

FALLOWS WAY, PRESCOT

FLOOD RISK AND DRAINAGE SUMMARY

AUGUST 2022

FALLOWS WAY, PRESCOT

FLOOD RISK AND DRAINAGE SUMMARY

Allied Properties

Flood Risk and Drainage Summary

CONFIDENTIAL

Project no: 21686-FRS-001

Date: August 2022

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1 DEVELOPMENT DESCRIPTION AND LOCATION

- 1.1.1 The site is located at land off Fallows Way, Knowsley, Merseyside, Liverpool, L35 1RA, and is currently consists of disused land with a mix of hardstanding and green vegetated areas. A site location plan can be found in Figure 1 along with the site layout plan in **Appendix A**.
- 1.1.2 Proposals for the site consists of an industrial/ commercial site consisting of warehouses and storage units.
- 1.1.3 The Site is referenced in Table 2-1 and Figure 1 below.

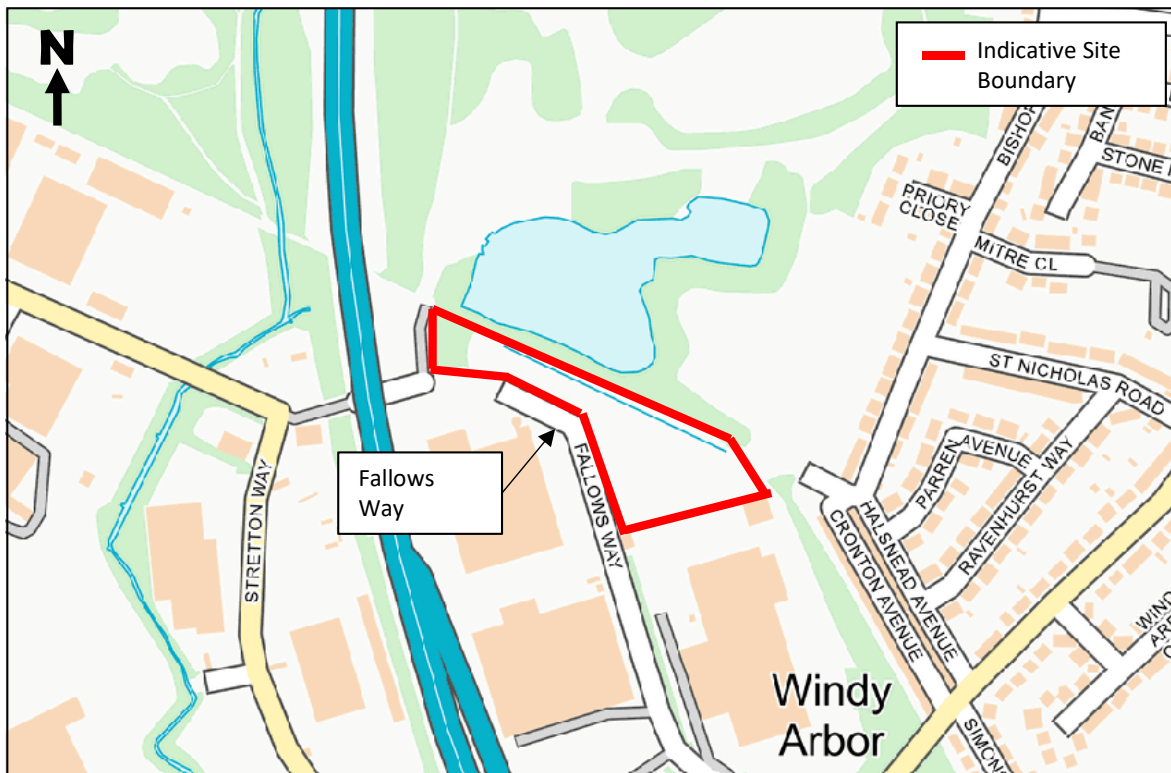


Figure 1. Site location

1.2 GEOLOGY

- 1.2.1 British Geological Survey (BGS) Open Geoscience website¹ indicates that the entire site is underlain by Pennine Middle Coal Measures Formation – Sandstone and superficial deposits of Till, Devensian - Diamicton

¹ Available at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> accessed on 26/12/2020

1.3 HYDROGEOLOGY

- 1.3.1 According to the Department for Environment, Food and Rural Affairs (DEFRA) MAGIC map², the site is indicated as not being located in a Groundwater Source Protection Zone (SPZ), as defined by the Environment Agency (EA) for the protection of a potable groundwater supply.
- 1.3.2 The site is located as being in an area of medium to low ground water vulnerability and located above a Secondary A bedrock aquifer and a secondary superficial drift aquifer
- 1.3.3 Information obtained from the Cranfield University's Soilscape website³ indicates that the site is located in an area classified as being Soilscape 18, which is defined as having Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.

1.4 HYDROLOGY

- 1.4.1 There is a watercourse located within the site boundary which runs along the northern perimeter of the site. It is not classified as a main river and also isn't located within a IDB, so therefore it falls under the remit of the LLFA.
- 1.4.2 The longwood Mill Brook is also in close proximity to the site and is 450m west of the site. It is classified as a main river and therefore falls under the remit of the EA.

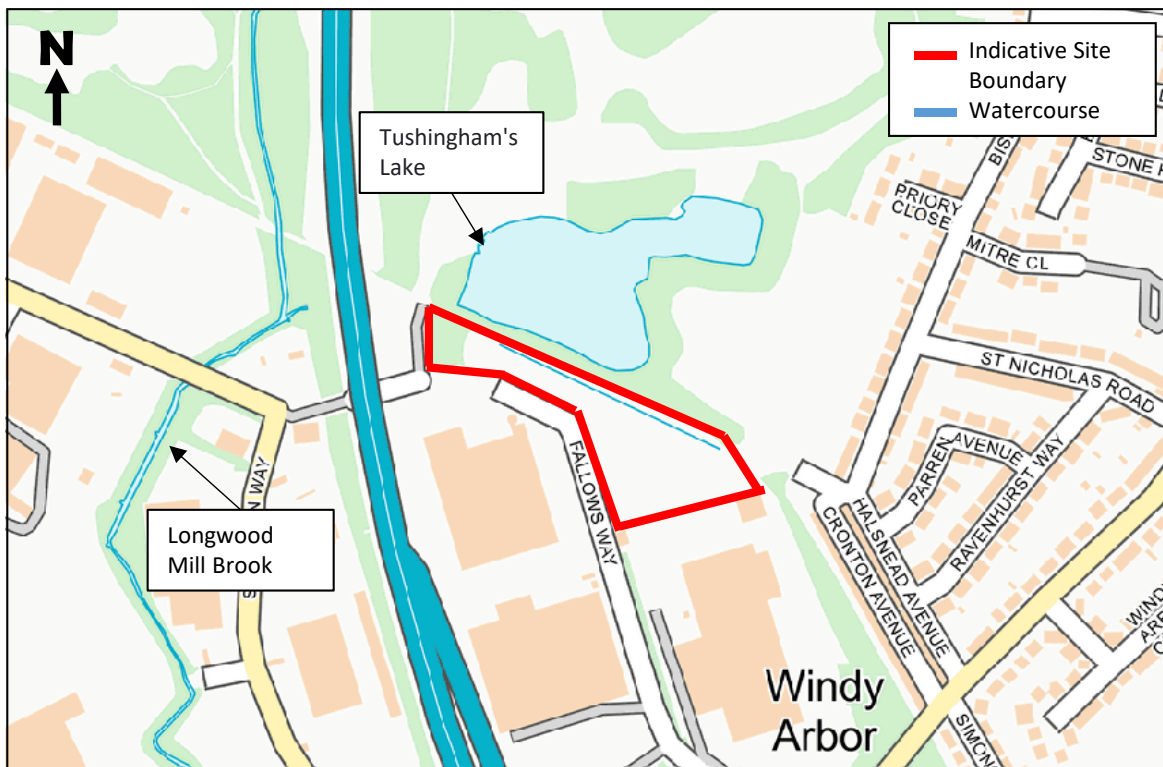


Figure 2. Watercourse location

² Available at: <https://magic.defra.gov.uk/MagicMap.aspx?startTopic>, accessed on 04/01/2021

³ Available at: <http://www.landis.org.uk/soilscales/>, accessed on 04/01/2021

2 POTENTIAL FLOOD RISK

- 2.1.1 The section will identify and consider all potential sources contributing to flood risk posed to the site works and potentially affecting the general areas surrounding the Site.

2.2 ENVIRONMENT AGENCY FLOOD ZONES

- 2.2.1 The EA Flood Map for Planning shows the site is located within Flood Zone 1, i.e. land assessed as having less than 1 in 1,000 annual probability (<0.1%) of river or sea flooding in any one year. This potential fluvial / coastal flood risk to the Site has been illustrated in **Figure 3**.

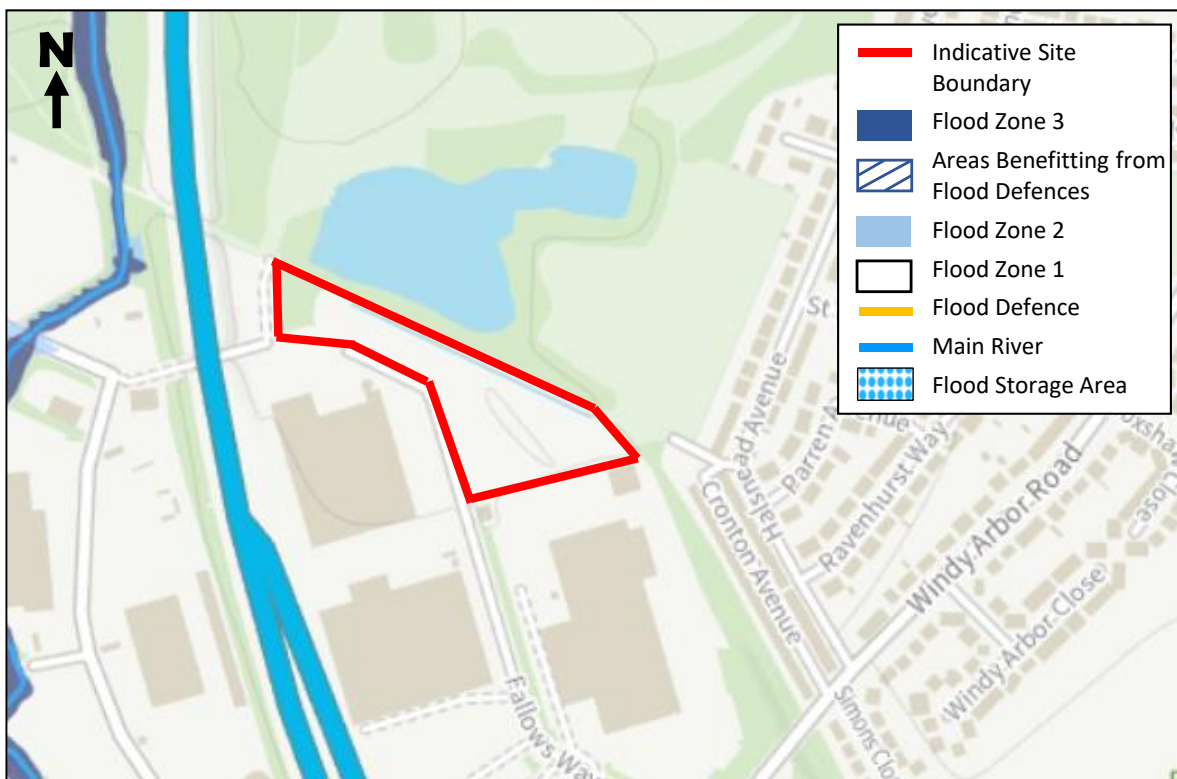


Figure 3. Environment Agency long term flood map for planning - rivers and seas

2.3 FLUVIAL AND COASTAL FLOODING

- 2.3.1 The EA Long Term Flood Risk Map for fluvial and coastal flooding shown indicates that the site is at very low risk of fluvial flooding. As the site is some distance from the coast it is not at risk of coastal or tidal flooding.
- 2.3.2 The risk of flooding posed to the proposed development is classed as very low.

2.4 PLUVIAL (SURFACE WATER) FLOODING

- 2.4.1 The EA Long Term Flood Risk Map for surface water flooding (**Figure 4**) shows the majority of the site is located in an area at very low risk of surface water flooding, with the remainder being located in an area of between low and high risk of surface water flooding.

- 2.4.2 The areas of the site shown to be at low to high risk are situated within the watercourse as the stretch of surface water flooding follows that route.
- 2.4.3 There is a small section to the south west of the site which is located at high risk. High risk means that this area has a chance of flooding of greater than 3.3% each year. This area could expect flood depths of less than 0.3m and flows of less than 0.25m/s.
- 2.4.4 As the proposed development of the site may potentially reduce the overall site permeability and potentially increase surface water runoff rates and volumes, the surface water discharge controls must ensure that any proposal for drainage, or discharge, does not adversely impact upon downstream drainage infrastructure or offsite receptors.
- 2.4.5 The site is therefore considered to have low potential risk of flooding from pluvial sources.

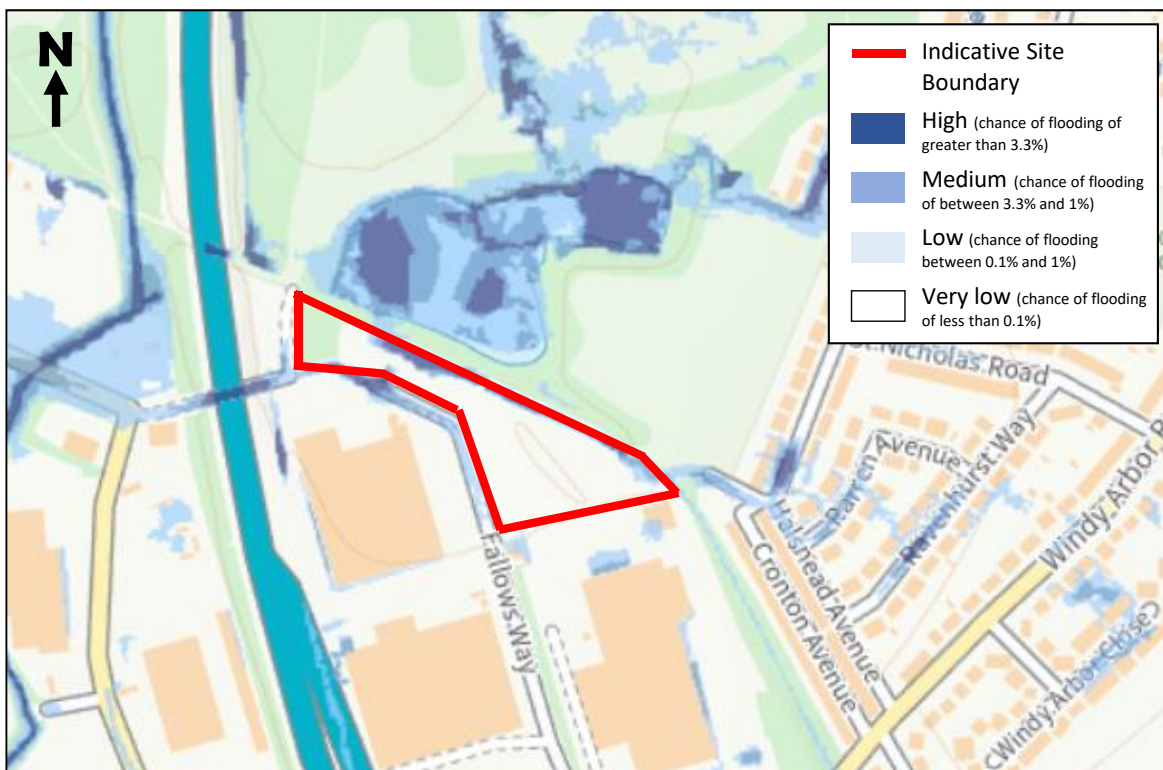


Figure 4. Environment Agency long term flood risk map – pluvial (surface water) flooding

2.5 GROUNDWATER FLOODING

- 2.5.1 Ground conditions at the site consist of Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils therefore the propensity for ground water emergence at the site is considered to be low risk
- 2.5.2 This is further confirmed by the Landmark Flood Risk Check which can be found in Appendix B which states that there is little to no risk of groundwater emergence at the site.
- 2.5.3 Given the impermeable nature of the proposed site's hardstanding areas subsequent to development, potential elevation of groundwater or groundwater emergence within the superficial geology causing flooding within the site post-development will be largely eliminated.

2.5.4 Site specific investigations should be able to prove the presence of ground water and propose remedial mitigation where required. Flood risk to the proposed development due to groundwater emergence is therefore considered to be low.

2.5.5 Flood risk to the proposed development due to groundwater emergence is considered to be low provided that all reasonable and practicable mitigation measures for any subsurface construction associated with the development are adhered to.

2.6 FLOODING FROM ARTIFICIAL SOURCES

2.6.1 The EA Long Term Flood Risk Map of flood risk from reservoir and canal failure indicates that the site and its surroundings, are not affected by potential flood waters from artificial sources such as dam or canal failure. The figures provided within the EA mapping principally indicate the worst-case flooding extents. Therefore, the potential risk of flooding from reservoir and/or canal failure is considered to be negligible.

2.6.2 In addition to the above reservoirs and canals are regularly maintained by relevant local authorities and failure is extremely unlikely. The site is therefore considered to have very low potential risk of flooding from artificial sources.

2.7 FLOODING FROM SEWERS

2.7.1 The site currently does not have any drainage infrastructure within its boundary. According to the Landmark Flood Risk Check (**Appendix B**) and the client the site has never suffered from sewer flooding.

2.8 HISTORIC FLOODING

2.8.1 The EA historic flood map shows the site to not have experienced historic flooding.

3 FLOOD RISK CONCLUSION AND RECOMMENDATIONS

3.1 CONCLUSION

- 3.1.1 Based on an assessment of all known sources of potential flooding at the site, the site is shown to have low potential flood risk from fluvial, coastal, groundwater, sewers and artificial flooding with medium risk associated with surface water. The primary risk of potential flooding is therefore surface water flooding. Flood risk to the site and comments on the potential impact upon the proposed work has been summarised in Table 2 below

Table 3-1. Flood Risk Summary

Source	Probability of Flood Risk	Impacts	Remarks/Mitigation Measures
Coastal	N/A	N/A	The site is not situated near the coast
Fluvial	Low	Low	The site is situated within Flood zone 1
Surface	Medium	Low	The site has a surface water flood risk in the center of the site which follows the route of the watercourse. The rest of the site is located in an area with low flood risk
Sewers	Low	Low	The site has no history of sewer flooding
Groundwater	Low	Low	The site has no history of groundwater flooding and due to the impermeable nature of the site post development this risk will be reduced further
Artificial Sources	Low	Low	The site is not in an artificial source flood zone so is not at risk

4 DRAINAGE SUMMARY

4.1 INTRODUCTION

4.1.1 The National Planning Policy Framework (NPPF) and accompanying Technical Guidance indicate that surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.

4.1.2 Consideration should therefore firstly be given to using sustainable drainage (SuDS) techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements. Approved document Part H of the Building Regulations (2015) sets out a hierarchy for the disposal of surface water which encourages a SuDS approach.

4.2 GROUNDWATER PROTECTION

4.2.1 The proposed development site is not identified as being within a groundwater source protection zone (SPZ), as such no special measures are required to prevent risk to drinking water supplies.

4.3 METHODS OF SURFACE WATER MANAGEMENT

4.3.1 There are three methods that have been reviewed for the management and discharge of surface water which are detailed below; these may be applied individually or collectively to form a complete strategy. They should be applied in the order of priority as listed:

- ▶ Discharge via Infiltration
- ▶ Discharge to a watercourse
- ▶ Discharge to public sewer

4.4 INFILTRATION

4.4.1 From a desktop review of the Geotechnical report for the site (**Appendix B**). It is believed that infiltration would not be an acceptable way of discharging surface water from the site. This is due to the fact that the ground at the site is made up of clayey soils.

4.4.2 Percolation testing has not yet been carried out on this site. It is recommended that infiltration testing to BRE 365 digest is undertaken as part of any future site investigations works at the site so that this can be used as satisfactory evidence for the LLFA. The results of a percolation test will also be required to produce infiltration/soakaway designs.

4.5 WATERCOURSE

4.5.1 There is a lake located adjacent to the development, surface water may be possible to drain into the lake if permission could be sought from the owners.

4.5.2 Further information is required to fully determine the possibility of discharging surface water into the lake.

4.6 PUBLIC SEWERS

- 4.6.1 As a last resort and following the hierarchy of surface water, disposal discharge to the public sewer system may need to be considered.
- 4.6.2 United Utilities may allow surface water to discharge into a sewer in close proximity to the site. However, an agreement with united utilities will need to be made through a pre development enquiry which will also discuss a discharge rate. We have initially assessed the green field run-off rate as 7.9l/s and a copy of the calculation can be found in **Appendix C**.

4.7 SURFACE WATER CONCLUSION

- 4.7.1 An initial review of the surface water characteristics of the site along with following the SuDS hierarchy would suggest that discharging surface water into the lake near the site would be the best option subject to the necessary approvals.
- 4.7.2 A limited discharge rate would require attenuation to be provided on the site.

4.8 FOUL WATER

- 4.8.1 Foul water from the site will discharge into either a foul water sewer or a combined sewer which is located in close proximity to the site. The exact location and connection point would be determined by a United Utilities pre development enquiry.

4.9 PROPOSED DISCHARGE RATES

- 4.9.1 Discharge via infiltration is required to be explored further before it can be fully ruled out. If infiltration has proved to be ineffective and evidenced to the satisfaction of the LLFA an agreement surface water will continue to discharge into the Meanwood Beck to the north of the site. This drainage strategy will be based upon this method.
- 4.9.2 The site is currently a Greenfield site with a total site area of 14,583m².
- 4.9.3 The 1 in 1 year greenfield discharge rate is 7.9l/s which we will use to determine likely attenuation requirements.

4.10 ATTENUATION REQUIREMENTS

- 4.10.1 It is proposed that surface water will discharge into the 525 diameter SW public sewer which crosses the site at a restricted discharge rate as such attenuation will be required at the site.
- 4.10.2 Causeway Flow drainage design software has been used to estimate the maximum storage volume required on-site for the 100-year storm event plus 40% climate change. The causeway results can be found in **Appendix D**
- 4.10.3 The results below are based on a single cellular storage to service the whole impermeable area.
- 4.10.4 A drainage layout drawing can be found in **Appendix E** of this report.

Total Impermeable Area

This volume is based on using cellular storage with a discharge limit of 7.9l/s. The details on the attenuation can be found in table 8-3 below.

Table 4-1. Attenuation Volume

Attenuation Volume

Gross area (ha)	Max Discharge (l/s)	Imp. Area (ha)	Q100+40% Volume (m ³)
1.45	7.9	1.26	831

5 SUSTAINABLE DRAINAGE SYSTEMS

- 5.1.1 Where possible, Sustainable drainage (SuDS) systems/techniques should be used to drain the site of surface water runoff. These could be in the form of permeable paving, rainwater harvesting, ponds, and other above ground green systems. Swales could also be incorporated into the layout to convey surface runoff rather than below ground pipes (which tend to have a higher velocity).

5.2 SUSTAINABLE DRAINAGE (OVERVIEW)

- 5.2.1 Drainage systems can contribute to sustainable development and improve urban design, by balancing the different issues that influence the development of communities. Approaches to manage surface water that take account of water quantity (flooding), water quality (pollution) and amenity issues are collectively referred to as Sustainable Drainage Systems (SuDS).
- 5.2.2 SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to slow water down (attenuate) before it enters streams, rivers, and other watercourses, they provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or evaporated from surface water and lost or transpired from vegetation (known as evapotranspiration).
- 5.2.3 SuDS are technically regarded a sequence of management practices, control structures and strategies designed to efficiently and sustainably drain surface water, while minimising pollution and managing the impact on water quality of local water bodies.
- 5.2.4 SuDS are more sustainable than traditional drainage methods because they:
- ▶ Manage runoff volumes and flow rates from hard surfaces, reducing the impact of urbanisation on flooding
 - ▶ Protect or enhance water quality (reducing pollution from runoff)
 - ▶ Protect natural flow regimes in watercourses
 - ▶ Are sympathetic to the environment and the needs of the local community
 - ▶ Provide an attractive habitat for wildlife in urban watercourses
 - ▶ Provide opportunities for evapotranspiration from vegetation and surface water
 - ▶ Encourage natural groundwater/aquifer recharge (where appropriate)
 - ▶ Create better places to live, work and play.

5.3 SUDS PRINCIPALS

- 5.3.1 Sustainable drainage is a departure from the traditional approach to draining sites. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:
- ▶ storing runoff and releasing it slowly (attenuation)
 - ▶ allowing water to soak into the ground (infiltration)
 - ▶ Slowly transporting (conveying) water on the surface
 - ▶ filtering out pollutants
 - ▶ allowing sediments to settle out by controlling the flow of the water
 - ▶ The above was replicated from www.susdrain.org

5.4 SUDS TECHNIQUES

5.4.1 The following table is a list of SuDS features that may/may not be feasible for the proposed site.

Table 5-1. SuDS feasibility table

SUDS Technique	Can they be feasibly incorporated into the site?	Comments
Green Roofs	✗	The sloping roofs of the proposed development would not permit a green-roof design
Basins and Ponds	✗	The proposed development could not be designed to incorporate these elements due to site layout constraints.
Filter Strips, Swales and Bio-Retention	✗	The proposed development could not be designed to incorporate these elements due to site layout constraints.
Infiltration techniques	✗	Desktop review of the available data indicate that infiltration would not be feasible at the site.
Permeable surfaces and tree pits	✗	Permeable surfaces are not suitable for industrial sites.
Rainwater Harvesting	✓	New roofs could be directed to rainwater harvesting tanks for reuse.
Tanked Systems	✓	Attenuation will be provided.

6 SUDS MAINTENANCE PLAN

6.1 SURFACE WATER DRAINAGE MAINTENANCE AND MANAGEMENT SCHEDULE

Attenuation Tank

Table 6-1. Attenuation Tank

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify areas that are not operating correctly. If required, take remedial action	Monthly for the first 3 months of operation then annually
	Recover debris from catchment surface area where it may cause risk to performance	Monthly
	Remove sediment and debris from pre-tank system	Annually
Remedial Actions	Repair inlets/outlets/vents/overflows	As necessary
Monitoring	Inspect all inlets/outlets and upstream drainage system to ensure they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment and build up and remove if necessary	Every 5 years

Hydrobrake Manhole

Table 6-2. Hydrobrake Manhole

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from flow control chambers and upstream manholes	Monthly for first 12 months than 6 monthly
Remedial Actions	Replace or clean hydrobrake if performance deteriorates or failure occurs	As necessary
Monitoring	Check flow control to ensure emptying is occurring	Quarterly and post high intensity storm event

Petrol Interceptor

Table 6-3. Petrol Interceptor

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from Petrol Interceptor	Monthly for first 12 months than 6 monthly
	Visual inspection for performance	6 monthly

Channel Drains

Table 6-4. Channel Drain

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly
	Inspect channel drain surface, inlet and outlet pipework and control system for blockages, clogging, standing water and structural damage	Monthly
Occasional Maintenance	Remove to control tree roots where they are encroaching to sides of channel drain using recommended methods (NJUG, 2007 or BS 3998:2010)	As necessary
	Clear perforated pipework of blockages	As necessary

7 SUMMARY & CONCLUSION

- 7.1.1 The site is in an area identified as being in Flood Zone 1 and therefore has a low probability of flooding.
- 7.1.2 As with any drainage system, blockages within the surface water sewer systems constructed to serve the development has the potential to cause flooding or disruption. Any drainage systems which are not to be offered for adoption to either the Water Company or the Local Authority will have a suitable maintenance regime scheduled and an appropriate management company appointed to carry out the works.
- 7.1.3 The primary option for surface water disposal is to the Public Sewers to the north of the site.
- 7.1.4 Surface water disposal through infiltration will require a BRE 365 infiltration test on site to confirm the ground conditions could support infiltration.
- 7.1.5 Surface water disposal to the Lake will require approval/permission from the owners.
- 7.1.6 Attenuation will be required and surface water will be restricted to 7.9l/s which will need to be agreed with United Utilities.
- 7.1.7 Foul water will connect into the existing United Utilities public foul water sewer located on Fallows Way.

8 LIMITATIONS

8.1 LIMITATIONS

- 8.1.1 This report has been prepared for exclusive use by Allied Properties Limited for the purpose of assisting them in evaluating the potential constraints imposed by flood risk and drainage in making a Planning Application.
- 8.1.2 AMA accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of AMA. Any advice, opinions or recommendations within this document should be read and relied upon only in the context of the document as a whole.
- 8.1.3 AMA has endeavoured to assess all information provided to them during this appraisal. The report summarises from several external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.
- 8.1.4 This report has been undertaken with the assumption that the site will be developed in accordance with the above proposals without significant change. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.
- 8.1.5 A topographic survey has been completed for the site and was supplied to AMA by the client. AMA accepts no liability for the accuracy of this survey, and it is recommended that it is verified on-site prior to the commencement of any construction work.
- 8.1.6 Existing drainage information is based on third party survey data and record information which is considered to be incomplete. It is therefore recommended that a FULL drainage investigation survey is commissioned to establish the precise alignment, level, and condition of ALL existing drainage within the development site to inform the masterplan and future detailed design proposals.

9 APPENDICES

APPENDIX A – PROPOSED SITE LAYOUT

APPENDIX B – GEOTECHNICAL REPORT

APPENDIX C – UK SUDS GREENFIELD RUNOFF CALCULATIONS

APPENDIX D – DRAINAGE CALCULATIONS

APPENDIX E – DRAINAGE STRATEGY LAYOUT

APPENDIX F – PUBLIC SEWERS MAP

Appendix A

PROPOSED SITE LAYOUT



Notes | Sketch schemes may be based on plan information of unknown origin and is subject to verification and survey. Contractors must verify all dimensions on site before commencing any work or shop drawings. This drawing is not to be scaled. Use figured dimensions only. Ensure digital versions are plotted at 'Actual Size'. Building areas are liable to adjustment over the course of the design process due to ongoing construction detailing developments. Subject to statutory approvals and survey. The bar above is to check that the drawing has been printed to scale.

SITE AREA	3.67 Acres
Block A	01- 87.5m ² (940 sq ft) 02- 87.5m ² (940 sq ft) 03- 87.5m ² (940 sq ft)
Total -	262.5m ² (2,820 sq ft)
Block B	04- 140m ² (1,500 sq ft) 05- 140m ² (1,500 sq ft) 06- 140m ² (1,500 sq ft)
Total -	420m ² (4,500 sq ft)
Block C	07- 140m ² (1,500 sq ft) 08- 140m ² (1,500 sq ft) 09- 140m ² (1,500 sq ft) 10- 140m ² (1,500 sq ft) 11- 140m ² (1,500 sq ft)
Total -	700m ² (7,500 sq ft)
Block D	12- 232m ² (2,500 sq ft)
Block E	13- 3,075m ² (33,070 sq ft) Inc 372m ² (4,000 sq ft) Offices
Blocks A-D Total No of parking spaces =	37
Blocks E Total No of parking spaces =	40

- Proposed Buildings
- Tarmac / HRA
- Tarmac Car Parking Spaces
- Pre cast concrete flags
- Landscaping Areas

Rev	Date	Description	ML	ML
A	08.11.2021	Scale bar added	Drawn	Checked
Project	Falls Way, Prescot			
Drawing	Proposed Site Layout			
Client	Allied Properties			
BIM Suitability Description	SUITABLE FOR INFORMATION			BIM Suitability Code S2
Status	Planning	2 Riverside Way	320 City Road	
Date	20/08/2021	Whitwell Waterfront	Angel	
Drawn	ML	LEEDS	LONDON	
Checked	GE	LS1 4EH	EC1V 2NZ	
Scale (A2)	1:500	t 0113 819 8041	t 0203 883 8602	
		w edwardarchitecture.co.uk		
		e info@edwardarchitecture.co.uk		
Project	Originator	Discipline	Drawing No	Rev
0924	- EA	- A	- PL03	- A

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architecture

Appendix B

GEOTECHNICAL REPORT

ELLISONS TRAVEL

SITE ON FALLOWS WAY, PRESCOT, L35 1RZ

GEOTECHNICAL AND GROUND CONTAMINATION INVESTIGATION REPORT

REPORT No. E0922.GGCI.R1

JULY 2017



Client : ELLISONS TRAVEL

Project Title : SITE ON FALLOWS WAY, PRESCOT, L35 1RZ

Document Title: GEOTECHNICAL AND GROUND CONTAMINATION INVESTIGATION REPORT

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Appendix 3	-	Chemical Analysis Results

1. INTRODUCTION

1.1 Terms of Reference

- 1.1.1 In June 2017 e-geo Solutions Ltd were commissioned by ACR Architects on behalf of Ellison Travel Ltd to undertake a geotechnical and ground contamination investigation at a site on Fallows Way, Prescott, Merseyside. The objectives of the investigation were to collate information on the geological, geotechnical, hydro-geological and contamination characteristics of the site, to allow appropriate foundation design and site development for a new coach park.
- 1.1.2 This report presents the findings of the site investigation, detailing the particular geological and ground contamination characteristics and presents design parameters and recommendations for ground bearing capacity.
- 1.1.3 The report has been prepared by e-geo Solutions Ltd for the sole use of the Client, for the purposes described and no extended duty of care applies to other parties. Any other party using this report for any purpose whatsoever do so at their own risk and any duty of care to that party is specifically excluded.
- 1.1.4 The comments given, and opinions expressed, in this report are based on the information available at the time the report was compiled, however there may be additional information and data which becomes available at a later date which has an impact on the report content. Where data supplied by others has been used it has been assumed that the information is correct. No responsibility can be accepted by e-geo Solutions Ltd for inaccuracies within the data supplied by others.
- 1.1.5 The copyright of this report and its contents prepared by e-geo Solutions Ltd is solely owned by e-geo Solutions Ltd. Neither this report nor contents prepared by e-geo Solutions Ltd may be reproduced, published or adapted without the express written approval of e-geo Solutions Ltd.

1.2 Report Contents

- 1.2.1 The report includes sections on:-
- Present site description, profile and setting
 - The scope of the investigation and testing and its justification
 - The geological, geotechnical and hydro-geological conditions encountered
 - The geotechnical properties and of the ground strata
 - The results of chemical analysis on soil samples and an assessment of contamination risk
 - Development considerations

2. SITE LOCATION, DESCRIPTION AND SETTING

2.1 Site Location

- 2.1.1 The area of investigation is located off Fallows Way between Huyton Park and Whiston near Prescott. The site location is shown on Figure 1 and Figure 2. The site is bordered by industrial units to the south, residential development to the east and by open greenfield land to the north.

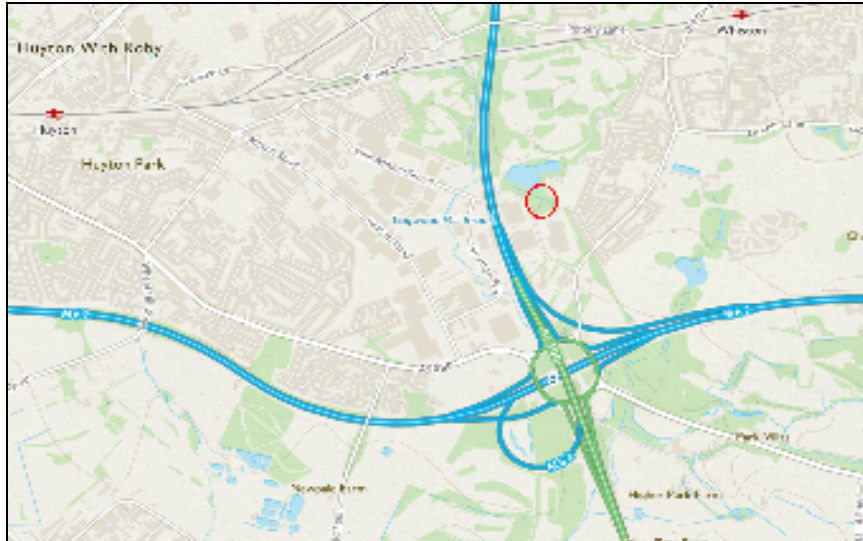


Figure 1 – Site Location

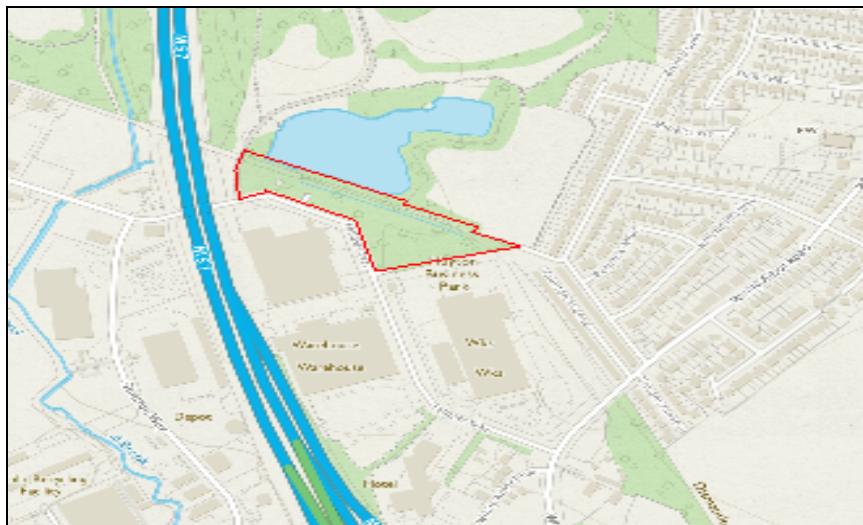


Figure 2 – Development Area

2.2 Site Description and Topography

- 2.2.1 The area of investigation comprises an area of ground where trees and vegetation have been cleared. A portion of the site at the western end remains densely vegetated and was not accessible for investigations.
- 2.2.2 The ground surface in area of investigation is undulating with a flat central portion with the ground level falling towards the northern boundary where there is a ditch. The ground surface is raised above the surrounding land to the south and appears to have been subjected to filling or tipping previously.

3. GEOLOGY AND GROUND STABILITY

3.1 Published Geology and Hydrogeology

- 3.1.1 Information from the British Geological Survey Map indicates that the superficial deposits below the site comprise Glacial Till deposits of Diamictic age. The bedrock below the site comprises mudstone, siltstone and sandstone of the Pennine Lower Coal Measures Formation.
- 3.1.2 The Glacial Till deposits are likely to be 8 to 15m thick and comprise consolidated clays and silts with varying proportions of sand and gravel and some cobbles of locally derived rock.

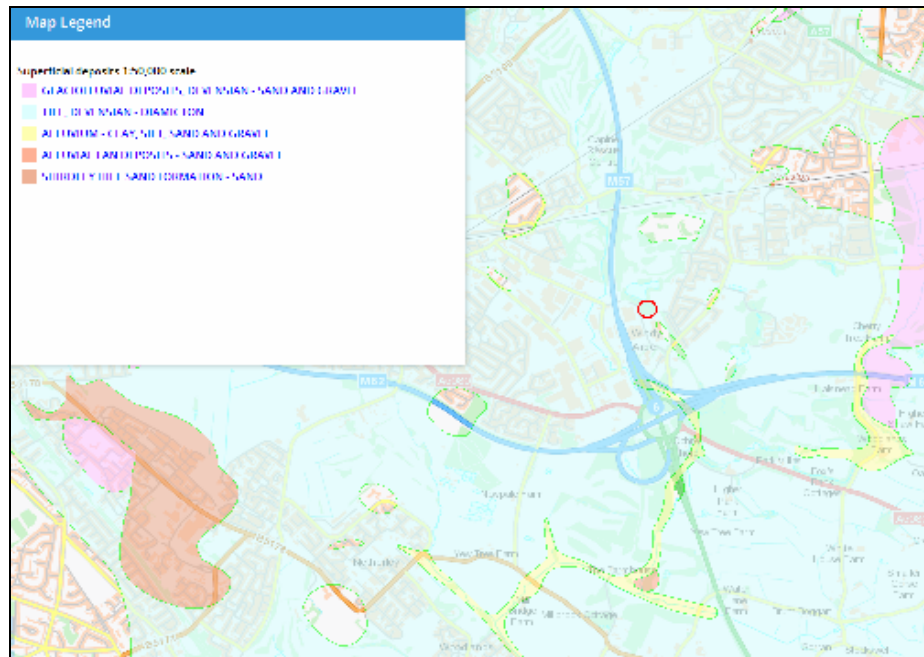


Figure 3 – BGS Superficial Geology Map Extract

- 3.1.3 The site is underlain by minor aquifer of intermediate permeability and vulnerability. Groundwater is likely to be present at depths (typically 5 to 8m) or in granular horizons.

3.2 Mining, Mineral Extraction and Ground Workings

- 3.2.1 The site is within a coal mining area. There is evidence of past surface within 100m north of the site. Shallow coal mining may be present below the site. An extract from the Coal Authority Mining Interactive map is shown as Figure 4.

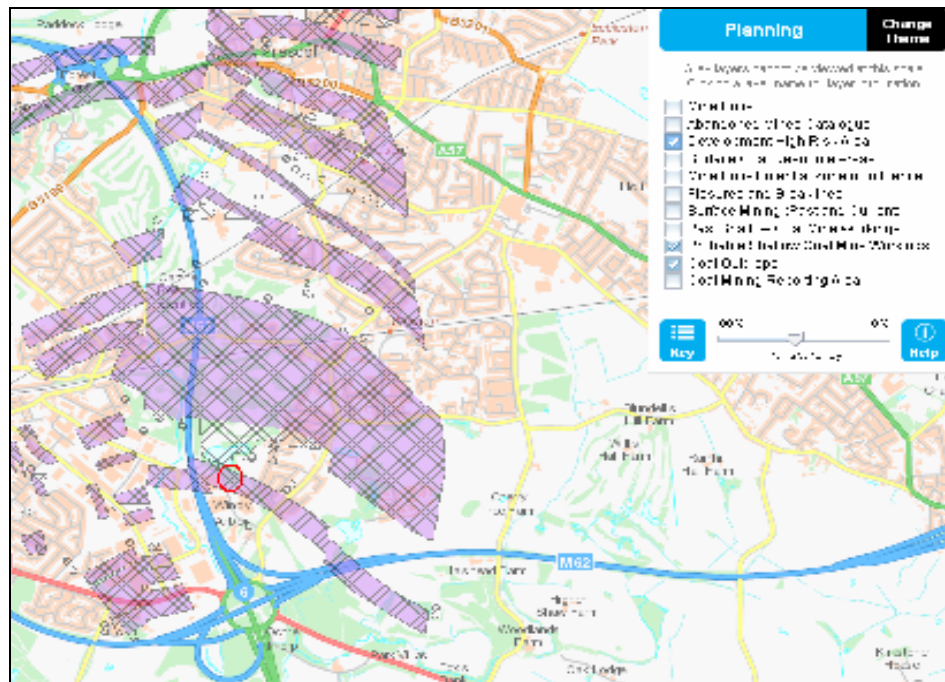


Figure 4 – Coal Authority Mining Information

3.3 Previous Investigations

- 3.3.1 There is evidence (borehole covers) to suggest that previous ground investigations have been undertaken at the site but no information is available.

4. GROUND INVESTIGATION

4.1 General

- 4.1.1 The ground investigation comprised the construction of 5 Nr shallow boreholes to with a tracked window sample rig, undertaking 5 Nr dynamic probe soundings adjacent to the borehole locations, the collection of representative ground samples and undertaking of in-situ geotechnical tests.
- 4.1.2 The scope of the investigation was proposed by ACR Architects and supervised and administered by e-geo Solutions Ltd and undertaken in accordance with BS5930 (2015) – code of Practice for Site Investigations (Amendment 1).

4.2 Scope of Work – Borehole Investigation

- 4.2.1 The scope of investigation work included the following tasks:
- The construction of 5 Nr. window sample rig boreholes with in-situ standard penetration tests (SPT) at 1.0m intervals to a depth of 4.00m.
 - The construction of 5 Nr Dynamic Probe holes to 6.7m with a window sample rig at locations adjacent to the boreholes
 - The examination of ground strata by a geo-environmental engineer with the careful description of soil types. Detailed descriptions of the ground strata are presented in the borehole records in Appendix 1 and Dynamic Probe Records in Appendix 2.

4.3 Scope of Work – In-Situ Geotechnical Testing

- 4.3.1 In-situ geotechnical tests were carried out in the boreholes with standard penetration tests (SPT) carried out at 1.0m intervals. The results are presented on borehole records in Appendix 1.

4.4 Scope of Work – Laboratory Geotechnical Testing

- 4.4.1 No laboratory geotechnical tests were scheduled on ground samples.

4.5 Scope of Work - Chemical Analysis

- 4.4.1 A total of 7 Nr ground samples were collected and submitted for chemical analysis at an accredited analytical laboratory. Samples wee tested for the following:

Analytical Suite/determinant	Samples
pH, arsenic, cadmium, chromium, chromium hex, lead, copper, nickel, zinc, mercury, selenium, cyanide, sulphate, sulphide, sulphur, cyanide, phenol, PAH (USEPA 16)	WS1-0.75, WS2-0.50, WS3-0.75, WS4-0.75,
Asbestos screen	WS3-2.00, WS5-0.50
EPH total	WS1-1.50, WS5-0.50
Soluble sulphate	WS1-0.75, WS2-1.50

- 4.4.2 The results are presented in Appendix 3.

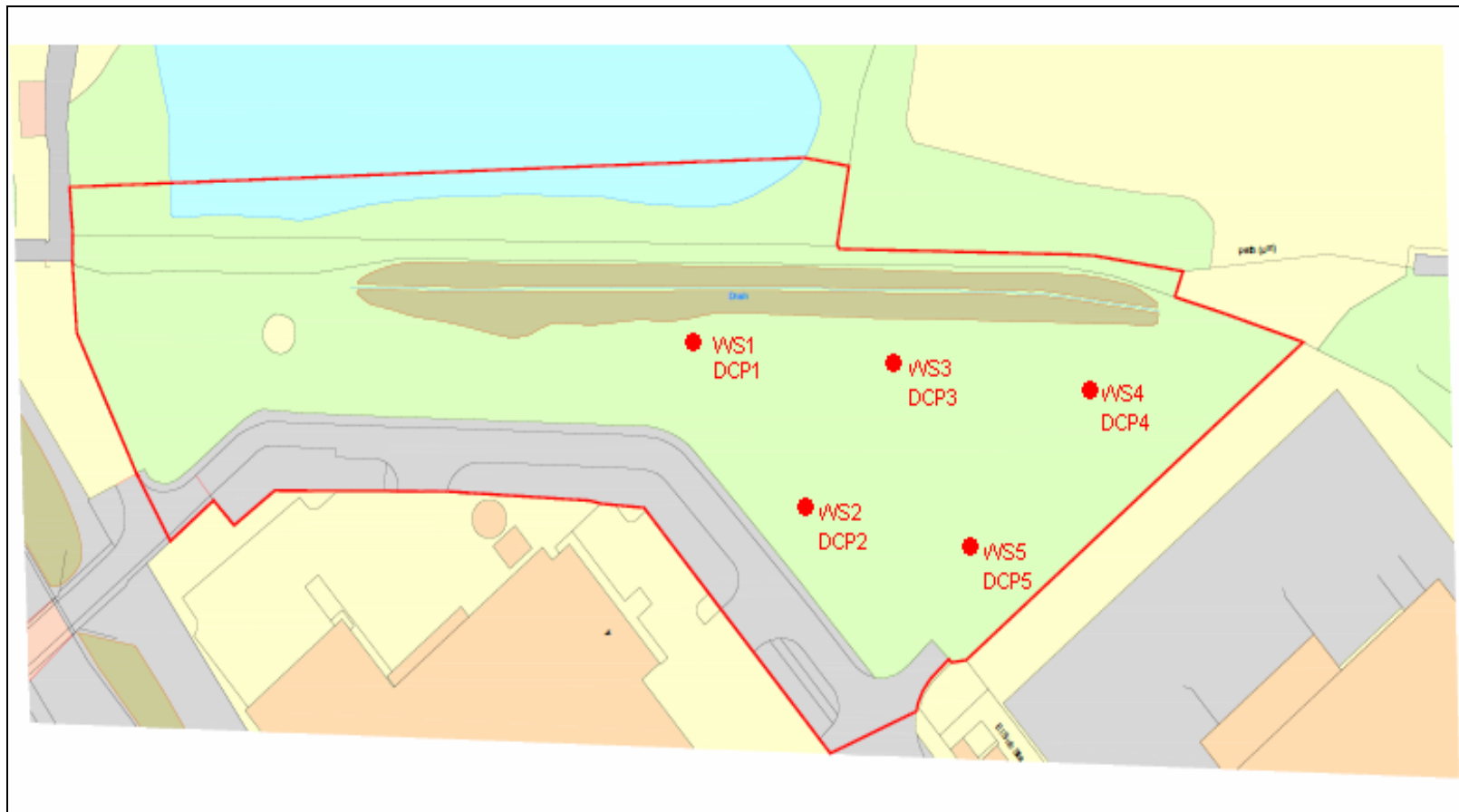


Figure 5 – WS Borehole (WS) and Dynamic Probe (DCP) Location Plan

5. GROUND CONDITIONS

5.1 General

- 5.1.1 A summary of the geological sequence is presented below. Full details of the ground strata and depths are presented on the borehole logs in Appendix 1.

5.2 Stratigraphy

- 5.2.1 The general stratigraphic sequence was:

Topsoil
MADE GROUND – Silt
MADE GROUND – Sand
MADE GROUND - Clay
CLAY

- 5.2.2 The strata and depths encountered during the investigation was:

Stratum	Description	Depth to base m range (average)	Thickness m (average)
Topsoil	Dark brown sandy TOPSOIL	0.10	0.10
MADE GROUND Silt	Soft medium brown and medium grey to grey brown slightly gravely sandy SILT. Gravel is fine to coarse angular siltstone. Occasional boulders of concrete sandstone and brick	2.00 to 3.50	3.00
MADE GROUND Sand (WS3 only)	Light brown gravely silty fine SAND. Gravel is angular fine to coarse sandstone	4.50	4.50
MADE GROUND Clay	Soft medium grey slightly sandy silty CLAY	3.50	1.50
CLAY	Firm light brown and light grey mottled slightly gravely slightly sandy silty CLAY	4.50+	

5.3 Groundwater

- 5.3.1 No groundwater was encountered in any of the boreholes during drilling.

5.4 Geotechnical Properties

- 5.4.1 From the window sample boreholes the following SPT 'N' values were obtained in the various strata.

Stratum	Description	Depth	SPT 'N' value
MADE GROUND Silt	Soft medium brown and medium grey to grey brown slightly gravely sandy SILT. Gravel is fine to coarse angular siltstone. Occasional boulders of concrete sandstone and brick	1.00 2.00 3.00	8, 10, 8, 9 8, 10, 11 7, 15, 16
MADE GROUND Sand (WS3 only)	Light brown gravely silty fine SAND. Gravel is angular fine to coarse sandstone	1.00 2.00 3.00 4.00	16 20 17 20
MADE GROUND Clay	Soft medium grey slightly sandy silty CLAY	2.00 3.00	9 17
CLAY	Firm light brown and light grey mottled slightly gravely slightly sandy silty CLAY	4.00	21, 19, 19, 17

- 5.4.2 From these results, the following safe bearing capacities can be assumed for the ground strata encountered for a 1m wide strip footing

Stratum	Description	Depth (m)	Assumed Safe Bearing Capacity kN/m2 (FOS=3)
MADE GROUND Silt	Soft medium brown and medium grey to grey brown slightly gravely sandy SILT. Gravel is fine to coarse angular siltstone. Occasional boulders of concrete sandstone and brick	1.00 2.00 3.00	100 112 140 **NB made ground
MADE GROUND Sand (WS3 only)	Light brown gravely silty fine SAND. Gravel is angular fine to coarse sandstone	1.00 2.00	150 200 **NB made ground
MADE GROUND Clay	Soft medium grey slightly sandy silty CLAY	2.00	100 **NB made ground
CLAY	Firm light brown and light grey mottled slightly gravely slightly sandy silty CLAY		225

5.5 Chemical Analysis

- 5.5.1 A total of 7 soil samples were analysed for a range of chemical parameters to determine if the ground materials would be classed as contaminated.
- 5.5.2 The results of the chemical analysis of soils samples are presented in Appendix 3. An assessment of the results of the analysis has been undertaken to determine the presence and extent of any ground contamination. The assessment of ground contamination undertaken is a 'Tier 1 Generic Risk Assessment' which requires the comparison of contaminant concentrations to a set of generic risk based screening concentrations. The guideline concentrations are based on a proposed 'commercial' land use.
- 5.5.3 In accordance with current best practice the chemical analysis results have been screened against the following criteria:

Ref	Guideline Criteria
1	(CLEA 2009) Soil Guideline Values (SGVs) for 'commercial development' end-use.
2	Tier 1 screening criteria for general soil contaminants not addressed by CLEA such as: 2.1 – LQM CIEH Generic Assessment Criteria – 2 nd Edition 2009 2.2 - Welsh Assembly Government C4SL

- 5.5.4 The results of the screening against guideline criteria values for commercial end use are presented in the tables below. Where values exceed the relevant TSVs they are highlighted.

PROJECT		Land on Fallows Way							
BH/TP			WS1	WS1	WS2	WS2	WS3	WS4	WS5
SAMPLE DEPTH			0.75	1.75	0.50	1.50	0.75	0.75	0.50
SAMPLE TYPE			MG	MG	MG	MG	MG	MG	MG
DATE SAMPLED			29.06.17	29.06.17	29.06.17	29.06.17	29.06.17	29.06.17	29.06.17
		Ref: 1 - SGV	Ref: 2.1/2.2						
Arsenic	mg/kg	640		15		15		5.5	15
Boron	mg/kg			0.7		1.9		2.8	1.8
Cadmium	mg/kg	348		0.6		0.5		0.1	0.6
Chromium (total)	mg/kg	8840		19		20		13	22
Chromium (hex)	mg/kg		35	< 1.0		< 1.0		< 1.0	< 1.0
Lead	mg/kg		6000	72		82		19	67
Mercury	mg/kg	26		0.12		0.15		< 0.05	0.11
Copper	mg/kg		71700	69		63		13	64
Nickel	mg/kg	1800		20		20		11	19
Zinc	mg/kg		665000	97		96		66	94
Selenium	mg/kg			< 0.5		0.5		1.4	0.7
Sulphur	%			0.09		0.22		0.30	0.03
Sulphate (2:1)	mg/l			190			130		
Sulphide	mg/kg			12		28		20	< 10
Phenol	mg/kg			< 0.3		0.6		< 0.3	< 0.3
Total cyanide	mg/kg			< 0.1		0.4		< 0.1	0.2
TPH	mg/kg				< 10				< 10
PAH	mg/kg			< 1.6		< 1.6		< 1.6	< 1.6
pH	NA			7.5		7.8		10.5	7.1
Asbestos							NAD		NAD

- 5.5.5 Comparison of all analytical results for metals and non-metals using maximum concentrations as a means of assessment with the Tier 1 TSVs for 'commercial' use, indicates that the near surface ground materials do not have any elevated concentrations of chemical parameters.
- 5.5.6 The concentrations of all toxic metal, phytotoxic metal and metalloid parameters are below the guideline concentrations.
- 5.5.7 Cyanide concentrations are exceedingly low or below detection limits.
- 5.5.8 The pH of 8.5 to 10.5 is neutral to alkaline.
- 5.5.9 No elevated concentrations of sulphate or soluble sulphate were found.
- 5.5.10 No elevated TPH or polyaromatic hydrocarbons were detected in the samples tested with concentrations below the detection limits.
- 5.5.11 Based on the available analysis the results indicate that the ground materials do not contain any parameters which would be classed as contaminated.
- 5.5.12 Assessment of the results on soils against guideline for the disposal of soils indicates that the soils would be classed as 'inert'.

6. DEVELOPMENT CONSIDERATIONS

6.1 Foundations

- 6.1.1 The following options for foundation design have been considered:

Traditional strip foundations at shallow depth

Due to the presence of made ground to depths of 3.50m to 4.50m traditional strip or pad foundations placed at standard depth are not acceptable although it should be noted that the made ground has a consistent strength and calculated allowable bearing capacity of at least 100 kN/m².

Traditional strip foundations on trench fill

Traditional strip foundations could be placed on deep trench fill with foundation trenches excavated through the made ground into the underlying clay to depths of 3.50 to 4.50m. Foundations should be designed with a maximum allowable bearing pressure of 200kN/m². The trenches should be backfilled to foundation level with lean mix concrete. Trenches can be excavated with standard construction plant and provided they do not remain open for any length of time only minimal shoring will be required. Some slight over break should be anticipated where boulders of demolition rubble is found.

Raft foundation

Raft foundations could be used on the made ground if placed on an over-excavated area of compacted backfill. The area below the raft should be over-excavated by at least 0.50m and the excavation backfilled with compacted granular material up to the raft formation level.

Piled foundations

Piled foundations can be used with final pile depth and spacing designed by a specialist piling contractor. Deeper boreholes will be required to prove the strata at depth and the final piling depth.

Floor Slabs

- 6.2.1 Floor slabs should be suspended due to the presence of made ground across the site.

6.3 Earthworks

- 6.3.2 The made ground strata of clay, silt and sand can be easily excavated with normal groundwork excavation plant. It is probable that all excavations for foundations and services will be stable within the made ground at shallow depth but in deeper excavations the excavation sides will require support in accordance with established guidelines.
- 6.3.3 No seepages or inflow of groundwater were encountered during borehole construction and it is probable that groundwater will not be encountered until the natural ground is penetrated and at least at 3.50m. Some perched water may be present however in the more sandy horizons in the made ground.

6.4 Concrete

- 6.4.1 The results of laboratory pH and sulphate content indicate that ACEC Class AC1 and sulphate class DS-1 conditions prevail at the site, in accordance with BRE Special Digest 1 'Concrete in Aggressive Ground 2005'.

Appendix 1 - Window Sample Borehole Records



WINDOW SAMPLE BOREHOLE RECORD

SITE: SITE ON FALLOWS WAY, PRESCOT	BOREHOLE No:
LOCN: FALLOWS WAY, PRESCOT, L35 1RZ	WS1
CLIENT: ELLISONS TRAVEL	Sheet 1 of 1
Dates : 29/06/2017	Project Ref: e0922
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : E-Geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
				MADE GROUND - Soft medium brown and medium grey to grey brown slightly gravely sandy SILT. Gravel is fine to coarse angular siltstone. Occasional boulders of concrete sandstone and brick			
1.00 - 1.50	D 0.75 SPT N = 8	2,2,2,2,2					
2.00 - 2.50	D 1.75 SPT N = 8	1,2,2,2,2					
3.00 - 3.50	SPT N = 7	2,2,2,2,1					
			3.50	Firm light brown and light grey mottled slightly gravely slightly sandy silty CLAY			
4.00 - 4.50	SPT N = 21	3,4,5,5,5,6					
			4.50				
				Base of borehole at 4.50m			

Remarks

Backfilled with arisings



WINDOW SAMPLE BOREHOLE RECORD

SITE: SITE ON FALLOWS WAY, PRESCOT	BOREHOLE No:
LOCN: FALLOWS WAY, PRESCOT, L35 1RZ	WS2
CLIENT: ELLISONS TRAVEL	Sheet 1 of 1
Dates : 29/06/2017	Project Ref: e0922
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : E-Geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
			0.10	Dark brown sandy Topsoil			
	D 0.50			MADE GROUND - Light brown gravely silty fine SAND. Gravel is angular fine to coarse sandstone			
1.00 - 1.50	SPT N = 16	2,4,4,4,4,4					
	D 1.50			becoming clayey and wet			
2.00 - 2.50	SPT N = 20	1,2,4,5,6,5	1.90	MADE GROUND - Firm red brown gravely sandy silty CLAY			
			2.10	MADE GROUND - Light brown gravely silty fine SAND. Gravel is angular fine to coarse sandstone			
3.00 - 3.50	SPT N = 17	2,4,4,5,4,4					
4.00 - 4.50	SPT N = 20	3,5,6,5,5,4					
			4.50				
				Base of borehole at 4.50m			

Remarks

Backfilled with arisings



SITE: SITE ON FALLOWS WAY, PRESCOT

BOREHOLE No:

LOCN: FALLOWS WAY, PRESCOT, L35 1RZ

WS3

CLIENT: ELLISONS TRAVEL

Sheet 1 of 1

Dates : 29/06/2017

Project Ref: e0922

Elev (maOD) :

Casing dia : 100mm

Logged By: HLJ

Engineer : E-Geo Solutions Ltd

Remarks
Backfilled with arisings



WINDOW SAMPLE BOREHOLE RECORD

SITE: SITE ON FALLOWS WAY, PRESCOT	BOREHOLE No:
LOCN: FALLOWS WAY, PRESCOT, L35 1RZ	WS4
CLIENT: ELLISONS TRAVEL	Sheet 1 of 1
Dates : 29/06/2017	Project Ref: e0922
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : E-Geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
			0.10	Dark brown sandy Topsoil			
1.00 - 1.50	D 0.75 SPT N = 8	1,2,2,2,2,2,		MADE GROUND - Firm (dry) light brown and medium grey to grey brown slightly gravely sandy SILT. Gravel is fine to coarse angular sandstone, siltstone, coal, brick			
2.00 - 2.50	D 1.75 SPT N = 9	2,3,2,3,2,2	2.00	MADE GROUND - Soft medium grey slightly sandy silty CLAY			
3.00 - 3.50	SPT N = 17	2,4,5,4,4,4					
4.00 - 4.50	SPT N = 19	3,4,4,5,5,5	3.50	Firm light brown and light grey mottled slightly gravely slightly sandy silty CLAY			
			4.50				
				Base of borehole at 4.50m			

Remarks

Backfilled with arisings

SITE: SITE ON FALLOWS WAY, PRESCOT	BOREHOLE No: WS5 Sheet 1 of 1 Project Ref: e0922 Logged By: HLJ
LOCN: FALLOWS WAY, PRESCOT, L35 1RZ	
CLIENT: ELLISONS TRAVEL	
Dates : 29/06/2017	
Elev (maOD) :	
Casing dia : 100mm	
Engineer : E-Geo Solutions Ltd	

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Appendix 2 - Dynamic Probe Records

Super Heavy Dynamic Probe Test Results

Fallows Way - Prescott

FACTUAL REPORT

Prepared for:

**E-Geo Solutions
Oak House
Abergele
LL22 7SU**

Report Reference: FTR 26726

ISSUE REF: 1

Issue Date: 18th July 2017

Prepared by:

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Page 1

1.0 Introduction

Following your instructions Six (6) dynamic probe tests was carried out using a Dynamic Probe with Super Heavy hammer (DPSH-B) with 90° cone. The test was carried out in with BS 1377: Part 9: clause 3.2 & BS EN ISO 22476-2 to determine the Dynamic Probe resistance of the underlying material.

It is assumed that the DPSH-B method has a direct correlation to the SPT.

Site Address: Fallows Way

Date of Test: 29/06/2017

Weather Conditions: Dry

Tested By: Marc Bullock and John Parry

This report was prepared by: 
Jason Chinery

This report is issued on behalf of Celtest Limited by: 
(✓) Mr. Jason Chinery – Site Services Manager

Date of issue: 18th July 2017

FTR 26726

Page 2

**2.0 Location Plan
(Not provided)**

FTR 26726

Page 3

3.0 Test Results

3.1 – Location 1

LOCATION ON SITE : DCP 1									
HAMMER TYPE/MASS: Super Heavy/63.5Kg						STANDARD DROP: 760mm			
CONE TYPE/DIAMETER: 90°/50.5mm Ø						ROD TYPE/MASS : 8Kg/35mm Ø			
DAMPER USED : NO						CONE LEFT BEHIND : NO			
HOLES BACKFILLED : NO									

Depth (m)		Blows/ 100mm	SPT 'N' Values	Depth (m)		Blows/ 100mm	SPT 'N' Values
From	To			From	To		
0.0	0.1		N/A	4.1	4.2	5	15.0
0.1	0.2			4.2	4.3	4	
0.2	0.3	4	9.0	4.3	4.4	6	15.0
0.3	0.4	2		4.4	4.5	5	
0.4	0.5	3	3.0	4.5	4.6	5	14.0
0.5	0.6	3		4.6	4.7	5	
0.6	0.7	0	6.0	4.7	4.8	5	17.0
0.7	0.8	0		4.8	4.9	4	
0.8	0.9	1	10.0	4.9	5.0	5	21.0
0.9	1.0	1		5.0	5.1	6	
1.0	1.1	4	9.0	5.1	5.2	5	30.0
1.1	1.2	3		5.2	5.3	6	
1.2	1.3	4	9.0	5.3	5.4	6	46.0
1.3	1.4	3		5.4	5.5	7	
1.4	1.5	3	12.0	5.5	5.6	8	0.0
1.5	1.6	3		5.6	5.7	8	
1.6	1.7	3	13.0	5.7	5.8	9	0.0
1.7	1.8	3		5.8	5.9	13	
1.8	1.9	3	13.0	5.9	6.0	21	0.0
1.9	2.0	3		6.0	6.1	25	
2.0	2.1	4	10.0	6.1	6.2		0.0
2.1	2.2	4		6.2	6.3		
2.2	2.3	4	8.0	6.3	6.4		0.0
2.3	2.4	5		6.4	6.5		
2.4	2.5	4	9.0	6.5	6.6		0.0
2.5	2.6	4		6.6	6.7		
2.6	2.7	4	12.0	6.7	6.8		0.0
2.7	2.8	5		6.8	6.9		
2.8	2.9	4	10.0	6.9	7.0		0.0
2.9	3.0	4		7.0	7.1		
3.0	3.1	3	8.0	7.1	7.2		0.0
3.1	3.2	3		7.2	7.3		
3.2	3.3	2	9.0	7.3	7.4		0.0
3.3	3.4	3		7.4	7.5		
3.4	3.5	3	12.0	7.5	7.6		0.0
3.5	3.6	4		7.6	7.7		
3.6	3.7	3		7.7	7.8		0.0
3.7	3.8	2		7.8	7.9		
3.8	3.9	3		7.9	8.0		
3.9	4.0	4					
4.0	4.1	5					

Blows / 100mm

0

10

20

30

40

50

0.0

0.5

1.0

1.5

2.0

2.5

3.0

3.5

4.0

4.5

5.0

5.5

6.0

6.5

7.0

7.5

8.0

Depth (m)

0.0

0.5

1.0

1.5

2.0

2.5

3.0

3.5

4.0

4.5

5.0

5.5

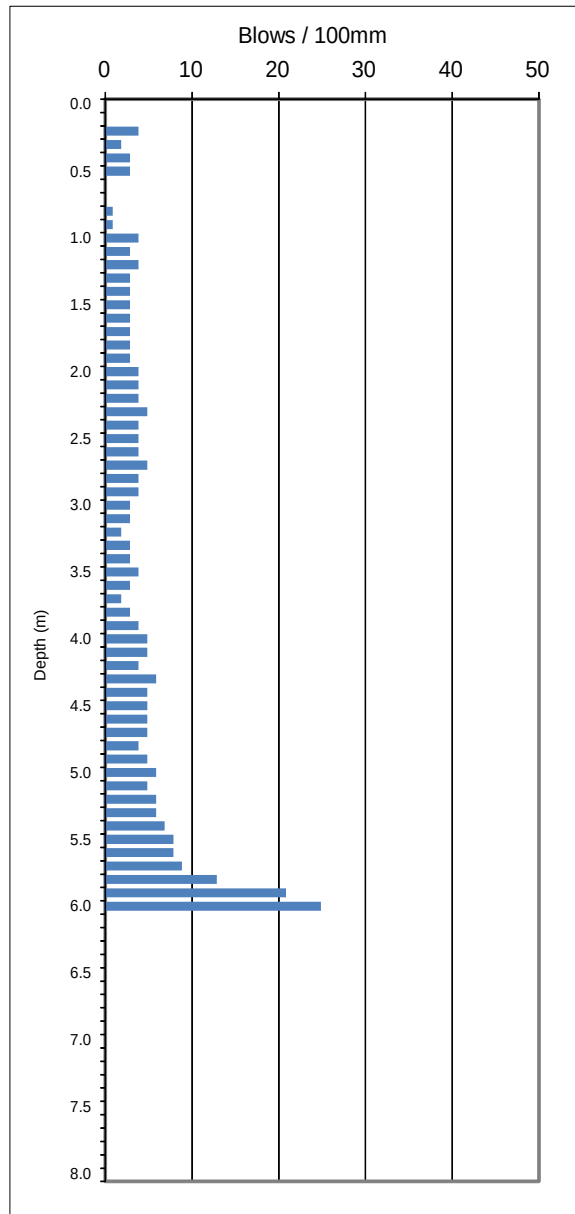
6.0

6.5

7.0

7.5

8.0



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Page 4

3.0 Test Results 3.2 – Location 2

LOCATION ON SITE : DCP 2							
HAMMER TYPE/MASS: Super Heavy/63.5Kg				STANDARD DROP: 760mm			
CONE TYPE/DIAMETER: 90°/50.5mm Ø				ROD TYPE/MASS : 8Kg/35mm Ø			
DAMPER USED : NO				CONE LEFT BEHIND : NO			
HOLES BACKFILLED : NO							

Depth (m)		Blows/ 100mm	SPT 'N' Values	Depth (m)		Blows/ 100mm	SPT 'N' Values
From	To			From	To		
0.0	0.1	4	N/A	4.1	4.2	3	9.0
0.1	0.2	4		4.2	4.3	3	
0.2	0.3	5		4.3	4.4	3	
0.3	0.4	4	14.0	4.4	4.5	2	8.0
0.4	0.5	5		4.5	4.6	3	
0.5	0.6	5		4.6	4.7	3	
0.6	0.7	3	11.0	4.7	4.8	3	9.0
0.7	0.8	3		4.8	4.9	3	
0.8	0.9	4		4.9	5.0	3	
0.9	1.0	4	13.0	5.0	5.1	6	23.0
1.0	1.1	5		5.1	5.2	8	
1.1	1.2	2		5.2	5.3	9	
1.2	1.3	2	6.0	5.3	5.4	16	53.0
1.3	1.4	2		5.4	5.5	19	
1.4	1.5	1		5.5	5.6	18	
1.5	1.6	1	3.0	5.6	5.7	21	46.0
1.6	1.7	1		5.7	5.8	25	
1.7	1.8			5.8	5.9		
1.8	1.9		0.0	5.9	6.0		0.0
1.9	2.0			6.0	6.1		
2.0	2.1	1		6.1	6.2		
2.1	2.2		2.0	6.2	6.3		0.0
2.2	2.3	1		6.3	6.4		
2.3	2.4	4		6.4	6.5		
2.4	2.5	2	8.0	6.5	6.6		0.0
2.5	2.6	2		6.6	6.7		
2.6	2.7	2		6.7	6.8		
2.7	2.8	2	7.0	6.8	6.9		0.0
2.8	2.9	3		6.9	7.0		
2.9	3.0	1		7.0	7.1		
3.0	3.1		2.0	7.1	7.2		0.0
3.1	3.2	1		7.2	7.3		
3.2	3.3	2		7.3	7.4		
3.3	3.4	1	5.0	7.4	7.5		0.0
3.4	3.5	2		7.5	7.6		
3.5	3.6	3		7.6	7.7		
3.6	3.7	8	16.0	7.7	7.8		0.0
3.7	3.8	5		7.8	7.9		
3.8	3.9	3		7.9	8.0		
3.9	4.0	3	8.0				
4.0	4.1	2					

Blows / 100mm

0

10

20

30

40

50

0.0

0.5

1.0

1.5

2.0

2.5

3.0

3.5

4.0

4.5

5.0

5.5

6.0

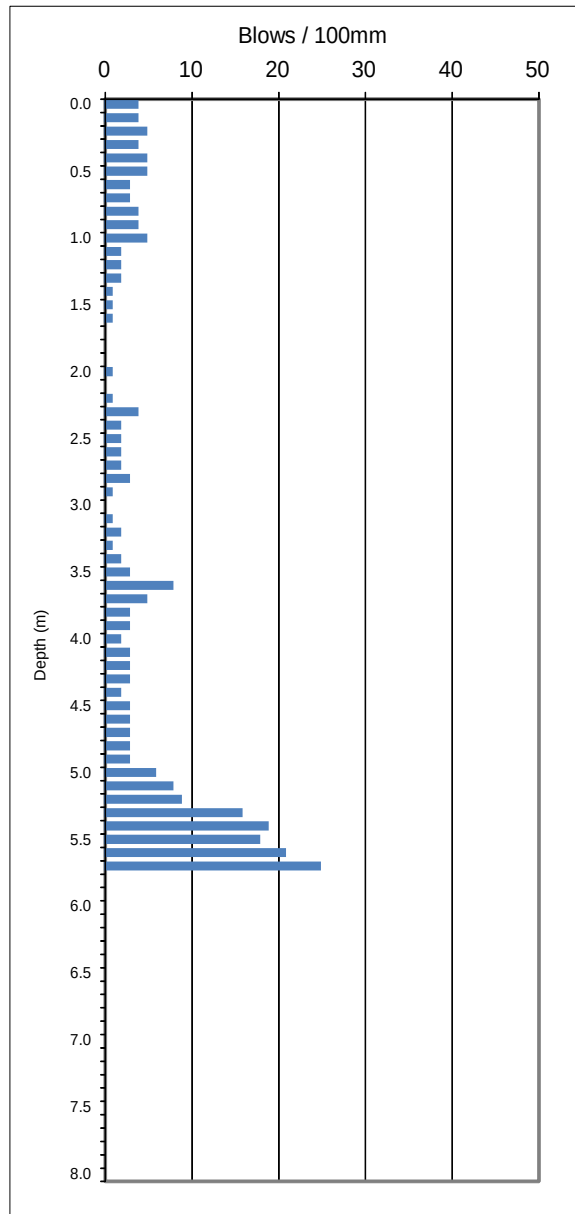
6.5

7.0

7.5

8.0

Depth (m)



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3.0 Test Results 3.3 – Location 3

LOCATION ON SITE : DCP 3									
HAMMER TYPE/MASS: Super Heavy/63.5Kg						STANDARD DROP: 760mm			
CONE TYPE/DIAMETER: 90 ⁰ /50.5mm Ø						ROD TYPE/MASS : 8Kg/35mm Ø			
DAMPER USED : NO						CONE LEFT BEHIND : NO			
HOLES BACKFILLED : NO									

Depth (m)		Blows/ 100mm	SPT 'N' Values	Depth (m)		Blows/ 100mm	SPT 'N' Values
From	To			From	To		
0.0	0.1		N/A	4.1	4.2	3	14.0
0.1	0.2			4.2	4.3	2	
0.2	0.3			4.3	4.4	9	
0.3	0.4	1	5.0	4.4	4.5	9	31.0
0.4	0.5	4		4.5	4.6	11	
0.5	0.6	4		4.6	4.7	11	
0.6	0.7	4	11.0	4.7	4.8	8	19.0
0.7	0.8	3		4.8	4.9	5	
0.8	0.9	3		4.9	5.0	6	
0.9	1.0	3	9.0	5.0	5.1	10	21.0
1.0	1.1	3		5.1	5.2	6	
1.1	1.2	2		5.2	5.3	5	
1.2	1.3	2	5.0	5.3	5.4	6	20.0
1.3	1.4	1		5.4	5.5	6	
1.4	1.5	1		5.5	5.6	8	
1.5	1.6	1	4.0	5.6	5.7	9	26.0
1.6	1.7	2		5.7	5.8	8	
1.7	1.8	2		5.8	5.9	9	
1.8	1.9	1	4.0	5.9	6.0	8	34.0
1.9	2.0	1		6.0	6.1	8	
2.0	2.1	2		6.1	6.2	18	
2.1	2.2	2	5.0	6.2	6.3	10	22.0
2.2	2.3	1		6.3	6.4	7	
2.3	2.4	1		6.4	6.5	5	
2.4	2.5	1	3.0	6.5	6.6	5	54.0
2.5	2.6	1		6.6	6.7	24	
2.6	2.7	1		6.7	6.8	25	
2.7	2.8	1	3.0	6.8	6.9		0.0
2.8	2.9	1		6.9	7.0		
2.9	3.0	1		7.0	7.1		
3.0	3.1	1	3.0	7.1	7.2		0.0
3.1	3.2	1		7.2	7.3		
3.2	3.3	1		7.3	7.4		
3.3	3.4	1	3.0	7.4	7.5		0.0
3.4	3.5	1		7.5	7.6		
3.5	3.6	2		7.6	7.7		
3.6	3.7	1	4.0	7.7	7.8		0.0
3.7	3.8	1		7.8	7.9		
3.8	3.9	2		7.9	8.0		
3.9	4.0	1	4.0	End			
4.0	4.1	1					

Blows / 100mm

Depth (m)

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3.0 Test Results

3.4 – Location 4

LOCATION ON SITE : DCP 4							
HAMMER TYPE/MASS: Super Heavy/63.5Kg					STANDARD DROP: 760mm		
CONE TYPE/DIAMETER: 90°/50.5mm Ø					ROD TYPE/MASS : 8Kg/35mm Ø		
DAMPER USED : NO					CONE LEFT BEHIND : NO		
HOLES BACKFILLED : NO							

Depth (m)		Blows/ 100mm	SPT 'N' Values	Depth (m)		Blows/ 100mm	SPT 'N' Values
From	To			From	To		
0.0	0.1	0	N/A	4.1	4.2	8	20.0
0.1	0.2	0		4.2	4.3	5	
0.2	0.3	1		4.3	4.4	7	
0.3	0.4	6	12.0	4.4	4.5	6	24.0
0.4	0.5	5		4.5	4.6	7	
0.5	0.6	12		4.6	4.7	11	
0.6	0.7	12	35.0	4.7	4.8	18	43.0
0.7	0.8	11		4.8	4.9	25	
0.8	0.9	11		4.9	5.0		
0.9	1.0	11	31.0	5.0	5.1		0.0
1.0	1.1	9		5.1	5.2		
1.1	1.2	15		5.2	5.3		
1.2	1.3	3	19.0	5.3	5.4		0.0
1.3	1.4	1		5.4	5.5		
1.4	1.5	1		5.5	5.6		
1.5	1.6	2	4.0	5.6	5.7		0.0
1.6	1.7	1		5.7	5.8		
1.7	1.8	1		5.8	5.9		
1.8	1.9	2	4.0	5.9	6.0		0.0
1.9	2.0	1		6.0	6.1		
2.0	2.1	0		6.1	6.2		
2.1	2.2	0	0.0	6.2	6.3		0.0
2.2	2.3	0		6.3	6.4		
2.3	2.4	1		6.4	6.5		
2.4	2.5	2	4.0	6.5	6.6		0.0
2.5	2.6	1		6.6	6.7		
2.6	2.7	1		6.7	6.8		
2.7	2.8	3	6.0	6.8	6.9		0.0
2.8	2.9	2		6.9	7.0		
2.9	3.0	1		7.0	7.1		
3.0	3.1	5	8.0	7.1	7.2		0.0
3.1	3.2	2		7.2	7.3		
3.2	3.3	3		7.3	7.4		
3.3	3.4	2	6.0	7.4	7.5		0.0
3.4	3.5	1		7.5	7.6		
3.5	3.6	2		7.6	7.7		
3.6	3.7	4	12.0	7.7	7.8		0.0
3.7	3.8	6		7.8	7.9		
3.8	3.9	4		7.9	8.0		
3.9	4.0	6	15.0	End			
4.0	4.1	5					

Blows / 100mm

Depth (m)

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3.0 Test Results 3.5 – Location 5

LOCATION ON SITE : DCP 5									
HAMMER TYPE/MASS: Super Heavy/63.5Kg						STANDARD DROP: 760mm			
CONE TYPE/DIAMETER: 90°/50.5mm Ø						ROD TYPE/MASS : 8Kg/35mm Ø			
DAMPER USED : NO						CONE LEFT BEHIND : NO			
HOLES BACKFILLED : NO									

Depth (m)		Blows/ 100mm	SPT 'N' Values	Depth (m)		Blows/ 100mm	SPT 'N' Values	
From	To			From	To			
0.0	0.1	0	N/A	4.1	4.2	4	15.0	
0.1	0.2	0		4.2	4.3	6		
0.2	0.3	2		4.3	4.4	5		
0.3	0.4	2	7.0	4.4	4.5	10	31.0	
0.4	0.5	3		4.5	4.6	10		
0.5	0.6	2		4.6	4.7	11		
0.6	0.7	4	8.0	4.7	4.8	9	41.0	
0.7	0.8	2		4.8	4.9	17		
0.8	0.9	2		4.9	5.0	15		
0.9	1.0	1	6.0	5.0	5.1	8	39.0	
1.0	1.1	3		5.1	5.2	6		
1.1	1.2	5		5.2	5.3	25		
1.2	1.3	8	26.0	5.3	5.4		0.0	
1.3	1.4	13		5.4	5.5			
1.4	1.5	9		5.5	5.6			
1.5	1.6	6	21.0	5.6	5.7		0.0	
1.6	1.7	6		5.7	5.8			
1.7	1.8	8		5.8	5.9			
1.8	1.9	14	37.0	5.9	6.0		0.0	
1.9	2.0	15		6.0	6.1			
2.0	2.1	17		6.1	6.2			
2.1	2.2	5	25.0	6.2	6.3		0.0	
2.2	2.3	3		6.3	6.4			
2.3	2.4	4		6.4	6.5			
2.4	2.5	3	9.0	6.5	6.6		0.0	
2.5	2.6	2		6.6	6.7			
2.6	2.7	3		6.7	6.8			
2.7	2.8	2	8.0	6.8	6.9		0.0	
2.8	2.9	3		6.9	7.0			
2.9	3.0	3		7.0	7.1			
3.0	3.1	3	8.0	7.1	7.2		0.0	
3.1	3.2	2		7.2	7.3			
3.2	3.3	2		7.3	7.4			
3.3	3.4	2	8.0	7.4	7.5		0.0	
3.4	3.5	4		7.5	7.6			
3.5	3.6	3		7.6	7.7			
3.6	3.7	4	12.0	7.7	7.8		0.0	
3.7	3.8	5		7.8	7.9			
3.8	3.9	4		7.9	8.0			
3.9	4.0	4	13.0	End				
4.0	4.1	5						

Blows / 100mm

0 10 20 30 40 50

Depth (m)

0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0

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3.0 Test Results 3.6 – Location 6

LOCATION ON SITE : SPT 1									
HAMMER TYPE/MASS: Super Heavy/63.5Kg						STANDARD DROP: 760mm			
CONE TYPE/DIAMETER: 90°/50.5mm Ø						ROD TYPE/MASS : 8Kg/35mm Ø			
DAMPER USED : NO						CONE LEFT BEHIND : NO			
HOLES BACKFILLED : NO									

Depth (m)		Blows/ 100mm	SPT 'N' Values	Depth (m)		Blows/ 100mm	SPT 'N' Values
From	To			From	To		
0.0	0.1		N/A	4.1	4.2		0.0
0.1	0.2			4.2	4.3		
0.2	0.3		0.0	4.3	4.4		0.0
0.3	0.4			4.4	4.5		
0.4	0.5		0.0	4.5	4.6		0.0
0.5	0.6			4.6	4.7		
0.6	0.7		0.0	4.7	4.8		0.0
0.7	0.8			4.8	4.9		
0.8	0.9		2.0	4.9	5.0		0.0
0.9	1.0			5.0	5.1		
1.0	1.1	2	6.0	5.1	5.2		0.0
1.1	1.2	2		5.2	5.3		
1.2	1.3	2	6.0	5.3	5.4		0.0
1.3	1.4	2		5.4	5.5		
1.4	1.5	2	6.0	5.5	5.6		0.0
1.5	1.6	2		5.6	5.7		
1.6	1.7	2	6.0	5.7	5.8		0.0
1.7	1.8	2		5.8	5.9		
1.8	1.9	2	0.0	5.9	6.0		0.0
1.9	2.0	2		6.0	6.1		
2.0	2.1		0.0	6.1	6.2		0.0
2.1	2.2			6.2	6.3		
2.2	2.3		0.0	6.3	6.4		0.0
2.3	2.4			6.4	6.5		
2.4	2.5		0.0	6.5	6.6		0.0
2.5	2.6			6.6	6.7		
2.6	2.7		0.0	6.7	6.8		0.0
2.7	2.8			6.8	6.9		
2.8	2.9		4.0	6.9	7.0		0.0
2.9	3.0			7.0	7.1		
3.0	3.1	2	6.0	7.1	7.2		0.0
3.1	3.2	2		7.2	7.3		
3.2	3.3	2	3.0	7.3	7.4		0.0
3.3	3.4	2		7.4	7.5		
3.4	3.5	2	2.0	7.5	7.6		0.0
3.5	3.6	1		7.6	7.7		
3.6	3.7	1	1.0	7.7	7.8		0.0
3.7	3.8	1		7.8	7.9		
3.8	3.9	1	1.0	7.9	8.0		0.0
3.9	4.0	1					
4.0	4.1						

Blows / 100mm

01020304050

Depth (m)

0.00.51.01.52.02.53.03.54.04.55.05.56.06.57.07.58.0

Appendix 3 - Chemical Analysis Results



Certificate of Analysis

Certificate Number 17-04427

13-Jul-17

Client EGEO Solutions Ltd
Oak House
Groes Lwyd
Abergele
LL22 7SU

Our Reference 17-04427

Client Reference FALLOWS

Order No 0922P02

Contract Title FALLOWS WAY, PRESCOT

Description 8 Soil samples.

Date Received 05-Jul-17

Date Started 05-Jul-17

Date Completed 13-Jul-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 10725 accreditation. 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 except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 17-04427

Client Ref FALLOWS

Contract Title FALLOWS WAY, PRESCOT

Sample ID	Depth	Lab No	Completed	Matrix Description
WS1	0.75	1199968	13/07/2017	Dark brown very sandy CLAY
WS1	1.75	1199969	13/07/2017	Dark brown gravelly, sandy CLAY
WS2	0.5	1199970	13/07/2017	Brown gravelly, very clayey SAND
WS2	1.5	1199971	13/07/2017	Brown clayey, gravelly SAND
WS3	0.75	1199972	13/07/2017	Dark brown very sandy CLAY
WS3	2	1199973	13/07/2017	Dark brown slightly gravelly, very sandy CLAY
WS4	0.75	1199974	13/07/2017	Light brown gravelly, clayey SAND
WS5	0.5	1199975	13/07/2017	Brown very sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 17-04427

Client Ref FALLOWS

Contract Title FALLOWS WAY, PRESCOT

Lab No	1199968	1199969	1199970	1199971	1199972	1199974	1199975
Sample ID	WS1	WS1	WS2	WS2	WS3	WS4	WS5
Depth	0.75	1.75	0.50	1.50	0.75	0.75	0.50
Other ID							
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	29/06/17	29/06/17	29/06/17	29/06/17	29/06/17	29/06/17	29/06/17
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	15		15		5.5	15
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.7		1.9		2.8	1.8
Cadmium	DETSC 2301#	0.1	mg/kg	0.6		0.5		0.1	0.6
Chromium	DETSC 2301#	0.15	mg/kg	19		20		13	22
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0		< 1.0		< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	69		63		13	64
Lead	DETSC 2301#	0.3	mg/kg	72		82		19	67
Mercury	DETSC 2325#	0.05	mg/kg	0.12		0.15		< 0.05	0.11
Nickel	DETSC 2301#	1	mg/kg	20		20		11	19
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5		0.5		1.4	0.7
Zinc	DETSC 2301#	1	mg/kg	97		96		66	94
Inorganics									
pH	DETSC 2008#			7.5		7.8		10.5	7.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1		0.4		< 0.1	0.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	790		130			
Sulphide	DETSC 2024#	10	mg/kg	12		28		20	< 10
Sulphur as S, Total	DETSC 2320	0.01	%	0.09		0.22		0.30	0.03
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.23		0.63		0.99	0.05
Petroleum Hydrocarbons									
EPH (C10-C40)	DETSC 3311#	10	mg/kg		< 10				< 10
PAHs									
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6		< 1.6		< 1.6	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3		0.6		< 0.3	< 0.3

Summary of Asbestos Analysis Soil Samples

Our Ref 17-04427

Client Ref FALLOWS

Contract Title FALLOWS WAY, PRESCOT

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1199973	WS3 2.00	SOIL	NAD	none	Keith Wilson
1199975	WS5 0.50	SOIL	NAD	none	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 17-04427
 Client Ref FALLOWS
 Contract FALLOWS WAY, PRESCOT

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1199968	WS1 0.75 SOIL	29/06/17	GJ 250ml		
1199969	WS1 1.75 SOIL	29/06/17	GJ 250ml		
1199970	WS2 0.50 SOIL	29/06/17	GJ 250ml		
1199971	WS2 1.50 SOIL	29/06/17	GJ 250ml		
1199972	WS3 0.75 SOIL	29/06/17	GJ 250ml		
1199973	WS3 2.00 SOIL	29/06/17	GJ 250ml		
1199974	WS4 0.75 SOIL	29/06/17	GJ 250ml		
1199975	WS5 0.50 SOIL	29/06/17	GJ 250ml		

Key: G-Glass J-Jar

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Appendix C

UK SUDS GREENFIELD RUNOFF CALCULATIONS

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Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

Default Edited

SOIL type:

HOST class:

SPR/SPRHOST:

Hydrological characteristics

Default Edited

SAAR (mm):

Hydrological region:

Growth curve factor 1 year:

Growth curve factor 30 years:

Growth curve factor 100 years:

Growth curve factor 200 years:

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default Edited

Q_{BAR} (l/s):

1 in 1 year (l/s):

1 in 30 years (l/s):

1 in 100 year (l/s):

1 in 200 years (l/s):

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix D

DRAINAGE CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
AT	1.266	5.00	100.000	1200	100.000	100.000	2.000

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	40	0	0

Node AT Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	98.000	Product Number	CTL-SHE-0128-7900-1200-7900
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	7.9	Min Node Diameter (mm)	1200

Node AT Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	730.0	0.0	1.200	730.0	0.0	1.201	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	84.280	23.848	30 year 360 minute summer	30.343	7.808
1 year 15 minute winter	59.144	23.848	30 year 360 minute winter	19.724	7.808
1 year 30 minute summer	57.102	16.158	30 year 480 minute summer	24.111	6.372
1 year 30 minute winter	40.072	16.158	30 year 480 minute winter	16.019	6.372
1 year 60 minute summer	40.398	10.676	30 year 600 minute summer	19.882	5.438
1 year 60 minute winter	26.839	10.676	30 year 600 minute winter	13.585	5.438
1 year 120 minute summer	26.432	6.985	30 year 720 minute summer	17.819	4.776
1 year 120 minute winter	17.561	6.985	30 year 720 minute winter	11.975	4.776
1 year 180 minute summer	21.115	5.434	30 year 960 minute summer	14.763	3.887
1 year 180 minute winter	13.725	5.434	30 year 960 minute winter	9.779	3.887
1 year 240 minute summer	17.197	4.545	30 year 1440 minute summer	10.836	2.904
1 year 240 minute winter	11.425	4.545	30 year 1440 minute winter	7.282	2.904
1 year 360 minute summer	13.694	3.524	100 year +40% CC 15 minute summer	368.854	104.373
1 year 360 minute winter	8.901	3.524	100 year +40% CC 15 minute winter	258.845	104.373
1 year 480 minute summer	11.066	2.925	100 year +40% CC 30 minute summer	255.101	72.185
1 year 480 minute winter	7.352	2.925	100 year +40% CC 30 minute winter	179.018	72.185
1 year 600 minute summer	9.254	2.531	100 year +40% CC 60 minute summer	180.954	47.821
1 year 600 minute winter	6.323	2.531	100 year +40% CC 60 minute winter	120.222	47.821
1 year 720 minute summer	8.394	2.250	100 year +40% CC 120 minute summer	116.088	30.679
1 year 720 minute winter	5.641	2.250	100 year +40% CC 120 minute winter	77.126	30.679
1 year 960 minute summer	7.097	1.869	100 year +40% CC 180 minute summer	90.626	23.321
1 year 960 minute winter	4.701	1.869	100 year +40% CC 180 minute winter	58.909	23.321
1 year 1440 minute summer	5.374	1.440	100 year +40% CC 240 minute summer	72.104	19.055
1 year 1440 minute winter	3.611	1.440	100 year +40% CC 240 minute winter	47.904	19.055
30 year 15 minute summer	205.071	58.028	100 year +40% CC 360 minute summer	55.175	14.198
30 year 15 minute winter	143.910	58.028	100 year +40% CC 360 minute winter	35.865	14.198
30 year 30 minute summer	140.191	39.669	100 year +40% CC 480 minute summer	43.619	11.527
30 year 30 minute winter	98.380	39.669	100 year +40% CC 480 minute winter	28.979	11.527
30 year 60 minute summer	98.615	26.061	100 year +40% CC 600 minute summer	35.816	9.797
30 year 60 minute winter	65.517	26.061	100 year +40% CC 600 minute winter	24.472	9.797
30 year 120 minute summer	63.038	16.659	100 year +40% CC 720 minute summer	31.983	8.572
30 year 120 minute winter	41.881	16.659	100 year +40% CC 720 minute winter	21.495	8.572
30 year 180 minute summer	49.285	12.683	100 year +40% CC 960 minute summer	26.337	6.935
30 year 180 minute winter	32.037	12.683	100 year +40% CC 960 minute winter	17.446	6.935
30 year 240 minute summer	39.344	10.398	100 year +40% CC 1440 minute summer	19.151	5.133
30 year 240 minute winter	26.139	10.398	100 year +40% CC 1440 minute winter	12.870	5.133

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute winter	AT	344	98.211	0.211	21.7	146.7550	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
480 minute winter	AT	Hydro-Brake®	7.5	201.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute winter	AT	448	98.557	0.557	47.3	387.0613	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
480 minute winter	AT	Hydro-Brake®	7.9	271.1

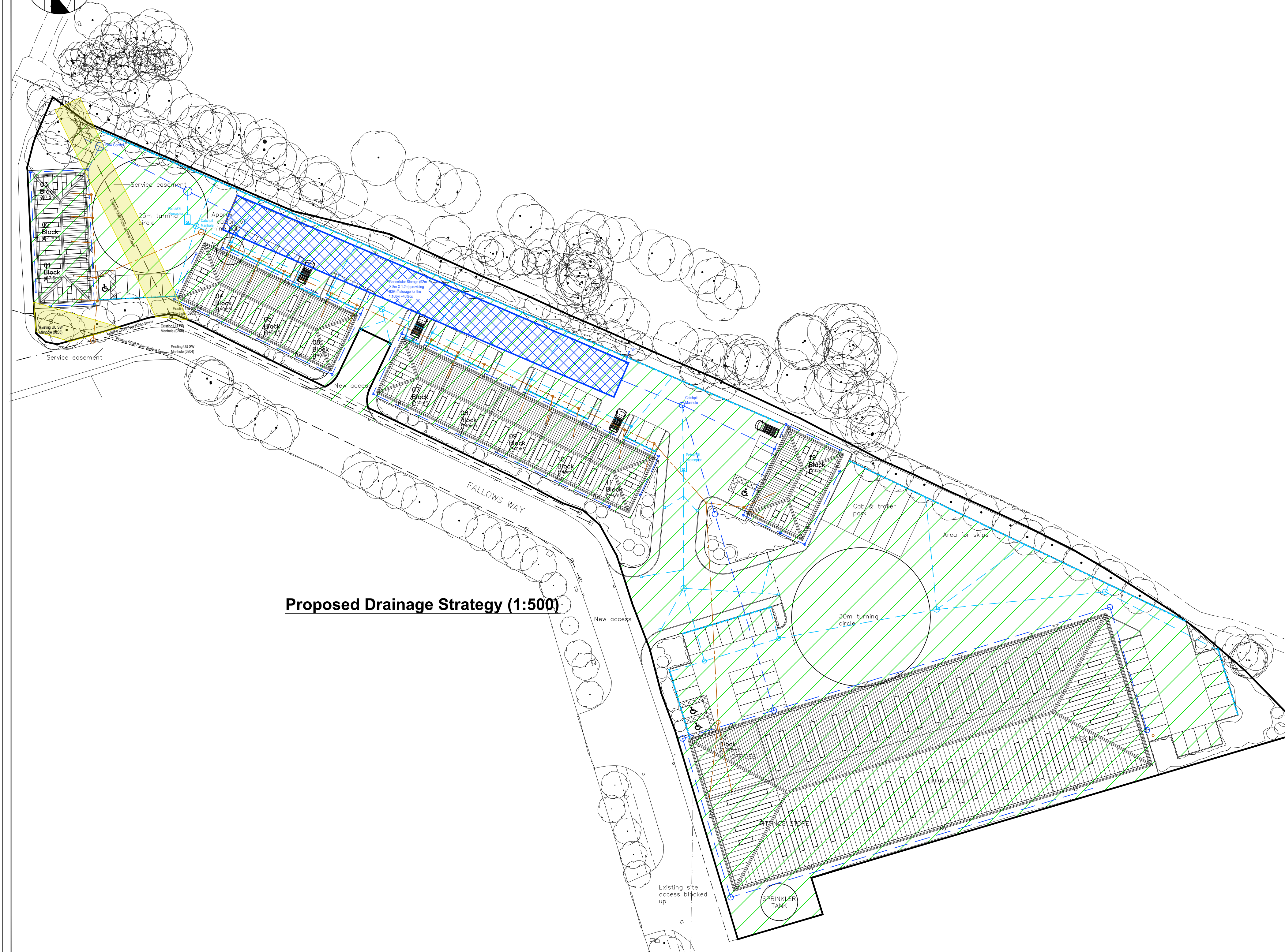
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	AT	900	99.197	1.197	51.5	831.2990	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	AT	Hydro-Brake®	7.9	465.4

Appendix E

DRAINAGE STRATEGY LAYOUT



Proposed Drainage Strategy (1:500)

1

Drainage Strategy

The site is in FZ1. Please refer to AMA Flood risk Assessment

The site is currently Greenfield with a site area of 14583m². The Greenfield run-off rate from the Estimation tool based on a 1 in 1 year event equates to 7.9 L/sec.

Under SuDs guidance the first point of discharge for surface water is via infiltration. As the ground conditions are clay we are proposing surface water discharge to the public sewer within Fallows Way.

Surface Water:

Flow restriction 7.9 L/s - To be confirmed with United Utilities.

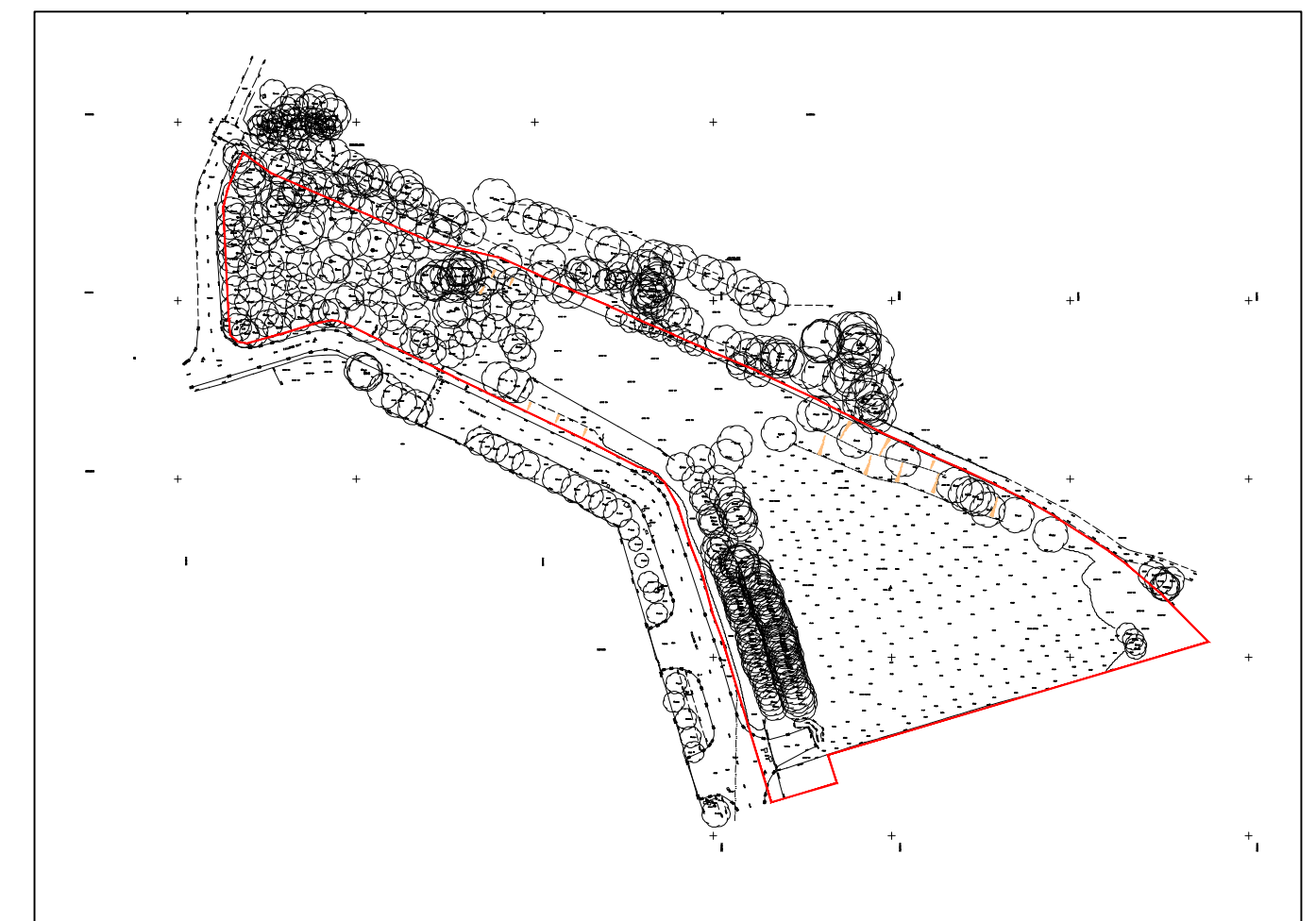
The proposed impermeable area is 12662m2. Based on a flow restriction of 7.9l/s and modeling using Causeway Flow software the attenuation requirement for a peak return period of 1 in 100year plus 40% climate change is **831m3**.

Attenuation to be provided via **GEO-CELLULAR TANK 92x8x1.2m DEEP WITH 95% VOID RATIO**. The flows will be attenuated using a 128mm Hydrobrake Model No: SHE-0128-7900-1200-7900.

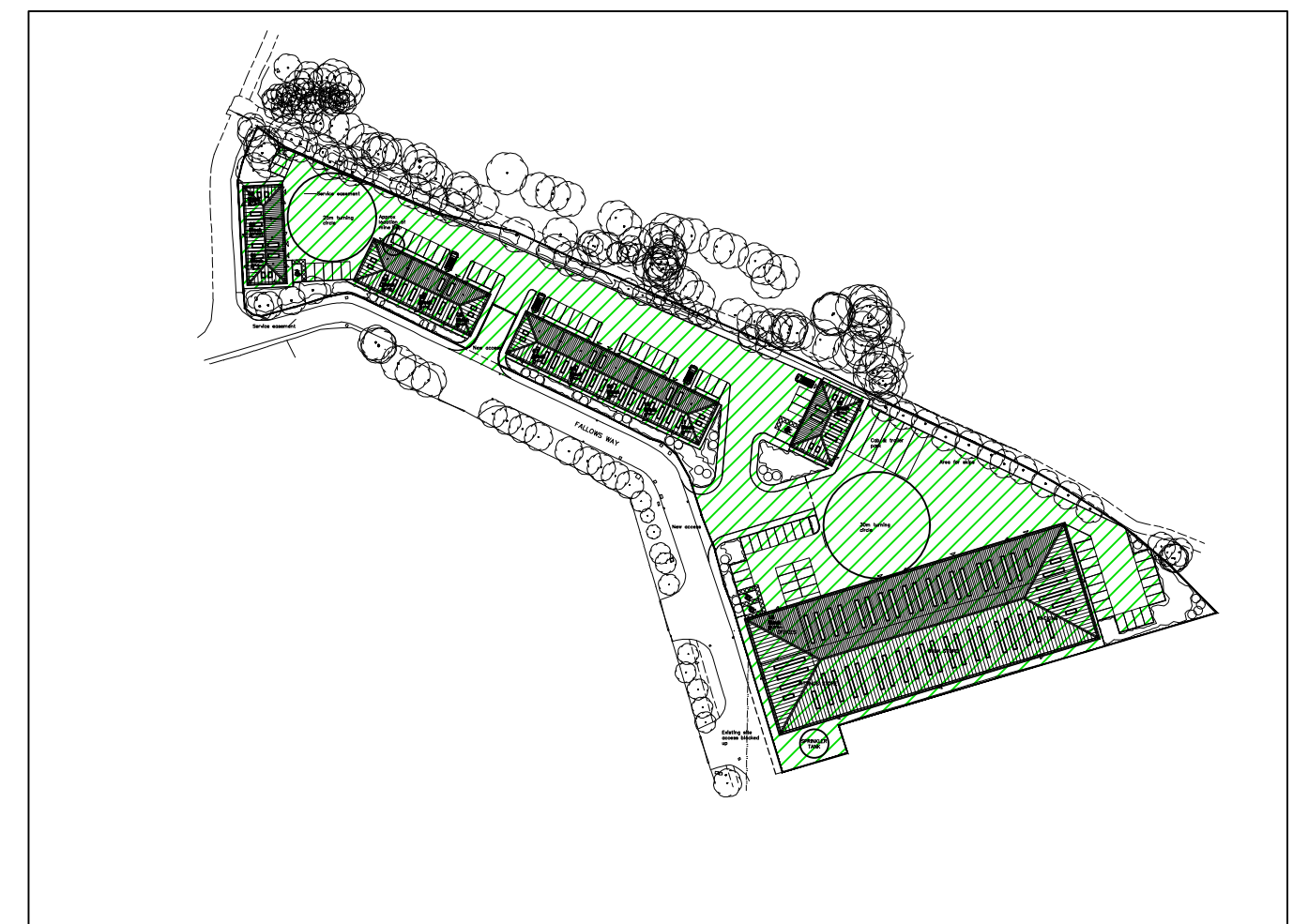
Exact point of connection to the 525dia Sewer is to be confirmed by United Utilities. A S106 new connection will be required. The exact line of the sewer crossing the site needs to be confirmed to determine any easement requirements.

Foul Water:

Foul water from the proposed new site will connect into the existing public foul sewer system within Fallows Way. Exact point of connection to be confirmed by United Utilities. A S106 new connection will be required.



Existing Site Area (1:2000) = 14583m²



Proposed Impermeable Area (1:2000) = 12662m²

RWP AND SVP/FOUL CONNECTIONS
ARE SUBJECT TO FINAL
CONFIRMATION BY ARCHITECT

NOTES

	Preliminary - Initial Issue	13/08/22	GS
REV	DESCRIPTION	DATE	BY
			
Project			
Fallows Way, Prescot			
Client			
Allied Properties			
Drawing			
Drainage Strategy			
Drawn By		Date	
GS		08/08/2022	
Checked		Scale	
TM		As Shown @ A1	
		A1	
Drawing No.		Rev.	
AMA-21686-DR-500		P1	

Appendix F

PUBLIC SEWERS MAP



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