Surface Water Drainage Technical Note

February 2026

Prepared for:

IRHA HOMES LTD

Location:

Land Adjacent to St Marks Lane

Robin Hood Street

Manchester

Cheetham Hill

M8 9GH

Our reference:

93021-Chaudhry-RobinHoodSt_Rev1



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Document Issue Record

Project Details	
Project:	Surface Water Drainage Technical Note
Prepared for:	IRHA HOMES LTD
Application:	Proposed part-two & part-three storey residential block consisting of 9 residential units (1 X 1 Bedroom & 8 X 2 Bedroom apartments) with associated car parking, landscaping, and amenity spaces.
Location:	Land Adjacent to St Marks Lane, Robin Hood Street, Manchester, Cheetham Hill, M8 9GH
Our reference:	93021-Chaudhry-RobinHoodSt_Rev1 DRAFT
Issue no.:	v1.0
Issue date:	3rd February 2026

Project Consultants	
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1. Introduction

1.1. This Surface Water Drainage Technical Note has been prepared by Unda Consulting Limited on behalf of IRHA HOMES LTD, to address Condition 6 of a planning application.

1.2. The planning application is for a proposed part-two & part-three storey residential block consisting of 9 residential units (1 X 1 Bedroom & 8 X 2 Bedroom apartments) with associated car parking, landscaping, and amenity spaces. These works are proposed to be undertaken at the land Adjacent to St Marks Lane, Robin Hood Street, Manchester, Cheetham Hill, M8 9GH.

1.3. Post development the roof area of the development will cover approximately 371m^2.

1.4. This report assesses the surface water drainage arrangement for the proposed development, which forms Condition 6 of a planning application. Condition 6 states the following:

Condition 6:

No development shall take place until surface water drainage works in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards have been submitted to and approved in writing by the Local Planning Authority.

In order to avoid/discharge the above drainage condition the following additional information has to be provided:

- *A finalised drainage layout showing all components, outfalls, levels, finished floor levels and connectivity;*
- *Maximised integration of green SuDS components (utilising infiltration or attenuation)if practicable;*
- *Runoff volume in the 1 in 100 year, 6 hours rainfall shall be constrained to a value as close as is reasonable practicable to the greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment;*
- *Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event with allowance for 45% climate change in any part of a building;*
- *Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site.*
- *Progression through the drainage hierarchy shall be evidence based and supported by site investigation. Results of ground investigation carried out under Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Proposal of the attenuation that is achieving half emptying time within 24 hours. If no ground investigations are possible or infiltration is not feasible on site, evidence of alternative surface water disposal routes (as follows) is required.*
- *Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.*
- *Hydraulic calculation of the proposed drainage system, including all engineering parameters;*
- *Construction details of flow control and SuDS elements.*

Reason: To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution. This condition is imposed in light of national policies within the NPPF and NPPG and local policies EN08 and EN14.

1.5. This Technical Note provides the information required to address the surface water elements of planning application Condition 6.

2. Existing Site

2.1. The site is currently vacant with overgrown landscaping.

2.2. Existing plans are provided in the report Appendix.



Figure 1: Aerial view of the site and surrounding area (Source: Google Earth)

Site Topography:

2.3. A topographic survey of the site undertaken on behalf of the Applicant shows ground topography on site ranges between 72.70mAOD to 74.55mAOD.

Existing Ground Conditions:

2.4. The 1:50,000 BGS map shows that the bedrock underlying the site is Manchester Marls Formation – Mudstone.

2.5. The BGS mapping shows superficial deposits of Glaciofluvial sheet deposits, Devensian – Sand and gravel underlying the site.

2.6. The soil type taken from the UKSO Soil Map Viewer, shows the site to be located upon relatively deep soils of Glaciofluvial Deposits parent material with a soil texture of sand to sandy loam.

2.7. The published Environment Agency Groundwater Source Protection Zone map shows the site is not located within a Groundwater Source Protection Zone.

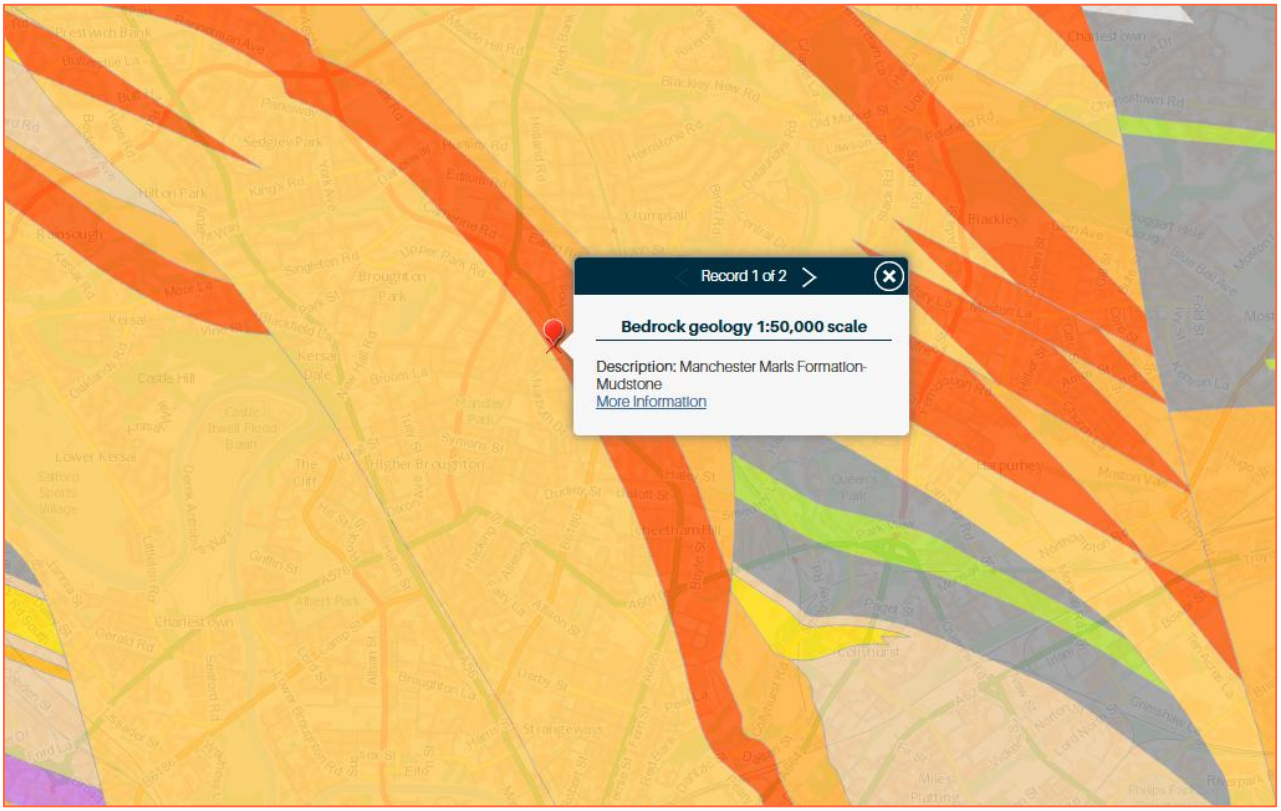


Figure 2: BGS Bedrock Geology (Source: BGS)

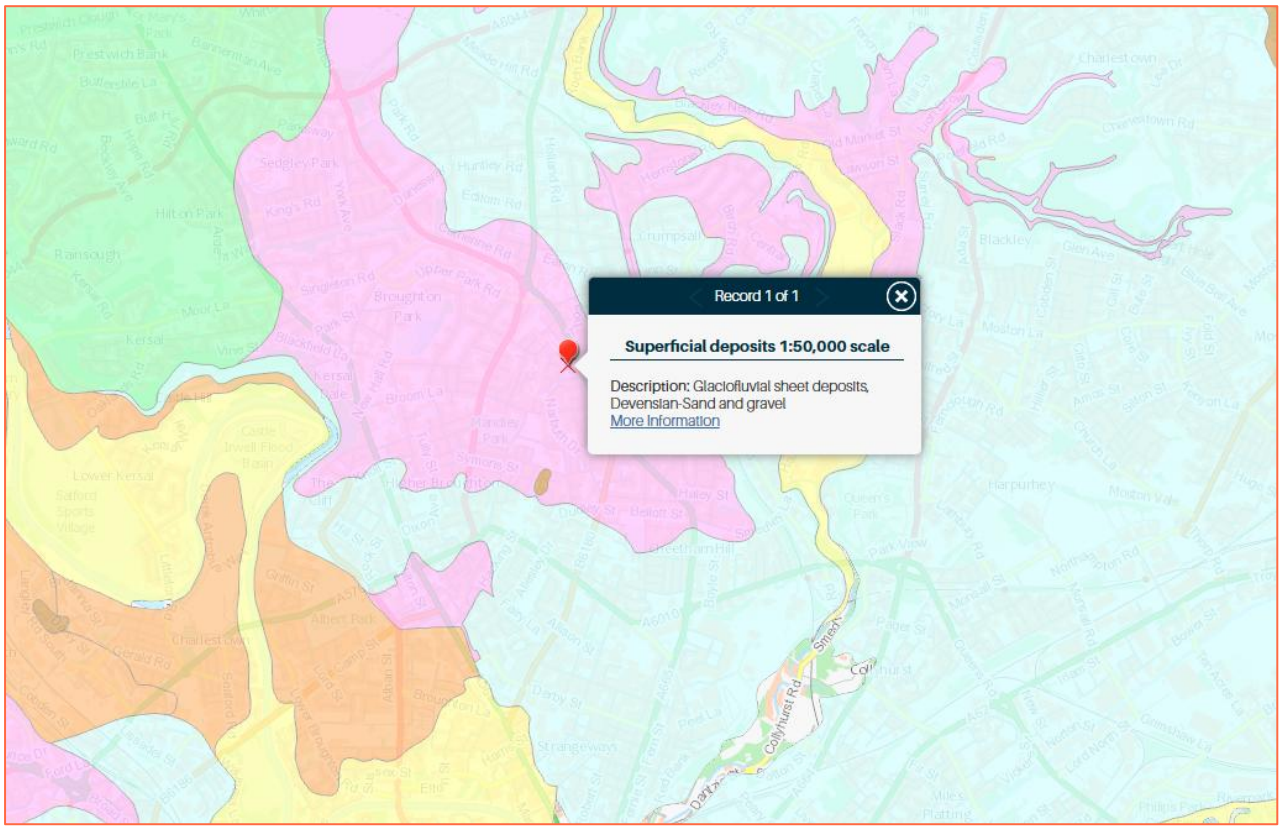


Figure 3: BGS superficial deposits (Source: BGS)

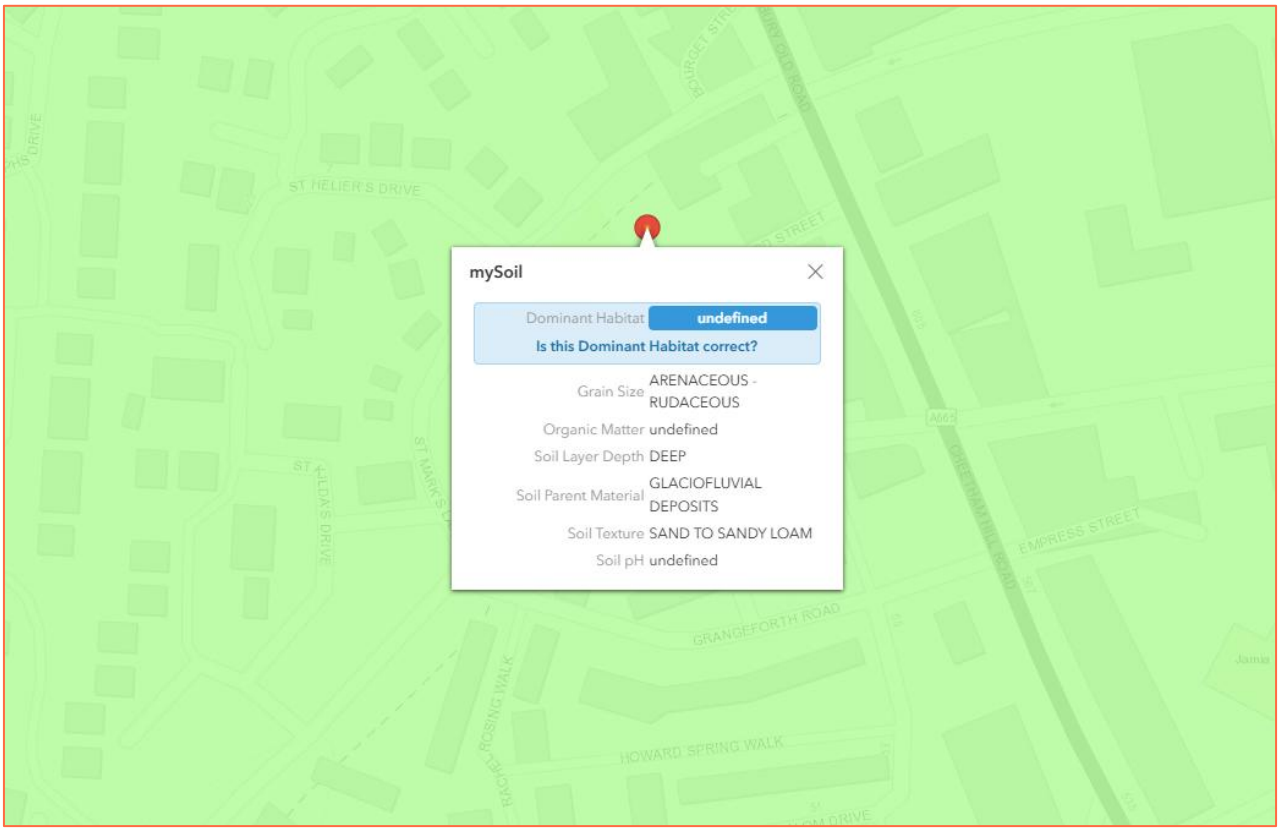


Figure 4: Soil map (Source: UK Soils, BGS)

Nearby Watercourses / Drainage Features:

2.8. It is understood from the Manchester City Council Decision Notice that the Moston Brook Culvert is located in close proximity to the site.

3. Development Proposal

3.1. Discharge of Surface Water Planning Condition 6 is for a proposed part-two & part-three storey residential block consisting of 9 residential units (1 X 1 Bedroom & 8 X 2 Bedroom apartments) with associated car parking, landscaping, and amenity spaces at the land Adjacent to St Marks Lane, Robin Hood Street, Manchester, Cheetham Hill, M8 9GH.

3.2. Post development the roof area of the development will cover approximately 371m^2.

3.3. Proposed plans are provided in the report Appendix.



Figure 5: Proposed site block plan (Source: Oyra Architectural Studios)

4. Surface Water Drainage Strategy

Existing Drainage:

4.1. According to United Utilities sewer records, there is a combined public sewer below the St Marks Lane and Robin Hood Street. There is also a non public drainage pipework located beneath St Marks Lane.

Drainage Hierarchy:

4.2. In order to mitigate flood risk posed by post development runoff, adequate control measures will need to be considered within the site. This will ensure that surface water runoff is dealt with at source and flood risk is not increased elsewhere.

4.3. The drainage strategy for the site has been prepared according to the drainage discharge hierarchy from CIRIA C753 The SuDS Manual, as follows:

1. Infiltration to the maximum extent that is practical;
2. Discharge to surface waters;
3. Discharge to surface water sewer;
4. Discharge to combined sewer.

Infiltration Potential:

4.4. The 1:50,000 BGS map showed the site to be located upon the bedrock of Manchester Marls Formation – Mudstone. The soil type taken from the UKSO Soil Map Viewer, shows the site to be located upon relatively deep soils of Glaciofluvial Deposits parent material with a soil texture of sand to sandy loam.

4.5. Infiltration testing at the site has shown that ground conditions are not suitable for infiltration SuDS. *Refer to Phase II Geoenvironmental Site Investigation by Earth Environmental & Geotechnical Ltd in the appendix.*

4.6. A Contaminated Land Phase Two Intrusive Investigation by Martin Environmental Solutions Ltd has shown there to be contamination at the site which would prohibit shallow infiltration SuDS from being utilised.

Proposed Discharge Rate and Location:

4.7. The greenfield runoff rate for the area of the site being attenuated has been calculated as 0.4 l/s for the 1:1 annual runoff event, 0.7 l/s for the 1:30 year event and 0.9 l/s for the 1:100 year event. Refer to calculations in Appendix.

4.8. Runoff from the roof of the flats and all impermeable ground surfaces will discharge into cellular storage attenuation.

4.9. From the cellular storage, runoff will be gradually discharged to the combined sewer beneath St Marks Lane. The discharge will be limited to 0.9 l/s for all storms up to the 1:100 year + 40% climate change event via a Hydro-Brake. The Hydro-Brake will be installed in an inspection chamber within the site.

Cellular Storage Attenuation:

4.10. The proposed area discharging into the cellular storage amounts to approximately 628m^2.

4.11. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to take into account future urban creep. Applying a 10% allowance to all areas discharging to cellular storage gives a value of 690.8m^2.

Therefore, all cellular storage drainage calculations have been made on a basis of a total impermeable area of 690.8m^2.

4.12. Preliminary calculations indicate that sufficient storage required to attenuate runoff from all impermeable surfaces arising from the critical 1:100 year + 45% climate change event can be provided by cellular storage of dimensions 60.8m^2 x 0.66m x 0.95 (voids).

4.13. Preliminary calculations indicated that some 38.12m^3 of storage is required to attenuate the runoff for all storms up to and including the 1:100 year + 45% climate change event.

4.14. *Please note that that the locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes*.

4.15. All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to Appendix.

Water Quality:

4.16. Roof water will contain negligible contaminant concentrations and does not warrant treatment. Nevertheless, it is suggested to include debris / sediment traps on any new drainage.

4.17. However, all Surface Water runoff from trafficked areas will be required to pass through a suitable interceptor prior to discharge to the cellular storage.

Design Exceedance:

4.18. Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. In the event of the drainage system failure, the runoff flow can be managed through detailing the new external levels to direct water away from structures.

Adoption and Maintenance:

4.19. It is proposed that all SuDS facilities will be maintained by the landlord of the site.

4.20. A draft Maintenance Schedule is outlined below.

4.21. In addition, it is recommended that all drainage elements are inspected following the first storm event and monthly for the first 3 months following commissioning.

Cellular Storage:

4.22. It is not envisaged that silt build up within the cellular crate systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits and inspection chambers on a regular basis. Notwithstanding this, a suitable maintenance regime is outlined in the table below.

Maintenance Schedule	Action	Frequency
Routine Maintenance	• Remove silt build-up from system.	Action as required.
	• Remove debris from catchment surface if it may cause risks to performance.	Action as required.
Remedial Actions	• Repair inlets, outlets and overflows.	Action as required.
Monitoring	• CCTV inspection of crates for silt build-up to establish silt removal frequencies.	Following first storm event and every five years thereafter.
	• Inspection of inlet, outlet and overflow pipework for silt accumulation to establish silt removal frequencies.	Monthly for first 3 months and annually thereafter.
	• Inspection of inlets, outlets and overflows to ensure they are functioning correctly.	Annually.

Table 1: Suggested maintenance regime for cellular storage

4.23. Inspection and maintenance access can be gained via inspection chambers and inlet pipework.

4.24. Jetting should be undertaken in accordance with current jetting guidelines, particularly the Sewer Jetting Code of Practice published by The Water Research Centre. Jetting at 150 bar at 300 l/min should be more than adequate in removing any build-up of material. However, unlike regular jetting which relies heavily on high pressure to remove hardened deposits on the inner bore of pipes, effective cleansing of a crate system relies more on the delivery flow rate to flush solids back through the system.

4.25. A standard jet head with rear facing nozzles should be used. The head should be fed to the far end of the crate tunnel via the nearest inspection chamber, activated and retracted. As the nozzle is removed, debris will be swept back into the inspection chamber where it can then be removed with the use of a standard gully sucker. This method will ensure the effective removal of gross solids (carrier bags, cans, leaf litter etc.) from the system. Whilst 100% removal cannot be guaranteed, it has been shown that this jetting method will also remove an element of finer material which would otherwise be 'lost' within the system.

Pipework, Inspection Chambers, Catchpits and Flow Controls:

4.26. It is not envisaged that silt build up within the pipework systems will require a rigorous maintenance regime so long as silt is removed from upstream catch pits on a regular basis. Notwithstanding this, a suitable maintenance regime for the systems is outlined in the table below.

Maintenance Schedule	Action	Frequency
Routine Maintenance	• Remove silt and debris from inspection chambers, catchpits and flow controls. • Cleaning of gutters and downpipe filters.	Annually or as required.
	• Remove root ingress.	Action as required.
Monitoring	• Inspect for silt and debris.	Every three months.
	• CCTV survey of drainage system to identify alignment issues, cracked pipes or leaking joints.	Every 10 years.

Table 2: Suggested maintenance regime for pipework, inspection chambers, catchpits and flow controls

5. Discussion and Conclusion

5.1. This Surface Water Drainage Technical Note has been prepared by Unda Consulting Limited on behalf of IRHA HOMES LTD, to address Condition 6 of a planning application.

5.2. The planning application is for a proposed part-two & part-three storey residential block consisting of 9 residential units (1 X 1 Bedroom & 8 X 2 Bedroom apartments) with associated car parking, landscaping, and amenity spaces. These works are proposed to be undertaken at the land Adjacent to St Marks Lane, Robin Hood Street, Manchester, Cheetham Hill, M8 9GH.

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5.13. The greenfield runoff rate for the area of the site being attenuated has been calculated as 0.4 l/s for the 1:1 annual runoff event, 0.7 l/s for the 1:30 year event and 0.9 l/s for the 1:100 year event. Refer to calculations in Appendix.

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5.17. In order to comply with CIRIA C753 The SuDS Manual, a 10% allowance will be added to take into account future urban creep. Applying a 10% allowance to all areas discharging to cellular storage gives a value of 690.8m^2. Therefore, all cellular storage drainage calculations have been made on a basis of a total impermeable area of 690.8m^2.

5.18. Preliminary calculations indicate that sufficient storage required to attenuate runoff from all impermeable surfaces arising from the critical 1:100 year + 45% climate change event can be provided by cellular storage of dimensions 60.8m^2 x 0.66m x 0.95 (voids).

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5.20. *Please note that that the locations of the cellular storage within the Causeway calculations are arbitrary for modelling purposes*.

5.21. All preliminary surface water drainage calculations have been undertaken using Causeway software. Refer to Appendix.

5.22. Roof water will contain negligible contaminant concentrations and does not warrant treatment. Nevertheless, it is suggested to include debris / sediment traps on any new drainage.

5.23. However, all Surface Water runoff from trafficked areas will be required to pass through a suitable interceptor prior to discharge to the cellular storage.

5.24. It is proposed that all SuDS facilities will be maintained by the landlord of the site. A draft Maintenance Schedule is outlined within the report.

5.25. Should the onsite drainage system fail under extreme rainfall events or blockage, flooding may occur within the site. In the event of the drainage system failure, the runoff flow can be managed through detailing the new external levels to direct water away from structures.

This drainage strategy has been undertaken in accordance with the principles set out in NPPF. We can conclude that providing the development adheres to the conditions advised above, the said development proposals can be accommodated without increasing flood risk within the locality in accordance with objectives set by Central Government and the EA.

Unda Consulting Limited
February 2026

Appendix

A – Development Plans:

- Site location, existing and proposed plans – Orya Architectural Studios.

B – Infiltration Testing:

- Phase II Geoenvironmental Site Investigation (Infiltration Testing) – Earth Environmental & Geotechnical Ltd;

C – Causeway Calculations:

- IH124 Pre-Development Greenfield Runoff Calculations for the area of the site being attenuated;
- Surface Water Drainage Calculations.

D – Drainage Layout Plans:

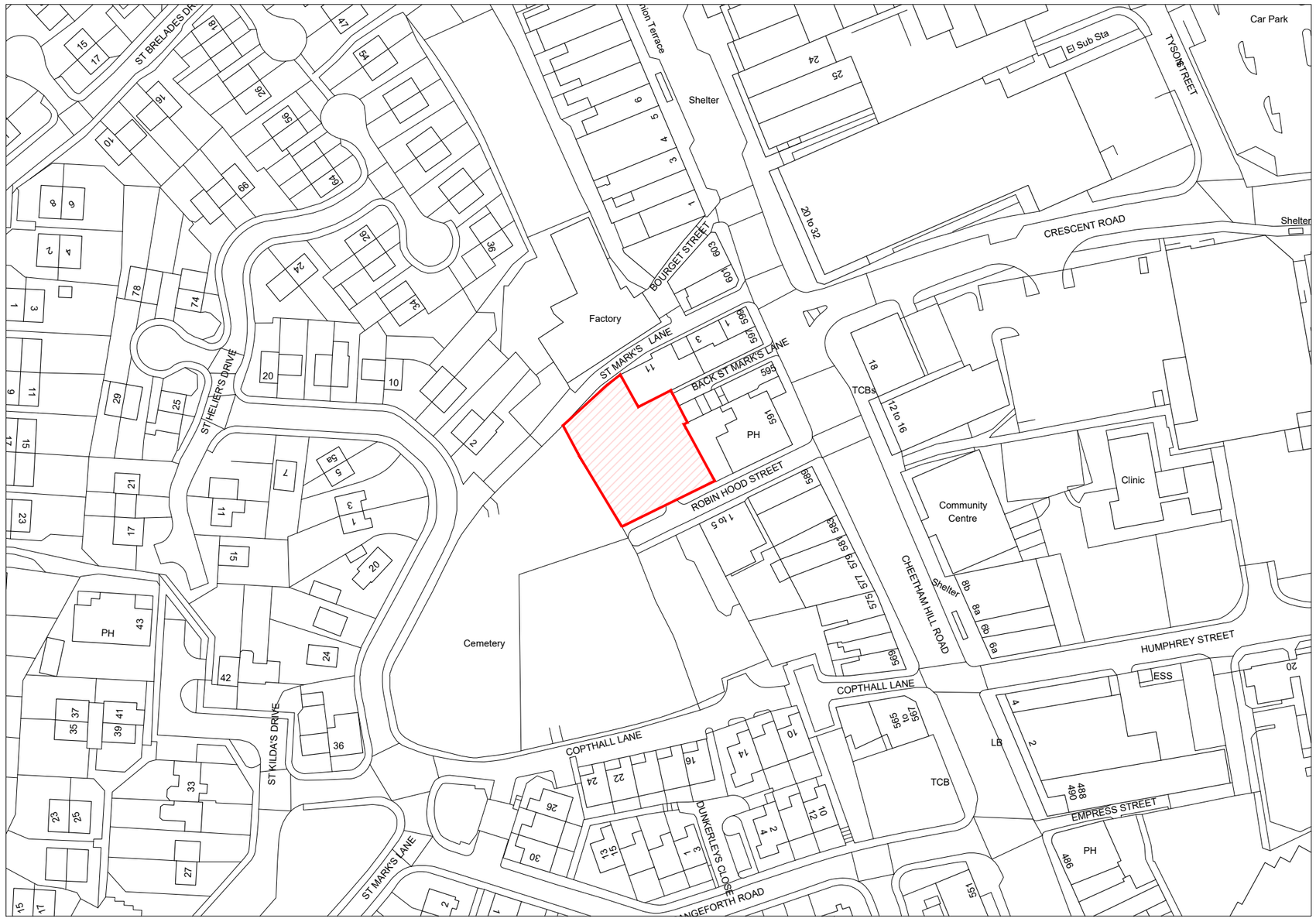
- Proposed Drainage Layout [93021-02].

E – Other:

- Sewer records – United Utilities
- Hydro-Brake Technical Specifications – Hydro International;
- Contaminated Land Phase Two Intrusive Investigation – Martin Environmental Solutions Ltd

F – Other:

- Email Correspondence from United Utilities – United Utilities.



Location Plan 1:1250

Scale Bar 1:1250

Drawing Notes

All dimensions to be checked on site and designers to be informed of any discrepancies before any works commencement on site.

Do not scale from this drawing.

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Date	Description	Revision
29/04/2024	Initial issue	A

Project Status: Building Regs. Stage

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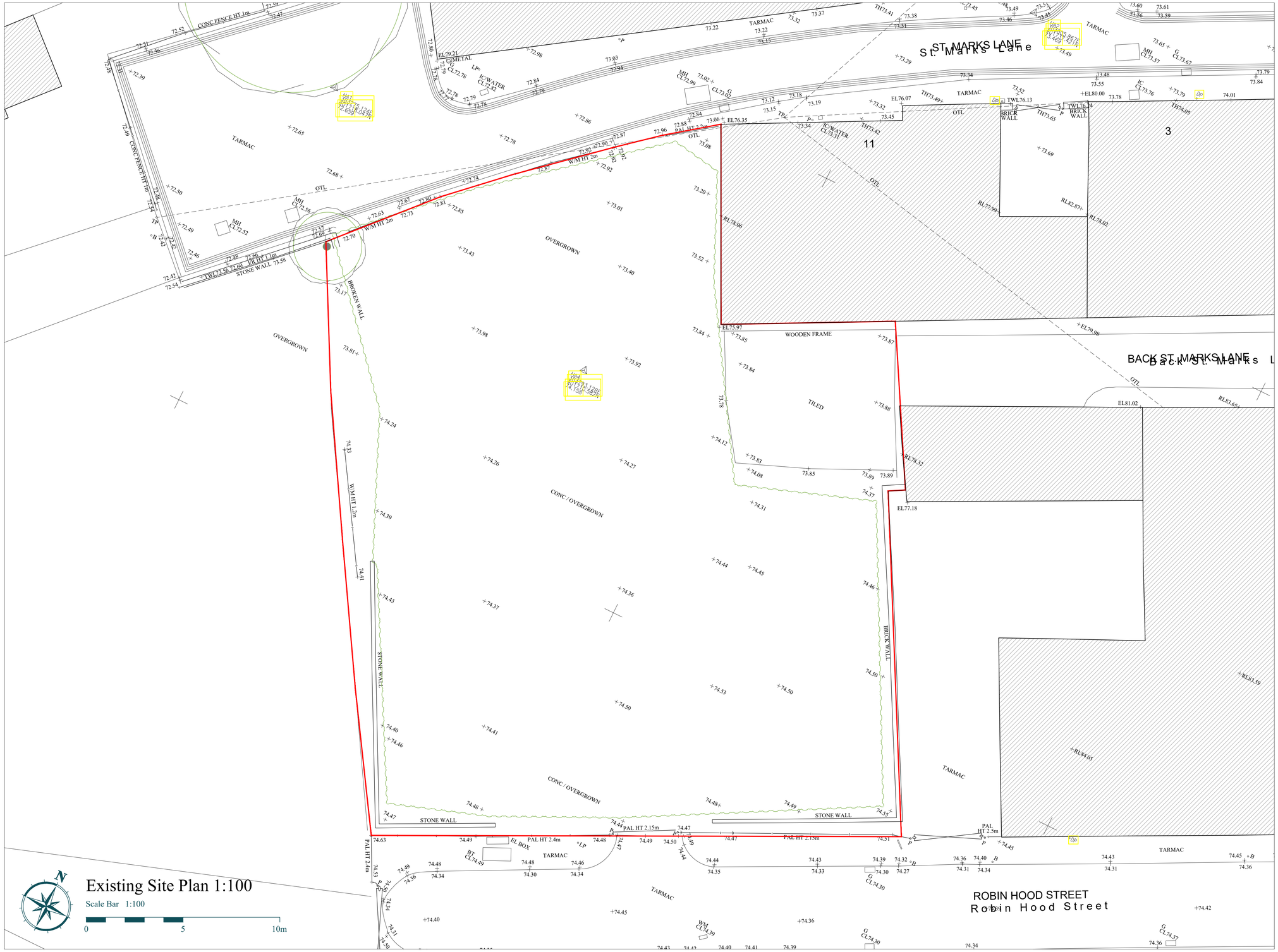
Client: Commercial Client

Site: Land At St Marks Lane & Robin Hood Street, Manchester, M8 9GH

Drawing Title: Location Plan

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1:1250	29/04/2024

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Project Status: Building Regs. Stage

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Client: Commercial Client

Site: Land At St Marks Lane & Robin Hood Street, Manchester, M8 9GH

Drawing Title: Existing Site Plan

Scale @ A1:	Date:
1:100	29/04/2024

Project:	Drawing No:	Revision:
0154	0154-BR-002	A



Proposed Site Plan 1:100

Drawing Notes

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29/04/2024	Initial issue	A

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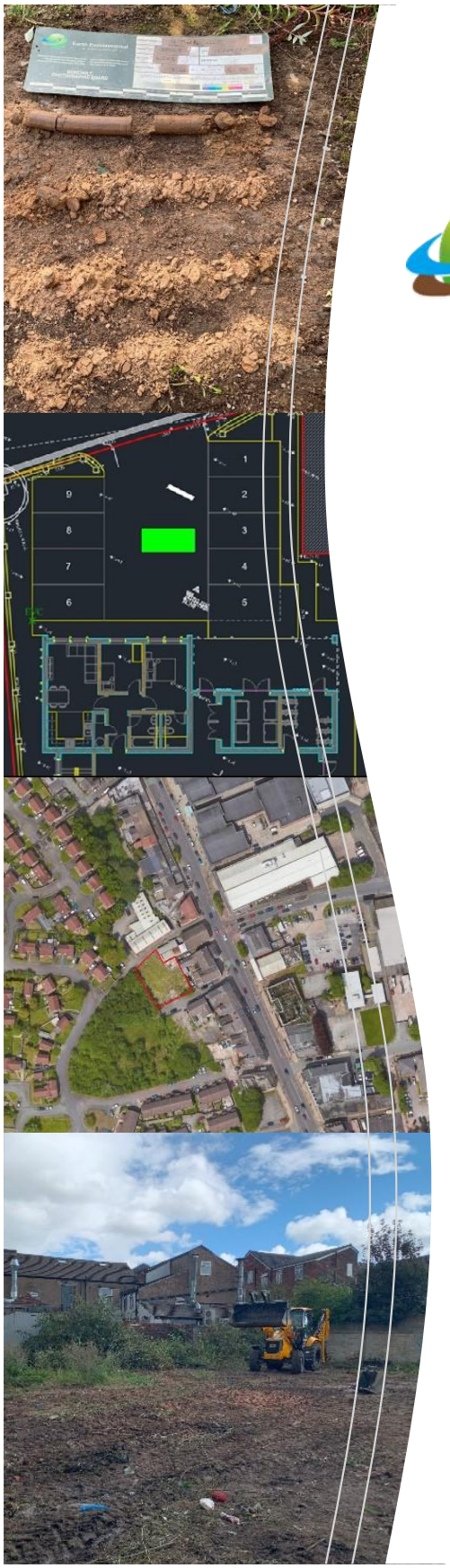
Client: Commercial Client

Site: Land At St Marks Lane & Robin Hood Street, Manchester, M8 9GH

Drawing Title: Proposed Site Plan

Scale @ A1:	Date:
1:100	29/04/2024

Project:	Drawing No:	Revision:
0154	0154-BR-003	A



EARTH ENVIRONMENTAL & GEOTECHNICAL
A Technics Group Company

Phase II GeoEnvironmental

Site Investigation

St Mark's Lane

Cheetham Hill

For

Baryar Investments

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GEOENVIRONMENTAL SITE INVESTIGATION REPORT

ST MARKS LANE

CHEETHAM HILL

Report Ref: A7049/25/SI

SEPTEMBER 2025

Prepared on Behalf of:

BARYAR INVESTMENTS

By:

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
Houldsworth Street
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GEOENVIRONMENTAL SITE INVESTIGATION REPORT

ST MARKS LANE, CHEETHAM HILL

Report Reference: A7049/25/SI

Version B.0

Date: 29th September 2025

Prepared for: Baryar Investments

Prepared by: Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
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Definition of Version Code:
D. Applied during the initial drafting of the report before it has been reviewed.
C. Applied after the report has been reviewed but before the Project Manager has approved it.
B. Applied after the Project Manager has approved the report, ready for issue to the client.
A. Applied to reports after external/internal review.

The version number starts at "0" and is raised by "1" at each re-type.

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1.0 EXECUTIVE SUMMARY

Appointment	A site investigation has been commissioned by Baryar Investments (the Client) to examine the ground conditions for a proposed residential development on the land between St Mark's Lane and Robin Hood Street, Cheetham Hill, Manchester.
The Investigation	The investigation consisted of four windowless sample boreholes, accompanied by associated sampling, in situ testing, and laboratory geotechnical testing, as well as soil infiltration testing to assess potential drainage design options.
The Site	The site, a disused parcel of land with overgrown vegetation, is located on land between St Mark's Lane and Robin Hood Street, approximately 2.6km north of Manchester Victoria train station. The approximate National Grid Reference for the centre of the site is SD 83798 01706 (X: 383798, Y: 401706) with the closest postcode being M8 9JG.
Ground Conditions	The site is recorded as being underlain by Glaciofluvial Sheet superficial deposits, comprising sand and gravel. The solid geology beneath the site is recorded as the Manchester Marls Formation, comprising mudstone and siltstone. The exploratory holes generally encountered variable made ground to a maximum depth of 2.50m bgl, underlain by superficial deposits of SAND to a maximum depth of 5.00m bgl. A layer of clay (0.80m - 1.40m thick) was encountered below the made ground and within the sand. Groundwater was not encountered during the ground investigation.
Geotechnical Assessment	Shallow strip/pad foundations placed in the superficial deposits are considered appropriate for the current proposed development, dependent on allowable bearing pressures and tolerance of structures to settlement. Pavement Design - preliminary design value = 1% in Made Ground. Design Sulphate Class = DS-1, ACEC Site Classification = AC-1s
Infiltration Assessment	Soakaways are unlikely to be feasible due to the low infiltration rate recorded. Advice should be sought from a qualified drainage designer/ civil engineer before the construction of any drainage scheme.
This sheet is intended to provide a summary only of the report. It does not offer a definitive engineering analysis for costing or construction and is subject to the limitations of the agreed brief.	

2.0 INTRODUCTION

2.1 Background

A site investigation has been commissioned by Baryar Investments (the Client) to examine ground conditions for a proposed development on land off St Mark's Lane, Cheetham Hill, Manchester.

2.2 Previous Reports

2.3.1 Martin Environmental Solutions Ltd, Contaminated Land Phase Two Intrusive Investigation for proposed residential development on land between St Mark's Lane and Robin Hood Street, Cheetham Hill, Manchester, M89JG

A ground investigation was conducted at the site by Martin Environmental Solutions Ltd on 25 June 2025 to assess the potential presence of contamination on the site.

4no. hand-dug trial pits were excavated to a maximum depth of 0.70m bgl in order to assess the underlying ground conditions and recover soil samples for chemical testing.

All trial holes encountered variable made ground to a maximum depth of 0.70m below ground level (bgl).

Chemical testing was conducted on a total of 7no. soil samples for the following determinants:

Asbestos Screen, Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Zinc, Moisture Content, Soil Organic Matter, Speciated Petroleum Hydrocarbons, and Speciated Polyaromatic Hydrocarbons (PAH).

Results were compared to the LQM/CIEH S4UL's values for a residential scenario with home-grown produce, with 1% soil organic matter. For lead the C4SL value was used.

No asbestos was identified in any of the samples analysed.

However, elevated levels of lead and cadmium were identified in shallow samples of TP1, TP3, and TP4, and the deeper sample of TP4, along with elevated cadmium levels in TP1 & TP3. In addition, elevated levels of Polyaromatic Hydrocarbons were found in the shallow samples of TP3 & TP4. The specific PAH's exceedances were Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene.

The contamination identified on site was deemed to pose a significant risk of harm to end users.

Therefore, a remediation strategy comprising a 600mm clean, imported cover system was recommended for garden areas to break the source-pathway-receptor pollutant linkage.

2.3 Terms of Reference

Earth Environmental and Geotechnical Ltd (EEG) has been commissioned by the Client to undertake a site investigation in accordance with proposal A7049/25 dated 5th September 2025.

The objectives of this investigation are as follows:

- *Provide factual information on the work undertaken, including sampling location plan, borehole logs, and geotechnical testing.*
- *A Tier 1 (semi-quantitative) risk assessment will be undertaken. This will compare the concentrations of potential soil contaminants identified against current and relevant published guidelines, as well as the identified receptors, such as existing or future end-users and site neighbours.*
- *Classification of potential soil for off-site disposal.*
- *Assessment of ground conditions for foundation and soakaway design.*

2.4 Report Scope

This report presents full factual records of the site work carried out, the ground conditions encountered in the exploratory holes, and the in-situ and laboratory test results. All information collected has been used to provide an interpretation of the ground conditions, along with recommendations for geotechnical design of the proposed development.

2.5 Limitations of the Study

The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information, improved practices, or changes in legislation may require a reinterpretation of the report in whole or in part. EEG reserves the right to amend either conclusions or recommendations in light of any further information that may become available. The report is provided for the sole use of the client and is confidential to them.

Recommendations within this report are also based on exploratory records and examination of samples and, where applicable, laboratory tests.

No liability can be accepted for conditions not revealed by the boreholes and trial pits, particularly at intervening locations.

Whilst every effort is made to ensure the accuracy of the data supplied, all opinions expressed regarding the spatial distribution of strata between sampling locations are for guidance only, and no responsibility is accepted for their accuracy.

3.0 SITE LOCATION & DESCRIPTION

The site is located at the land between St Mark's Lane and Robin Hood Street, approximately 2.6km north of Manchester Victoria train station.

The approximate National Grid Reference for the centre of the site is SD 83798 01706 (X: 383798, Y: 401706) with the closest postcode being M8 9JG.

The site is a roughly square-shaped parcel of land, with current access via Robin Hood Street to the south of the site. The maximum dimensions of the site are approximately 31m north to south and 27m east to west.

The site occupies an area of approximately 0.09 hectares.

The site is currently a disused parcel of land with dense, overgrown vegetation. No mature trees are present on the site.

The ground surface generally comprises variable-made ground and topsoil with a small patch of hardstanding in the northeastern corner.

The surface topography is generally flat with a slight slope in the northern section towards St Mark's Lane.

The site is bound by St Mark's churchyard to the west, Robin Hood Street to the south, multiple takeaway restaurants to the east and S Mark's Lane to the north. The site boundary is delineated by brick walls to the west and east, metal fencing to the south and wire fencing to the north.

The site's surrounding area is predominantly residential, with commercial land to the east along Cheetham Hill Road.

The site location is shown in the aerial photograph presented as Figure 1, below.

Figure 1: Aerial Photograph Showing Site Location



General site photographs are presented in Figure 2 below.

Figure 2: General Site Photographs

Photograph taken viewing across the western section of the site, facing west



Photograph taken viewing across the southeastern section of the site, facing east



Photograph taken viewing across the northern section of the site, facing northeast



Photograph showing representative soils (WS03)



3.1 Proposed Development

It is understood that the client wishes to construct a residential development with an associated amenity space and car parking area.

The proposed development layout details are shown in Figure 3 below.

Figure 3: Proposed Development Plan



4.0 SITE INVESTIGATION

4.1 Exploratory Fieldwork

The fieldwork was carried out by EEG on the 11th of September 2025 and comprised:

- Four window sample boreholes (WS01 - WS04) were each sunk to depths of 5.00m bgl. Window sampler boring was carried out with a small, track-mounted rig, which uses a chain-driven trip hammer to drive sampling tubes or penetrometers into the ground. These tools are coupled to the anvil of the hammer by solid drill rods. Sampling tubes comprise "windowless samplers," which are plain sampler tubes in which a continuous disturbed sample is recovered within a semi-rigid plastic liner. In order to reduce friction within the borehole, sampling tubes of progressively smaller diameter are used as the borehole depth increases. Sampler diameters generally range from between approximately 90mm to 50mm. Standard Penetration Tests (SPTs) were undertaken in the boreholes in accordance with BS EN ISO 22476-3. Groundwater observations were noted where possible. These observations relate to the time of the investigation only, and do not necessarily reflect seasonal fluctuations. Exploratory hole logs are included in Appendix 1.

- Two trial pits were excavated using a tracked hydraulic excavator to a maximum depth of 3.20m below ground level (bgl). Both of the trial pits (SA01 & SA02) were excavated to conduct infiltration rate testing in accordance with BRE Digest365(2016). Trial pits were backfilled immediately on completion of the testing. Trial pit logs are presented in Appendix 1 and soakaway testing results are presented in Appendix 3.

On completion, samples recovered from the site were taken to specialist laboratories for geotechnical testing.

Samples were tracked using appropriate Chain of Custody forms provided by Murray Rix.

All site investigation work was supervised full time by a representative of EEG. The logging of soils and rocks has been carried out in accordance with BS5930(2015+A1:2020) except where superseded by the soil and rock description methodology in BS EN14688-1(2002), BS EN 14688-2(2004) and BS EN 14689-1(2003).

The descriptive terminologies such as firm, etc formerly used within older versions of BS5930 to describe strength now solely relate to consistency. Shear strength is now defined related to results obtained in the field (using a hand vane for example) or in the laboratory (from triaxial tests), as detailed in Table 1 overleaf.

Table 1: Shear Strength Definitions

Term based on measurement	Undrained Strength (c_u) definition in kN/m² (from BS EN ISO 14688-2: 2004, 5.3, Table 5)
Extremely Low Strength	<10
Very Low Strength	10 to 20
Low Strength	20 to 40
Medium Strength	40 to 75
High Strength	75 to 150
Very High Strength	150 to 300
Extremely High Strength	300 to 600

Exploratory Hole Locations

Exploratory hole locations were selected based on the proposed development and located on site by an EEG engineer avoiding known or suspected services. Each exploratory location was scanned using a Cable Avoidance Tool (CAT) in order to locate unrecorded underground services, and the exploratory locations were repositioned if necessary. Table 2 below outlines the targeted features.

Table 2: Sampling Location Justification

Exploratory Hole	Sampling Location
WS01	Below Proposed Development
WS02	Below Proposed Development
WS03	Below Proposed Development
WS04	Below Proposed Development
SA01	Car Parking Area
SA02	Car Parking Area

A summary of exploratory holes and tests undertaken during the investigation are presented in Table 3 below.

Table 3: Summary of Exploratory Holes Undertaken

Hole	Type*	Depth (m)	Date Started	Date Finished	Easting (m)	Northing (m)	Backfill Details**
WS01	WS	5.00	11/09/2025	11/09/2025	383788	401705	A
WS02	WS	5.00	11/09/2025	11/09/2025	383797	401694	A
WS03	WS	5.00	11/09/2025	11/09/2025	383812	401701	A
WS04	WS	5.00	11/09/2025	11/09/2025	383804	401710	A
SA01	TP	2.20	11/09/2025	11/09/2025	383789	401715	A
SA02	TP	3.30	11/09/2025	11/09/2025	383796	401716	A

*WS = Window Sample Borehole, TP = Trial Pit
**A = Arisings

An Exploratory Hole Location Plan is presented as Figure 4, overleaf.

Figure 4: Exploratory Hole Location Plan



4.2 Laboratory Testing

4.2.1 *Geotechnical Testing*

A programme of laboratory testing was carried out on samples taken from the various strata to assist in classification and determine the engineering properties of the materials underlying the site. The tests were scheduled by EEG and carried out by Murray Rix. The test procedures used were generally in accordance with the methods described in BS 1377:1990.

Details of the specific tests used in each case are given in Table 4, below.

Table 4: Summary of Laboratory Geotechnical Tests Undertaken

TEST	STANDARD	No.
Particle size distribution (wet)	BS1377-2:2022, Cl. 10	1
Moisture Content	BS1377-2:2022, Cl. 4	3
Liquid Limit, Plastic Limit, Plasticity Index	BS1377-2:2022, Cl. 5.3/ 6	3
Sulphate content of 2:1 soil: water extract	BS1377-3:2018 + A1:2021, Cl. 7.3	3
pH value	BS1377-3:2018 + A1:2021, Cl. 12	3

The results of the laboratory geotechnical tests are discussed in Section 6 and included in Appendix 2.

5.0 GROUND CONDITIONS ENCOUNTERED

5.1 Soil Profile Encountered

BGS digital mapping indicates that the site is underlain by Glaciofluvial Sheet superficial deposits, comprising sand and gravel.

The solid geology beneath the site is recorded as the Manchester Marls Formation, comprising calcareous mudstone and siltstone, with beds of fossiliferous marine limestone and dolomite.

The sequence of strata encountered beneath the site was as follows:

- **MADE GROUND** - was encountered in all exploratory hole locations between ground level and to a maximum depth of 1.50m bgl, comprising:
    - SAND, with variable quantities of clay and gravel of red brick, concrete, asphalt, plastic, glass, metal, ceramic, sandstone and mudstone, with variable quantities of cobbles and boulders of red brick and concrete
    - GRAVEL of sandstone
- **SUPERFICIAL DEPOSITS** - were encountered in all exploratory hole locations, to a maximum depth of 5.00m bgl, comprising:
    - SAND with variable quantities of clay and gravel of sandstone, mudstone and coal.
    - CLAY, with variable quantities of silt, sand and gravel of sandstone, and mudstone.

The depths of the various materials encountered in the exploratory holes are summarised in Table 5, below.

Table 5: Summary of Ground Conditions Encountered

Hole	Depth to Stratum (m bgl)			Groundwater (Investigation) (m bgl)
	MADE GROUND	SAND	CLAY	
WS01	GL - 1.50	1.50 – 2.80 4.20 – 5.00+	2.80 – 4.20	-
WS02	GL - 0.60	0.60 – 5.00+	-	-
WS03	GL - 0.70	0.70 - 1.20 2.00 – 5.00	1.20 – 2.00	-
WS04	GL - 1.00	1.00 - 5.00+	-	-
SA01	GL - 1.50	-	1.50 – 2.20+	-
SA02	GL - 1.20	1.20 - 3.20+	-	-

5.2 Observable Indications of Contamination

No observable signs of visual or olfactory contamination were identified during the site investigation.

5.3 Obstructions

A ceramic land drain was encountered at the base of SA02 at a depth of 3.20m bgl. No other man-made subsurface obstructions were encountered during the ground investigation.

5.4 Groundwater

Groundwater was not encountered during the ground investigation.

6.0 ENGINEERING PROPERTIES OF SOILS ENCOUNTERED

6.1 General

The following sections discuss the engineering properties of the strata encountered, based on results of in situ testing and laboratory testing obtained during this investigation.

The results of laboratory geotechnical testing are summarised in the following table.

Table 6: Summary of Laboratory Geotechnical Test Results

Location	Depth (m)	Strata*	CLASSIFICATION											STRENGTH	CHEMICAL	
			Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Modified Plasticity Index (%)	PSD Gravel (%)	PSD Sand (%)	PSD Silt (%)	PSD Clay (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Undrained Shear Strength (kN/m^2)	pH Value	Water Soluble Sulphate SO_4 (mg/l)
WS02	1.5	Sand	-	-	-	-	-	5	77	18		-	-	-	-	-
SA01	2	Clay	24	37	15	22	21	-	-	-	-	-	-	-	-	-
WS01	3.5	Clay	44.3	46	26	20	20	-	-	-	-	-	-	-	-	-
WS03	1.5	Clay	17.2	36	16	20	18	-	-	-	-	-	-	-	-	-
WS01	1.8	Sand	-	-	-	-	-	-	-	-	-	-	-	-	7.9	170
WS03	0.80	Sand	-	-	-	-	-	-	-	-	-	-	-	-	7.5	480
WS04	1.3	Sand	-	-	-	-	-	-	-	-	-	-	-	-	7.8	210

6.2 Made Ground

Made ground was encountered in all exploratory boreholes to a maximum depth of 1.50m below ground level.

Due to the material encountered, no geotechnical testing was carried out in the made ground.

6.3 Superficial Deposits

As discussed in Section 5, material interpreted as superficial deposits was encountered as variable SAND and CLAY in all of the exploratory hole locations.

6.3.1 Sand

Sand was encountered in all exploratory hole locations, at a minimum depth of 0.60m and to a maximum depth of 5.00m bgl.

The **water-soluble sulphate** content of three sand samples ranged from 170mg/l to 480mg/l SO_4, together with **pH values** of 7.5 to 7.9.

Particle Size Distribution (PSD) tests were carried out on one sample of sand. A breakdown of the test results is shown in Table 5 above and in Appendix 2.

SPT tests carried out in the sand resulted in **SPT N values** between 6 and 21, as shown on the SPT v Depth Plot, in Figure 5. The results suggest the sand is loose to medium dense.

Recommended N values and derived design values for the granular soils are summarised in Table 7, below.

Table 7: Summary of Design Parameters (Sand)

Depth	SPT N Value Range	Average N Value	Design N Value*	Equivalent Soil Density	Angle of Internal Friction (degrees)**
1.00	6 - 7	7	6	Loose	28.6
2.00	6 - 9	7	6	Loose	28.6
3.00	11 - 16	13	12	Medium Dense	30.6
4.00	14 - 21	18	16	Medium Dense	31.9
5.00	16 - 21	18	17	Medium Dense	32.5
*Based on lower quartile N value **Based on the correlation by Peck, Hanson and Thornburn (1974)					

It is recommended that for assessing ultimate bearing capacities, where the lower values are critical, the lower quartile value of N values is used.

Based on the correlation by Peck, Hanson and Thornburn (1974), this gives a range of **angle of shearing resistance** of between ϕ=28.6° and 32.5°.

For assessing settlements average ground conditions will give a more realistic value of settlements, and the average of N values should be used.

6.3.2 Clay

Clay was encountered in three exploratory hole locations, as a layer below the made ground or within the sand, with thicknesses ranging between 0.80m and 1.40m.

SPT tests carried out in the clay resulted in **SPT N values** between 5 and 6, as shown on the SPT v Depth Plot in Figure 5 (overleaf). This result suggests the clay is soft.

Atterberg Limit tests were carried out on three samples of the clay. Results of the tests reported **liquid limit** values between 36% and 46% and **plastic limit** values between 15% and 26%, resulting in **plasticity index** values between 20% to 22%.

These results suggest the clay to be of **medium plasticity**. Results are shown on the Plasticity Chart in Figure 6, overleaf.

Recommended N values and derived design values for the cohesive soils are summarised in Table 8, overleaf.

Table 8: Summary of Design Parameters (Clay)

Depth	SPT N Value	Design N Value*	Equivalent Shear Strength** (kN/m²)	Coefficient of Volume Compressibility** (mv)
1.20	6	6	31 (Low Strength)	0.32 (High Compressibility)
*Based on lower quartile N value and correlations by Peck Hanson and Thornburn(1974) **Based on correlation by Stroud & Butler (1975)				

It is recommended that for assessing ultimate bearing capacities, where the lower values are critical, the lower quartile value of N values is used. Based on the N Value in the above table, the equivalent shear strength value is 31kN/m^2.

For design purposes, a value of plasticity index = 21% is recommended, based on the upper quartile value of the results.

The **coefficient of volume compressibility (mv)** has been estimated using the following correlation by Stroud and Butler (1975): for a clay with a plasticity index of 21%, mv = 1 / (0.520 x N value). This correlation gives a value of coefficient of volume compressibility of 0.32m^2/MN, as shown in Table 8, above. The results suggest the clay has a **high compressibility**.

In accordance with NHBC Chapter 4.2 Building Near Trees (2003) soils can be classified in terms of volume change potential, using the relationship:

$$I'_p = I_p \times \frac{\%\ \text{less than } 425\mu m}{100\%}$$

I'_p = modified plasticity index,
I_p = plasticity index.

Based on the laboratory test results, the above relationship and Table 1 of NHBC Chapter 4.2, the samples of clay are shown to have **low to medium volume change potential**.

The **Natural Moisture Content** (NMC) and **Liquid Limit** (LL) of the soil can be used to give an indication of **soil desiccation**, i.e., where the NMC is less than 40% of the LL, the soil is inferred to be desiccated, as summarised in Table 9, below.

Table 9: Soil Desiccation Indicators in the Clay

Location	Depth (m)	Liquid Limit (%)	40% Liquid Limit (%)	Natural Moisture Content (%)	Desiccation
SA01	2	37	14.8	24	No
WS01	3.5	46	18.4	44.3	No
WS03	1.5	36	14.4	17.2	No

The results in the above table show that none of the clay samples tested shows evidence of desiccation.

Figure 5: SPT v Depth Plot

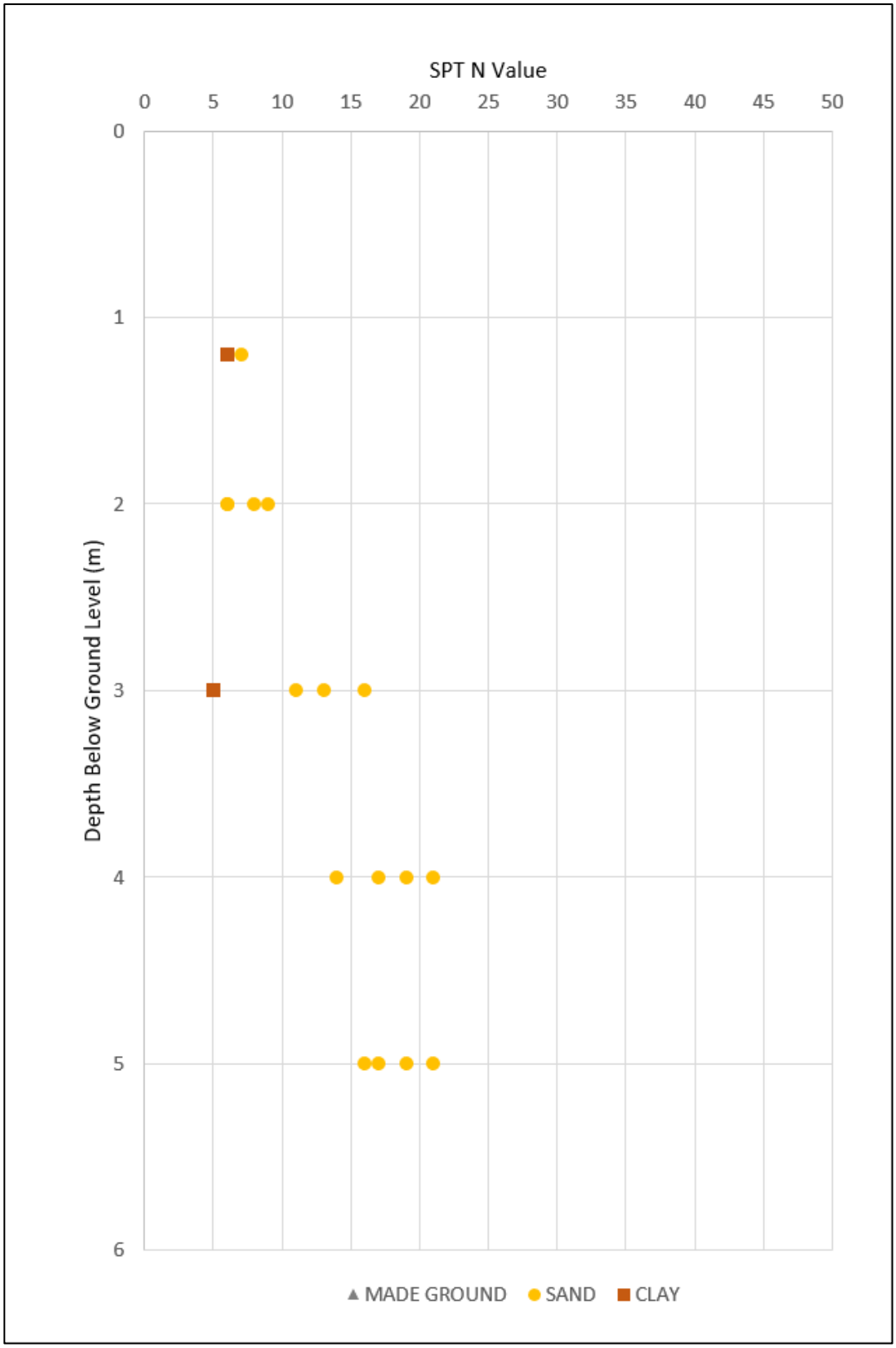
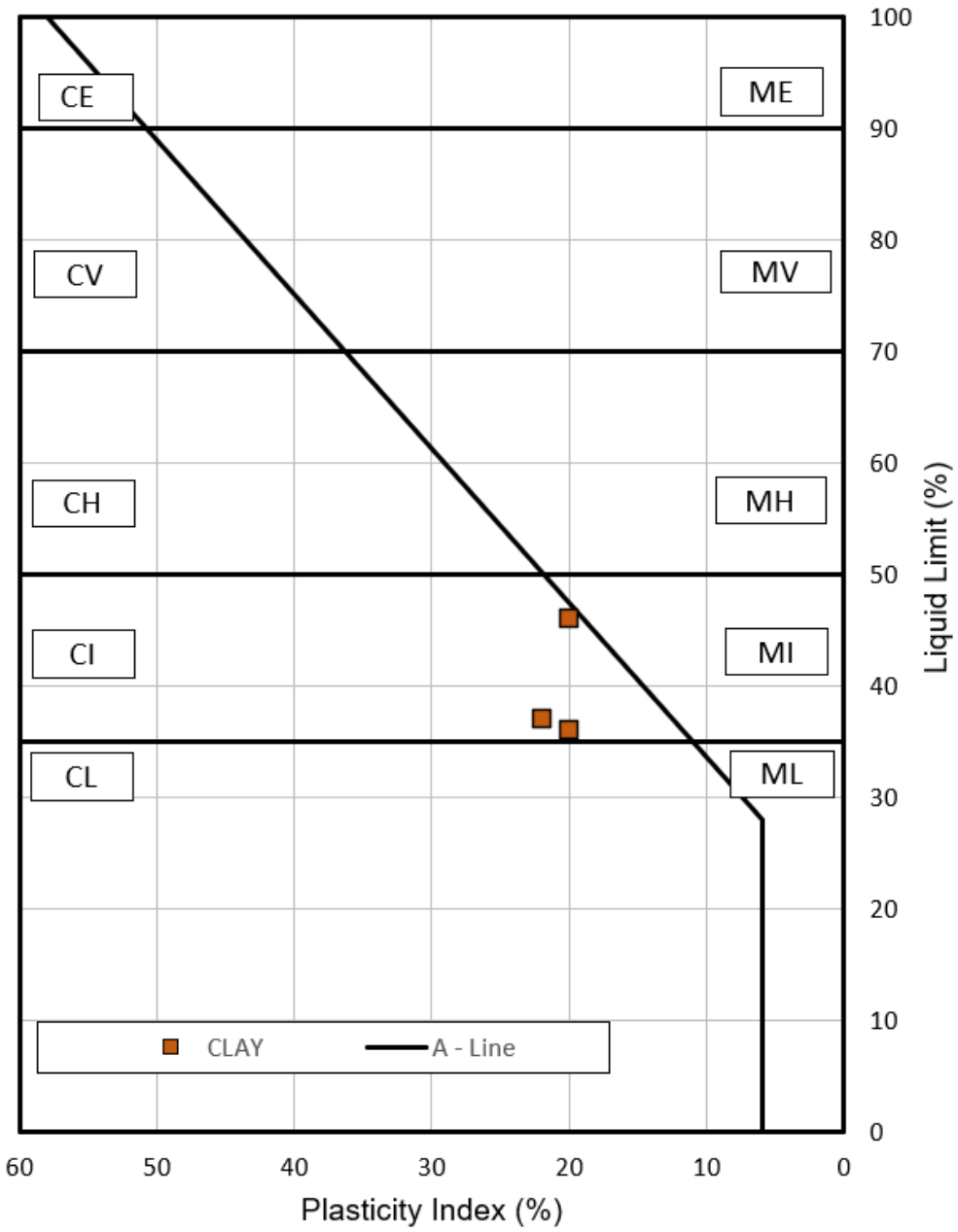


Figure 6: Plasticity Chart



7.0 GEOTECHNICAL ASSESSMENT

7.1 Proposed Development

It is understood that the client wishes to construct a residential development with an associated amenity space and car parking area.

Detailed information regarding structural loadings and the proposed foundation type was not available at the time of authoring this report.

7.2 Ground Conditions Encountered

The exploratory holes generally encountered made ground to a maximum depth of 1.5m below ground level (bgl) underlain by SAND.

A horizon of CLAY was encountered below the made ground in one location (SA01) to a depth of at least 2.20m bgl, and within the sand in two other locations (WS01 and WS03) with a thickness of 1.40m and 0.80m, respectively.

Groundwater was not encountered during the ground investigation.

7.3 Foundation Considerations

Based on the ground conditions encountered, conventional shallow depth foundations (strip/pad), placed in the superficial deposits, should be suitable for providing the anticipated structural loadings are relatively low and subject to tolerances of structure to settlement.

However, consideration should be given to the variable thickness of made ground encountered across the development area.

Should the allowable bearing pressure and settlement prove unfavourable, then alternative foundation options will need to be considered, such as ground improvement and piles.

Due to the variable thickness of the made ground observed across the site, piled foundations driven into the dense superficial deposits may be more suitable for the proposed development.

Both options have been presented below.

7.3.1 *Conventional Shallow Depth Strip/Pad Foundations*

Strip/pad foundations should be taken down below any made ground and placed in the natural clay or sand deposits. Suppose any Made Ground, particularly loose or soft material, is encountered at the foundation level. In that case, this should be excavated and replaced with suitable granular fill or the foundation extended at least 150mm into suitable natural strata.

Foundations should be placed in materials of similar bearing and consolidation characteristics to avoid potential differential settlement occurring. When foundations transition from cohesive to granular soils, nominal reinforcement should be incorporated to mitigate the effects of differential settlement.

Table 10 below summarises anticipated allowable bearing pressures for strip/pad foundations placed in the superficial deposits. The bearing capacities are calculated based on Hansen's (1978) method and assuming a factor of safety against bearing capacity failure of 3.

Groundwater was not encountered during the investigation; therefore, for calculation, groundwater has been assumed to be at 5.00m bgl, which corresponds to the base of the deepest borehole drilled.

Table 10: Summary of Allowable Bearing Pressures

Foundation Strata	Design Value (Section 8)	Foundation Depth (m bgl)	Foundation Type	Foundation Size (m)	Allowable Bearing Pressure (kN/m²)
CLAY	c_u=31kN/m²	1.0	Strip	0.4	85
				0.9	78
			Pad	1.0 x 1.0	90
				2.0 x 2.0	82
	c_u=31kN/m²	1.5	Strip	0.4	91
				0.9	85
			Pad	1.0 x 1.0	98
				2.0 x 2.0	89
	c_u=26kN/m²	2.0	Strip	0.4	81
				0.9	77
			Pad	1.0 x 1.0	89
				2.0 x 2.0	82
	c_u=26kN/m²	2.5	Strip	0.4	85
				0.9	82
			Pad	1.0 x 1.0	94
				2.0 x 2.0	87
SAND	ϕ = 28.6°	1.0	Strip	0.4	142
				0.9	151
			Pad	1.0 x 1.0	201
				2.0 x 2.0	209
	ϕ = 28.6°	1.5	Strip	0.4	211
				0.9	218
			Pad	1.0 x 1.0	304
				2.0 x 2.0	304
	ϕ = 28.6°	2.0	Strip	0.4	281
				0.9	287
			Pad	1.0 x 1.0	409
				2.0 x 2.0	403
	ϕ = 28.6°	2.5	Strip	0.4	350
				0.9	356
			Pad	1.0 x 1.0	515
				2.0 x 2.0	505
	ϕ = 30.6°	3.0	Strip	0.4	521
				0.9	531
			Pad	1.0 x 1.0	795
				2.0 x 2.0	782

Table 11, overleaf, summarises the anticipated settlements of the above foundations in sand based on the design values discussed in Section 6. Settlement in granular soils typically comprises a large amount of immediate settlement as loads are applied, and a smaller proportion of consolidation settlement, which occurs over a more extended period.

As the proposed foundation loading is not known, a foundation loading of 75kN/m² has been used for these calculations.

Table 11: Summary of Anticipated Settlements (Granular)

Foundation Depth (m bgl)	Foundation Strata	Foundation Type	Foundation Size (m)	Foundation Loading (kN/m²)	Settlement* (mm)		
					Lower Limit	Upper Limit	Best Estimate
1.0 - 1.5	SAND	Strip	0.4	75	3	22	**6**
			0.9	75	5	39	**11**
		Pad	1.0 x 1.0	75	4	27	**8**
			2.0 x 2.0	75	6	44	**13**
2.0 - 2.5		Strip	0.4	75	3	22	**6**
			0.9	75	5	39	**11**
		Pad	1.0 x 1.0	75	4	27	**8**
			2.0 x 2.0	75	6	44	**13**
3.0		Strip	0.4	75	1	8	**3**
			0.9	75	2	14	**5**
		Pad	1.0 x 1.0	75	2	10	**3**
			2.0 x 2.0	75	3	16	**5**

Table 12 below summarises the anticipated settlements of the above foundations in cohesive soils, based on the design values discussed in Section 6. Settlement in cohesive soils typically comprises a small amount of immediate settlement as loads are applied and a larger proportion of consolidation settlement, which will occur over a more extended period.

Table 12: Summary of Anticipated Settlement (Cohesive)

Foundation Depth (m bgl)	Foundation Strata	Foundation Type	Foundation Size (m)	Pad Foundation Loading (kN/m²)	Settlement (mm)		
					At Centre	At Corner	Average
1.0	CLAY	Strip	0.4	75	-	-	**8**
			0.9	75	-	-	**10**
		Pad	1.0 x 1.0	75	15	4	**11**
			2.0 x 2.0	75	24	6	**18**
1.5		Strip	0.4	75	-	-	**9**
			0.9	75	-	-	**14**
		Pad	1.0 x 1.0	75	20	5	**15**
			2.0 x 2.0	75	24	6	**18**
2.0		Strip	0.4	75	-	-	**12**
			0.9	75	-	-	**18**
		Pad	1.0 x 1.0	75	23	6	**18**
			2.0 x 2.0	75	30	8	**23**

Floor slabs should be designed as suspended if Made Ground of 600mm thickness or greater is present.

Made ground is not considered an appropriate bearing stratum due to its variable nature.

Floor slabs may be designed as ground-bearing, where the made ground is excavated and replaced with suitable granular fill.

A suitably qualified engineer should inspect all foundation excavations to prove that the foundation strata are suitable and uniform along the length of the foundation, and capable of taking the anticipated structural loadings. Again, if foundations cross from granular to cohesive soils, nominal reinforcement should be incorporated.

7.3.2 *Piled Foundations*

Due to the variable depth of the encountered made ground, particularly in the exploratory hole locations east of the site, driven or bored piles could be adopted. Driven piles would have the advantage of minimising the spoil generated; however, the noise and vibration associated with the installation of driven piles may prevent this type of pile from being selected. It should also be noted that driven piles can potentially create preferential pathways for pollutants.

Short bored (cast-in-situ) piles installed using continuous flight auger (CFA) techniques may therefore be more appropriate. However, given the various advantages and limitations of each pile type, as well as the cost implications, advice should be sought from specialist piling contractors to determine the most suitable and cost-effective type.

They should also be able to provide recommended pile diameters and depths, as well as likely pile capacities, with guaranteed performance. It is recommended that a pile test be conducted to confirm the pile capacities. In assessing the pile capacities, contractors should make an allowance for the effects of negative skin friction, particularly in any Made Ground.

There may be differential settlement between piled structures and the surrounding ground level. Provision should, therefore, be made to bring ground levels up to threshold positions, vehicle access doorways, etc. Alternatively, these materials should be removed and replaced in a controlled manner by suitable existing materials or imported engineered fill.

It is essential that the advice of a specialist piling contractor is sought and that the piling contractor provides positive assurances that their proprietary system is capable of delivering the required working loads in the ground conditions encountered.

7.4 Pavement Design

The ground investigation identified the soil type at the subgrade level to typically be made ground underlain by clay or sand. Based on the recommendations for design CBR values provided in Interim Advice Note 73/06, Revision 1 (2009), a conservative design CBR value of 1% should be adopted in areas where made ground is encountered at the subgrade level.

Consideration should be given to the potential varying ground conditions near the surface, which could result in pavements being constructed on variable materials. In this context, a flexible pavement design may be required.

Consideration should also be given to the use of geotextiles to reduce capping thickness. For example, biaxial geogrids such as Tensar SSLA20 and SSLA30 are often used to minimise capping thickness. The advice of a suitable contractor should be sought as to the most appropriate type of geotextile to use in the ground conditions encountered at this site. For guidance, the following table gives a comparison of granular layer thickness with and without the use of a geotextile, in accordance with the requirements of HA25/94 Part 2.

It should be noted that the type of construction will depend on the proposed finished pavement levels across the site. Therefore, it is recommended that the pavement design be reviewed once these levels are confirmed. In this context, it is essential that further in situ CBR testing is carried out once formation levels are known to verify design CBR values.

Table 13: Comparison of Capping Thickness with and without Geotextile

CBR	Unreinforced			Reinforced with Tensar Geogrid				
	Sub-base	Capping	Total	Sub-base	Capping	No. of grids	Total	Thickness saving
0.5%	Design not suitable			200mm	400mm	2	600mm	-
1.0%	150mm	600mm	750mm	400mm	0	1	400mm	350mm
1.5%	150mm	600mm	750mm	310mm	0	1	310mm	440mm
2.0%	150mm	600mm	750mm	260mm	0	1	260mm	490mm
3.0%	150mm	350mm	500mm	210mm	0	1	210mm	290mm
4.0%	150mm	300mm	450mm	175mm	0	1	175mm	275mm
5.0%	150mm	250mm	400mm	160mm	0	1	160mm	240mm
These figures are suitable for light access roads and car parks, based on 1000 standard axles. For heavily loaded pavements, it is advisable to seek the advice of a specialist contractor.								

A suitably experienced engineer or inspector should examine all formation excavations to check for soft or unsuitable material, which should be removed and replaced with compacted granular fill. Also, to ensure good compaction and remove unevenness, the formation should be compacted with equipment suitable for use in the ground conditions encountered. Careful inspection of this work will also help identify any soft spots at or just below the formation level.

7.5 Chemical Attack on Buried Concrete

Chemical tests (see Appendices) show low levels of water-soluble sulphates and neutral conditions. Based on these conditions, it is recommended that for concrete placed in natural strata, the Design Sulphate Class for the site, as defined in BRE Special Digest 1$^{(2005)}$, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1s. The recommendations in BRE Special Digest 1 should be followed for concrete foundations and ground-bearing floor slabs.

7.6 Soil Infiltration Testing

Soil Infiltration Testing was conducted in 2no. trial pits across the site (SA01 & SA02) in accordance with the methods described in BRE Digest 365(2016). Each of the soakaway pits was excavated into the natural strata. The trial pits were rapidly filled with water using a towed bowser, and the water level was monitored over a specified period.

Whilst excavating SA02, a buried ceramic land drain was struck at the base of the trial pit at 3.20m bgl. An attempt was made to fill the trial pit with water; however, this was unsuccessful due to rapid drainage via the ceramic drain. Therefore, testing could not be conducted in this trial pit as it would not represent the permeability of the soil.

Subsequently, a falling head test was also conducted in WS01 to collect additional data on the in-situ permeability of the soils.

Table 14 below summarises the results of the infiltration testing for each location.

Table 14: Summary of Soil Infiltration Testing

Location	Test No.	Test Depth (m bgl)	Test Duration (secs)	Fall in Water Level (m)	Soil Infiltration Rate (metres/second)
SA01	Test 1	1.84 - 2.20	17340	0.10	Too Slow to calculate
SA02	Test 1	N/A	N/A	N/A	N/A
WS01	Test 1	0.77 – 5.00	3600	0.24	Too slow to calculate

It is considered that the use of soakaways at the site is not feasible, and alternative methods for surface water drainage should be investigated.

Full results are presented in Appendix 3.

7.7 Suitability of Excavated Materials

Acceptability criteria and testing methods, as well as compaction/placement methods, will depend on the type of contract and specification used for the construction of the proposed development. It is recommended that a suitably qualified engineer review earthworks specifications once the relevant parties have prepared them.

Granular and natural sand can be suitable for reuse as structural fill, provided it is not contaminated. It does not contain excessive amounts of clay, and the moisture contents are controlled during placement. The control of moisture content will be necessary, as the cohesive content of this stratum is likely to be sensitive to changes in moisture content.

7.8 Temporary Works

Formations will be susceptible to damage from both weather and trafficking, and should be protected immediately upon exposure, particularly in areas where construction plant will access the site.

Excavations in Made Ground are likely to be unstable and should be battered back to an angle of 1 in 2. Alternatively, a system of close sheeting and shoring should be adopted to ensure stability, particularly where personnel are required to enter the excavations. All excavations should be adequately supported where personnel are required to enter the area.

Groundwater seepages could be encountered near the surface within excavations, particularly during the wetter months of the year. Pumping of excavations from a suitably located sump is likely to be required to keep excavations dry.

8.0 CONCLUSIONS & RECOMMENDATIONS

8.1 Foundations

Shallow strip/pad foundations placed in the superficial deposits, are considered appropriate for the current proposed development, dependent on allowable bearing pressures and tolerance of structures to settlement. I f a shallow foundation solution is used, consideration must be given to the potential for differential settlement across the footprint.

Additionally, any made ground identified at the founding level should be excavated and replaced with engineered fill.

Due to the thickness of the made ground identified across the site, it is recommended that a suspended floor slab be used for the proposed development. Ground bearing floor slabs can be utilised if the made ground is excavated and replaced with engineered granular fill.

It is recommended that for foundations and ground floor slabs in contact with the made ground, the Design Sulphate Class should be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification should be taken as AC-1.

8.2 Soil Infiltration Testing

Based on the infiltration testing, it is unlikely that the use of soakaways at the site will be feasible, and alternative means of drainage should be considered.

However, advice should be sought from a qualified drainage designer/ civil engineer prior to the development of any drainage scheme.

8.3 Pavement Design

Based on the site investigation findings, the soil type at the subgrade level was typically made up of ground underlain by variable clay and sand. Based on the recommendations for design CBR values provided in Interim Advice Note 73/06, Revision 1 (2009), a conservative design CBR value of 1% should be adopted in areas where made ground is encountered at the subgrade level.

8.4 Site Personnel

As with all construction sites, personnel working on the site during the construction period should be encouraged to maintain a high standard of personal hygiene, and on-site washing facilities should be available.

8.5 Other Matters

Due diligence is required during the construction period, and if any further evidence of contamination is found, appropriate investigation and/or action should be taken. The significance of any contamination not discovered by this investigation is outside the scope of this report.

APPENDIX 1

EXPLORATORY HOLE LOGS

APPENDIX 2

GEOTECHNICAL TESTING RESULTS

APPENDIX 3

SOIL INFILTRATION TESTING RESULTS

APPENDIX 4

REPORT LIMITATIONS

REPORT LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget, and staff resources allocated to the project.

Other than that, expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2025 and should be read in light of any subsequent changes in legislation, statutory requirements, and industry best practices. Ground conditions can also change over time and further investigations, or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full of those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.

EARTH ENVIRONMENTAL & GEOTECHNICAL
A Technics Group Company

Project Title: St Marks Lane, Cheetham Hill		**WS01**
Project Number: A7049	Client: Baryar Investments	Sheet 1 Of 1
GL (mAOD): 77.00	N Coord: 401705	E Coord: 383788
Date: 11/09/2025	Method: Drilling Rig	Driller: PM Sampling	Logged By: TP

Depth (m)	Type	Test Result	Level	Depth (m)	Description	Water	Standpipe
			76.00	1.00	MADE GROUND: Dark brown, slightly clayey, gravelly, fine to coarse SAND. Gravel is angular to subangular, fine to coarse of red brick, concrete, glass, plastic, metal, ceramic, sandstone and mudstone.		
		N=6 (2,2,1,1)	75.50	1.50			
1.80	D				Loose, orangish brown, slightly clayey, slightly gravelly, fine to coarse SAND. Gravel is angular to subrounded of sandstone, mudstone and coal.		
		N=9 (2,2,2,3)	75.00	2.00			
			74.20	2.80			
		N=5 (1,1,1,2)	74.00	3.00	Soft, dark brown, silty CLAY.		
3.50	D						
		N=19 (4,5,5,5)	73.00	4.00	3.80 Becoming firm at 3.80m bgl.		
			72.80	4.20			
					Medium dense, dark brown, slightly clayey, fine to coarse SAND.		
					4.50 Becoming orangish brown at 4.50m bgl.		
		N=19 (4,5,5,5)	72.00	5.00			
					End Of Borehole At 5.00 m		
			71.00	6.00			

KEY

D - Disturbed Sample
B - Bulk Sample
U - Undisturbed
W - Water Sample
S - Standard Penetration Test
C - Cone Penetration Test
N - Penetration Test 'N' Value
V - Hand Shear Vane kPa
▽ - Groundwater Strike
▼ - Groundwater Level

AGS

REMARKS

No Groundwater Encountered
1. Borehole was scanned and an inspection pit dug to 1.20mbgl. 2. No visual or olfactory contamination identified. 3. Borehole terminated at 5.00m bgl at the target depth. 4. Borehole was backfilled with arisings.

Scale: 1:40

Water Strikes

Date	Strike	Level	Minutes	Casing	Sealed

Daily Log Of Depths

Date	Casing	Water

Chiselling

From	To	Hours

Printed By GeoLogs (www.GeoLogs.com)

EARTH ENVIRONMENTAL & GEOTECHNICAL
A Technics Group Company

	Project Title: St Marks Lane, Cheetham Hill		**WS02**
	Project Number: A7049	Client: Baryar Investments	Sheet 1 Of 1
	GL (mAOD): 77.00	N Coord: 401694	E Coord: 383797
Date: 11/09/2025	Method: Drilling Rig	Driller: PM Sampling	Logged By: TP

Depth (m)	Type	Test Result	Level	Depth (m)	Description	Water	Standpipe
			76.80	0.20	MADE GROUND: Grey, angular to subangular, fine to coarse GRAVEL of sandstone.		
			76.40	0.60	MADE GROUND : Dark brown, slightly clayey, gravelly, fine to coarse SAND. Gravel is angular to subangular, fine to coarse of red brick, concrete, glass, plastic, metal, ceramic, sandstone and mudstone.		
			76.00	1.00			
		N=6 (2,2,1,1)	75.80	1.20	Brown, fine to coarse SAND.		
1.50	D				Loose, light brown, fine to coarse SAND.		
		N=6 (1,1,2,2)	75.00	2.00			
		N=11 (2,2,3,4)	74.00	3.00	3.00 Becoming medium dense at 3.00m bgl.		
		N=14 (3,3,4,4)	73.00	4.00			
		N=17 (4,4,4,5)	72.00	5.00	End Of Borehole At 5.00 m		
			71.00	6.00			

KEY

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W - Water Sample
S - Standard Penetration Test
C - Cone Penetration Test
N - Penetration Test 'N' Value
V - Hand Shear Vane kPa
▽ - Groundwater Strike
▼ - Groundwater Level

AGS

REMARKS

No Groundwater Encountered
1. Borehole was scanned and an inspection pit dug to 1.20mbgl. 2. No visual or olfactory contamination identified. 3. Borehole terminated at 5.00m bgl at the target depth. 4. Borehole was backfilled with arisings.

Scale: 1:40

Water Strikes

Date	Strike	Level	Minutes	Casing	Sealed

Daily Log Of Depths

Date	Casing	Water

Chiselling

From	To	Hours

Printed By GeoLogs (www.GeoLogs.com)

EARTH ENVIRONMENTAL & GEOTECHNICAL
A Technics Group Company

	Project Title: St Marks Lane, Cheetham Hill		**WS03**
	Project Number: A7049	Client: Baryar Investments	Sheet 1 Of 1
	GL (mAOD): 77.00	N Coord: 401701	E Coord: 383812
Date: 11/09/2025	Method: Drilling Rig	Driller: PM Sampling	Logged By: TP

Depth (m)	Type	Test Result	Level	Depth (m)	Description	Water	Standpipe
			76.30	0.70	MADE GROUND: Dark brown, slightly clayey, gravelly, fine to coarse SAND. Gravel is angular to subangular, fine to coarse of red brick, concrete, glass, plastic, metal, ceramic, sandstone and mudstone.		
0.80	D		76.00	1.00	Orangish brown, slightly gravelly, fine to coarse SAND. Gravel is angular to subangular, fine of sandstone and mudstone.		
		N=6 (2,2,1,1)	75.80	1.20	Soft, silty, slightly sandy, slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse of sandstone and mudstone.		
1.50	D						
		N=8 (2,2,2,2)	75.00	2.00	Medium dense, light brown, fine to medium SAND.		
		N=13 (2,3,4,4)	74.00	3.00			
3.50	D						
		N=21 (5,5,5,6)	73.00	4.00			
		N=21 (5,5,5,6)	72.00	5.00	End Of Borehole At 5.00 m		
			71.00	6.00			

KEY

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C - Cone Penetration Test
N - Penetration Test 'N' Value
V - Hand Shear Vane kPa
▽ - Groundwater Strike
▼ - Groundwater Level

AGS

REMARKS

No Groundwater Encountered
1. Borehole was scanned and an inspection pit dug to 1.20mbgl. 2. No visual or olfactory contamination identified. 3. Borehole terminated at 5.00m bgl at the target depth. 4. Borehole was backfilled with arisings.

Scale: 1:40

Water Strikes

Date	Strike	Level	Minutes	Casing	Sealed

Daily Log Of Depths

Date	Casing	Water

Chiselling

From	To	Hours

Printed By GeoLogs (www.GeoLogs.com)

EARTH ENVIRONMENTAL & GEOTECHNICAL
A Technics Group Company

	Project Title: St Marks Lane, Cheetham Hill		**WS04**
	Project Number: A7049	Client: Baryar Investments	Sheet 1 Of 1
	GL (mAOD): 77.00	N Coord: 401710	E Coord: 383804
Date: 11/09/2025	Method: Drilling Rig	Driller: PM Sampling	Logged By: TP

Depth (m)	Type	Test Result	Level	Depth (m)	Description	Water	Standpipe
			76.00	1.00	MADE GROUND: Dark brown, slightly clayey, gravelly, fine to coarse SAND. Gravel is angular to subangular, fine to coarse of red brick, concrete, glass, plastic, metal, ceramic, sandstone and mudstone.		
1.30	D	N=7 (1,2,2,2)			Loose, dark brown, slightly clayey, slightly gravelly, fine to coarse SAND. Gravel is angular to subangular of sandstone, mudstone and coal.		
		N=6 (1,1,2,2)	75.00	2.00			
2.50	D				Loose, light brown, fine to medium SAND.		
		N=16 (4,4,4,4)	74.00	3.00	3.00 Becoming medium dense at 3.00m bgl.		
		N=17 (4,4,4,5)	73.00	4.00			
		N=16 (4,4,4,4)	72.00	5.00	End Of Borehole At 5.00 m		
			71.00	6.00			

KEY

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U - Undisturbed
W - Water Sample
S - Standard Penetration Test
C - Cone Penetration Test
N - Penetration Test 'N' Value
V - Hand Shear Vane kPa
▽ - Groundwater Strike
▼ - Groundwater Level

AGS

REMARKS

No Groundwater Encountered
1. Borehole was scanned and an inspection pit dug to 1.20mbgl. 2. No visual or olfactory contamination identified. 3. Borehole terminated at 5.00m bgl at the target depth. 4. Borehole was backfilled with arisings.

Scale: 1:40

Water Strikes

Date	Strike	Level	Minutes	Casing	Sealed

Daily Log Of Depths

Date	Casing	Water

Chiselling

From	To	Hours

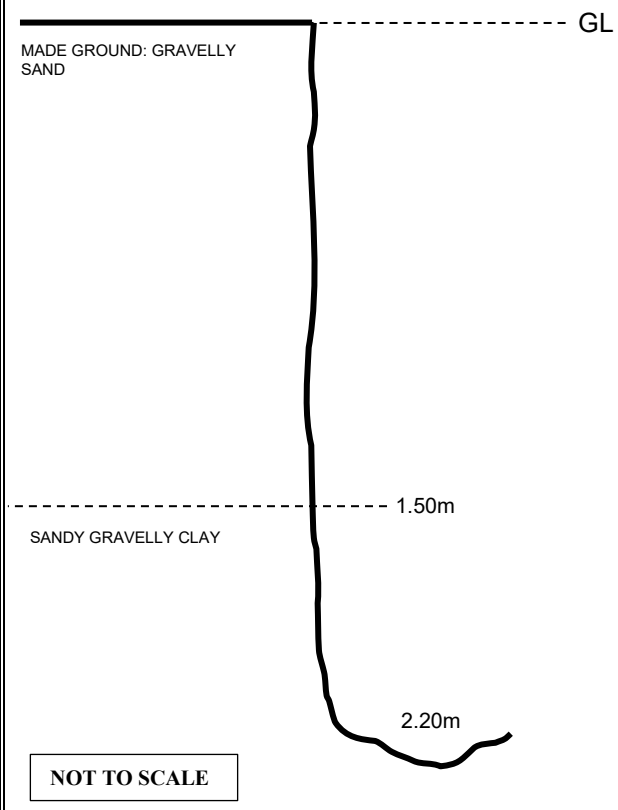
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TRIAL PIT LOG

Project Name:	St Marks Lane, Cheetham Hill	**Hole Number:**	SA01
Date:	11/09/2025	**Logged By:**	Tom Pudifoot
Project No.:	A7049	**Total Depth:**	2.20
Client:	Baryar Investments	**Remarks:**	N/A

Schematic Profile:



Legend	Depth (m)	Description
	GL-1.50	MADE GROUND: Dark brown, gravelly, fine to coarse SAND with high cobble content and occasional subangular boulders of concrete. Gravel is angular to subangular, fine to coarse of red brick, concrete, asphalt, ceramic, plastic, wood, glass, metal, sandstone and mudstone. Cobbles are subangular of red brick and concrete. *Possible red brick foundation encountered at 1.50m bgl.*
	1.50-2.20	Brown, sandy, slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone and mudstone.

Trial pit terminated at 2.20m.
B @ 1.70m bgl
D @ 2.00m bgl

Trial pit stable. Terminated at 2.20m bgl at target depth.

Pictures:



SA01 (2.20m): Spoil mound



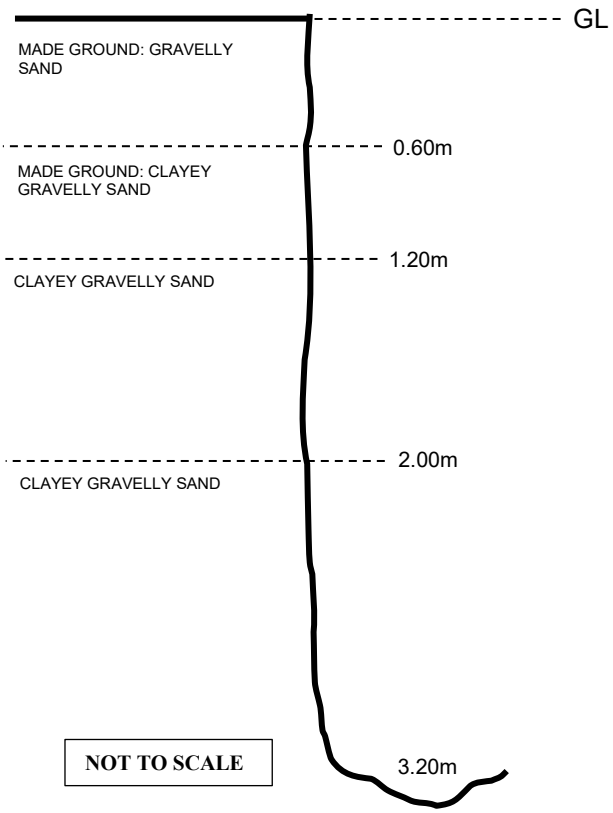
SA01 (2.00m): Internal view of excavation

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TRIAL PIT LOG

Project Name: St Marks Lane, Cheetham Hill	**Hole Number:** SA02
Date: 11/09/2025	**Logged By:** Tom Pudifoot
Project No.: A7049	**Total Depth:** 3.20
Client: Baryar Investments	**Remarks:** N/A

Schematic Profile:



Legend	Depth (m)	Description
	GL-0.60	MADE GROUND: Greyish brown, gravelly, fine to coarse SAND with high cobble content and occasional subangular boulders of concrete. Gravel is angular to subangular, fine to coarse of red brick, concrete, asphalt, ceramic, plastic, glass, metal, sandstone and mudstone. Cobbles are subangular of red brick and concrete. *Becoming greyish brown at 0.30m bgl*.
	0.60-1.20	MADE GROUND: Dark brown, slightly clayey, slightly gravelly, fine to coarse SAND. Gravel is angular to subrounded, fine to coarse of red brick, concrete, ceramic, sandstone and mudstone.
	1.20-2.00	Brown, slightly clayey, slightly gravelly, fine to coarse SAND.
	2.00-3.20	Orangish brown, slightly clayey, slightly gravelly, fine to coarse SAND with pockets of sandy clay inclusions.

Trial pit terminated at 3.20m.
D @ 2.30m bgl
B @ 2.90m bgl

Trial pit stable. Terminated at 3.20m bgl at target depth.

Pictures:



SA02 (3.20m): Spoil mound



SA02 (3.20m): Internal view of excavation

TEST REPORT

Client Earth Environmental & Geotechnical Ltd

Address Houldsworth Mill Business & Arts Centre
Houldsworth Mill
Reddish
Stockport
SK5 6DA

Contract A7049 -
St Marks Lane, Cheetham Hill

Job Number MRN 25001/66
Date of Issue 22 September 2025
Page 1 of 6

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

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

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

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

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

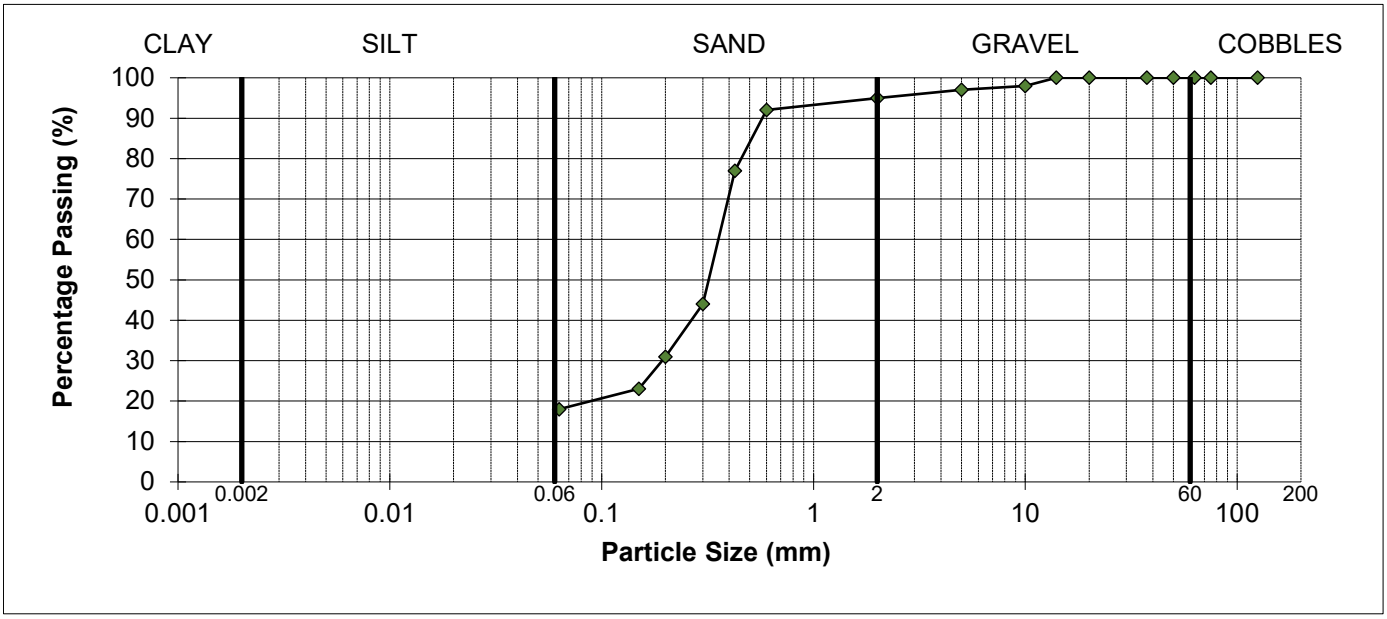
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	Earth Environmental & Geotechnical Ltd
SITE	A7049 - St Marks Lane, Cheetham Hill
JOB NUMBER	MRN 25001/66

SAMPLE LABEL	WS02 1.5m D	DATE SAMPLED	11-Sep-25
LAB SAMPLE No	5174203	DATE RECEIVED	11-Sep-25
DATE TESTED	15-Sep-25	SAMPLED BY	Client

MATERIAL	Brown silty gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		5	97	
75	100		2	95	
63	100		0.6	92	
50	100		0.425	77	
37.5	100		0.3	44	
20	100		0.2	31	
14	100		0.15	23	
10	98		0.063	18	



REMARKS

SIGNED [redacted]

NAME O.P. Davies BA (Hons) DATE 22-Sep-25
(Director / Head of Laboratory)

MURRAY RIX

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UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

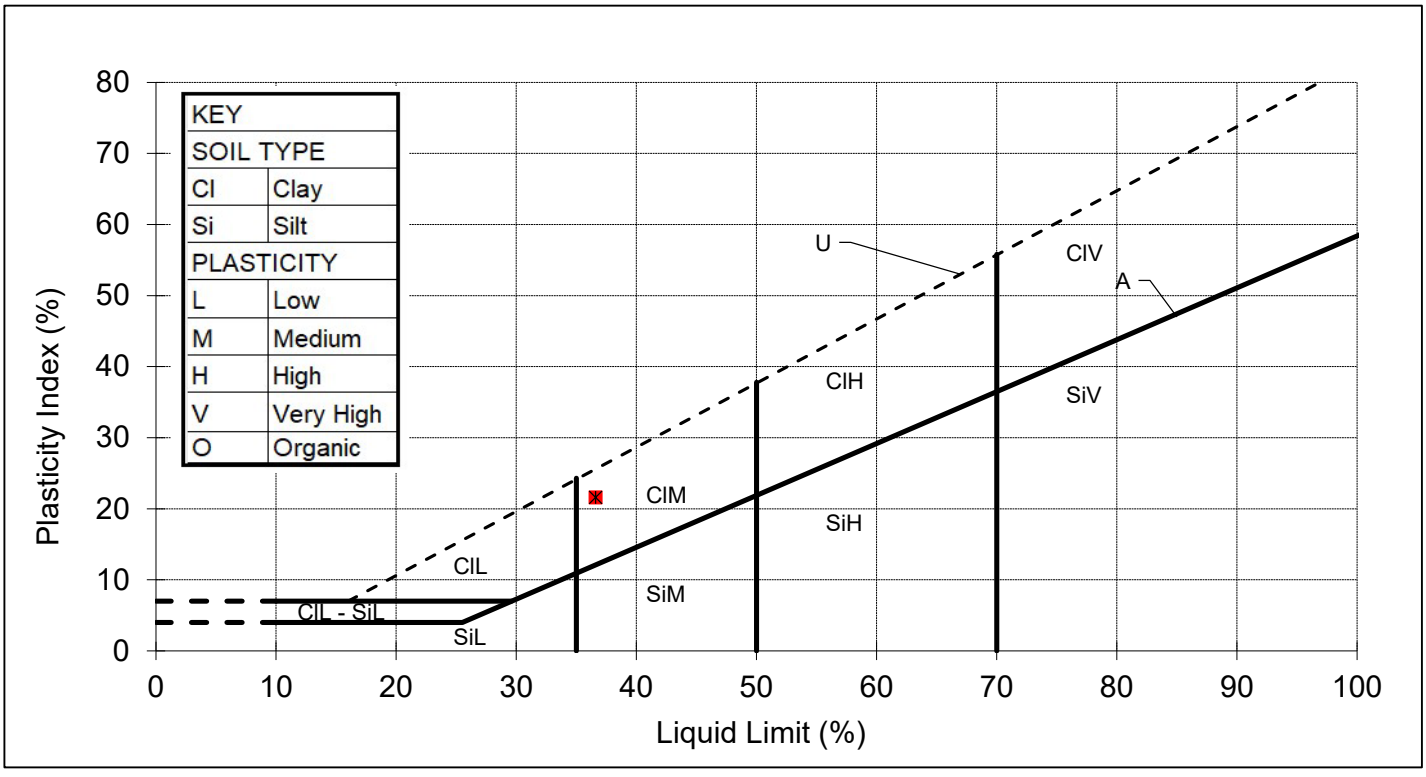
CLIENT	Earth Environmental & Geotechnical Ltd
SITE	A7049 - St Marks Lane, Cheetham Hill
JOB NUMBER	MRN 25001/66

SAMPLE LABEL	SA01 2.0m D	DATE SAMPLED	11-Sep-25
SAMPLE No.	5174209	DATE RECEIVED	11-Sep-25
DATE TESTED	15-Sep-25	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.9	36.5	1.004	
Determination 2 (avg)	19.7	36.4		

Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
24.0	37	15	22	94



REMARKS

SIGNED [redacted]

NAME O.P. Davies BA (Hons) DATE 22-Sep-25
(Director / Head of Laboratory)

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UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

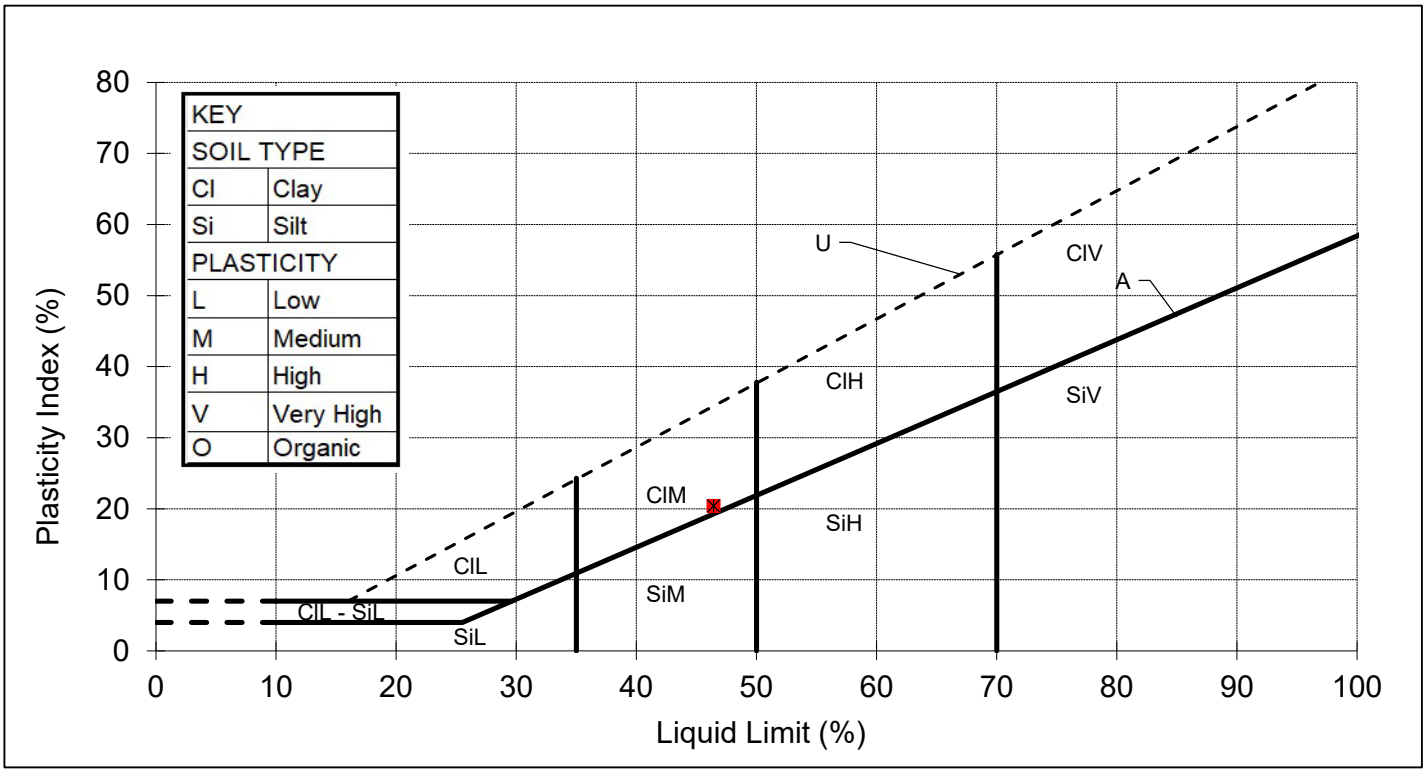
CLIENT	Earth Environmental & Geotechnical Ltd
SITE	A7049 - St Marks Lane, Cheetham Hill
JOB NUMBER	MRN 25001/66

SAMPLE LABEL	WS01 3.5m D	DATE SAMPLED	11-Sep-25
SAMPLE No.	5174202	DATE RECEIVED	11-Sep-25
DATE TESTED	15-Sep-25	SAMPLED BY	Client

MATERIAL	Brown very silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	23.2	48.6	0.954	
Determination 2 (avg)	23.1	48.7		

Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
44.3	46	26	20	99



REMARKS

SIGNED [redacted]

NAME O.P. Davies BA (Hons) DATE 22-Sep-25
(Director / Head of Laboratory)

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UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

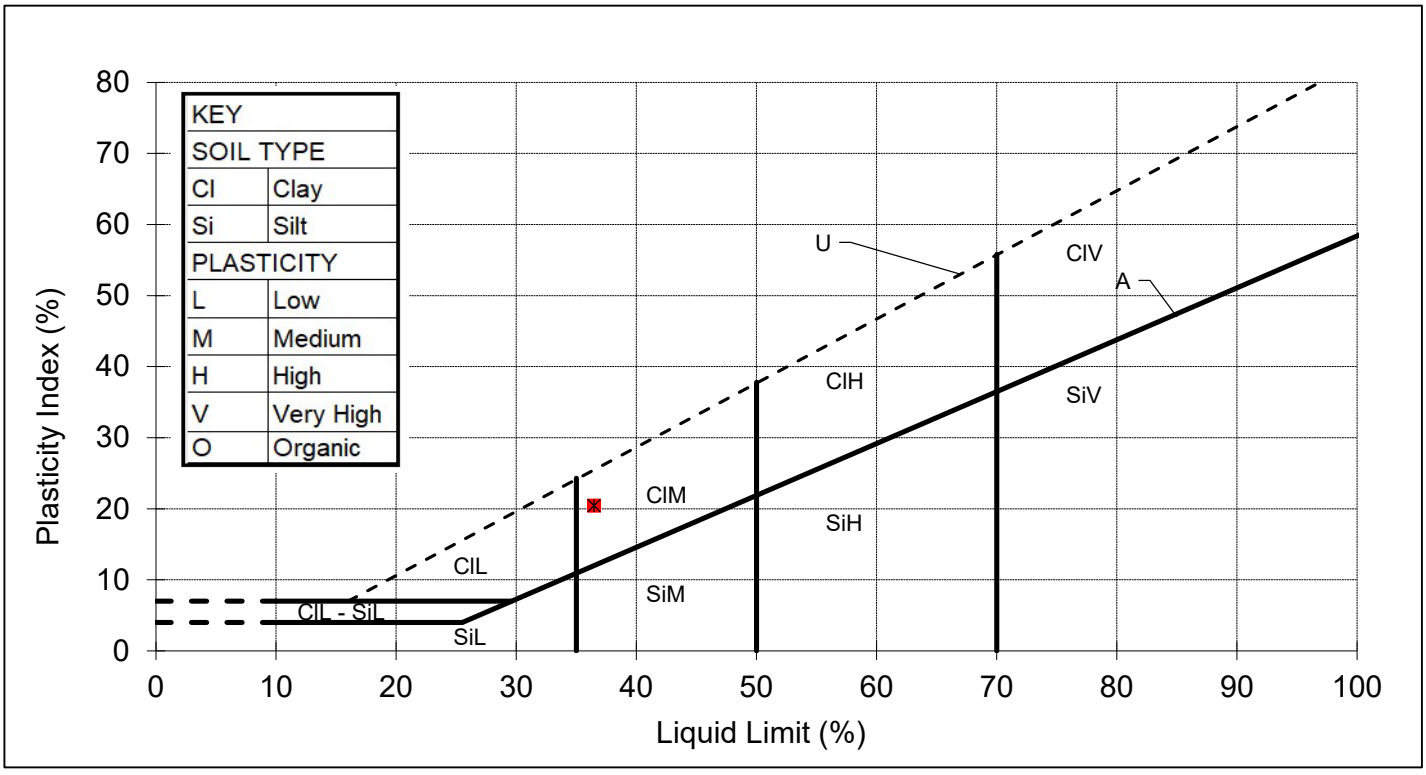
CLIENT	Earth Environmental & Geotechnical Ltd
SITE	A7049 - St Marks Lane, Cheetham Hill
JOB NUMBER	MRN 25001/66

SAMPLE LABEL	WS03 1.5m D	DATE SAMPLED	11-Sep-25
SAMPLE No.	5174205	DATE RECEIVED	11-Sep-25
DATE TESTED	15-Sep-25	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Water Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.2	36.6	0.999	
Determination 2 (avg)	19.9	36.4		

Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17.2	36	16	20	89



REMARKS

SIGNED [redacted]

NAME O.P. Davies BA (Hons) (Director / Head of Laboratory) DATE 22-Sep-25

MURRAY RIX

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TEST CERTIFICATE

DETERMINATION OF WATER-SOLUBLE SULPHATE IN SOIL
& DETERMINATION OF THE pH VALUE
BS 1377-3:2018+A1:2021, Cl. 7.3 & Cl. 12

CLIENT	Earth Environmental & Geotechnical Ltd
SITE	A7049 - St Marks Lane, Cheetham Hill
JOB NUMBER	MRN 25001/66

DATE TESTED	15-Sep-25	DATE SAMPLED	11-Sep-25
SAMPLED BY	Client	DATE RECEIVED	11-Sep-25
PRE-TREATMENT	Air Dried	ADVISED SOURCE	Site Investigation Samples

Sample Number	Sample Label	Material	% Ret. 2mm	pH Value	Water Soluble Sulphate as SO_4 (mg/l)
5174201	WS01 1.8m D	Brown silty gravelly SAND	8	7.9	170
5174204	WS03 0.8m D	Brown silty gravelly SAND	10	7.5	480
5174207	WS04 1.3m D	Brown silty gravelly SAND	6	7.8	210

REMARKS

SIGNED 

NAME O.P. Davies BA (Hons) DATE 22-Sep-25
(Director / Head of Laboratory)

Earth Environmental & Geotechnical Ltd

Tel / Fax: 0161 975 6088
Web: www.earthenvironmental.co.uk
Email: Headoffice@technicsgroup.co.uk

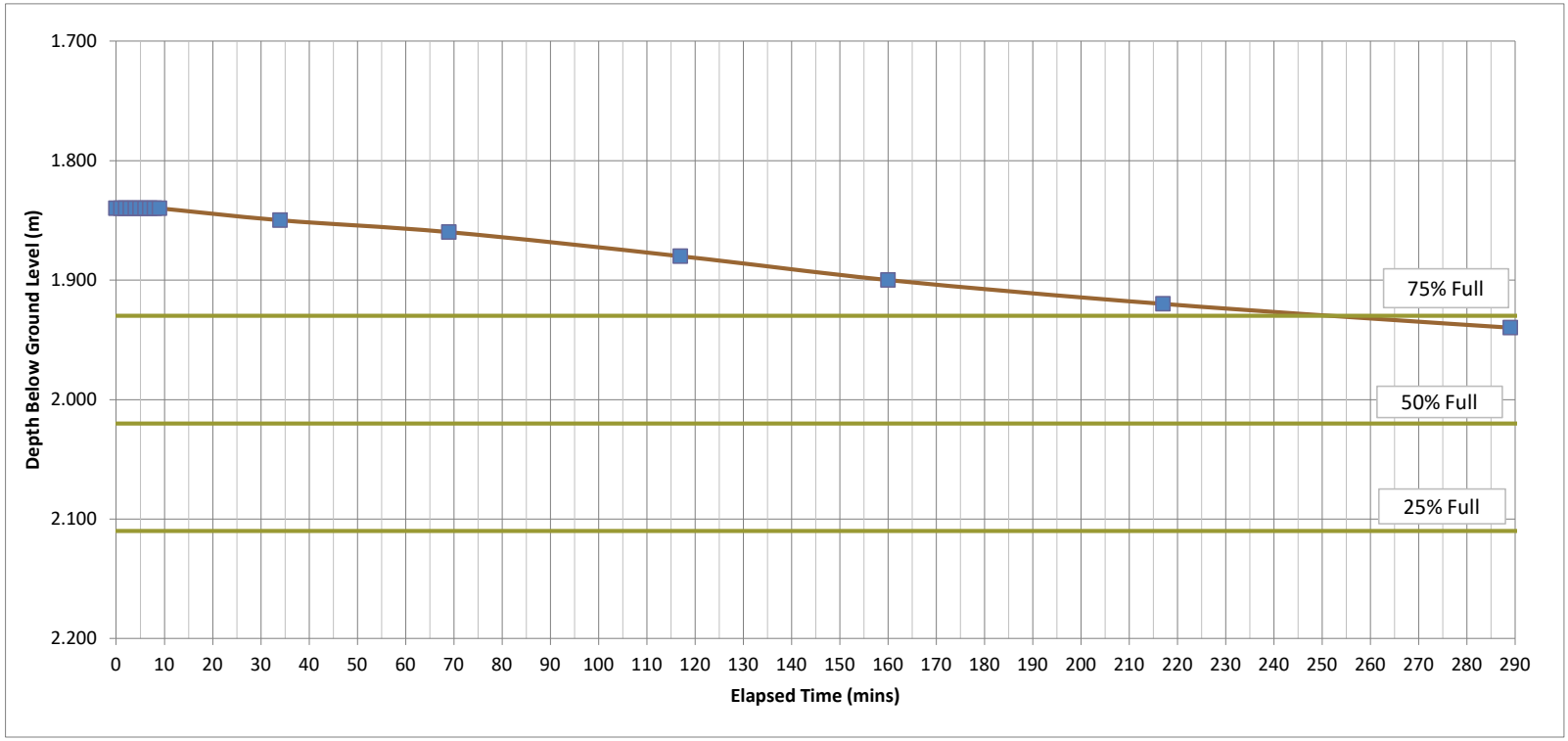
SOAKAWAY TEST

(To: BRE 365 2016)

Job No:	A7049
Site:	St Marks Lane, Cheetham Hill
Client:	Baryar Investments

Location Reference:	**SA01 (2.20m)**		
Date	11/09/2025		
Geology in test section	**Sandy CLAY**		
Depth to Base of Hole	2.20	m	
Effective Depth	0.36	m	
Hole width	0.60	m	
Hole length	2.10	m	
Depth to water at start of test below ground level	1.84	m	
Depth to water at end of test below ground level	1.94	m	
Effective storage depth to 75% full	0.27	m	
(Depth below GL)	1.93	m	
Effective storage depth to 50% full	0.18	m	
(Depth below GL)	2.02	m	
Effective storage depth to 25% full	0.09	m	
(Depth below GL)	2.11	m	
Height to 50% depth	0.180	m3	
Effective Storage Volume *Vp75-25*	0.23	m3	Assumes pit is not filled
Time tp25 at which water is 75% of effective depth (minutes)	Infiltration rate too slow to calculate	mins	
Time tp25 at which water is 25% of effective depth (minutes)		mins	
Time for water level to fall between Vp75 -25		mins	
Time for water level to fall between Vp75 -25		secs	
Internal surface area of hole up to 50% depth including base		m2	
Soil Infiltration Rate, f		m/s	

Time Elapsed (mins)	**Depth of Water below GL** (m)
0	1.840
1	1.840
2	1.840
3	1.840
4	1.840
5	1.840
6	1.840
7	1.840
8	1.840
9	1.840
34	1.850
69	1.860
117	1.880
160	1.900
217	1.920
289	1.940



Earth Environmental & Geotechnical Ltd

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Email: Headoffice@technicsgroup.com

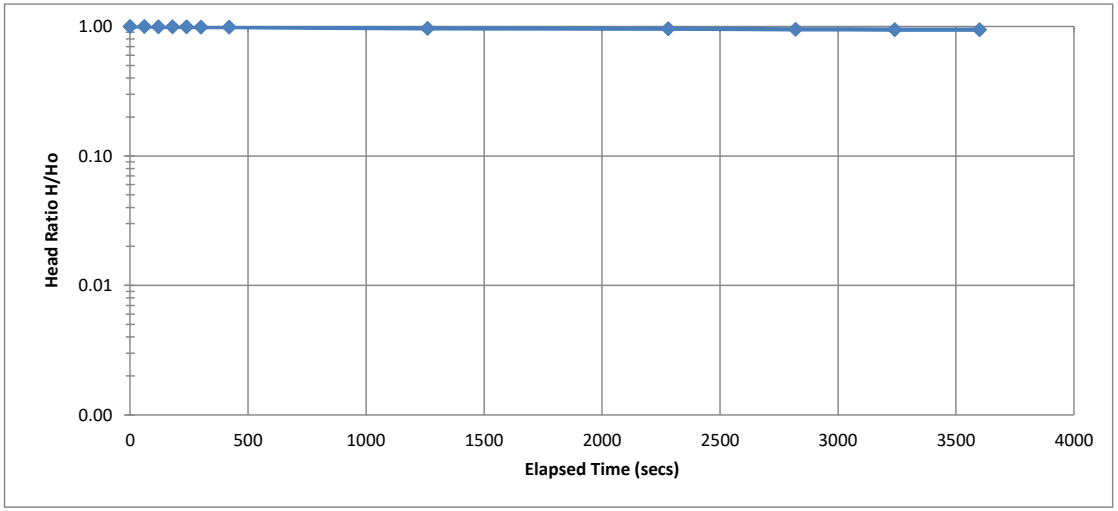
FALLING HEAD TEST

(To: BS5930 :1999 Page 50)

Job No:	A7049
Site:	St Marks Lane, Cheeham Hill
Client:	Baryar Investments

Location Reference:	WS01	
Date	11 September 2025	
Geology in test section	Sand and Clay	
Depth of test section	5.00	metres
Depth to Standing Water Level (or base of well)	5.00	metres
Height of Casing	0.00	metres
Height of Casing above water level	5.00	metres
Depth to water at start of test below casing level (or base of well)	0.77	metres
Depth to water at end of test below casing level	1.01	metres
Response zone length	5.00	metres
Standpipe diameter in test section	0.10	metres
Cross sectional area of standpipe	7.86E-03	metres
Intake Factor (BS5930 p50) Figure d	6.82	
Basic Time Lag at H/Ho =0.37		sec
	Infiltration rate too slow to calculate	
Coefficient of Permeability		m/s

Time Elapsed (secs)	Depth of water below top of casing (m)	h(m)	h1/ho
0	0.77	4.23	1.00
60	0.78	4.22	1.00
120	0.79	4.21	1.00
180	0.80	4.20	0.99
240	0.81	4.19	0.99
300	0.82	4.18	0.99
420	0.83	4.17	0.99
1260	0.91	4.09	0.97
2280	0.95	4.05	0.96
2820	0.98	4.02	0.95
3240	1.00	4.00	0.95
3600	1.01	3.99	0.94



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
MH1	0.022	5.00	74.400	450	151552.319	-13310.865	0.600	73.800
MH2			74.200	600	151551.730	-13298.471	1.100	73.100
MH4			74.000		151574.089	-13298.746	2.432	71.568
MH7	0.010	5.00	74.400	1200	151574.887	-13316.851	1.700	72.700
MH8			74.400		151576.049	-13311.007	2.832	71.568
MH5	0.026	5.00	72.800	600	151557.296	-13287.271	0.400	72.400
MH3	0.011	5.00	74.000	1200	151568.077	-13296.391	1.800	72.200
MH9		5.00	73.850		151574.089	-13297.026	2.310	71.540
MH10			73.840	1200	151572.605	-13296.036	2.340	71.500
MH11			72.740	1200	151553.614	-13283.358	1.540	71.200
EXMH			72.520		151544.727	-13288.257	2.600	69.920
MH6	0.001	5.00	74.400	600	151564.944	-13318.445	1.200	73.200

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	MH1	MH2	12.408	0.600	73.800	73.100	0.700	17.7	150	5.09	50.0
1.001	MH2	MH3	16.479	0.600	73.100	72.200	0.900	18.3	150	5.20	50.0
2.000	MH6	MH7	10.070	0.600	73.200	72.700	0.500	20.1	100	5.10	50.0
2.001	MH7	MH8	5.958	0.600	72.700	72.100	0.600	9.9	100	5.14	50.0
3.000	MH5	MH3	14.121	0.600	72.400	72.200	0.200	70.6	150	5.20	50.0
1.002	MH3	MH4	6.457	0.600	72.200	72.050	0.150	43.0	150	5.27	50.0
1.003	MH9	MH10	1.784	0.600	71.540	71.500	0.040	44.6	100	5.03	50.0
1.004	MH10	MH11	22.834	0.600	71.500	71.200	0.300	76.1	100	5.46	50.0
1.005	MH11	EXMH	10.148	0.600	71.200	69.920	1.280	7.9	100	5.52	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)
1.000	2.404	42.5	4.0	0.450	0.950	0.022	0.0	31	1.509
1.001	2.365	41.8	4.0	0.950	1.650	0.022	0.0	31	1.501
2.000	1.728	13.6	0.2	1.100	1.600	0.001	0.0	8	0.592
2.001	2.467	19.4	2.0	1.600	2.200	0.011	0.0	21	1.581
3.000	1.198	21.2	4.7	0.250	1.650	0.026	0.0	48	0.963
1.002	1.538	27.2	10.7	1.650	1.800	0.059	0.0	65	1.447
1.003	1.157	9.1	0.0	2.210	2.240	0.000	0.0	0	0.000
1.004	0.883	6.9	0.0	2.240	1.440	0.000	0.0	0	0.000
1.005	2.762	21.7	0.0	1.440	2.500	0.000	0.0	0	0.000

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Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	1 year (l/s)	0.4
Rainfall Events	Singular	Drain Down Time (mins)	240	30 year (l/s)	0.7
Summer CV	0.750	Additional Storage (m³/ha)	0.0	100 year (l/s)	0.9
Winter CV	0.840	Starting Level (m)		Check Discharge Volume	x
Analysis Speed	Detailed	Check Discharge Rate(s)	✓		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.70
Greenfield Method	IH124	Growth Factor 100 year	2.08
Positively Drained Area (ha)	0.063	Betterment (%)	0
SAAR (mm)	922	QBar	0.4
Soil Index	4	Q 1 year (l/s)	0.4
SPR	0.47	Q 30 year (l/s)	0.7
Region	10	Q 100 year (l/s)	0.9
Growth Factor 1 year	0.87		

Node MH10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	71.500	Product Number	CTL-SHE-0049-9000-0660-9000
Design Depth (m)	0.660	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	0.9	Min Node Diameter (mm)	1200

Node MH9 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Main Channel Length (m)	14.100
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	71.540	Main Channel Slope (1:X)	500.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.012

Inlets

MH8	MH4

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	60.8	0.0	0.660	60.8	0.0	0.661	0.0	0.0

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.11%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	MH1	10	73.861	0.061	13.6	0.0098	0.0000	OK
15 minute winter	MH2	10	73.159	0.059	13.5	0.0166	0.0000	OK
360 minute winter	MH4	344	72.148	0.579	5.2	0.0000	0.0000	OK
15 minute winter	MH7	10	72.742	0.042	6.8	0.0479	0.0000	OK
360 minute winter	MH8	344	72.147	0.579	1.0	0.0000	0.0000	OK
15 minute winter	MH5	11	72.630	0.230	16.0	0.0652	0.0000	FLOOD RISK
15 minute winter	MH3	11	72.499	0.299	35.0	0.3384	0.0000	SURCHARGED
360 minute winter	MH9	344	72.147	0.607	3.5	0.0000	0.0000	SURCHARGED
360 minute winter	MH10	344	72.146	0.646	2.9	0.7309	0.0000	SURCHARGED
15 minute summer	MH11	119	71.214	0.014	0.9	0.0159	0.0000	OK
15 minute summer	EXMH	119	69.934	0.014	0.9	0.0000	0.0000	OK
15 minute summer	MH6	11	73.214	0.014	0.6	0.0041	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	MH1	1.000	MH2	13.5	2.059	0.319	0.0817	
15 minute winter	MH2	1.001	MH3	13.5	0.957	0.323	0.1976	
360 minute winter	MH4	Flow through Pond	MH9	3.5	0.026	0.001	34.2086	
15 minute winter	MH7	2.001	MH8	6.7	2.190	0.348	0.0183	
360 minute winter	MH8	Flow through Pond	MH9	3.5	0.026	0.001	34.2086	
15 minute winter	MH5	3.000	MH3	15.3	0.915	0.721	0.2486	
15 minute winter	MH3	1.002	MH4	34.8	1.975	1.279	0.1125	
360 minute winter	MH9	1.003	MH10	2.9	0.474	0.323	0.0140	
360 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
15 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	13.2
15 minute summer	MH6	2.000	MH7	0.6	0.345	0.044	0.0188	

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Results for 100 year +45% CC 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 99.28%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	MH1	10	73.860	0.060	12.9	0.0095	0.0000	OK
15 minute summer	MH2	10	73.157	0.057	12.9	0.0161	0.0000	OK
15 minute summer	MH4	19	71.832	0.264	33.3	0.0000	0.0000	OK
15 minute summer	MH7	10	72.741	0.041	6.5	0.0467	0.0000	OK
15 minute summer	MH8	20	71.832	0.263	6.5	0.0000	0.0000	OK
15 minute summer	MH5	11	72.594	0.194	15.3	0.0549	0.0000	FLOOD RISK
15 minute summer	MH3	11	72.474	0.274	33.2	0.3097	0.0000	SURCHARGED
15 minute summer	MH9	20	71.831	0.291	24.4	0.0000	0.0000	SURCHARGED
15 minute summer	MH10	20	71.831	0.331	2.2	0.3738	0.0000	SURCHARGED
15 minute summer	MH11	119	71.214	0.014	0.9	0.0159	0.0000	OK
15 minute summer	EXMH	119	69.934	0.014	0.9	0.0000	0.0000	OK
15 minute summer	MH6	11	73.214	0.014	0.6	0.0041	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	MH1	1.000	MH2	12.9	2.032	0.303	0.0786	
15 minute summer	MH2	1.001	MH3	12.8	0.945	0.306	0.1957	
15 minute summer	MH4	Flow through Pond	MH9	24.4	0.138	0.007	16.0254	
15 minute summer	MH7	2.001	MH8	6.5	2.166	0.333	0.0178	
15 minute summer	MH8	Flow through Pond	MH9	24.4	0.138	0.007	16.0254	
15 minute summer	MH5	3.000	MH3	14.6	0.912	0.690	0.2486	
15 minute summer	MH3	1.002	MH4	33.3	1.891	1.225	0.1125	
15 minute summer	MH9	1.003	MH10	2.2	0.772	0.238	0.0140	
15 minute summer	MH10	1.004	MH11	0.9	0.791	0.130	0.0269	
15 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	13.2
15 minute summer	MH6	2.000	MH7	0.6	0.345	0.044	0.0188	

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Results for 100 year +45% CC 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 99.01%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	MH1	10	73.861	0.061	13.6	0.0098	0.0000	OK
15 minute winter	MH2	10	73.159	0.059	13.5	0.0166	0.0000	OK
15 minute winter	MH4	20	71.868	0.300	34.8	0.0000	0.0000	OK
15 minute winter	MH7	10	72.742	0.042	6.8	0.0479	0.0000	OK
15 minute winter	MH8	20	71.868	0.299	6.7	0.0000	0.0000	OK
15 minute winter	MH5	11	72.630	0.230	16.0	0.0652	0.0000	FLOOD RISK
15 minute winter	MH3	11	72.499	0.299	35.0	0.3384	0.0000	SURCHARGED
15 minute winter	MH9	21	71.867	0.327	26.3	0.0000	0.0000	SURCHARGED
15 minute winter	MH10	20	71.867	0.367	2.5	0.4150	0.0000	SURCHARGED
15 minute winter	MH11	160	71.214	0.014	0.9	0.0159	0.0000	OK
15 minute winter	EXMH	161	69.934	0.014	0.9	0.0000	0.0000	OK
15 minute winter	MH6	11	73.214	0.014	0.6	0.0041	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	MH1	1.000	MH2	13.5	2.059	0.319	0.0817	
15 minute winter	MH2	1.001	MH3	13.5	0.957	0.323	0.1976	
15 minute winter	MH4	Flow through Pond	MH9	26.3	0.149	0.008	18.0857	
15 minute winter	MH7	2.001	MH8	6.7	2.190	0.348	0.0183	
15 minute winter	MH8	Flow through Pond	MH9	26.3	0.149	0.008	18.0857	
15 minute winter	MH5	3.000	MH3	15.3	0.915	0.721	0.2486	
15 minute winter	MH3	1.002	MH4	34.8	1.975	1.279	0.1125	
15 minute winter	MH9	1.003	MH10	2.5	0.811	0.275	0.0140	
15 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
15 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	13.2
15 minute winter	MH6	2.000	MH7	0.6	0.338	0.044	0.0194	

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Results for 100 year +45% CC 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 98.71%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	MH1	18	73.857	0.057	11.8	0.0090	0.0000	OK
30 minute summer	MH2	18	73.155	0.055	11.8	0.0154	0.0000	OK
30 minute summer	MH4	34	71.921	0.353	31.1	0.0000	0.0000	OK
30 minute summer	MH7	18	72.739	0.039	5.9	0.0444	0.0000	OK
30 minute summer	MH8	35	71.921	0.353	5.9	0.0000	0.0000	OK
30 minute summer	MH5	18	72.517	0.117	14.0	0.0332	0.0000	OK
30 minute summer	MH3	18	72.438	0.238	31.4	0.2692	0.0000	SURCHARGED
30 minute summer	MH9	35	71.921	0.381	18.4	0.0000	0.0000	SURCHARGED
30 minute summer	MH10	35	71.920	0.420	2.8	0.4751	0.0000	SURCHARGED
30 minute summer	MH11	240	71.214	0.014	0.9	0.0159	0.0000	OK
30 minute summer	EXMH	240	69.934	0.014	0.9	0.0000	0.0000	OK
30 minute summer	MH6	19	73.213	0.013	0.5	0.0037	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	MH1	1.000	MH2	11.8	1.987	0.278	0.0737	
30 minute summer	MH2	1.001	MH3	11.8	0.915	0.282	0.1927	
30 minute summer	MH4	Flow through Pond	MH9	18.4	0.140	0.005	21.1786	
30 minute summer	MH7	2.001	MH8	5.9	2.117	0.305	0.0166	
30 minute summer	MH8	Flow through Pond	MH9	18.4	0.140	0.005	21.1786	
30 minute summer	MH5	3.000	MH3	13.7	0.910	0.649	0.2286	
30 minute summer	MH3	1.002	MH4	31.1	1.765	1.143	0.1132	
30 minute summer	MH9	1.003	MH10	2.8	0.697	0.308	0.0140	
30 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
30 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	13.6
30 minute summer	MH6	2.000	MH7	0.5	0.320	0.037	0.0174	

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Results for 100 year +45% CC 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 98.42%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	MH1	18	73.854	0.054	10.7	0.0085	0.0000	OK
30 minute winter	MH2	18	73.152	0.052	10.7	0.0147	0.0000	OK
30 minute winter	MH4	34	71.969	0.400	28.5	0.0000	0.0000	OK
30 minute winter	MH7	18	72.737	0.037	5.4	0.0422	0.0000	OK
30 minute winter	MH8	34	71.968	0.400	5.4	0.0000	0.0000	OK
30 minute winter	MH5	18	72.484	0.084	12.7	0.0238	0.0000	OK
30 minute winter	MH3	18	72.399	0.199	28.7	0.2248	0.0000	SURCHARGED
30 minute winter	MH9	35	71.968	0.428	19.3	0.0000	0.0000	SURCHARGED
30 minute winter	MH10	35	71.967	0.467	3.2	0.5286	0.0000	SURCHARGED
30 minute winter	MH11	18	71.214	0.014	0.9	0.0159	0.0000	OK
30 minute winter	EXMH	18	69.934	0.014	0.9	0.0000	0.0000	OK
30 minute winter	MH6	19	73.213	0.013	0.5	0.0037	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	MH1	1.000	MH2	10.7	1.937	0.252	0.0685	
30 minute winter	MH2	1.001	MH3	10.7	0.911	0.256	0.1895	
30 minute winter	MH4	Flow through Pond	MH9	19.3	0.138	0.006	23.9089	
30 minute winter	MH7	2.001	MH8	5.4	2.069	0.279	0.0156	
30 minute winter	MH8	Flow through Pond	MH9	19.3	0.138	0.006	23.9089	
30 minute winter	MH5	3.000	MH3	12.6	0.895	0.597	0.1960	
30 minute winter	MH3	1.002	MH4	28.5	1.666	1.048	0.1126	
30 minute winter	MH9	1.003	MH10	3.2	0.732	0.357	0.0140	
30 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
30 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	13.1
30 minute winter	MH6	2.000	MH7	0.5	0.332	0.037	0.0165	

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Results for 100 year +45% CC 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 98.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	MH1	33	73.849	0.049	9.0	0.0078	0.0000	OK
60 minute summer	MH2	33	73.147	0.047	9.0	0.0134	0.0000	OK
60 minute summer	MH4	64	72.009	0.441	24.2	0.0000	0.0000	OK
60 minute summer	MH7	33	72.734	0.034	4.5	0.0383	0.0000	OK
60 minute summer	MH8	64	72.009	0.440	4.5	0.0000	0.0000	OK
60 minute summer	MH5	32	72.477	0.077	10.7	0.0217	0.0000	OK
60 minute summer	MH3	33	72.321	0.121	24.2	0.1365	0.0000	OK
60 minute summer	MH9	64	72.008	0.468	15.2	0.0000	0.0000	SURCHARGED
60 minute summer	MH10	64	72.008	0.508	3.1	0.5743	0.0000	SURCHARGED
60 minute summer	MH11	32	71.214	0.014	0.9	0.0159	0.0000	OK
60 minute summer	EXMH	32	69.934	0.014	0.9	0.0000	0.0000	OK
60 minute summer	MH6	34	73.212	0.012	0.4	0.0034	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	MH1	1.000	MH2	9.0	1.851	0.212	0.0604	
60 minute summer	MH2	1.001	MH3	9.0	0.903	0.215	0.1644	
60 minute summer	MH4	Flow through Pond	MH9	15.2	0.111	0.004	26.2470	
60 minute summer	MH7	2.001	MH8	4.5	1.970	0.232	0.0136	
60 minute summer	MH8	Flow through Pond	MH9	15.2	0.111	0.004	26.2470	
60 minute summer	MH5	3.000	MH3	10.7	0.877	0.505	0.1707	
60 minute summer	MH3	1.002	MH4	24.2	1.664	0.890	0.0938	
60 minute summer	MH9	1.003	MH10	3.1	0.621	0.337	0.0140	
60 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
60 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	14.0
60 minute summer	MH6	2.000	MH7	0.4	0.304	0.029	0.0143	

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Results for 100 year +45% CC 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 98.11%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	MH1	33	73.844	0.044	7.3	0.0069	0.0000	OK
60 minute winter	MH2	33	73.142	0.042	7.3	0.0120	0.0000	OK
60 minute winter	MH4	63	72.069	0.501	19.5	0.0000	0.0000	OK
60 minute winter	MH7	33	72.730	0.030	3.6	0.0340	0.0000	OK
60 minute winter	MH8	63	72.069	0.501	3.6	0.0000	0.0000	OK
60 minute winter	MH5	33	72.468	0.068	8.6	0.0192	0.0000	OK
60 minute winter	MH3	33	72.301	0.101	19.5	0.1143	0.0000	OK
60 minute winter	MH9	63	72.069	0.529	12.1	0.0000	0.0000	SURCHARGED
60 minute winter	MH10	63	72.068	0.568	2.8	0.6426	0.0000	SURCHARGED
60 minute winter	MH11	30	71.214	0.014	0.9	0.0159	0.0000	OK
60 minute winter	EXMH	30	69.934	0.014	0.9	0.0000	0.0000	OK
60 minute winter	MH6	32	73.210	0.010	0.3	0.0029	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	MH1	1.000	MH2	7.3	1.750	0.172	0.0518	
60 minute winter	MH2	1.001	MH3	7.3	0.878	0.175	0.1377	
60 minute winter	MH4	Flow through Pond	MH9	12.1	0.109	0.003	29.7374	
60 minute winter	MH7	2.001	MH8	3.6	1.854	0.186	0.0116	
60 minute winter	MH8	Flow through Pond	MH9	12.1	0.109	0.003	29.7374	
60 minute winter	MH5	3.000	MH3	8.6	0.843	0.406	0.1436	
60 minute winter	MH3	1.002	MH4	19.5	1.609	0.718	0.0782	
60 minute winter	MH9	1.003	MH10	2.8	0.608	0.303	0.0140	
60 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
60 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	13.8
60 minute winter	MH6	2.000	MH7	0.3	0.298	0.022	0.0121	

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Results for 100 year +45% CC 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 98.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	MH1	64	73.838	0.038	5.6	0.0060	0.0000	OK
120 minute summer	MH2	64	73.137	0.037	5.6	0.0105	0.0000	OK
120 minute summer	MH4	124	72.046	0.478	15.0	0.0000	0.0000	OK
120 minute summer	MH7	64	72.726	0.026	2.8	0.0298	0.0000	OK
120 minute summer	MH8	124	72.046	0.478	2.8	0.0000	0.0000	OK
120 minute summer	MH5	64	72.458	0.058	6.6	0.0163	0.0000	OK
120 minute summer	MH3	64	72.285	0.085	15.0	0.0956	0.0000	OK
120 minute summer	MH9	124	72.046	0.506	9.2	0.0000	0.0000	SURCHARGED
120 minute summer	MH10	124	72.045	0.545	2.3	0.6167	0.0000	SURCHARGED
120 minute summer	MH11	60	71.214	0.014	0.9	0.0159	0.0000	OK
120 minute summer	EXMH	60	69.934	0.014	0.9	0.0000	0.0000	OK
120 minute summer	MH6	64	73.210	0.010	0.3	0.0029	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute summer	MH1	1.000	MH2	5.6	1.627	0.132	0.0427	
120 minute summer	MH2	1.001	MH3	5.6	0.837	0.134	0.1122	
120 minute summer	MH4	Flow through Pond	MH9	9.2	0.074	0.003	28.4132	
120 minute summer	MH7	2.001	MH8	2.8	1.729	0.145	0.0096	
120 minute summer	MH8	Flow through Pond	MH9	9.2	0.074	0.003	28.4132	
120 minute summer	MH5	3.000	MH3	6.6	0.806	0.312	0.1161	
120 minute summer	MH3	1.002	MH4	15.0	1.523	0.552	0.0636	
120 minute summer	MH9	1.003	MH10	2.3	0.508	0.255	0.0140	
120 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
120 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	16.5
120 minute summer	MH6	2.000	MH7	0.3	0.305	0.022	0.0104	

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Results for 100 year +45% CC 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 98.14%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	MH1	64	73.833	0.033	4.3	0.0053	0.0000	OK
120 minute winter	MH2	64	73.133	0.033	4.3	0.0092	0.0000	OK
120 minute winter	MH4	122	72.117	0.549	11.6	0.0000	0.0000	OK
120 minute winter	MH7	64	72.723	0.023	2.2	0.0263	0.0000	OK
120 minute winter	MH8	122	72.117	0.548	2.2	0.0000	0.0000	OK
120 minute winter	MH5	64	72.450	0.050	5.1	0.0142	0.0000	OK
120 minute winter	MH3	64	72.272	0.072	11.6	0.0815	0.0000	OK
120 minute winter	MH9	122	72.116	0.576	7.2	0.0000	0.0000	SURCHARGED
120 minute winter	MH10	122	72.116	0.616	2.2	0.6964	0.0000	SURCHARGED
120 minute winter	MH11	56	71.214	0.014	0.9	0.0159	0.0000	OK
120 minute winter	EXMH	56	69.934	0.014	0.9	0.0000	0.0000	OK
120 minute winter	MH6	58	73.209	0.009	0.2	0.0024	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	MH1	1.000	MH2	4.3	1.513	0.101	0.0353	
120 minute winter	MH2	1.001	MH3	4.3	0.788	0.103	0.0921	
120 minute winter	MH4	Flow through Pond	MH9	7.2	0.080	0.002	32.4904	
120 minute winter	MH7	2.001	MH8	2.2	1.615	0.114	0.0081	
120 minute winter	MH8	Flow through Pond	MH9	7.2	0.080	0.002	32.4904	
120 minute winter	MH5	3.000	MH3	5.1	0.758	0.241	0.0954	
120 minute winter	MH3	1.002	MH4	11.6	1.434	0.427	0.0522	
120 minute winter	MH9	1.003	MH10	2.2	0.534	0.244	0.0140	
120 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
120 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	16.6
120 minute winter	MH6	2.000	MH7	0.2	0.286	0.015	0.0086	

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Results for 100 year +45% CC 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 98.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	MH1	96	73.832	0.032	4.1	0.0051	0.0000	OK
180 minute summer	MH2	96	73.132	0.032	4.1	0.0090	0.0000	OK
180 minute summer	MH4	184	72.062	0.494	11.1	0.0000	0.0000	OK
180 minute summer	MH7	96	72.723	0.023	2.1	0.0257	0.0000	OK
180 minute summer	MH8	184	72.062	0.494	2.1	0.0000	0.0000	OK
180 minute summer	MH5	96	72.449	0.049	4.9	0.0139	0.0000	OK
180 minute summer	MH3	96	72.270	0.070	11.1	0.0794	0.0000	OK
180 minute summer	MH9	184	72.062	0.522	7.0	0.0000	0.0000	SURCHARGED
180 minute summer	MH10	184	72.061	0.561	2.5	0.6347	0.0000	SURCHARGED
180 minute summer	MH11	88	71.214	0.014	0.9	0.0159	0.0000	OK
180 minute summer	EXMH	88	69.934	0.014	0.9	0.0000	0.0000	OK
180 minute summer	MH6	96	73.209	0.009	0.2	0.0024	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute summer	MH1	1.000	MH2	4.1	1.492	0.097	0.0341	
180 minute summer	MH2	1.001	MH3	4.1	0.779	0.098	0.0890	
180 minute summer	MH4	Flow through Pond	MH9	7.0	0.046	0.002	29.3351	
180 minute summer	MH7	2.001	MH8	2.1	1.595	0.108	0.0078	
180 minute summer	MH8	Flow through Pond	MH9	7.0	0.046	0.002	29.3351	
180 minute summer	MH5	3.000	MH3	4.9	0.754	0.231	0.0924	
180 minute summer	MH3	1.002	MH4	11.1	1.418	0.408	0.0505	
180 minute summer	MH9	1.003	MH10	2.5	0.485	0.276	0.0140	
180 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
180 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	19.1
180 minute summer	MH6	2.000	MH7	0.2	0.277	0.015	0.0083	

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Results for 100 year +45% CC 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 98.22%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	MH1	96	73.828	0.028	3.2	0.0045	0.0000	OK
180 minute winter	MH2	96	73.128	0.028	3.2	0.0080	0.0000	OK
180 minute winter	MH4	180	72.139	0.571	8.5	0.0000	0.0000	OK
180 minute winter	MH7	92	72.719	0.019	1.5	0.0217	0.0000	OK
180 minute winter	MH8	180	72.138	0.570	1.5	0.0000	0.0000	OK
180 minute winter	MH5	96	72.442	0.042	3.7	0.0120	0.0000	OK
180 minute winter	MH3	96	72.260	0.060	8.5	0.0681	0.0000	OK
180 minute winter	MH9	180	72.138	0.598	5.4	0.0000	0.0000	SURCHARGED
180 minute winter	MH10	180	72.138	0.638	1.7	0.7211	0.0000	SURCHARGED
180 minute winter	MH11	80	71.214	0.014	0.9	0.0159	0.0000	OK
180 minute winter	EXMH	80	69.934	0.014	0.9	0.0000	0.0000	OK
180 minute winter	MH6	68	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	MH1	1.000	MH2	3.2	1.390	0.075	0.0286	
180 minute winter	MH2	1.001	MH3	3.2	0.740	0.077	0.0732	
180 minute winter	MH4	Flow through Pond	MH9	5.4	0.068	0.002	33.7382	
180 minute winter	MH7	2.001	MH8	1.5	1.447	0.077	0.0087	
180 minute winter	MH8	Flow through Pond	MH9	5.4	0.068	0.002	33.7382	
180 minute winter	MH5	3.000	MH3	3.7	0.699	0.175	0.0754	
180 minute winter	MH3	1.002	MH4	8.5	1.326	0.313	0.0414	
180 minute winter	MH9	1.003	MH10	1.7	0.325	0.187	0.0140	
180 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
180 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	19.5
180 minute winter	MH6	2.000	MH7	0.1	0.257	0.007	0.0063	

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Results for 100 year +45% CC 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 98.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	MH1	124	73.830	0.030	3.5	0.0047	0.0000	OK
240 minute summer	MH2	124	73.129	0.029	3.5	0.0083	0.0000	OK
240 minute summer	MH4	240	72.065	0.497	9.2	0.0000	0.0000	OK
240 minute summer	MH7	124	72.721	0.021	1.8	0.0236	0.0000	OK
240 minute summer	MH8	244	72.065	0.496	1.8	0.0000	0.0000	OK
240 minute summer	MH5	124	72.445	0.045	4.1	0.0126	0.0000	OK
240 minute summer	MH3	124	72.263	0.063	9.3	0.0713	0.0000	OK
240 minute summer	MH9	244	72.064	0.524	5.9	0.0000	0.0000	SURCHARGED
240 minute summer	MH10	244	72.064	0.564	2.5	0.6376	0.0000	SURCHARGED
240 minute summer	MH11	116	71.214	0.014	0.9	0.0159	0.0000	OK
240 minute summer	EXMH	116	69.934	0.014	0.9	0.0000	0.0000	OK
240 minute summer	MH6	124	73.208	0.008	0.2	0.0024	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute summer	MH1	1.000	MH2	3.5	1.427	0.082	0.0304	
240 minute summer	MH2	1.001	MH3	3.5	0.757	0.083	0.0778	
240 minute summer	MH4	Flow through Pond	MH9	5.9	0.045	0.002	29.4822	
240 minute summer	MH7	2.001	MH8	1.8	1.521	0.092	0.0070	
240 minute summer	MH8	Flow through Pond	MH9	5.9	0.045	0.002	29.4822	
240 minute summer	MH5	3.000	MH3	4.1	0.720	0.193	0.0806	
240 minute summer	MH3	1.002	MH4	9.2	1.353	0.339	0.0440	
240 minute summer	MH9	1.003	MH10	2.5	0.477	0.278	0.0140	
240 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
240 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	21.7
240 minute summer	MH6	2.000	MH7	0.2	0.269	0.014	0.0075	

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Results for 100 year +45% CC 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	MH1	124	73.826	0.026	2.6	0.0041	0.0000	OK
240 minute winter	MH2	124	73.125	0.025	2.6	0.0072	0.0000	OK
240 minute winter	MH4	236	72.144	0.576	6.9	0.0000	0.0000	OK
240 minute winter	MH7	124	72.718	0.018	1.3	0.0202	0.0000	OK
240 minute winter	MH8	236	72.144	0.576	1.3	0.0000	0.0000	OK
240 minute winter	MH5	124	72.438	0.038	3.0	0.0108	0.0000	OK
240 minute winter	MH3	124	72.254	0.054	6.9	0.0605	0.0000	OK
240 minute winter	MH9	236	72.144	0.604	4.5	0.0000	0.0000	SURCHARGED
240 minute winter	MH10	236	72.143	0.643	2.4	0.7273	0.0000	SURCHARGED
240 minute winter	MH11	108	71.214	0.014	0.9	0.0159	0.0000	OK
240 minute winter	EXMH	108	69.934	0.014	0.9	0.0000	0.0000	OK
240 minute winter	MH6	92	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	MH1	1.000	MH2	2.6	1.309	0.061	0.0246	
240 minute winter	MH2	1.001	MH3	2.6	0.703	0.062	0.0626	
240 minute winter	MH4	Flow through Pond	MH9	4.5	0.041	0.001	34.0348	
240 minute winter	MH7	2.001	MH8	1.3	1.388	0.067	0.0104	
240 minute winter	MH8	Flow through Pond	MH9	4.5	0.041	0.001	34.0348	
240 minute winter	MH5	3.000	MH3	3.0	0.663	0.142	0.0646	
240 minute winter	MH3	1.002	MH4	6.9	1.255	0.253	0.0416	
240 minute winter	MH9	1.003	MH10	2.4	0.435	0.266	0.0140	
240 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
240 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	22.3
240 minute winter	MH6	2.000	MH7	0.1	0.258	0.007	0.0058	

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Results for 100 year +45% CC 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 98.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	MH1	184	73.826	0.026	2.6	0.0041	0.0000	OK
360 minute summer	MH2	184	73.125	0.025	2.6	0.0072	0.0000	OK
360 minute summer	MH4	304	72.056	0.488	6.9	0.0000	0.0000	OK
360 minute summer	MH7	184	72.718	0.018	1.3	0.0202	0.0000	OK
360 minute summer	MH8	304	72.056	0.487	1.3	0.0000	0.0000	OK
360 minute summer	MH5	184	72.439	0.039	3.1	0.0110	0.0000	OK
360 minute summer	MH3	184	72.254	0.054	7.0	0.0608	0.0000	OK
360 minute summer	MH9	304	72.055	0.515	4.5	0.0000	0.0000	SURCHARGED
360 minute summer	MH10	304	72.055	0.555	2.9	0.6276	0.0000	SURCHARGED
360 minute summer	MH11	176	71.214	0.014	0.9	0.0159	0.0000	OK
360 minute summer	EXMH	176	69.934	0.014	0.9	0.0000	0.0000	OK
360 minute summer	MH6	160	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	MH1	1.000	MH2	2.6	1.309	0.061	0.0246	
360 minute summer	MH2	1.001	MH3	2.6	0.698	0.062	0.0630	
360 minute summer	MH4	Flow through Pond	MH9	4.5	0.040	0.001	28.9696	
360 minute summer	MH7	2.001	MH8	1.3	1.386	0.067	0.0056	
360 minute summer	MH8	Flow through Pond	MH9	4.5	0.040	0.001	28.9696	
360 minute summer	MH5	3.000	MH3	3.1	0.671	0.146	0.0655	
360 minute summer	MH3	1.002	MH4	6.9	1.258	0.256	0.0357	
360 minute summer	MH9	1.003	MH10	2.9	0.467	0.321	0.0140	
360 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
360 minute summer	MH11	1.005	EXMH	0.9	1.354	0.041	0.0067	26.8
360 minute summer	MH6	2.000	MH7	0.1	0.257	0.007	0.0058	

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Results for 100 year +45% CC 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 98.51%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	MH1	184	73.822	0.022	1.9	0.0035	0.0000	OK
360 minute winter	MH2	184	73.122	0.022	1.9	0.0062	0.0000	OK
360 minute winter	MH4	344	72.148	0.579	5.2	0.0000	0.0000	OK
360 minute winter	MH7	184	72.716	0.016	1.0	0.0177	0.0000	OK
360 minute winter	MH8	344	72.147	0.579	1.0	0.0000	0.0000	OK
360 minute winter	MH5	184	72.433	0.033	2.3	0.0094	0.0000	OK
360 minute winter	MH3	184	72.246	0.046	5.2	0.0519	0.0000	OK
360 minute winter	MH9	344	72.147	0.607	3.5	0.0000	0.0000	SURCHARGED
360 minute winter	MH10	344	72.146	0.646	2.9	0.7309	0.0000	SURCHARGED
360 minute winter	MH11	160	71.214	0.014	0.9	0.0159	0.0000	OK
360 minute winter	EXMH	160	69.934	0.014	0.9	0.0000	0.0000	OK
360 minute winter	MH6	144	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	MH1	1.000	MH2	1.9	1.196	0.045	0.0197	
360 minute winter	MH2	1.001	MH3	1.9	0.651	0.045	0.0506	
360 minute winter	MH4	Flow through Pond	MH9	3.5	0.026	0.001	34.2086	
360 minute winter	MH7	2.001	MH8	1.0	1.286	0.051	0.0112	
360 minute winter	MH8	Flow through Pond	MH9	3.5	0.026	0.001	34.2086	
360 minute winter	MH5	3.000	MH3	2.3	0.619	0.109	0.0528	
360 minute winter	MH3	1.002	MH4	5.2	1.163	0.191	0.0430	
360 minute winter	MH9	1.003	MH10	2.9	0.474	0.323	0.0140	
360 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
360 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	27.7
360 minute winter	MH6	2.000	MH7	0.1	0.277	0.007	0.0049	

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Results for 100 year +45% CC 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 98.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute summer	MH1	248	73.823	0.023	2.1	0.0037	0.0000	OK
480 minute summer	MH2	248	73.123	0.023	2.1	0.0065	0.0000	OK
480 minute summer	MH4	368	72.053	0.485	5.6	0.0000	0.0000	OK
480 minute summer	MH7	248	72.716	0.016	1.0	0.0178	0.0000	OK
480 minute summer	MH8	368	72.053	0.485	1.0	0.0000	0.0000	OK
480 minute summer	MH5	248	72.435	0.035	2.5	0.0098	0.0000	OK
480 minute summer	MH3	248	72.248	0.048	5.6	0.0541	0.0000	OK
480 minute summer	MH9	368	72.053	0.513	3.7	0.0000	0.0000	SURCHARGED
480 minute summer	MH10	368	72.052	0.552	2.8	0.6246	0.0000	SURCHARGED
480 minute summer	MH11	232	71.214	0.014	0.9	0.0159	0.0000	OK
480 minute summer	EXMH	232	69.934	0.014	0.9	0.0000	0.0000	OK
480 minute summer	MH6	216	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute summer	MH1	1.000	MH2	2.1	1.232	0.049	0.0211	
480 minute summer	MH2	1.001	MH3	2.1	0.664	0.050	0.0538	
480 minute summer	MH4	Flow through Pond	MH9	3.7	0.042	0.001	28.8153	
480 minute summer	MH7	2.001	MH8	1.0	1.287	0.052	0.0046	
480 minute summer	MH8	Flow through Pond	MH9	3.7	0.042	0.001	28.8153	
480 minute summer	MH5	3.000	MH3	2.5	0.636	0.118	0.0559	
480 minute summer	MH3	1.002	MH4	5.6	1.187	0.206	0.0305	
480 minute summer	MH9	1.003	MH10	2.8	0.484	0.304	0.0140	
480 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
480 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	31.8
480 minute summer	MH6	2.000	MH7	0.1	0.277	0.007	0.0050	

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Results for 100 year +45% CC 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 98.69%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	MH1	248	73.820	0.020	1.6	0.0032	0.0000	OK
480 minute winter	MH2	248	73.120	0.020	1.6	0.0057	0.0000	OK
480 minute winter	MH4	392	72.133	0.565	4.2	0.0000	0.0000	OK
480 minute winter	MH7	232	72.714	0.014	0.8	0.0159	0.0000	OK
480 minute winter	MH8	392	72.133	0.565	0.8	0.0000	0.0000	OK
480 minute winter	MH5	240	72.430	0.030	1.8	0.0084	0.0000	OK
480 minute winter	MH3	248	72.241	0.041	4.2	0.0464	0.0000	OK
480 minute winter	MH9	392	72.133	0.593	2.9	0.0000	0.0000	SURCHARGED
480 minute winter	MH10	392	72.132	0.632	2.5	0.7148	0.0000	SURCHARGED
480 minute winter	MH11	216	71.214	0.014	0.9	0.0159	0.0000	OK
480 minute winter	EXMH	216	69.934	0.014	0.9	0.0000	0.0000	OK
480 minute winter	MH6	208	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	MH1	1.000	MH2	1.6	1.137	0.038	0.0175	
480 minute winter	MH2	1.001	MH3	1.6	0.622	0.038	0.0437	
480 minute winter	MH4	Flow through Pond	MH9	2.9	0.025	0.001	33.4292	
480 minute winter	MH7	2.001	MH8	0.8	1.204	0.041	0.0071	
480 minute winter	MH8	Flow through Pond	MH9	2.9	0.025	0.001	33.4292	
480 minute winter	MH5	3.000	MH3	1.8	0.577	0.085	0.0449	
480 minute winter	MH3	1.002	MH4	4.2	1.098	0.155	0.0363	
480 minute winter	MH9	1.003	MH10	2.5	0.464	0.275	0.0140	
480 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
480 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	32.8
480 minute winter	MH6	2.000	MH7	0.1	0.277	0.007	0.0044	

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Results for 100 year +45% CC 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 99.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	MH1	315	73.821	0.021	1.7	0.0033	0.0000	OK
600 minute summer	MH2	315	73.121	0.021	1.7	0.0059	0.0000	OK
600 minute summer	MH4	435	72.042	0.474	4.6	0.0000	0.0000	OK
600 minute summer	MH7	315	72.715	0.015	0.9	0.0169	0.0000	OK
600 minute summer	MH8	435	72.041	0.473	0.9	0.0000	0.0000	OK
600 minute summer	MH5	315	72.431	0.031	2.0	0.0088	0.0000	OK
600 minute summer	MH3	315	72.243	0.043	4.6	0.0487	0.0000	OK
600 minute summer	MH9	435	72.041	0.501	3.2	0.0000	0.0000	SURCHARGED
600 minute summer	MH10	435	72.041	0.541	2.1	0.6116	0.0000	SURCHARGED
600 minute summer	MH11	285	71.214	0.014	0.9	0.0159	0.0000	OK
600 minute summer	EXMH	285	69.934	0.014	0.9	0.0000	0.0000	OK
600 minute summer	MH6	300	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute summer	MH1	1.000	MH2	1.7	1.157	0.040	0.0182	
600 minute summer	MH2	1.001	MH3	1.7	0.623	0.041	0.0464	
600 minute summer	MH4	Flow through Pond	MH9	3.2	0.021	0.001	28.1504	
600 minute summer	MH7	2.001	MH8	0.9	1.247	0.046	0.0043	
600 minute summer	MH8	Flow through Pond	MH9	3.2	0.021	0.001	28.1504	
600 minute summer	MH5	3.000	MH3	2.0	0.592	0.094	0.0481	
600 minute summer	MH3	1.002	MH4	4.6	1.126	0.169	0.0264	
600 minute summer	MH9	1.003	MH10	2.1	0.470	0.230	0.0140	
600 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
600 minute summer	MH11	1.005	EXMH	0.9	1.353	0.041	0.0067	36.6
600 minute summer	MH6	2.000	MH7	0.1	0.257	0.007	0.0047	

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Results for 100 year +45% CC 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 98.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	MH1	300	73.818	0.018	1.3	0.0029	0.0000	OK
600 minute winter	MH2	300	73.118	0.018	1.3	0.0052	0.0000	OK
600 minute winter	MH4	480	72.129	0.560	3.6	0.0000	0.0000	OK
600 minute winter	MH7	300	72.713	0.013	0.7	0.0149	0.0000	OK
600 minute winter	MH8	480	72.128	0.560	0.7	0.0000	0.0000	OK
600 minute winter	MH5	315	72.428	0.028	1.6	0.0079	0.0000	OK
600 minute winter	MH3	315	72.238	0.038	3.6	0.0429	0.0000	OK
600 minute winter	MH9	480	72.128	0.588	2.8	0.0000	0.0000	SURCHARGED
600 minute winter	MH10	480	72.127	0.627	2.1	0.7095	0.0000	SURCHARGED
600 minute winter	MH11	270	71.214	0.014	0.9	0.0159	0.0000	OK
600 minute winter	EXMH	270	69.934	0.014	0.9	0.0000	0.0000	OK
600 minute winter	MH6	285	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	MH1	1.000	MH2	1.3	1.068	0.031	0.0151	
600 minute winter	MH2	1.001	MH3	1.3	0.588	0.031	0.0387	
600 minute winter	MH4	Flow through Pond	MH9	2.6	0.026	0.001	33.1602	
600 minute winter	MH7	2.001	MH8	0.7	1.158	0.036	0.0058	
600 minute winter	MH8	Flow through Pond	MH9	2.6	0.026	0.001	33.1602	
600 minute winter	MH5	3.000	MH3	1.6	0.561	0.076	0.0405	
600 minute winter	MH3	1.002	MH4	3.6	1.052	0.132	0.0339	
600 minute winter	MH9	1.003	MH10	2.1	0.446	0.234	0.0140	
600 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
600 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	37.7
600 minute winter	MH6	2.000	MH7	0.1	0.278	0.007	0.0041	

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Results for 100 year +45% CC 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 99.17%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute summer	MH1	375	73.820	0.020	1.5	0.0031	0.0000	OK
720 minute summer	MH2	375	73.120	0.020	1.5	0.0055	0.0000	OK
720 minute summer	MH4	510	72.038	0.470	4.1	0.0000	0.0000	OK
720 minute summer	MH7	375	72.714	0.014	0.8	0.0159	0.0000	OK
720 minute summer	MH8	510	72.038	0.470	0.8	0.0000	0.0000	OK
720 minute summer	MH5	375	72.430	0.030	1.8	0.0084	0.0000	OK
720 minute summer	MH3	375	72.241	0.041	4.1	0.0459	0.0000	OK
720 minute summer	MH9	510	72.038	0.498	2.9	0.0000	0.0000	SURCHARGED
720 minute summer	MH10	510	72.037	0.537	2.2	0.6074	0.0000	SURCHARGED
720 minute summer	MH11	345	71.214	0.014	0.9	0.0159	0.0000	OK
720 minute summer	EXMH	345	69.934	0.014	0.9	0.0000	0.0000	OK
720 minute summer	MH6	360	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute summer	MH1	1.000	MH2	1.5	1.116	0.035	0.0167	
720 minute summer	MH2	1.001	MH3	1.5	0.599	0.036	0.0427	
720 minute summer	MH4	Flow through Pond	MH9	2.9	0.020	0.001	27.9395	
720 minute summer	MH7	2.001	MH8	0.8	1.204	0.041	0.0040	
720 minute summer	MH8	Flow through Pond	MH9	2.9	0.020	0.001	27.9395	
720 minute summer	MH5	3.000	MH3	1.8	0.577	0.085	0.0444	
720 minute summer	MH3	1.002	MH4	4.1	1.091	0.151	0.0243	
720 minute summer	MH9	1.003	MH10	2.2	0.483	0.239	0.0140	
720 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
720 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0067	41.6
720 minute summer	MH6	2.000	MH7	0.1	0.257	0.007	0.0044	

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Results for 100 year +45% CC 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 99.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	MH1	375	73.818	0.018	1.2	0.0028	0.0000	OK
720 minute winter	MH2	375	73.118	0.018	1.2	0.0050	0.0000	OK
720 minute winter	MH4	555	72.110	0.542	3.2	0.0000	0.0000	OK
720 minute winter	MH7	360	72.712	0.012	0.6	0.0139	0.0000	OK
720 minute winter	MH8	555	72.110	0.542	0.6	0.0000	0.0000	OK
720 minute winter	MH5	375	72.426	0.026	1.4	0.0074	0.0000	OK
720 minute winter	MH3	375	72.236	0.036	3.2	0.0403	0.0000	OK
720 minute winter	MH9	555	72.109	0.569	2.3	0.0000	0.0000	SURCHARGED
720 minute winter	MH10	555	72.109	0.609	2.9	0.6887	0.0000	SURCHARGED
720 minute winter	MH11	330	71.214	0.014	0.9	0.0159	0.0000	OK
720 minute winter	EXMH	330	69.934	0.014	0.9	0.0000	0.0000	OK
720 minute winter	MH6	360	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	MH1	1.000	MH2	1.2	1.043	0.028	0.0143	
720 minute winter	MH2	1.001	MH3	1.2	0.570	0.029	0.0358	
720 minute winter	MH4	Flow through Pond	MH9	2.3	0.018	0.001	32.0947	
720 minute winter	MH7	2.001	MH8	0.6	1.105	0.031	0.0032	
720 minute winter	MH8	Flow through Pond	MH9	2.3	0.018	0.001	32.0947	
720 minute winter	MH5	3.000	MH3	1.4	0.536	0.066	0.0371	
720 minute winter	MH3	1.002	MH4	3.2	1.018	0.118	0.0250	
720 minute winter	MH9	1.003	MH10	2.9	0.469	0.318	0.0140	
720 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
720 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	42.5
720 minute winter	MH6	2.000	MH7	0.1	0.278	0.007	0.0038	

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Results for 100 year +45% CC 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 99.45%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	MH1	495	73.818	0.018	1.3	0.0029	0.0000	OK
960 minute summer	MH2	495	73.118	0.018	1.3	0.0052	0.0000	OK
960 minute summer	MH4	660	72.017	0.449	3.4	0.0000	0.0000	OK
960 minute summer	MH7	495	72.713	0.013	0.7	0.0149	0.0000	OK
960 minute summer	MH8	660	72.017	0.449	0.7	0.0000	0.0000	OK
960 minute summer	MH5	495	72.427	0.027	1.5	0.0077	0.0000	OK
960 minute summer	MH3	495	72.237	0.037	3.4	0.0416	0.0000	OK
960 minute summer	MH9	660	72.017	0.477	2.5	0.0000	0.0000	SURCHARGED
960 minute summer	MH10	660	72.016	0.516	3.0	0.5838	0.0000	SURCHARGED
960 minute summer	MH11	1200	71.214	0.014	0.9	0.0159	0.0000	OK
960 minute summer	EXMH	1200	69.934	0.014	0.9	0.0000	0.0000	OK
960 minute summer	MH6	480	73.206	0.006	0.1	0.0018	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute summer	MH1	1.000	MH2	1.3	1.068	0.031	0.0151	
960 minute summer	MH2	1.001	MH3	1.3	0.588	0.031	0.0376	
960 minute summer	MH4	Flow through Pond	MH9	2.5	0.022	0.001	26.7292	
960 minute summer	MH7	2.001	MH8	0.7	1.158	0.036	0.0036	
960 minute summer	MH8	Flow through Pond	MH9	2.5	0.022	0.001	26.7292	
960 minute summer	MH5	3.000	MH3	1.5	0.549	0.071	0.0388	
960 minute summer	MH3	1.002	MH4	3.4	1.035	0.125	0.0212	
960 minute summer	MH9	1.003	MH10	3.0	0.453	0.328	0.0140	
960 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
960 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	50.7
960 minute summer	MH6	2.000	MH7	0.1	0.278	0.007	0.0041	

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Results for 100 year +45% CC 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 99.25%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	MH1	495	73.816	0.016	1.0	0.0026	0.0000	OK
960 minute winter	MH2	495	73.116	0.016	1.0	0.0046	0.0000	OK
960 minute winter	MH4	705	72.084	0.516	2.6	0.0000	0.0000	OK
960 minute winter	MH7	435	72.710	0.010	0.4	0.0114	0.0000	OK
960 minute winter	MH8	705	72.084	0.516	0.4	0.0000	0.0000	OK
960 minute winter	MH5	465	72.423	0.023	1.1	0.0066	0.0000	OK
960 minute winter	MH3	495	72.232	0.032	2.6	0.0363	0.0000	OK
960 minute winter	MH9	705	72.084	0.544	2.6	0.0000	0.0000	SURCHARGED
960 minute winter	MH10	705	72.083	0.583	2.5	0.6595	0.0000	SURCHARGED
960 minute winter	MH11	435	71.214	0.014	0.9	0.0159	0.0000	OK
960 minute winter	EXMH	435	69.934	0.014	0.9	0.0000	0.0000	OK
960 minute winter	MH6	15	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	MH1	1.000	MH2	1.0	0.988	0.024	0.0126	
960 minute winter	MH2	1.001	MH3	1.0	0.549	0.024	0.0310	
960 minute winter	MH4	Flow through Pond	MH9	1.9	0.019	0.001	30.6007	
960 minute winter	MH7	2.001	MH8	0.4	0.978	0.021	0.0024	
960 minute winter	MH8	Flow through Pond	MH9	1.9	0.019	0.001	30.6007	
960 minute winter	MH5	3.000	MH3	1.1	0.511	0.052	0.0316	
960 minute winter	MH3	1.002	MH4	2.6	0.960	0.096	0.0175	
960 minute winter	MH9	1.003	MH10	2.5	0.451	0.270	0.0140	
960 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
960 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	52.5
960 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0021	

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Results for 100 year +45% CC 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute summer	MH1	750	73.816	0.016	1.0	0.0026	0.0000	OK
1440 minute summer	MH2	750	73.116	0.016	1.0	0.0046	0.0000	OK
1440 minute summer	MH4	930	71.982	0.414	2.6	0.0000	0.0000	OK
1440 minute summer	MH7	720	72.710	0.010	0.4	0.0114	0.0000	OK
1440 minute summer	MH8	930	71.982	0.414	0.4	0.0000	0.0000	OK
1440 minute summer	MH5	750	72.423	0.023	1.1	0.0066	0.0000	OK
1440 minute summer	MH3	750	72.232	0.032	2.6	0.0363	0.0000	OK
1440 minute summer	MH9	930	71.981	0.441	1.9	0.0000	0.0000	SURCHARGED
1440 minute summer	MH10	930	71.981	0.481	1.6	0.5441	0.0000	SURCHARGED
1440 minute summer	MH11	720	71.214	0.014	0.9	0.0159	0.0000	OK
1440 minute summer	EXMH	720	69.934	0.014	0.9	0.0000	0.0000	OK
1440 minute summer	MH6	30	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute summer	MH1	1.000	MH2	1.0	0.988	0.024	0.0126	
1440 minute summer	MH2	1.001	MH3	1.0	0.549	0.024	0.0310	
1440 minute summer	MH4	Flow through Pond	MH9	1.9	0.013	0.001	24.6994	
1440 minute summer	MH7	2.001	MH8	0.4	0.978	0.021	0.0024	
1440 minute summer	MH8	Flow through Pond	MH9	1.9	0.013	0.001	24.6994	
1440 minute summer	MH5	3.000	MH3	1.1	0.495	0.052	0.0316	
1440 minute summer	MH3	1.002	MH4	2.6	0.960	0.096	0.0175	
1440 minute summer	MH9	1.003	MH10	1.6	0.368	0.176	0.0140	
1440 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
1440 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	66.5
1440 minute summer	MH6	2.000	MH7	0.0	0.000	0.000	0.0021	

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Results for 100 year +45% CC 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 99.73%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	MH1	720	73.814	0.014	0.7	0.0022	0.0000	OK
1440 minute winter	MH2	720	73.114	0.014	0.7	0.0039	0.0000	OK
1440 minute winter	MH4	1020	72.018	0.450	1.9	0.0000	0.0000	OK
1440 minute winter	MH7	660	72.709	0.009	0.3	0.0100	0.0000	OK
1440 minute winter	MH8	1020	72.018	0.450	0.3	0.0000	0.0000	OK
1440 minute winter	MH5	690	72.420	0.020	0.8	0.0056	0.0000	OK
1440 minute winter	MH3	750	72.227	0.027	1.9	0.0310	0.0000	OK
1440 minute winter	MH9	1020	72.018	0.478	2.4	0.0000	0.0000	SURCHARGED
1440 minute winter	MH10	1020	72.017	0.517	1.3	0.5849	0.0000	SURCHARGED
1440 minute winter	MH11	690	71.214	0.014	0.9	0.0159	0.0000	OK
1440 minute winter	EXMH	690	69.934	0.014	0.9	0.0000	0.0000	OK
1440 minute winter	MH6	30	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	MH1	1.000	MH2	0.7	0.890	0.016	0.0098	
1440 minute winter	MH2	1.001	MH3	0.7	0.498	0.017	0.0246	
1440 minute winter	MH4	Flow through Pond	MH9	1.5	0.013	0.000	26.7902	
1440 minute winter	MH7	2.001	MH8	0.3	0.900	0.015	0.0020	
1440 minute winter	MH8	Flow through Pond	MH9	1.5	0.013	0.000	26.7902	
1440 minute winter	MH5	3.000	MH3	0.8	0.471	0.038	0.0253	
1440 minute winter	MH3	1.002	MH4	1.9	0.877	0.070	0.0140	
1440 minute winter	MH9	1.003	MH10	1.3	0.293	0.144	0.0140	
1440 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
1440 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	70.6
1440 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0017	

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Results for 100 year +45% CC 2160 minute summer. 2400 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute summer	MH1	1140	73.814	0.014	0.7	0.0022	0.0000	OK
2160 minute summer	MH2	1140	73.114	0.014	0.7	0.0039	0.0000	OK
2160 minute summer	MH4	1380	71.884	0.316	1.8	0.0000	0.0000	OK
2160 minute summer	MH7	1140	72.709	0.009	0.3	0.0100	0.0000	OK
2160 minute summer	MH8	1380	71.884	0.315	0.3	0.0000	0.0000	OK
2160 minute summer	MH5	1140	72.420	0.020	0.8	0.0056	0.0000	OK
2160 minute summer	MH3	1140	72.227	0.027	1.8	0.0302	0.0000	OK
2160 minute summer	MH9	1380	71.883	0.343	1.5	0.0000	0.0000	SURCHARGED
2160 minute summer	MH10	1380	71.883	0.383	2.0	0.4330	0.0000	SURCHARGED
2160 minute summer	MH11	1740	71.214	0.014	0.9	0.0159	0.0000	OK
2160 minute summer	EXMH	1740	69.934	0.014	0.9	0.0000	0.0000	OK
2160 minute summer	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute summer	MH1	1.000	MH2	0.7	0.890	0.016	0.0098	
2160 minute summer	MH2	1.001	MH3	0.7	0.498	0.017	0.0239	
2160 minute summer	MH4	Flow through Pond	MH9	1.5	0.012	0.000	19.0330	
2160 minute summer	MH7	2.001	MH8	0.3	0.900	0.015	0.0020	
2160 minute summer	MH8	Flow through Pond	MH9	1.5	0.012	0.000	19.0330	
2160 minute summer	MH5	3.000	MH3	0.8	0.461	0.038	0.0247	
2160 minute summer	MH3	1.002	MH4	1.8	0.864	0.066	0.0135	
2160 minute summer	MH9	1.003	MH10	2.0	0.475	0.224	0.0140	
2160 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
2160 minute summer	MH11	1.005	EXMH	0.9	1.354	0.041	0.0067	73.8
2160 minute summer	MH6	2.000	MH7	0.0	0.000	0.000	0.0017	

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Results for 100 year +45% CC 2160 minute winter. 2400 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2160 minute winter	MH1	1020	73.812	0.012	0.5	0.0018	0.0000	OK
2160 minute winter	MH2	1020	73.112	0.012	0.5	0.0033	0.0000	OK
2160 minute winter	MH4	1440	71.892	0.324	1.4	0.0000	0.0000	OK
2160 minute winter	MH7	900	72.707	0.007	0.2	0.0083	0.0000	OK
2160 minute winter	MH8	1440	71.892	0.323	0.2	0.0000	0.0000	OK
2160 minute winter	MH5	1080	72.417	0.017	0.6	0.0049	0.0000	OK
2160 minute winter	MH3	1140	72.224	0.024	1.4	0.0266	0.0000	OK
2160 minute winter	MH9	1440	71.891	0.351	1.2	0.0000	0.0000	SURCHARGED
2160 minute winter	MH10	1440	71.891	0.391	3.0	0.4419	0.0000	SURCHARGED
2160 minute winter	MH11	1080	71.214	0.014	0.9	0.0159	0.0000	OK
2160 minute winter	EXMH	1080	69.934	0.014	0.9	0.0000	0.0000	OK
2160 minute winter	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2160 minute winter	MH1	1.000	MH2	0.5	0.801	0.012	0.0077	
2160 minute winter	MH2	1.001	MH3	0.5	0.468	0.012	0.0197	
2160 minute winter	MH4	Flow through Pond	MH9	1.2	0.012	0.000	19.4863	
2160 minute winter	MH7	2.001	MH8	0.2	0.792	0.010	0.0015	
2160 minute winter	MH8	Flow through Pond	MH9	1.2	0.012	0.000	19.4863	
2160 minute winter	MH5	3.000	MH3	0.6	0.430	0.028	0.0205	
2160 minute winter	MH3	1.002	MH4	1.4	0.804	0.052	0.0113	
2160 minute winter	MH9	1.003	MH10	3.0	0.480	0.329	0.0140	
2160 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
2160 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0067	81.9
2160 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0013	

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Results for 100 year +45% CC 2880 minute summer. 3120 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute summer	MH1	1500	73.813	0.013	0.6	0.0020	0.0000	OK
2880 minute summer	MH2	1500	73.113	0.013	0.6	0.0036	0.0000	OK
2880 minute summer	MH4	1740	71.851	0.283	1.6	0.0000	0.0000	OK
2880 minute summer	MH7	1500	72.709	0.009	0.3	0.0100	0.0000	OK
2880 minute summer	MH8	1740	71.851	0.283	0.3	0.0000	0.0000	OK
2880 minute summer	MH5	1500	72.419	0.019	0.7	0.0053	0.0000	OK
2880 minute summer	MH3	1500	72.225	0.025	1.6	0.0285	0.0000	OK
2880 minute summer	MH9	1740	71.850	0.310	1.4	0.0000	0.0000	SURCHARGED
2880 minute summer	MH10	1740	71.850	0.350	1.5	0.3957	0.0000	SURCHARGED
2880 minute summer	MH11	2040	71.214	0.014	0.9	0.0159	0.0000	OK
2880 minute summer	EXMH	2040	69.934	0.014	0.9	0.0000	0.0000	OK
2880 minute summer	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute summer	MH1	1.000	MH2	0.6	0.849	0.014	0.0088	
2880 minute summer	MH2	1.001	MH3	0.6	0.469	0.014	0.0218	
2880 minute summer	MH4	Flow through Pond	MH9	1.4	0.012	0.000	17.1291	
2880 minute summer	MH7	2.001	MH8	0.3	0.900	0.015	0.0020	
2880 minute summer	MH8	Flow through Pond	MH9	1.4	0.012	0.000	17.1291	
2880 minute summer	MH5	3.000	MH3	0.7	0.440	0.033	0.0226	
2880 minute summer	MH3	1.002	MH4	1.6	0.835	0.059	0.0124	
2880 minute summer	MH9	1.003	MH10	1.5	0.240	0.163	0.0140	
2880 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
2880 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	83.4
2880 minute summer	MH6	2.000	MH7	0.0	0.000	0.000	0.0017	

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Results for 100 year +45% CC 2880 minute winter. 3120 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
2880 minute winter	MH1	1320	73.810	0.010	0.4	0.0017	0.0000	OK
2880 minute winter	MH2	1320	73.111	0.011	0.4	0.0030	0.0000	OK
2880 minute winter	MH4	1800	71.797	0.229	1.1	0.0000	0.0000	OK
2880 minute winter	MH7	1320	72.707	0.007	0.2	0.0083	0.0000	OK
2880 minute winter	MH8	1800	71.797	0.229	0.2	0.0000	0.0000	OK
2880 minute winter	MH5	1380	72.416	0.016	0.5	0.0045	0.0000	OK
2880 minute winter	MH3	1380	72.221	0.021	1.1	0.0237	0.0000	OK
2880 minute winter	MH9	1800	71.797	0.257	1.9	0.0000	0.0000	SURCHARGED
2880 minute winter	MH10	1800	71.796	0.296	2.4	0.3347	0.0000	SURCHARGED
2880 minute winter	MH11	1560	71.214	0.014	0.9	0.0159	0.0000	OK
2880 minute winter	EXMH	1560	69.934	0.014	0.9	0.0000	0.0000	OK
2880 minute winter	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
2880 minute winter	MH1	1.000	MH2	0.4	0.748	0.009	0.0066	
2880 minute winter	MH2	1.001	MH3	0.4	0.429	0.010	0.0166	
2880 minute winter	MH4	Flow through Pond	MH9	1.1	0.012	0.000	14.0117	
2880 minute winter	MH7	2.001	MH8	0.2	0.792	0.010	0.0015	
2880 minute winter	MH8	Flow through Pond	MH9	1.1	0.012	0.000	14.0117	
2880 minute winter	MH5	3.000	MH3	0.5	0.405	0.024	0.0175	
2880 minute winter	MH3	1.002	MH4	1.1	0.748	0.040	0.0095	
2880 minute winter	MH9	1.003	MH10	2.4	0.460	0.259	0.0140	
2880 minute winter	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
2880 minute winter	MH11	1.005	EXMH	0.9	1.354	0.042	0.0068	90.6
2880 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0013	

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Results for 100 year +45% CC 4320 minute summer. 4560 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
4320 minute summer	MH1	2160	73.810	0.010	0.4	0.0017	0.0000	OK
4320 minute summer	MH2	2160	73.111	0.011	0.4	0.0030	0.0000	OK
4320 minute summer	MH4	2400	71.723	0.154	1.1	0.0000	0.0000	OK
4320 minute summer	MH7	2100	72.707	0.007	0.2	0.0083	0.0000	OK
4320 minute summer	MH8	2400	71.722	0.154	0.2	0.0000	0.0000	OK
4320 minute summer	MH5	2160	72.416	0.016	0.5	0.0045	0.0000	OK
4320 minute summer	MH3	2160	72.221	0.021	1.1	0.0237	0.0000	OK
4320 minute summer	MH9	2400	71.722	0.182	1.1	0.0000	0.0000	SURCHARGED
4320 minute summer	MH10	2400	71.721	0.221	1.4	0.2502	0.0000	SURCHARGED
4320 minute summer	MH11	2400	71.214	0.014	0.9	0.0159	0.0000	OK
4320 minute summer	EXMH	2400	69.934	0.014	0.9	0.0000	0.0000	OK
4320 minute summer	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
4320 minute summer	MH1	1.000	MH2	0.4	0.748	0.009	0.0066	
4320 minute summer	MH2	1.001	MH3	0.4	0.410	0.010	0.0166	
4320 minute summer	MH4	Flow through Pond	MH9	1.1	0.013	0.000	9.6962	
4320 minute summer	MH7	2.001	MH8	0.2	0.792	0.010	0.0015	
4320 minute summer	MH8	Flow through Pond	MH9	1.1	0.013	0.000	9.6962	
4320 minute summer	MH5	3.000	MH3	0.5	0.405	0.024	0.0175	
4320 minute summer	MH3	1.002	MH4	1.1	0.748	0.040	0.0095	
4320 minute summer	MH9	1.003	MH10	1.4	0.372	0.155	0.0140	
4320 minute summer	MH10	1.004	MH11	0.9	0.784	0.130	0.0269	
4320 minute summer	MH11	1.005	EXMH	0.9	1.354	0.042	0.0067	81.7
4320 minute summer	MH6	2.000	MH7	0.0	0.000	0.000	0.0013	

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Results for 100 year +45% CC 4320 minute winter. 4560 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
4320 minute winter	MH1	1920	73.809	0.009	0.3	0.0015	0.0000	OK
4320 minute winter	MH2	1920	73.109	0.009	0.3	0.0026	0.0000	OK
4320 minute winter	MH4	2340	71.648	0.080	0.9	0.0000	0.0000	OK
4320 minute winter	MH7	1380	72.705	0.005	0.1	0.0060	0.0000	OK
4320 minute winter	MH8	2340	71.647	0.079	0.1	0.0000	0.0000	OK
4320 minute winter	MH5	2100	72.414	0.014	0.4	0.0041	0.0000	OK
4320 minute winter	MH3	2160	72.219	0.019	0.9	0.0215	0.0000	OK
4320 minute winter	MH9	2340	71.647	0.107	2.1	0.0000	0.0000	SURCHARGED
4320 minute winter	MH10	2340	71.646	0.146	2.6	0.1657	0.0000	SURCHARGED
4320 minute winter	MH11	2340	71.214	0.014	0.9	0.0155	0.0000	OK
4320 minute winter	EXMH	2340	69.934	0.014	0.9	0.0000	0.0000	OK
4320 minute winter	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
4320 minute winter	MH1	1.000	MH2	0.3	0.685	0.007	0.0054	
4320 minute winter	MH2	1.001	MH3	0.3	0.408	0.007	0.0142	
4320 minute winter	MH4	Flow through Pond	MH9	1.1	0.012	0.000	5.3745	
4320 minute winter	MH7	2.001	MH8	0.1	0.641	0.005	0.0009	
4320 minute winter	MH8	Flow through Pond	MH9	1.1	0.012	0.000	5.3745	
4320 minute winter	MH5	3.000	MH3	0.4	0.395	0.019	0.0151	
4320 minute winter	MH3	1.002	MH4	0.9	0.705	0.033	0.0082	
4320 minute winter	MH9	1.003	MH10	2.6	0.479	0.283	0.0140	
4320 minute winter	MH10	1.004	MH11	0.9	0.773	0.124	0.0260	
4320 minute winter	MH11	1.005	EXMH	0.9	1.335	0.040	0.0065	100.0
4320 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0008	

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Results for 100 year +45% CC 5760 minute summer. 6000 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
5760 minute summer	MH1	2760	73.809	0.009	0.3	0.0015	0.0000	OK
5760 minute summer	MH2	2760	73.109	0.009	0.3	0.0026	0.0000	OK
5760 minute summer	MH4	3060	71.647	0.079	0.9	0.0000	0.0000	OK
5760 minute summer	MH7	2940	72.707	0.007	0.2	0.0083	0.0000	OK
5760 minute summer	MH8	3060	71.647	0.079	0.2	0.0000	0.0000	OK
5760 minute summer	MH5	2880	72.414	0.014	0.4	0.0041	0.0000	OK
5760 minute summer	MH3	2880	72.219	0.019	0.9	0.0215	0.0000	OK
5760 minute summer	MH9	3060	71.647	0.107	2.0	0.0000	0.0000	SURCHARGED
5760 minute summer	MH10	3060	71.646	0.146	2.7	0.1652	0.0000	SURCHARGED
5760 minute summer	MH11	3060	71.214	0.014	0.9	0.0155	0.0000	OK
5760 minute summer	EXMH	3060	69.934	0.014	0.9	0.0000	0.0000	OK
5760 minute summer	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
5760 minute summer	MH1	1.000	MH2	0.3	0.685	0.007	0.0054	
5760 minute summer	MH2	1.001	MH3	0.3	0.408	0.007	0.0142	
5760 minute summer	MH4	Flow through Pond	MH9	1.0	0.012	0.000	5.3528	
5760 minute summer	MH7	2.001	MH8	0.2	0.792	0.010	0.0015	
5760 minute summer	MH8	Flow through Pond	MH9	1.0	0.012	0.000	5.3528	
5760 minute summer	MH5	3.000	MH3	0.4	0.377	0.019	0.0151	
5760 minute summer	MH3	1.002	MH4	0.9	0.705	0.033	0.0082	
5760 minute summer	MH9	1.003	MH10	2.7	0.485	0.292	0.0140	
5760 minute summer	MH10	1.004	MH11	0.9	0.773	0.124	0.0260	
5760 minute summer	MH11	1.005	EXMH	0.9	1.334	0.040	0.0065	80.0
5760 minute summer	MH6	2.000	MH7	0.0	0.000	0.000	0.0013	

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Results for 100 year +45% CC 5760 minute winter. 6000 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
5760 minute winter	MH1	2940	73.809	0.009	0.3	0.0015	0.0000	OK
5760 minute winter	MH2	2940	73.109	0.009	0.3	0.0026	0.0000	OK
5760 minute winter	MH4	3000	71.595	0.027	0.7	0.0000	0.0000	OK
5760 minute winter	MH7	1980	72.705	0.005	0.1	0.0060	0.0000	OK
5760 minute winter	MH8	3000	71.595	0.026	0.1	0.0000	0.0000	OK
5760 minute winter	MH5	2580	72.413	0.013	0.3	0.0036	0.0000	OK
5760 minute winter	MH3	2940	72.217	0.017	0.7	0.0191	0.0000	OK
5760 minute winter	MH9	3000	71.594	0.054	2.6	0.0000	0.0000	OK
5760 minute winter	MH10	2940	71.608	0.108	2.9	0.1218	0.0000	SURCHARGED
5760 minute winter	MH11	3000	71.213	0.013	0.7	0.0144	0.0000	OK
5760 minute winter	EXMH	3000	69.933	0.013	0.7	0.0000	0.0000	OK
5760 minute winter	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
5760 minute winter	MH1	1.000	MH2	0.3	0.685	0.007	0.0054	
5760 minute winter	MH2	1.001	MH3	0.3	0.408	0.007	0.0125	
5760 minute winter	MH4	Flow through Pond	MH9	1.1	0.012	0.000	2.3285	
5760 minute winter	MH7	2.001	MH8	0.1	0.641	0.005	0.0009	
5760 minute winter	MH8	Flow through Pond	MH9	1.1	0.012	0.000	2.3285	
5760 minute winter	MH5	3.000	MH3	0.3	0.361	0.014	0.0126	
5760 minute winter	MH3	1.002	MH4	0.7	0.654	0.026	0.0069	
5760 minute winter	MH9	1.003	MH10	2.9	0.487	0.317	0.0107	
5760 minute winter	MH10	1.004	MH11	0.7	0.747	0.108	0.0235	
5760 minute winter	MH11	1.005	EXMH	0.7	1.275	0.034	0.0059	99.7
5760 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0008	

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Results for 100 year +45% CC 7200 minute summer. 7440 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
7200 minute summer	MH1	3540	73.809	0.009	0.3	0.0015	0.0000	OK
7200 minute summer	MH2	3540	73.109	0.009	0.3	0.0026	0.0000	OK
7200 minute summer	MH4	3780	71.603	0.035	0.7	0.0000	0.0000	OK
7200 minute summer	MH7	2940	72.705	0.005	0.1	0.0060	0.0000	OK
7200 minute summer	MH8	3780	71.602	0.034	0.1	0.0000	0.0000	OK
7200 minute summer	MH5	3420	72.413	0.013	0.3	0.0036	0.0000	OK
7200 minute summer	MH3	3540	72.217	0.017	0.7	0.0191	0.0000	OK
7200 minute summer	MH9	3780	71.602	0.062	2.3	0.0000	0.0000	OK
7200 minute summer	MH10	3540	71.603	0.103	2.7	0.1163	0.0000	SURCHARGED
7200 minute summer	MH11	3780	71.213	0.013	0.8	0.0148	0.0000	OK
7200 minute summer	EXMH	3780	69.933	0.013	0.8	0.0000	0.0000	OK
7200 minute summer	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
7200 minute summer	MH1	1.000	MH2	0.3	0.685	0.007	0.0054	
7200 minute summer	MH2	1.001	MH3	0.3	0.408	0.007	0.0125	
7200 minute summer	MH4	Flow through Pond	MH9	1.1	0.012	0.000	2.7910	
7200 minute summer	MH7	2.001	MH8	0.1	0.641	0.005	0.0009	
7200 minute summer	MH8	Flow through Pond	MH9	1.1	0.012	0.000	2.7910	
7200 minute summer	MH5	3.000	MH3	0.3	0.361	0.014	0.0126	
7200 minute summer	MH3	1.002	MH4	0.7	0.654	0.026	0.0069	
7200 minute summer	MH9	1.003	MH10	2.7	0.486	0.299	0.0115	
7200 minute summer	MH10	1.004	MH11	0.8	0.753	0.112	0.0242	
7200 minute summer	MH11	1.005	EXMH	0.8	1.293	0.036	0.0061	77.4
7200 minute summer	MH6	2.000	MH7	0.0	0.000	0.000	0.0008	

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Results for 100 year +45% CC 7200 minute winter. 7440 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
7200 minute winter	MH1	3000	73.808	0.008	0.2	0.0012	0.0000	OK
7200 minute winter	MH2	3000	73.108	0.008	0.2	0.0022	0.0000	OK
7200 minute winter	MH4	3660	71.580	0.012	0.6	0.0000	0.0000	OK
7200 minute winter	MH7	2640	72.705	0.005	0.1	0.0060	0.0000	OK
7200 minute winter	MH8	3660	71.580	0.012	0.1	0.0000	0.0000	OK
7200 minute winter	MH5	3660	72.413	0.013	0.3	0.0036	0.0000	OK
7200 minute winter	MH3	3660	72.216	0.016	0.6	0.0177	0.0000	OK
7200 minute winter	MH9	3660	71.580	0.040	2.0	0.0000	0.0000	OK
7200 minute winter	MH10	3600	71.591	0.091	2.1	0.1034	0.0000	OK
7200 minute winter	MH11	3720	71.212	0.012	0.7	0.0137	0.0000	OK
7200 minute winter	EXMH	3660	69.932	0.012	0.7	0.0000	0.0000	OK
7200 minute winter	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
7200 minute winter	MH1	1.000	MH2	0.2	0.607	0.005	0.0041	
7200 minute winter	MH2	1.001	MH3	0.2	0.350	0.005	0.0107	
7200 minute winter	MH4	Flow through Pond	MH9	0.9	0.012	0.000	1.4847	
7200 minute winter	MH7	2.001	MH8	0.1	0.641	0.005	0.0009	
7200 minute winter	MH8	Flow through Pond	MH9	0.9	0.012	0.000	1.4847	
7200 minute winter	MH5	3.000	MH3	0.3	0.361	0.014	0.0118	
7200 minute winter	MH3	1.002	MH4	0.6	0.624	0.022	0.0062	
7200 minute winter	MH9	1.003	MH10	2.1	0.478	0.235	0.0089	
7200 minute winter	MH10	1.004	MH11	0.7	0.726	0.096	0.0216	
7200 minute winter	MH11	1.005	EXMH	0.7	1.234	0.030	0.0054	95.7
7200 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0008	

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Results for 100 year +45% CC 8640 minute summer. 8880 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
8640 minute summer	MH1	4380	73.809	0.009	0.3	0.0015	0.0000	OK
8640 minute summer	MH2	4380	73.109	0.009	0.3	0.0026	0.0000	OK
8640 minute summer	MH4	4440	71.594	0.025	0.7	0.0000	0.0000	OK
8640 minute summer	MH7	3600	72.705	0.005	0.1	0.0060	0.0000	OK
8640 minute summer	MH8	4440	71.593	0.025	0.1	0.0000	0.0000	OK
8640 minute summer	MH5	4200	72.413	0.013	0.3	0.0036	0.0000	OK
8640 minute summer	MH3	4380	72.217	0.017	0.7	0.0191	0.0000	OK
8640 minute summer	MH9	4440	71.593	0.053	2.6	0.0000	0.0000	OK
8640 minute summer	MH10	4440	71.598	0.098	2.5	0.1110	0.0000	OK
8640 minute summer	MH11	4500	71.213	0.013	0.7	0.0144	0.0000	OK
8640 minute summer	EXMH	4500	69.933	0.013	0.7	0.0000	0.0000	OK
8640 minute summer	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
8640 minute summer	MH1	1.000	MH2	0.3	0.685	0.007	0.0054	
8640 minute summer	MH2	1.001	MH3	0.3	0.408	0.007	0.0125	
8640 minute summer	MH4	Flow through Pond	MH9	1.2	0.012	0.000	2.2410	
8640 minute summer	MH7	2.001	MH8	0.1	0.641	0.005	0.0009	
8640 minute summer	MH8	Flow through Pond	MH9	1.2	0.012	0.000	2.2410	
8640 minute summer	MH5	3.000	MH3	0.3	0.361	0.014	0.0126	
8640 minute summer	MH3	1.002	MH4	0.7	0.654	0.026	0.0069	
8640 minute summer	MH9	1.003	MH10	2.5	0.487	0.273	0.0107	
8640 minute summer	MH10	1.004	MH11	0.7	0.745	0.108	0.0236	
8640 minute summer	MH11	1.005	EXMH	0.7	1.271	0.034	0.0058	79.4
8640 minute summer	MH6	2.000	MH7	0.0	0.000	0.000	0.0008	

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Results for 100 year +45% CC 8640 minute winter. 8880 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
8640 minute winter	MH1	3780	73.808	0.008	0.2	0.0012	0.0000	OK
8640 minute winter	MH2	3780	73.108	0.008	0.2	0.0022	0.0000	OK
8640 minute winter	MH4	4560	71.574	0.006	0.5	0.0000	0.0000	OK
8640 minute winter	MH7	3300	72.705	0.005	0.1	0.0060	0.0000	OK
8640 minute winter	MH8	4560	71.574	0.005	0.1	0.0000	0.0000	OK
8640 minute winter	MH5	3480	72.410	0.010	0.2	0.0030	0.0000	OK
8640 minute winter	MH3	3780	72.214	0.014	0.5	0.0162	0.0000	OK
8640 minute winter	MH9	4620	71.574	0.034	1.9	0.0000	0.0000	OK
8640 minute winter	MH10	4560	71.589	0.089	2.1	0.1002	0.0000	OK
8640 minute winter	MH11	4740	71.212	0.012	0.6	0.0133	0.0000	OK
8640 minute winter	EXMH	4620	69.932	0.012	0.6	0.0000	0.0000	OK
8640 minute winter	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
8640 minute winter	MH1	1.000	MH2	0.2	0.607	0.005	0.0041	
8640 minute winter	MH2	1.001	MH3	0.2	0.350	0.005	0.0097	
8640 minute winter	MH4	Flow through Pond	MH9	0.8	0.012	0.000	1.1259	
8640 minute winter	MH7	2.001	MH8	0.1	0.641	0.005	0.0009	
8640 minute winter	MH8	Flow through Pond	MH9	0.8	0.012	0.000	1.1259	
8640 minute winter	MH5	3.000	MH3	0.2	0.326	0.009	0.0097	
8640 minute winter	MH3	1.002	MH4	0.5	0.592	0.018	0.0055	
8640 minute winter	MH9	1.003	MH10	2.1	0.472	0.235	0.0085	
8640 minute winter	MH10	1.004	MH11	0.6	0.718	0.092	0.0210	
8640 minute winter	MH11	1.005	EXMH	0.6	1.206	0.028	0.0052	100.2
8640 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0008	

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Results for 100 year +45% CC 10080 minute summer. 10320 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
10080 minute summer	MH1	4620	73.808	0.008	0.2	0.0012	0.0000	OK
10080 minute summer	MH2	4620	73.108	0.008	0.2	0.0022	0.0000	OK
10080 minute summer	MH4	5160	71.584	0.016	0.6	0.0000	0.0000	OK
10080 minute summer	MH7	4320	72.705	0.005	0.1	0.0060	0.0000	OK
10080 minute summer	MH8	5160	71.584	0.016	0.1	0.0000	0.0000	OK
10080 minute summer	MH5	5040	72.413	0.013	0.3	0.0036	0.0000	OK
10080 minute summer	MH3	5040	72.216	0.016	0.6	0.0177	0.0000	OK
10080 minute summer	MH9	5160	71.583	0.043	2.4	0.0000	0.0000	OK
10080 minute summer	MH10	5100	71.596	0.096	2.5	0.1085	0.0000	OK
10080 minute summer	MH11	5160	71.212	0.012	0.7	0.0139	0.0000	OK
10080 minute summer	EXMH	5160	69.932	0.012	0.7	0.0000	0.0000	OK
10080 minute summer	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
10080 minute summer	MH1	1.000	MH2	0.2	0.607	0.005	0.0041	
10080 minute summer	MH2	1.001	MH3	0.2	0.350	0.005	0.0107	
10080 minute summer	MH4	Flow through Pond	MH9	1.0	0.012	0.000	1.7050	
10080 minute summer	MH7	2.001	MH8	0.1	0.641	0.005	0.0009	
10080 minute summer	MH8	Flow through Pond	MH9	1.0	0.012	0.000	1.7050	
10080 minute summer	MH5	3.000	MH3	0.3	0.361	0.014	0.0118	
10080 minute summer	MH3	1.002	MH4	0.6	0.624	0.022	0.0062	
10080 minute summer	MH9	1.003	MH10	2.5	0.479	0.277	0.0096	
10080 minute summer	MH10	1.004	MH11	0.7	0.733	0.102	0.0226	
10080 minute summer	MH11	1.005	EXMH	0.7	1.240	0.031	0.0055	79.1
10080 minute summer	MH6	2.000	MH7	0.0	0.000	0.000	0.0008	

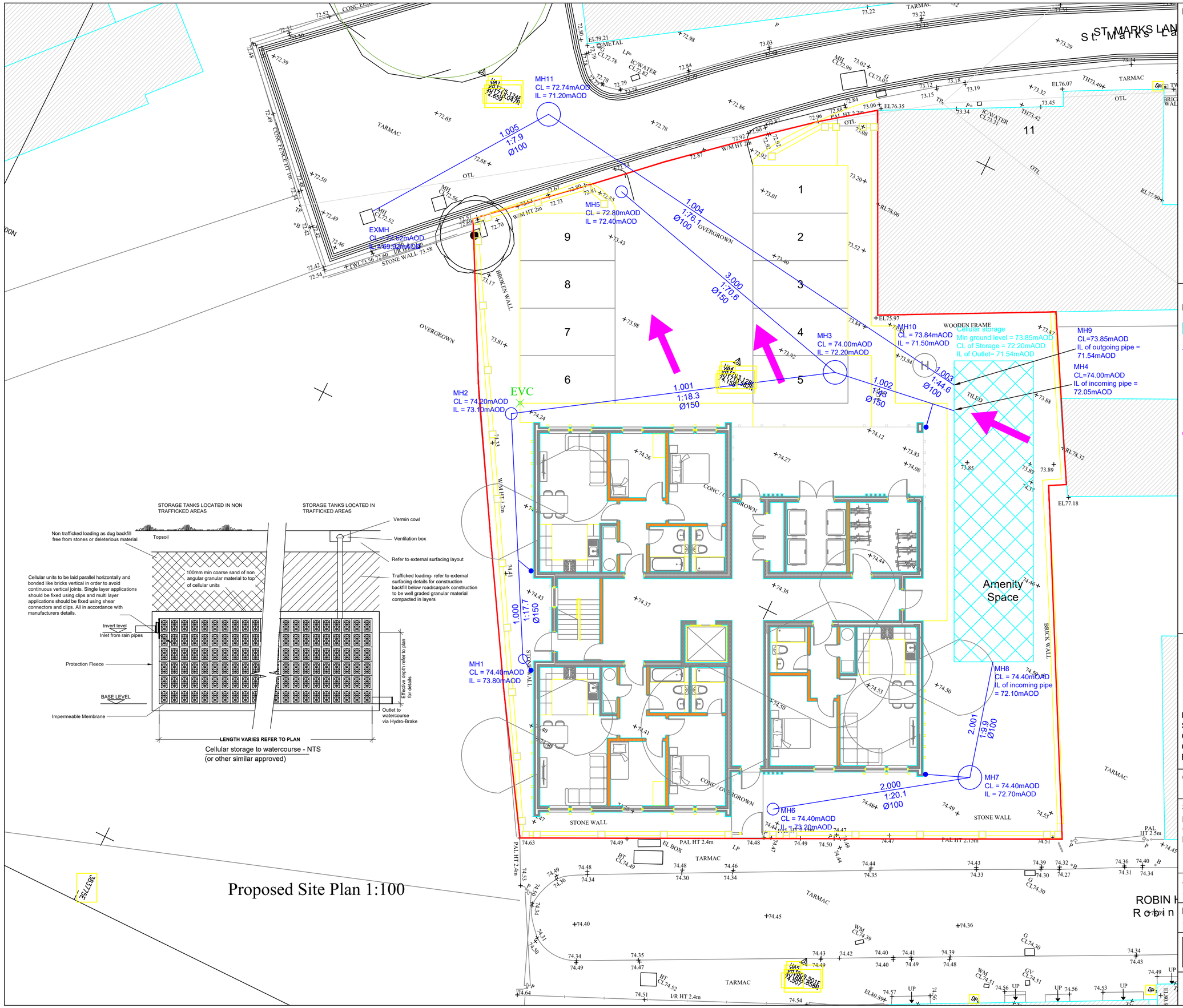
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Results for 100 year +45% CC 10080 minute winter. 10320 minute analysis at 60 minute timestep. Mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
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10080 minute winter	MH2	4680	73.108	0.008	0.2	0.0022	0.0000	OK
10080 minute winter	MH4	5520	71.574	0.006	0.5	0.0000	0.0000	OK
10080 minute winter	MH7	4020	72.705	0.005	0.1	0.0060	0.0000	OK
10080 minute winter	MH8	5520	71.574	0.005	0.1	0.0000	0.0000	OK
10080 minute winter	MH5	4260	72.410	0.010	0.2	0.0030	0.0000	OK
10080 minute winter	MH3	4680	72.214	0.014	0.5	0.0162	0.0000	OK
10080 minute winter	MH9	5460	71.574	0.034	1.9	0.0000	0.0000	OK
10080 minute winter	MH10	5040	71.589	0.089	2.1	0.1003	0.0000	OK
10080 minute winter	MH11	5280	71.212	0.012	0.6	0.0133	0.0000	OK
10080 minute winter	EXMH	5280	69.932	0.012	0.6	0.0000	0.0000	OK
10080 minute winter	MH6	60	73.200	0.000	0.0	0.0000	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
10080 minute winter	MH1	1.000	MH2	0.2	0.607	0.005	0.0041	
10080 minute winter	MH2	1.001	MH3	0.2	0.350	0.005	0.0097	
10080 minute winter	MH4	Flow through Pond	MH9	0.8	0.012	0.000	1.1260	
10080 minute winter	MH7	2.001	MH8	0.1	0.641	0.005	0.0009	
10080 minute winter	MH8	Flow through Pond	MH9	0.8	0.012	0.000	1.1260	
10080 minute winter	MH5	3.000	MH3	0.2	0.326	0.009	0.0097	
10080 minute winter	MH3	1.002	MH4	0.5	0.592	0.018	0.0055	
10080 minute winter	MH9	1.003	MH10	2.1	0.480	0.232	0.0085	
10080 minute winter	MH10	1.004	MH11	0.6	0.718	0.092	0.0209	
10080 minute winter	MH11	1.005	EXMH	0.6	1.206	0.028	0.0052	102.4
10080 minute winter	MH6	2.000	MH7	0.0	0.000	0.000	0.0008	

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Cellular storage to watercourse - NTS
(or other similar approved)

Proposed Site Plan 1:100

Notes:

1. Discharge of surface water via cellular storage attenuation. Preliminary calculations indicate that sufficient storage required to attenuate runoff arising from the proposed impermeable areas, during the critical 1 in 100 year + 45% Climate Change event, can be provided within cellular storage of dimensions 60.8m^2 x 0.66m deep x 0.95 (voids).
2. All levels are in metres above ordnance datum.

Legend

- Proposed Cellular Storage Attenuation
- Proposed Surface Water Pipework
- Proposed Hydro-Brake
- Proposed Surface Water Manhole
- Proposed Surface Water Downpipe
- Design Exceedance Route

Unda Consulting Ltd
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Gatwick
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Tel: 01293 214444
Email: info@unda.co.uk
Web: www.unda.co.uk

Client:
Irha Homes LTD

Site Address:
Land Adjacent To St Marks Lane Robin Hood Street
Cheetham Hill
M8 9GH

Job Reference:	Date:
93021-Chaudhry-RobinHoodSt_Rev1	17-Nov-25
Drawing Number:	**Revision:**
93021-02	v1

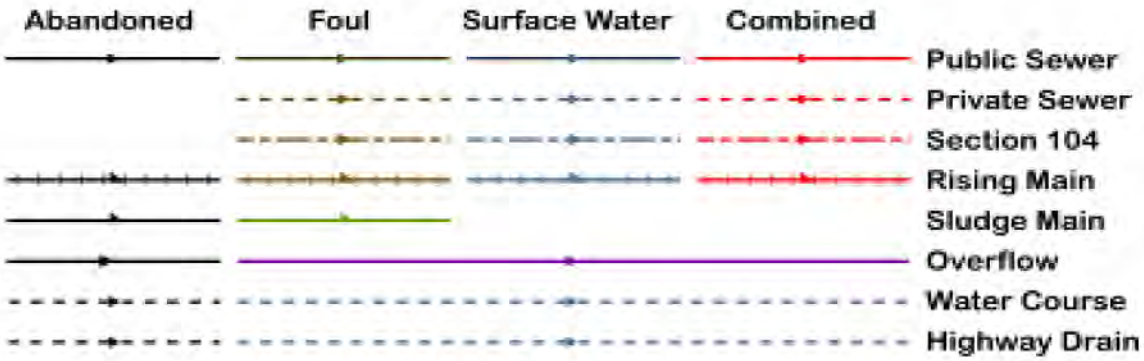
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AR	AR	EW

Scale: 1:125@A2

Disclaimer:
The drawings provided are for planning purposes only.

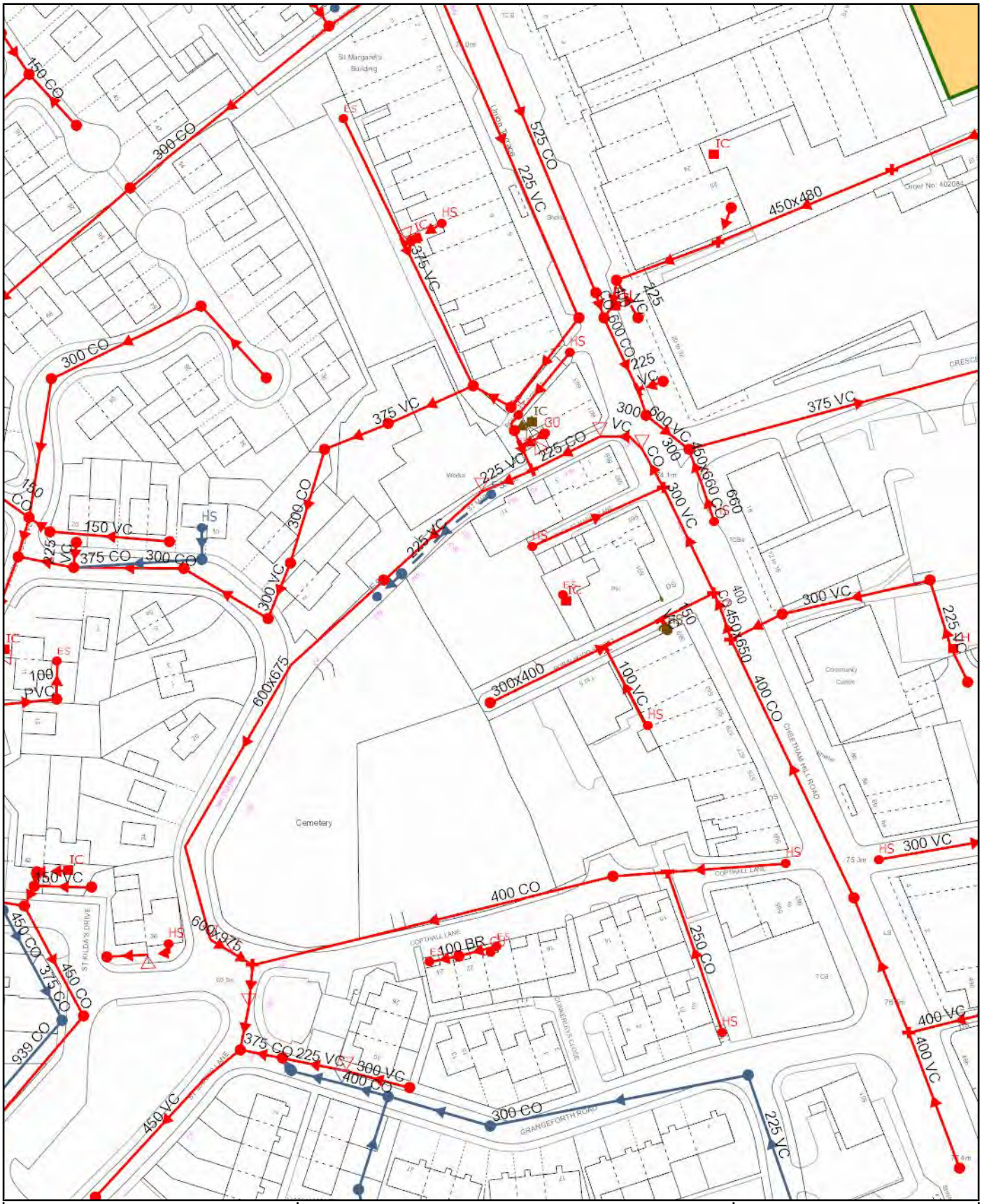
United Utilities
Water for the North West

Wastewater Symbology



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

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



Scale:	1:1250	**SEWER RECORDS**	United Utilities Water for the North West
Date:	17/07/2023		
Address or Site Reference:	1 ROBIN HOOD STREET, MANCHESTER, M8 9JG		
Printed by:	Property Searches		

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

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Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	0.660	0.900
Flush-Flo™	0.210	0.897
Kick-Flo®	0.424	0.742
Mean Flow		0.792

This Hydro-Brake® Optimum includes:

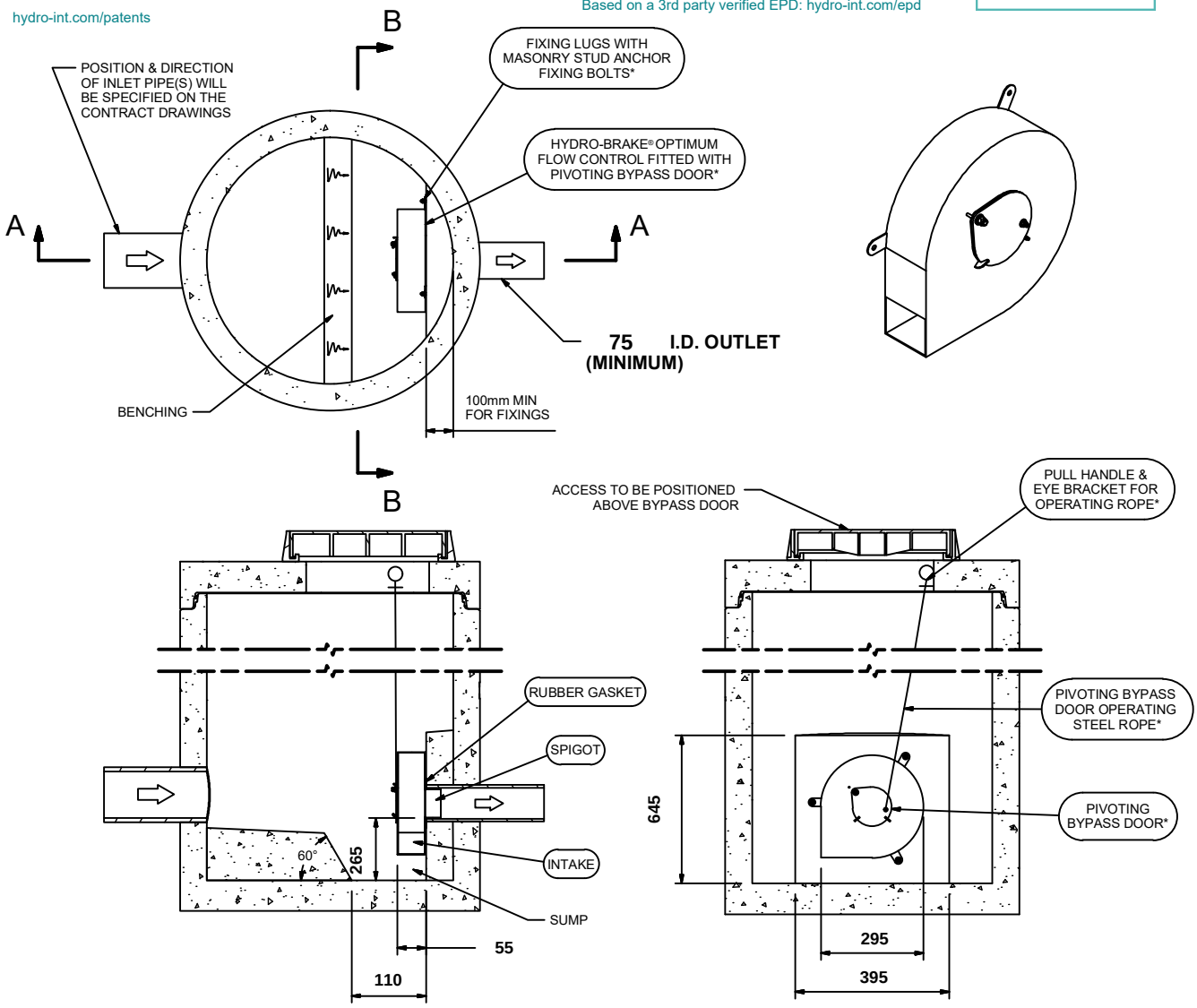
- •All in 3 mm Grade 304L stainless steel
- • Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- • Media blasted for corrosion resistance
- • Variable flow rate post installation via adjustable inlet (if necessary)
- • Indicative Weight: 5 kg
- • Product Carbon Footprint: 19.5 kgCO2e

Based on a 3rd party verified EPD: hydro-int.com/epd

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

wrc approved PT/503/0422 Valid: 01/04/2022 - 31/03/2027

hydro-int.com/patents



SECTION A-A

SECTION B-B

IMPORTANT:
- ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
- THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
- FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
- ALL CIVIL AND INSTALLATION WORK BY OTHERS
- * WHERE SUPPLIED
- HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0049-9000-0660-9000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International A CRH COMPANY

DATE	12/11/2025 09:02
SITE	
DESIGNER	Ellen Webb
REF	93021

SHE-0049-9000-0660-9000

Hydro-Brake® Optimum

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MARTIN
ENVIRONMENTAL
SOLUTIONS LTD

Contaminated Land Phase Two Intrusive Investigation for proposed residential development on Land between St Marks Lane and Robin Hood Street, Cheetham Hill, Manchester, M8 9JG.

Prepared for

Perfect Property 4 U Limited,
451 Cheetham Hill Road
Cheetham Hill
Manchester
M8 9PA.

August 2025

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Introduction

Martin Environmental Solutions has been commissioned, to carry out a phase two intrusive investigation for a proposed residential development on land between St Marks Lane and Robin Hood Street, Cheetham Manchester M8 9GH.

The Phase II Intrusive investigation follows a phase I report ref: 2531--1 by Martin Environmental Solutions produced in July 2023, which identified a potential for contamination to exist on site.

The Site:

Site Address*:* Land between St Marks Lane and Robin Hood Street, Cheetham Manchester M8 9GH.

Grid reference: 383798, 401703

An aerial photograph of the site is included in Figure 1.

Current Site use:

The site currently consists of an open overgrown piece of land situated between Robin Hood Street to the south and St Mark's Lane to the north. To the east the site backs onto a number of commercial units along Cheetham Hill Road. To the west the grounds of a former church, now overgrown.

History of the Site & Summary of the Phase I report

A summary of the history of the site and surrounding area and the findings of the Phase I report are presented below.

Site History	On-Site	The site is shown as formal gardens in the earliest 1840's mapping. It is later developed into a smithy in the northwest corner with terrace hosing to the south. By 1981 the housing has been demolished and in 1986 the site is cleared with the exception of the former smithy building, aerial photographs show the site used for commercial purposes until it was finally cleared in 2018.
	Beyond Site Boundary	The earliest mapping properties surrounding the site to the north and east, with a public house to the southeast of the site. to the west is St Marks Church, the grave yard identified as disused from 1890. Various activities occur in the wider area including a timber yard, smith and corporation yard, later turned into a skating ring and picture house in the 1920's. Additional housing is developed in the area, with the estate to the south being rebuilt in the 1980's. the church is demolished by 2000 and the site left to overgrow.
Geological Appraisal	Made Ground	No Made Ground is recorded.
	Geology	Manchester Marls Formation – Mudstone overlaid with Glaciofluvial Deposits of Devensian, Sand and gravel. No mine entries or shallow mining are identified in the area.
	Subsidence hazard	The hazard rating for compressible deposits, running sands shrink swell and landslides is very low/negligible.
	Mining	No Coal mining activities have been identified.
	Radon	1% of properties above the action level of 200 Becquerel's per cubic metre. Basic Radon protection are not required
Environmental Appraisal	Industrial Land Uses	Potentially contaminative sites identified include electrical substations located 127m SE & 137m 198m NE and 148m N, two vehicle repair garages 229m & 242m north and a bakery and a shop. Four permitted installations are recorded These include three dry cleaners, all historical located 70m &

		266m north, and 92m southeast, the fourth site a historic petrol station is located 497m northwest.
	Landfill Sites	No current or historic landfill sites exist within 250m of the site.
	Hydrogeology	Secondary B Aquifer in the Bedrock and a Secondary A Aquifer Superficial geology. Groundwater vulnerability is high in the surface geology and medium in the superficial and low in the bedrock layer. The ground and surface water abstractions licences are located 1.5Km away.
	Hydrology	There are no nearby watercourses
	Flood Risk	Site lies is not located within a flood zone and the risk of flooding is negligible.
	Other relevant details	

Pathway	Description	Identified sources	Receptor at risk	Likelihood
1	Run off and seepage into groundwater from any spillages	Rubble,	Watercourse/ Environment	Low
2	Migration of gases into the building.	Rubble, made ground, former smithy	Future users	Low,
3	Inhalation of gases/ vapours outside	Rubble, made ground, former smithy	Construction workers/future users	Low
4	Inhalation of fine particles	Rubble, made ground, former smithy	Construction workers/future users	Medium
5	Direct ingestion of contaminated soil	Rubble, made ground, former smithy	Construction workers	Medium
6	In-direct ingestion of contaminated soil	Rubble, made ground, former smithy	Future users	Medium
7	Absorption via direct dermal contact with contaminated soil	Rubble, made ground, former smithy	Construction workers/future users	Medium

Investigation Context

As a result of the Phase I report a potential for contamination was identified due to the former use of the site as a smithy and the rubble identified on the site. This Phase II Intrusive investigation has therefore been undertaken to identify whether any contamination is present on site and whether it presents any significant risk to the identified receptors.

The Phase II investigation was undertaken on the 25th June 2025 to investigate the potential presence of contaminants.

It is understood that the current site levels approximately represent the finished site level.

As a result, the intrusive investigation has concentrated on the potential for contamination from the following contaminants within across the site;

- Total Petroleum Hydrocarbons, e.g. oils and fuel
- Polyaromatic Hydrocarbons e.g. Made Ground, burning,
- Heavy metals,
- Asbestos, e.g. garage structures, brakes.

The Investigation

A site visit was conducted on the 25th June 2025 to undertake an intrusive investigation. The initial plan was unt carry out five trail holes across the site. This was however reduced to four while on site. Further information is provided below.

To soil samples were to be taken from each location, as identified in Figure 2.

Sampling locations were spread across the site including under the proposed building, garden areas and access road.

The samples were taken at approximately 250-300mm bgl and the second at 600mm bgl.

The samples were sent to Chemtech environmental a UKAS and MCERTs laboratory and each analysed for heavy metals, Total Petroleum Hydrocarbons (TPH) and Polyaromatic Hydrocarbons (PAH), and Asbestos.

The site runs from Robin Hood Street northwards toward St Marks Lane, with the northern section of the site dipping down to meet St Marks approx. 1m lower than Robin Hood Street. This northern section is covered in rubble.

The first trail hole was located to the southeast corner of the site, below a surface layer of vegetation and sand a layer of asphalt and clean hardcore was found. Below this clean sand. Two samples were recovered.

The second trail hole to the southwest of the site consisted of a layer of concrete, below which hardcore was found and then sand. Two samples were recovered.

The third trail hole was located in the centre of the site, with vegetation, sand and concrete found above hardcore and at ~400mm bgl a void was encountered. Later confirmed as not particularly deep ~450mm not further excavation of this area was undertaken at the time and only one sample was recovered.

The fourth trail hole to the northeast of the site vegetation covered the surface below which brick, concrete and made ground to 800mm bgl. Two samples were recovered.

The fifth trail hole was to be located towards the northwest corner however significant rubble; concrete n brick was found which could not at the time be excavated. No samples were recovered.

Results

The full sampling results are presented in Appendix 1, the sampling locations in Figure 2. The results have been compared against the LQM/CIEH S4UL's & for lead the C4SL value. In each case the residential with homegrown produce end use scenario has been used. Soil organic matter ranged across the site ranged from 2.33-6.33%. The results of the sampling have been compared to the 1% organic matter values for each sample.

The below table provides the range of monitoring results for the site along with the relevant criterion for each contaminant. Details of each trail pits, including photographs are shown in Appendix 2. No ground water was encountered in any of the trail pits.

Soil encountered in the trail pits comprised mainly of brown sand with gravel and stone and brick. No obvious contamination was encountered in any of the trail holes.

The results of the samples identified no asbestos fibres present, in any of the samples.

However, elevated level of lead and cadmium were identified in shallow samples of TP1, TP3 and TP4 and the deeper sample of TP4, along with elevated cadmium levels in TP1 & TP3.

In addition, elevated levels of Polyaromatic Hydrocarbons were found in the shallow samples of TP3 & TP4. The specific PAH's exceedances were Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene.

No elevated Total Petroleum Hydrocarbons were identified.

Contaminant	Assessment Criteria (residential with home grown) (mg/Kg)	Range identified on site (mg/Kg)	Pass/Fail
Arsenic	37	5.9-22.1	Pass
Cadmium	11	<1.6-**30.1**	**Fail**
Chromium	910	11.0-137.0	Pass
Copper	2400	17.0-364.0	Pass

Lead	200		25.3-**489.0**	**Fail**
Mercury	40		<0.7-24.6	Pass
Nickel	180		9.1-77.5	Pass
Selenium	250		<3.0-43.5	Pass
Zinc	3700		23.4-1180.0	Pass
Asbestos	N/A		N/A	Pass
Petroleum Hydrocarbons				
>C5-C6 Aliphatic (HS_1D_AL)	42-160		<0.1	Pass
>C6-C8 Aliphatic (HS_1D_AL)	100-230		<0.1	Pass
>C8-C10 Aliphatic (HS_1D_AL)	27-65		<0.1	Pass
>C10-C12 Aliphatic (EH_2D_AL)	130-760		<1.0-3.5	Pass
>C12-C16 Aliphatic (EH_2D_AL)	1100-4300		<0.5-18.3	Pass
>C16-C21 Aliphatic (EH_2D_AL)	65000-110000		<0.7-80.7	Pass
>C21-C35 Aliphatic (EH_2D_AL)	65000-110000		<0.4-279.0	Pass
>C35-C44 Aliphatic (EH_2D_AL)	65000-110000		<0.5-42.2	Pass
>C5-C7 Aromatic (HS_1D_AR)	70-300		<0.01	Pass
>C7-C8 Aromatic (HS_1D_AR)	130-660		<0.01	Pass
>C8-C10 Aromatic (HS_1D_AR)	34-190		<0.01	Pass
>C10-C12 Aromatic (EH_2D_AR)	74-380		<0.6-15.7	Pass
>C12-C16 Aromatic (EH_2D_AR)	140-660		1.1-57.9	Pass
>C16-C21 Aromatic (EH_2D_AR)	260-930		<2.0-159.0	Pass
>C21-C35 Aromatic (EH_2D_AR)	1100-1700		<4.5-560.0	Pass
>C35-C44 Aromatic (EH_2D_AR)	1100-1700		<2.0-282.0	Pass
Polyaromatic hydrocarbons				
	SOM			
	1%	2.5%	6%	
Naphthalene	2.3	5.6	13	<0.016-0.076	Pass
Acenaphthylene	170	420	920	<0.015	Pass
Acenaphthene	210	510	1100	<0.013-1.760	Pass
Fluorene	170	400	860	<0.013-1.370	Pass
Phenanthrene	95	220	440	<0.014-13.800	Pass
Anthracene	2400	5400	11000	<0.017-4.560	Pass

Fluoranthene	280	560	890	<0.017-16.400	Pass
Pyrene	620	1200	2000	<0.016-13.4	Pass
Benzo(a)anthracene	7.2	11	13	<0.012-6.070	Pass
Chrysene	15	22	27	<0.028-6.550	Pass
Benzo(b)fluoranthene	2.6	3.3	3.7	<0.020-8.050	**Fail**
Benzo(k)fluoranthene	77	93	100	<0.025-2.950	Pass
Benzo(a)pyrene	2.2	2.7	3.0	<0.019-6.310	**Fail**
Indeno(1,2,3-cd)pyrene	27	36	41	<0.019-4.950	Pass
Dibenzo(a,h)anthracene	0.24	0.28	0.3	<0.017-1.070	**Fail**
Benzo(g,h,i)perylene	320	340	350	<0.019-4.080	Pass

Conclusions & Recommendations

Following the phase II investigation elevated levels of heavy metals and Polyaromatic Hydrocarbons, were identified in some samples which would result in a Significant Possibility of Significant Harm to the identified receptors.

The presence of a void under trail hole 3 suggest unknown substructures which will require further investigation as part of the development for structural reasons. In addition, one area of the site, which is to form part of the car parking area for the site has not been assessed.

However, the work undertaken so far to investigate the site has identified contamination likely to result Significant Possibility of Significant Harm and as such work is required to break the source-pathway-receptor pollutant linkage. This work must extend to the full site area as appropriate.

It is therefore proposed that the following remediation work is undertaken in order to break the Source-pathway-receptor pollutant linkage.

A minimum of **600mm clean imported cover system** to be placed over the gardens areas. Typically, 450mm subsoil and 150mm topsoil for landscaping areas. A suitable no dig barrier should be installed below the 600mm clean imported cover system. 400mm within hardstanding areas.

Suitable **testing of the imported material** shall be carried out to ensure it is contamination free. Sampling frequency will depend on the source of the new material and should following a sampling rate of 1 sample per 100m^3 if the source of green field and 1 sample per 50m^3 if the source if brownfield, a minimum of three samples should be obtained

It is also recommended that **Barrier pipe is used for new mains water connections** this and any other services should be laid in clean trenches and backfilled with clean imported stone. Excavated material shall be removed from site to a suitable disposal facility.

Waste transfer notes for all exported material shall be retained, along with photographic evidence of the removal of material and the placing of the no-dig battier.

An updated conceptual model is provided below based on the original within the Phase I report.

A watching brief is recommended throughout the construction works. Any signs of any contamination should be fully investigated and appropriate measures taken to remove the source-pathway-receptor pollutant linkages.

Pre-remediation

Pathway	Description	Identified sources	Receptor at risk	Probability	Consequence	Risk
1	Run off and seepage into groundwater	PAH, heavy metal	Watercourse/ Environment	Likely	Medium	**Moderate**
2	Migration of gases into the building.	-	Future users	Unlikely	Medium	Low
3	Inhalation of gases/ vapours outside	-	Construction workers/future users	Unlikely	Mild	Very Low
4	Inhalation of fine particles	Arsenic, PAHs	Construction workers/future users	Likely	Medium	**Moderate**
5	Direct ingestion of contaminated soil	Arsenic, PAHs	Construction workers Future users	Likely Likely	Minor Medium	**Moderate/ Low** **Moderate**
6	In-direct ingestion of contaminated soil	Arsenic, PAHs	Future users	Likely	Medium	**Moderate**
7	Absorption via direct dermal contact with contaminated soil	Arsenic, PAHs	Construction workers/future users	Likely	Mild	**Moderate/ low**

Post Remediation

Pathway	Description	Identified sources	Receptor at risk	Probability	Consequence	Risk
1	Run off and seepage into groundwater	PAH, heavy metals	Watercourse/ Environment	Low Likelihood	Medium	Moderate/ Low
2	Migration of gases into the building.	-	Future users	Unlikely	Medium	Low
3	Inhalation of gases/ vapours outside	-	Construction workers/future users	Unlikely	Mild	Very Low
4	Inhalation of fine particles	Heavy Metals, PAHs	Construction workers/future users	Unlikely	Medium	Low
5	Direct ingestion of contaminated soil	Heavy Metals, PAHs	Future users	Unlikely	Medium	Low
6	In-direct ingestion of contaminated soil	Heavy Metals, PAHs	Future users	Unlikely	Medium	Low
7	Absorption via direct dermal contact with contaminated soil	Heavy Metals, PAHs	Future users	Unlikely	Mild	Very low

		CONSEQUENCE			
		Severe	Medium	Mild	Minor
PROBABILITY	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very low Risk	Very low Risk

Figure 1 – Aerial Photograph



Figure 2 – Proposed Plan and Sampling Locations



Appendix 1 – Soil Sample Results

CHEMTECH environmental part of Cawood

ANALYTICAL TEST REPORT

Report Number	25-06367, issue number 1
Contract name:	Standard Soil Suite
Client reference:	Not Supplied
Clients name:	Martin Environmental Solutions Ltd
Clients address:	Martin Environmental Solutions Ltd 14 Hermitage Way Lytham St Annes Lancashire FY8 4FX
Samples received:	27/06/2025
Analysis started:	27/06/2025
Analysis completed:	08/07/2025
Report issued:	08/07/2025

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
I/S	Insufficient sample to carry out test
U/S	Sample not suitable for testing
NAD	No Asbestos Detected

[redacted]

Approved by: Sam Rogerson
Receipt and Reporting Manager

Unit 6 Parkhead, Greencroft Industrial Park, Stanley, County Durham, DH9 7YB

Telephone: (01207) 528578, Email supportsquad@chemtech-env.co.uk

SAMPLE INFORMATION

MCERTS (Soils):
Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample ID	Depth (m)	Sample description	Material removed	% Removed	% Moisture
56043	TP1A	0.30	Brown Sand with Gravel and Vegetation.	-	-	11.7
56044	TP1B	0.65	Brown Sand with Gravel.	-	-	14.1
56045	TP2A	0.40	Brown Sand with Gravel and Vegetation.	-	-	14.0
56046	TP2B	0.60	Brown Sand with Gravel and Vegetation.	-	-	13.8
56047	TP3A	0.45	Brown Sand with Gravel and Vegetation.	-	-	16.5
56048	TP4A	0.40	Brown Sand with Gravel and Vegetation.	-	-	13.3
56049	TP4B	0.70	Brown Sand with Gravel and Vegetation.	-	-	14.0

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

a	Sampling date not provided
b	Sampling time not provided (waters only)
c	Sample not received in appropriate containers
d	Storage Temperature
e	Headspace present in sample container
f	Sample exceeded sampling to receipt
g	Sample exceeded holding time(s)

Lab ref	Sample ID	Depth (m)	Deviating	Tests (Reason for deviation)
56043	TP1A	0.30	N	
56044	TP1B	0.65	N	
56045	TP2A	0.40	N	
56046	TP2B	0.60	N	
56047	TP3A	0.45	N	
56048	TP4A	0.40	N	
56049	TP4B	0.70	N	

SOILS

Lab Number					56043	56044	56045	56046	56047
Client Reference					SOIL	SOIL	SOIL	SOIL	SOIL
Sample ID					TP1A	TP1B	TP2A	TP2B	TP3A
Depth (m)					0.30	0.65	0.40	0.60	0.45
Sampling Date					25/06/2025	25/06/2025	25/06/2025	25/06/2025	25/06/2025
Test	Method	Accred	LoD	Units					
Asbestos									
Asbestos Identification	SUBCON	SU	0	-	NAD	NAD	NAD	NAD	NAD
Metals									
Arsenic	CE264	U	1.8	mg/kg	22.1	5.9	8.6	9.3	11.1
Cadmium	CE264	M	1.6	mg/kg	11.7	< 1.6	< 1.6	< 1.6	30.1
Chromium	CE264	U	2	mg/kg	137	11.0	11.9	11.3	26.7
Copper	CE264	M	1.6	mg/kg	279	17.0	22.6	21.7	364
Lead	CE264	U	2.3	mg/kg	489	25.3	94.3	57.2	327
Mercury	CE264	U	0.7	mg/kg	24.6	< 0.7	< 0.7	< 0.7	0.8
Nickel	CE264	M	2.1	mg/kg	77.5	9.6	10.4	9.1	21.8
Selenium	CE264	U	3	mg/kg	43.5	< 3.0	< 3.0	< 3.0	< 3.0
Zinc	CE264	M	4	mg/kg	370	19.2	30.3	23.4	1180
Combustion									
Moisture Content	CE001	N	0.1	%	11.7	14.1	14.0	13.8	16.5
Soil Organic Matter	CE192	N	0.1	%	3.36	2.33	3.33	2.57	6.33
Polyaromatic hydrocarbons									
Naphthalene	CE087	M	0.016	mg/kg	< 0.016	< 0.016	< 0.016	< 0.016	0.313
Acenaphthylene	CE087	M	0.015	mg/kg	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Acenaphthene	CE087	M	0.013	mg/kg	< 0.013	< 0.013	< 0.013	< 0.013	1.76
Fluorene	CE087	U	0.013	mg/kg	< 0.013	< 0.013	< 0.013	< 0.013	1.37
Phenanthrene	CE087	M	0.014	mg/kg	< 0.014	< 0.014	< 0.014	< 0.014	13.8
Anthracene	CE087	U	0.017	mg/kg	< 0.017	< 0.017	< 0.017	< 0.017	4.56
Fluoranthene	CE087	M	0.017	mg/kg	0.021	< 0.017	< 0.017	< 0.017	16.4
Pyrene	CE087	M	0.016	mg/kg	0.018	< 0.016	< 0.016	< 0.016	13.4
Benzo(a)anthracene	CE087	U	0.012	mg/kg	0.017	< 0.012	< 0.012	< 0.012	6.07
Chrysene	CE087	M	0.028	mg/kg	< 0.028	< 0.028	< 0.028	< 0.028	6.55
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	8.05
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	< 0.025	< 0.025	< 0.025	< 0.025	2.95
Benzo(a)pyrene	CE087	U	0.019	mg/kg	< 0.019	< 0.019	< 0.019	< 0.019	6.31
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	< 0.019	< 0.019	< 0.019	< 0.019	4.95
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	< 0.017	< 0.017	< 0.017	< 0.017	1.07

SOILS

Lab Number					56043	56044	56045	56046	56047
Client Reference					SOIL	SOIL	SOIL	SOIL	SOIL
Sample ID					TP1A	TP1B	TP2A	TP2B	TP3A
Depth (m)					0.30	0.65	0.40	0.60	0.45
Sampling Date					25/06/2025	25/06/2025	25/06/2025	25/06/2025	25/06/2025
Test	Method	Accred	LoD	Units					
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	< 0.019	< 0.019	< 0.019	< 0.019	4.08
Total PAH(16)	CE087	N	0.28	mg/kg	< 0.280	< 0.280	< 0.280	< 0.280	91.7
Total Petroleum Hydrocarbons									
>C5-C6 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C6-C8 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C8-C10 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C10-C12 Aliphatic (EH_2D_AL)	CE250	N	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	2.1
>C12-C16 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	3.2
>C16-C21 Aliphatic (EH_2D_AL)	CE250	N	0.7	mg/kg	< 0.7	< 0.7	< 0.7	< 0.7	13.2
>C21-C35 Aliphatic (EH_2D_AL)	CE250	N	4	mg/kg	8.8	< 4.0	< 4.0	< 4.0	142
>C35-C44 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	10.9
>C5-C7 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
>C7-C8 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
>C8-C10 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
>C10-C12 Aromatic (EH_2D_AR)	CE250	N	0.6	mg/kg	1.6	1.1	< 0.6	< 0.6	13.0
>C12-C16 Aromatic (EH_2D_AR)	CE250	N	1	mg/kg	3.9	2.8	1.1	1.1	39.6
>C16-C21 Aromatic (EH_2D_AR)	CE250	N	2	mg/kg	2.5	< 2.0	< 2.0	< 2.0	38.0
>C21-C35 Aromatic (EH_2D_AR)	CE250	N	4.5	mg/kg	10.7	< 4.5	< 4.5	< 4.5	194
>C35-C44 Aromatic (EH_2D_AR)	CE250	N	2	mg/kg	2.3	4.8	< 2.0	< 2.0	40.6

SOILS

Lab Number					56048	56049
Client Reference					SOIL	SOIL
Sample ID					TP4A	TP4B
Depth (m)					0.40	0.70
Sampling Date					25/06/2025	25/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**		
Asbestos						
Asbestos Identification	SUBCON	SU	0	-	NAD	NAD
Metals						
Arsenic	CE264	U	1.8	mg/kg	6.6	10.2
Cadmium	CE264	M	1.6	mg/kg	4.6	4.9
Chromium	CE264	U	2	mg/kg	25.9	18.2
Copper	CE264	M	1.6	mg/kg	98.0	51.7
Lead	CE264	U	2.3	mg/kg	212	199
Mercury	CE264	U	0.7	mg/kg	< 0.7	0.8
Nickel	CE264	M	2.1	mg/kg	16.9	16.1
Selenium	CE264	U	3	mg/kg	< 3.0	< 3.0
Zinc	CE264	M	4	mg/kg	380	290
Combustion						
Moisture Content	CE001	N	0.1	%	13.3	14.0
Soil Organic Matter	CE192	N	0.1	%	6.19	4.22
Polyaromatic hydrocarbons						
Naphthalene	CE087	M	0.016	mg/kg	0.076	0.069
Acenaphthylene	CE087	M	0.015	mg/kg	< 0.015	< 0.015
Acenaphthene	CE087	M	0.013	mg/kg	0.330	0.149
Fluorene	CE087	U	0.013	mg/kg	0.239	0.112
Phenanthrene	CE087	M	0.014	mg/kg	2.80	1.10
Anthracene	CE087	U	0.017	mg/kg	0.928	0.264
Fluoranthene	CE087	M	0.017	mg/kg	4.27	1.74
Pyrene	CE087	M	0.016	mg/kg	3.40	1.62
Benzo(a)anthracene	CE087	U	0.012	mg/kg	1.72	0.708
Chrysene	CE087	M	0.028	mg/kg	1.68	0.748
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	2.68	0.977
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	0.833	0.376
Benzo(a)pyrene	CE087	U	0.019	mg/kg	2.41	0.829
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	2.26	0.595
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	0.398	0.121

SOILS

Lab Number					56048	56049
Client Reference					SOIL	SOIL
Sample ID					TP4A	TP4B
Depth (m)					0.40	0.70
Sampling Date					25/06/2025	25/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**		
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	1.96	0.548
Total PAH(16)	CE087	N	0.28	mg/kg	26.0	9.95
Total Petroleum Hydrocarbons						
>C5-C6 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10
>C6-C8 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10
>C8-C10 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10
>C10-C12 Aliphatic (EH_2D_AL)	CE250	N	1	mg/kg	3.5	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	18.3	3.3
>C16-C21 Aliphatic (EH_2D_AL)	CE250	N	0.7	mg/kg	80.7	12.5
>C21-C35 Aliphatic (EH_2D_AL)	CE250	N	4	mg/kg	279	113
>C35-C44 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	42.2	8.3
>C5-C7 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010
>C7-C8 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010
>C8-C10 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010
>C10-C12 Aromatic (EH_2D_AR)	CE250	N	0.6	mg/kg	15.7	8.3
>C12-C16 Aromatic (EH_2D_AR)	CE250	N	1	mg/kg	57.9	49.5
>C16-C21 Aromatic (EH_2D_AR)	CE250	N	2	mg/kg	159	79.6
>C21-C35 Aromatic (EH_2D_AR)	CE250	N	4.5	mg/kg	560	293
>C35-C44 Aromatic (EH_2D_AR)	CE250	N	2	mg/kg	282	52.0

METHOD DETAILS

METHOD	TESTNAME	METHOD SUMMARY	ANALYSIS BASIS
CE267	VPH in Soil	HS-GCFID	As submitted sample
CE250	GCXGC in Soil	DCM Extraction and GCxGC-FID	As submitted sample
SUBCON	Asbestos Soil	HSG248	Air Dried Sample
CE264	Metals by ICP in Soil	ICPOES	Air dried sample
CE087	PAH in Soil	DCM Extraction and GCMS	As submitted sample

REPORT INFORMATION

Report No.:25-06367, issue number 1

Key

U	ISO17025 Accredited Result
M	ISO17025 and MCERTS Accredited Result
N	Do not currently hold accreditation
^	MCERTS accreditation not applicable for sample matrix. Result is unaccredited.
*	ISO17025 accreditation not applicable for sample matrix. Result is unaccredited.
S	Subcontracted
I/S	Insufficient Sample
U/S	Unsuitable sample
N/T	Not tested
<	Means "less than"
>	Means "greater than"

LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

This report shall not be reproduced except in full, without prior written approval.

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

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

The results relate only to the sample received.

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Moisture Content Calculated on a Wet Weight basis

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

Sampling was undertaken by Chemtech Environmental Limited and is outside the UKAS accreditation scope.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying

For soils and solids, analytical results are inclusive of stones, where applicable.

Sample Retention and Disposal

All soil samples will be retained for a period of 4 weeks from the point of receipt

All water samples will be retained for a period of 2 weeks from the point of Reporting

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

Lab Number			56043	56044	56045	56046	56047	56048	56049
Client Reference			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample ID			TP1A	TP1B	TP2A	TP2B	TP3A	TP4A	TP4B
Depth (m)			0.30	0.65	0.40	0.60	0.45	0.40	0.70
Sampling Date			25/06/2025	25/06/2025	25/06/2025	25/06/2025	25/06/2025	25/06/2025	25/06/2025
Test	**Method**	**Units**							
Asbestos									
Asbestos Identification	SUBCON	-	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Metals									
Arsenic	CE264	mg/kg	22.1	5.9	8.6	9.3	11.1	6.6	10.2
Cadmium	CE264	mg/kg	11.7	< 1.6	< 1.6	< 1.6	30.1	4.6	4.9
Chromium	CE264	mg/kg	137.0	11.0	11.9	11.3	26.7	25.9	18.2
Copper	CE264	mg/kg	279.0	17.0	22.6	21.7	364.0	98.0	51.7
Lead	CE264	mg/kg	489.0	25.3	94.3	57.2	327.0	212.0	199.0
Mercury	CE264	mg/kg	24.6	< 0.7	< 0.7	< 0.7	0.8	< 0.7	0.8
Nickel	CE264	mg/kg	77.5	9.6	10.4	9.1	21.8	16.9	16.1
Selenium	CE264	mg/kg	43.5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Zinc	CE264	mg/kg	370.0	19.2	30.3	23.4	1180.0	380.0	290.0

Polyaromatic hydrocarbons									
Naphthalene	CE087	mg/kg	< 0.016	< 0.016	< 0.016	< 0.016	0.313	0.076	0.069
Acenaphthylene	CE087	mg/kg	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Acenaphthene	CE087	mg/kg	< 0.013	< 0.013	< 0.013	< 0.013	1.760	0.330	0.149
Fluorene	CE087	mg/kg	< 0.013	< 0.013	< 0.013	< 0.013	1.370	0.239	0.112
Phenanthrene	CE087	mg/kg	< 0.014	< 0.014	< 0.014	< 0.014	13.800	2.800	1.100
Anthracene	CE087	mg/kg	< 0.017	< 0.017	< 0.017	< 0.017	4.560	0.928	0.264
Fluoranthene	CE087	mg/kg	0.021	< 0.017	< 0.017	< 0.017	16.400	4.270	1.740
Pyrene	CE087	mg/kg	0.018	< 0.016	< 0.016	< 0.016	13.400	3.400	1.620
Benzo(a)anthracene	CE087	mg/kg	0.017	< 0.012	< 0.012	< 0.012	6.070	1.720	0.708
Chrysene	CE087	mg/kg	< 0.028	< 0.028	< 0.028	< 0.028	6.550	1.680	0.748
Benzo(b)fluoranthene	CE087	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	8.050	2.680	0.977
Benzo(k)fluoranthene	CE087	mg/kg	< 0.025	< 0.025	< 0.025	< 0.025	2.950	0.833	0.376
Benzo(a)pyrene	CE087	mg/kg	< 0.019	< 0.019	< 0.019	< 0.019	6.310	2.410	0.829
Indeno(1,2,3-cd)pyrene	CE087	mg/kg	< 0.019	< 0.019	< 0.019	< 0.019	4.950	2.260	0.595
Dibenzo(a,h)anthracene	CE087	mg/kg	< 0.017	< 0.017	< 0.017	< 0.017	1.070	0.398	0.121
Benzo(g,h,i)perylene	CE087	mg/kg	< 0.019	< 0.019	< 0.019	< 0.019	4.080	1.960	0.548
Total PAH(16)	CE087	mg/kg	< 0.280	< 0.280	< 0.280	< 0.280	91.700	26.000	9.950

Total Petroleum Hydrocarbons									
>C5-C6 Aliphatic (HS_1D_AL)	CE267	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C6-C8 Aliphatic (HS_1D_AL)	CE267	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C8-C10 Aliphatic (HS_1D_AL)	CE267	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C10-C12 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	2.1	3.5	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	3.2	18.3	3.3
>C16-C21 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 0.7	< 0.7	< 0.7	< 0.7	13.2	80.7	12.5
>C21-C35 Aliphatic (EH_2D_AL)	CE250	mg/kg	8.8	< 4.0	< 4.0	< 4.0	142.0	279.0	113.0
>C35-C44 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	10.9	42.2	8.3
>C5-C7 Aromatic (HS_1D_AR)	CE267	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
>C7-C8 Aromatic (HS_1D_AR)	CE267	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
>C8-C10 Aromatic (HS_1D_AR)	CE267	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
>C10-C12 Aromatic (EH_2D_AR)	CE250	mg/kg	1.6	1.1	< 0.6	< 0.6	13.0	15.7	8.3
>C12-C16 Aromatic (EH_2D_AR)	CE250	mg/kg	3.9	2.8	1.1	1.1	39.6	57.9	49.5
>C16-C21 Aromatic (EH_2D_AR)	CE250	mg/kg	2.5	< 2.0	< 2.0	< 2.0	38.0	159.0	79.6
>C21-C35 Aromatic (EH_2D_AR)	CE250	mg/kg	10.7	< 4.5	< 4.5	< 4.5	194.0	560.0	293.0
>C35-C44 Aromatic (EH_2D_AR)	CE250	mg/kg	2.3	4.8	< 2.0	< 2.0	40.6	282.0	52.0

Combustion									
Moisture Content	CE001	%	11.7	14.1	14.0	13.8	16.5	13.3	14.0
Soil Organic Matter	CE192	%	3.36	2.33	3.33	2.57	6.33	6.19	4.22

=exceedances

Appendix 2 – Trail pit logs

TP1–southeast corner













Trail Pit 1 – southeast corner	
0.00-0.05m	grass, roots, sand
0.05-0.10m	Asphalt
0.10-0.25m	clean hardcore
0.25-0.65	brown sand

TP2 – southwest corner





Trail Pit 2 –eastern boundary under former garage structure – no concrete	
0.00-0.05m	concrete screen and concrete
0.05-0.25m	hardcore
0.25-0.6m	brown sand, gravel, stones

TP3 – Central area





Trail Pit 3 – southeast boundary	
0.00-0.05m	vegetation, roots, sand
0.05-0.10m	Brown sand
0.10-0.15m	Asphalt
0.15-0.20m	Concrete
0.20-0.45m	Brown sand, gravel, stones
0.45m	Void discovered ~0.3-0.4m deep

TP4 – Northeast corner





Trail Pit 3 – southeast boundary

0.00-0.05m	grass, roots
0.05-0.25m	asphalt and concrete
0.25-0.40m	Bron sandy soil, brick, gravel, plastic
0.40-0.70m	sandy loamy soil, some gravel, bricks, tile fragments.

Antony Rousou

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 07 January 2026 10:51
To: [redacted]
Cc:
Subject: RE: United Utilities - Our reference - - 08503462 Land At St Marks Lane & Robin Hood Street, Manchester, M8 9GH (Our Ref: 93021_Rev1)

Good morning Anthony,

Following our telephone conversation today in principal i will accept 0.9 l/s to the 600mm combined sewer in St Marks Lane as highways will not accept flows to the highway drain.

Regards,



James Darlington
Developer Engineer
Developer Services & Metering
[redacted]
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

If you are happy with the service we have provided, please consider submitting a nomination in the following link – this only takes a moment and would be greatly appreciated: **unitedutilities.com/wow**