



FALLOWS WAY, PRESCOT

FLOOD RISK AND
DRAINAGE STRATEGY

AUGUST 2022

FALLOWS WAY, PRESCOT

FLOOD RISK AND DRAINAGE STRATEGY

Allied Properties

Flood Risk and Drainage Strategy

CONFIDENTIAL

Project no: 21686-FRS-001

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Q U A L I T Y M A N A G E M E N T

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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.

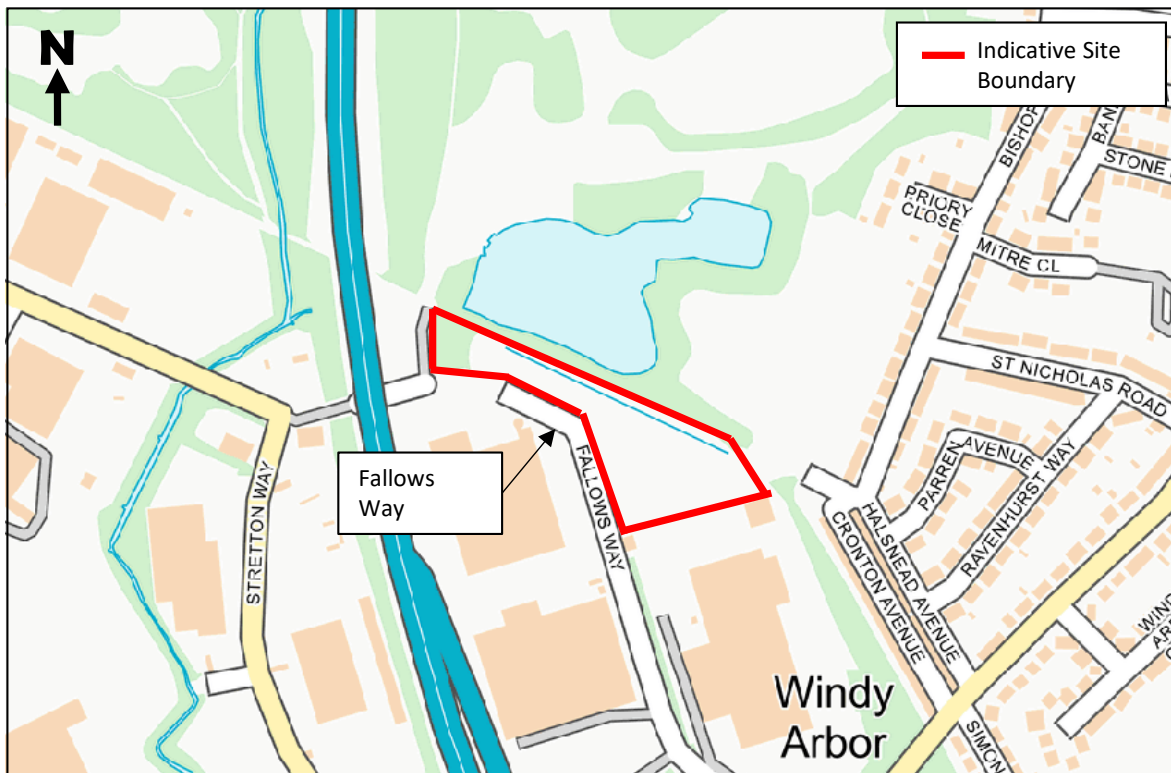


Figure 1. Site location

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 an 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.

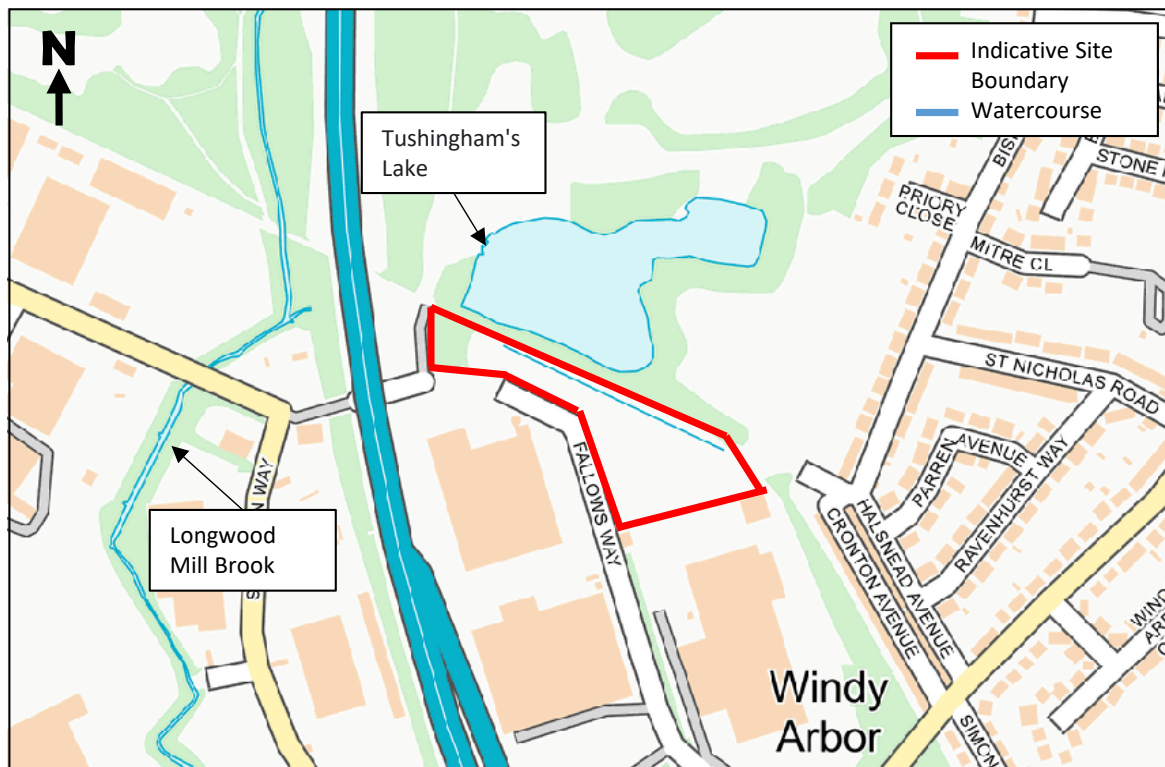


Figure 2. Watercourse location

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.

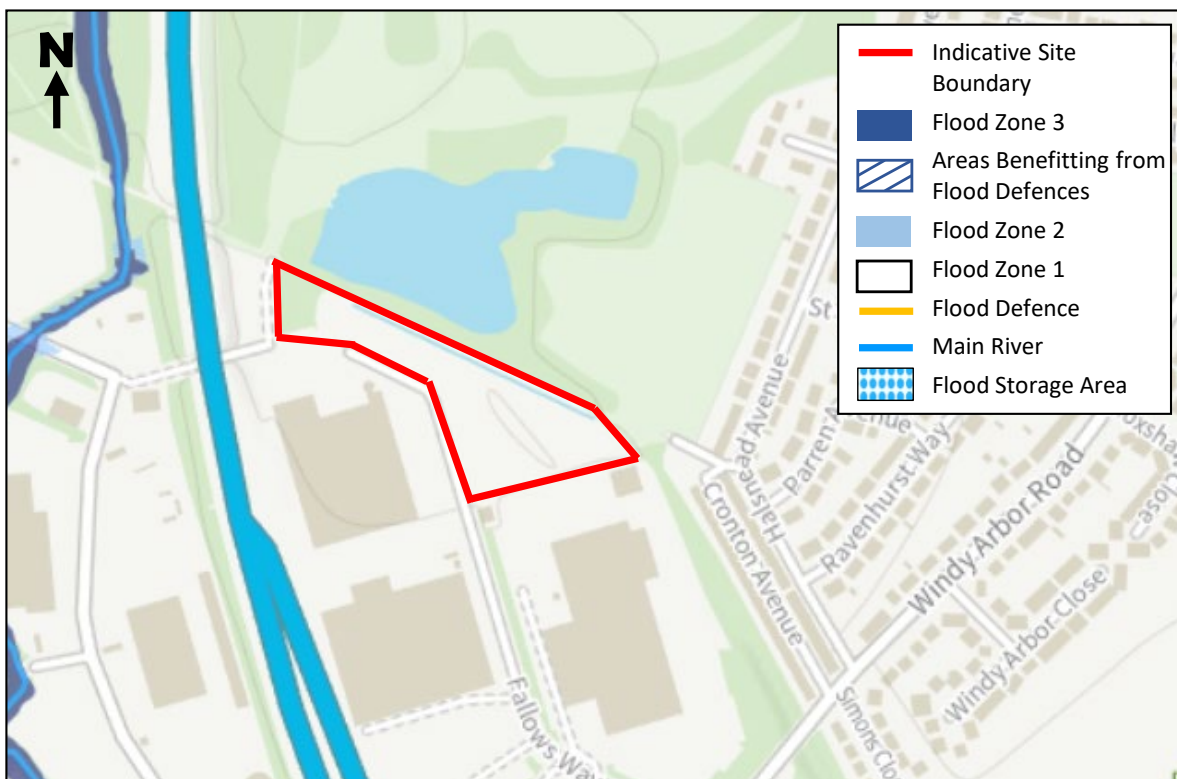


Figure 3. Environment Agency long term flood map for planning - rivers and seas

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.

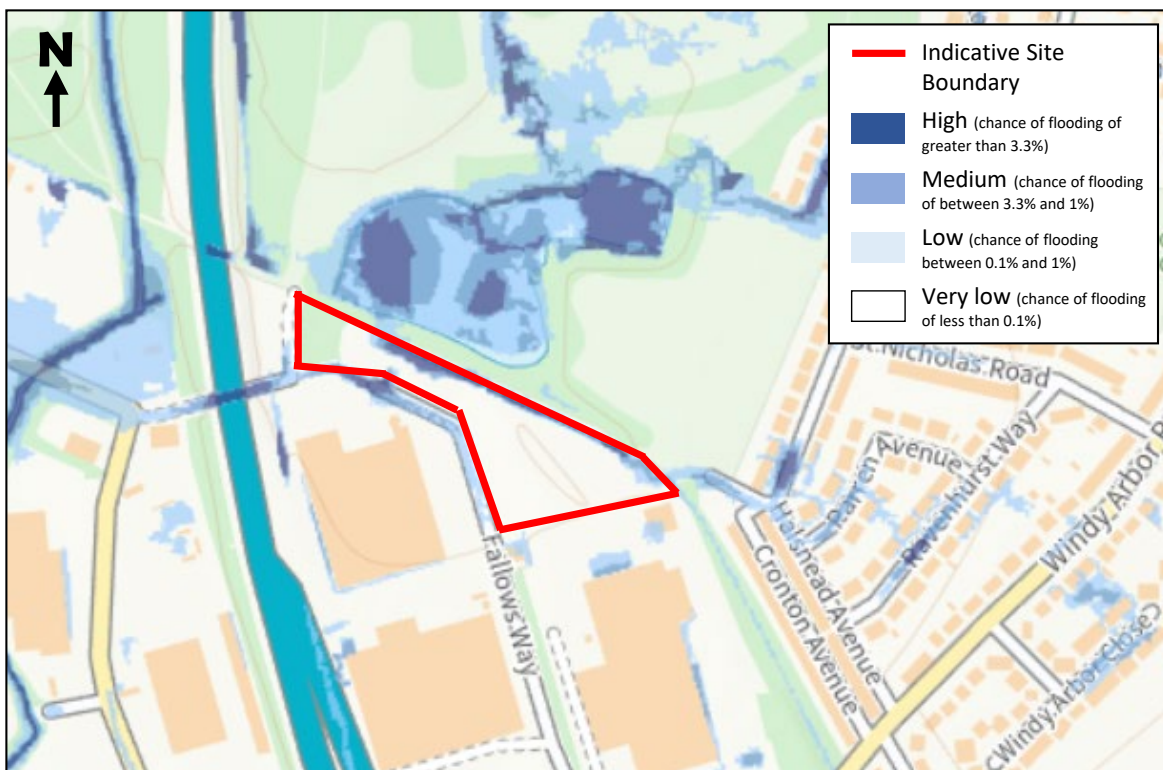


Figure 4. Environment Agency long term flood risk map – pluvial (surface water) flooding

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 STRATEGY

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 site consists of clayey soils, with the 3.5m of made silty / clayey ground.
- 4.4.2 At the time of writing this report, further ground investigation works have been halted due to the boggy nature of the existing soils. This suggests that the existing ground is not freely draining and does not support infiltration methods for the proposed development. Photographs of the site can be found in Appendix G.
- 4.4.3 Additionally, the proximity to Tushingham's Lake would suggest that the ground on site will have a relatively high water table, which suggests that infiltration methods would not be suitable.

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 detailed drainage calculations 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 detailed drainage 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	884

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 does not appear to support infiltration due to the ground conditions. The Ground Investigation contractors will verify this upon completion of the investigation.
- 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 G – SITE PHOTOGRAPHY

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- 81.5m ² (880 sq ft) 05- 140m ² (1,500 sq ft) 06- 140m ² (1,500 sq ft) Total - 361.5m ² (3,880 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) Plus 185m ² (1,991 sq ft) FF Offices
TOTAL	4,816m ² (51,839 sq ft)
PARKING	
Blocks A-D	39 car spaces
Blocks E	48 car spaces
TOTAL	87 car spaces
Total motorcycle parking spaces	= 6 (min 1 per 1,000m ²)
Total cycle spaces	= 17 (min 1 per 450m ²)

A	08.11.2021	Scale bar added	ML	ML
Rev	Date	Description	Drawn	Checked
Project	Fallows Way, Prescot			
Drawing	Proposed Site Layout			
Client	Allied Properties			
BIM Suitability Description	SUITABLE FOR INFORMATION			BIM Suitability Code S2
Status	Planning	2 Riverside Way Whitehall Waterfront	320 City Road Angel	
Date	20/08/2021	LEEDS	LONDON	
Drawn	ML	LS1 4EH	EC1V 2NZ	
Checked	GE	T 0113 819 8041	T 0203 883 8602	
Scale (A2)	1:500	v edwardarchitecture.co.uk	e info@edwardarchitecture.co.uk	
Project	0924	Originator	Discipline	Rev
	- EA	- A	- PL03	- B

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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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Distribution: ELLISONS TRAVEL

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Date:	19/07/17		
Prepared by:	Huw Littler-Jones		
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Signed:			

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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.

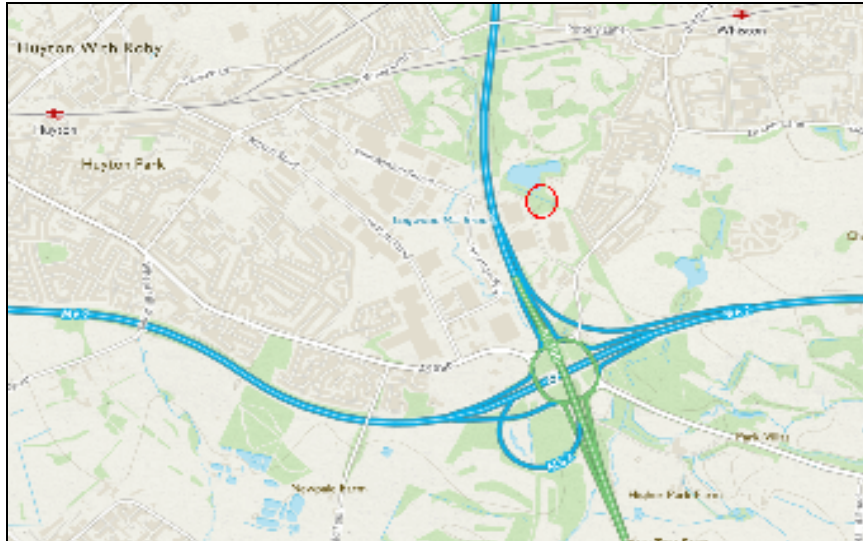


Figure 1 – Site Location

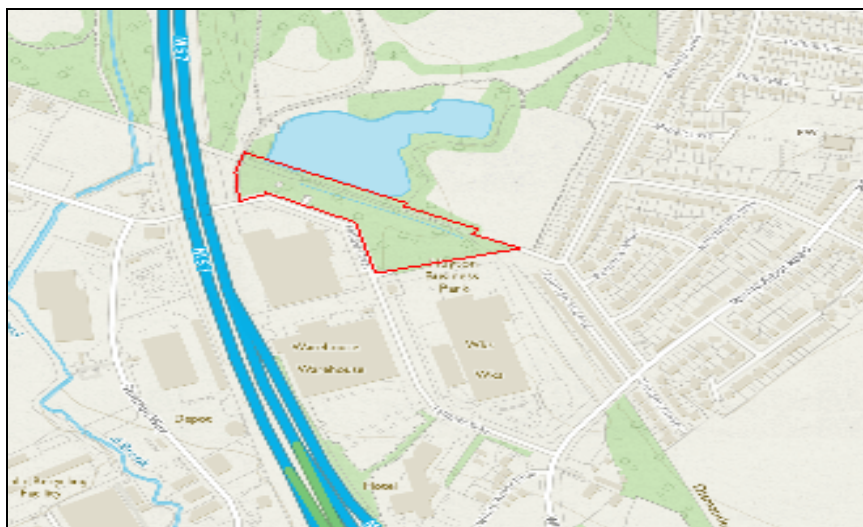


Figure 2 – Development Area

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.

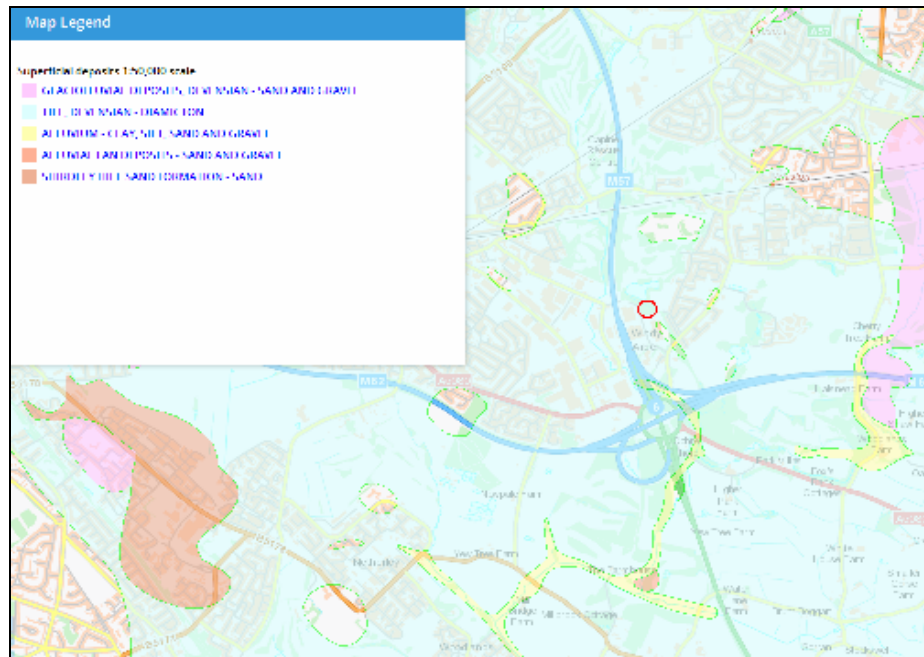


Figure 3 – BGS Superficial Geology Map Extract

- 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.

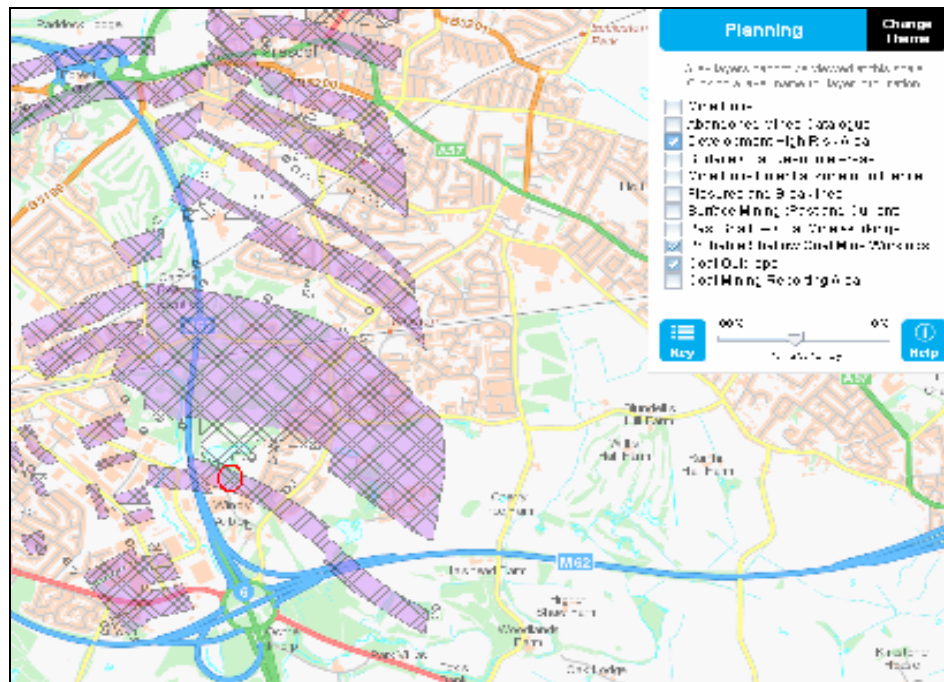


Figure 4 – Coal Authority Mining Information

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.

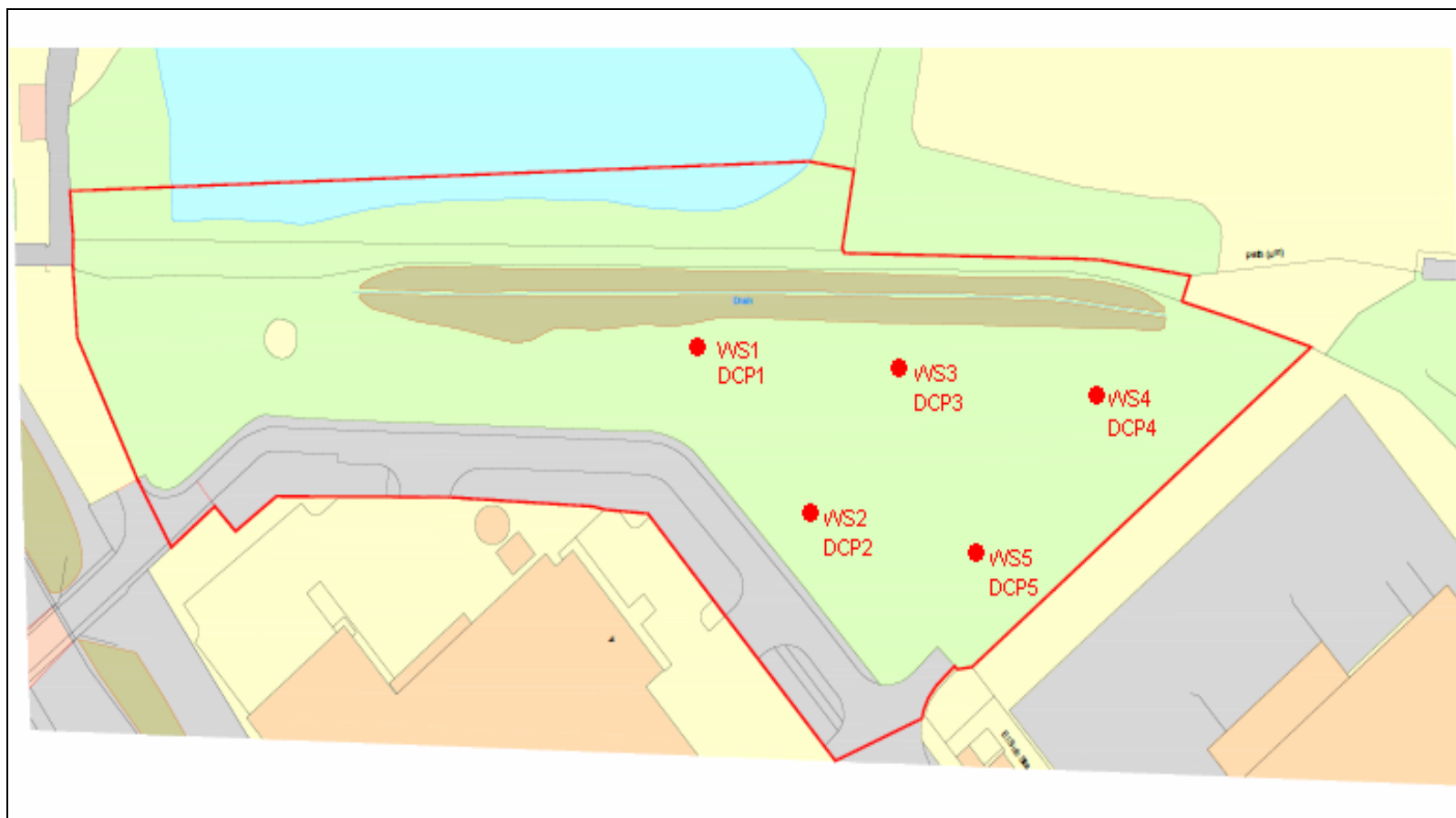


Figure 5 – WS Borehole (WS) and Dynamic Probe (DCP) Location Plan

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

[illegible]

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:

LOCN: FALLOWS WAY, PRESCOT, L35 1RZ

WS5

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

[illegible]

Remarks

Backfilled with arisings

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

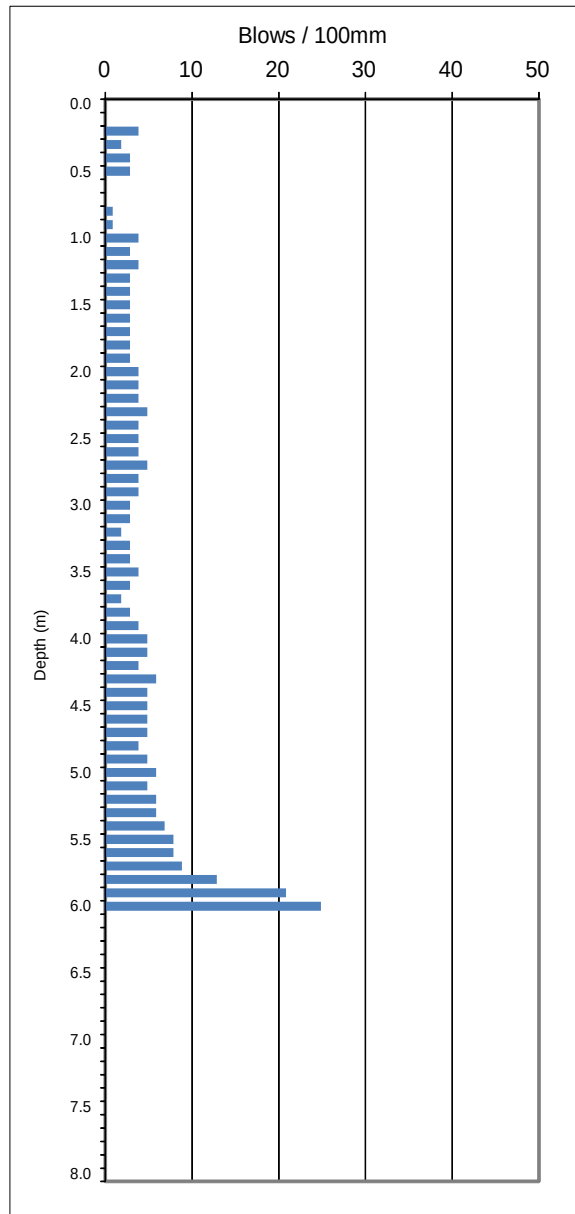
6.0

6.5

7.0

7.5

8.0



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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

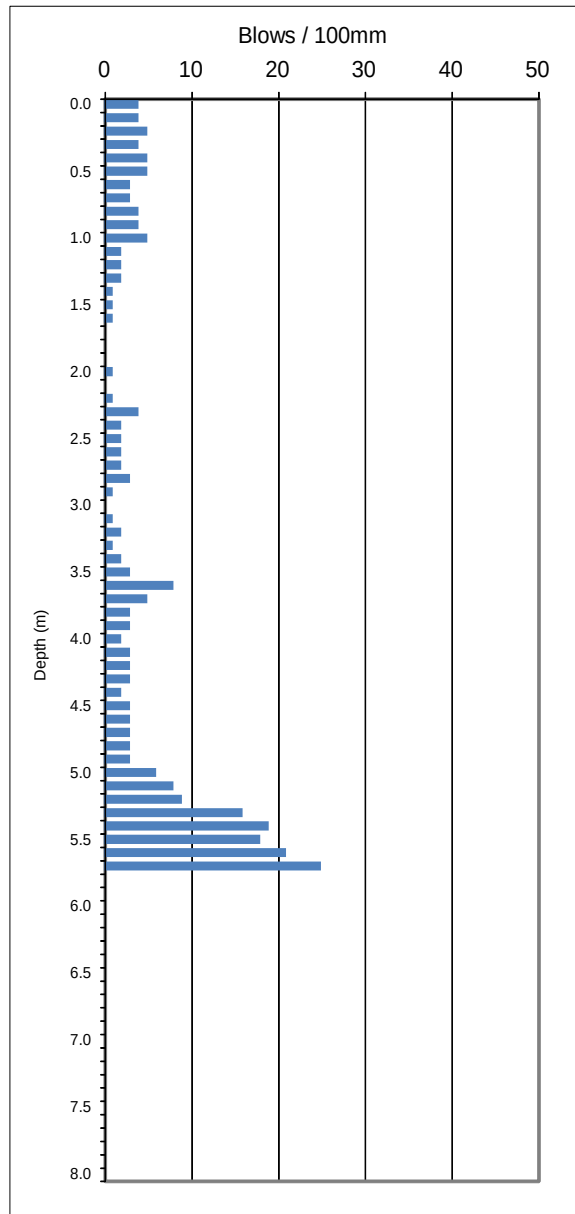
6.5

7.0

7.5

8.0

Depth (m)



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°/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)

FTR 26726

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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: 90⁰/50.5mm Ø				ROD TYPE/MASS : 8Kg/35mm Ø																																																																																																																																																																																																																																																																																																
DAMPER USED : NO				CONE LEFT BEHIND : NO																																																																																																																																																																																																																																																																																																
HOLES BACKFILLED : NO																																																																																																																																																																																																																																																																																																				
<table><tr><th colspan="2">Depth (m)</th><th rowspan="2">Blows/ 100mm</th><th rowspan="2">SPT 'N' Values</th><th colspan="2">Depth (m)</th><th rowspan="2">Blows/ 100mm</th><th rowspan="2">SPT 'N' Values</th></tr><tr><th>From</th><th>To</th><th>From</th><th>To</th></tr><tr><td>0.0</td><td>0.1</td><td>0</td><td rowspan="3">N/A</td><td>4.1</td><td>4.2</td><td>8</td><td rowspan="3">20.0</td></tr><tr><td>0.1</td><td>0.2</td><td>0</td><td>4.2</td><td>4.3</td><td>5</td></tr><tr><td>0.2</td><td>0.3</td><td>1</td><td>4.3</td><td>4.4</td><td>7</td></tr><tr><td>0.3</td><td>0.4</td><td>6</td><td rowspan="3">12.0</td><td>4.4</td><td>4.5</td><td>6</td><td rowspan="3">24.0</td></tr><tr><td>0.4</td><td>0.5</td><td>5</td><td>4.5</td><td>4.6</td><td>7</td></tr><tr><td>0.5</td><td>0.6</td><td>12</td><td>4.6</td><td>4.7</td><td>11</td></tr><tr><td>0.6</td><td>0.7</td><td>12</td><td rowspan="3">35.0</td><td>4.7</td><td>4.8</td><td>18</td><td rowspan="3">43.0</td></tr><tr><td>0.7</td><td>0.8</td><td>11</td><td>4.8</td><td>4.9</td><td>25</td></tr><tr><td>0.8</td><td>0.9</td><td>11</td><td>4.9</td><td>5.0</td><td></td></tr><tr><td>0.9</td><td>1.0</td><td>11</td><td rowspan="3">31.0</td><td>5.0</td><td>5.1</td><td></td><td rowspan="3">0.0</td></tr><tr><td>1.0</td><td>1.1</td><td>9</td><td>5.1</td><td>5.2</td><td></td></tr><tr><td>1.1</td><td>1.2</td><td>15</td><td>5.2</td><td>5.3</td><td></td></tr><tr><td>1.2</td><td>1.3</td><td>3</td><td rowspan="3">19.0</td><td>5.3</td><td>5.4</td><td></td><td rowspan="3">0.0</td></tr><tr><td>1.3</td><td>1.4</td><td>1</td><td>5.4</td><td>5.5</td><td></td></tr><tr><td>1.4</td><td>1.5</td><td>1</td><td>5.5</td><td>5.6</td><td></td></tr><tr><td>1.5</td><td>1.6</td><td>2</td><td rowspan="3">4.0</td><td>5.6</td><td>5.7</td><td></td><td rowspan="3">0.0</td></tr><tr><td>1.6</td><td>1.7</td><td>1</td><td>5.7</td><td>5.8</td><td></td></tr><tr><td>1.7</td><td>1.8</td><td>1</td><td>5.8</td><td>5.9</td><td></td></tr><tr><td>1.8</td><td>1.9</td><td>2</td><td rowspan="3">4.0</td><td>5.9</td><td>6.0</td><td></td><td rowspan="3">0.0</td></tr><tr><td>1.9</td><td>2.0</td><td>1</td><td>6.0</td><td>6.1</td><td></td></tr><tr><td>2.0</td><td>2.1</td><td>0</td><td>6.1</td><td>6.2</td><td></td></tr><tr><td>2.1</td><td>2.2</td><td>0</td><td rowspan="3">0.0</td><td>6.2</td><td>6.3</td><td></td><td rowspan="3">0.0</td></tr><tr><td>2.2</td><td>2.3</td><td>0</td><td>6.3</td><td>6.4</td><td></td></tr><tr><td>2.3</td><td>2.4</td><td>1</td><td>6.4</td><td>6.5</td><td></td></tr><tr><td>2.4</td><td>2.5</td><td>2</td><td rowspan="3">4.0</td><td>6.5</td><td>6.6</td><td></td><td rowspan="3">0.0</td></tr><tr><td>2.5</td><td>2.6</td><td>1</td><td>6.6</td><td>6.7</td><td></td></tr><tr><td>2.6</td><td>2.7</td><td>1</td><td>6.7</td><td>6.8</td><td></td></tr><tr><td>2.7</td><td>2.8</td><td>3</td><td rowspan="3">6.0</td><td>6.8</td><td>6.9</td><td></td><td rowspan="3">0.0</td></tr><tr><td>2.8</td><td>2.9</td><td>2</td><td>6.9</td><td>7.0</td><td></td></tr><tr><td>2.9</td><td>3.0</td><td>1</td><td>7.0</td><td>7.1</td><td></td></tr><tr><td>3.0</td><td>3.1</td><td>5</td><td rowspan="3">8.0</td><td>7.1</td><td>7.2</td><td></td><td rowspan="3">0.0</td></tr><tr><td>3.1</td><td>3.2</td><td>2</td><td>7.2</td><td>7.3</td><td></td></tr><tr><td>3.2</td><td>3.3</td><td>3</td><td>7.3</td><td>7.4</td><td></td></tr><tr><td>3.3</td><td>3.4</td><td>2</td><td rowspan="3">6.0</td><td>7.4</td><td>7.5</td><td></td><td rowspan="3">0.0</td></tr><tr><td>3.4</td><td>3.5</td><td>1</td><td>7.5</td><td>7.6</td><td></td></tr><tr><td>3.5</td><td>3.6</td><td>2</td><td>7.6</td><td>7.7</td><td></td></tr><tr><td>3.6</td><td>3.7</td><td>4</td><td rowspan="3">12.0</td><td>7.7</td><td>7.8</td><td></td><td rowspan="5">0.0</td></tr><tr><td>3.7</td><td>3.8</td><td>6</td><td>7.8</td><td>7.9</td><td></td></tr><tr><td>3.8</td><td>3.9</td><td>4</td><td>7.9</td><td>8.0</td><td></td></tr><tr><td>3.9</td><td>4.0</td><td>6</td><td rowspan="2">15.0</td><td colspan="3">End</td></tr><tr><td>4.0</td><td>4.1</td><td>5</td><td colspan="3"></td></tr></table>								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			
Depth (m)		Blows/ 100mm	SPT 'N' Values	Depth (m)		Blows/ 100mm	SPT 'N' Values																																																																																																																																																																																																																																																																																													
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3.1	3.2	2		7.2	7.3																																																																																																																																																																																																																																																																																															
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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

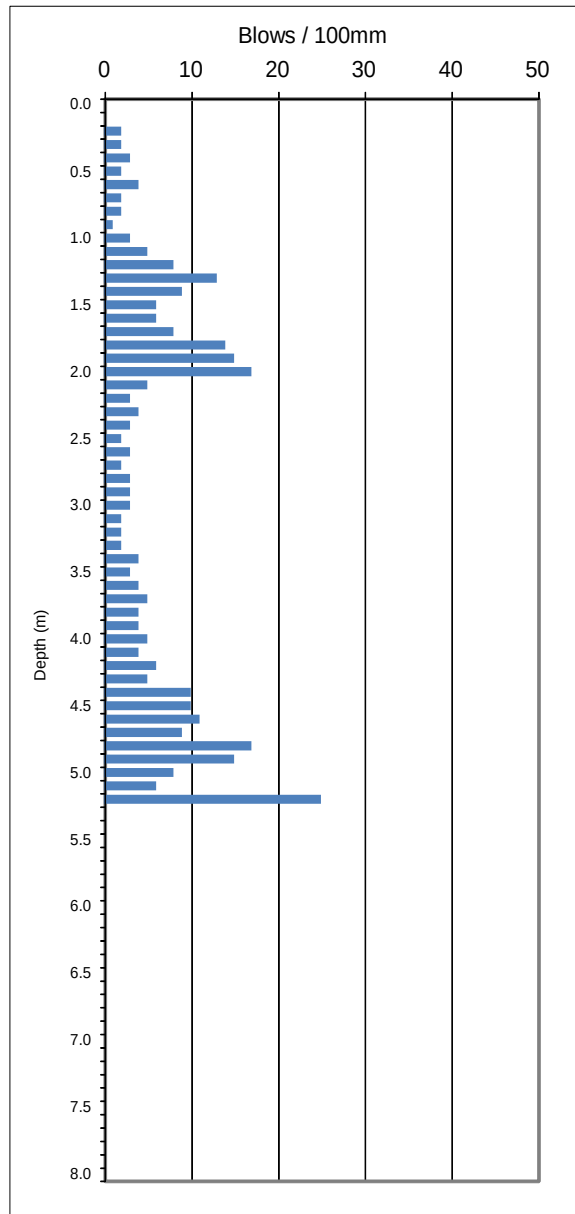
LOCATION ON SITE : DCP 5							
HAMMER TYPE/MASS: Super Heavy/63.5Kg					STANDARD DROP: 760mm		
CONE TYPE/DIAMETER: 90°/50.5mm Ø					ROD TYPE/MASS : 8Kg/35mm Ø		
DAMPER USED : NO					CONE LEFT BEHIND : NO		
HOLES BACKFILLED : NO							

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)	Blows / 100mm
0.0	0
0.1	0
0.2	2
0.3	2
0.4	3
0.5	2
0.6	4
0.7	2
0.8	2
0.9	1
1.0	3
1.1	5
1.2	8
1.3	13
1.4	9
1.5	6
1.6	6
1.7	8
1.8	14
1.9	15
2.0	17
2.1	5
2.2	3
2.3	4
2.4	3
2.5	2
2.6	3
2.7	2
2.8	3
2.9	3
3.0	3
3.1	2
3.2	2
3.3	2
3.4	4
3.5	3
3.6	4
3.7	5
3.8	4
3.9	4
4.0	5



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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)
1	0.133	5.00	30.810	450	346292.931	390142.038	1.425
2	0.030	5.00	30.040	600	346214.712	390118.498	1.425
3	0.015	5.00	29.172	600	346204.333	390152.819	1.472
4	0.030	5.00	30.496	450	346305.904	390154.313	1.350
5	0.118	5.00	29.090	600	346297.607	390181.479	1.443
6			30.618	1200	346223.654	390160.240	3.398
7	0.129	5.00	28.918	1200	346295.639	390184.502	1.575
8	0.151	5.00	30.449	1200	346259.210	390180.699	3.204
9	0.037	5.00	30.699	1200	346225.109	390174.444	4.174
10	0.057	5.00	29.966	1200	346209.049	390169.544	3.561
11	0.040	5.00	29.564	1200	346204.553	390185.285	3.269
12			28.524	1200	346202.214	390220.279	2.449
13	0.012	5.00	29.462	450	346233.502	390200.611	1.350
14	0.006	5.00	28.384	450	346240.178	390214.614	1.419
15			28.311	450	346226.798	390220.941	1.446
16	0.006	5.00	30.224	450	346230.710	390194.757	1.350
17	0.013	5.00	29.627	450	346217.428	390201.090	2.150
18			28.158	450	346224.184	390215.403	1.658
19			28.522	1500	346204.201	390224.867	2.822
20	0.005	5.00	28.445	450	346195.451	390205.343	1.350
21	0.036	5.00	28.461	450	346199.442	390213.713	1.431
22	0.042	5.00	28.456	450	346188.518	390202.946	1.350
23	0.005	5.00	27.757	450	346137.457	390227.293	1.350
24			28.522	450	346143.663	390240.309	2.322
25	0.002	5.00	27.977	450	346096.780	390253.613	1.341
26	0.021	5.00	27.743	450	346094.090	390247.972	1.354
27	0.005	5.00	27.825	450	346128.629	390231.503	1.690
28	0.020	5.00	27.936	450	346105.014	390258.738	1.350
29			27.959	450	346134.835	390244.519	2.009
30			25.800	1350	346106.748	390267.082	1.500
31	0.068	5.00	28.418	600	346193.800	390220.024	2.225
32	0.046	5.00	28.272	600	346171.692	390230.430	2.226
33			28.469	600	346150.717	390240.307	2.564
34	0.048	5.00	28.000	600	346139.418	390245.615	2.170
35	0.039	5.00	28.226	600	346128.626	390250.423	2.468
36	0.090	5.00	27.953	600	346106.911	390260.096	2.453
37			28.057	600	346099.243	390263.512	3.057
38			28.201	1200	346097.435	390271.116	3.969
39	0.004	5.00	27.902	450	346067.793	390246.254	1.350
40	0.015	5.00	28.059	450	346077.246	390246.699	1.609
41	0.016	5.00	27.725	450	346064.663	390249.347	1.350

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
42	0.004	5.00	27.690	450	346063.448	390275.202	1.690
43			28.389	450	346075.880	390275.787	3.489
44			28.270	1200	346078.395	390280.755	4.180
44_OUT			28.088	1200	346075.115	390282.219	4.088

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	81.684	0.600	29.385	28.615	0.770	106.1	225	6.07	50.0
1.001	2	3	35.856	0.600	28.615	27.700	0.915	39.2	225	6.36	49.0
1.002	3	6	20.697	0.600	27.700	27.220	0.480	43.1	225	6.53	48.4
2.000	4	5	28.405	0.600	29.146	27.722	1.424	19.9	150	5.21	50.0
2.001	5	6	76.942	0.600	27.647	27.220	0.427	180.2	225	6.53	48.4
1.003	6	19	67.491	0.600	27.220	26.000	1.220	55.3	450	6.94	46.9
3.000	7	8	36.627	0.600	27.343	27.313	0.030	1220.9	375	6.20	49.6
3.001	8	9	34.670	0.600	27.245	26.525	0.720	48.2	375	6.42	48.8
3.002	9	10	16.791	0.600	26.525	26.405	0.120	139.9	375	6.60	48.1
3.003	10	11	16.370	0.600	26.405	26.295	0.110	148.8	375	6.79	47.5
3.004	11	12	35.072	0.600	26.295	26.075	0.220	159.4	375	7.19	46.1
3.005	12	19	5.000	0.600	26.075	25.925	0.150	33.3	375	7.22	46.0
4.000	13	14	15.513	0.600	28.112	26.965	1.147	13.5	150	5.09	50.0
4.001	14	15	14.801	0.600	26.965	26.865	0.100	148.0	150	5.39	50.0
4.002	15	18	6.124	0.600	26.865	26.500	0.365	16.8	150	5.43	50.0
5.000	16	17	14.715	0.600	28.874	27.477	1.397	10.5	150	5.08	50.0
5.001	17	18	15.827	0.600	27.477	26.500	0.977	16.2	150	5.18	50.0
4.003	18	19	22.111	0.600	26.500	26.000	0.500	44.2	150	5.68	50.0
1.004	19	30	106.204	0.600	25.700	24.300	1.400	75.9	450	7.98	43.7

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.269	50.4	18.0	1.200	1.200	0.133	0.0	93	1.165
1.001	2.096	83.3	21.6	1.200	1.247	0.163	0.0	78	1.765
1.002	1.997	79.4	23.3	1.247	3.173	0.178	0.0	83	1.739
2.000	2.265	40.0	4.1	1.200	1.218	0.030	0.0	32	1.453
2.001	0.971	38.6	19.4	1.218	3.173	0.148	0.0	113	0.972
1.003	2.737	435.4	41.5	2.948	2.072	0.326	0.0	93	1.751
3.000	0.510	56.3	17.3	1.200	2.761	0.129	0.0	142	0.450
3.001	2.616	289.0	37.0	2.829	3.799	0.280	0.0	90	1.817
3.002	1.529	168.9	41.3	3.799	3.186	0.317	0.0	126	1.271
3.003	1.483	163.8	48.1	3.186	2.894	0.374	0.0	139	1.295
3.004	1.432	158.2	51.7	2.894	2.074	0.414	0.0	147	1.285
3.005	3.147	347.6	51.6	2.074	2.222	0.414	0.0	97	2.283
4.000	2.754	48.7	1.6	1.200	1.269	0.012	0.0	19	1.286
4.001	0.824	14.6	2.4	1.269	1.296	0.018	0.0	41	0.611
4.002	2.471	43.7	2.4	1.296	1.508	0.018	0.0	24	1.325
5.000	3.122	55.2	0.8	1.200	2.000	0.006	0.0	13	1.114
5.001	2.515	44.4	2.6	2.000	1.508	0.019	0.0	24	1.369
4.003	1.517	26.8	5.0	1.508	2.372	0.037	0.0	44	1.162
1.004	2.336	371.5	92.1	2.372	1.050	0.777	0.0	152	1.949

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
6.000	20	21	9.273	0.600	27.095	27.030	0.065	142.7	150	5.18	50.0
6.001	21	24	61.795	0.600	27.030	26.250	0.780	79.2	150	6.10	50.0
7.000	22	23	56.569	0.600	27.106	26.407	0.699	80.9	150	5.84	50.0
7.001	23	24	14.420	0.600	26.407	26.250	0.157	91.8	150	6.07	50.0
6.002	24	30	45.602	0.600	26.200	25.550	0.650	70.2	150	6.73	47.7
8.000	25	26	6.250	0.600	26.636	26.389	0.247	25.3	150	5.05	50.0
8.001	26	27	38.264	0.600	26.389	26.135	0.254	150.6	150	5.83	50.0
8.002	27	29	14.420	0.600	26.135	25.950	0.185	77.9	150	6.04	50.0
9.000	28	29	33.037	0.600	26.586	25.950	0.636	51.9	150	5.39	50.0
8.003	29	30	36.027	0.600	25.950	25.450	0.500	72.1	150	6.55	48.3
1.005	30	38	10.149	0.600	24.300	24.232	0.068	149.3	450	8.08	43.4
10.000	31	32	24.435	0.600	26.193	26.046	0.147	166.2	225	5.40	50.0
10.001	32	33	23.184	0.600	26.046	25.905	0.141	164.4	225	5.78	50.0
10.002	33	34	12.484	0.600	25.905	25.830	0.075	166.5	225	5.99	50.0
10.003	34	35	11.815	0.600	25.830	25.758	0.072	164.1	225	6.18	49.7
10.004	35	36	23.772	0.600	25.758	25.500	0.258	92.1	225	6.47	48.6
10.005	36	37	8.394	0.600	25.500	25.000	0.500	16.8	225	6.52	48.4
10.006	37	38	7.816	0.600	25.000	24.532	0.468	16.7	225	6.56	48.3
1.006	38	44	21.341	0.600	24.232	24.090	0.142	150.3	450	8.29	42.8
11.000	39	40	9.463	0.600	26.552	26.450	0.102	92.8	150	5.15	50.0
11.001	40	43	29.120	0.600	26.450	24.900	1.550	18.8	150	5.36	50.0
12.000	41	42	25.884	0.600	26.375	26.000	0.375	69.0	150	5.36	50.0
12.001	42	43	12.446	0.600	26.000	24.900	1.100	11.3	150	5.42	50.0
11.002	43	44	5.568	0.600	24.900	24.390	0.510	10.9	150	5.46	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
6.000	0.839	14.8	0.7	1.200	1.281	0.005	0.0	22	0.425
6.001	1.130	20.0	5.6	1.281	2.122	0.041	0.0	54	0.971
7.000	1.118	19.8	5.7	1.200	1.200	0.042	0.0	55	0.966
7.001	1.049	18.5	6.4	1.200	2.122	0.047	0.0	61	0.953
6.002	1.202	21.2	11.4	2.172	0.100	0.088	0.0	78	1.223
8.000	2.010	35.5	0.3	1.191	1.204	0.002	0.0	10	0.596
8.001	0.816	14.4	3.1	1.204	1.540	0.023	0.0	47	0.651
8.002	1.140	20.1	3.8	1.540	1.859	0.028	0.0	44	0.879
9.000	1.399	24.7	2.7	1.200	1.859	0.020	0.0	34	0.925
8.003	1.186	21.0	6.3	1.859	0.200	0.048	0.0	57	1.041
1.005	1.662	264.3	107.5	1.050	3.519	0.913	0.0	199	1.578
10.000	1.011	40.2	9.2	2.000	2.001	0.068	0.0	73	0.825
10.001	1.017	40.4	15.4	2.001	2.339	0.114	0.0	96	0.949
10.002	1.010	40.2	15.4	2.339	1.945	0.114	0.0	97	0.948
10.003	1.018	40.5	21.8	1.945	2.243	0.162	0.0	117	1.035
10.004	1.362	54.2	26.5	2.243	2.228	0.201	0.0	111	1.356
10.005	3.209	127.6	38.2	2.228	2.832	0.291	0.0	84	2.809
10.006	3.217	127.9	38.1	2.832	3.444	0.291	0.0	84	2.816
1.006	1.656	263.3	139.8	3.519	3.730	1.204	0.0	233	1.680
11.000	1.043	18.4	0.5	1.200	1.459	0.004	0.0	18	0.464
11.001	2.334	41.3	2.6	1.459	3.339	0.019	0.0	25	1.308
12.000	1.212	21.4	2.2	1.200	1.540	0.016	0.0	32	0.775
12.001	3.012	53.2	2.7	1.540	3.339	0.020	0.0	23	1.591
11.002	3.066	54.2	5.3	3.339	3.730	0.039	0.0	31	1.947

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.007	44	44_OUT	3.592	0.600	24.090	24.000	0.090	39.9	450	8.31	42.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.007	3.225	512.9	144.1	3.730	3.638	1.243	0.0	162	2.783

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	81.684	106.1	225	Circular	30.810	29.385	1.200	30.040	28.615	1.200
1.001	35.856	39.2	225	Circular	30.040	28.615	1.200	29.172	27.700	1.247
1.002	20.697	43.1	225	Circular	29.172	27.700	1.247	30.618	27.220	3.173
2.000	28.405	19.9	150	Circular	30.496	29.146	1.200	29.090	27.722	1.218
2.001	76.942	180.2	225	Circular	29.090	27.647	1.218	30.618	27.220	3.173
1.003	67.491	55.3	450	Circular	30.618	27.220	2.948	28.522	26.000	2.072
3.000	36.627	1220.9	375	Circular	28.918	27.343	1.200	30.449	27.313	2.761
3.001	34.670	48.2	375	Circular	30.449	27.245	2.829	30.699	26.525	3.799
3.002	16.791	139.9	375	Circular	30.699	26.525	3.799	29.966	26.405	3.186
3.003	16.370	148.8	375	Circular	29.966	26.405	3.186	29.564	26.295	2.894
3.004	35.072	159.4	375	Circular	29.564	26.295	2.894	28.524	26.075	2.074
3.005	5.000	33.3	375	Circular	28.524	26.075	2.074	28.522	25.925	2.222
4.000	15.513	13.5	150	Circular	29.462	28.112	1.200	28.384	26.965	1.269
4.001	14.801	148.0	150	Circular	28.384	26.965	1.269	28.311	26.865	1.296
4.002	6.124	16.8	150	Circular	28.311	26.865	1.296	28.158	26.500	1.508
5.000	14.715	10.5	150	Circular	30.224	28.874	1.200	29.627	27.477	2.000
5.001	15.827	16.2	150	Circular	29.627	27.477	2.000	28.158	26.500	1.508
4.003	22.111	44.2	150	Circular	28.158	26.500	1.508	28.522	26.000	2.372
1.004	106.204	75.9	450	Circular	28.522	25.700	2.372	25.800	24.300	1.050

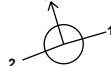
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1.000	1	450	Manhole	Adoptable	2	600	Manhole	Adoptable
1.001	2	600	Manhole	Adoptable	3	600	Manhole	Adoptable
1.002	3	600	Manhole	Adoptable	6	1200	Manhole	Adoptable
2.000	4	450	Manhole	Adoptable	5	600	Manhole	Adoptable
2.001	5	600	Manhole	Adoptable	6	1200	Manhole	Adoptable
1.003	6	1200	Manhole	Adoptable	19	1500	Manhole	Adoptable
3.000	7	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable
3.001	8	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
3.002	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
3.003	10	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
3.004	11	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
3.005	12	1200	Manhole	Adoptable	19	1500	Manhole	Adoptable
4.000	13	450	Manhole	Adoptable	14	450	Manhole	Adoptable
4.001	14	450	Manhole	Adoptable	15	450	Manhole	Adoptable
4.002	15	450	Manhole	Adoptable	18	450	Manhole	Adoptable
5.000	16	450	Manhole	Adoptable	17	450	Manhole	Adoptable
5.001	17	450	Manhole	Adoptable	18	450	Manhole	Adoptable
4.003	18	450	Manhole	Adoptable	19	1500	Manhole	Adoptable
1.004	19	1500	Manhole	Adoptable	30	1350	Manhole	Adoptable

Pipeline Schedule

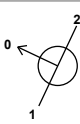
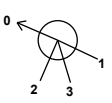
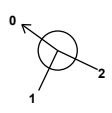
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
6.000	9.273	142.7	150	Circular	28.445	27.095	1.200	28.461	27.030	1.281
6.001	61.795	79.2	150	Circular	28.461	27.030	1.281	28.522	26.250	2.122
7.000	56.569	80.9	150	Circular	28.456	27.106	1.200	27.757	26.407	1.200
7.001	14.420	91.8	150	Circular	27.757	26.407	1.200	28.522	26.250	2.122
6.002	45.602	70.2	150	Circular	28.522	26.200	2.172	25.800	25.550	0.100
8.000	6.250	25.3	150	Circular	27.977	26.636	1.191	27.743	26.389	1.204
8.001	38.264	150.6	150	Circular	27.743	26.389	1.204	27.825	26.135	1.540
8.002	14.420	77.9	150	Circular	27.825	26.135	1.540	27.959	25.950	1.859
9.000	33.037	51.9	150	Circular	27.936	26.586	1.200	27.959	25.950	1.859
8.003	36.027	72.1	150	Circular	27.959	25.950	1.859	25.800	25.450	0.200
1.005	10.149	149.3	450	Circular	25.800	24.300	1.050	28.201	24.232	3.519
10.000	24.435	166.2	225	Circular	28.418	26.193	2.000	28.272	26.046	2.001
10.001	23.184	164.4	225	Circular	28.272	26.046	2.001	28.469	25.905	2.339
10.002	12.484	166.5	225	Circular	28.469	25.905	2.339	28.000	25.830	1.945
10.003	11.815	164.1	225	Circular	28.000	25.830	1.945	28.226	25.758	2.243
10.004	23.772	92.1	225	Circular	28.226	25.758	2.243	27.953	25.500	2.228
10.005	8.394	16.8	225	Circular	27.953	25.500	2.228	28.057	25.000	2.832
10.006	7.816	16.7	225	Circular	28.057	25.000	2.832	28.201	24.532	3.444
1.006	21.341	150.3	450	Circular	28.201	24.232	3.519	28.270	24.090	3.730
11.000	9.463	92.8	150	Circular	27.902	26.552	1.200	28.059	26.450	1.459
11.001	29.120	18.8	150	Circular	28.059	26.450	1.459	28.389	24.900	3.339
12.000	25.884	69.0	150	Circular	27.725	26.375	1.200	27.690	26.000	1.540
12.001	12.446	11.3	150	Circular	27.690	26.000	1.540	28.389	24.900	3.339
11.002	5.568	10.9	150	Circular	28.389	24.900	3.339	28.270	24.390	3.730
1.007	3.592	39.9	450	Circular	28.270	24.090	3.730	28.088	24.000	3.638

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
6.000	20	450	Manhole	Adoptable	21	450	Manhole	Adoptable
6.001	21	450	Manhole	Adoptable	24	450	Manhole	Adoptable
7.000	22	450	Manhole	Adoptable	23	450	Manhole	Adoptable
7.001	23	450	Manhole	Adoptable	24	450	Manhole	Adoptable
6.002	24	450	Manhole	Adoptable	30	1350	Manhole	Adoptable
8.000	25	450	Manhole	Adoptable	26	450	Manhole	Adoptable
8.001	26	450	Manhole	Adoptable	27	450	Manhole	Adoptable
8.002	27	450	Manhole	Adoptable	29	450	Manhole	Adoptable
9.000	28	450	Manhole	Adoptable	29	450	Manhole	Adoptable
8.003	29	450	Manhole	Adoptable	30	1350	Manhole	Adoptable
1.005	30	1350	Manhole	Adoptable	38	1200	Manhole	Adoptable
10.000	31	600	Manhole	Adoptable	32	600	Manhole	Adoptable
10.001	32	600	Manhole	Adoptable	33	600	Manhole	Adoptable
10.002	33	600	Manhole	Adoptable	34	600	Manhole	Adoptable
10.003	34	600	Manhole	Adoptable	35	600	Manhole	Adoptable
10.004	35	600	Manhole	Adoptable	36	600	Manhole	Adoptable
10.005	36	600	Manhole	Adoptable	37	600	Manhole	Adoptable
10.006	37	600	Manhole	Adoptable	38	1200	Manhole	Adoptable
1.006	38	1200	Manhole	Adoptable	44	1200	Manhole	Adoptable
11.000	39	450	Manhole	Adoptable	40	450	Manhole	Adoptable
11.001	40	450	Manhole	Adoptable	43	450	Manhole	Adoptable
12.000	41	450	Manhole	Adoptable	42	450	Manhole	Adoptable
12.001	42	450	Manhole	Adoptable	43	450	Manhole	Adoptable
11.002	43	450	Manhole	Adoptable	44	1200	Manhole	Adoptable
1.007	44	1200	Manhole	Adoptable	44_OUT	1200	Manhole	Adoptable

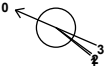
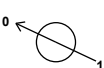
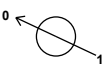
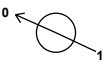
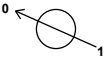
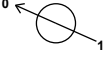
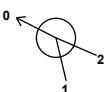
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	346292.931	390142.038	30.810	1.425	450	 0	0	1.000	29.385	225
2	346214.712	390118.498	30.040	1.425	600	 01	01	1.001	28.615	225
3	346204.333	390152.819	29.172	1.472	600	 01	01	1.002	27.700	225
4	346305.904	390154.313	30.496	1.350	450	 0	0	2.000	29.146	150
5	346297.607	390181.479	29.090	1.443	600	 1	1	2.001	27.722	150
6	346223.654	390160.240	30.618	3.398	1200	 012	012	2.002	27.647	225
7	346295.639	390184.502	28.918	1.575	1200	 0	0	2.001	27.220	225
8	346259.210	390180.699	30.449	3.204	1200	 01	1	1.002	27.220	225
9	346225.109	390174.444	30.699	4.174	1200	 01	0	1.003	27.220	450
10	346209.049	390169.544	29.966	3.561	1200	 0	1	3.000	27.343	375
11	346204.553	390185.285	29.564	3.269	1200	 01	1	3.000	27.313	375
12	346202.214	390220.279	28.524	2.449	1200	 01	0	3.001	27.245	375
13	346233.502	390200.611	29.462	1.350	450	 0	1	3.001	26.525	375
						 0	0	3.002	26.525	375
						 1	1	3.002	26.405	375
						 0	0	3.003	26.405	375
						 1	1	3.003	26.295	375
						 0	0	3.004	26.295	375
						 1	1	3.004	26.075	375
						 0	0	3.005	26.075	375
						 0	0	4.000	28.112	150

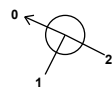
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
14	346240.178	390214.614	28.384	1.419	450	 1	4.000	26.965	150
						0	4.001	26.965	150
15	346226.798	390220.941	28.311	1.446	450	 1	4.001	26.865	150
						0	4.002	26.865	150
16	346230.710	390194.757	30.224	1.350	450	 0	5.000	28.874	150
17	346217.428	390201.090	29.627	2.150	450	 1	5.000	27.477	150
						0	5.001	27.477	150
18	346224.184	390215.403	28.158	1.658	450	 1	5.001	26.500	150
						2	4.002	26.500	150
						0	4.003	26.500	150
19	346204.201	390224.867	28.522	2.822	1500	 1	4.003	26.000	150
						2	3.005	25.925	375
						3	1.003	26.000	450
						0	1.004	25.700	450
20	346195.451	390205.343	28.445	1.350	450	 0	6.000	27.095	150
						0	6.000	27.030	150
21	346199.442	390213.713	28.461	1.431	450	 1	6.001	27.030	150
						0	6.001	27.030	150
22	346188.518	390202.946	28.456	1.350	450	 0	7.000	27.106	150
						0	7.000	26.407	150
23	346137.457	390227.293	27.757	1.350	450	 1	7.001	26.407	150
						0	7.001	26.250	150
24	346143.663	390240.309	28.522	2.322	450	 1	6.001	26.250	150
						2	6.002	26.200	150
25	346096.780	390253.613	27.977	1.341	450	 0	8.000	26.636	150
26	346094.090	390247.972	27.743	1.354	450	 1	8.001	26.389	150
						0	8.001	26.389	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
27	346128.629	390231.503	27.825	1.690	450		1 8.001	26.135	150
						0	8.002	26.135	150
28	346105.014	390258.738	27.936	1.350	450		0 9.000	26.586	150
29	346134.835	390244.519	27.959	2.009	450		1 9.000 2 8.002	25.950 25.950	150 150
						0	8.003	25.950	150
30	346106.748	390267.082	25.800	1.500	1350		1 8.003 2 6.002 3 1.004	25.450 25.550 24.300	150 150 450
						0	1.005	24.300	450
31	346193.800	390220.024	28.418	2.225	600		0 10.000	26.193	225
32	346171.692	390230.430	28.272	2.226	600		1 10.000	26.046	225
						0	10.001	26.046	225
33	346150.717	390240.307	28.469	2.564	600		1 10.001	25.905	225
						0	10.002	25.905	225
34	346139.418	390245.615	28.000	2.170	600		1 10.002	25.830	225
						0	10.003	25.830	225
35	346128.626	390250.423	28.226	2.468	600		1 10.003	25.758	225
						0	10.004	25.758	225
36	346106.911	390260.096	27.953	2.453	600		1 10.004	25.500	225
						0	10.005	25.500	225
37	346099.243	390263.512	28.057	3.057	600		1 10.005	25.000	225
						0	10.006	25.000	225
38	346097.435	390271.116	28.201	3.969	1200		1 10.006 2 1.005	24.532 24.232	225 450
						0	1.006	24.232	450
39	346067.793	390246.254	27.902	1.350	450		0 11.000	26.552	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
40	346077.246	390246.699	28.059	1.609	450		1 11.000	26.450	150
							0 11.001	26.450	150
41	346064.663	390249.347	27.725	1.350	450				
							0 12.000	26.375	150
42	346063.448	390275.202	27.690	1.690	450		1 12.000	26.000	150
							0 12.001	26.000	150
43	346075.880	390275.787	28.389	3.489	450		1 12.001	24.900	150
							2 11.001	24.900	150
							0 11.002	24.900	150
44	346078.395	390280.755	28.270	4.180	1200		1 11.002	24.390	150
							2 1.006	24.090	450
							0 1.007	24.090	450
44_OUT	346075.115	390282.219	28.088	4.088	1200		1 1.007	24.000	450

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
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 44_OUT Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	x
Invert Level (m)	-999.000	Product Number	CTL-SHE-0099-7900-3800-7900
Design Depth (m)	3.800	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	7.9	Min Node Diameter (mm)	1200

Node 30 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	24.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	736.6	0.0	1.200	736.6	0.0	1.201	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 1.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	29.469	0.084	14.4	0.0134	0.0000	OK
15 minute winter	2	11	28.684	0.069	17.2	0.0197	0.0000	OK
15 minute winter	3	11	27.776	0.076	18.7	0.0214	0.0000	OK
15 minute winter	4	10	29.175	0.029	3.3	0.0046	0.0000	OK
15 minute winter	5	10	27.750	0.103	16.0	0.0293	0.0000	OK
15 minute winter	6	12	27.305	0.085	34.5	0.0956	0.0000	OK
15 minute winter	7	11	27.465	0.122	14.0	0.1378	0.0000	OK
15 minute winter	8	11	27.324	0.079	29.0	0.0895	0.0000	OK
15 minute winter	9	11	26.646	0.121	32.7	0.1366	0.0000	OK
15 minute winter	10	11	26.539	0.134	38.7	0.1520	0.0000	OK
15 minute winter	11	11	26.434	0.139	42.9	0.1576	0.0000	OK
15 minute winter	12	11	26.180	0.105	42.8	0.1184	0.0000	OK
15 minute winter	13	10	28.129	0.017	1.3	0.0027	0.0000	OK
15 minute winter	14	10	27.004	0.039	2.0	0.0062	0.0000	OK
15 minute winter	15	11	26.886	0.021	1.9	0.0034	0.0000	OK
15 minute winter	16	10	28.886	0.012	0.7	0.0019	0.0000	OK
15 minute winter	17	10	27.499	0.022	2.1	0.0035	0.0000	OK
15 minute winter	18	11	26.539	0.039	3.9	0.0063	0.0000	OK
15 minute summer	19	11	25.900	0.200	75.7	0.3536	0.0000	OK
15 minute winter	20	11	27.114	0.019	0.5	0.0030	0.0000	OK
15 minute winter	21	11	27.077	0.047	4.4	0.0074	0.0000	OK
15 minute winter	22	10	27.154	0.048	4.6	0.0077	0.0000	OK
15 minute winter	23	11	26.461	0.054	5.0	0.0086	0.0000	OK
15 minute winter	24	12	26.269	0.069	9.0	0.0109	0.0000	OK
15 minute winter	25	12	26.644	0.008	0.2	0.0013	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	14.0	1.183	0.277	0.9703	
15 minute winter	2	1.001	3	17.2	1.559	0.207	0.3966	
15 minute winter	3	1.002	6	18.8	1.487	0.236	0.2613	
15 minute winter	4	2.000	5	3.2	1.354	0.081	0.0678	
15 minute winter	5	2.001	6	15.8	1.028	0.409	1.1999	
15 minute winter	6	1.003	19	33.5	1.645	0.077	1.3738	
15 minute winter	7	3.000	8	13.3	0.552	0.237	0.8928	
15 minute winter	8	3.001	9	28.9	1.237	0.100	0.8236	
15 minute winter	9	3.002	10	32.9	0.996	0.195	0.5548	
15 minute winter	10	3.003	11	38.8	1.068	0.237	0.5950	
15 minute winter	11	3.004	12	42.8	1.379	0.271	1.0932	
15 minute winter	12	3.005	19	42.4	1.907	0.122	0.1115	
15 minute winter	13	4.000	14	1.3	0.694	0.026	0.0369	
15 minute winter	14	4.001	15	1.9	0.745	0.130	0.0385	
15 minute winter	15	4.002	18	1.9	0.750	0.044	0.0160	
15 minute winter	16	5.000	17	0.7	0.629	0.012	0.0164	
15 minute winter	17	5.001	18	2.0	0.819	0.046	0.0414	
15 minute winter	18	4.003	19	3.9	1.073	0.145	0.0803	
15 minute summer	19	1.004	30	82.3	2.916	0.221	3.6934	
15 minute winter	20	6.000	21	0.5	0.182	0.034	0.0277	
15 minute winter	21	6.001	24	4.2	0.894	0.209	0.2882	
15 minute winter	22	7.000	23	4.5	0.858	0.225	0.3004	
15 minute winter	23	7.001	24	4.9	0.868	0.263	0.0810	
15 minute winter	24	6.002	30	8.9	1.144	0.418	0.3540	
15 minute winter	25	8.000	26	0.2	0.110	0.006	0.0139	

Results for 1 year Critical Storm Duration. Lowest mass balance: 1.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	26	10	26.431	0.042	2.5	0.0067	0.0000	OK
15 minute winter	27	11	26.173	0.038	2.9	0.0061	0.0000	OK
15 minute winter	28	10	26.616	0.030	2.2	0.0047	0.0000	OK
15 minute winter	29	12	25.999	0.049	5.0	0.0078	0.0000	OK
120 minute winter	30	86	24.384	0.084	37.0	61.6404	0.0000	OK
15 minute winter	31	10	26.257	0.064	7.4	0.0182	0.0000	OK
15 minute winter	32	10	26.133	0.087	12.3	0.0245	0.0000	OK
15 minute winter	33	11	25.995	0.090	12.0	0.0255	0.0000	OK
15 minute winter	34	11	25.939	0.109	17.0	0.0309	0.0000	OK
15 minute winter	35	11	25.861	0.103	21.0	0.0292	0.0000	OK
15 minute winter	36	11	25.581	0.081	30.2	0.0229	0.0000	OK
15 minute winter	37	11	25.083	0.083	30.3	0.0234	0.0000	OK
15 minute winter	38	11	24.334	0.102	30.3	0.1158	0.0000	OK
15 minute winter	39	11	26.567	0.015	0.4	0.0024	0.0000	OK
15 minute winter	40	10	26.472	0.022	2.0	0.0035	0.0000	OK
15 minute winter	41	10	26.405	0.030	1.7	0.0048	0.0000	OK
15 minute winter	42	11	26.020	0.020	2.1	0.0032	0.0000	OK
15 minute winter	43	11	24.929	0.029	4.0	0.0046	0.0000	OK
15 minute winter	44	11	24.180	0.090	31.7	0.1020	0.0000	OK
1440 minute winter	44_OUT	1680	-658.927	-682.927	9.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	26	8.001	27	2.4	0.636	0.166	0.1451	
15 minute winter	27	8.002	29	2.9	0.683	0.143	0.0617	
15 minute winter	28	9.000	29	2.1	0.651	0.086	0.1226	
15 minute winter	29	8.003	30	4.7	0.956	0.227	0.1789	
120 minute winter	30	1.005	38	17.0	0.809	0.064	0.2215	
15 minute winter	31	10.000	32	7.3	0.623	0.181	0.2858	
15 minute winter	32	10.001	33	12.0	0.840	0.297	0.3341	
15 minute winter	33	10.002	34	12.1	0.714	0.301	0.2116	
15 minute winter	34	10.003	35	17.0	0.926	0.421	0.2175	
15 minute winter	35	10.004	36	21.0	1.379	0.388	0.3631	
15 minute winter	36	10.005	37	30.3	2.325	0.237	0.1093	
15 minute winter	37	10.006	38	30.3	2.460	0.237	0.0963	
15 minute winter	38	1.006	44	27.7	1.117	0.105	0.5297	
15 minute winter	39	11.000	40	0.4	0.317	0.022	0.0121	
15 minute winter	40	11.001	43	2.0	0.990	0.047	0.0581	
15 minute winter	41	12.000	42	1.7	0.853	0.078	0.0510	
15 minute winter	42	12.001	43	2.1	1.095	0.039	0.0236	
15 minute winter	43	11.002	44	4.0	1.739	0.074	0.0128	
15 minute winter	44	1.007	44_OUT	31.6	1.592	0.062	0.0715	
1440 minute winter	44_OUT	Hydro-Brake®		0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 1.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	29.527	0.142	35.1	0.0226	0.0000	OK
15 minute winter	2	11	28.729	0.114	42.1	0.0323	0.0000	OK
15 minute winter	3	11	27.830	0.130	45.8	0.0368	0.0000	OK
15 minute winter	4	10	29.191	0.045	7.9	0.0072	0.0000	OK
15 minute winter	5	11	27.834	0.187	39.0	0.0531	0.0000	OK
15 minute winter	6	11	27.355	0.135	83.9	0.1523	0.0000	OK
15 minute winter	7	11	27.531	0.188	34.1	0.2121	0.0000	OK
15 minute winter	8	10	27.370	0.125	72.1	0.1419	0.0000	OK
15 minute winter	9	11	26.736	0.211	81.2	0.2391	0.0000	OK
15 minute winter	10	11	26.641	0.236	95.2	0.2673	0.0000	OK
15 minute winter	11	11	26.530	0.235	105.6	0.2660	0.0000	OK
15 minute winter	12	11	26.257	0.182	106.2	0.2058	0.0000	OK
15 minute winter	13	10	28.138	0.026	3.2	0.0041	0.0000	OK
15 minute winter	14	10	27.028	0.063	4.8	0.0100	0.0000	OK
15 minute winter	15	11	26.898	0.033	4.7	0.0053	0.0000	OK
15 minute winter	16	10	28.892	0.018	1.6	0.0028	0.0000	OK
15 minute winter	17	10	27.511	0.034	5.0	0.0054	0.0000	OK
15 minute winter	18	11	26.564	0.064	9.5	0.0101	0.0000	OK
15 minute summer	19	11	26.002	0.302	188.6	0.5339	0.0000	OK
15 minute winter	20	10	27.125	0.030	1.3	0.0047	0.0000	OK
15 minute winter	21	11	27.107	0.077	10.8	0.0123	0.0000	OK
15 minute winter	22	10	27.185	0.079	11.1	0.0126	0.0000	OK
15 minute winter	23	11	26.500	0.093	12.1	0.0148	0.0000	OK
15 minute winter	24	12	26.329	0.129	22.3	0.0205	0.0000	OK
15 minute summer	25	11	26.649	0.013	0.5	0.0020	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	34.2	1.473	0.677	1.8933	
15 minute winter	2	1.001	3	42.1	1.914	0.505	0.7882	
15 minute winter	3	1.002	6	46.0	1.894	0.579	0.5027	
15 minute winter	4	2.000	5	7.8	1.295	0.196	0.2627	
15 minute winter	5	2.001	6	37.9	1.246	0.982	2.3145	
15 minute winter	6	1.003	19	82.2	2.118	0.189	2.6279	
15 minute winter	7	3.000	8	33.0	0.743	0.587	1.6333	
15 minute winter	8	3.001	9	71.4	1.501	0.247	1.6655	
15 minute winter	9	3.002	10	81.0	1.180	0.479	1.1516	
15 minute winter	10	3.003	11	95.7	1.313	0.585	1.1942	
15 minute winter	11	3.004	12	106.2	1.687	0.671	2.2051	
15 minute winter	12	3.005	19	105.9	2.343	0.305	0.2263	
15 minute winter	13	4.000	14	3.2	0.729	0.065	0.0699	
15 minute winter	14	4.001	15	4.7	0.964	0.320	0.0727	
15 minute winter	15	4.002	18	4.7	0.953	0.107	0.0306	
15 minute winter	16	5.000	17	1.6	0.792	0.029	0.0303	
15 minute winter	17	5.001	18	4.9	1.022	0.111	0.0793	
15 minute winter	18	4.003	19	9.5	1.367	0.356	0.1543	
15 minute summer	19	1.004	30	195.1	3.420	0.525	6.4796	
15 minute winter	20	6.000	21	1.3	0.229	0.086	0.0534	
15 minute winter	21	6.001	24	10.4	1.120	0.519	0.5731	
15 minute winter	22	7.000	23	10.8	1.056	0.548	0.5867	
15 minute winter	23	7.001	24	11.9	1.080	0.645	0.1594	
15 minute winter	24	6.002	30	21.5	1.356	1.013	0.7440	
15 minute summer	25	8.000	26	0.5	0.137	0.014	0.0259	

Results for 30 year Critical Storm Duration. Lowest mass balance: 1.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	26	10	26.457	0.068	6.0	0.0109	0.0000	OK
15 minute winter	27	11	26.198	0.063	7.1	0.0100	0.0000	OK
15 minute winter	28	10	26.633	0.047	5.3	0.0074	0.0000	OK
15 minute winter	29	11	26.034	0.084	12.2	0.0133	0.0000	OK
60 minute winter	30	46	24.465	0.165	136.2	121.7990	0.0000	OK
15 minute winter	31	10	26.297	0.104	18.0	0.0294	0.0000	OK
15 minute winter	32	10	26.197	0.151	29.9	0.0428	0.0000	OK
15 minute winter	33	11	26.089	0.184	29.2	0.0521	0.0000	OK
15 minute winter	34	11	26.047	0.217	41.0	0.0615	0.0000	OK
15 minute winter	35	11	25.945	0.187	50.7	0.0530	0.0000	OK
15 minute winter	36	11	25.642	0.142	73.1	0.0401	0.0000	OK
15 minute winter	37	11	25.147	0.147	73.2	0.0416	0.0000	OK
30 minute winter	38	21	24.412	0.180	78.6	0.2037	0.0000	OK
15 minute winter	39	10	26.577	0.025	1.1	0.0039	0.0000	OK
15 minute winter	40	10	26.485	0.035	5.1	0.0056	0.0000	OK
15 minute winter	41	10	26.423	0.048	4.2	0.0077	0.0000	OK
15 minute winter	42	10	26.032	0.032	5.2	0.0050	0.0000	OK
15 minute winter	43	10	24.947	0.047	10.2	0.0076	0.0000	OK
30 minute winter	44	21	24.249	0.159	85.1	0.1801	0.0000	OK
1440 minute winter	44_OUT	1680	-287.492	-311.492	20.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	26	8.001	27	5.8	0.799	0.405	0.2805	
15 minute winter	27	8.002	29	7.1	0.846	0.354	0.1228	
15 minute winter	28	9.000	29	5.2	0.774	0.211	0.2422	
15 minute winter	29	8.003	30	12.0	1.211	0.572	0.3564	
60 minute winter	30	1.005	38	56.7	1.090	0.215	0.5524	
15 minute winter	31	10.000	32	17.8	0.766	0.442	0.5650	
15 minute winter	32	10.001	33	29.2	0.971	0.723	0.7274	
15 minute winter	33	10.002	34	29.1	0.806	0.724	0.4625	
15 minute winter	34	10.003	35	41.0	1.095	1.013	0.4410	
15 minute winter	35	10.004	36	50.7	1.651	0.936	0.7331	
15 minute winter	36	10.005	37	73.2	2.721	0.574	0.2257	
15 minute winter	37	10.006	38	73.2	2.970	0.572	0.1925	
30 minute winter	38	1.006	44	78.5	1.444	0.298	1.1671	
15 minute winter	39	11.000	40	1.1	0.430	0.058	0.0238	
15 minute winter	40	11.001	43	5.0	1.263	0.121	0.1155	
15 minute winter	41	12.000	42	4.1	1.103	0.194	0.0982	
15 minute winter	42	12.001	43	5.2	1.399	0.098	0.0466	
15 minute winter	43	11.002	44	10.0	2.219	0.185	0.0252	
30 minute winter	44	1.007	44_OUT	84.6	2.006	0.165	0.1522	
1440 minute winter	44_OUT	Hydro-Brake®		0.0				0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 1.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	29.848	0.463	63.2	0.0736	0.0000	SURCHARGED
15 minute winter	2	11	28.775	0.160	69.9	0.0454	0.0000	OK
15 minute winter	3	11	27.901	0.201	76.1	0.0568	0.0000	OK
15 minute winter	4	10	29.208	0.062	14.2	0.0098	0.0000	OK
15 minute winter	5	12	28.483	0.836	70.1	0.2366	0.0000	SURCHARGED
15 minute winter	6	11	27.395	0.175	135.2	0.1977	0.0000	OK
15 minute winter	7	10	27.600	0.257	61.3	0.2908	0.0000	OK
15 minute winter	8	10	27.419	0.174	130.5	0.1964	0.0000	OK
15 minute winter	9	11	27.049	0.524	147.5	0.5923	0.0000	SURCHARGED
15 minute winter	10	11	26.919	0.514	167.7	0.5810	0.0000	SURCHARGED
15 minute winter	11	11	26.742	0.447	185.0	0.5056	0.0000	SURCHARGED
15 minute winter	12	12	26.356	0.281	183.5	0.3180	0.0000	OK
15 minute winter	13	10	28.147	0.035	5.7	0.0055	0.0000	OK
15 minute winter	14	10	27.052	0.087	8.5	0.0138	0.0000	OK
15 minute winter	15	11	26.909	0.044	8.3	0.0071	0.0000	OK
15 minute winter	16	10	28.897	0.023	2.8	0.0037	0.0000	OK
15 minute winter	17	10	27.523	0.046	9.0	0.0073	0.0000	OK
15 minute winter	18	10	26.587	0.087	17.2	0.0138	0.0000	OK
15 minute winter	19	12	26.210	0.510	332.1	0.9015	0.0000	SURCHARGED
15 minute winter	20	13	27.286	0.191	2.4	0.0303	0.0000	SURCHARGED
15 minute winter	21	13	27.279	0.249	19.3	0.0395	0.0000	SURCHARGED
15 minute winter	22	12	27.508	0.402	19.9	0.0639	0.0000	SURCHARGED
15 minute winter	23	13	27.070	0.663	20.4	0.1054	0.0000	SURCHARGED
15 minute winter	24	13	26.933	0.733	33.8	0.1165	0.0000	SURCHARGED
15 minute summer	25	11	26.653	0.017	0.9	0.0026	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	56.5	1.525	1.120	2.8598	
15 minute winter	2	1.001	3	69.4	2.034	0.833	1.2133	
15 minute winter	3	1.002	6	75.4	2.151	0.949	0.7298	
15 minute winter	4	2.000	5	14.1	1.343	0.352	0.3466	
15 minute winter	5	2.001	6	60.0	1.556	1.555	2.8034	
15 minute winter	6	1.003	19	138.3	2.351	0.318	4.3230	
15 minute winter	7	3.000	8	59.5	0.902	1.056	2.4060	
15 minute winter	8	3.001	9	129.9	1.604	0.450	2.7771	
15 minute winter	9	3.002	10	142.2	1.290	0.842	1.8520	
15 minute winter	10	3.003	11	167.1	1.515	1.021	1.8056	
15 minute winter	11	3.004	12	183.5	1.800	1.160	3.4888	
15 minute winter	12	3.005	19	181.0	2.498	0.521	0.4465	
15 minute winter	13	4.000	14	5.7	0.849	0.117	0.1057	
15 minute winter	14	4.001	15	8.3	1.127	0.572	0.1103	
15 minute winter	15	4.002	18	8.3	1.123	0.190	0.0457	
15 minute winter	16	5.000	17	2.8	0.920	0.051	0.0458	
15 minute winter	17	5.001	18	8.9	1.190	0.201	0.1194	
15 minute winter	18	4.003	19	17.1	1.458	0.637	0.3113	
15 minute winter	19	1.004	30	335.6	3.259	0.903	11.1832	
15 minute winter	20	6.000	21	3.2	0.265	0.218	0.1632	
15 minute winter	21	6.001	24	17.6	1.160	0.880	1.0879	
15 minute winter	22	7.000	23	18.0	1.163	0.913	0.9959	
15 minute winter	23	7.001	24	16.9	1.087	0.911	0.2539	
15 minute winter	24	6.002	30	28.3	1.608	1.333	0.7947	
15 minute summer	25	8.000	26	0.9	0.153	0.025	0.0405	

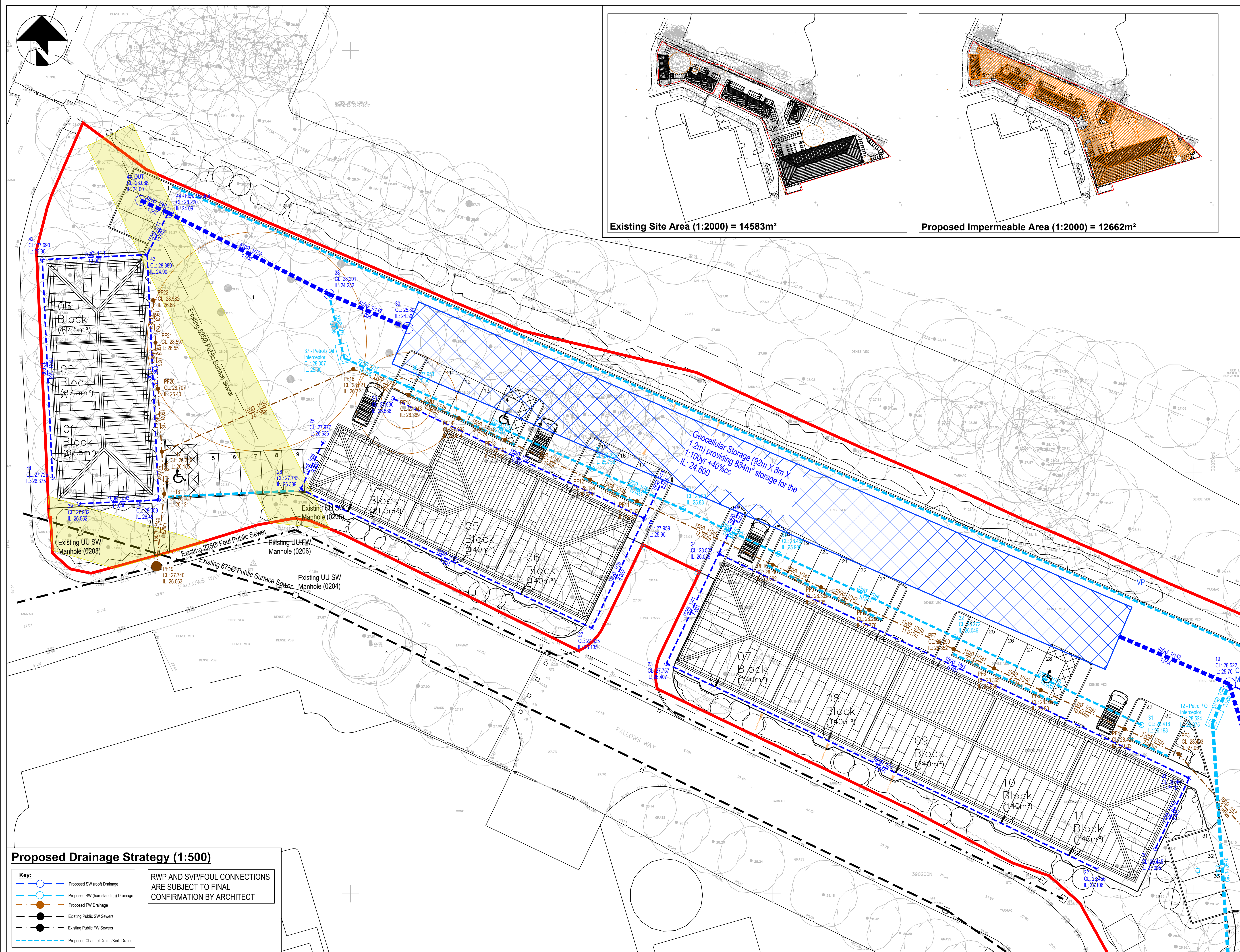
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 1.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	26	10	26.488	0.099	10.9	0.0157	0.0000	OK
15 minute winter	27	10	26.226	0.091	13.0	0.0145	0.0000	OK
15 minute winter	28	10	26.650	0.064	9.5	0.0102	0.0000	OK
15 minute winter	29	11	26.085	0.135	22.1	0.0214	0.0000	OK
60 minute winter	30	44	24.580	0.280	247.7	206.6273	0.0000	OK
15 minute winter	31	12	27.240	1.047	32.3	0.2962	0.0000	SURCHARGED
15 minute winter	32	12	27.167	1.121	48.5	0.3171	0.0000	SURCHARGED
15 minute winter	33	12	26.966	1.061	44.1	0.3002	0.0000	SURCHARGED
15 minute winter	34	12	26.839	1.009	62.3	0.2857	0.0000	SURCHARGED
15 minute winter	35	12	26.597	0.839	76.9	0.2375	0.0000	SURCHARGED
15 minute winter	36	11	25.948	0.447	114.4	0.1266	0.0000	SURCHARGED
15 minute winter	37	12	25.332	0.332	113.0	0.0940	0.0000	SURCHARGED
60 minute winter	38	40	24.518	0.286	168.6	0.3233	0.0000	OK
15 minute winter	39	10	26.584	0.032	1.9	0.0051	0.0000	OK
15 minute winter	40	10	26.497	0.047	9.0	0.0075	0.0000	OK
15 minute winter	41	10	26.442	0.067	7.6	0.0106	0.0000	OK
15 minute winter	42	10	26.043	0.043	9.4	0.0068	0.0000	OK
15 minute winter	43	10	24.967	0.067	18.2	0.0107	0.0000	OK
1440 minute winter	44	1080	24.393	0.303	37.0	0.3424	0.0000	OK
1440 minute winter	44_OUT	1140	24.414	0.414	37.0	0.4688	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	26	8.001	27	10.6	0.909	0.736	0.4495	
15 minute winter	27	8.002	29	13.1	0.943	0.651	0.2002	
15 minute winter	28	9.000	29	9.4	0.869	0.379	0.3903	
15 minute winter	29	8.003	30	21.4	1.330	1.020	0.5968	
60 minute winter	30	1.005	38	128.7	1.302	0.487	1.0573	
15 minute winter	31	10.000	32	26.9	0.810	0.670	0.9718	
15 minute winter	32	10.001	33	44.1	1.109	1.091	0.9221	
15 minute winter	33	10.002	34	45.3	1.139	1.127	0.4965	
15 minute winter	34	10.003	35	62.6	1.575	1.548	0.4699	
15 minute winter	35	10.004	36	77.6	1.953	1.433	0.9454	
15 minute winter	36	10.005	37	113.0	2.842	0.886	0.3338	
15 minute winter	37	10.006	38	112.8	3.105	0.882	0.2755	
60 minute winter	38	1.006	44	168.7	1.726	0.641	2.0875	
15 minute winter	39	11.000	40	1.9	0.502	0.102	0.0357	
15 minute winter	40	11.001	43	8.9	1.442	0.216	0.1802	
15 minute winter	41	12.000	42	7.5	1.297	0.350	0.1508	
15 minute winter	42	12.001	43	9.3	1.604	0.175	0.0729	
15 minute winter	43	11.002	44	18.0	2.552	0.333	0.0393	
1440 minute winter	44	1.007	44_OUT	37.0	1.654	0.072	0.4761	
1440 minute winter	44_OUT	Hydro-Brake®		8.8				274.0

Appendix E

DETAILED DRAINAGE DESIGN





Attenuation to be provided via **GEO-CELLULAR TANK 92x8x1.2m DEEP WITH 95% VOID RATIO**. The flows will be attenuated using a 99mm Hydrobrake Model No: SHE-099-7900-3800-7900.

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.

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

P1	Preliminary - Initial Issue		28.02.23		AJA
REV	DESCRIPTION		DATE		BY
					
Project: Fallows Way, Prescot					
Client: Allied Properties					
Drawing: Proposed Drainage Layout (Sheet 2 of 2)					
Drawn By: AJA		Date: 28/02/2023			
Checked: GS		Scale: As Shown @ A1		A1	
Drawing No: AMA-21686-D-511					No: P1

Appendix F

PUBLIC SEWERS MAP

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 G

SITE PHOTOGRAPHY



Photos taken 15/03/23



Photos taken 15/03/23





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