 Sample</i>	<i>9</i>

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

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 (O₂), carbon dioxide (CO₂) and methane (CH₄) as the percentage volume in air (%v/v).
- Hydrogen sulphide (H₂S) 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 excavations 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 column 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 N_q bearing capacity factors have been used for the Sand strata and driven piles would allow a more efficient design to be 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 allow 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/m² 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
<i>Granular Made Ground</i>	<i>7</i>	<i>TP01 to TP03, BH01, BH03, BH04</i>
<i>Natural Sand</i>	<i>1</i>	<i>BH02</i>

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

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

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

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

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 recorded 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 (CH₄) were not recorded within any monitoring locations. Carbon dioxide (CO₂) has been recorded at a maximum concentration of 4.3% v/v within BH01. Detectable levels of oxygen (O₂) 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” (Q_{hg}) have been derived for each monitoring point. As no levels of methane have been recorded, a GSV for carbon dioxide only has been calculated.

$$GSV (l/hr) = \text{max borehole flow rate (l/hr)} \times \text{max gas concentration (\%)}$$

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.

$$\text{Carbon Dioxide GSV} = 0.043 (4.3\%) \times 0.1 = 0.0043 \text{ l/hr}$$

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.

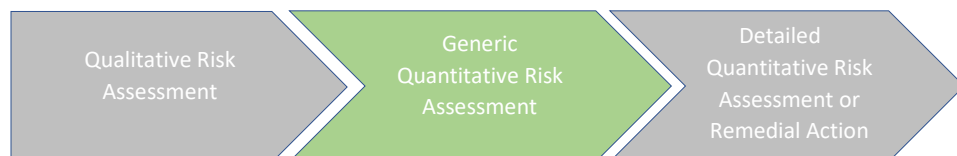
Radon

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-licensed, 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. 600m³) of non-hazardous soil*
- *5,000 tonnes (c. 3,000m³) of natural sand and gravels.*
- *50,000 tonnes (c. 25,000m³) of bituminous material to be used in roadways.*
- *5,000 tonnes (c. 3,000m³) 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 subgrade 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.
- British Standards Institution "*Geotechnical investigation and testing – Identification and classification of rock*" BS EN ISO 14689:2002.
- BRE Report BR211 '*Radon – Guidance on protective measures for new buildings*' 2015 Edition.
- BRE Special Digest 1: "*Concrete in Aggressive Ground*" 3rd Ed 2005.
- 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.
- The National Planning Policy Framework (NPPF) March 2012
- DETR. Circular 02/2000 Contaminated Land.
- Environment Agency, 2009 '*Using Soil Guideline Values*'.
- Environment Agency, 2009 '*Updated Technical Background to the CLEA model*'.
- Environment Agency, 2009 '*Human health toxicological assessment of contaminants in soil*'.
- Department of the Environment, 1994, CLR Report No 1 '*A framework for assessing the impact of contaminated land on groundwater and surface water*'.
- Department of the Environment, 1994, CLR Report No 2 '*Guidance on Preliminary Site Inspection of Contaminated Land*'.
- Department of the Environment, 1994, CLR Report No 3 '*Documentary research on Industrial Sites*'.
- Department of the Environment, 1994, CLR Report No 4 '*Sampling Strategies for Contaminated Land*'.
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- DEFRA and the Environment Agency, 2004, CLR Report No 11 '*Model Procedures for the Management of Contaminated Land*'.
- Nathanail, C. P., McCaffrey, C., Gillett, A., Ogden, R. C. and Nathanail, J.F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham.
- 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



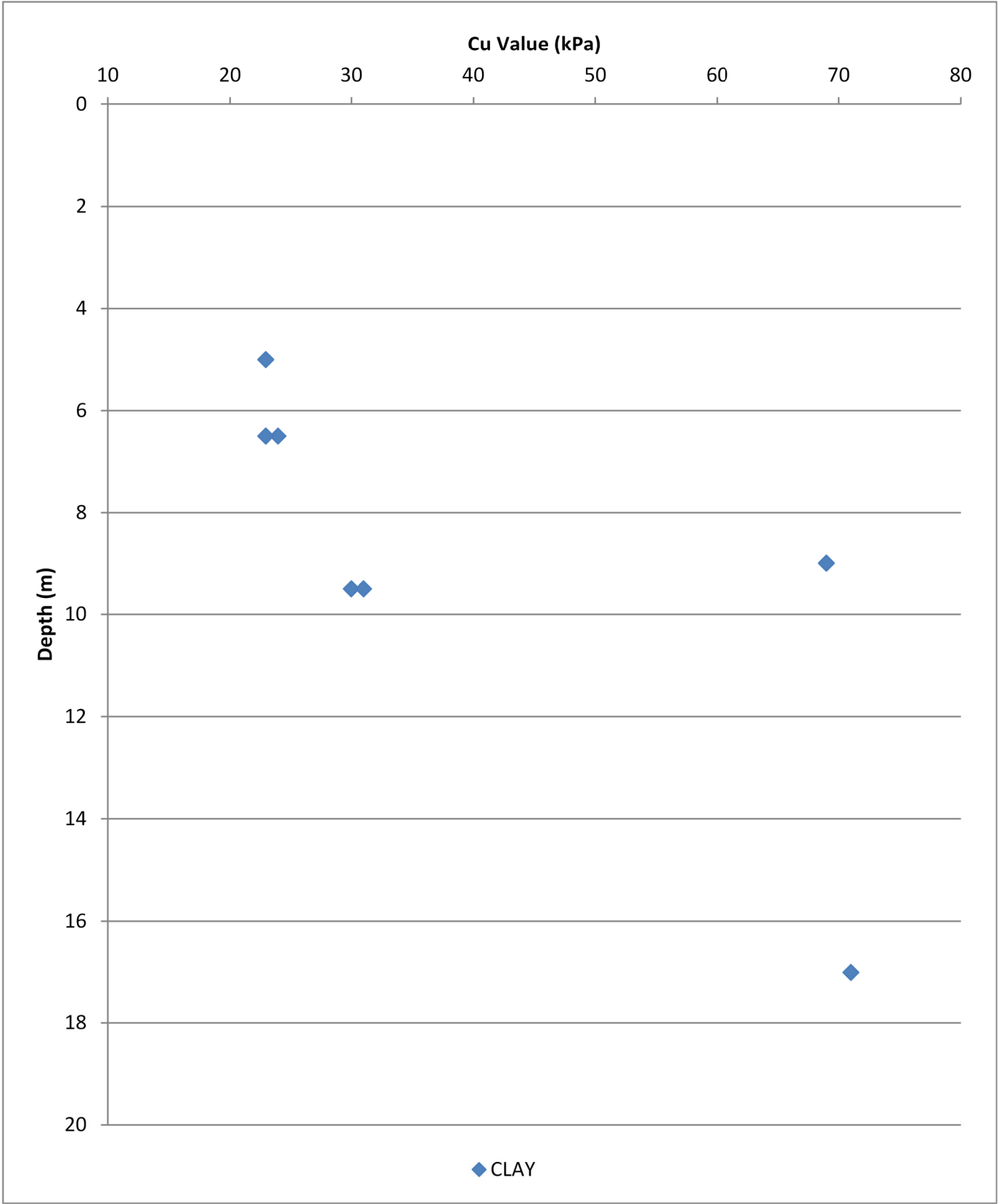
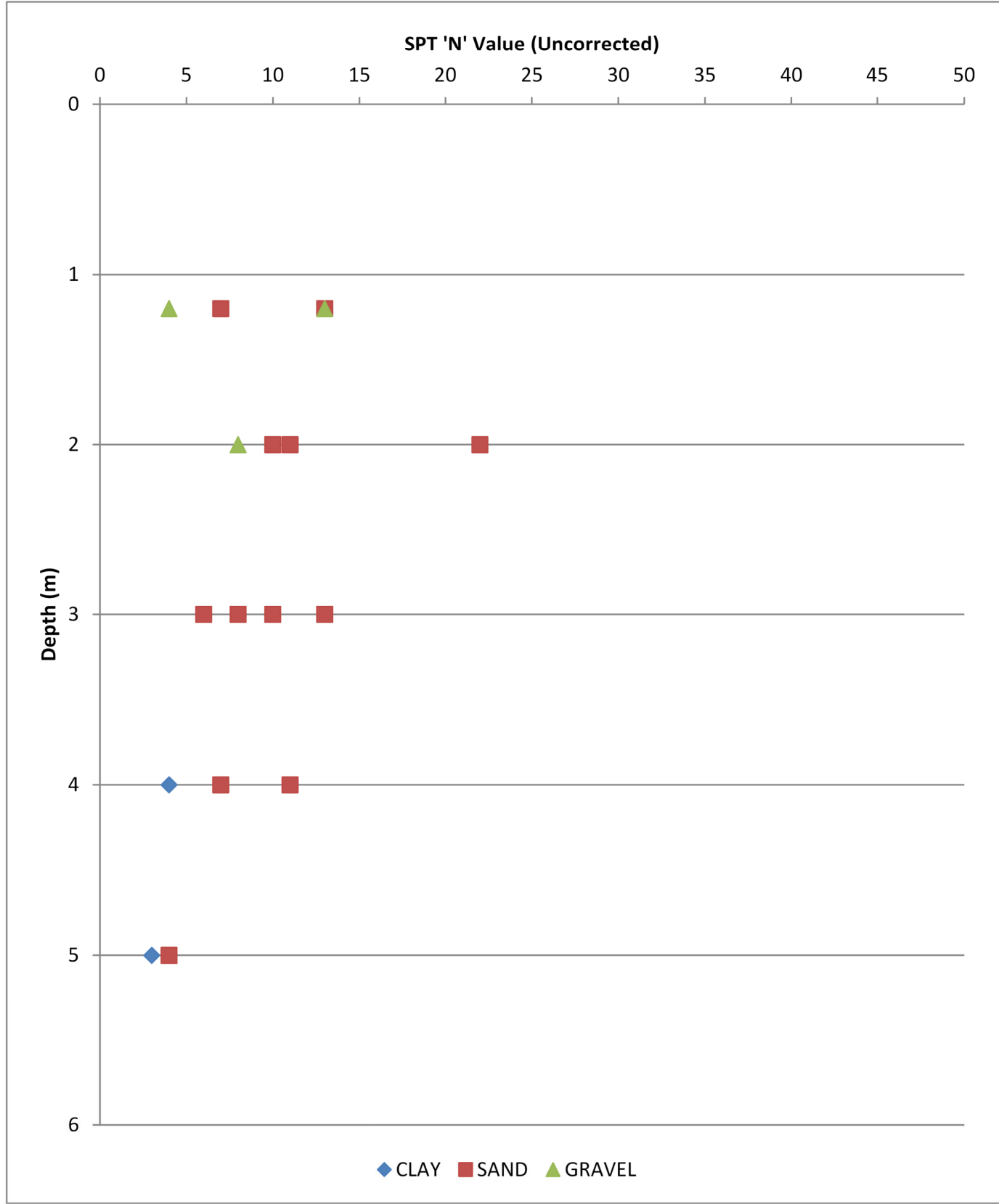
APPENDIX 1 - Plans



GROUNDTECH CONSULTING	CLIENT	DATE			Status	Notes - Site Location
	JD SPORTS	JANUARY 2022			Preliminary	
	PROJECT TITLE	SCALE			Draft	
	NEW OFFICE BLOCK, BURY	NTS			Issued	
	PLAN TITLE	PLAN NUMBER			For Comment	
	PROJECT LOCATION PLAN	GRO-21438-P01	Rev.	Details	Date	Approved



GROUNDTECH CONSULTING 	CLIENT	DATE				Status	Notes		
	JD SPORTS	JANUARY 2022				Preliminary		 – Site Location	 – CBR Location
	PROJECT TITLE	SCALE				Draft		 – Borehole Location	
	NEW OFFICE BLOCK, BURY	NTS				Issued		 – Trial Pit Location	
	PLAN TITLE	PLAN NUMBER				For Comment			
	EXPLORATORY HOLE LOCATION PLAN	GRO-21438-P04	Rev.	Details	Date	Approved			



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CONSULTING



CLIENT

JD SPORTS

PROJECT TITLE

NEW OFFICE BLOCK, BURY

PLAN TITLE

GENERALISED GROUND MODEL

DATE

FEBRUARY 2022

SCALE

NTS

PLAN NUMBER

GRO-21438-P05

Rev.

Details

Date

Status

Preliminary

Draft

Issued

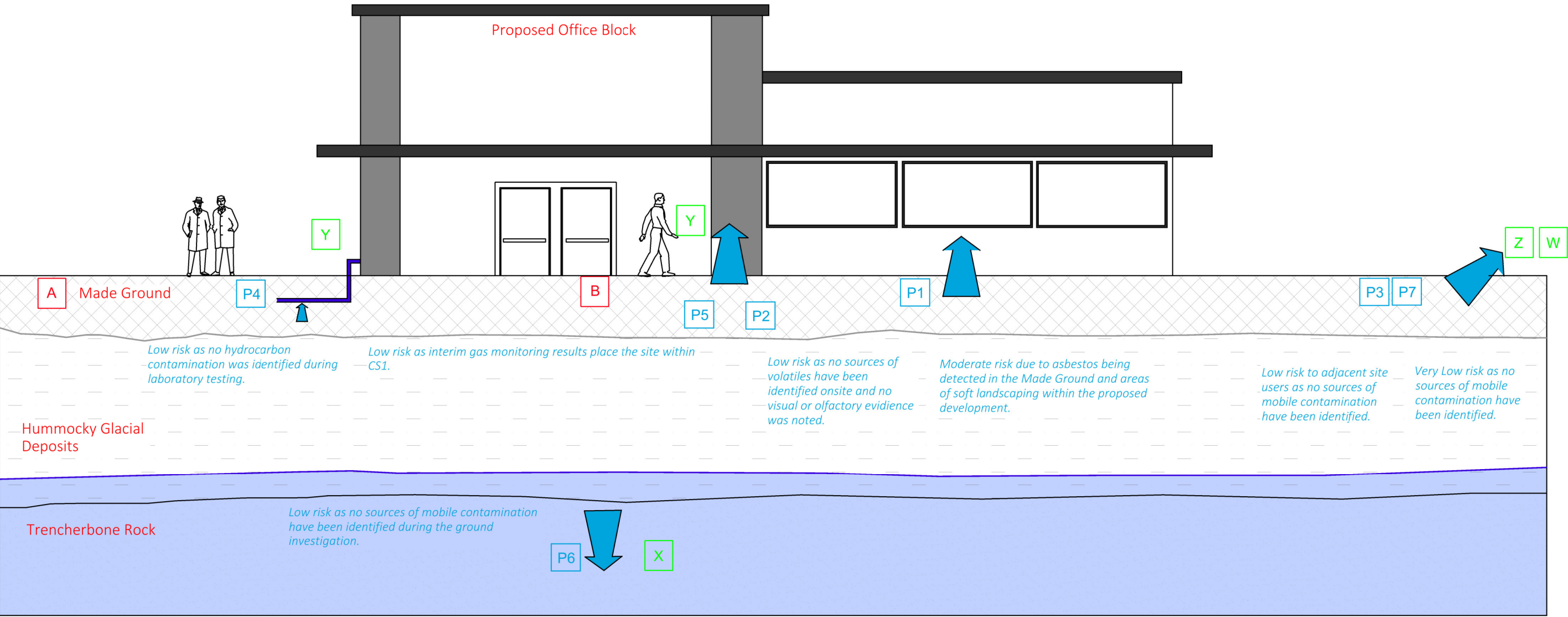
For Comment

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				Status		Notes
	JD SPORTS	JANUARY 2022				Preliminary		
	PROJECT TITLE	SCALE				Draft		
	NEW OFFICE BLOCK, BURY	NTS				Issued		
	PLAN TITLE	PLAN NUMBER				For Comment		
	REVISED ILLUSTRATIVE CSM	GRO-21438-P06	Rev.	Details	Date	Approved		







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



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CONSULTING

Borehole Log

Borehole No.

BH01

Sheet 1 of 5

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					
		0.20	ES		0.30			Stone.	
		0.30	D						
		0.50	ES						
		1.00	ES		0.90			MADE GROUND: Dark brown clayey gravelly medium to coarse sand. Gravel is angular to subangular fine to medium of mixed lithologies including brick.	1
		1.20		N=13 (1,2/3,3,3,4)					
		1.20 - 1.65	D						
		2.00	ES					Medium dense orange brown slightly gravelly medium to coarse SAND. Gravel is angular to subangular fine to medium of mixed lithologies.	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						
		8.00		N=4 (1,0/1,1,1,1)					8
		8.00 - 8.45	D						
		9.50 - 9.95	U						9
		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.





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Borehole Log

Borehole No.

BH01

Sheet 2 of 5

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						
		11.00 - 11.45	D	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.	11	
		11.50								
		12.00	D						12	
		12.50 - 12.95	U	N=24 (3,4/4,5,7,8)	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=17 (1,2/3,4,5,5)	15.00			Medium dense brown medium to coarse SAND.	14	
		14.00 - 14.45	D							
		15.00 - 17.50	D						15	
		15.50		N=23 (2,3/4,5,7,7)	17.00			Firm to stiff brown CLAY with bands of sand. Sand is fine to medium.	16	
		15.50 - 15.95	D							
		17.00							17	
		17.00 - 17.50	D	N=39 (4,5/7,8,10,14)	20.00				18	
		18.50								
		18.50 - 18.95	D						19	
		20.00		N=31 (3,4/6,7,8,10)	20.00				20	
		Continued on next sheet								

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.





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Borehole Log

Borehole No.

BH01

Sheet 3 of 5

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					
		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.





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Borehole Log

Borehole No.

BH01

Sheet 4 of 5

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.





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Borehole Log

Borehole No.

BH01

Sheet 5 of 5

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					
					45.00				41
									42
									43
									44
									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.





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Borehole Log

Borehole No.

BH02

Sheet 1 of 2

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)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		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	D					Loose orange brown slightly gravelly clayey medium to coarse SAND. Gravel is angular to subangular fine to medium of mixed lithologies.	1
		1.00	ES						
		1.20							
		1.20 - 1.65	D	N=7 (1,1/1,2,2,2)				Soft to firm brown sandy CLAY. Sand is fine to medium.	
		2.00							
		2.00 - 2.45	D	N=10 (1,2/1,3,3,3)					2
		3.00						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.	
		3.00 - 3.45	D	N=12 (2,3/2,3,3,4)					3
		4.00							
		4.00 - 4.45	D	N=7 (1,1/1,2,2,2)	4.10			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.	4
		5.00							
		5.00 - 5.45	D	N=3 (1,0/0,1,1,1)					5
		6.50 - 6.95	U		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
		7.00	D						7
		8.00							
		8.00 - 8.45	D	N=14 (2,2/2,3,4,5)					8
		9.50 - 9.95	U					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.	9
		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 4.00m bgl. 5. Hole terminated at 20.0m bgl. 6. Standpipe installed to 5.0m bgl, 1m plain and 4m slotted.





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Borehole Log

Borehole No.

BH02

Sheet 2 of 2

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





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Borehole Log

Borehole No.

BH03

Sheet 1 of 2

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					
		0.15			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						
		1.00	ES						
		1.20		N=13 (2,2/3,3,3,4)				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
		1.20 - 1.65	D						
		2.00			1.80				
		2.00	ES	N=22 (3,3/22 for 275mm)				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 - 2.45	D						
		3.00		N=8 (1,2/1,2,2,3)					
		3.00 - 3.45	D					<u>Becoming loose at 3.0m bgl.</u>	3
		4.00		N=4 (1 for 125mm/4 for 235mm)	4.00				
		4.00 - 4.45	D					Very soft to soft low strength dark brown sandy CLAY. Sand is fine to medium.	4
		5.00 - 5.45	U						5
		5.50	D						6
		6.50		N=21 (2,3/3,5,6,7)	6.80				
		6.50 - 6.95	D					Firm to stiff medium strength sandy CLAY. Sand is fine to medium.	7
		9.00 - 9.45	U						8
		9.50	D						9
									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

Sheet 2 of 2

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					
		10.50 10.50 - 10.95	D	N=30 (5,4/5,7,8,10)	10.30			Medium dense dark brown very clayey fine to medium SAND.	11
		12.00 12.00 - 12.45	D	N=26 (5,5/5,6,7,8)					12
		13.50 13.50 - 13.95	D	N=39 (3,5/7,10,10,12)				Becoming dense from 13.5m bgl.	13
		15.00 15.00 - 15.45	D	N=47 (5,6/8,10,14,15)	15.00			End of borehole at 15.00 m	14
									15
									16
									17
									18
									19
									20

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
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Borehole Log

Borehole No.

BH04

Sheet 1 of 5

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					
		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 6.50 6.50 - 6.95	D D	N=8 (1,1/2,2,2,2)					6
		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				10

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

Sheet 2 of 5

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					
		11.00 11.00 - 11.45	D	N=30 (2,4/5,7,8,10)	14.00			Dark brown slightly gravelly clayey SAND. Sand is medium to coarse. Gravel is angular to subangular fine to medium of mixed lithologies including coal.	11
									12
									13
									14
		14.00 - 14.45	U		15.50			Medium dense dark brown very clayey fine to medium SAND.	15
									16
									17
									18
		14.50 14.50 - 14.95	D	N=17 (2,3/4,4,4,5)	18.50			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.	19
									20
		15.50 15.50 - 15.95	D	N=30 (2,5/6,6,8,10)				Firm to stiff brown CLAY with boulders.	
		17.00 - 17.45	U						
		17.50	D						
		18.50 18.50 - 18.95	D	N=32 (4,5/7,8,8,9)					

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 No.

BH04

Sheet 3 of 5

Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords: -

Hole Type	CP
-----------	----

Location: BURY

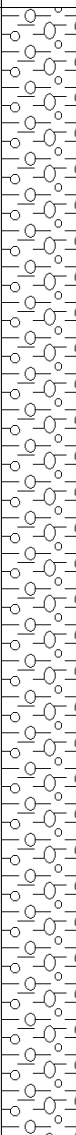
Level:

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					
Well 1					27.50				21
							22		
							23		
							24		
							25		
							26		
							27		
							28		
							29		
							30		
							Continued on next sheet		

Continued on next sheet

Remarks	
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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.





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Borehole Log

Borehole No.

BH04

Sheet 4 of 5

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 No.

BH04

Sheet 5 of 5

Project Name: NEW OFFICE BLOCK

Project No.	GRO-21438
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Co-ords: -

Hole Type	CP
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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				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

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

Logged
RR

Client: JD SPORTS

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.25	ES		0.25			MADE GROUND: Grey concrete.	1
							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 1.30	ES D		1.10			Orange brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium of mixed lithologies including coal.	
	1.90 2.00	D D						2
	2.50	D						
	3.00	D		3.00				3
							End of pit at 3.00 m	4
								5

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

Stability:



Trial Pit Log

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

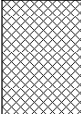
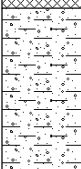
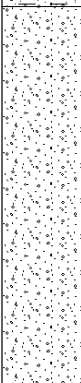
Dimensions
(m):

Depth
2.50

Scale
1:25

Logged
RR

Client: JD SPORTS

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.35	ES		0.30			MADE GROUND: Grey concrete.	
	0.70 0.70	D ES		0.70			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.	
	1.40 1.45	ES D		1.25			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
	2.00	D					Orange brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium of mixed lithologies including sandstone and coal.	2
	2.50	D		2.50			End of pit at 2.50 m	3
								4
								5

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

Stability:



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

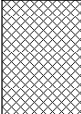
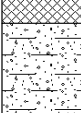
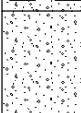
Dimensions
(m):

Depth
3.00

Scale
1:25

Logged
RR

Client: JD SPORTS

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
▼				0.30			MADE GROUND: Grey concrete.	
	0.55	ES					MADE GROUND: Dark brown sandy angular to subangular fine to medium gravel of mixed lithologies including brick. Sand is medium to coarse.	
	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
	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
	2.00	D						
	2.50	D						
				3.00			End of pit at 3.00 m	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



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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 22-37451

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

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

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

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 SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	2600	2700	1300	230	45
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.3	1.3	0.67	0.12	0.023
Water Soluble SO ₄ 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

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

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 SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	97	31	94
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.049	0.015	0.047
Water Soluble SO ₄ 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
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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

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



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.

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 diphenylcarbazine 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
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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

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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Page 1 of

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



4043

PSL

Professional Soils Laboratory

New Office Block, Bury

Contract No:

PSL22/0922

Client Ref:

21438

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

PSL

Professional Soils Laboratory

New Office Block, Bury

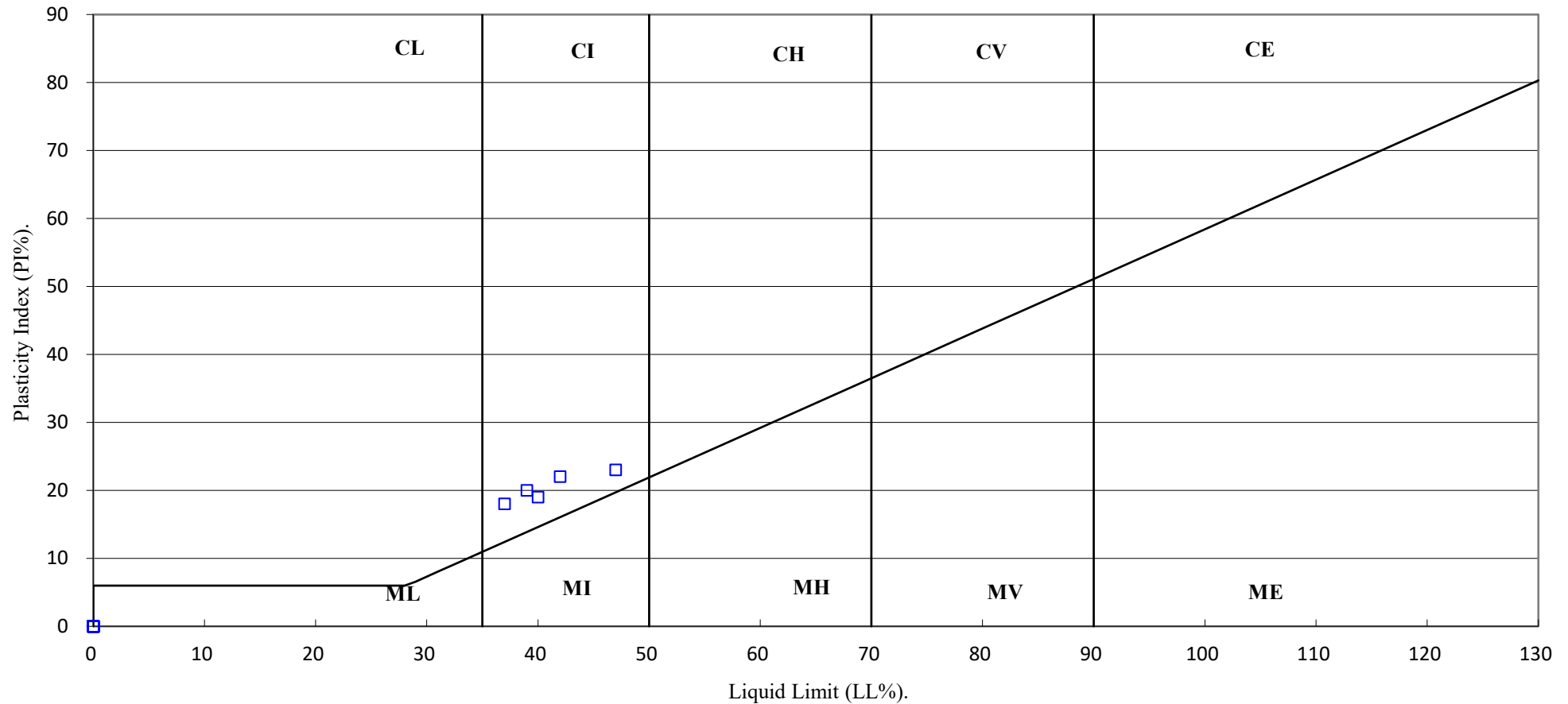
Contract No:

PSL22/0922

Client Ref:

21438

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



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

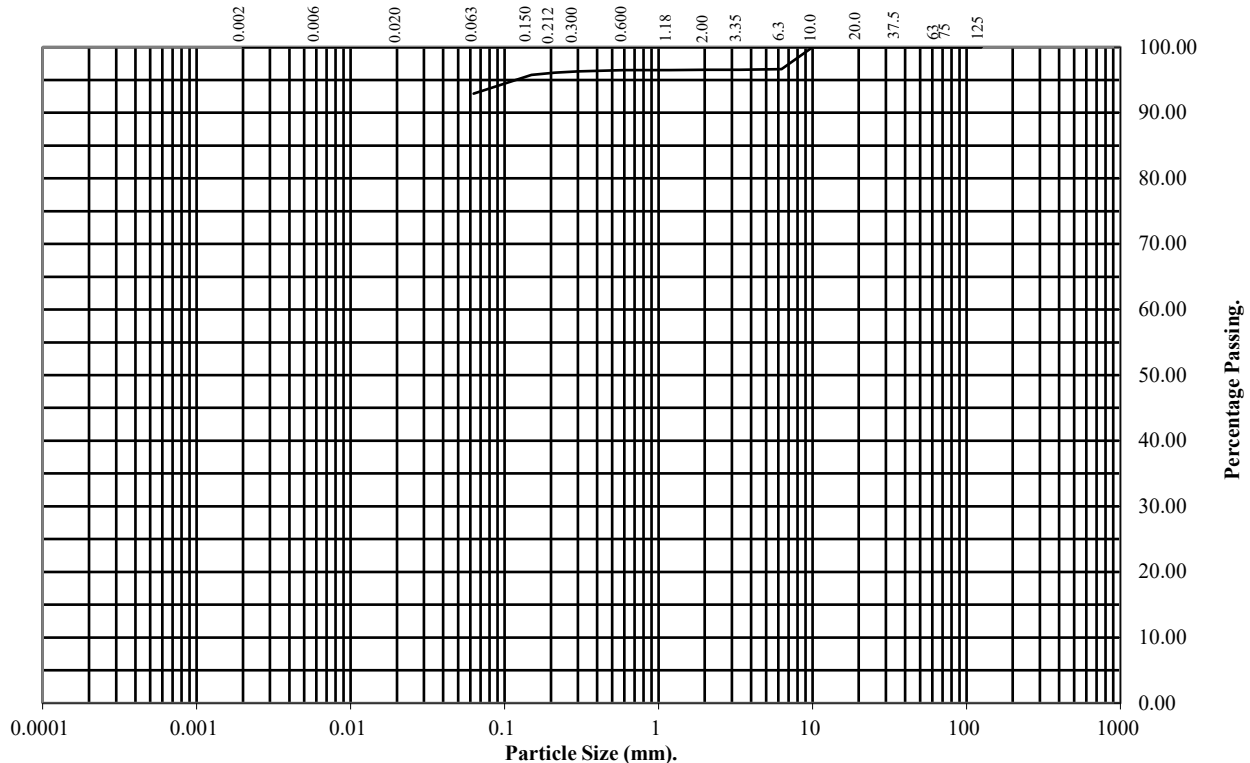
Sample Number:

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



PSL

Professional Soils Laboratory

New Office Block, Bury

Contract No:

PSL22/0922

Client Ref:

21438

PARTICLE SIZE DISTRIBUTION TEST

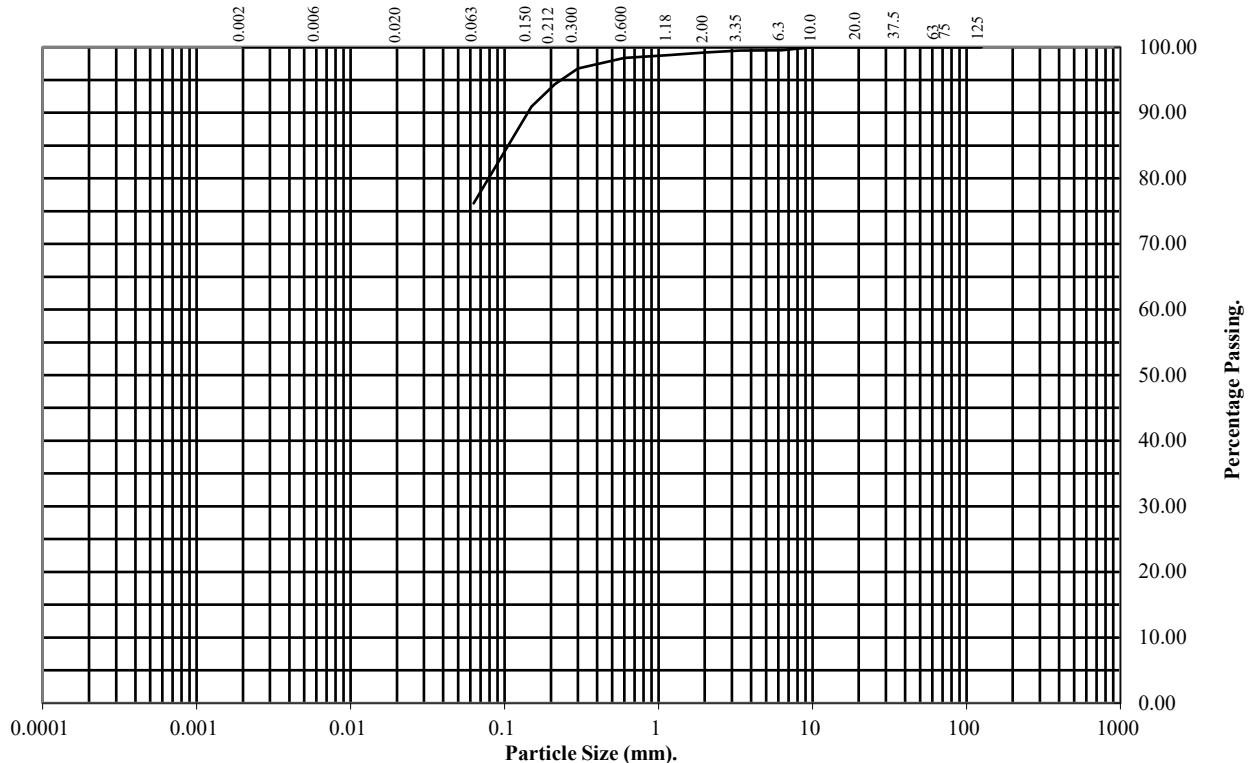
BS1377 : Part 2 : 1990

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



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

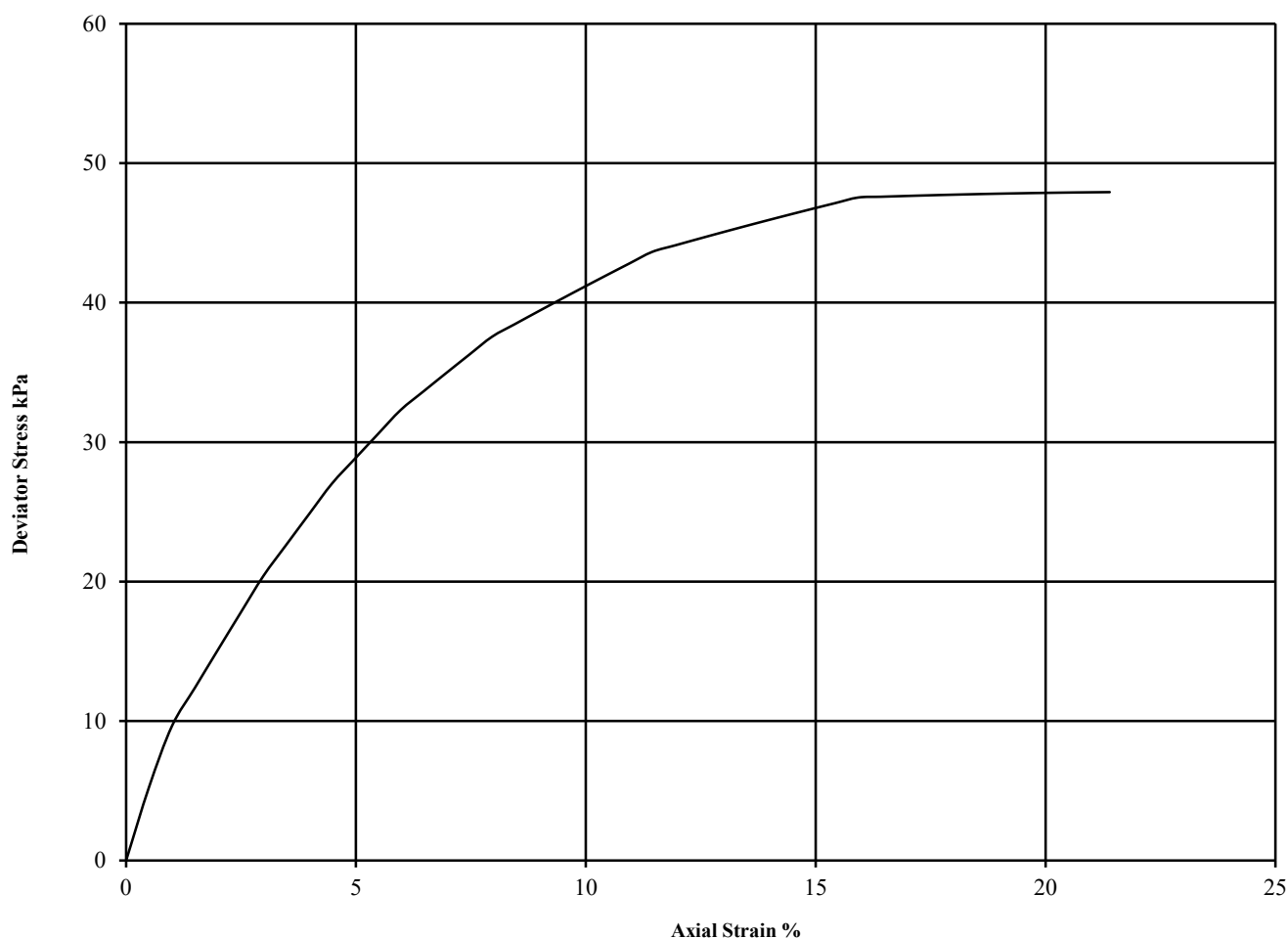
Hole Number: BH01

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)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	30	1.96	1.51	130	48	24	21.4	Plastic	



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

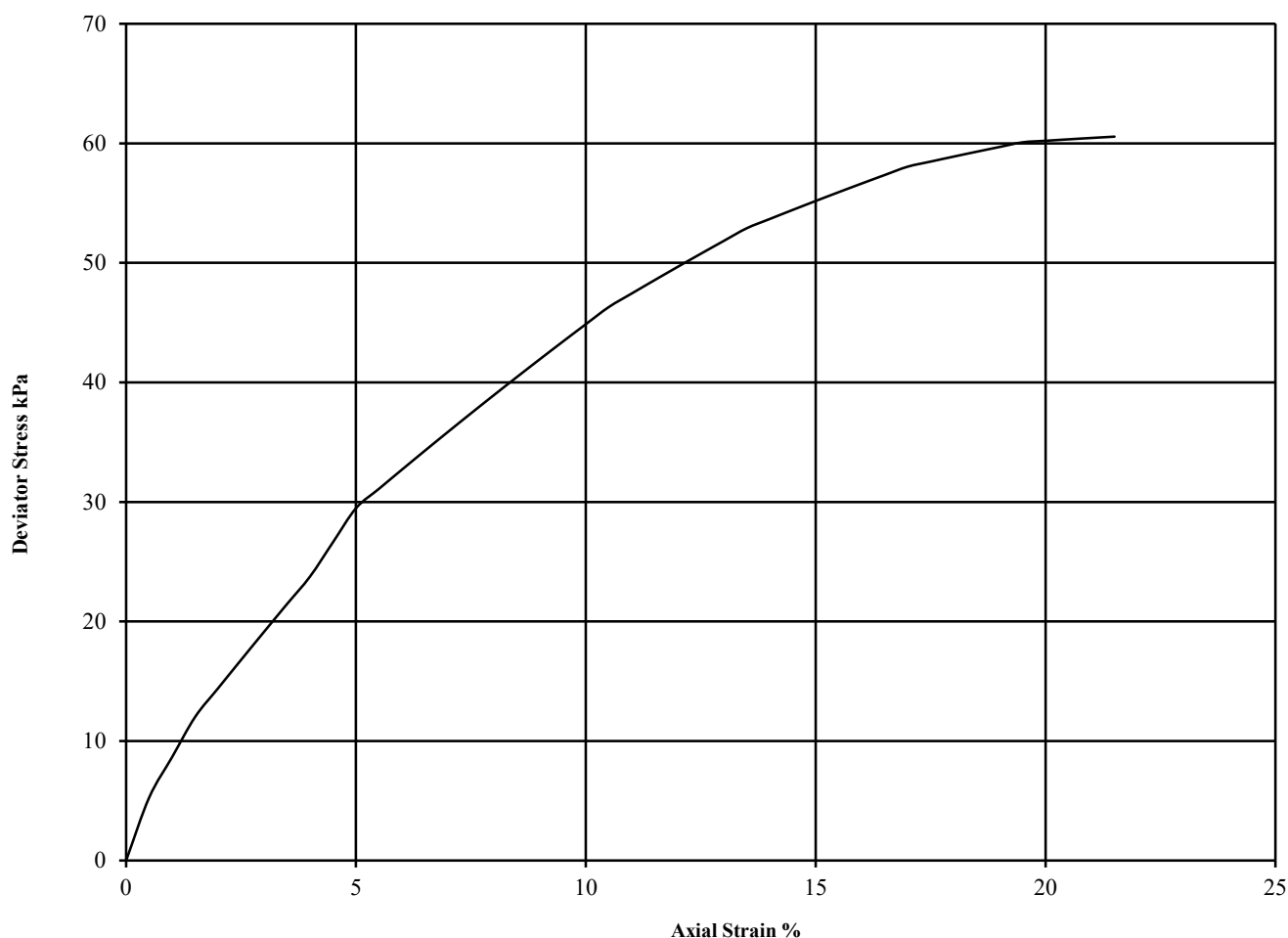
Hole Number: BH01

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/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	25	2.05	1.64	190	61	30	21.5	Plastic	



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

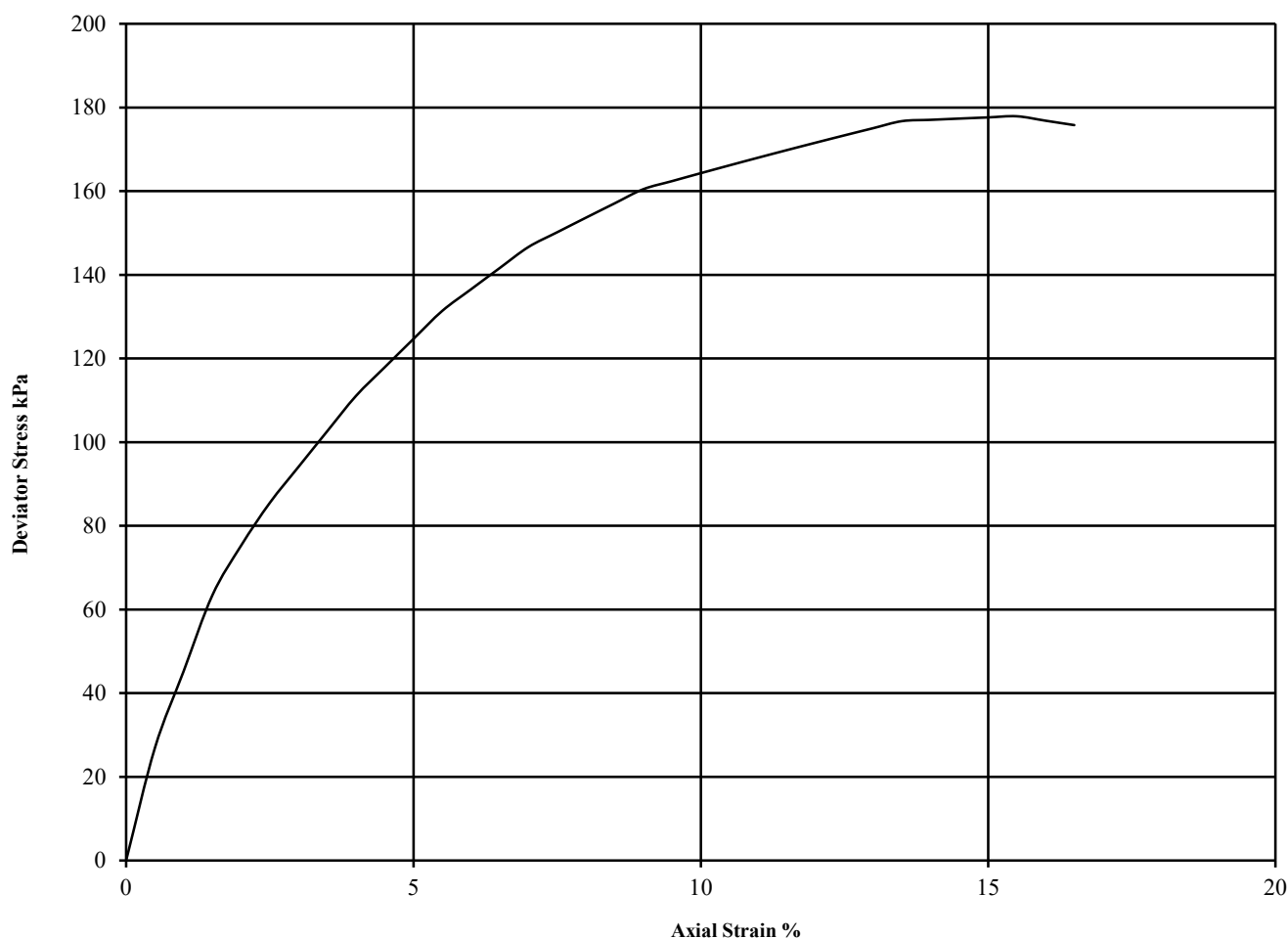
Hole Number: BH01

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)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.77 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	20	2.10	1.74	250	178	89	15.5	Plastic	



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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

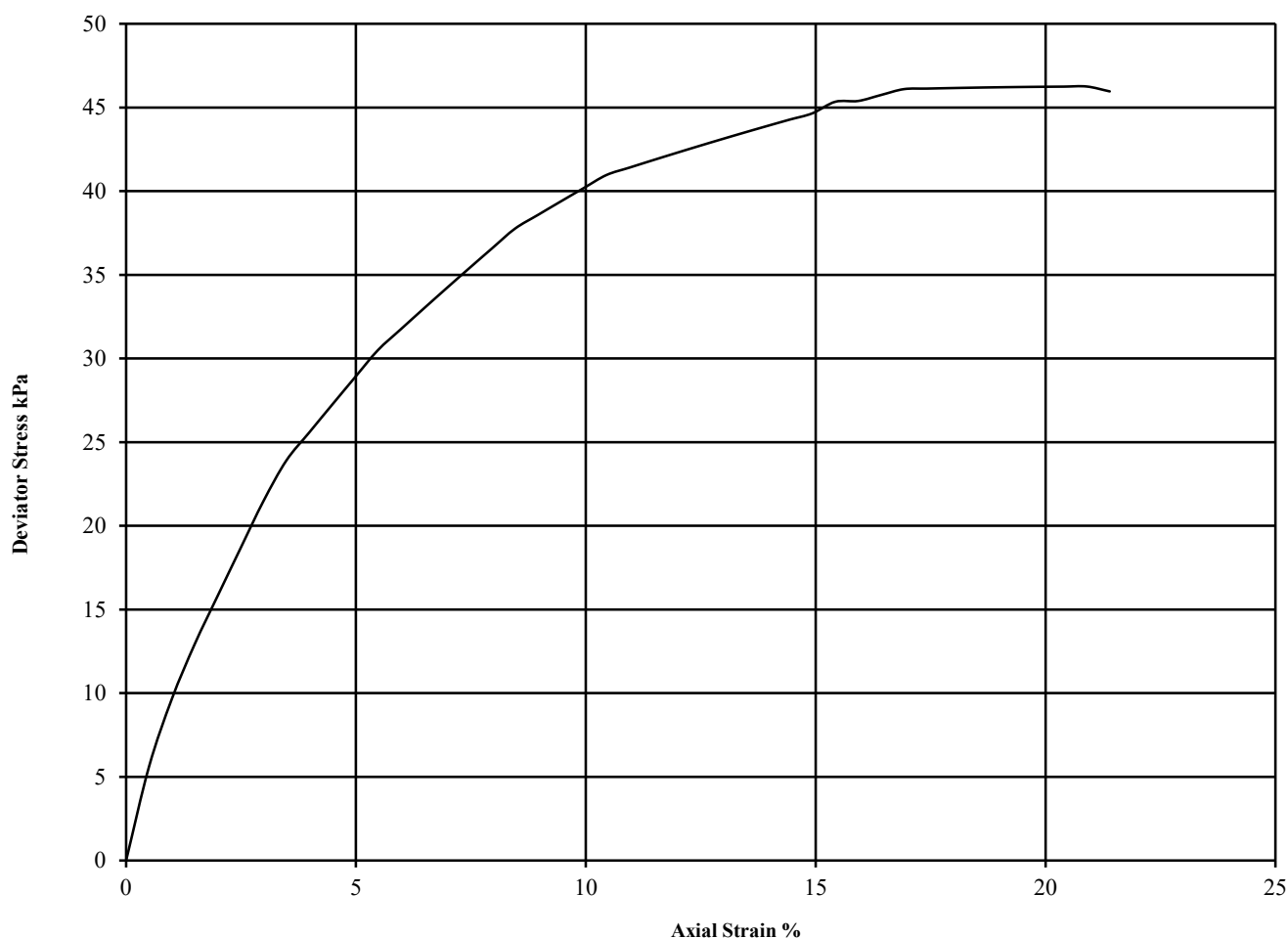
Hole Number: BH02

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)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	29	1.97	1.53	130	46	23	20.9	Plastic	



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Professional Soils Laboratory

New Office Block, Bury

Contract No:

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Client Ref:

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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

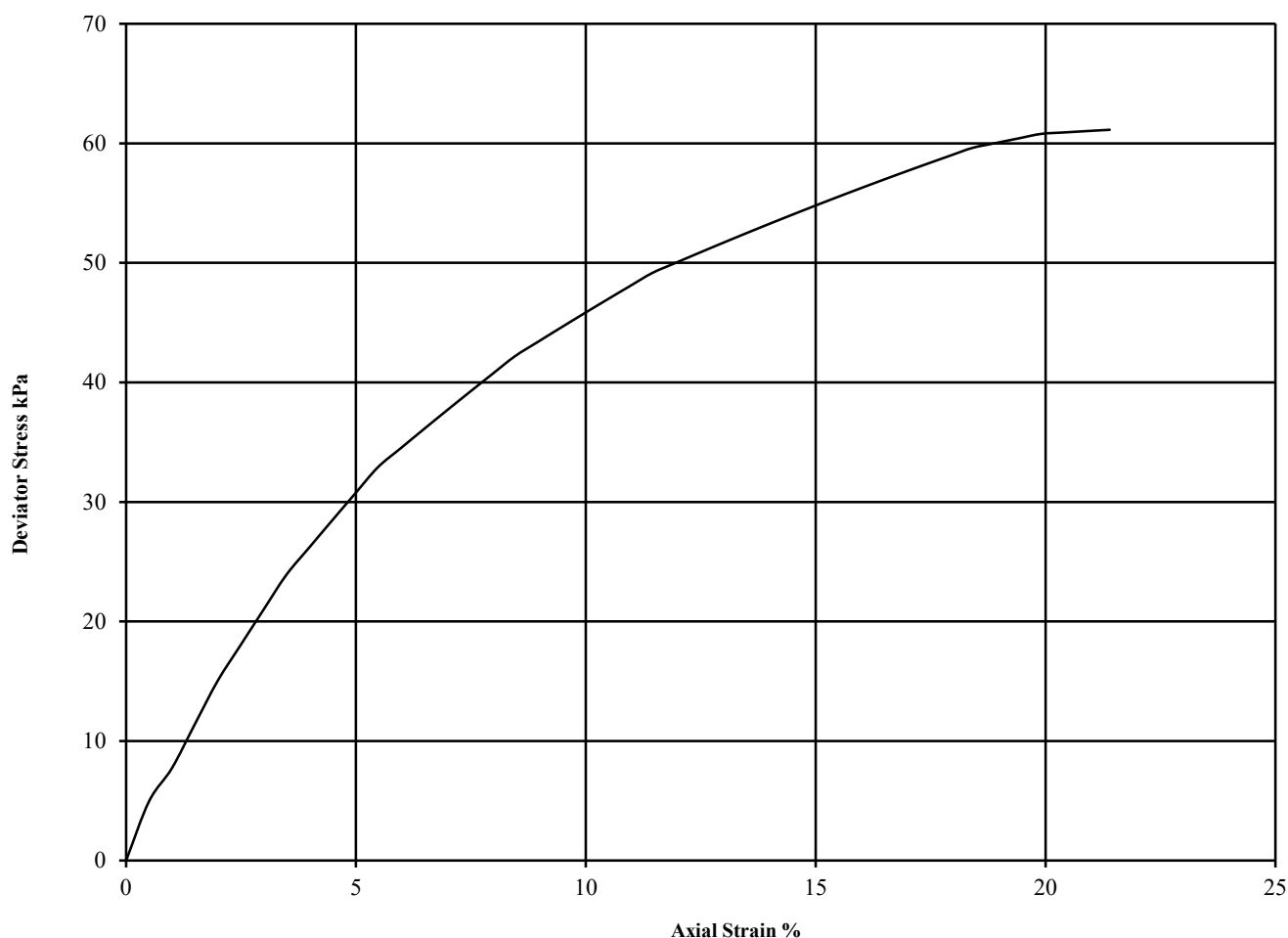
Hole Number: BH02

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)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	29	1.98	1.53	190	61	31	21.4	Plastic	



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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

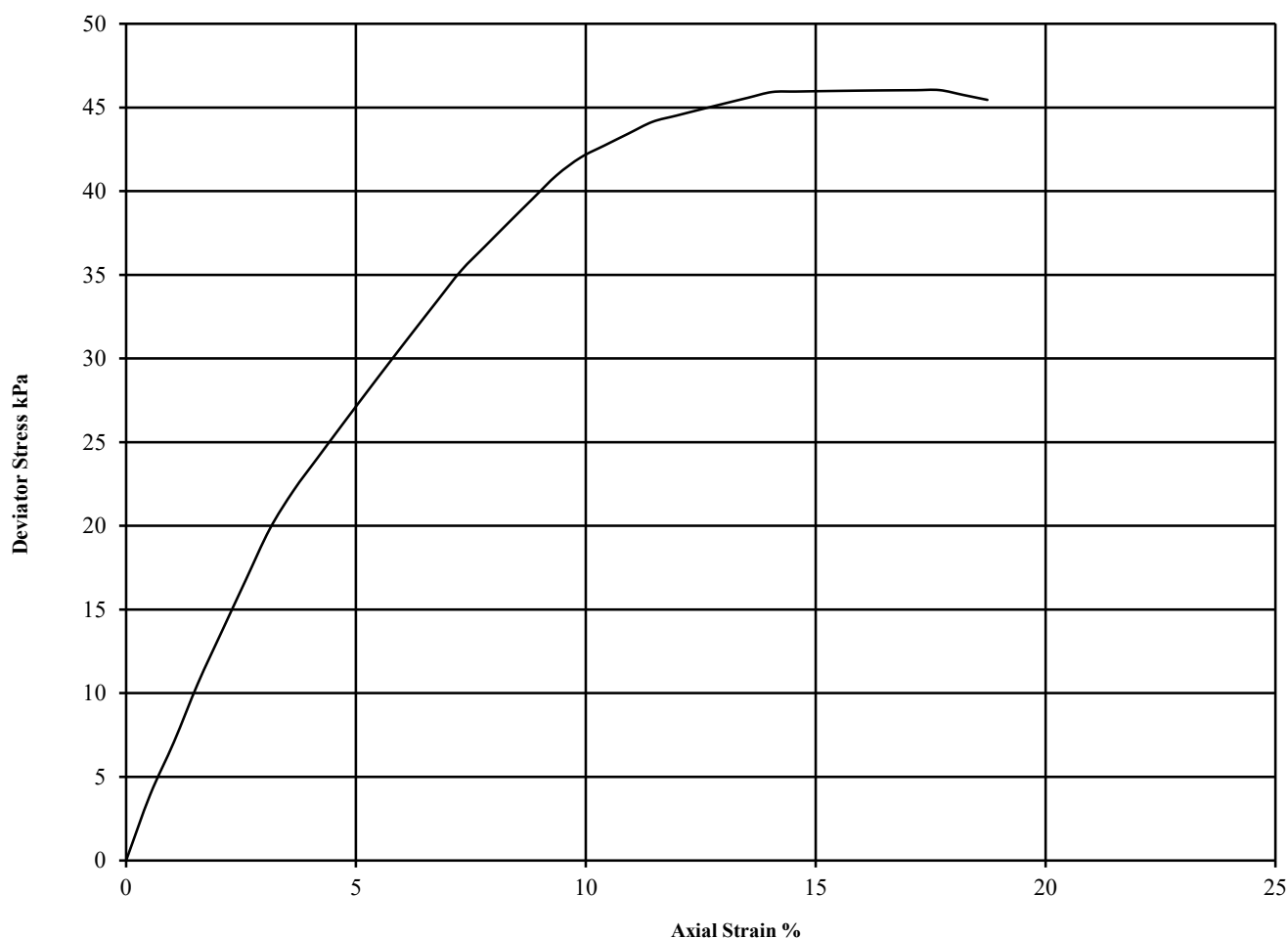
Hole Number: BH03

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)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	27	1.95	1.54	100	46	23	17.7	Plastic	



4043

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Contract No:

PSL22/0922

Client Ref:

21438

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

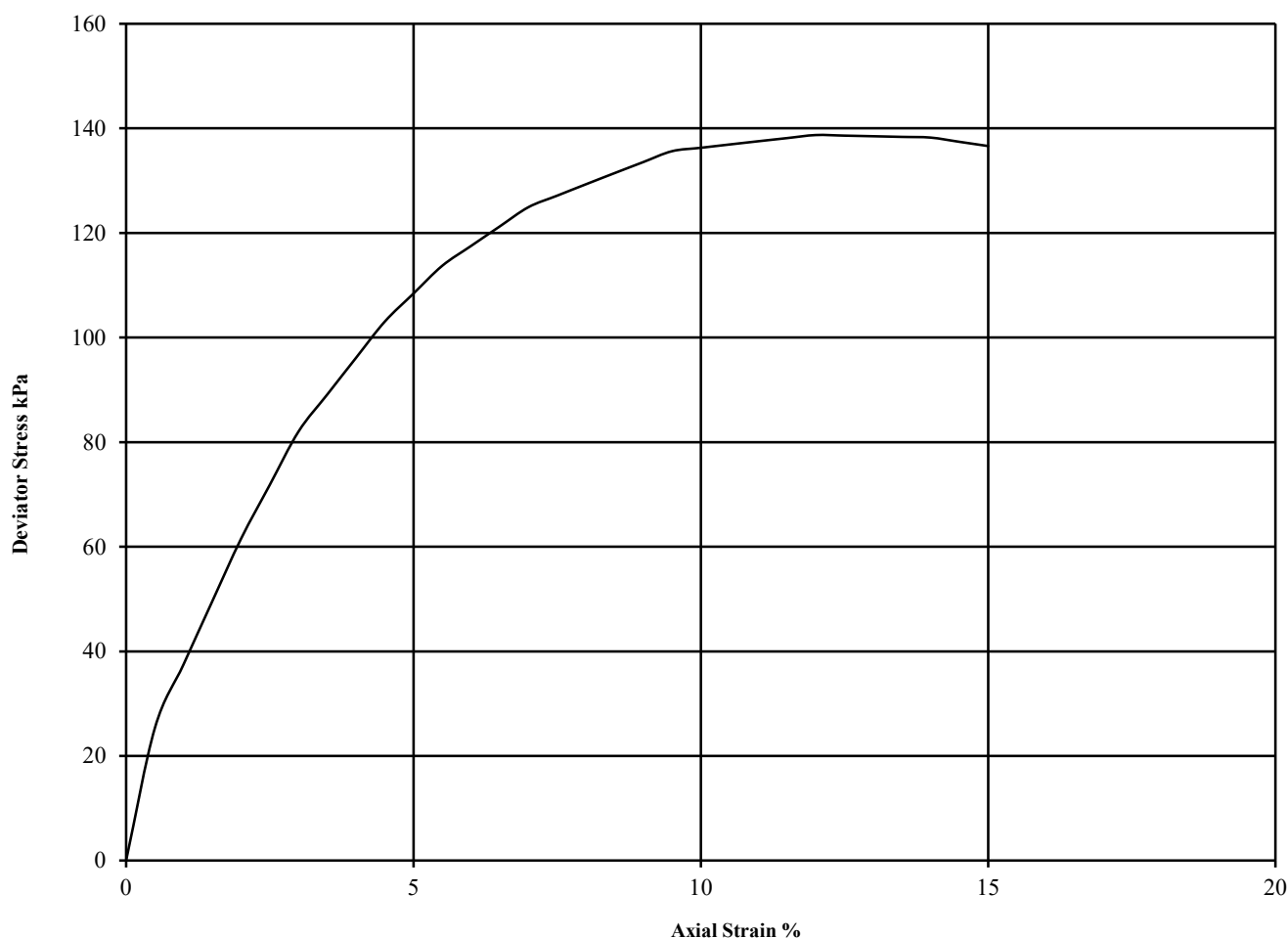
Hole Number: BH03

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/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.83 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	14	2.18	1.92	180	139	69	12.0	Plastic	



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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

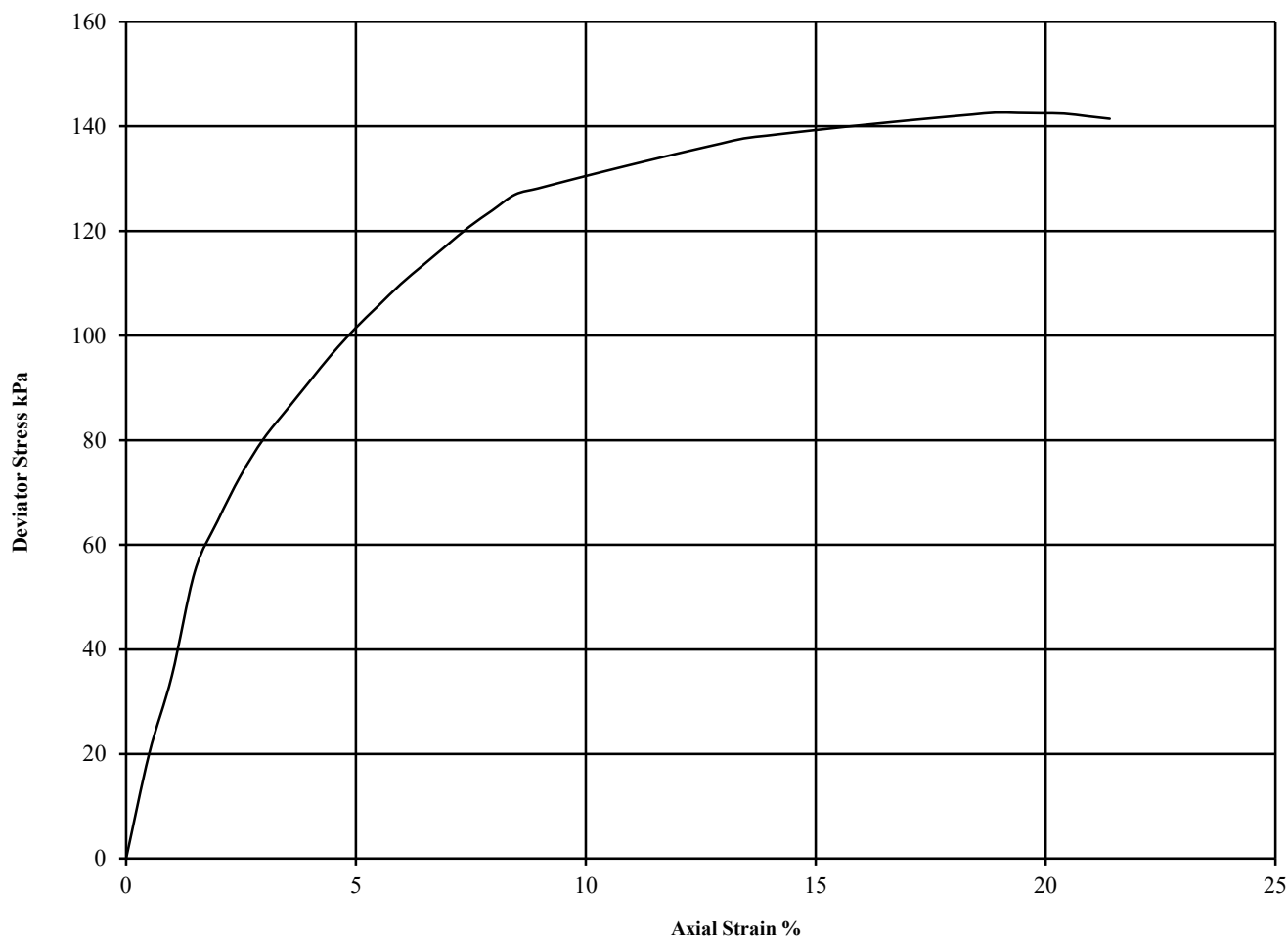
Hole Number: BH04

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/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.33 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	26	1.99	1.58	340	143	71	18.9	Plastic	



4043

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Professional Soils Laboratory

New Office Block, Bury

Contract No:

PSL22/0922

Client Ref:

21438



APPENDIX 6 - Interim Permanent Gas Monitoring Results

GROUNDTECH
CONSULTING

Pressure Trend:	Falling	Weather:	Rain			Equipment:	GFM 436	
Ambient:	O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (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

Page 1 of

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):

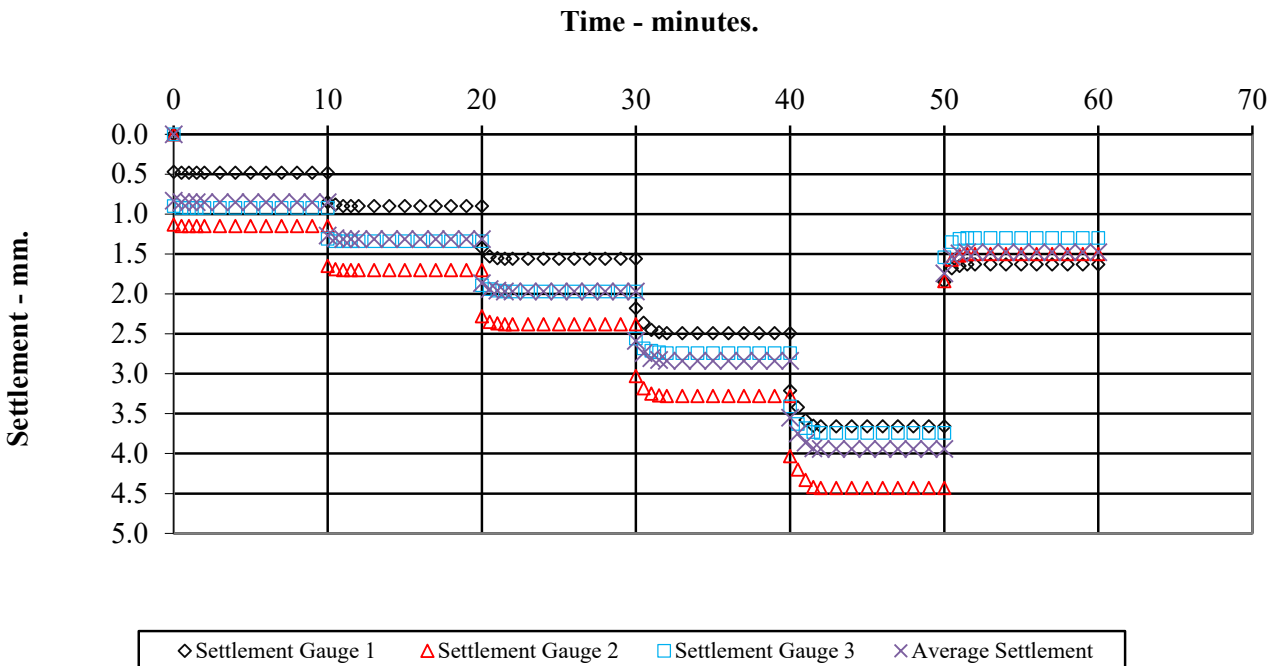
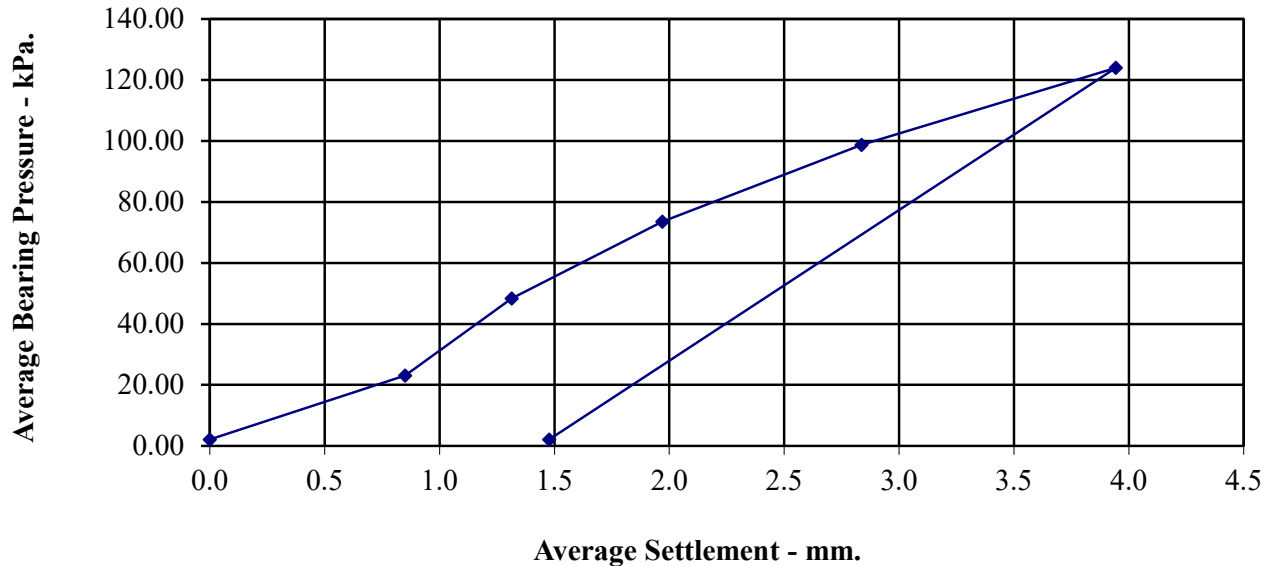
123.97

Maximum Deformation (mm):

3.94

Description:

Brown CLAY.



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

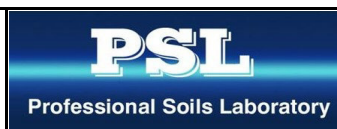
Load at 1.25mm 45 kN/m²

Plate diameter 455 mm

Conversion factor for plate diameter 0.629

K₇₆₂(modulus of subgrade reaction)
calculated using 1.25mm settlement 22.6 kN/m²/mm

CBR Value 2.1 %



Pilsworth Road, Bury

Contract No:

PSL22/0517

Client Ref:

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):

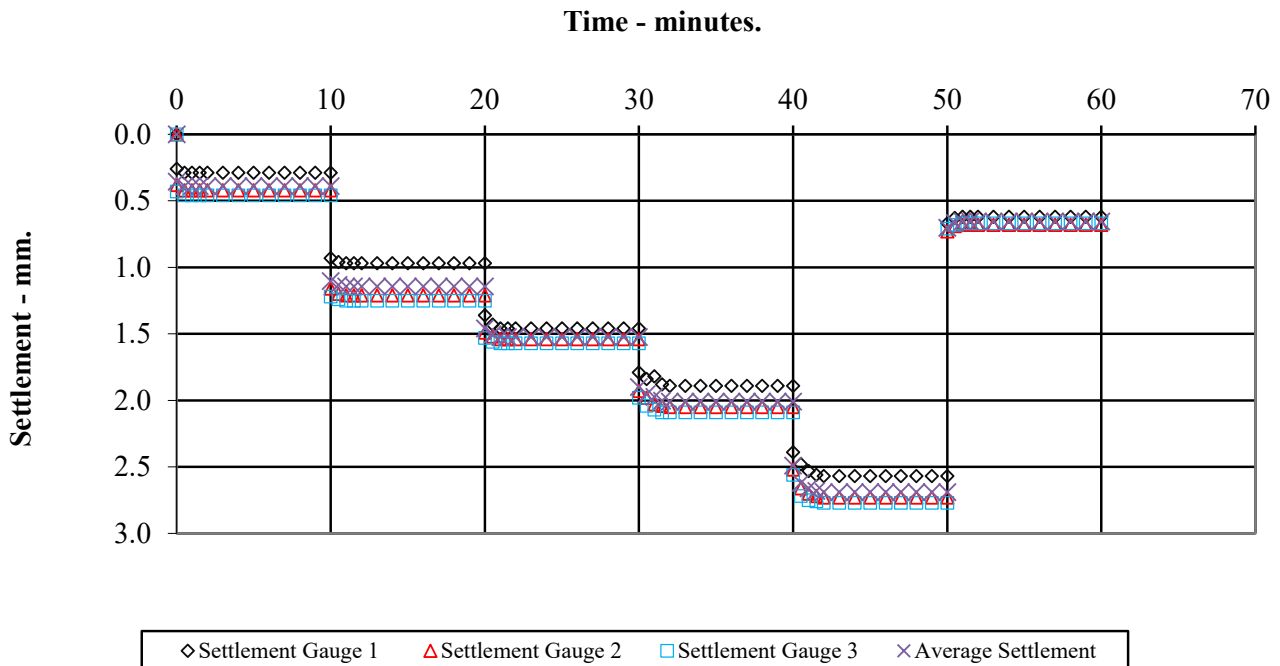
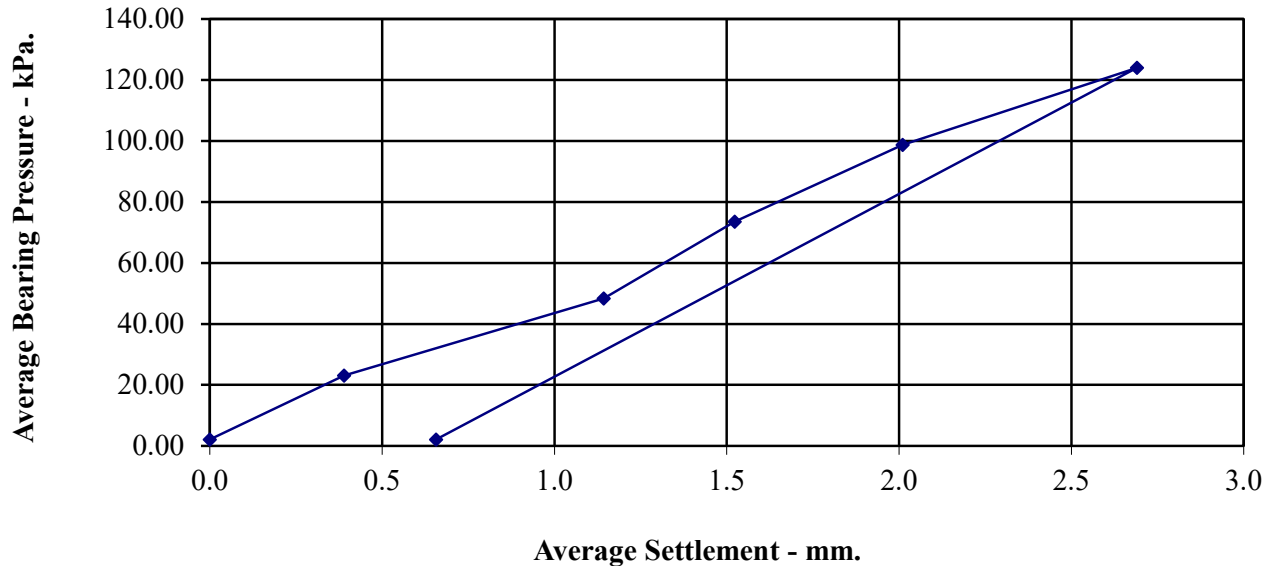
123.97

Maximum Deformation (mm):

2.69

Description:

Brown sandy CLAY.

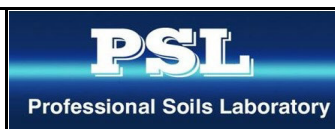


Calculation of Equivalent CBR Value from Plate Bearing Test

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	%



Pilsworth Road, Bury

Contract No:

PSL22/0517

Client Ref:

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):

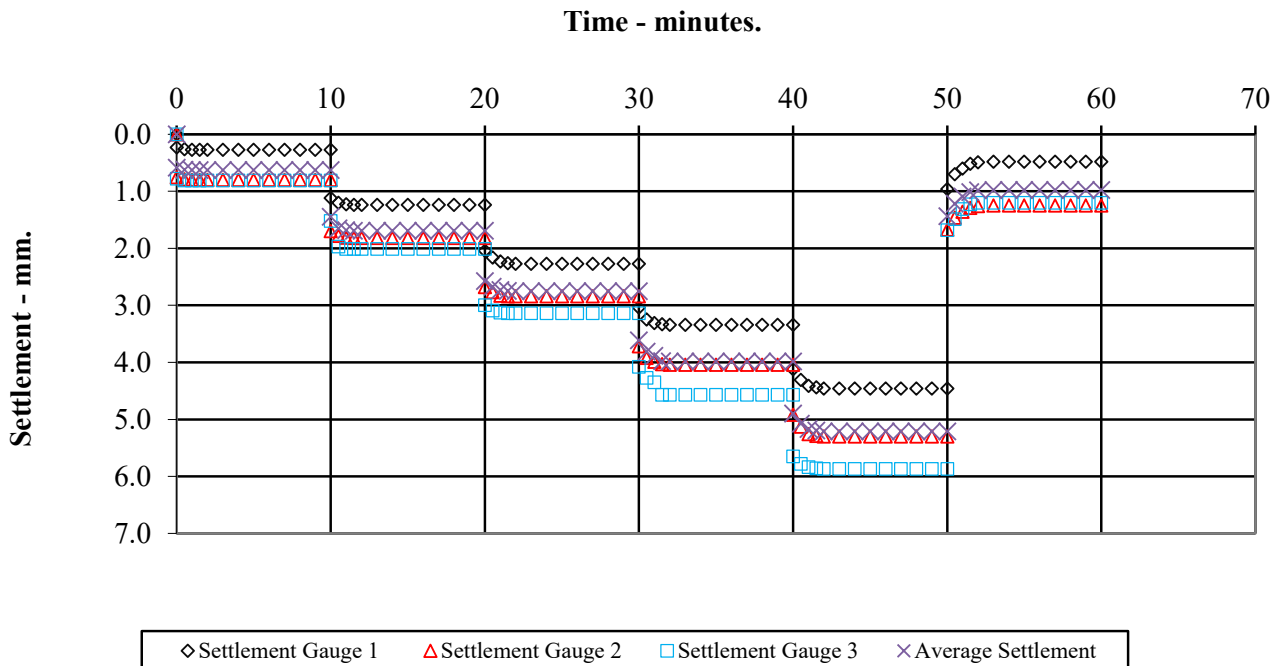
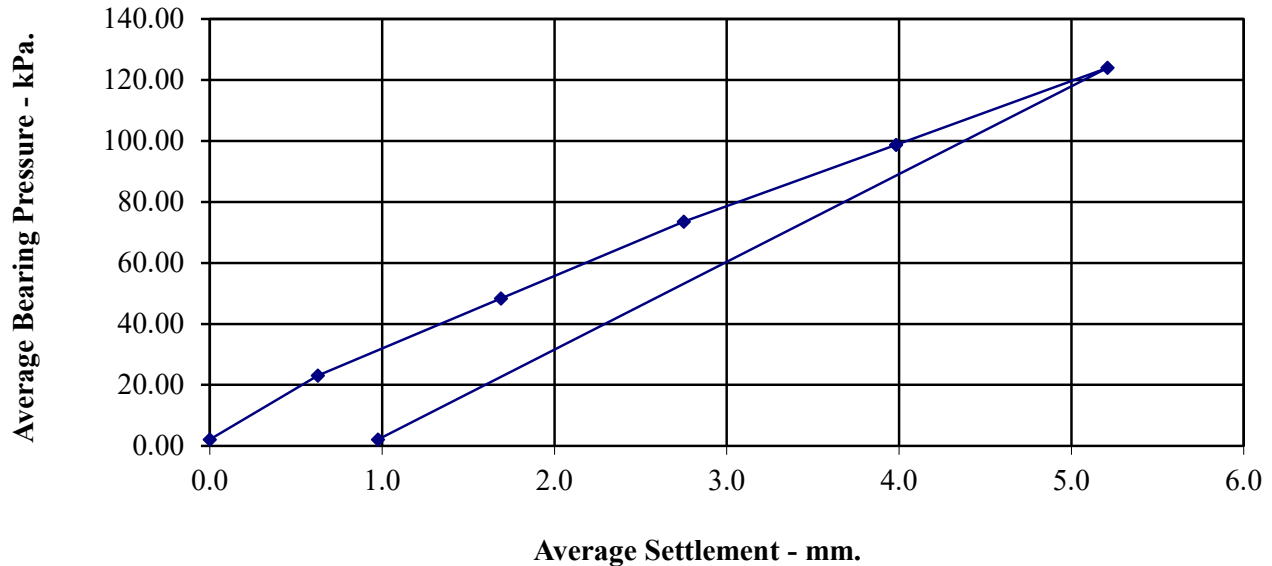
123.97

Maximum Deformation (mm):

5.21

Description:

Brown CLAY.



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

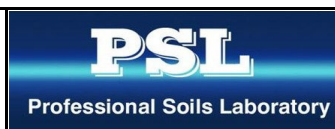
Load at 1.25mm 38 kN/m²

Plate diameter 455 mm

Conversion factor for plate diameter 0.629

K₇₆₂(modulus of subgrade reaction)
calculated using 1.25mm settlement 19.1 kN/m²/mm

CBR Value 1.6 %



Pilsworth Road, Bury

Contract No:

PSL22/0517

Client Ref:

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):

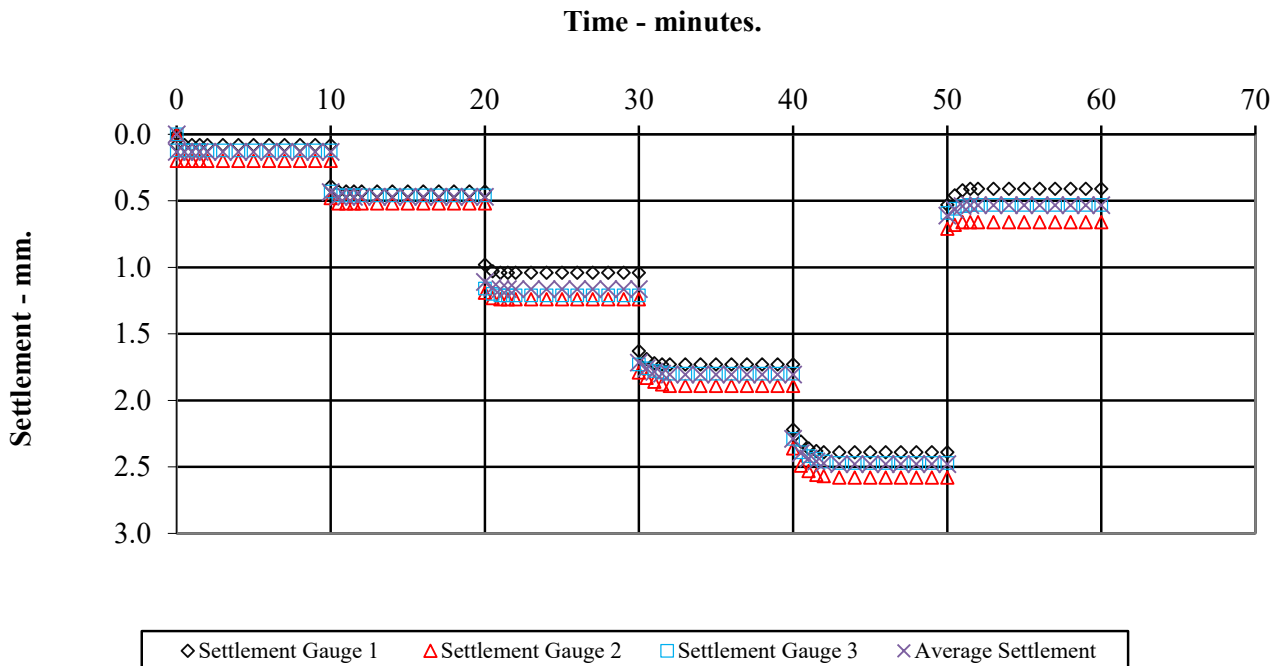
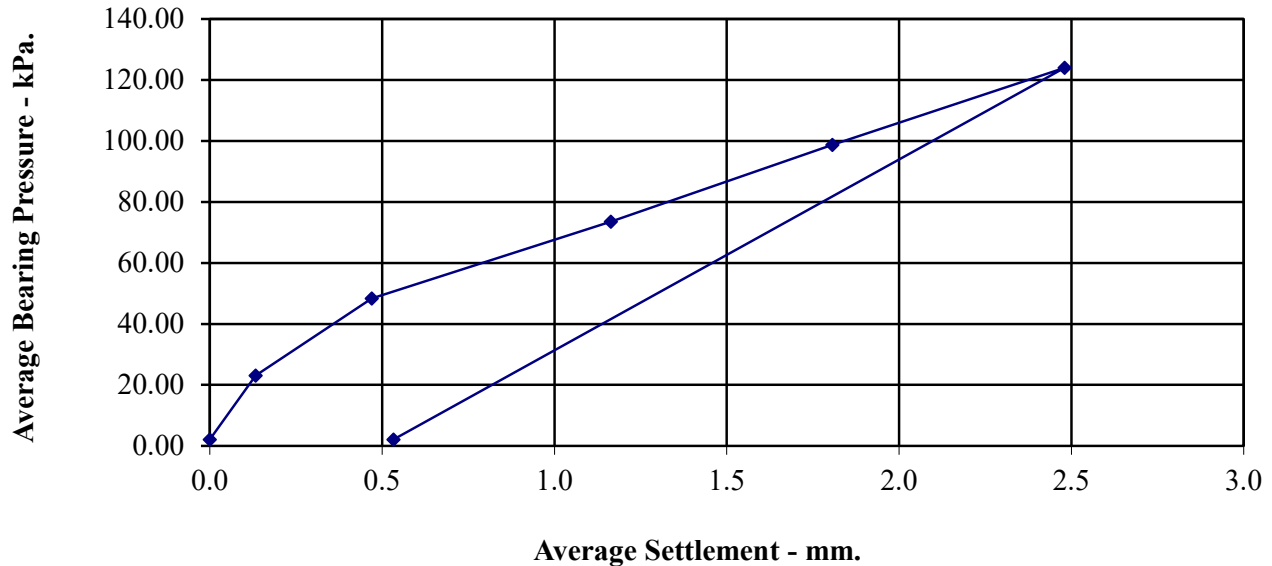
123.97

Maximum Deformation (mm):

2.48

Description:

Brown sandy CLAY.

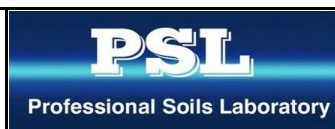


Calculation of Equivalent CBR Value from Plate Bearing Test

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	%



Pilsworth Road, Bury

Contract No:

PSL22/0517

Client Ref:

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):

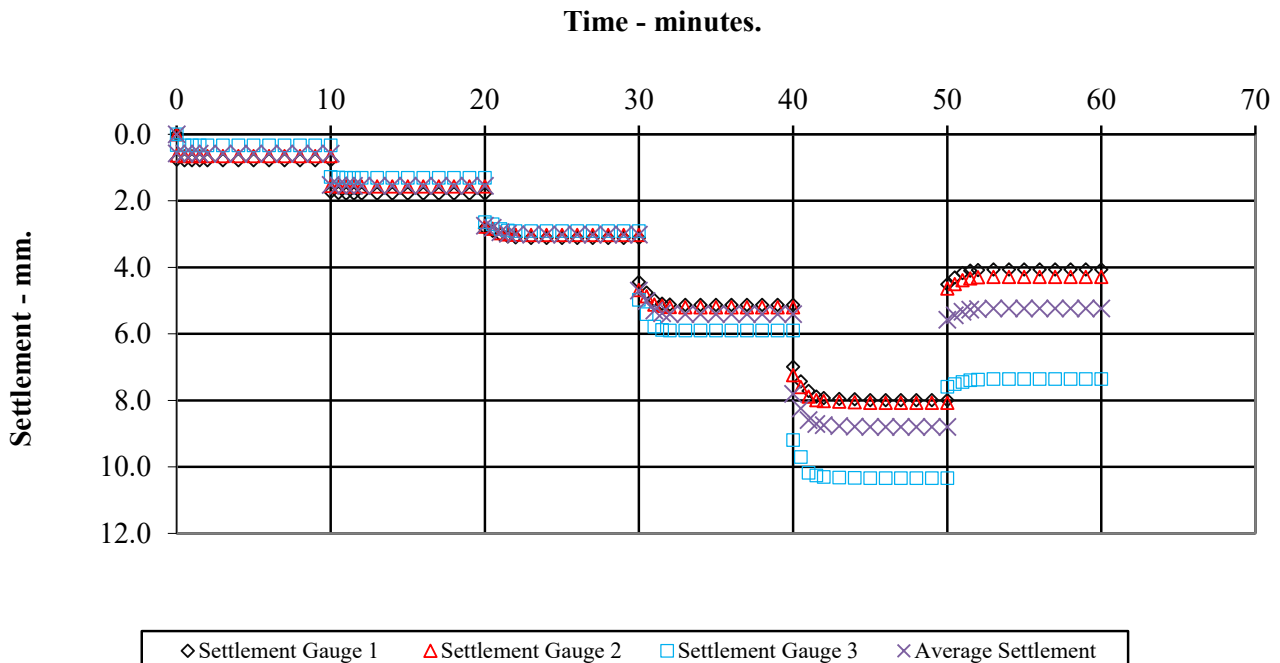
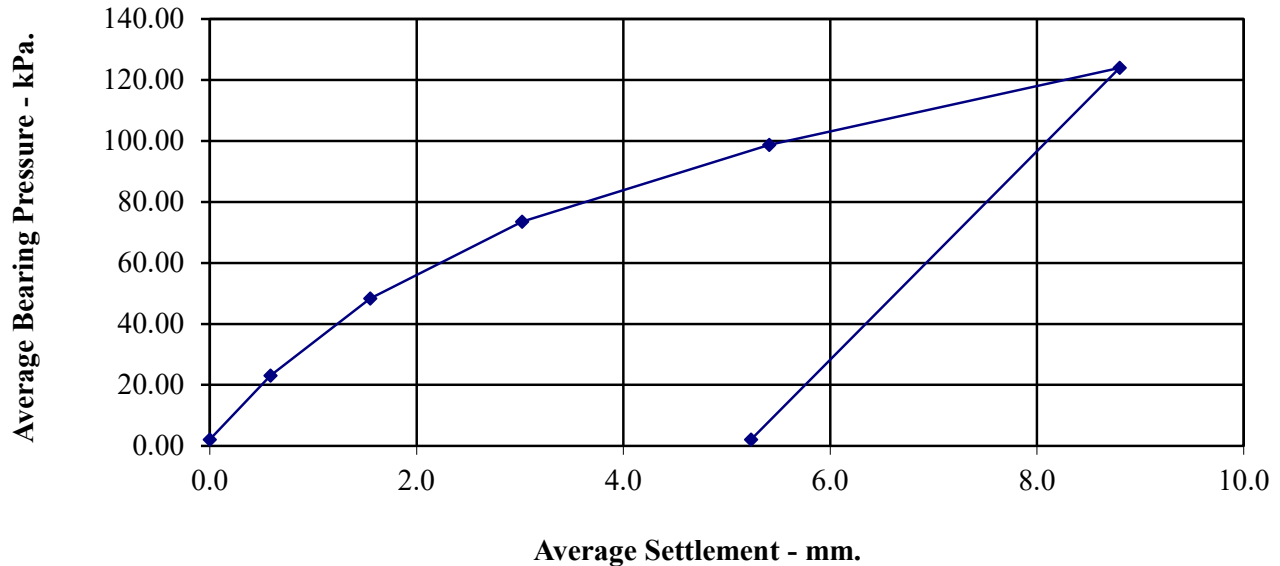
123.97

Maximum Deformation (mm):

8.80

Description:

Brown CLAY.



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

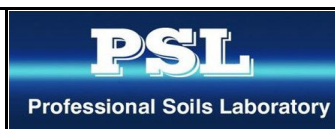
Load at 1.25mm 40 kN/m²

Plate diameter 455 mm

Conversion factor for plate diameter 0.629

K₇₆₂(modulus of subgrade reaction)
calculated using 1.25mm settlement 20.3 kN/m²/mm

CBR Value 1.8 %



Pilsworth Road, Bury

Contract No:

PSL22/0517

Client Ref:



APPENDIX 8 - Soil Percolation Testing Results

SOIL PERCOLATION TEST

Sheet 1 of 2

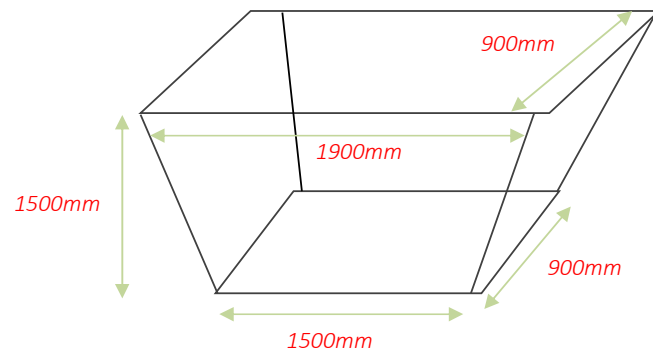
Date of Test: 25/01/2022

POSITION: SuDS1
TEST 1

Weather: Sunny, clear

Engineer: R Rowlinson
Checked: R Wyatt

Trial Pit Measurements



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

Pit Depth (mm): 1500

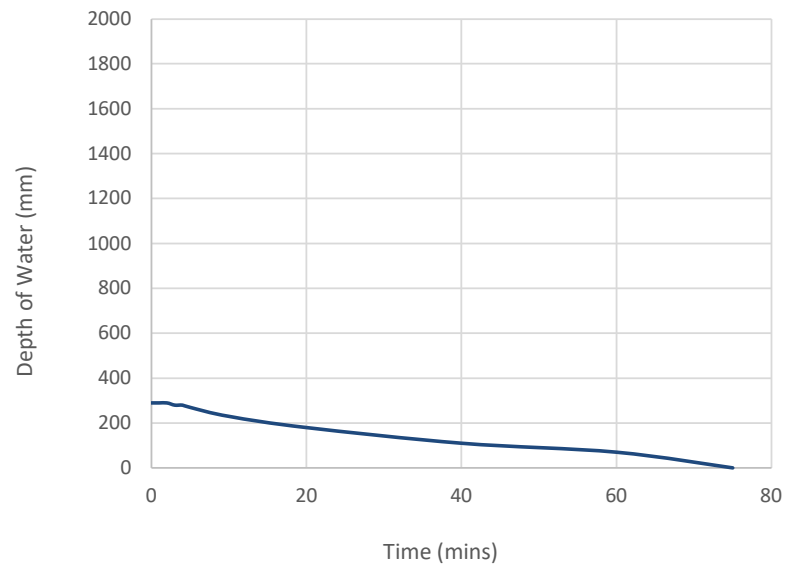
Pit Details: Open with no stone filling

Groundwater Level: NGW

SOIL PERCOLATION TEST

POSITION: SuDS1
TEST 1

Depth vs Time



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

Compliance 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



Sheet 1 of 2

Date of Test: 26/01/2022

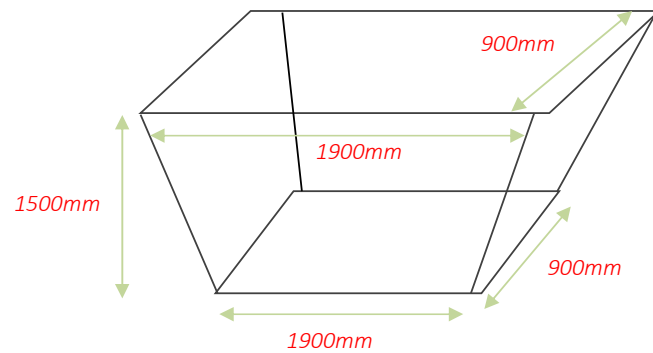
POSITION: SuDS1
TEST 2

Weather: Sunny, clear

Engineer: R Rowlinson

Checked: R Wyatt

Trial Pit Measurements



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

Pit Depth (mm): 1500

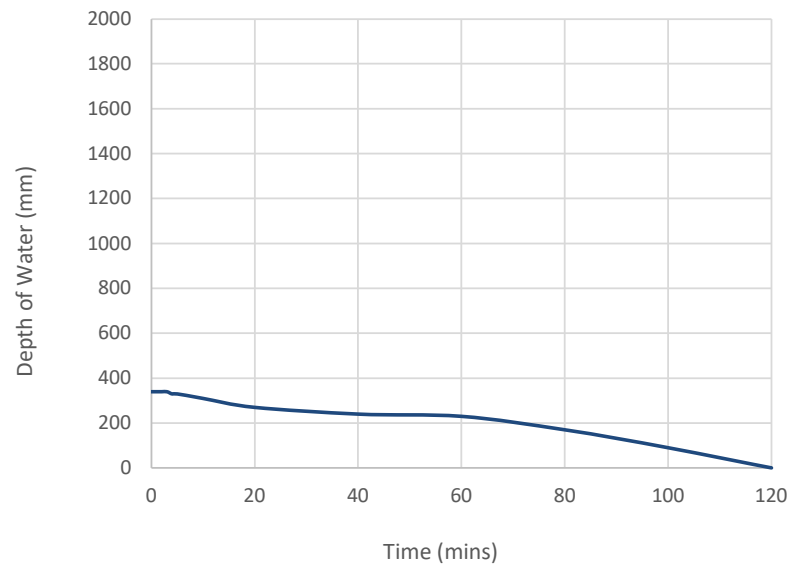
Pit Details: Open with no stone filling

Groundwater Level: NGW

SOIL PERCOLATION TEST

POSITION: SuDS1
TEST 2

Depth vs Time



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

Compliance 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



Sheet 1 of 2

Date of Test: 25/01/2022

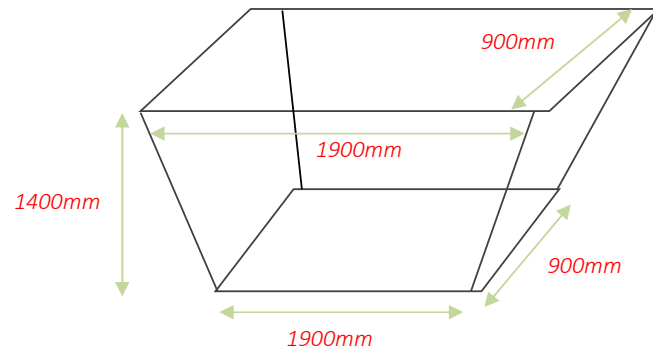
POSITION: SuDS1
TEST 3

Weather: Sunny, clear

Engineer: R Rowlinson

Checked: R Wyatt

Trial Pit Measurements



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

Pit Depth (mm): 1400

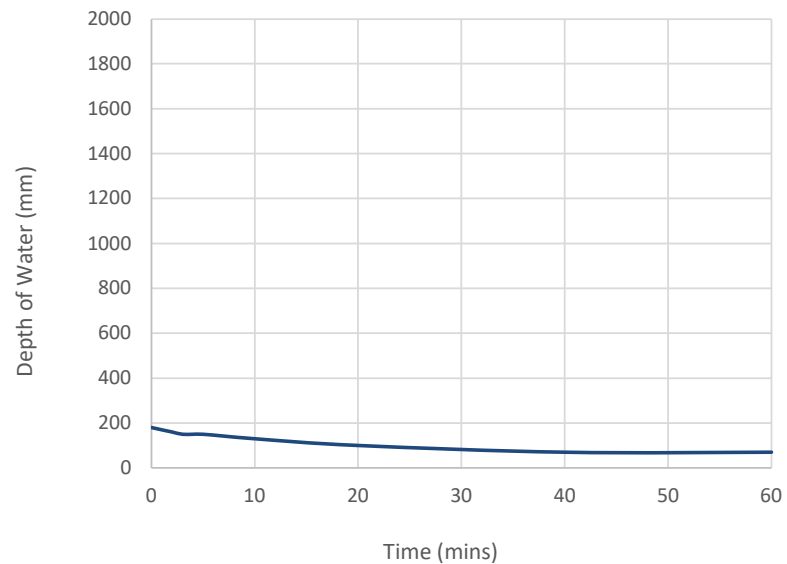
Pit Details: Open with no stone filling

Groundwater Level: NGW

SOIL PERCOLATION TEST

POSITION: SuDS1
TEST 3

Depth vs Time



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

Compliance 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
--------------------------------	----------

Sheet 1 of 2

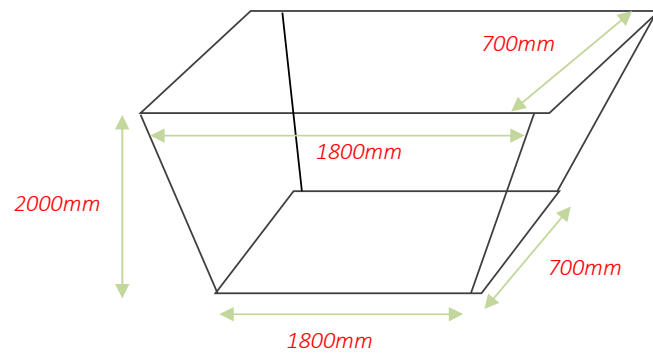
Date of Test: 18/01/2022

POSITION: SuDS2
TEST 1

Weather: Sunny, clear

Engineer: R Rowlinson
Checked: R Wyatt

Trial Pit Measurements



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

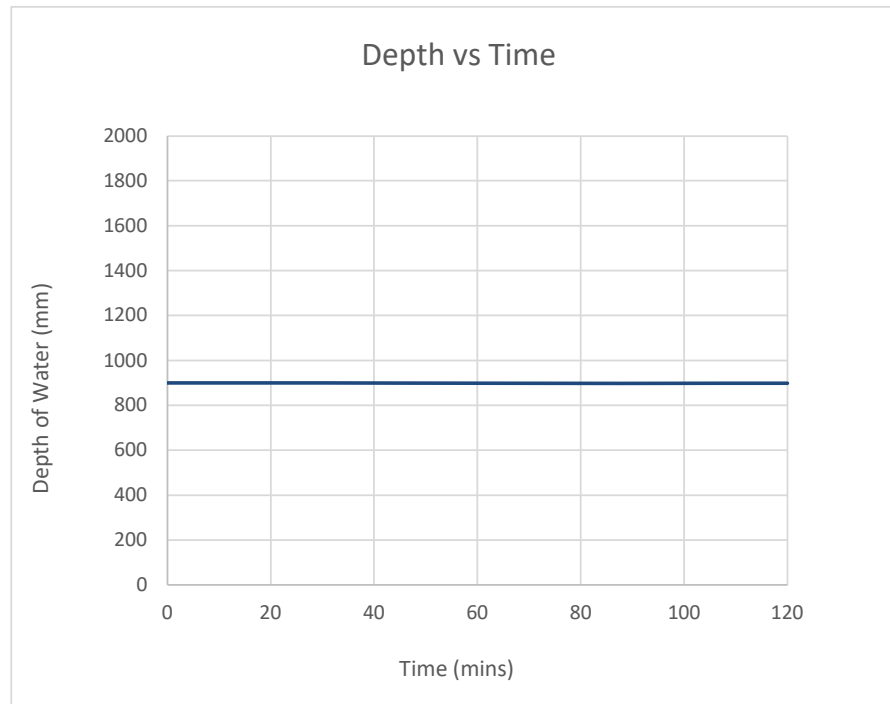
Pit Depth (mm): 2000

Pit Details: Open with no stone filling

Groundwater Level: NGW

SOIL PERCOLATION TEST

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

Compliance 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
--------------------------------	----------

Sheet 1 of 2

Date of Test: 18/01/2022

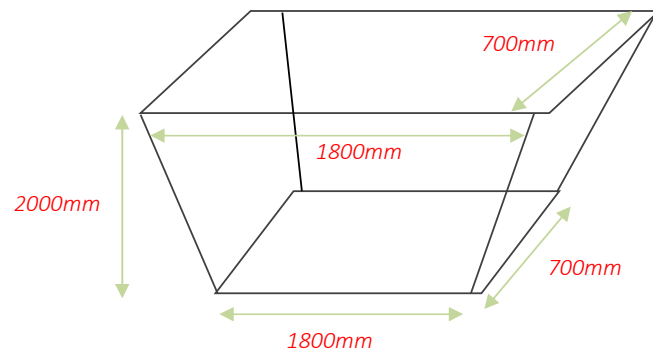
POSITION: SuDS2
TEST 2

Weather: Sunny, clear

Engineer: R Rowlinson

Checked: R Wyatt

Trial Pit Measurements



Test Data

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

Pit Depth (mm): 2000

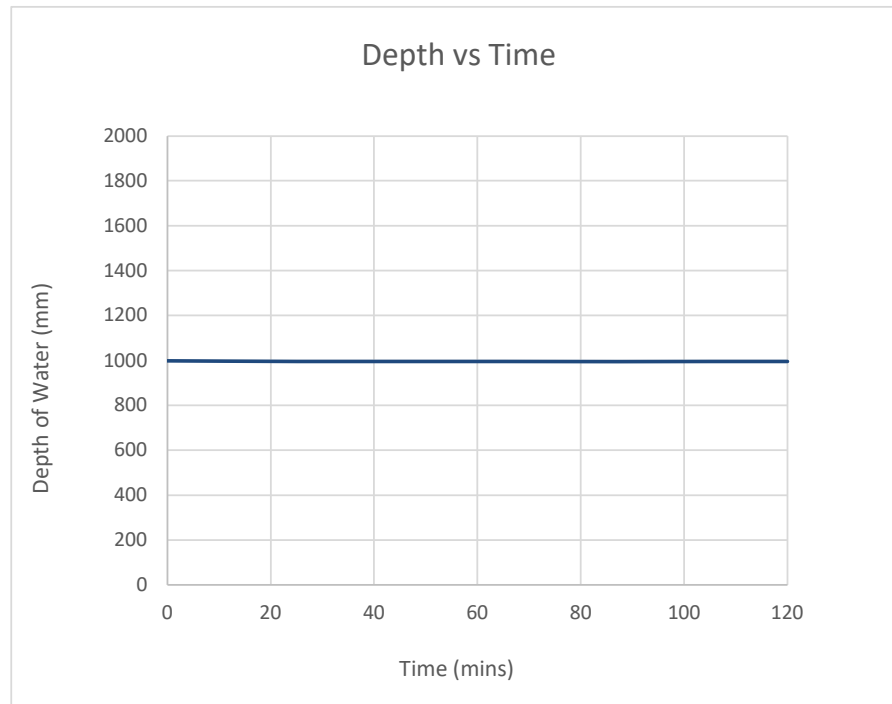
Pit Details: Open with no stone filling

Groundwater Level: NGW

SOIL PERCOLATION TEST

Sheet 2 of 2

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

Compliance 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



Sheet 1 of 2

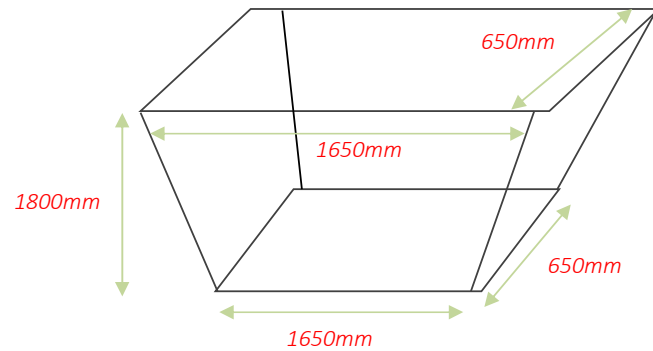
Date of Test: 30/11/2021

POSITION: SuDS2
TEST 3

Weather: Sunny, clear

Engineer: L Harrison
Checked: R Wyatt

Trial Pit Measurements



Test Data

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

Pit Depth (mm): 1800

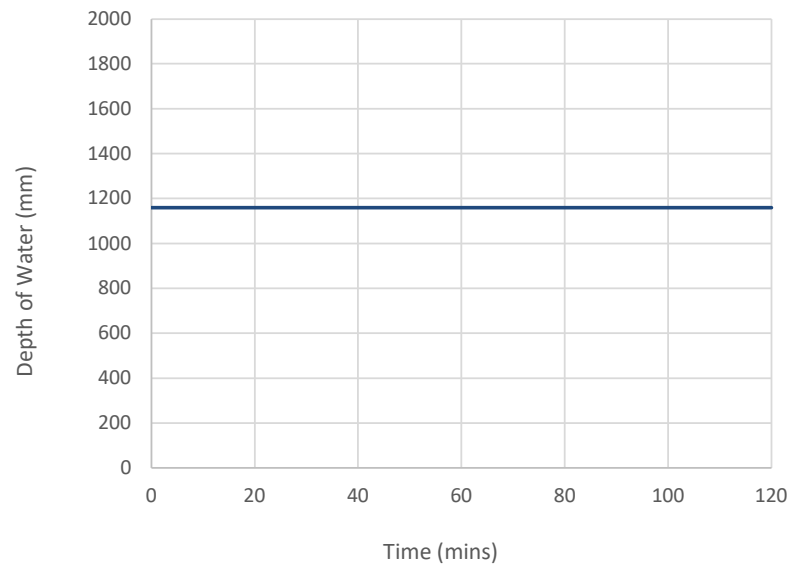
Pit Details: Open with no stone filling

Groundwater Level: NGW

SOIL PERCOLATION TEST

POSITION: SuDS2
TEST 3

Depth vs Time



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

Compliance 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)

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) ^{vop}	LQM S4ULs	
Aliphatic EC 10 - 12	mg/kg	130 (48) ^{vop}	330 (118) ^{vop}	760 (283) ^{vop}	9700 (48) ^{sol}	23000 (118) ^{vop}	47000 (283) ^{vop}	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) ^{vop}	110000 (1920) ^{vop}	180000 (4360) ^{vop}	LQM S4ULs	
Aromatic EC 8 - 10	mg/kg	34	83	190	3500 (613) ^{vop}	8100 (1500) ^{vop}	17000 (3580) ^{vop}	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	

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		Score
Hazard Identification		
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.



Stage 2		Score
Emission Factors		
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

Stage 3		Score
Pathway and Receptor Sensitivity		
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



Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

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	



APPENDIX 12 - Waste Classification Report

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:

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



8SSFK-H0JF0-HOEN2

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

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
Hazardous Waste Classification

Date

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:	LoW Code:
TP01---0.25	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
7.6% (wet weight correction)	

Hazard properties

None identified

Determinands

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

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

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

Classification of sample: TP01---0.70

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

Sample details

Sample name:	LoW Code:
TP01---0.70	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
13% (wet weight correction)	

Hazard properties

None identified

Determinands

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

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

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

Classification of sample: TP02---0.35

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

Sample details

Sample name:	LoW Code:
TP02---0.35	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
12% (wet weight correction)	

Hazard properties

None identified

Determinands

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

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

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

Classification of sample: TP03---0.55

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

Sample details

Sample name:	LoW Code:
TP03---0.55	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
5.9% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 5.9% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	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 }				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		<LOD
	024-017-00-8											
3	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
4	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8									
5	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9									
6	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
7	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
8	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7									
9	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
10	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
11	benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-033-00-9	200-280-6	56-55-3									
12	chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-048-00-0	205-923-4	218-01-9									
13	benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-032-00-3	200-028-5	50-32-8									
14	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
15	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
16	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-883-8	191-24-2									
17	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				7.3	mg/kg	1.895	13.014	mg/kg	0.0013 %	✓	
	033-005-00-1											

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
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 }			1	0.4 mg/kg		0.376 mg/kg	0.0000376 %	✓	
	048-001-00-5									
19	copper { copper(II) chloride dihydrate }				28 mg/kg	2.683	70.685 mg/kg	0.00707 %	✓	
		231-210-2	10125-13-0							
20	mercury { mercury difulminate }				<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		<LOD
	080-005-00-2	211-057-8	628-86-4							
21	nickel { nickel diiodide }				36 mg/kg	5.324	180.366 mg/kg	0.018 %	✓	
	028-029-00-4	236-666-6	13462-90-3							
22	lead { lead di(acetate) }			1	24 mg/kg	1.57	35.455 mg/kg	0.00226 %	✓	
	082-005-00-8	206-104-4	301-04-2							
23	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5							
24	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				93 mg/kg	4.398	384.876 mg/kg	0.0385 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
25	benzene				<1 µg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
26	ethylbenzene				<1 µg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
27	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<1 µg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
28	toluene				<1 µg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
29	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				28 mg/kg	1.462	40.924 mg/kg	0.00409 %		
		215-160-9	1308-38-9							
30	benzo[bk]fluoranthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9							
31	xylene				<2 µg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH01---0.50

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

Sample details

Sample name:	LoW Code:
BH01---0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
12% (wet weight correction)	

Hazard properties

None identified

Determinands

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

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	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 }				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		<LOD
	024-017-00-8											
3	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
4	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8									
5	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9									
6	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
7	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
8	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7									
9	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
10	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
11	benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-033-00-9	200-280-6	56-55-3									
12	chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-048-00-0	205-923-4	218-01-9									
13	benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-032-00-3	200-028-5	50-32-8									
14	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
15	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
16	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-883-8	191-24-2									
17	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				6.9	mg/kg	1.895	11.504	mg/kg	0.00115 %	✓	
	033-005-00-1											

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
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 }			1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
	048-001-00-5									
19	copper { copper(II) chloride dihydrate }				24 mg/kg	2.683	56.66 mg/kg	0.00567 %	✓	
		231-210-2	10125-13-0							
20	mercury { mercury difulminate }				<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		<LOD
	080-005-00-2	211-057-8	628-86-4							
21	nickel { nickel diiodide }				15 mg/kg	5.324	70.281 mg/kg	0.00703 %	✓	
	028-029-00-4	236-666-6	13462-90-3							
22	lead { lead di(acetate) }			1	14 mg/kg	1.57	19.341 mg/kg	0.00123 %	✓	
	082-005-00-8	206-104-4	301-04-2							
23	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5							
24	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				60 mg/kg	4.398	232.21 mg/kg	0.0232 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
25	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				14 mg/kg	1.462	20.462 mg/kg	0.00205 %		
		215-160-9	1308-38-9							
26	benzo[bk]fluoranthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9							
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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH02---1.00

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

Sample details

Sample name:	LoW Code:
BH02---1.00	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
15% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 15% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	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 }				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		<LOD
	024-017-00-8											
3	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
4	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8									
5	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9									
6	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
7	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
8	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7									
9	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
10	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
11	benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-033-00-9	200-280-6	56-55-3									
12	chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-048-00-0	205-923-4	218-01-9									
13	benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-032-00-3	200-028-5	50-32-8									
14	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
15	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
16	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-883-8	191-24-2									
17	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				6.9	mg/kg	1.895	11.111	mg/kg	0.00111 %	✓	
	033-005-00-1											

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
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 }			1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
	048-001-00-5									
19	copper { copper(II) chloride dihydrate }				17 mg/kg	2.683	38.766 mg/kg	0.00388 %	✓	
		231-210-2	10125-13-0							
20	mercury { mercury difulminate }				<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		<LOD
	080-005-00-2	211-057-8	628-86-4							
21	nickel { nickel diiodide }				10 mg/kg	5.324	45.257 mg/kg	0.00453 %	✓	
	028-029-00-4	236-666-6	13462-90-3							
22	lead { lead di(acetate) }			1	15 mg/kg	1.57	20.016 mg/kg	0.00128 %	✓	
	082-005-00-8	206-104-4	301-04-2							
23	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5							
24	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				31 mg/kg	4.398	115.885 mg/kg	0.0116 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
25	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				10 mg/kg	1.462	14.616 mg/kg	0.00146 %		
		215-160-9	1308-38-9							
26	benzo[bk]fluoranthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9							
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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH03---1.00

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

Sample details

Sample name:	LoW Code:
BH03---1.00	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
7.4% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 7.4% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	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 }				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		<LOD
	024-017-00-8											
3	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
4	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8									
5	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9									
6	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
7	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
8	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7									
9	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
10	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
11	benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-033-00-9	200-280-6	56-55-3									
12	chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-048-00-0	205-923-4	218-01-9									
13	benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-032-00-3	200-028-5	50-32-8									
14	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
15	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
16	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-883-8	191-24-2									
17	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				3.4	mg/kg	1.895	5.965	mg/kg	0.000596 %	✓	
	033-005-00-1											

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
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 }			1	<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
	048-001-00-5									
19	copper { copper(II) chloride dihydrate }				12 mg/kg	2.683	29.811 mg/kg	0.00298 %	✓	
		231-210-2	10125-13-0							
20	mercury { mercury difulminate }				<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		<LOD
	080-005-00-2	211-057-8	628-86-4							
21	nickel { nickel diiodide }				13 mg/kg	5.324	64.094 mg/kg	0.00641 %	✓	
	028-029-00-4	236-666-6	13462-90-3							
22	lead { lead di(acetate) }			1	42 mg/kg	1.57	61.056 mg/kg	0.00389 %	✓	
	082-005-00-8	206-104-4	301-04-2							
23	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5							
24	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				52 mg/kg	4.398	211.769 mg/kg	0.0212 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
25	benzene				<1 µg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
26	ethylbenzene				<1 µg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
27	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<1 µg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
28	toluene				<1 µg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
29	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				12 mg/kg	1.462	17.539 mg/kg	0.00175 %		
		215-160-9	1308-38-9							
30	benzo[bk]fluoranthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9							
31	xylene				<2 µg/kg		<0.002 mg/kg	<0.0000002 %		<LOD
	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH04---0.50

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

Sample details

Sample name:	LoW Code:
BH04---0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
9.5% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 9.5% Wet Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number									
1	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 }				<4	mg/kg	2.27	<9.08	mg/kg	<0.000908 %		<LOD
	024-017-00-8											
3	naphthalene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-052-00-2	202-049-5	91-20-3									
4	acenaphthylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-917-1	208-96-8									
5	acenaphthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-469-6	83-32-9									
6	fluorene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-695-5	86-73-7									
7	phenanthrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		201-581-5	85-01-8									
8	anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-371-1	120-12-7									
9	fluoranthene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-912-4	206-44-0									
10	pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		204-927-3	129-00-0									
11	benzo[a]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-033-00-9	200-280-6	56-55-3									
12	chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-048-00-0	205-923-4	218-01-9									
13	benzo[a]pyrene; benzo[def]chrysene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-032-00-3	200-028-5	50-32-8									
14	indeno[123-cd]pyrene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-893-2	193-39-5									
15	dibenz[a,h]anthracene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
	601-041-00-2	200-181-8	53-70-3									
16	benzo[ghi]perylene				<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
		205-883-8	191-24-2									
17	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }				6.6	mg/kg	1.895	11.316	mg/kg	0.00113 %	✓	
	033-005-00-1											

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
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 }			1	0.5 mg/kg		0.453 mg/kg	0.0000453 %	✓	
	048-001-00-5									
19	copper { copper(II) chloride dihydrate }				23 mg/kg	2.683	55.842 mg/kg	0.00558 %	✓	
		231-210-2	10125-13-0							
20	mercury { mercury difulminate }				<0.3 mg/kg	1.419	<0.426 mg/kg	<0.0000426 %		<LOD
	080-005-00-2	211-057-8	628-86-4							
21	nickel { nickel diiodide }				37 mg/kg	5.324	178.284 mg/kg	0.0178 %	✓	
	028-029-00-4	236-666-6	13462-90-3							
22	lead { lead di(acetate) }			1	21 mg/kg	1.57	29.836 mg/kg	0.0019 %	✓	
	082-005-00-8	206-104-4	301-04-2							
23	selenium { nickel selenate }				<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
	028-031-00-5	239-125-2	15060-62-5							
24	zinc { zinc sulphate (hydrous) (mono-, hexa- and hepta hydrate); [1] zinc sulphate (anhydrous) [2] }				96 mg/kg	4.398	382.092 mg/kg	0.0382 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
25	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				28 mg/kg	1.462	40.924 mg/kg	0.00409 %		
		215-160-9	1308-38-9							
26	benzo[bk]fluoranthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
		[1] 205-911-9 [2] 205-916-6	[1] 205-99-2 [2] 207-08-9							
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 Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non 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 sulposelenide (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 sulposelenide (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.				
REV 2.				
Report Reference	4251-ROC-ZZ-XX-RP-ES-PH2SI			
Report Status	FINAL			





COMPLEX CHALLENGES ...
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CONTENTS

1.0	INTRODUCTION	3
1.1	BACKGROUND	3
1.2	TERMS OF REFERENCE	3
1.3	OBJECTIVES	3
2.0	LIMITATIONS OF STUDY ASSESSMENT	4
3.0	BACKGROUND INFORMATION	5
3.1	SITE DESCRIPTION	5
3.2	GEOLOGICAL CHARACTERISTICS	5
3.3	SITE HISTORY AND ENVIRONMENTAL CHARACTERISTICS	5
4.0	SITE INVESTIGATION DESIGN	6
5.0	SITE INVESTIGATION FIELDWORKS	7
6.0	ENCOUNTERED GROUND CONDITIONS	8
6.1	GROUND CONDITIONS OVERVIEW	8
6.2	GROUNDWATER & CONTAMINATION OBSERVATIONS	10
6.3	BELOW GROUND OBSTRUCTIONS	10
6.4	TRLDCP TESTING	10
6.5	GAS MAIN DELINEATION.	11
7.0	LABORATORY TESTING	12
8.0	GEO-ENVIRONMENTAL ASSESSMENT	13
8.1	ASSESSMENT OF SOIL CONTAMINATION	17
8.2	GROUND GAS RISK ASSESSMENT	18
8.3	CONTROLLED WATERS	18
8.4	BELOW GROUND CONCRETE CONSTRUCTION	18
8.5	BELOW GROUND UTILITIES AND SERVICE RUNS	18
9.0	REFINED CONCEPTUAL SITE MODEL	19
10.0	GEOTECHNICAL & FOUNDATION DESIGN ASSESSMENT	23
10.1	NEW ROAD DESIGN	23
10.2	GENERAL COMMENTS	24
11.0	CONCLUSIONS & RECOMMENDATIONS	25
APPENDIX A – SITE DRAWINGS		26
APPENDIX B – EXPLORATORY HOLE LOGSHEETS		27
APPENDIX C – CHEMICAL TESTING RESULTS		28
APPENDIX D – GEOTECHNICAL TESTING RESULTS		29



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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 TRLDGP 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.



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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 TRLDGP tests and three slit trenches.
- 4.0.3 Window sample boreholes and TRLDGP 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

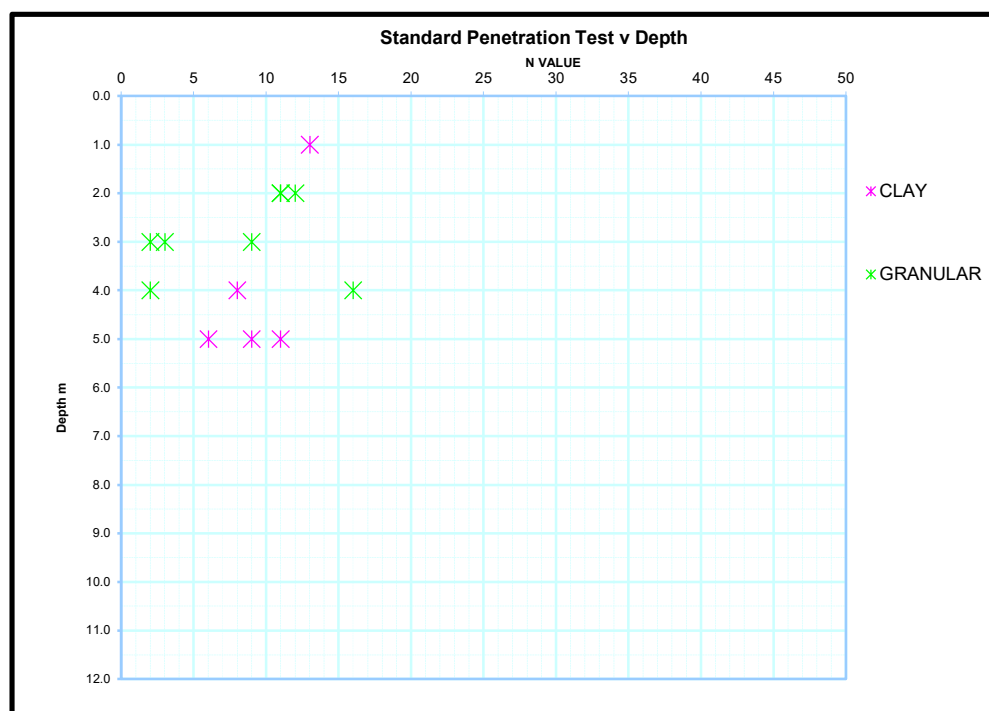
Hummocky Glacial Deposits Sand / Clay

- 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.

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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 TRLDGP 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%
<i>Proposed Staff Car Park and Access Route</i>			
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



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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.

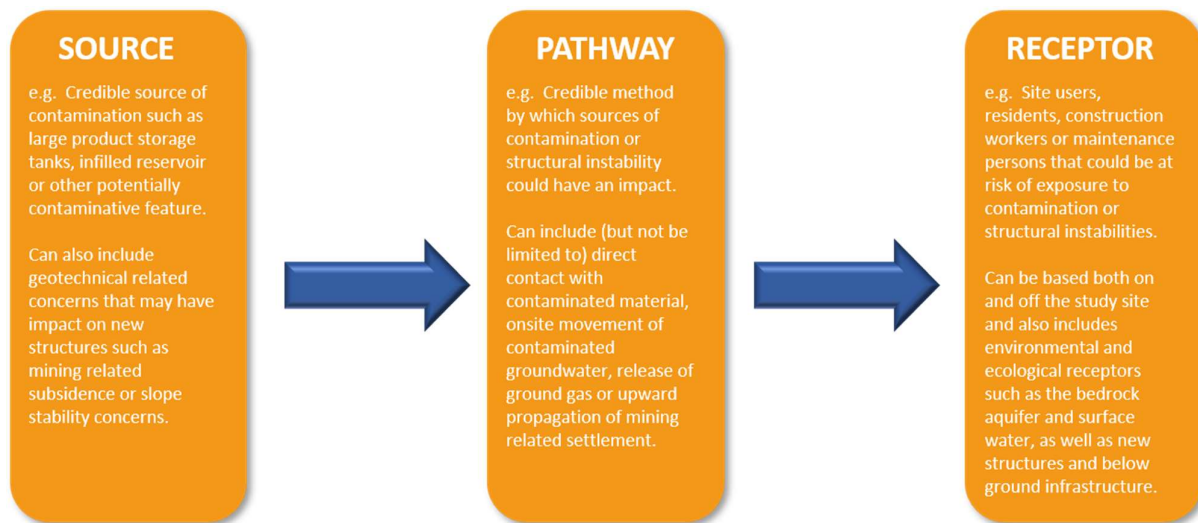


Figure 8.0 Source Pathway Receptor Diagram

- 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).

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- 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.

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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 contaminants 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	

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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 established 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 possibility 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.

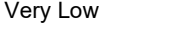


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9.0 Refined Conceptual Site Model

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
							



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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	



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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.



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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.



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- 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.



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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.



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX A – Site Drawings



Photo No. 1: ST102 and ST101



Photo No. 2: View northwest from ST101

Client: JD Plc

Project Name: Hollinsbrook Way, Bury

Project No.: 4251

Commercial Wharf,
6 Commercial Street,
Manchester,
M15 4PZ
T 0161 214 5390
W rocconsulting.com

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CONSULTING



Photo No. 3: ST101



Photo No. 4: ST101

Client: JD Plc

Project Name: Hollinsbrook Way, Bury

Project No.: 4251

Commercial Wharf,
6 Commercial Street,
Manchester,
M15 4PZ
T 0161 214 5390
W roconconsulting.com

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CONSULTING



Photo No. 5: ST102



Photo No. 6: ST102

Client: JD Plc

Project Name: Hollinsbrook Way, Bury

Project No.: 4251

Commercial Wharf,
6 Commercial Street,
Manchester,
M15 4PZ
T 0161 214 5390
W roconsulting.com

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CONSULTING



Photo No. 7: ST103



Photo No. 8: ST103

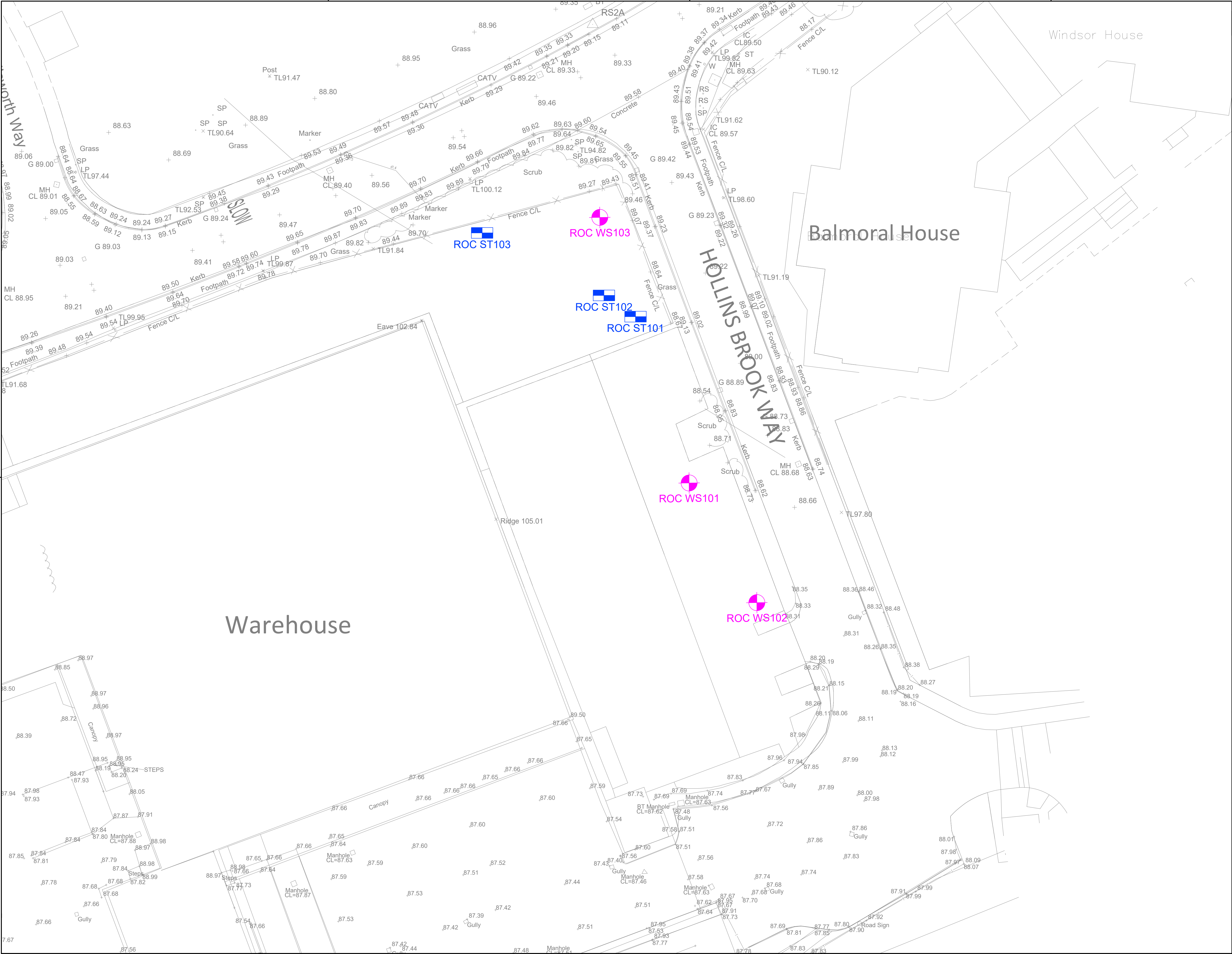
Client: JD Plc

Project Name: Hollinsbrook Way, Bury

Project No.: 4251

Commercial Wharf,
6 Commercial Street,
Manchester,
M15 4PZ
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CONSULTING



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NOTES

ES101 DRAWING NOTES

ROC WINDOW SAMPLE BOREHOLE LOCATION

ROC SLIT TRENCH LOCATION

DRAWING NOTES

1) EXPLORATORY HOLE LOCATIONS SHOWN AT APPROXIMATE EXTENTS.

2) PROPOSED DEVELOPMENT ARRANGEMENT TAKEN FROM EDDISON'S 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-PH2S) FOR FINDINGS OF SITE INVESTIGATION WORKS.

01	01.11.21	FIRST ISSUE	RM	AS
REV	DATE	DETAILS	DRN	CHK

DRAWING STATUS

INFORMATION

RIBA STAGE

Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
W roccoconsulting.com

DRAWN RM	DATE 29/10/2021	SCALES 1:200
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@roccoconsulting.com

CLIENT

JD PLC

PROJECT TITLE

HOLLINS BROOK WAY, BURY

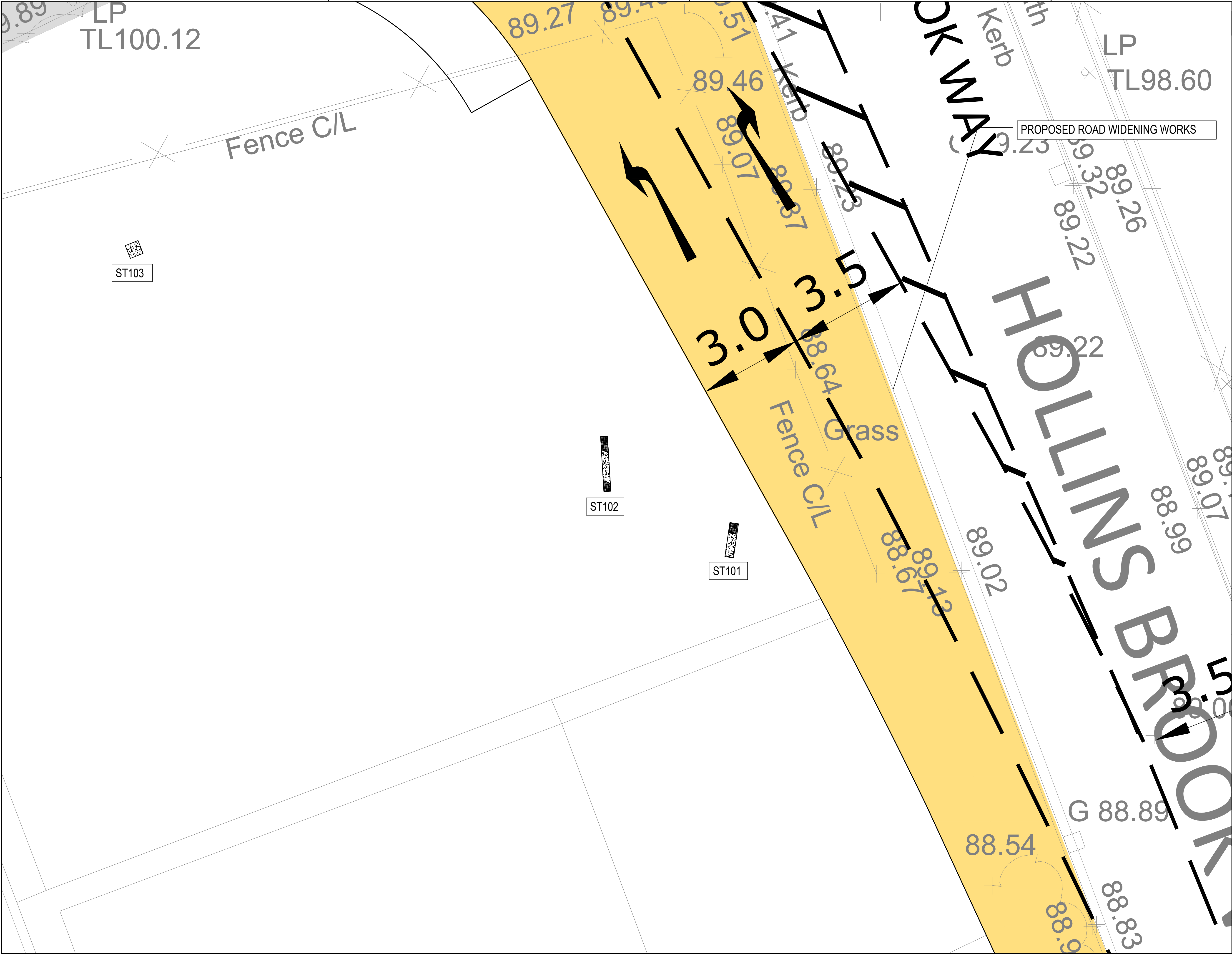
DRAWING TITLE

SITE INVESTIGATION LAYOUT PLAN

DRAWING No.	REV.
4251-ROC-ZZ-XX-DR-ES-ES101	01



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NOTES

ES103 DRAWING NOTES

ROC SLIT TRENCH CONCRETE

ROC SLIT TRENCH SOIL

DRAWING NOTES

1) SLIT TRENCH LOCATIONS SHOWN AT APPROXIMATE EXTENTS.

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-PH2S) FOR FINDINGS OF SITE INVESTIGATION WORKS.

01	01.11.21	FIRST ISSUE	RM	AS
REV	DATE	DETAILS	DRN	CHK

DRAWING STATUS

INFORMATION

RIBA STAGE

ROC CONSULTING

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Manchester M15 4PZ
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W roccoconsulting.com

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APPRVD. AS	DATE 29/10/2021	EMAIL FOR DRAWINGS info@roccoconsulting.com

CLIENT

JD PLC

PROJECT TITLE

HOLLINS BROOK WAY, BURY

DRAWING TITLE

SITE INVESTIGATION SLIT TRENCH PLAN (PROPOSED SITE)

DRAWING No.	REV.
4251-ROC-ZZ-XX-DR-ES-ES103	01

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NOTES

ES102 DRAWING NOTES

 ROC WINDOW SAMPLE BOREHOLE LOCATION
OC WS101

 ROC SLIT TRENCH LOCATION
ROC TP101

DRAWING NOTES

- 1) EXPLORATORY HOLE LOCATIONS SHOWN AT APPROXIMATE EXTENTS.
- 2) PROPOSED DEVELOPMENT ARRANGEMENT TAKEN FROM EDDISON'S 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-PH2S) FOR FINDINGS OF SITE INVESTIGATION WORKS.

01	01.11.21	FIRST ISSUE	RM	AS
REV	DATE	DETAILS	DRN	CHK

DRAWING STATUS
INFORMATION

RIBA STAGE

ROC

CONSULTING

Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
W roccoconsulting.com

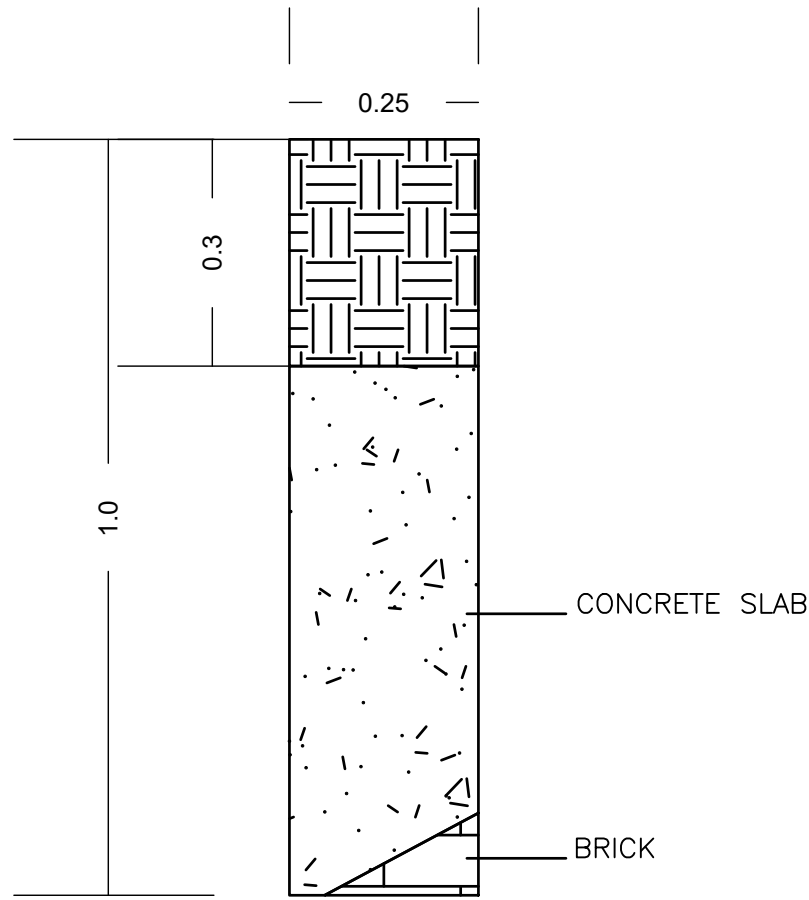
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CLIENT
JD PLC

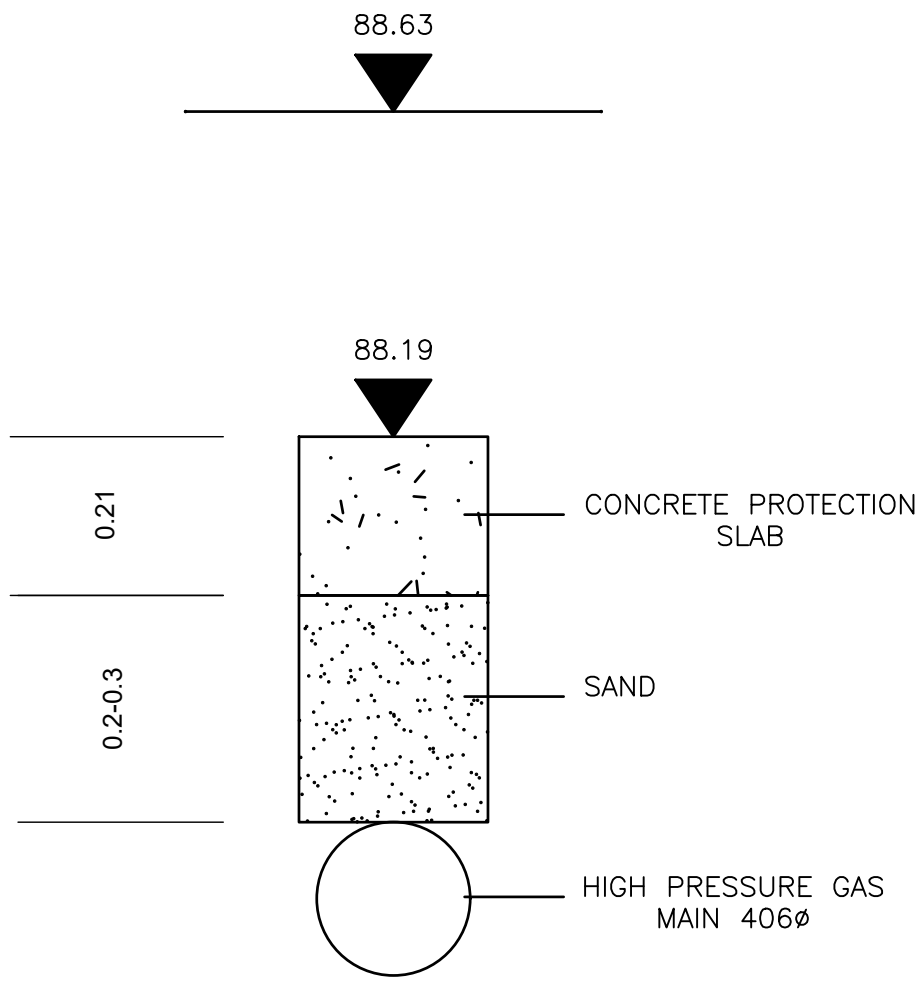
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**HOLLINS BROOK
WAY, BURY**

DRAWING TITLE
**GAS MAIN
PLANS & SECTIONS**

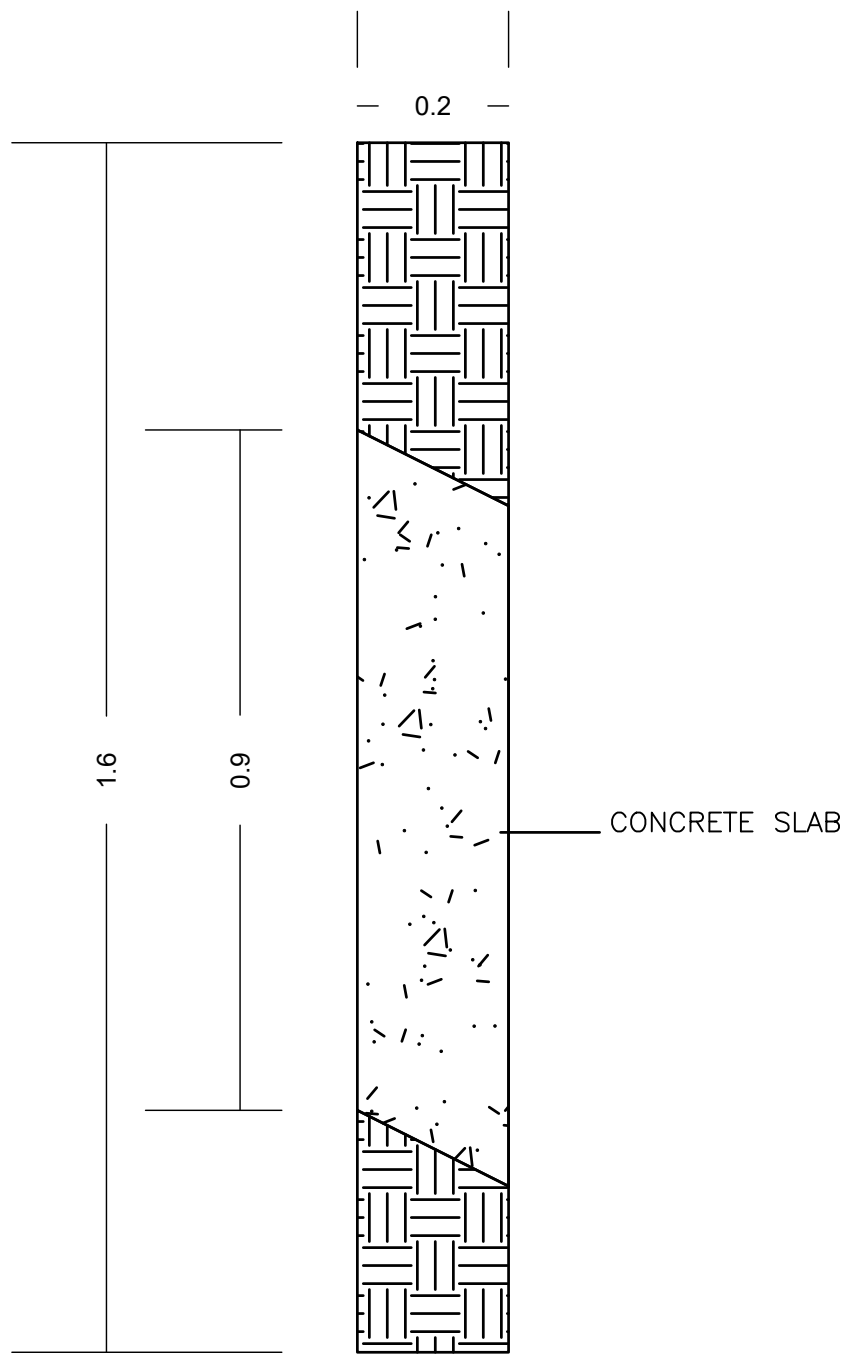
DRAWING No. 4251-ROC-ZZ-XX-DR-ES-ES104	REV. 01
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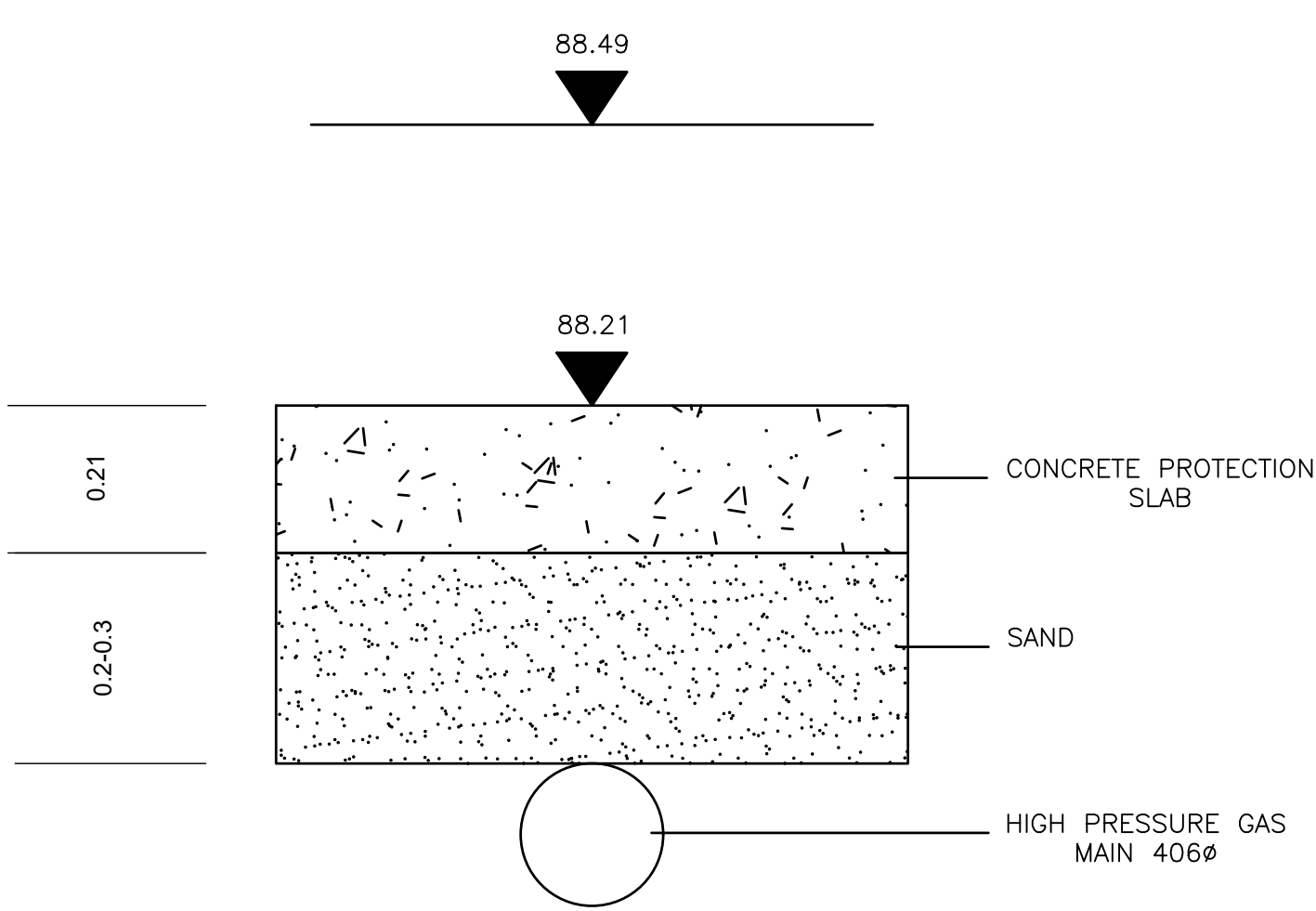
ST101 PLAN



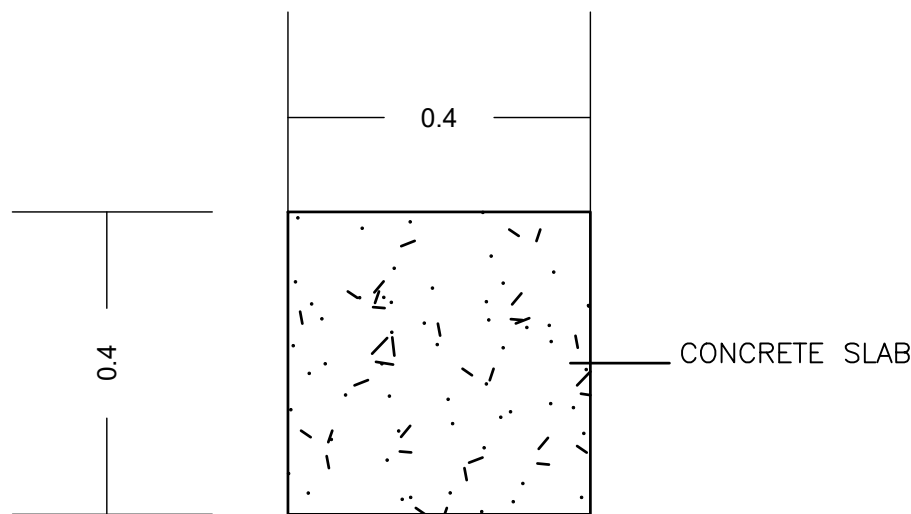
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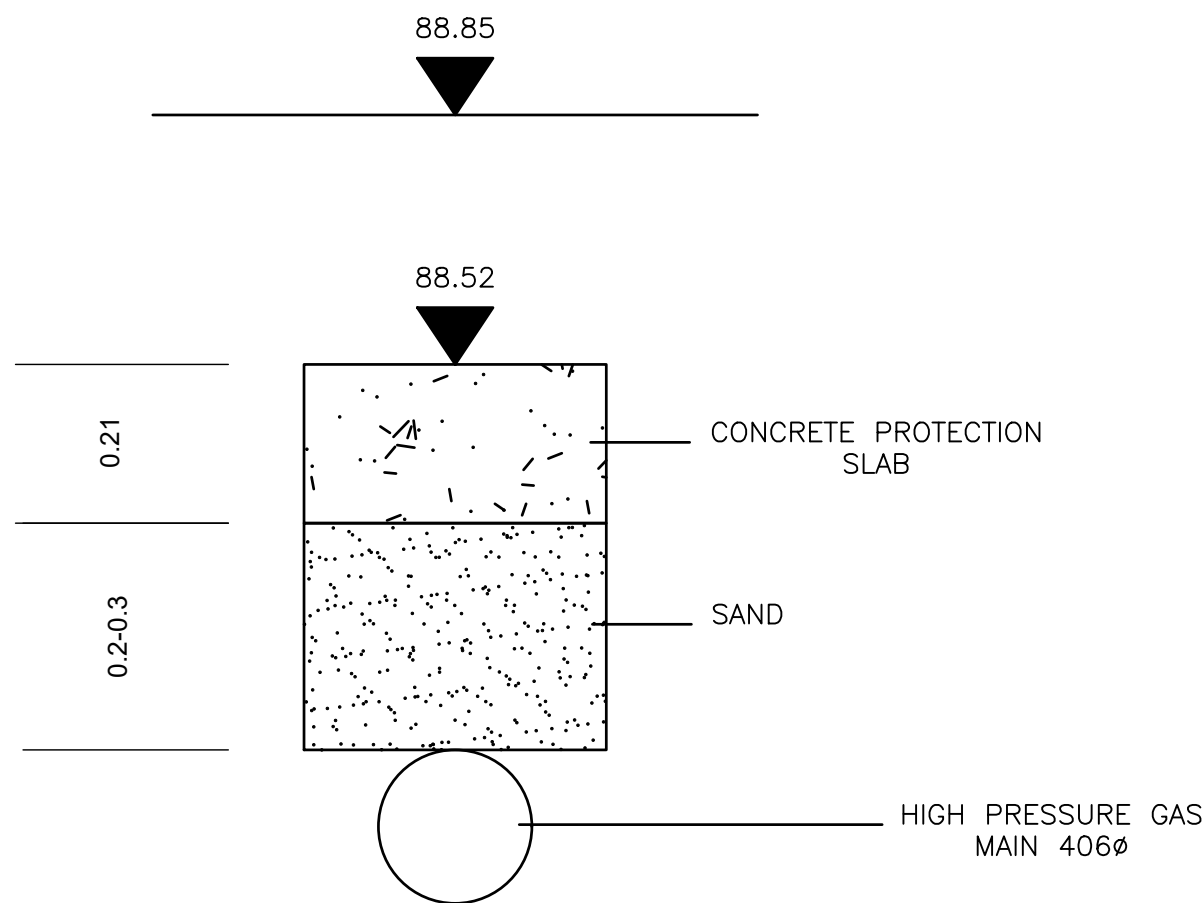
ST102 PLAN



ST102 SECTION



ST103 PLAN



ST102 SECTION



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 WS101	Hole Type WS	Level	Logged By RM	Scale 1:25	Page Number Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05			Asphalt (MADE GROUND)	
		0.18			0.18			Greyish brown sandy angular fine to medium GRAVEL of limestone (MADE GROUND)	
		0.40			0.40			Reddish brown slightly clayey sandy sub angular to angular fine to coarse GRAVEL of brick. Occasional red brick cobbles. (MADE GROUND)	
		0.50			0.50			Brown gravelly SAND. Gravel is fine to coarse sub angular of sandstone, brick and limestone. Occasional wood fragments (MADE GROUND)	
		0.75			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		1.20			Stiff brown mottled orangish brown slightly gravelly CLAY. Gravel is sub rounded to rounded fine of sandstone and coal (HUMMOCKY GLACIAL DEPOSITS)	1
		2.00	SPT	N=11 (2,2/3,3,2,3)				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
		3.00	SPT	N=2 (1,1/0,0,0,2)				...at 2.40mbgl greyish brown sub angular to rounded fine to medium gravel of sandstone and siltstone	
								...at 2.70mbgl becoming slightly clayey	
		4.00	SPT	N=2 (0,0/0,0,1,1)	4.00			Very soft brown slightly sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	
								...at 3.20mbgl becoming wet	
		5.00	SPT	N=6 (2,1/1,1,2,2)	4.80			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	
								Soft brown very sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	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 WS101	Hole Type WS	Level	Logged By RM	Scale 1:25	Page Number Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.45			Soft brown very sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	
								End of Borehole at 5.450m	
									6
									7
									8
									9
									10

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 WS102	Hole Type WS	Level	Logged By RM	Scale 1:25	Page Number Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40	ES		0.10			Asphalt (MADE GROUND)	1
					0.20			Greyish brown sandy subangular to angular fine to medium GRAVEL of limestone (MADE GROUND)	
								Brown sandy subangular to angular fine to medium GRAVEL of limestone and brick. Rare sandstone cobble (MADE GROUND)	
		0.80 0.80	D ES		0.70			Soft brown mottled orangish brown sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	
								Very soft brown mottled orangish brown slightly gravelly CLAY. Gravel is sub rounded to rounded fine of sandstone and coal (HUMMOCKY GLACIAL DEPOSITS)	
		1.00 - 1.40	U		1.00			Soft brown very clayey SAND (HUMMOCKY GLACIAL DEPOSITS)	
					1.50			Medium dense brown fine to medium 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)				...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
									
									
		4.00	SPT	N=16 (4,3/4,4,4,4)	3.50			Soft brown very sandy CLAY (HUMMOCKY GLACIAL DEPOSITS)	4
									
									
		5.00	SPT	N=11 (1,2/2,3,3,3)	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.										
--	--	--	--	--	--	--	--	--	--	---

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 WS102	Hole Type WS	Level	Logged By RM	Scale 1:25	Page Number 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)	
								Firm brown CLAY (HUMMOCKY GLACIAL DEPOSITS)	
							End of Borehole at 5.450m		
									6
									7
									8
									9
									10

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		

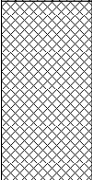
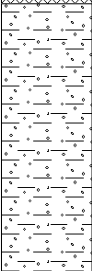
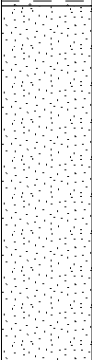
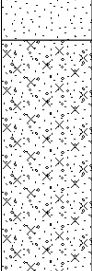
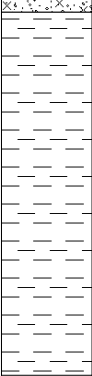
Remarks

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 WS103	Hole Type WS	Level	Logged By RM	Scale 1:25	Page Number Sheet 1 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.20			Dark brown sandy organic SILT. Frequent roots and rootlets (TOPSOIL)	
		0.70	ES		0.80			Brown gravelly fine SAND. Gravel is angular fine to medium of limestone and brick (MADE GROUND)	
		1.00	D					Firm brown mottled orange slightly gravelly CLAY. Gravel is sub rounded to rounded fine to medium (HUMMOCKY GLACIAL DEPOSITS)	1
		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
		2.00	SPT	N=12 (2,2/3,2,3,4)					
					3.00			...at 2.90mbgl fine angular band of coal gravel Loose brown slightly gravelly silty SAND. Gravel is rounded fine to medium of quartz (HUMMOCKY GLACIAL DEPOSITS)	3
		3.00	SPT	N=9 (2,2/3,1,2,3)					
					3.80			Firm brown CLAY (HUMMOCKY GLACIAL DEPOSITS)	4
		4.00	SPT	N=8 (1,2/1,2,2,3)					
		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 WS103	Hole Type WS	Level	Logged By RM	Scale 1:25	Page Number Sheet 2 of 2

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					5.45			Firm brown CLAY (HUMMOCKY GLACIAL DEPOSITS)	
								End of Borehole at 5.450m	
									6
									7
									8
									9
									10

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.



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX C – Chemical Testing Results

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

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 [#]	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.

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 $5 \pm 3^{\circ}\text{C}$), 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

4041

Client: ROC Consulting Ltd
Client Address: Commercial Wharf, 6 Commercial Street,
Castlefield, Manchester,
M15 4PZ
Contact: Reece McGuinness
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

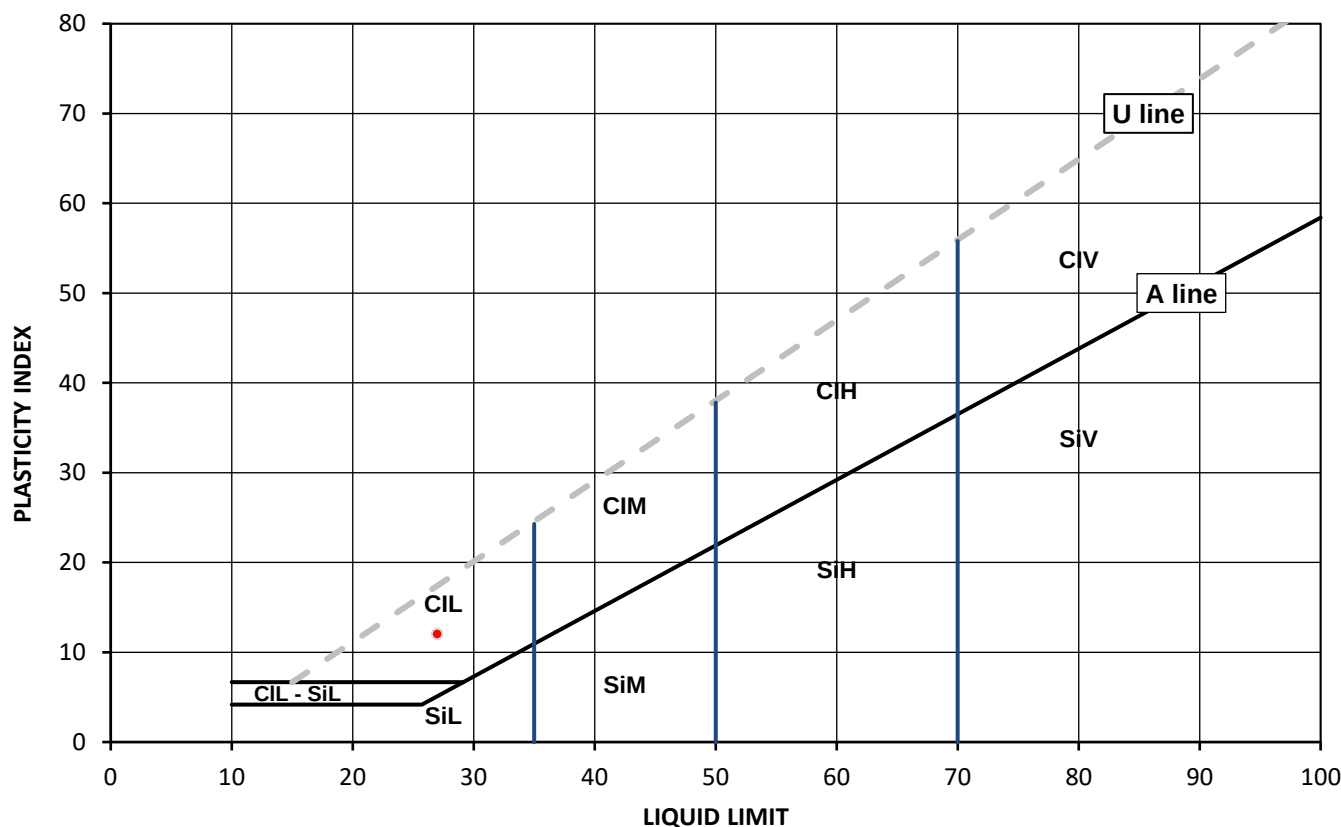
Test Results:

Laboratory Reference: 2068872
Hole No.: WS101
Sample Reference: Not Given
Sample Description: Yellowish brown slightly gravelly very sandy CLAY

Depth Top [m]: 0.80
Depth Base [m]: Not Given
Sample Type: D

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	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Anna Dudzinska

Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

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4041

Client: ROC Consulting Ltd
Client Address: Commercial Wharf, 6 Commercial Street,
Castlefield, Manchester,
M15 4PZ
Contact: Reece McGuinness
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

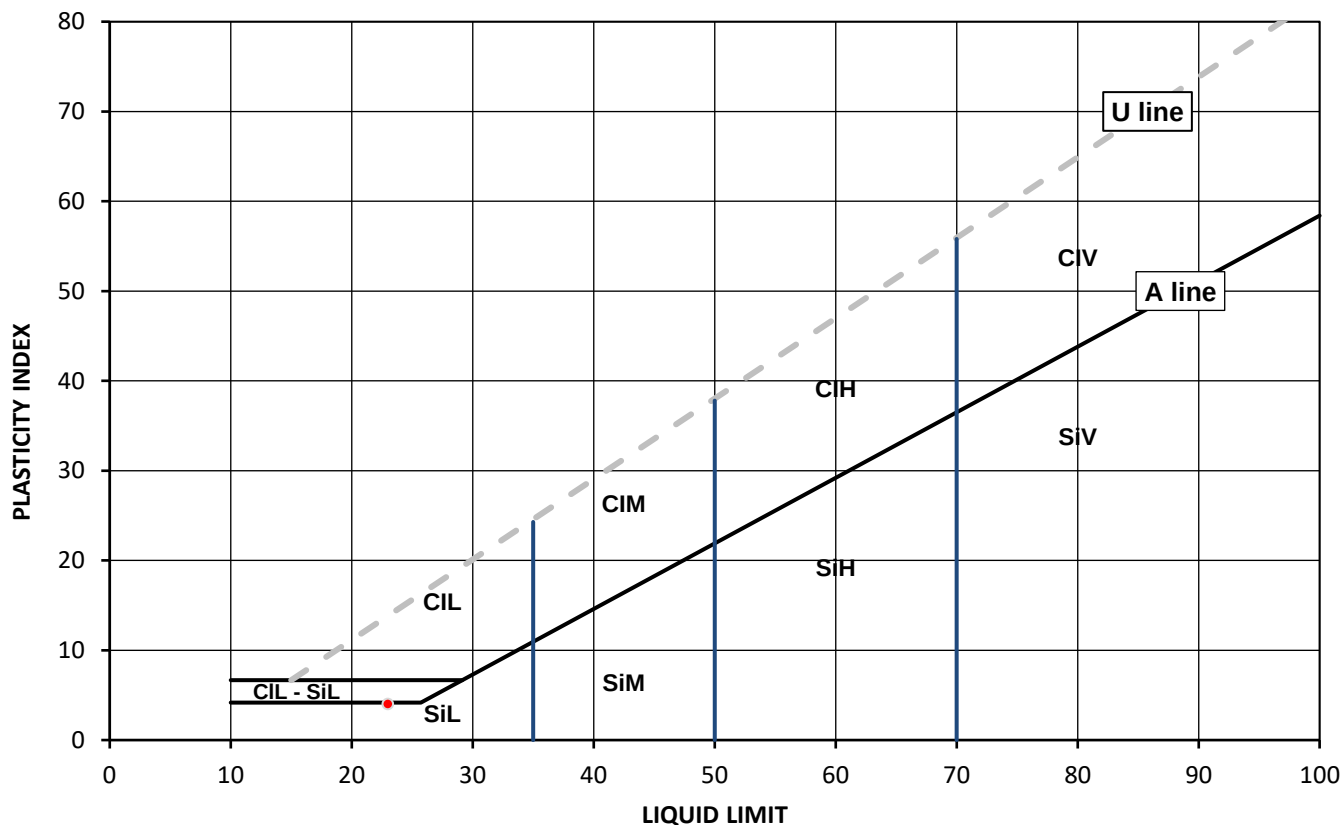
Test Results:

Laboratory Reference: 2068874
Hole No.: WS102
Sample Reference: Not Given
Sample Description: Brownish grey slightly gravelly silty SAND

Depth Top [m]: 0.80
Depth Base [m]: Not Given
Sample Type: D

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



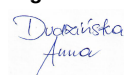
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

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4041

Client: ROC Consulting Ltd
Client Address: Commercial Wharf, 6 Commercial Street,
Castlefield, Manchester,
M15 4PZ
Contact: Reece McGuinness
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

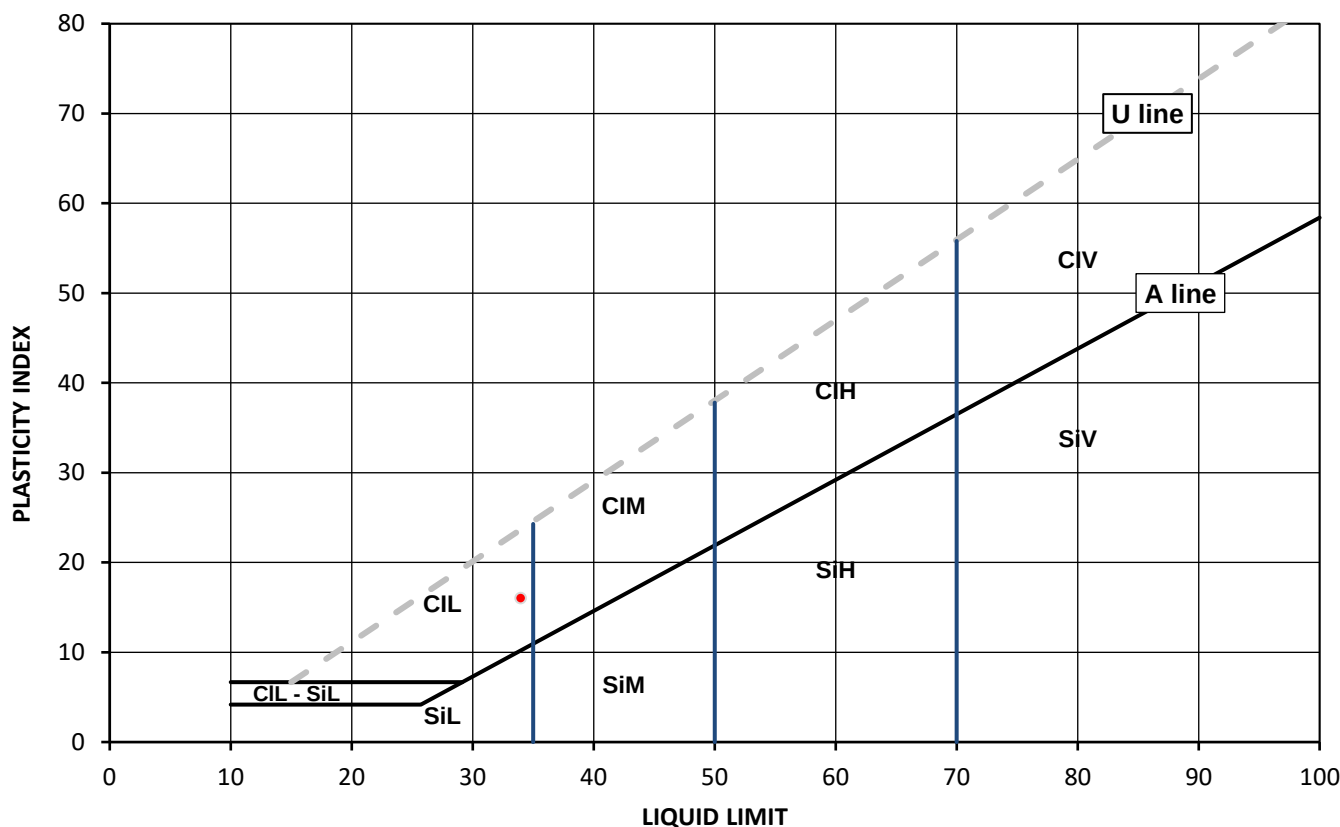
Test Results:

Laboratory Reference: 2068876
Hole No.: WS103
Sample Reference: Not Given
Sample Description: Brown slightly gravelly very sandy CLAY

Depth Top [m]: 1.00
Depth Base [m]: Not Given
Sample Type: D

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 CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Anna Dudzinska

Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd

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4041

Client: ROC Consulting Ltd
 Client Address: Commercial Wharf, 6 Commercial Street,
 Castlefield, Manchester,
 M15 4PZ
 Contact: Reece McGuinness
 Site Address: Hollinsbrook Way, Bury

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



Environmental Science

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:

Dudzińska Anna

Anna Dudzińska
 Deputy Head of Geo Office Section
 for and on behalf of i2 Analytical Ltd

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.



4041

TEST CERTIFICATE
Unconsolidated Undrained**Triaxial Compression**Tested in Accordance with:
BS 1377-7: 1990: Clause 8i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EBClient: ROC Consulting Ltd
Client Address: Commercial Wharf, 6 Commercial Street,
Castlefield, Manchester,
M15 4PZ
Contact: Reece McGuinness
Site Address: Hollinsbrook Way, BuryClient Reference: 4251
Job Number: 21-20214
Date Sampled: 27/10/2021
Date Received: 01/11/2021
Date Tested: 18/11/2021
Sampled By: Not Given

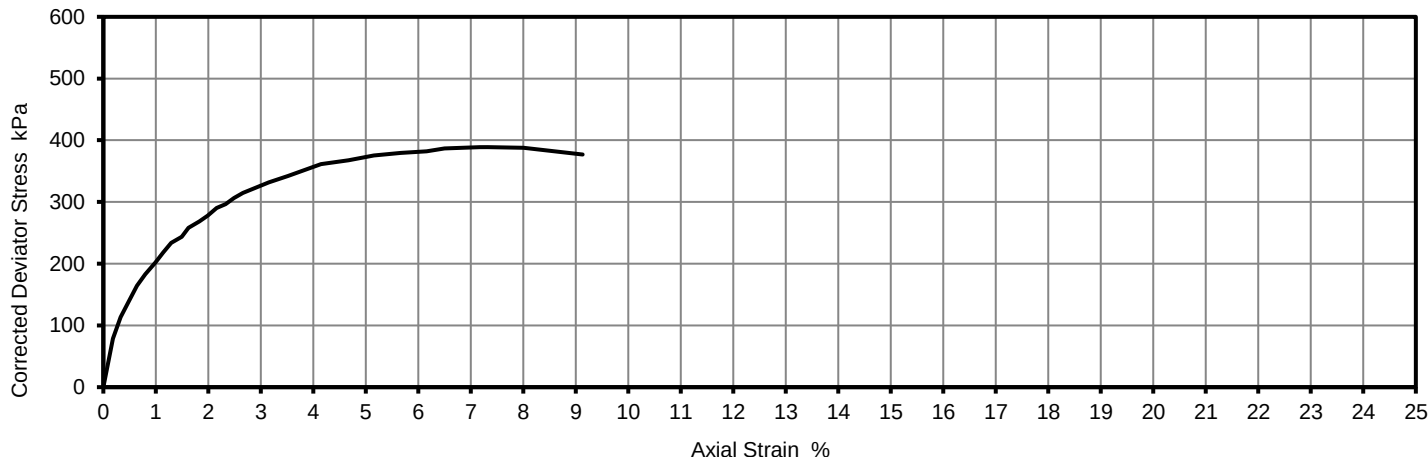
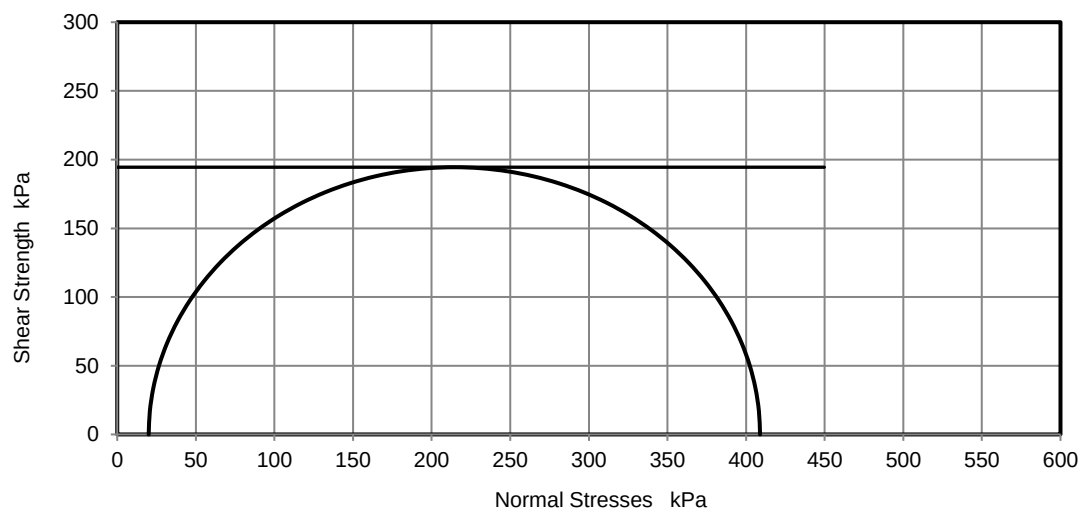
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:Laboratory Reference: 2068873
Hole No.: WS101
Sample Reference: Not Given
Sample Description: Yellowish brown and grey mottled slightly gravelly very sandy CLAYDepth Top [m]: 1.00
Depth Base [m]: 1.40
Sample Type: U

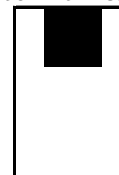
Test Number	1
Length	76.46 mm
Diameter	37.96 mm
Bulk Density	2.18 Mg/m ³
Moisture Content	13 %
Dry Density	1.92 Mg/m ³
Membrane Correction	0.99 kPa

Rate of Strain
Cell Pressure
Axial Strain at failure
Deviator Stress, ($\sigma_1 - \sigma_3$)_f
Undrained Shear Strength, c_u
Mode of Failure
Membrane thickness

2.00	%/min
20	kPa
7.3	%
389	kPa
194	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Compound	
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:Anna Dudzinska
Deputy Head of Geo Office Section
for and on behalf of i2 Analytical Ltd



4041

TEST CERTIFICATE
Unconsolidated Undrained**Triaxial Compression**Tested in Accordance with:
BS 1377-7: 1990: Clause 8i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client: ROC Consulting Ltd
 Client Address: Commercial Wharf, 6 Commercial Street,
 Castlefield, Manchester,
 M15 4PZ
 Contact: Reece McGuinness
 Site Address: Hollinsbrook Way, Bury

Client Reference: 4251
 Job Number: 21-20214
 Date Sampled: 27/10/2021
 Date Received: 01/11/2021
 Date Tested: 23/11/2021
 Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

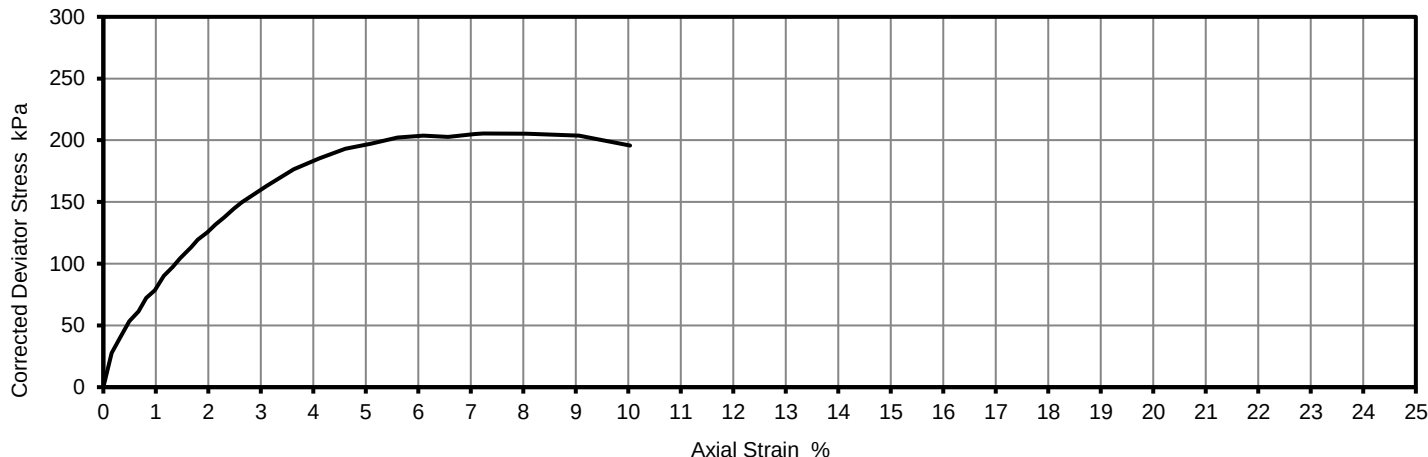
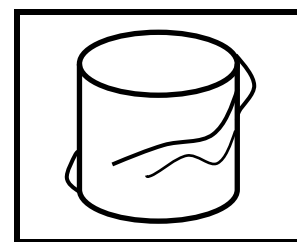
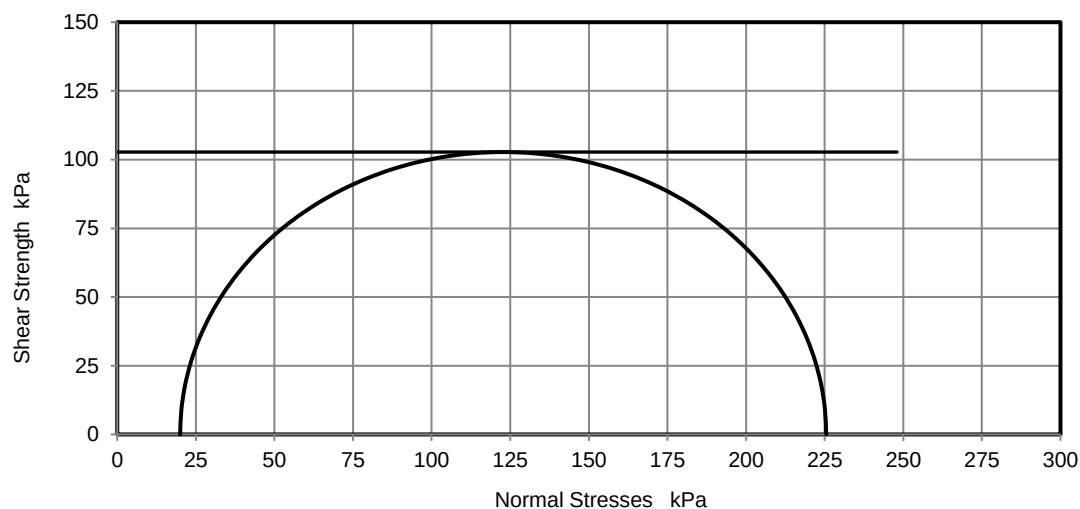
Laboratory Reference: 2068875
 Hole No.: WS102
 Sample Reference: Not Given
 Sample Description: Brownish grey very sandy CLAY

Depth Top [m]: 1.00
 Depth Base [m]: 1.40
 Sample Type: U

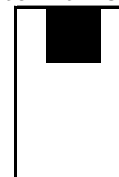
Test Number	1
Length	77.25 mm
Diameter	37.12 mm
Bulk Density	2.02 Mg/m ³
Moisture Content	21 %
Dry Density	1.68 Mg/m ³
Membrane Correction	1.05 kPa

Rate of Strain
 Cell Pressure
 Axial Strain at failure
 Deviator Stress, $(\sigma_1 - \sigma_3)_f$
 Undrained Shear Strength, c_u
 Mode of Failure
 Membrane thickness

2.00	%/min
20	kPa
7.2	%
205	kPa
103	kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Compound	
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:

Anna Dudzinska

Anna Dudzinska
 Deputy Head of Geo Office Section
 for and on behalf of i2 Analytical Ltd

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W | www.rocconsulting.com

PERCOLATION TESTS RESULTS

Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords:	-
Level:	

Date
18/07/2022

Location: BURY

Dimensions
(m):

Scale
1:25

Client: JD SPORTS

Depth
1.60

Logged
JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.80	B					MADE GROUND: Sandy gravelly cobble. Sand is fine. Gravels are subangular to subrounded fine to coarse. Cobbles are subrounded to subangular. Mixed lithologies including concrete and brick.
				0.60			MADE GROUND: Firm dark brown gravelly clay.Gravels are subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.
				1.10			Red brown slightly clayey slightly gravelly SAND. Sand is fine. Gravels are fine to coarse angular to subangular of mixed lithologies.
				1.60			End of pit at 1.60 m

Remarks:	1. No groundwater encountered	2. Pit sides stable	3. Pit backfilled with arisings.
----------	-------------------------------	---------------------	----------------------------------

Stability:



Project Name: NEW OFFICE BLOCK

Project No.
GRO-21438

Co-ords:	-
Level:	

Date
18/07/2022

Location: BURY

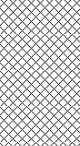
Dimensions
(m):

Scale
1:25

Client: JD SPORTS

Depth
1.10

Logged
JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.80	B					MADE GROUND: Sandy gravelly cobble. Sand is fine. Gravels are subangular to subrounded fine to coarse. Cobbles are subrounded to subangular. Mixed lithologies including concrete and brick.
				0.50			MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine. Gravels are subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.
				0.80			Red brown slightly clayey slightly gravelly SAND. Sand is fine. Gravels are fine to coarse angular to subangular of mixed lithologies.
				1.10			End of pit at 1.10 m

Remarks:	1. No groundwater encountered	2. Pit sides stable	3. Pit backfilled with arisings.
----------	-------------------------------	---------------------	----------------------------------

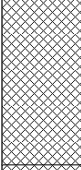
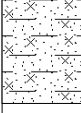
Stability:



Trial Pit Log

Trialpit No
SuDS103
Sheet 1 of 1

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: - Level:	Date 18/07/2022
Location: BURY	Dimensions (m): Depth 1.20		Scale 1:25
Client: JD SPORTS			Logged JOD

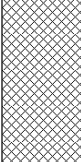
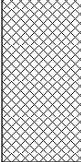
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.00 - 0.60	B					MADE GROUND: Sandy gravelly cobble. Sand is fine. Gravels are subangular to subrounded fine to coarse. Cobbles are subrounded to subangular. Mixed lithologies including concrete and brick. <u>Rebar excavated.</u>	
				0.55			MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine. Gravels are subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.	
				0.66			Red brown slightly clayey slightly gravelly SAND. Sand is fine. Gravels are fine to coarse angular to subangular of mixed lithologies.	1
				1.20			End of pit at 1.20 m	
								2
								3
								4
								5

Remarks: 1. No groundwater encountered 2. Pit sides unstable 3. Pit backfilled with arisings.	
Stability:	

Trial Pit Log

Trialpit No
SuDS104
Sheet 1 of 1

Project Name: NEW OFFICE BLOCK	Project No. GRO-21438	Co-ords: - Level:	Date 19/07/2022
Location: BURY	Dimensions (m): Depth 2.30		Scale 1:25
Client: JD SPORTS			Logged JOD

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.55			MADE GROUND: Sandy gravelly cobble. Sand is fine. Gravels are subangular to subrounded fine to coarse. Cobbles are subrounded to subangular. Mixed lithologies including concrete and brick.	
				1.10			MADE GROUND: Firm dark brown sandy gravelly clay. Sand is fine. Gravels are subrounded to subangular fine to coarse of mixed lithologies including brick and concrete.	1
				2.30			Red brown slightly clayey slightly silty slightly gravelly SAND. Sand is fine. Gravels are fine to coarse angular to subangular of mixed lithologies.	2
							End of pit at 2.30 m	3
								4
								5

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

Stability:



SOIL PERCOLATION TEST

Sheet 1 of 2

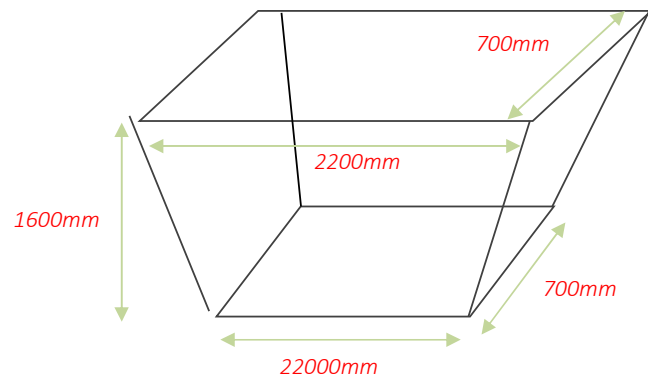
Date of Test: 18/07/2022

POSITION: SuDS101
TEST 1

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1600

Pit Details: Open with no stone filling

Groundwater Level: NGW

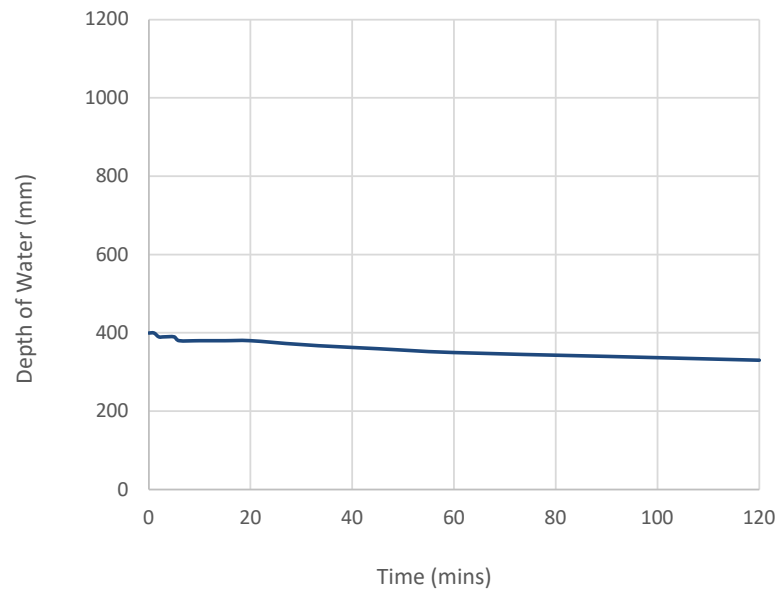
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1200
1	1200
2	1210
3	1210
5	1210
6	1220
10	1220
15	1220
20	1220
30	1230
45	1240
60	1250
90	1260
120	1270

SOIL PERCOLATION TEST

POSITION: SuDS101
TEST 1

Depth vs Time



Volume of Pit (m ³)	2.464
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.616

Compliance Check:

Water Level at 75% effective depth (mm)	300
---	-----

Water Level at 25% effective depth (mm)	100
---	-----

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

Soil Infiltration Rate Calculation

Water Level 1	400
Water Level 2	330
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1078

Discharge Area (m ²)	3.657
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0002456
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	4.09E-06
--------------------------------	----------

SOIL PERCOLATION TEST

Sheet 1 of 2

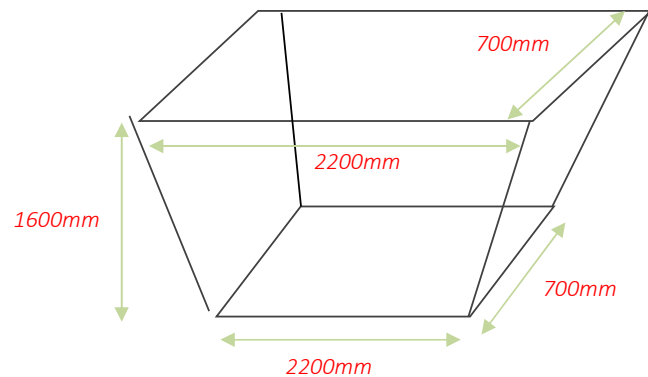
Date of Test: 18/07/2022

POSITION: SuDS101
TEST 2

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1600

Pit Details: Open with no stone filling

Groundwater Level: NGW

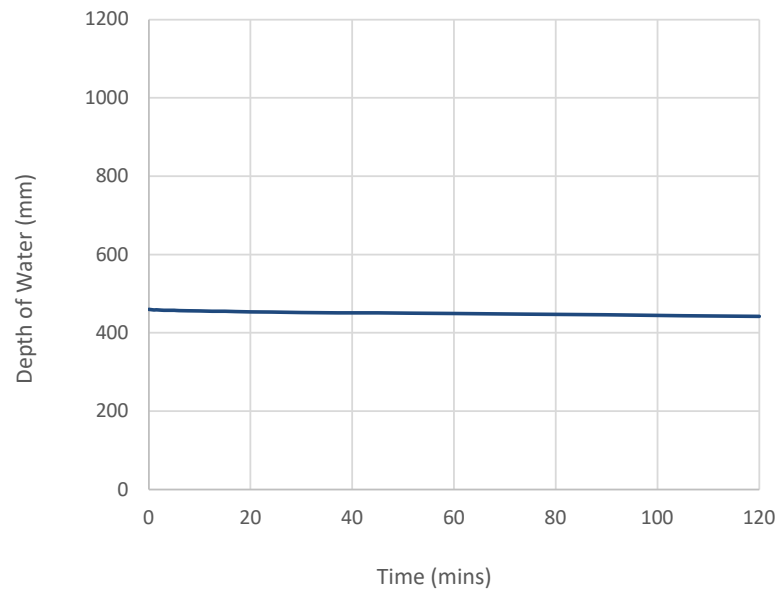
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1140
1	1141
2	1141
3	1142
5	1142
6	1143
10	1144
15	1145
20	1146
30	1148
45	1149
60	1150
90	1154
120	1158

SOIL PERCOLATION TEST

POSITION: SuDS101
TEST 2

Depth vs Time



Volume of Pit (m ³)	2.464
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.7084

Compliance Check:

Water Level at 75% effective depth (mm)	345
Water Level at 25% effective depth (mm)	115

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

Soil Infiltration Rate Calculation

Water Level 1	460
Water Level 2	442
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.02772

Discharge Area (m ²)	4.1558
----------------------------------	--------

Soil Infiltration Rate (m/min)	5.558E-05
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	9.26E-07
--------------------------------	----------

SOIL PERCOLATION TEST

Sheet 1 of 2

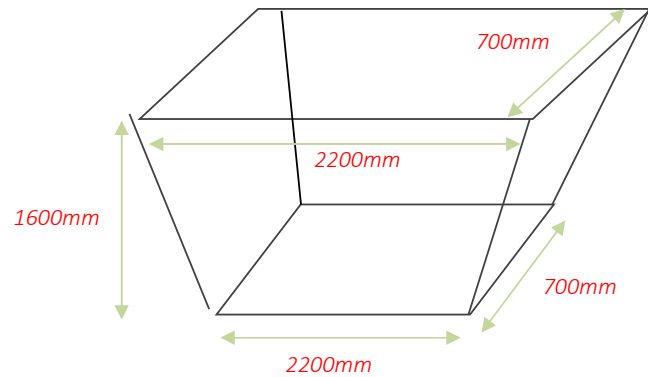
Date of Test: 18/07/2022

POSITION: SuDS101
TEST 3

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1600

Pit Details: Open with no stone filling

Groundwater Level: NGW

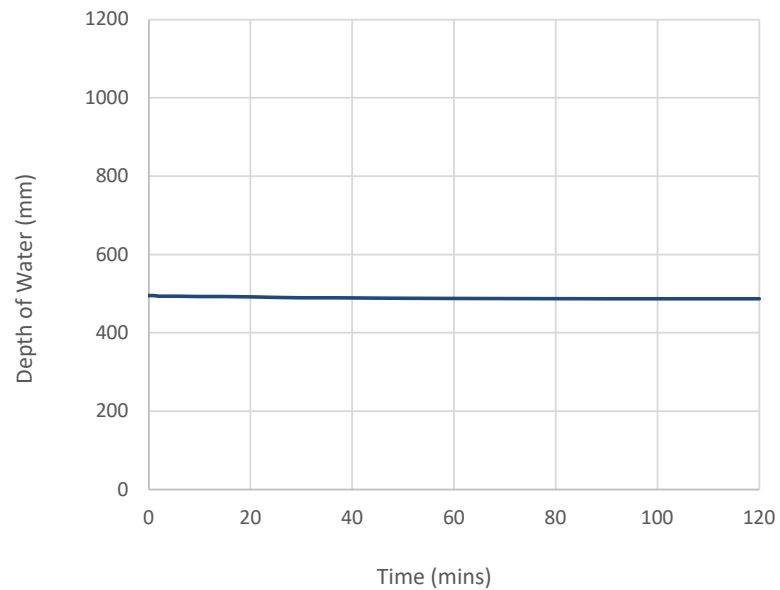
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1105
1	1105
2	1106
3	1106
5	1106
6	1106
10	1107
15	1107
20	1108
30	1110
45	1111
60	1112
90	1113
120	1113

SOIL PERCOLATION TEST

POSITION: SuDS101
TEST 3

Depth vs Time



Volume of Pit (m ³)	2.464
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.7623

Compliance Check:

Water Level at 75% effective depth (mm)	371.25
Water Level at 25% effective depth (mm)	123.75

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

Soil Infiltration Rate Calculation

Water Level 1	495
Water Level 2	487
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.01232

Discharge Area (m ²)	4.3878
----------------------------------	--------

Soil Infiltration Rate (m/min)	2.34E-05
--------------------------------	----------

Soil Infiltration Rate (m/sec)	3.90E-07
--------------------------------	----------

SOIL PERCOLATION TEST

Sheet 1 of 2

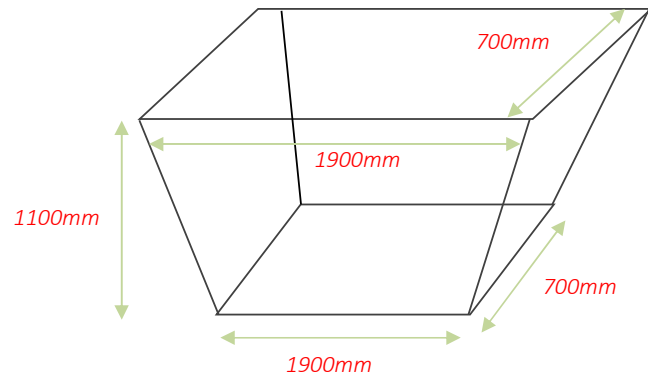
Date of Test: 18/07/2022

POSITION: SuDS102
TEST 1

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1100

Pit Details: Open with no stone filling

Groundwater Level: NGW

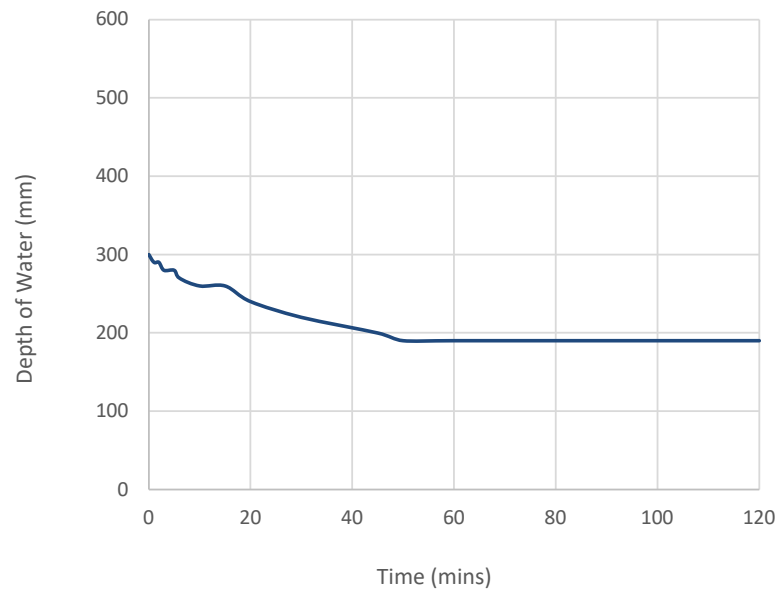
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	800
1	810
2	810
3	820
5	820
6	830
10	840
15	840
20	860
30	880
45	900
50	910
60	910
90	910
120	910

SOIL PERCOLATION TEST

POSITION: SuDS102
TEST 1

Depth vs Time



Volume of Pit (m ³)	1.463
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.399

Compliance Check:

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

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

Soil Infiltration Rate Calculation

Water Level 1	300
Water Level 2	190
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1463

Discharge Area (m ²)	2.604
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0004682
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	7.80E-06
--------------------------------	----------

SOIL PERCOLATION TEST

Sheet 1 of 2

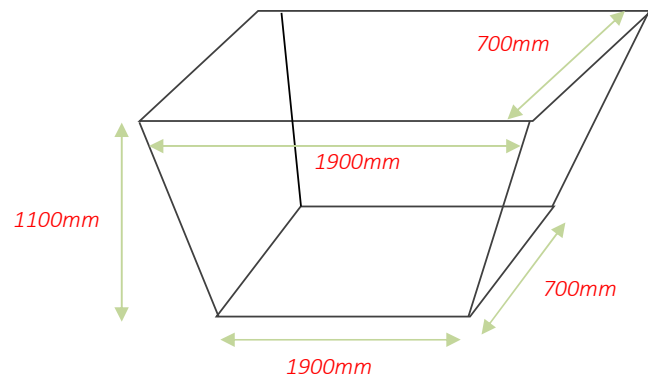
Date of Test: 18/07/2022

POSITION: SuDS102
TEST 2

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1100

Pit Details: Open with no stone filling

Groundwater Level: NGW

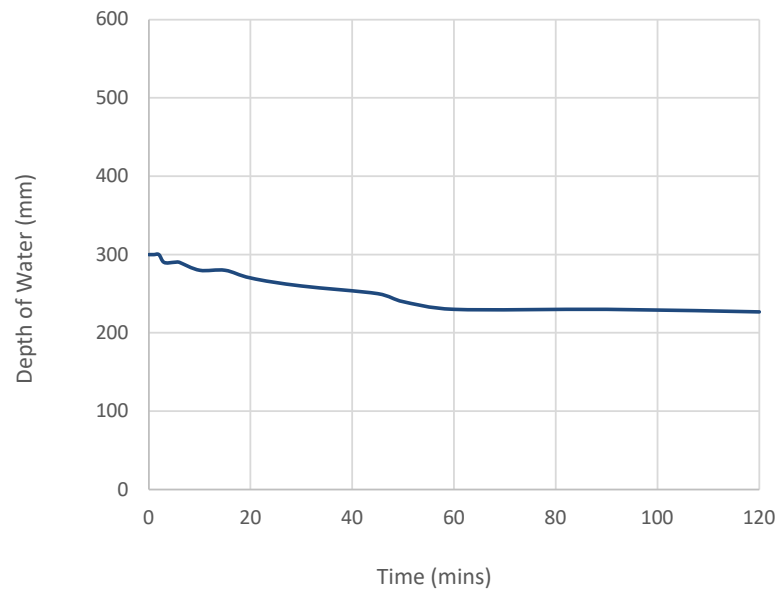
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	800
1	800
2	800
3	810
5	810
6	810
10	820
15	820
20	830
30	840
45	850
50	860
60	870
90	870
120	873

SOIL PERCOLATION TEST

POSITION: SuDS102
TEST 2

Depth vs Time



Volume of Pit (m ³)	1.463
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.399

Compliance Check:

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

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

Soil Infiltration Rate Calculation

Water Level 1	300
Water Level 2	227
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.09709

Discharge Area (m ²)	2.7002
----------------------------------	--------

Soil Infiltration Rate (m/min)	0.0002996
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	4.99E-06
--------------------------------	----------

SOIL PERCOLATION TEST

Sheet 1 of 2

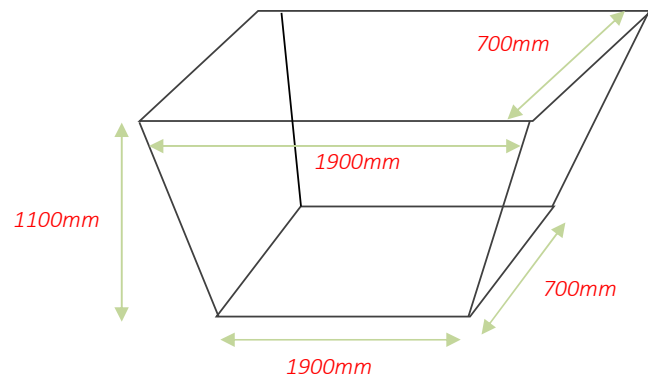
Date of Test: 18/07/2022

POSITION: SuDS102
TEST 3

Weather: Sunny

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1100

Pit Details: Open with no stone filling

Groundwater Level: NGW

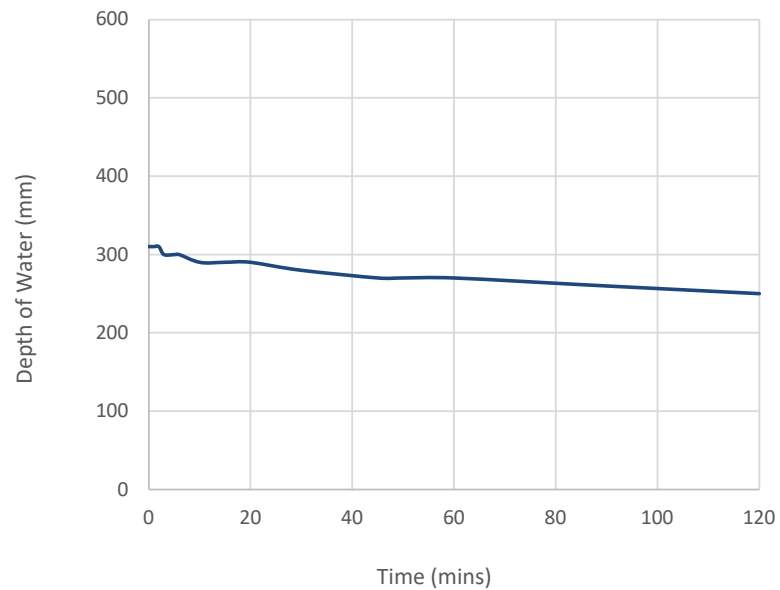
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	790
1	790
2	790
3	800
5	800
6	800
10	810
15	810
20	810
30	820
45	830
50	830
60	830
90	840
120	850

SOIL PERCOLATION TEST

POSITION: SuDS102
TEST 3

Depth vs Time



Volume of Pit (m ³)	1.463
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.4123

Compliance Check:

Water Level at 75% effective depth (mm)	232.5
Water Level at 25% effective depth (mm)	77.5

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

Soil Infiltration Rate Calculation

Water Level 1	310
Water Level 2	250
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.0798

Discharge Area (m ²)	2.786
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0002387
--------------------------------	-----------

Soil Infiltration Rate (m/sec)	3.98E-06
--------------------------------	----------

SOIL PERCOLATION TEST

Sheet 1 of 2

Date of Test: 18/07/2022

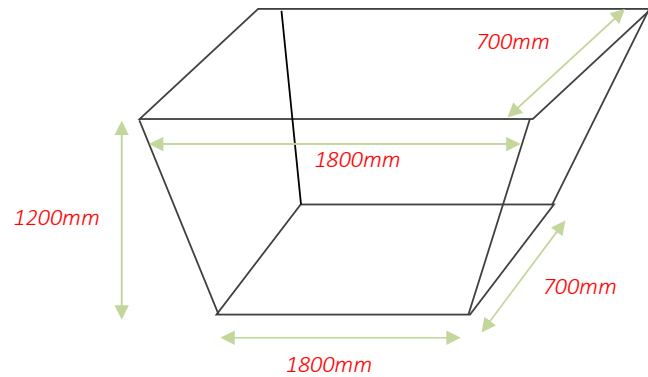
POSITION: SuDS103
TEST 1

Weather: Sunny, clear

Engineer: J Donohue

Checked:

Trial Pit Measurements



Pit Depth (mm): 1200

Pit Details: Open with no stone filling

Groundwater Level: NGW

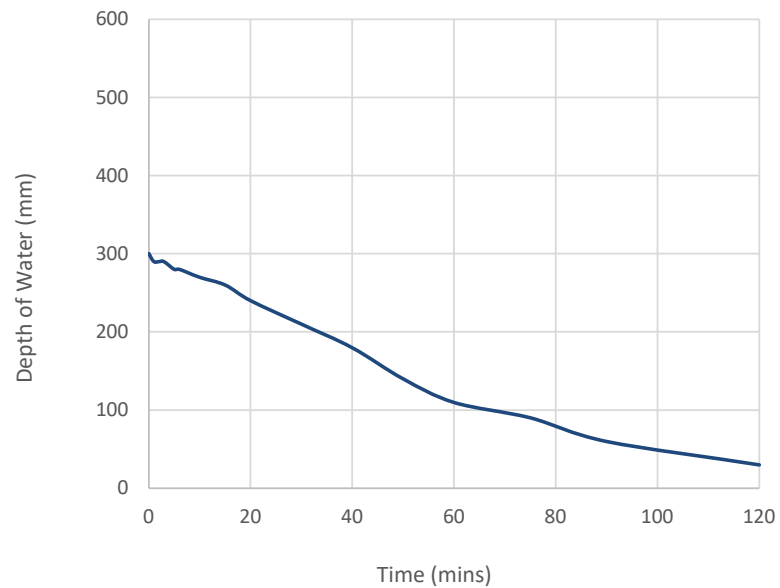
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	900
1	910
2	910
3	910
5	920
6	920
10	930
15	940
20	960
30	990
40	1020
50	1060
60	1090
75	1110
90	1140
120	1170

SOIL PERCOLATION TEST

POSITION: SuDS103
TEST 1

Depth vs Time



Volume of Pit (m ³)	1.512
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.378

Compliance Check:

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

Compliant with BRE 365

Soil Infiltration Rate Calculation

Water Level 1	225
Water Level 2	75
Time to Drain from Level 1 to Level 2 (mins)	47.5
Volume of water discharged (m ³)	0.189

Discharge Area (m ²)	2.01
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Soil Infiltration Rate (m/min)	0.0019796
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Soil Infiltration Rate (m/sec)	3.30E-05
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SOIL PERCOLATION TEST

Sheet 1 of 2

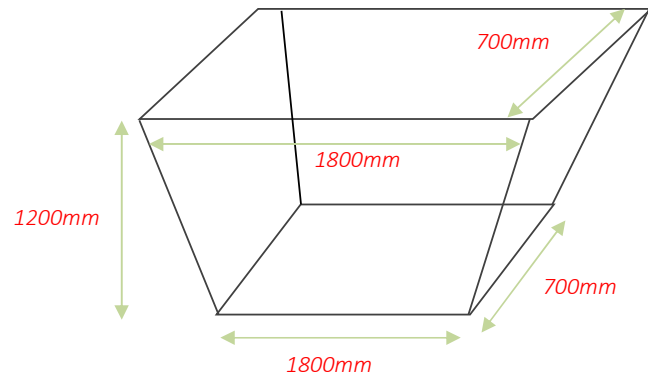
Date of Test: 18/07/2022

POSITION: SuDS103
Test 2

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1200

Pit Details: Open with no stone filling

Groundwater Level: NGW

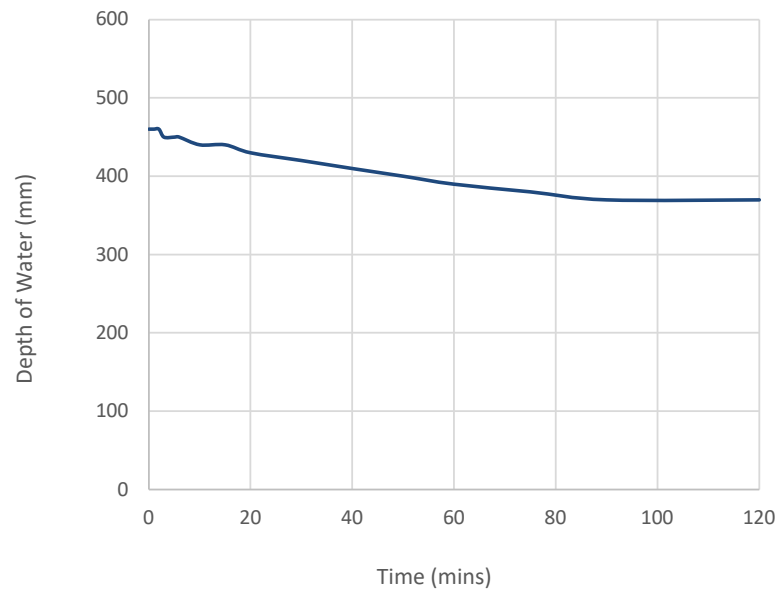
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	740
1	740
2	740
3	750
5	750
6	750
10	760
15	760
20	770
30	780
40	790
50	800
60	810
75	820
90	830
120	830

SOIL PERCOLATION TEST

POSITION: SuDS103
Test 2

Depth vs Time



Volume of Pit (m ³)	1.512
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.5796

Compliance Check:

Water Level at 75% effective depth (mm)	345
Water Level at 25% effective depth (mm)	115

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

Soil Infiltration Rate Calculation

Water Level 1	460
Water Level 2	370
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1134

Discharge Area (m ²)	3.335
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0002834
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Soil Infiltration Rate (m/sec)	4.72E-06
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SOIL PERCOLATION TEST

Sheet 1 of 2

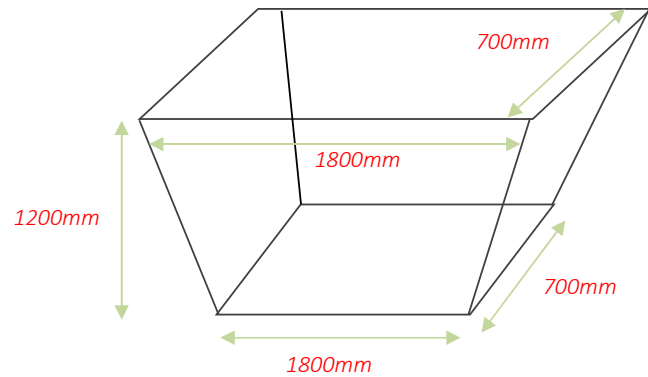
Date of Test: 18/07/2022

POSITION: SuDS103
Test 3

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 1200

Pit Details: Open with no stone filling

Groundwater Level: NGW

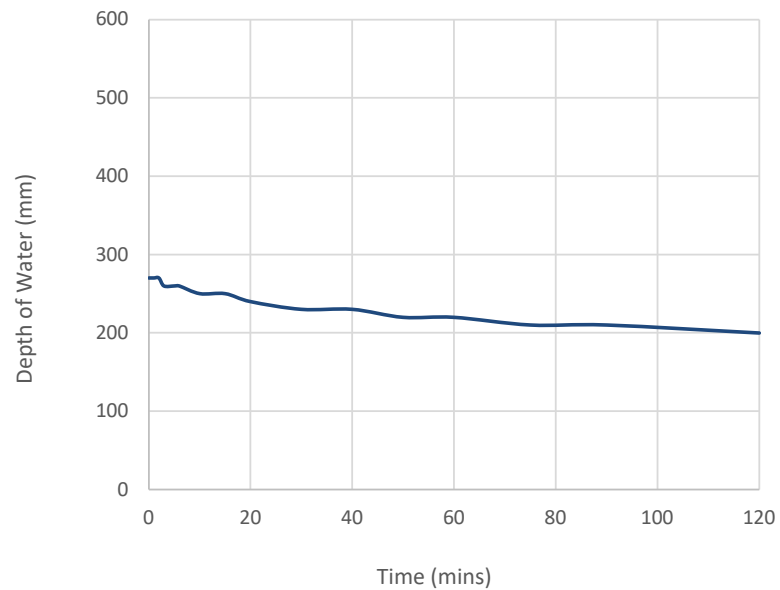
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	930
1	930
2	930
3	940
5	940
6	940
10	950
15	950
20	960
30	970
40	970
50	980
60	980
75	990
90	990
120	1000

SOIL PERCOLATION TEST

POSITION: SuDS103
Test 3

Depth vs Time



Volume of Pit (m ³)	1.512
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.3402

Compliance Check:

Water Level at 75% effective depth (mm)	202.5
Water Level at 25% effective depth (mm)	67.5

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

Soil Infiltration Rate Calculation

Water Level 1	270
Water Level 2	200
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.0882

Discharge Area (m ²)	2.435
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Soil Infiltration Rate (m/min)	0.0003018
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Soil Infiltration Rate (m/sec)	5.03E-06
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SOIL PERCOLATION TEST

Sheet 1 of 2

Date of Test: 19/07/2022

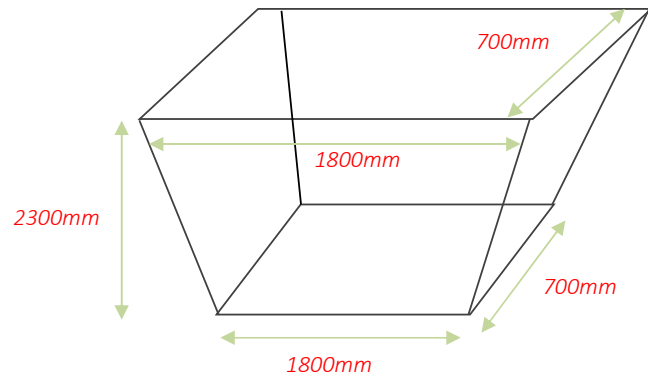
POSITION: SuDS104
Test 1

Weather: Sunny, clear

Engineer: J Donohue

Checked:

Trial Pit Measurements



Pit Depth (mm): 2300

Pit Details: Open with no stone filling

Groundwater Level: 2000

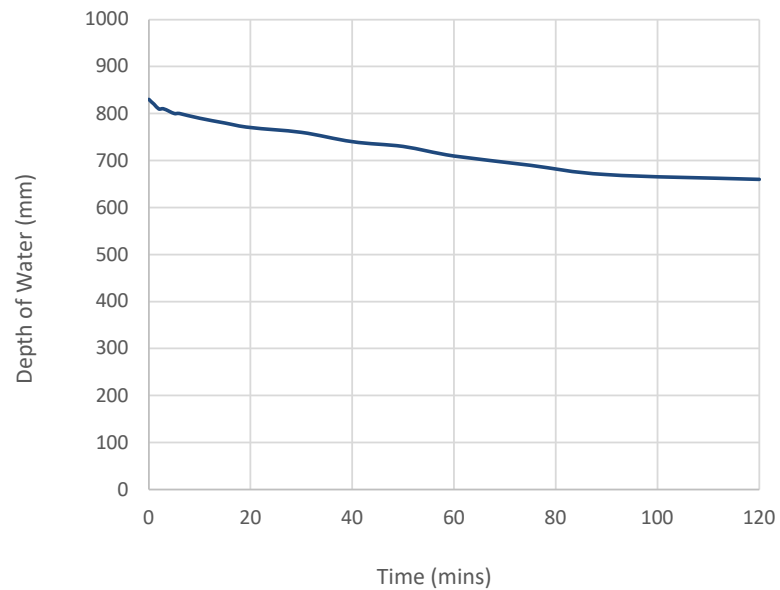
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1470
1	1480
2	1490
3	1490
5	1500
6	1500
10	1510
15	1520
20	1530
30	1540
40	1560
50	1570
60	1590
75	1610
90	1630
120	1640

SOIL PERCOLATION TEST

POSITION: SuDS104
Test 1

Depth vs Time



Volume of Pit (m ³)	2.898
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	1.0458

Compliance Check:

Water Level at 75% effective depth (mm)	622.5
Water Level at 25% effective depth (mm)	207.5

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

Soil Infiltration Rate Calculation

Water Level 1	830
Water Level 2	660
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.2142

Discharge Area (m ²)	4.985
----------------------------------	-------

Soil Infiltration Rate (m/min)	0.0003581
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Soil Infiltration Rate (m/sec)	5.97E-06
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SOIL PERCOLATION TEST

Sheet 1 of 2

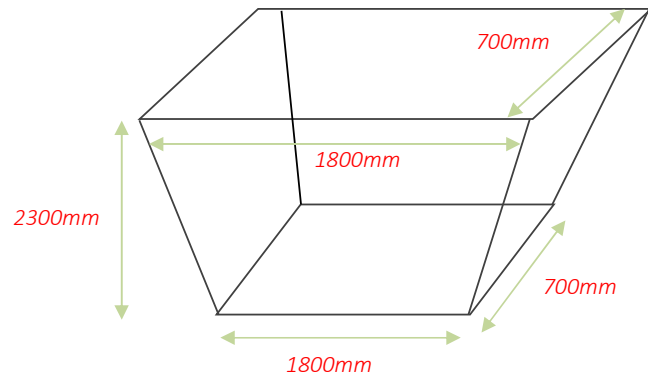
Date of Test: 19/07/2022

POSITION: SuDS104
Test 2

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2300

Pit Details: Open with no stone filling

Groundwater Level: 1970

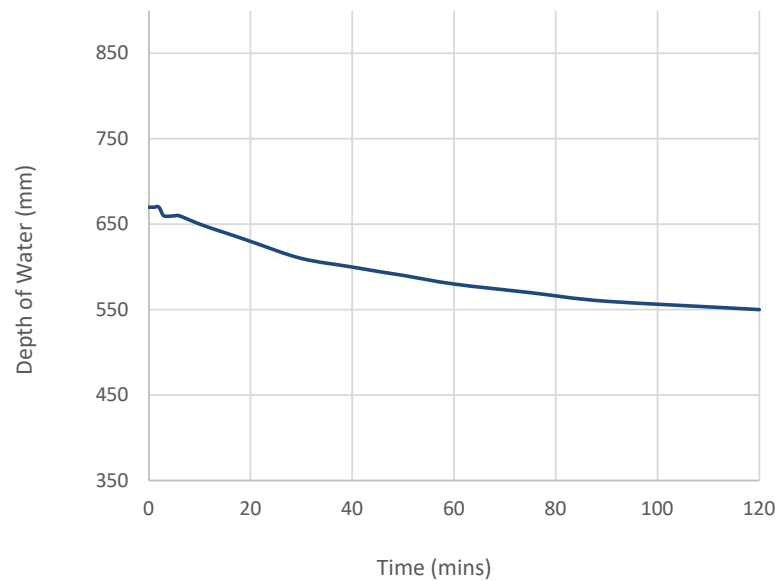
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1630
1	1630
2	1630
3	1640
5	1640
6	1640
10	1650
15	1660
20	1670
30	1690
40	1700
50	1710
60	1720
75	1730
90	1740
120	1750

SOIL PERCOLATION TEST

POSITION: SuDS104
Test 2

Depth vs Time



Volume of Pit (m ³)	2.898
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.8442

Compliance Check:

Water Level at 75% effective depth (mm)	502.5
Water Level at 25% effective depth (mm)	167.5

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

Soil Infiltration Rate Calculation

Water Level 1	670
Water Level 2	550
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1512

Discharge Area (m ²)	4.31
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Soil Infiltration Rate (m/min)	0.0002923
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Soil Infiltration Rate (m/sec)	4.87E-06
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SOIL PERCOLATION TEST

Sheet 1 of 2

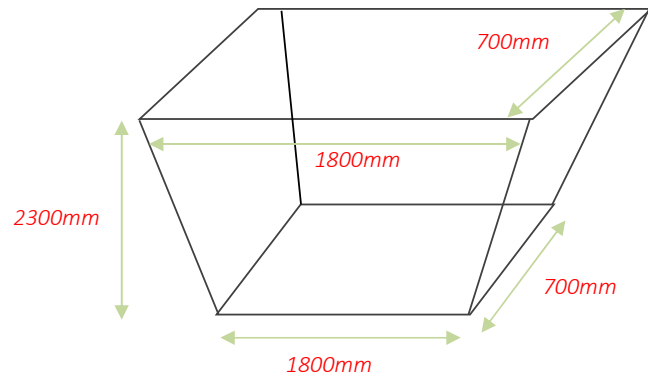
Date of Test: 19/07/2022

POSITION: SuDS104
Test 3

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2300

Pit Details: Open with no stone filling

Groundwater Level: 1968

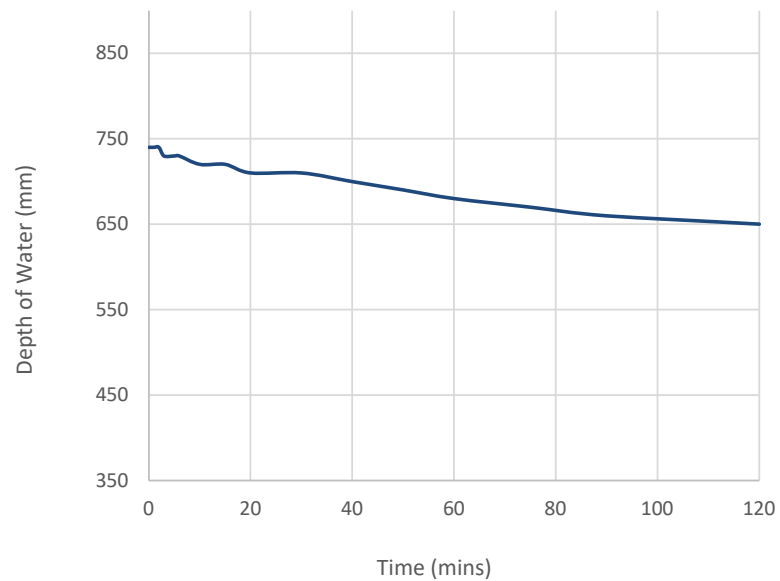
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1560
1	1560
2	1560
3	1570
5	1570
6	1570
10	1580
15	1580
20	1590
30	1590
40	1600
50	1610
60	1620
75	1630
90	1640
120	1650

SOIL PERCOLATION TEST

POSITION: SuDS104
Test 3

Depth vs Time



Volume of Pit (m ³)	2.898
Void Ratio of Infill	1
Volume of Infill (m ³)	N/A
Volume of Water in Pit (m ³)	0.9324

Compliance Check:

Water Level at 75% effective depth (mm)	555
Water Level at 25% effective depth (mm)	185

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

Soil Infiltration Rate Calculation

Water Level 1	740
Water Level 2	650
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1134

Discharge Area (m ²)	4.735
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Soil Infiltration Rate (m/min)	0.0001996
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Soil Infiltration Rate (m/sec)	3.33E-06
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SOIL PERCOLATION TEST

Sheet 1 of 2

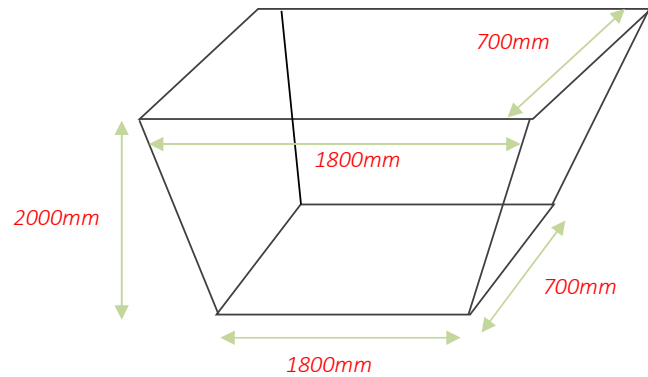
Date of Test: 19/07/2022

POSITION: SuDS105
Test 1

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2000

Pit Details: Open with no stone filling

Groundwater Level: 1900

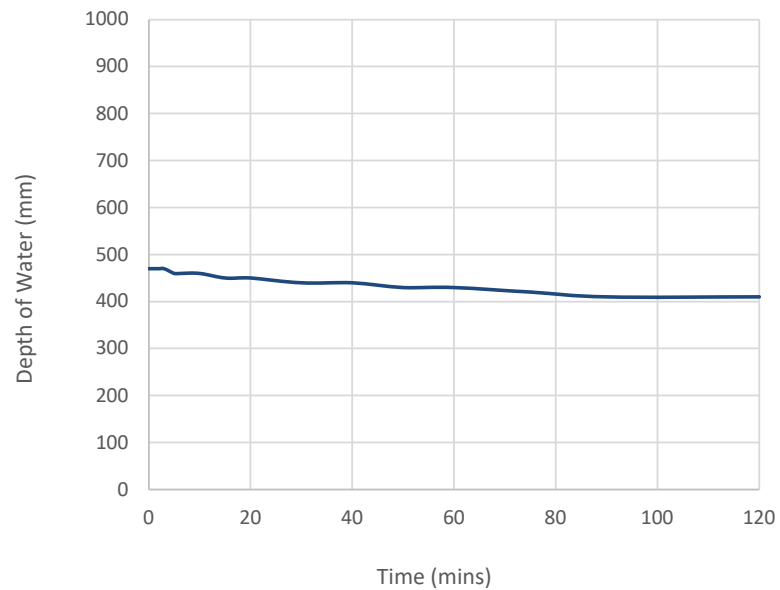
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1530
1	1530
2	1530
3	1530
5	1540
6	1540
10	1540
15	1550
20	1550
30	1560
40	1560
50	1570
60	1570
75	1580
90	1590
120	1590

SOIL PERCOLATION TEST

POSITION: SuDS105
Test 1

Depth vs Time



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)	0.5922

Compliance Check:

Water Level at 75% effective depth (mm)	352.5
Water Level at 25% effective depth (mm)	117.5

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

Soil Infiltration Rate Calculation

Water Level 1	470
Water Level 2	410
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.0756

Discharge Area (m ²)	3.46
----------------------------------	------

Soil Infiltration Rate (m/min)	0.0001821
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Soil Infiltration Rate (m/sec)	3.03E-06
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SOIL PERCOLATION TEST

Sheet 1 of 2

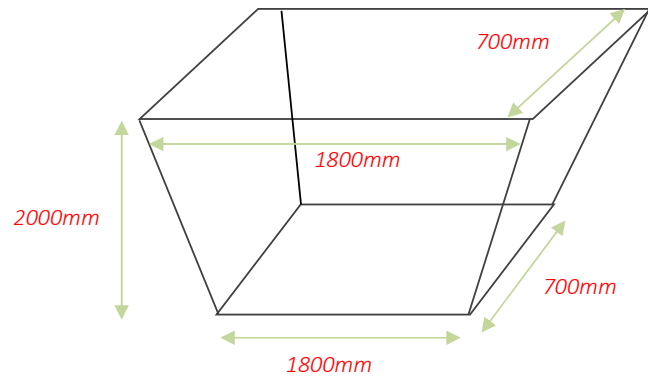
Date of Test: 19/07/2022

POSITION: SuDS105
Test 2

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2000

Pit Details: Open with no stone filling

Groundwater Level: 1900

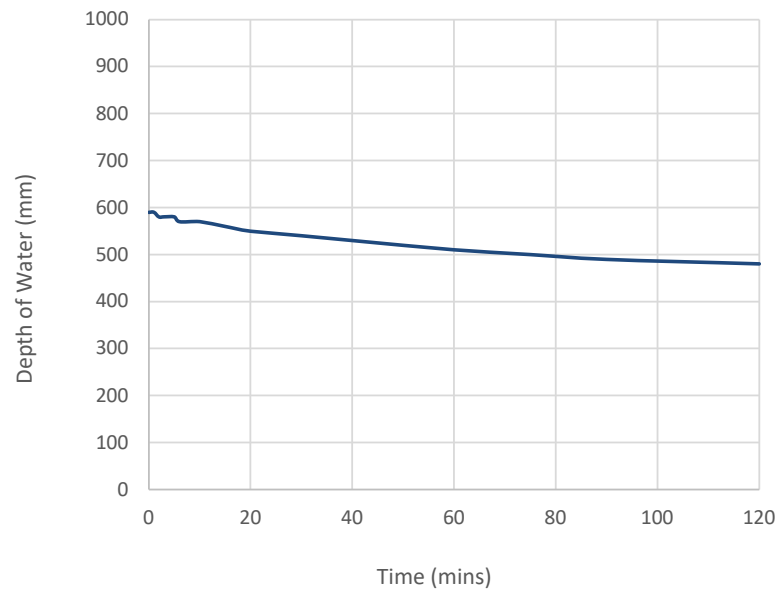
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1410
1	1410
2	1420
3	1420
5	1420
6	1430
10	1430
15	1440
20	1450
30	1460
40	1470
50	1480
60	1490
75	1500
90	1510
120	1520

SOIL PERCOLATION TEST

POSITION: SuDS105
Test 2

Depth vs Time



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)	0.7434

Compliance Check:

Water Level at 75% effective depth (mm)	442.5
Water Level at 25% effective depth (mm)	147.5

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

Soil Infiltration Rate Calculation

Water Level 1	590
Water Level 2	480
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.1386

Discharge Area (m ²)	3.935
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Soil Infiltration Rate (m/min)	0.0002935
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Soil Infiltration Rate (m/sec)	4.89E-06
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SOIL PERCOLATION TEST

Sheet 1 of 2

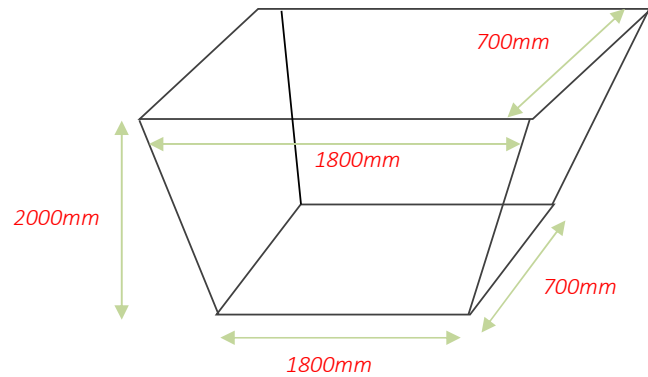
Date of Test: 19/07/2022

POSITION: SuDS105
Test 3

Weather: Sunny, clear

Engineer: J Donohue
Checked:

Trial Pit Measurements



Pit Depth (mm): 2000

Pit Details: Open with no stone filling

Groundwater Level: 1900

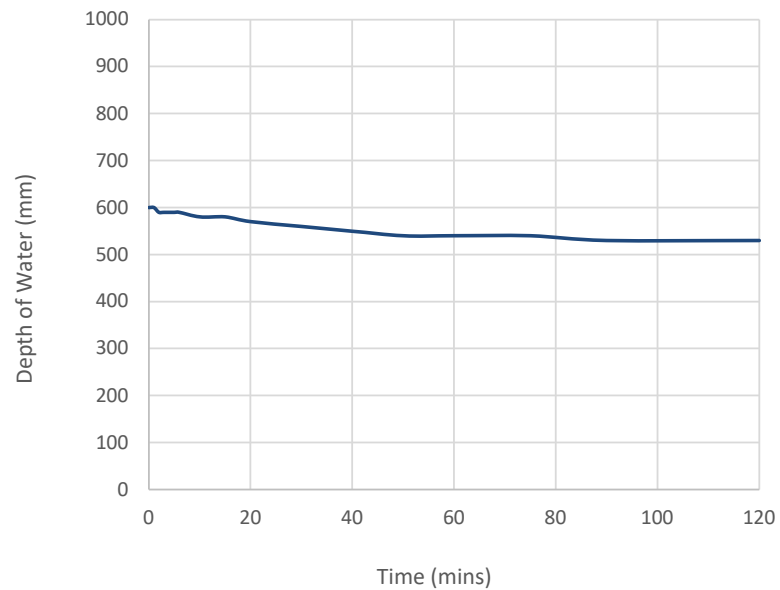
Test Data

Time Elapsed (mins)	Depth to Water Level (mm)
0	1400
1	1400
2	1410
3	1410
5	1410
6	1410
10	1420
15	1420
20	1430
30	1440
40	1450
50	1560
60	1460
75	1460
90	1470
120	1470

SOIL PERCOLATION TEST

POSITION: SuDS105
Test 3

Depth vs Time



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)	0.756

Compliance Check:

Water Level at 75% effective depth (mm)	450
Water Level at 25% effective depth (mm)	150

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

Soil Infiltration Rate Calculation

Water Level 1	600
Water Level 2	530
Time to Drain from Level 1 to Level 2 (mins)	120
Volume of water discharged (m ³)	0.0882

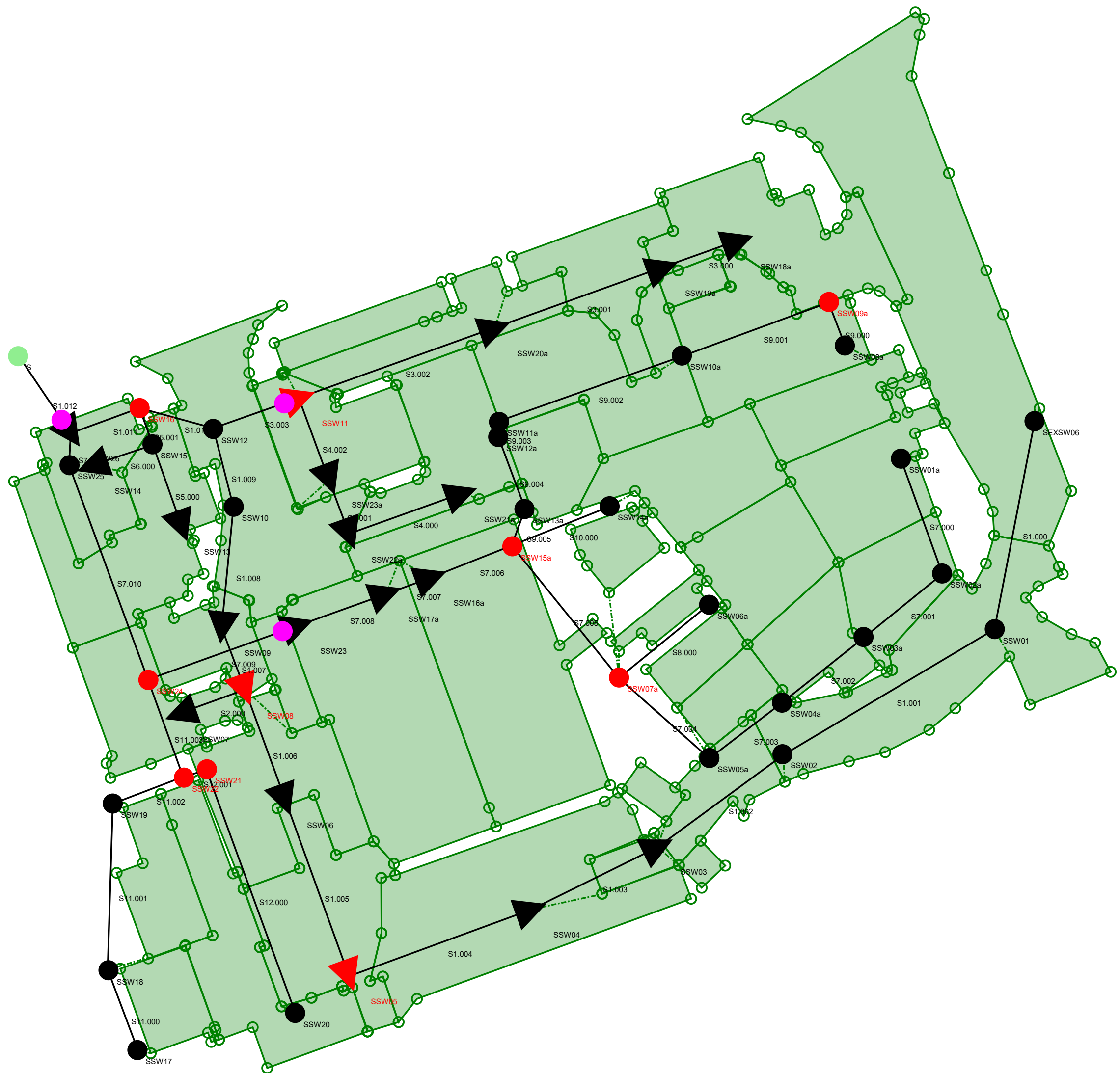
Discharge Area (m ²)	4.085
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Soil Infiltration Rate (m/min)	0.0001799
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Soil Infiltration Rate (m/sec)	3.00E-06
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PROPOSED DRAINAGE CALCULATIONS



Kennedy Redford Ltd		Page 1
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Proposed SW JD

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	40
Ratio R	0.315	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Proposed SW JD

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.748	4-8	0.633

Total Area Contributing (ha) = 1.381

Total Pipe Volume (m³) = 36.328

Network Design Table for Proposed SW JD

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	32.666	0.327	99.9	0.121	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	38.030	0.317	120.0	0.076	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	23.897	0.199	120.1	0.019	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	21.870	0.146	149.8	0.013	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	29.991	0.150	199.9	0.080	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	28.859	0.144	200.0	0.048	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.006	18.030	0.090	200.3	0.044	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	10.600	0.133	79.7	0.030	4.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	4.42	87.154	0.121	0.0	0.0	6.6	1.31	52.0	23.0
S1.001	50.00	4.95	86.827	0.197	0.0	0.0	10.7	1.19	47.4	37.4
S1.002	50.00	5.23	86.435	0.216	0.0	0.0	11.7	1.43	101.3	41.0
S1.003	50.00	5.51	86.236	0.230	0.0	0.0	12.4	1.28	90.6	43.5
S1.004	50.00	5.96	86.090	0.309	0.0	0.0	16.8	1.11	78.3	58.7
S1.005	50.00	6.39	85.940	0.357	0.0	0.0	19.3	1.11	78.3	67.7
S1.006	50.00	6.67	85.796	0.401	0.0	0.0	21.7	1.11	78.3	76.1
S2.000	50.00	4.16	86.830	0.030	0.0	0.0	1.6	1.13	19.9	5.8

Kennedy Redford Ltd		Page 2
20 Market Street Altrincham WS14 1PF	JD Sports Phase 2 Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Network Design Table for Proposed SW JD

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.007	10.259	0.051	200.0	0.009	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.008	18.756	0.094	200.0	0.021	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.009	12.407	0.062	200.0	0.066	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.000	12.337	0.154	80.1	0.049	4.00	0.0	0.600	o	150	Pipe/Conduit	
S3.001	27.489	0.275	100.0	0.033	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.002	32.017	0.267	119.9	0.029	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	18.466	0.386	47.8	0.037	4.00	0.0	0.600	o	150	Pipe/Conduit	
S4.001	8.993	0.112	80.3	0.014	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.002	13.406	0.168	79.8	0.033	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.003	14.179	0.142	100.0	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.010	11.794	0.059	200.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S5.000	13.407	0.168	79.8	0.051	4.00	0.0	0.600	o	150	Pipe/Conduit	
S6.000	9.851	0.248	39.7	0.026	4.00	0.0	0.600	o	150	Pipe/Conduit	
S5.001	5.941	0.059	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.011	11.320	0.185	61.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.000	18.823	0.235	80.0	0.035	4.00	0.0	0.600	o	150	Pipe/Conduit	
S7.001	15.584	0.156	99.9	0.024	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.007	50.00	6.82	85.706	0.441	0.0	0.0	23.9	1.11	78.3«	83.6
S1.008	50.00	7.10	85.655	0.462	0.0	0.0	25.0	1.11	78.3«	87.6
S1.009	50.00	7.26	85.486	0.528	0.0	0.0	28.6	1.28	141.1	100.1
S3.000	50.00	4.18	87.090	0.049	0.0	0.0	2.6	1.12	19.9	9.2
S3.001	50.00	4.64	86.936	0.081	0.0	0.0	4.4	1.01	17.8	15.4
S3.002	50.00	5.09	86.586	0.110	0.0	0.0	6.0	1.19	47.4	20.9
S4.000	50.00	4.21	87.060	0.037	0.0	0.0	2.0	1.46	25.8	7.1
S4.001	50.00	4.34	86.674	0.051	0.0	0.0	2.8	1.12	19.8	9.7
S4.002	50.00	4.54	86.562	0.085	0.0	0.0	4.6	1.13	19.9	16.0
S3.003	50.00	5.27	86.319	0.207	0.0	0.0	11.2	1.31	52.0	39.2
S1.010	50.00	7.42	85.424	0.735	0.0	0.0	39.8	1.28	141.1	139.3
S5.000	50.00	4.20	86.800	0.051	0.0	0.0	2.8	1.13	19.9	9.7
S6.000	50.00	4.10	86.880	0.026	0.0	0.0	1.4	1.60	28.3	4.9
S5.001	50.00	4.30	86.632	0.077	0.0	0.0	4.2	1.00	17.8	14.7
S1.011	50.00	7.50	85.365	0.812	0.0	0.0	44.0	2.32	256.2	154.0
S7.000	50.00	4.28	87.700	0.035	0.0	0.0	1.9	1.12	19.9	6.6
S7.001	50.00	4.54	87.465	0.059	0.0	0.0	3.2	1.01	17.8	11.2

Kennedy Redford Ltd		Page 3
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Network Design Table for Proposed SW JD

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S7.002	16.154	0.162	99.7	0.021	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.003	14.087	0.117	120.0	0.012	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.004	18.677	0.156	120.0	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.000	17.881	0.224	79.8	0.031	4.00	0.0	0.600	o	150	Pipe/Conduit	
S7.005	26.099	0.217	120.0	0.017	0.00	0.0	0.600	o	225	Pipe/Conduit	
S9.000	7.148	0.089	80.3	0.022	4.00	0.0	0.600	o	150	Pipe/Conduit	
S9.001	24.154	0.302	80.0	0.044	0.00	0.0	0.600	o	150	Pipe/Conduit	
S9.002	30.029	0.300	100.1	0.051	0.00	0.0	0.600	o	150	Pipe/Conduit	
S9.003	2.311	0.023	100.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S9.004	11.847	0.118	100.4	0.019	0.00	0.0	0.600	o	225	Pipe/Conduit	
S9.005	6.054	0.061	99.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.000	16.239	0.203	80.0	0.036	4.00	0.0	0.600	o	150	Pipe/Conduit	
S7.006	13.422	0.067	200.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S7.007	7.418	0.037	200.5	0.084	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.008	14.453	0.072	200.7	0.083	0.00	0.0	0.600	o	450	Pipe/Conduit	
S7.009	24.538	0.246	99.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S11.000	13.099	0.164	80.0	0.015	4.00	0.0	0.600	o	150	Pipe/Conduit	
S11.001	25.746	0.322	80.0	0.021	0.00	0.0	0.600	o	150	Pipe/Conduit	
S11.002	11.683	0.146	80.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S7.002	50.00	4.80	87.309	0.080	0.0	0.0	4.3	1.01	17.8	15.2
S7.003	50.00	5.06	87.147	0.093	0.0	0.0	5.0	0.92	16.2«	17.5
S7.004	50.00	5.40	87.030	0.103	0.0	0.0	5.6	0.92	16.2«	19.6
S8.000	50.00	4.26	87.690	0.031	0.0	0.0	1.7	1.13	19.9	5.9
S7.005	50.00	5.77	86.799	0.151	0.0	0.0	8.2	1.19	47.4	28.7
S9.000	50.00	4.11	87.550	0.022	0.0	0.0	1.2	1.12	19.8	4.1
S9.001	50.00	4.46	87.461	0.066	0.0	0.0	3.6	1.13	19.9	12.5
S9.002	50.00	4.96	87.159	0.117	0.0	0.0	6.3	1.00	17.7«	22.1
S9.003	50.00	5.00	86.859	0.117	0.0	0.0	6.3	1.00	17.7«	22.1
S9.004	50.00	5.15	86.761	0.135	0.0	0.0	7.3	1.30	51.9	25.7
S9.005	50.00	5.23	86.643	0.135	0.0	0.0	7.3	1.31	52.2	25.7
S10.000	50.00	4.24	87.690	0.036	0.0	0.0	2.0	1.12	19.9	6.8
S7.006	50.00	5.97	86.507	0.323	0.0	0.0	17.5	1.11	78.3	61.2
S7.007	50.00	6.06	86.365	0.407	0.0	0.0	22.0	1.28	140.9	77.1
S7.008	50.00	6.23	86.253	0.489	0.0	0.0	26.5	1.43	227.6	92.8
S7.009	50.00	6.55	86.181	0.489	0.0	0.0	26.5	1.31	52.1«	92.8
S11.000	50.00	4.19	87.560	0.015	0.0	0.0	0.8	1.12	19.9	2.8
S11.001	50.00	4.58	87.396	0.035	0.0	0.0	1.9	1.12	19.9	6.7
S11.002	50.00	4.75	87.071	0.035	0.0	0.0	1.9	1.12	19.9	6.7

Kennedy Redford Ltd		Page 4
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Network Design Table for Proposed SW JD

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S12.000	39.995	0.678	59.0	0.044	4.00	0.0	0.600	o	150	Pipe/Conduit	
S12.001	3.780	0.047	80.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S11.003	16.040	0.160	100.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.010	35.300	0.534	66.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.011	4.948	0.071	69.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.012	14.370	0.093	154.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S12.000	50.00	4.51	87.650	0.044	0.0	0.0	2.4	1.31	23.2	8.4
S12.001	50.00	4.56	86.972	0.044	0.0	0.0	2.4	1.12	19.8	8.4
S11.003	50.00	5.02	86.925	0.080	0.0	0.0	4.3	1.00	17.7	15.1
S7.010	50.00	6.91	85.935	0.569	0.0	0.0	30.8	1.61	64.1<	107.9
S7.011	50.00	6.95	85.251	0.569	0.0	0.0	30.8	2.17	240.0	107.9
S1.012	50.00	7.69	85.180	1.381	0.0	0.0	74.8	1.26	89.2<	261.9

Kennedy Redford Ltd		Page 5
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Manhole Schedules for Proposed SW JD

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SEXSW06	88.530	1.376	Open Manhole	1200	S1.000	87.154	225				
SSW01	88.060	1.233	Open Manhole	1200	S1.001	86.827	225	S1.000	86.827	225	
SSW02	88.070	1.635	Open Manhole	1200	S1.002	86.435	300	S1.001	86.510	225	
SSW03	88.180	1.944	Open Manhole	1200	S1.003	86.236	300	S1.002	86.236	300	
SSW04	88.140	2.050	Open Manhole	1200	S1.004	86.090	300	S1.003	86.090	300	
SSW05	88.100	2.160	Open Manhole	1200	S1.005	85.940	300	S1.004	85.940	300	
SSW06	88.130	2.334	Open Manhole	1200	S1.006	85.796	300	S1.005	85.796	300	
SSW07	88.250	1.420	Open Manhole	1200	S2.000	86.830	150				
SSW08	88.130	2.424	Open Manhole	1200	S1.007	85.706	300	S1.006	85.706	300	
								S2.000	86.697	150	841
SSW09	88.120	2.465	Open Manhole	1200	S1.008	85.655	300	S1.007	85.655	300	
SSW10	88.150	2.664	Open Manhole	1350	S1.009	85.486	375	S1.008	85.561	300	
SSW18a	88.440	1.350	Open Manhole	1200	S3.000	87.090	150				
SSW19a	88.440	1.504	Open Manhole	1200	S3.001	86.936	150	S3.000	86.936	150	
SSW20a	88.440	1.854	Open Manhole	1200	S3.002	86.586	225	S3.001	86.661	150	
SSW21a	88.410	1.350	Open Manhole	1200	S4.000	87.060	150				
SSW22a	88.410	1.736	Open Manhole	1200	S4.001	86.674	150	S4.000	86.674	150	
SSW23a	88.440	1.878	Open Manhole	1200	S4.002	86.562	150	S4.001	86.562	150	
SSW11	88.450	2.131	Open Manhole	1200	S3.003	86.319	225	S3.002	86.319	225	
								S4.002	86.394	150	
SSW12	88.270	2.846	Open Manhole	1350	S1.010	85.424	375	S1.009	85.424	375	
								S3.003	86.177	225	603
SSW13	88.200	1.400	Open Manhole	1200	S5.000	86.800	150				
SSW14	88.230	1.350	Open Manhole	1200	S6.000	86.880	150				
SSW15	88.180	1.548	Open Manhole	1200	S5.001	86.632	150	S5.000	86.632	150	
								S6.000	86.632	150	
SSW16	88.330	2.965	Open Manhole	1500	S1.011	85.365	375	S1.010	85.365	375	
								S5.001	86.573	150	983
SSW01a	88.450	0.750	Open Manhole	475	S7.000	87.700	150				
SSW02a	88.410	0.945	Open Manhole	475	S7.001	87.465	150	S7.000	87.465	150	
SSW03a	88.430	1.121	Open Manhole	475	S7.002	87.309	150	S7.001	87.309	150	
SSW04a	88.400	1.253	Open Manhole	475	S7.003	87.147	150	S7.002	87.147	150	
SSW05a	88.410	1.380	Open Manhole	475	S7.004	87.030	150	S7.003	87.030	150	
SSW06a	88.440	0.750	Open Manhole	475	S8.000	87.690	150				
SSW07a	88.390	1.591	Open Manhole	600	S7.005	86.799	225	S7.004	86.874	150	
								S8.000	87.466	150	592
SSW08a	88.470	0.920	Open Manhole	475	S9.000	87.550	150				
SSW09a	88.450	0.989	Open Manhole	475	S9.001	87.461	150	S9.000	87.461	150	
SSW10a	88.430	1.271	Open Manhole	475	S9.002	87.159	150	S9.001	87.159	150	
SSW11a	88.420	1.561	Open Manhole	475	S9.003	86.859	150	S9.002	86.859	150	
SSW12a	88.420	1.659	Open Manhole	600	S9.004	86.761	225	S9.003	86.836	150	
SSW13a	88.420	1.777	Open Manhole	600	S9.005	86.643	225	S9.004	86.643	225	
SSW14a	88.440	0.750	Open Manhole	475	S10.000	87.690	150				
SSW15a	88.410	1.903	Open Manhole	1200	S7.006	86.507	300	S7.005	86.582	225	

Kennedy Redford Ltd		Page 6
20 Market Street Altrincham WS14 1PF	JD Sports Phase 2 Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Manhole Schedules for Proposed SW JD

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
								S9.005	86.582	225	
								S10.000	87.487	150	830
SSW16a	88.350	1.985	Open Manhole	1350	S7.007	86.365	375	S7.006	86.440	300	
SSW17a	88.350	2.097	Open Manhole	1350	S7.008	86.253	450	S7.007	86.328	375	
SSW23	88.400	2.219	Open Manhole	1350	S7.009	86.181	225	S7.008	86.181	450	
SSW17	88.310	0.750	Open Manhole	475	S11.000	87.560	150				
SSW18	88.290	0.894	Open Manhole	475	S11.001	87.396	150	S11.000	87.396	150	
SSW19	88.340	1.269	Open Manhole	475	S11.002	87.071	150	S11.001	87.074	150	3
SSW20	88.310	0.660	Open Manhole	475	S12.000	87.650	150				
SSW21	88.330	1.358	Open Manhole	475	S12.001	86.972	150	S12.000	86.972	150	
SSW22	88.340	1.415	Open Manhole	475	S11.003	86.925	150	S11.002	86.925	150	
								S12.001	86.925	150	
SSW24	88.250	2.315	Open Manhole	1200	S7.010	85.935	225	S7.009	85.935	225	
								S11.003	86.765	150	755
SSW25	88.200	2.949	Open Manhole	1500	S7.011	85.251	375	S7.010	85.401	225	
SSW26	88.250	3.070	Open Manhole	2100	S1.012	85.180	300	S1.011	85.180	375	
								S7.011	85.180	375	
S	88.000	2.913	Open Manhole	0		OUTFALL		S1.012	85.087	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SEXSW06	381607.627	408691.352	381607.627	408691.352	Required	
SSW01	381601.485	408659.269	381601.485	408659.269	Required	
SSW02	381568.727	408639.950	381568.727	408639.950	Required	
SSW03	381549.549	408625.693	381549.549	408625.693	Required	
SSW04	381529.947	408615.995	381529.947	408615.995	Required	
SSW05	381501.752	408605.772	381501.752	408605.772	Required	
SSW06	381491.916	408632.903	381491.916	408632.903	Required	
SSW07	381475.812	408646.220	381475.812	408646.220	Required	
SSW08	381485.770	408649.853	381485.770	408649.853	Required	

Kennedy Redford Ltd		Page 7
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Manhole Schedules for Proposed SW JD

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SSW09	381482.247	408659.488	381482.247	408659.488	Required	
SSW10	381484.057	408678.157	381484.057	408678.157	Required	
SSW18a	381561.871	408719.123	381561.871	408719.123	Required	
SSW19a	381550.247	408714.991	381550.247	408714.991	Required	
SSW20a	381524.364	408705.731	381524.364	408705.731	Required	
SSW21a	381519.246	408680.133	381519.246	408680.133	Required	
SSW22a	381501.860	408673.910	381501.860	408673.910	Required	
SSW23a	381498.797	408682.366	381498.797	408682.366	Required	
SSW11	381494.212	408694.964	381494.212	408694.964	Required	
SSW12	381480.875	408690.149	381480.875	408690.149	Required	
SSW13	381476.026	408675.141	381476.026	408675.141	Required	
SSW14	381462.234	408684.466	381462.234	408684.466	Required	
SSW15	381471.515	408687.767	381471.515	408687.767	Required	
SSW16	381469.528	408693.365	381469.528	408693.365	Required	
SSW01a	381587.005	408685.558	381587.005	408685.558	Required	
SSW02a	381593.364	408667.842	381593.364	408667.842	Required	
SSW03a	381581.231	408658.060	381581.231	408658.060	Required	
SSW04a	381568.657	408647.919	381568.657	408647.919	Required	

Kennedy Redford Ltd		Page 8
20 Market Street Altrincham WS14 1PF	JD Sports Phase 2 Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Manhole Schedules for Proposed SW JD

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SSW05a	381557.461	408639.371	381557.461	408639.371	Required	
SSW06a	381557.408	408663.031	381557.408	408663.031	Required	
SSW07a	381543.507	408651.786	381543.507	408651.786	Required	
SSW08a	381578.351	408703.015	381578.351	408703.015	Required	
SSW09a	381575.911	408709.734	381575.911	408709.734	Required	
SSW10a	381553.209	408701.485	381553.209	408701.485	Required	
SSW11a	381524.985	408691.232	381524.985	408691.232	Required	
SSW12a	381524.852	408688.925	381524.852	408688.925	Required	
SSW13a	381528.921	408677.798	381528.921	408677.798	Required	
SSW14a	381542.063	408678.227	381542.063	408678.227	Required	
SSW15a	381527.048	408672.041	381527.048	408672.041	Required	
SSW16a	381514.507	408667.258	381514.507	408667.258	Required	
SSW17a	381507.534	408664.726	381507.534	408664.726	Required	
SSW23	381493.949	408659.793	381493.949	408659.793	Required	
SSW17	381469.193	408594.307	381469.193	408594.307	Required	
SSW18	381464.726	408606.620	381464.726	408606.620	Required	
SSW19	381465.385	408632.358	381465.385	408632.358	Required	
SSW20	381493.535	408600.027	381493.535	408600.027	Required	

Kennedy Redford Ltd		Page 9
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Manhole Schedules for Proposed SW JD

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SSW21	381479.919	408637.634	381479.919	408637.634	Required	
SSW22	381476.366	408636.345	381476.366	408636.345	Required	
SSW24	381470.885	408651.419	381470.885	408651.419	Required	
SSW25	381458.726	408684.559	381458.726	408684.559	Required	
SSW26	381458.887	408689.504	381458.887	408689.504	Required	
S	381450.797	408701.381			No Entry	

Free Flowing Outfall Details for Proposed SW JD

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S1.012	S	88.000	85.087	0.000	0	0
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Simulation Criteria for Proposed SW JD

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	3	Number of Storage Structures	20	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.298		

Kennedy Redford Ltd		Page 10
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Online Controls for Proposed SW JD

Hydro-Brake® Optimum Manhole: SSW11, DS/PN: S3.003, Volume (m³): 3.9

Unit Reference MD-SHE-0170-1700-2000-1700
Design Head (m) 2.000
Design Flow (l/s) 17.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 170
Invert Level (m) 86.319
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	17.0	Kick-Flo®	1.217	13.4
Flush-Flo™	0.576	17.0	Mean Flow over Head Range	-	14.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.0	0.800	16.6	2.000	17.0	4.000	23.7	7.000	31.0
0.200	14.2	1.000	15.8	2.200	17.8	4.500	25.0	7.500	32.0
0.300	15.8	1.200	13.7	2.400	18.5	5.000	26.3	8.000	33.0
0.400	16.6	1.400	14.3	2.600	19.3	5.500	27.6	8.500	34.0
0.500	16.9	1.600	15.3	3.000	20.6	6.000	28.7	9.000	35.0
0.600	17.0	1.800	16.2	3.500	22.2	6.500	29.9	9.500	35.9

Hydro-Brake® Optimum Manhole: SSW23, DS/PN: S7.009, Volume (m³): 5.3

Unit Reference MD-SHE-0205-2500-2000-2500
Design Head (m) 2.000
Design Flow (l/s) 25.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 205
Invert Level (m) 86.181
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	25.0	Kick-Flo®	1.253	20.0
Flush-Flo™	0.587	25.0	Mean Flow over Head Range	-	21.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.0	0.400	24.3	0.800	24.5	1.400	21.1	2.000	25.0
0.200	19.5	0.500	24.9	1.000	23.5	1.600	22.5	2.200	26.2
0.300	23.2	0.600	25.0	1.200	21.1	1.800	23.8	2.400	27.3

Kennedy Redford Ltd		Page 11
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Hydro-Brake® Optimum Manhole: SSW23, DS/PN: S7.009, Volume (m³): 5.3

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.600	28.3	4.000	34.9	5.500	40.6	7.000	45.7	8.500	50.2
3.000	30.4	4.500	36.9	6.000	42.4	7.500	47.2	9.000	51.6
3.500	32.7	5.000	38.8	6.500	44.1	8.000	48.7	9.500	53.0

Hydro-Brake® Optimum Manhole: SSW26, DS/PN: S1.012, Volume (m³): 12.0

Unit Reference	MD-SHE-0289-5790-2800-5790
Design Head (m)	2.800
Design Flow (l/s)	57.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	289
Invert Level (m)	85.180
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.800	57.9	Kick-Flo®	1.744	46.1
Flush-Flo™	0.814	57.9	Mean Flow over Head Range	-	50.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.0	0.800	57.9	2.000	49.2	4.000	68.8	7.000	90.3
0.200	29.7	1.000	57.5	2.200	51.5	4.500	72.9	7.500	93.4
0.300	49.5	1.200	56.3	2.400	53.7	5.000	76.7	8.000	96.4
0.400	53.2	1.400	54.3	2.600	55.9	5.500	80.3	8.500	99.3
0.500	55.6	1.600	50.6	3.000	59.9	6.000	83.8	9.000	102.1
0.600	57.0	1.800	46.8	3.500	64.5	6.500	87.1	9.500	104.8

Kennedy Redford Ltd		Page 12
20 Market Street Altrincham WS14 1PF	JD Sports Phase 2 Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Storage Structures for Proposed SW JD

Porous Car Park Manhole: SSW03, DS/PN: S1.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.1
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	14.0	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.700	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW04, DS/PN: S1.004

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	87.6
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	121.7	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.660	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW05, DS/PN: S1.005

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	17.8
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	24.7	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.620	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW06, DS/PN: S1.006

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	37.3
Membrane Percolation (mm/hr)	1000	Length (m)	6.0
Max Percolation (l/s)	62.2	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.650	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW07, DS/PN: S2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	27.8	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.770	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW08, DS/PN: S1.007

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	17.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	23.6	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.650	Membrane Depth (mm)	130

Kennedy Redford Ltd		Page 13
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Porous Car Park Manhole: SSW09, DS/PN: S1.008

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	12.5
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	34.7	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.640	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW18a, DS/PN: S3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	24.0
Membrane Percolation (mm/hr)	1000	Length (m)	6.0
Max Percolation (l/s)	40.0	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.090	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW19a, DS/PN: S3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	32.7
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	43.6	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.970	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW20a, DS/PN: S3.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.5
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	10.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.960	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW21a, DS/PN: S4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.8
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	27.7	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.930	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW22a, DS/PN: S4.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	6.0
Max Percolation (l/s)	33.3	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.930	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW23a, DS/PN: S4.002

Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	87.960
Membrane Percolation (mm/hr)	1000	Width (m)	45.2
Max Percolation (l/s)	60.3	Length (m)	4.8
Safety Factor	2.0	Slope (1:X)	100.0
Porosity	0.30	Depression Storage (mm)	5

Kennedy Redford Ltd		Page 14
20 Market Street Altrincham WS14 1PF	JD Sports Phase 2 Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Porous Car Park Manhole: SSW23a, DS/PN: S4.002

Evaporation (mm/day) 3 Membrane Depth (mm) 130

Porous Car Park Manhole: SSW11, DS/PN: S3.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	24.9
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	33.2	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.970	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW13, DS/PN: S5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	37.2
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	51.7	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.720	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW14, DS/PN: S6.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	22.5
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	31.3	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.750	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW16a, DS/PN: S7.007

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	13.7
Membrane Percolation (mm/hr)	1000	Length (m)	36.5
Max Percolation (l/s)	138.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.870	Membrane Depth (mm)	130

Porous Car Park Manhole: SSW17a, DS/PN: S7.008

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	13.7
Membrane Percolation (mm/hr)	1000	Length (m)	36.5
Max Percolation (l/s)	138.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	87.870	Membrane Depth (mm)	130

Cellular Storage Manhole: SSW23, DS/PN: S7.009

Invert Level (m)	86.166	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	50.0	50.0	1.000	50.0	78.3	1.001	0.0	78.3

Kennedy Redford Ltd		Page 15
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

Cellular Storage Manhole: SSW26, DS/PN: S1.012

Invert Level (m) 85.251 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	63.7	0.0	1.500	63.7	0.0	1.501	0.0	0.0

Kennedy Redford Ltd		Page 16
20 Market Street Altrincham WS14 1PF	JD Sports Phase 2 Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed SW JD

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 20 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.303 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged	
	Name	Storm							Level (m)	Depth (m)
S1.000	SEXSW06	15 Winter	2	+0%	100/15 Summer				87.255	-0.124
S1.001	SSW01	15 Winter	2	+0%	30/15 Summer	100/15 Summer			86.963	-0.089
S1.002	SSW02	15 Winter	2	+0%	100/15 Summer				86.558	-0.177
S1.003	SSW03	15 Winter	2	+0%	30/15 Summer				86.372	-0.164
S1.004	SSW04	15 Winter	2	+0%	30/15 Summer				86.260	-0.130
S1.005	SSW05	15 Winter	2	+0%	30/15 Summer				86.122	-0.118
S1.006	SSW06	15 Winter	2	+0%	30/15 Summer				85.994	-0.102
S2.000	SSW07	15 Winter	2	+0%	100/15 Winter				86.884	-0.096
S1.007	SSW08	15 Winter	2	+0%	30/15 Summer				85.927	-0.079
S1.008	SSW09	15 Winter	2	+0%	30/15 Summer				85.865	-0.090
S1.009	SSW10	60 Winter	2	+0%	30/15 Summer				85.834	-0.027
S3.000	SSW18a	15 Winter	2	+0%	30/15 Summer				87.154	-0.086
S3.001	SSW19a	15 Winter	2	+0%	30/15 Summer				87.025	-0.061
S3.002	SSW20a	30 Winter	2	+0%	30/15 Summer				86.793	-0.018
S4.000	SSW21a	15 Summer	2	+0%	30/15 Summer				87.112	-0.098
S4.001	SSW22a	30 Winter	2	+0%	30/15 Summer				86.803	-0.021
S4.002	SSW23a	30 Winter	2	+0%	2/15 Winter				86.792	0.080
S3.003	SSW11	30 Winter	2	+0%	2/15 Summer				86.768	0.224
S1.010	SSW12	60 Winter	2	+0%	2/30 Winter				85.824	0.025
S5.000	SSW13	15 Winter	2	+0%	30/15 Summer				86.872	-0.078
S6.000	SSW14	15 Summer	2	+0%	100/15 Summer				86.922	-0.108
S5.001	SSW15	15 Summer	2	+0%	30/15 Summer				86.745	-0.037
S1.011	SSW16	60 Winter	2	+0%	2/30 Winter				85.811	0.071
S7.000	SSW01a	15 Winter	2	+0%	30/15 Summer	100/15 Summer			87.757	-0.093
S7.001	SSW02a	15 Winter	2	+0%	30/15 Summer	100/15 Summer			87.544	-0.071
S7.002	SSW03a	15 Winter	2	+0%	30/15 Summer	100/30 Winter			87.404	-0.055
S7.003	SSW04a	15 Winter	2	+0%	30/15 Summer	100/30 Winter			87.258	-0.039
S7.004	SSW05a	15 Winter	2	+0%	30/15 Summer				87.147	-0.033
S8.000	SSW06a	15 Winter	2	+0%	100/15 Summer				87.744	-0.096

Kennedy Redford Ltd		Page 17
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed SW
JD

PN	US/MH Name	Flooded		Half Drain		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)		
S1.000	SEXSW06	0.000	0.41			20.1	OK	
S1.001	SSW01	0.000	0.66			29.7	OK	6
S1.002	SSW02	0.000	0.35			31.9	OK	
S1.003	SSW03	0.000	0.42		5	33.3	OK	
S1.004	SSW04	0.000	0.60		6	42.6	OK	
S1.005	SSW05	0.000	0.67		5	47.4	OK	
S1.006	SSW06	0.000	0.76		5	51.0	OK	
S2.000	SSW07	0.000	0.29		6	5.1	OK	
S1.007	SSW08	0.000	0.89		6	54.4	OK	
S1.008	SSW09	0.000	0.83		7	56.1	OK	
S1.009	SSW10	0.000	0.40			43.2	OK	
S3.000	SSW18a	0.000	0.38		5	6.9	OK	
S3.001	SSW19a	0.000	0.64		7	10.9	OK	
S3.002	SSW20a	0.000	0.28		5	12.4	OK	
S4.000	SSW21a	0.000	0.26		5	6.3	OK	
S4.001	SSW22a	0.000	0.35		4	6.2	OK	
S4.002	SSW23a	0.000	0.51		5	9.3	SURCHARGED	
S3.003	SSW11	0.000	0.37		7	16.8	SURCHARGED	
S1.010	SSW12	0.000	0.53			57.3	SURCHARGED	
S5.000	SSW13	0.000	0.47		6	8.6	OK	
S6.000	SSW14	0.000	0.17		5	4.4	OK	
S5.001	SSW15	0.000	0.89			13.2	OK	
S1.011	SSW16	0.000	0.36			61.1	SURCHARGED	
S7.000	SSW01a	0.000	0.31			5.8	OK	7
S7.001	SSW02a	0.000	0.54			8.9	OK	8
S7.002	SSW03a	0.000	0.71			11.7	OK	1
S7.003	SSW04a	0.000	0.90			13.4	OK	
S7.004	SSW05a	0.000	0.96			14.5	OK	
S8.000	SSW06a	0.000	0.28			5.2	OK	

Kennedy Redford Ltd		Page 18
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed SW
JD

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
S7.005	SSW07a	15	Winter	2	+0%	30/30	Summer		86.910	-0.114
S9.000	SSW08a	15	Winter	2	+0%	30/15	Summer	100/15	87.597	-0.103
S9.001	SSW09a	15	Winter	2	+0%	30/15	Summer	100/15	87.537	-0.074
S9.002	SSW10a	15	Winter	2	+0%	30/15	Summer	100/15	87.294	-0.015
S9.003	SSW11a	15	Winter	2	+0%	2/15	Summer		87.041	0.032
S9.004	SSW12a	15	Winter	2	+0%	30/15	Winter		86.860	-0.126
S9.005	SSW13a	15	Winter	2	+0%	30/15	Summer		86.757	-0.111
S10.000	SSW14a	15	Summer	2	+0%	100/15	Summer		87.749	-0.091
S7.006	SSW15a	15	Winter	2	+0%	30/15	Summer		86.690	-0.117
S7.007	SSW16a	30	Winter	2	+0%	30/15	Summer		86.571	-0.169
S7.008	SSW17a	30	Winter	2	+0%	30/15	Summer		86.565	-0.138
S7.009	SSW23	30	Winter	2	+0%	2/15	Summer		86.556	0.150
S11.000	SSW17	15	Winter	2	+0%	100/15	Summer		87.597	-0.113
S11.001	SSW18	15	Winter	2	+0%	100/15	Summer		87.449	-0.097
S11.002	SSW19	15	Winter	2	+0%	30/15	Summer		87.126	-0.095
S12.000	SSW20	15	Winter	2	+0%	100/15	Summer		87.709	-0.091
S12.001	SSW21	15	Winter	2	+0%	30/15	Summer		87.051	-0.071
S11.003	SSW22	15	Winter	2	+0%	30/15	Summer		87.024	-0.051
S7.010	SSW24	30	Winter	2	+0%	30/15	Winter		86.050	-0.110
S7.011	SSW25	60	Winter	2	+0%	2/15	Winter		85.803	0.177
S1.012	SSW26	60	Winter	2	+0%	2/15	Summer		85.797	0.317

PN	US/MH Name	Flooded		Half Drain		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)		
S7.005	SSW07a	0.000	0.48			21.2	OK	
S9.000	SSW08a	0.000	0.21			3.6	OK	6
S9.001	SSW09a	0.000	0.50			9.4	OK	8
S9.002	SSW10a	0.000	0.91			15.5	OK	6
S9.003	SSW11a	0.000	1.44			15.6	SURCHARGED	
S9.004	SSW12a	0.000	0.40			17.8	OK	
S9.005	SSW13a	0.000	0.51			17.8	OK	
S10.000	SSW14a	0.000	0.33			6.0	OK	
S7.006	SSW15a	0.000	0.68			43.8	OK	
S7.007	SSW16a	0.000	0.50		9	47.7	OK	
S7.008	SSW17a	0.000	0.33		11	55.7	OK	
S7.009	SSW23	0.000	0.50		15	24.1	SURCHARGED	
S11.000	SSW17	0.000	0.14			2.5	OK	
S11.001	SSW18	0.000	0.27			5.1	OK	
S11.002	SSW19	0.000	0.29			5.1	OK	
S12.000	SSW20	0.000	0.32			7.3	OK	
S12.001	SSW21	0.000	0.53			7.2	OK	
S11.003	SSW22	0.000	0.75			12.4	OK	
S7.010	SSW24	0.000	0.52			31.3	OK	
S7.011	SSW25	0.000	0.26			27.6	SURCHARGED	
S1.012	SSW26	0.000	0.77		22	57.1	SURCHARGED	

Kennedy Redford Ltd		Page 19
20 Market Street Altrincham WS14 1PF	JD Sports Phase 2 Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed SW JD

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 20 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.303 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SEXSW06	15 Winter	30	+0%	100/15 Summer				87.369	-0.010
S1.001	SSW01	15 Winter	30	+0%	30/15 Summer	100/15 Summer			87.199	0.147
S1.002	SSW02	120 Winter	30	+0%	100/15 Summer				86.727	-0.008
S1.003	SSW03	120 Winter	30	+0%	30/15 Summer				86.718	0.182
S1.004	SSW04	120 Winter	30	+0%	30/15 Summer				86.708	0.318
S1.005	SSW05	120 Winter	30	+0%	30/15 Summer				86.694	0.454
S1.006	SSW06	120 Winter	30	+0%	30/15 Summer				86.678	0.582
S2.000	SSW07	15 Summer	30	+0%	100/15 Winter				86.908	-0.072
S1.007	SSW08	60 Winter	30	+0%	30/15 Summer				86.666	0.660
S1.008	SSW09	60 Winter	30	+0%	30/15 Summer				86.658	0.703
S1.009	SSW10	60 Winter	30	+0%	30/15 Summer				86.647	0.786
S3.000	SSW18a	30 Winter	30	+0%	30/15 Summer				87.363	0.123
S3.001	SSW19a	30 Winter	30	+0%	30/15 Summer				87.396	0.310
S3.002	SSW20a	30 Winter	30	+0%	30/15 Summer				87.456	0.645
S4.000	SSW21a	30 Winter	30	+0%	30/15 Summer				87.612	0.402
S4.001	SSW22a	30 Winter	30	+0%	30/15 Summer				87.584	0.760
S4.002	SSW23a	30 Winter	30	+0%	2/15 Winter				87.557	0.845
S3.003	SSW11	30 Winter	30	+0%	2/15 Summer				87.461	0.917
S1.010	SSW12	60 Winter	30	+0%	2/30 Winter				86.641	0.842
S5.000	SSW13	15 Winter	30	+0%	30/15 Summer				86.990	0.040
S6.000	SSW14	15 Winter	30	+0%	100/15 Summer				86.939	-0.091
S5.001	SSW15	15 Winter	30	+0%	30/15 Summer				86.865	0.083
S1.011	SSW16	60 Winter	30	+0%	2/30 Winter				86.629	0.889
S7.000	SSW01a	15 Winter	30	+0%	30/15 Summer	100/15 Summer			88.037	0.187
S7.001	SSW02a	15 Winter	30	+0%	30/15 Summer	100/15 Summer			87.993	0.378
S7.002	SSW03a	15 Winter	30	+0%	30/15 Summer	100/30 Winter			87.883	0.424
S7.003	SSW04a	15 Winter	30	+0%	30/15 Summer	100/30 Winter			87.671	0.374
S7.004	SSW05a	15 Winter	30	+0%	30/15 Summer				87.419	0.239
S8.000	SSW06a	15 Winter	30	+0%	100/15 Summer				87.767	-0.073

Kennedy Redford Ltd		Page 20
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed SW JD

PN	US/MH Name	Flooded		Flow / Cap.	Overflow (l/s)	Half Drain		Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m³)	Flow			Time (mins)				
S1.000	SEXSW06	0.000	0.73					35.7	OK	
S1.001	SSW01	0.000	1.21					54.2	SURCHARGED	6
S1.002	SSW02	0.000	0.26					23.5	OK	
S1.003	SSW03	0.000	0.31			28		24.9	SURCHARGED	
S1.004	SSW04	0.000	0.47			36		33.2	SURCHARGED	
S1.005	SSW05	0.000	0.51			42		36.4	SURCHARGED	
S1.006	SSW06	0.000	0.55			48		37.3	SURCHARGED	
S2.000	SSW07	0.000	0.54			5	9.6		OK	
S1.007	SSW08	0.000	0.95			38		58.4	SURCHARGED	
S1.008	SSW09	0.000	0.88			39		59.5	SURCHARGED	
S1.009	SSW10	0.000	0.62					66.7	SURCHARGED	
S3.000	SSW18a	0.000	0.72			12		13.0	SURCHARGED	
S3.001	SSW19a	0.000	0.82			19		13.9	SURCHARGED	
S3.002	SSW20a	0.000	0.34			20		15.0	SURCHARGED	
S4.000	SSW21a	0.000	0.35			8	8.5		SURCHARGED	
S4.001	SSW22a	0.000	0.51			15		8.8	SURCHARGED	
S4.002	SSW23a	0.000	0.75			17		13.6	SURCHARGED	
S3.003	SSW11	0.000	0.37			26		17.0	SURCHARGED	
S1.010	SSW12	0.000	0.75					80.5	SURCHARGED	
S5.000	SSW13	0.000	0.83			3	15.2		SURCHARGED	
S6.000	SSW14	0.000	0.33			5	8.2		OK	
S5.001	SSW15	0.000	1.57					23.2	SURCHARGED	
S1.011	SSW16	0.000	0.54					91.4	SURCHARGED	
S7.000	SSW01a	0.000	0.55					10.2	SURCHARGED	7
S7.001	SSW02a	0.000	0.84					13.8	SURCHARGED	8
S7.002	SSW03a	0.000	1.13					18.7	SURCHARGED	1
S7.003	SSW04a	0.000	1.45					21.5	SURCHARGED	
S7.004	SSW05a	0.000	1.58					24.0	SURCHARGED	
S8.000	SSW06a	0.000	0.53					9.8	OK	

Kennedy Redford Ltd		Page 21
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed SW JD

PN	US/MH		Return Period	Climate Change	First (X)		First (Y)		First (Z)		Overflow Act.	Water Level	Surcharged Depth
	Name	Storm			Surcharge	Summer	Flood	Summer	Overflow	Summer		(m)	(m)
S7.005	SSW07a	60	Winter	30	+0%	30/30	Summer					87.255	0.231
S9.000	SSW08a	15	Winter	30	+0%	30/15	Summer	100/15	Summer			88.190	0.490
S9.001	SSW09a	15	Winter	30	+0%	30/15	Summer	100/15	Summer			88.176	0.565
S9.002	SSW10a	15	Winter	30	+0%	30/15	Summer	100/15	Summer			87.973	0.664
S9.003	SSW11a	60	Winter	30	+0%	2/15	Summer					87.260	0.251
S9.004	SSW12a	60	Winter	30	+0%	30/15	Winter					87.254	0.268
S9.005	SSW13a	60	Winter	30	+0%	30/15	Summer					87.243	0.375
S10.000	SSW14a	15	Winter	30	+0%	100/15	Summer					87.775	-0.065
S7.006	SSW15a	60	Winter	30	+0%	30/15	Summer					87.237	0.430
S7.007	SSW16a	60	Winter	30	+0%	30/15	Summer					87.223	0.483
S7.008	SSW17a	60	Winter	30	+0%	30/15	Summer					87.217	0.514
S7.009	SSW23	60	Winter	30	+0%	2/15	Summer					87.208	0.802
S11.000	SSW17	15	Winter	30	+0%	100/15	Summer					87.612	-0.098
S11.001	SSW18	15	Winter	30	+0%	100/15	Summer					87.479	-0.067
S11.002	SSW19	15	Winter	30	+0%	30/15	Summer					87.267	0.046
S12.000	SSW20	15	Winter	30	+0%	100/15	Summer					87.736	-0.064
S12.001	SSW21	15	Winter	30	+0%	30/15	Summer					87.261	0.139
S11.003	SSW22	15	Winter	30	+0%	30/15	Summer					87.221	0.146
S7.010	SSW24	60	Winter	30	+0%	30/15	Winter					86.713	0.553
S7.011	SSW25	60	Winter	30	+0%	2/15	Winter					86.622	0.996
S1.012	SSW26	60	Winter	30	+0%	2/15	Summer					86.616	1.136

PN	US/MH Name	Flooded		Half Drain		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)		
S7.005	SSW07a	0.000	0.55			24.3	SURCHARGED	
S9.000	SSW08a	0.000	0.31			5.3	FLOOD RISK	6
S9.001	SSW09a	0.000	0.83			15.6	FLOOD RISK	8
S9.002	SSW10a	0.000	1.61			27.4	SURCHARGED	6
S9.003	SSW11a	0.000	1.75			18.9	SURCHARGED	
S9.004	SSW12a	0.000	0.48			21.4	SURCHARGED	
S9.005	SSW13a	0.000	0.57			20.0	SURCHARGED	
S10.000	SSW14a	0.000	0.62			11.4	OK	
S7.006	SSW15a	0.000	0.72			46.5	SURCHARGED	
S7.007	SSW16a	0.000	0.59		35	56.9	SURCHARGED	
S7.008	SSW17a	0.000	0.40		38	68.2	SURCHARGED	
S7.009	SSW23	0.000	0.52		37	24.9	SURCHARGED	
S11.000	SSW17	0.000	0.26			4.7	OK	
S11.001	SSW18	0.000	0.59			11.1	OK	
S11.002	SSW19	0.000	0.56			10.1	SURCHARGED	
S12.000	SSW20	0.000	0.61			13.8	OK	
S12.001	SSW21	0.000	0.95			12.9	SURCHARGED	
S11.003	SSW22	0.000	1.39			22.8	SURCHARGED	
S7.010	SSW24	0.000	0.63			37.8	SURCHARGED	
S7.011	SSW25	0.000	0.31			33.3	SURCHARGED	
S1.012	SSW26	0.000	0.78		38	57.8	SURCHARGED	

Kennedy Redford Ltd		Page 22
20 Market Street Altrincham WS14 1PF	JD Sports Phase 2 Proposed SW	
Date 17/02/2023 File PROPOSED SURFACE JD SPORTS.MDX	Designed by RB Checked by PV	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed SW JD

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 20 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.303 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SEXSW06	15 Winter	100	+40%	100/15 Summer				88.525	1.146
S1.001	SSW01	30 Winter	100	+40%	30/15 Summer	100/15 Summer			88.068	1.016
S1.002	SSW02	120 Winter	100	+40%	100/15 Summer				87.959	1.224
S1.003	SSW03	120 Winter	100	+40%	30/15 Summer				87.945	1.409
S1.004	SSW04	120 Winter	100	+40%	30/15 Summer				87.932	1.542
S1.005	SSW05	120 Winter	100	+40%	30/15 Summer				87.914	1.674
S1.006	SSW06	120 Winter	100	+40%	30/15 Summer				87.894	1.798
S2.000	SSW07	120 Winter	100	+40%	100/15 Winter				87.880	0.900
S1.007	SSW08	120 Winter	100	+40%	30/15 Summer				87.876	1.870
S1.008	SSW09	120 Winter	100	+40%	30/15 Summer				87.863	1.908
S1.009	SSW10	120 Winter	100	+40%	30/15 Summer				87.842	1.981
S3.000	SSW18a	120 Winter	100	+40%	30/15 Summer				87.980	0.740
S3.001	SSW19a	120 Winter	100	+40%	30/15 Summer				87.974	0.888
S3.002	SSW20a	15 Winter	100	+40%	30/15 Summer				87.963	1.152
S4.000	SSW21a	30 Winter	100	+40%	30/15 Summer				88.068	0.858
S4.001	SSW22a	30 Winter	100	+40%	30/15 Summer				88.033	1.209
S4.002	SSW23a	30 Winter	100	+40%	2/15 Winter				88.003	1.291
S3.003	SSW11	15 Winter	100	+40%	2/15 Summer				87.955	1.411
S1.010	SSW12	120 Winter	100	+40%	2/30 Winter				87.832	2.033
S5.000	SSW13	120 Winter	100	+40%	30/15 Summer				87.832	0.882
S6.000	SSW14	120 Winter	100	+40%	100/15 Summer				87.827	0.797
S5.001	SSW15	120 Winter	100	+40%	30/15 Summer				87.824	1.042
S1.011	SSW16	120 Winter	100	+40%	2/30 Winter				87.818	2.078
S7.000	SSW01a	15 Winter	100	+40%	30/15 Summer	100/15 Summer			88.452	0.602
S7.001	SSW02a	60 Winter	100	+40%	30/15 Summer	100/15 Summer			88.416	0.801
S7.002	SSW03a	30 Winter	100	+40%	30/15 Summer	100/30 Winter			88.430	0.971
S7.003	SSW04a	30 Winter	100	+40%	30/15 Summer	100/30 Winter			88.396	1.099
S7.004	SSW05a	30 Winter	100	+40%	30/15 Summer				88.316	1.136
S8.000	SSW06a	120 Winter	100	+40%	100/15 Summer				88.206	0.366

Kennedy Redford Ltd		Page 23
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed
SW JD

PN	US/MH Name	Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m³)	Flow						
S1.000	SEXSW06	0.000	1.12				54.6	FLOOD RISK	
S1.001	SSW01	7.613	1.28				57.4	FLOOD	6
S1.002	SSW02	0.000	0.40				35.8	FLOOD RISK	
S1.003	SSW03	0.000	0.42			69	33.5	FLOOD RISK	
S1.004	SSW04	0.000	0.63			53	44.6	FLOOD RISK	
S1.005	SSW05	0.000	0.72			65	51.3	FLOOD RISK	
S1.006	SSW06	0.000	0.86			50	57.7	FLOOD RISK	
S2.000	SSW07	0.000	0.34			36	6.0	SURCHARGED	
S1.007	SSW08	0.000	1.00			56	61.4	FLOOD RISK	
S1.008	SSW09	0.000	0.94			51	63.8	FLOOD RISK	
S1.009	SSW10	0.000	0.69				74.4	SURCHARGED	
S3.000	SSW18a	0.000	0.66			70	11.8	SURCHARGED	
S3.001	SSW19a	0.000	0.73			83	12.4	SURCHARGED	
S3.002	SSW20a	0.000	0.43			38	19.0	SURCHARGED	
S4.000	SSW21a	0.000	0.41			13	9.8	SURCHARGED	
S4.001	SSW22a	0.000	0.68			13	11.8	SURCHARGED	
S4.002	SSW23a	0.000	0.93			17	16.9	SURCHARGED	
S3.003	SSW11	0.000	0.37				16.9	SURCHARGED	
S1.010	SSW12	0.000	0.83				89.5	SURCHARGED	
S5.000	SSW13	0.000	0.57			33	10.3	SURCHARGED	
S6.000	SSW14	0.000	0.21			31	5.2	SURCHARGED	
S5.001	SSW15	0.000	1.00				14.8	SURCHARGED	
S1.011	SSW16	0.000	0.60				101.2	SURCHARGED	
S7.000	SSW01a	2.057	0.57				10.7	FLOOD	7
S7.001	SSW02a	5.680	0.73				12.0	FLOOD	8
S7.002	SSW03a	0.070	1.22				20.1	FLOOD	1
S7.003	SSW04a	0.017	1.56				23.2	FLOOD	
S7.004	SSW05a	0.000	1.75				26.5	FLOOD RISK	
S8.000	SSW06a	0.000	0.32				6.0	FLOOD RISK	

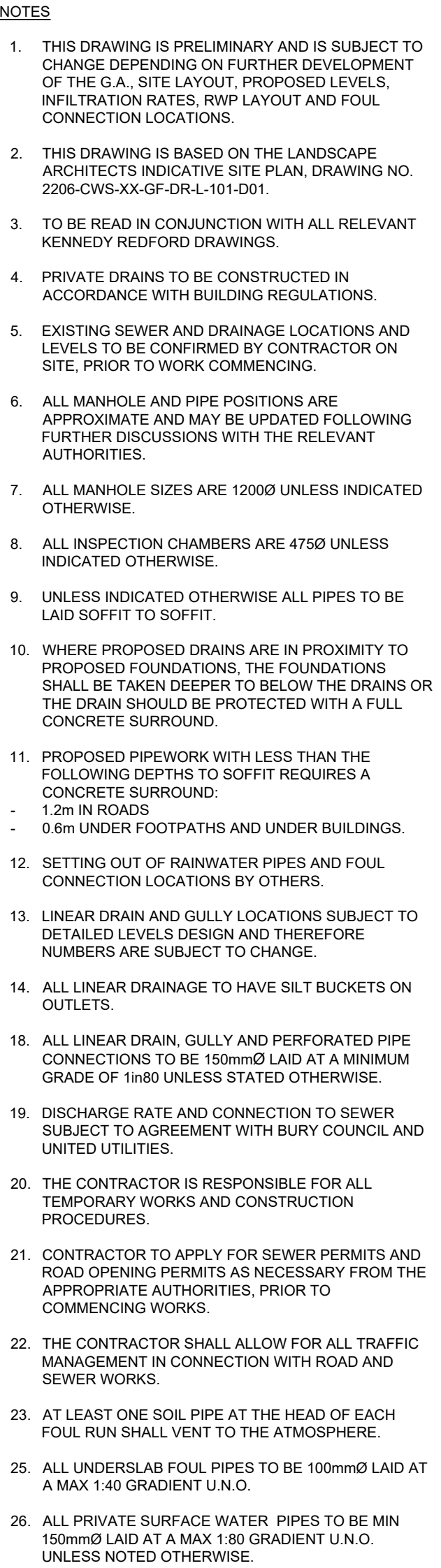
Kennedy Redford Ltd		Page 24
20 Market Street	JD Sports	
Altrincham	Phase 2	
WS14 1PF	Proposed SW	
Date 17/02/2023	Designed by RB	
File PROPOSED SURFACE JD SPORTS.MDX	Checked by PV	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Proposed
SW JD

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
S7.005	SSW07a	120 Winter	100	+40%	30/30 Summer				88.199	1.175
S9.000	SSW08a	15 Winter	100	+40%	30/15 Summer	100/15 Summer			88.471	0.771
S9.001	SSW09a	30 Winter	100	+40%	30/15 Summer	100/15 Summer			88.458	0.847
S9.002	SSW10a	30 Winter	100	+40%	30/15 Summer	100/15 Summer			88.431	1.122
S9.003	SSW11a	120 Winter	100	+40%	2/15 Summer				88.236	1.227
S9.004	SSW12a	120 Winter	100	+40%	30/15 Winter				88.201	1.215
S9.005	SSW13a	120 Winter	100	+40%	30/15 Summer				88.183	1.315
S10.000	SSW14a	120 Winter	100	+40%	100/15 Summer				88.179	0.339
S7.006	SSW15a	120 Winter	100	+40%	30/15 Summer				88.172	1.365
S7.007	SSW16a	120 Winter	100	+40%	30/15 Summer				88.156	1.416
S7.008	SSW17a	120 Winter	100	+40%	30/15 Summer				88.153	1.450
S7.009	SSW23	120 Winter	100	+40%	2/15 Summer				88.196	1.790
S11.000	SSW17	60 Winter	100	+40%	100/15 Summer				88.014	0.304
S11.001	SSW18	60 Winter	100	+40%	100/15 Summer				88.004	0.458
S11.002	SSW19	60 Winter	100	+40%	30/15 Summer				87.971	0.750
S12.000	SSW20	15 Winter	100	+40%	100/15 Summer				88.235	0.435
S12.001	SSW21	60 Winter	100	+40%	30/15 Summer				87.961	0.839
S11.003	SSW22	60 Winter	100	+40%	30/15 Summer				87.949	0.874
S7.010	SSW24	120 Winter	100	+40%	30/15 Winter				87.887	1.727
S7.011	SSW25	120 Winter	100	+40%	2/15 Winter				87.809	2.183
S1.012	SSW26	120 Winter	100	+40%	2/15 Summer				87.804	2.324

PN	US/MH Name	Flooded		Half Drain		Pipe		Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	
S7.005	SSW07a	0.000	0.56			24.7	FLOOD RISK	
S9.000	SSW08a	0.977	0.43			7.4	FLOOD	6
S9.001	SSW09a	8.212	0.76			14.4	FLOOD	8
S9.002	SSW10a	0.825	1.79			30.5	FLOOD	6
S9.003	SSW11a	0.000	1.61			17.5	FLOOD RISK	
S9.004	SSW12a	0.000	0.47			21.0	FLOOD RISK	
S9.005	SSW13a	0.000	0.60			20.9	FLOOD RISK	
S10.000	SSW14a	0.000	0.38			7.0	FLOOD RISK	
S7.006	SSW15a	0.000	0.81			51.9	FLOOD RISK	
S7.007	SSW16a	0.000	0.64		59	61.4	FLOOD RISK	
S7.008	SSW17a	0.000	0.44		58	74.4	FLOOD RISK	
S7.009	SSW23	0.000	0.52		128	24.9	FLOOD RISK	
S11.000	SSW17	0.000	0.25			4.6	FLOOD RISK	
S11.001	SSW18	0.000	0.58			11.0	FLOOD RISK	
S11.002	SSW19	0.000	0.60			10.7	SURCHARGED	
S12.000	SSW20	0.000	0.89			20.1	FLOOD RISK	
S12.001	SSW21	0.000	0.99			13.5	SURCHARGED	
S11.003	SSW22	0.000	1.47			24.2	SURCHARGED	
S7.010	SSW24	0.000	0.64			38.6	SURCHARGED	
S7.011	SSW25	0.000	0.34			36.3	SURCHARGED	
S1.012	SSW26	0.000	0.78		143	57.8	SURCHARGED	

PROPOSED DRAINAGE LAYOUT



P05	17.02.23	DRAINAGE UPDATED, OUTFALLS REALIGNED TO SURVEY INFO	MM	P.V	R.M
P04	31.01.23	SURFACE WATER OUTFALL AND ATTENUATION TANK REVIEWED	MM	P.V	R.M
P03	23.12.22	FOUL POP-UPS AND RWP ADDED TO CRECHE BUILDING	MM	P.V	R.M
P02	13.10.22	STRATEGY UPDATED	R.B	P.V	R.M
P01	10.05.22	PRELIMINARY ISSUE	R.B	D.B	R.M
REV	DATE	DESCRIPTION	DRN	CHK	APPR

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CLIENT
JD SPORTS PLC

PROJECT NAME
JD SPORTS OFFICE BURY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT
PHASE 1

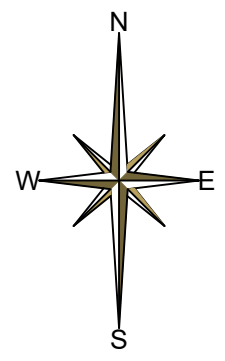
DATE	SCALE	SHEET SIZE	REV
10.05.22	1:250	A0	P05
DRAWING STATUS			

S1 - ISSUED FOR INFORMATION

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

KEY

- EXISTING SURFACE WATER SEWER
- EXISTING COMBINED WATER SEWER
- EXISTING SURFACE WATER DRAIN
- PROPOSED SURFACE WATER DRAIN
- PROPOSED FOUL WATER DRAIN
- PROPOSED SUMP MANHOLE
- PROPOSED FLOW CONTROL
- PROPOSED POLYPROPYLENE INSPECTION CHAMBER
- PROPOSED CAR PARKING POROUS PAVING & PERFORATED COLLECTION PIPE
- PROPOSED MUGA POROUS PAVING
- PROPOSED GEOCELLULAR ATTENUATION TANK
- EXISTING GULLY
- PROPOSED LINEAR DRAIN
- PROPOSED GULLY



IT IS ASSUMED THAT ANY WORK TO WIDEN PILSWORTH ROAD WILL FALL UNDER A S278 AGREEMENT. IT IS ALSO ASSUMED THAT ANY ADDITIONAL DRAINAGE REQUIRED TO DRAIN THE ROAD WILL CONNECT TO THE EXISTING HIGHWAY DRAINAGE. THEREFORE, THIS AREA HAS NOT BEEN INCLUDED IN ANY PROPOSED DRAINAGE LAYOUT OR CALCULATIONS AT THIS STAGE.

MANHOLE LOCATION BASED ON PDF SEWER RECORDS ONLY. MANHOLE LOCATION, COVER LEVEL AND INVERT LEVEL TBC PRIOR TO ANY CONSTRUCTION OCCURRING.

FLOW RATE SUBJECT TO AGREEMENT WITH BURY COUNCIL AND UNITED UTILITIES. CONNECTION SUBJECT TO S106 AGREEMENT WITH UNITED UTILITIES.

25.5m x 2.5m x 1.5m
GEOCELLULAR ATTENUATION TANK. STORAGE VOLUME = 90.8m³ ASSUMING 95% VOIDS.

10.0m x 5.0m x 1.0m
GEOCELLULAR ATTENUATION TANK. STORAGE VOLUME = 47.5m³ ASSUMING 95% VOIDS.

NOTE

THE FOLLOWING INFORMATION IS REQUIRED TO COMPLETE THE DRAINAGE DESIGN. THE LAYOUT IS SUBJECT TO CHANGE UNTIL THIS INFORMATION IS RECEIVED. THIS MAY INCLUDE INCREASING PIPE SIZES, MANHOLE NUMBERS AND ATTENUATION VOLUME.

1. FLOW RATE APPROVAL FROM BURY COUNCIL
2. FLOW RATE APPROVAL FROM UNITED UTILITIES
3. RWP LAYOUT
4. INTERNAL FOUL CTD LAYOUT
5. MUGA SURFACE BUILD-UP CONFIRMATION
6. HOLLINS BROOK WAY EXISTING DRAINAGE LAYOUT
7. EXISTING FOUL WATER DRAINAGE SYSTEM LAYOUT

NEW CONNECTION TO UNITED UTILITIES SEWER TO THE NORTH REQUIRED. LEVELS TO BE CONFIRMED PRIOR TO ANY CONSTRUCTION WORK COMMENCING. CONNECTION SUBJECT TO A S106 APPLICATION TO UNITED UTILITIES AND APPROVAL FROM BURY COUNCIL.

THE EXISTING DRAINAGE SYSTEM SERVING HOLLINS BROOK WAY HAS NOT BEEN SURVEYED. IT IS ASSUMED AT THIS STAGE THAT THE DRAINAGE SYSTEM SERVING HOLLINS BROOK WAY DISCHARGES INTO EXSW06.

NEW GULLIES OR LINEAR DRAINAGE WILL BE REQUIRED TO DRAIN THE WIDENED ROAD. THESE WILL CONNECT INTO THE EXISTING DRAINAGE SYSTEM.

A SURVEY SHOULD BE CARRIED OUT ON THE EXISTING DRAINAGE SYSTEM AS SOON AS PRACTICAL TO ESTABLISH CAPACITY AND LAYOUT.

EXISTING SURFACE WATER DRAINAGE UPSTREAM OF EXSW06 TO BE SURVEYED. THE ATTENUATION REQUIREMENTS OF THE PROPOSED DEVELOPMENT ARE SUBJECT TO INCREASE DEPENDING ON THE UPSTREAM CONNECTIONS TO EXSW06.

IT IS ASSUMED THAT 350mm OF POROUS AGGREGATE IS USED WITHIN THE MUGA BUILD-UP. ANY REDUCTION IN THIS MAY LEAD TO ADDITIONAL ATTENUATION VOLUMES BEING REQUIRED WITHIN THE DEVELOPMENT.

- NOTES
1. THIS DRAWING IS PRELIMINARY AND IS SUBJECT TO CHANGE DEPENDING ON FURTHER DEVELOPMENT OF THE G.A. SITE LAYOUT. PROPOSED LEVELS, INFILTRATION RATES, RWP LAYOUT AND FOUL CONNECTION LOCATIONS.
 2. THIS DRAWING IS BASED ON THE LANDSCAPE ARCHITECTS FUTURE DEVELOPMENT OUTLINE PLAN, DRAWING NO. 2206-CVS-34-07-DR-L-10-001.
 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 1200mm UNLESS OTHERWISE INDICATED.
 8. ALL INSPECTION CHAMBERS ARE 4750mm UNLESS OTHERWISE INDICATED.
 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 UNKNOWN AT PRESENT.
 13. RAINWATER PIPE AND FOUL CONNECTION LOCATIONS UNKNOWN AT PRESENT.
 14. LINEAR DRAIN AND GULLY LOCATIONS SUBJECT TO DETAILED LEVELS DESIGN AND THEREFORE NUMBERS ARE SUBJECT TO CHANGE.
 15. ALL LINEAR DRAINAGE TO HAVE SILT BUCKETS ON OUTLETS.
 16. ALL LINEAR DRAIN, GULLY AND PERFORATED PIPE CONNECTIONS TO BE 150mm LAID AT A MINIMUM GRADE OF 1:80 UNLESS STATED OTHERWISE.
 17. DISCHARGE RATE AND CONNECTION TO SEWER SUBJECT TO AGREEMENT WITH BURY COUNCIL AND UNITED UTILITIES.
 18. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND CONSTRUCTION PROCEDURES.
 19. CONTRACTOR TO APPLY FOR SEWER PERMITS AND ROAD OPENING PERMITS AS NECESSARY FROM THE APPROPRIATE AUTHORITIES, PRIOR TO COMMENCING WORKS.
 20. THE CONTRACTOR SHALL ALLOW FOR ALL TRAFFIC MANAGEMENT IN CONNECTION WITH ROAD AND SEWER WORKS.
 21. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL VENT TO THE ATMOSPHERE.
 22. ALL UNDERSLAB FOUL PIPES TO BE 100mm LAID AT A MAX 1:40 GRADIENT UNDO.

REV	DATE	DESCRIPTION	DRN	CHK	APP
P03	17.02.23	DRAINAGE UPDATED, OUTFALLS REALIGNED TO SURVEY INFO	NM	PV	RK
P02	13.10.22	STRATEGY UPDATED	RB	PV	RK
P01	10.05.22	PRELIMINARY ISSUE	RB	DB	RK

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Kennedy Redford
MANAGING VISION

CLIENT
JD SPORTS PLC

PROJECT NAME
JD SPORTS OFFICE BURY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT
PHASE 2

DATE	SCALE	SHEET SIZE	REV
10.05.22	1:250	A0	P03
DRAWING STATUS			
S1 - ISSUED FOR INFORMATION			
DRAWING NUMBER			

211124 - KRD - XX - EX - DR - C - 0002