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Client

**Marco Investments Limited
81 Newton Street
Manchester
M1 1EX**

Site Address

**123 Barlow Moor Road
West Didsbury
Manchester
M20 2TS**

Document Title

Drainage Strategy Report



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Revision History

Issue	Date	Status	Prepared By	Signature
P01	14.10.22	First Issue	Lee Meadowcroft BSc (Hons) PgDip MScCHE CEng MStructE MICE IHBC	

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Executive Summary

Item	Brief Description
Development Proposed	The erection of two semi detached residential dwellings with a rear annex building, landscaping and car parking on land at 123 Barlow Moor Road, West Didsbury, Manchester, M20 2TS.
Site Area	0.11ha (Redline Area)
Flood Zone Classification	Flood Zone 1 – Low Risk
Geology	At this time a Phase 2 site Investigation has not been undertaken. The British Geological Survey dataset would indicate the superficial geology to encompass Devensian - Sands and Gravels. The Bedrock Geology comprises the Wilmslow Sandstone Formation.
Infiltration Rate	Based on the assessment of the BGS data set, it is anticipated that infiltration would be suitable as a means of draining the site. In lieu of completing the formal BRE 365 infiltration tests a rate of 2×10^{-5} m/s has been used in the outline storage design calculations.
Nearest Watercourses	The River Mersey is located approximately 400m to the west of the site.
Nearest Adopted Sewers and Drainage Networks	The United Utilities sewer records have been reviewed and indicate a 1200mm diameter combined sewer that passes in a westerly direction beneath Barlow Moor Road at approximately 8m deep. A larger 2100mm diameter is located beyond this sewer, again flowing west. It is anticipated that a 150mm diameter combined drain connects from the current property to the 1200mm diameter sewer, though further investigation is required.
Surface Water Drainage Strategy and SuDS Hierarchical Approach	Based on the underlying ground being suitable for infiltration, the proposed strategy is to construct a geocellular infiltration tank beneath the central landscaping area.
Existing Discharge Rate	Brownfield @ 400m ² 1 yr (30mm/hr) – 3.3l/s 30 yr (65mm/hr) – 7.2l/s 100 yr (95mm/hr) – 10.6l/s
Proposed Discharge Rate	Infiltration to underlying sands and gravels
Allowance for Climate Change	45% - based on a residential >100-year design life to 'the 2100's'.
Proposed Attenuation Method	Geocellular infiltration tank.
SuDS features	Water Butts, Permeable surfacing, geocellular infiltration tank.
Maintenance Responsibility	Property owners
Foul Drainage Outfall	Reuse Existing connection to combined sewer.

Figure 1: Flood Risk and Drainage Strategy Summary

1.0 Introduction

- 1.1 Brennan Consult has been appointed by Marco Investments Ltd to prepare this Drainage Strategy Report to support a planning submission for a proposed residential re-development of two semi-detached residential dwellings with a rear annex building to both on land at 123 Barlow Moor Road, West Didsbury, Manchester, M20 2TS. The assessment has been undertaken in line with Section 10 of the 'National Planning Policy Framework' plus the accompanying Technical Guidance on Flood Risk.
- 1.2 The outline Site Master Plan as indicated in Appendix A provides details of the proposed development intent.
- 1.3 This Drainage Strategy Report has been commissioned by Marco Investments Ltd and is specific to their interests in the development proposals as described by the Architectural plan in Appendix A. This report may not be assigned.
- 1.4 The report has been commissioned to identify any drainage related issues associated with the proposed development and any likely constraints that could be imposed. The following issues have been addressed within this report;
- Determine any the current surface water drainage regime and assess any potential increase in surface water runoff as a result of the proposed development.
 - Discuss Sustainable Drainage Systems (SuDS) as an option for reducing surface water flood risk and devise an outline Drainage layout.
 - Devise an appropriate outline surface water drainage strategy (including calculation where appropriate) to deal with any potential increase in surface water runoff and include for climate change. Include for a reduction in predevelopment discharge rates where possible.
 - Devise an appropriate outline foul water drainage strategy.

2.0 Development Description and Location

2.1 Site Location

2.1.1 The site is referenced in Figure 2, and a site location map is provided in Appendix A.

Item	Brief Description
Project name	123 Barlow Moor Road.
Site address and location	123 Barlow Moor Road, West Didsbury, Manchester, M20 2TS
Council Area	Manchester City Council
Approximate Grid Reference	OS: 384092, 391527
General Locality	The site is located approx. 500m to the west of Didsbury Town Centre.

Figure 2 Site Referencing Information

2.2 Existing Site Description

- 2.2.1 The development site is predominantly rectangular in plan shape and currently encompasses a detached property with garage, hard paving and grassed areas. There are some mature trees along the property boundary with residential properties to the south, east and west. The general area is predominantly residential.
- 2.2.2 Access is currently off Barlow Moor Road to the north and will be maintained post development.
- 2.2.3 Figure 3 identifies the overall site location details.



Figure 3 Site Location plan

2.3 Topography

A full topographical survey has been undertaken at the site. This has identified the site to hold a flat level of circa 34.50m AOD with a slight drop down to Barlow Moor Road at 34.10m AOD.

2.4 Hydrology

- 2.4.1 The nearest watercourse is the River Mersey which is located approximately 400m to the west of the site.

3.0 Flood Risk Review

3.1 Fluvial Flood Risk Review

- 3.1.1 Figure 4 below locates the site on the Environment Agency's indicative flood plain map. It is clear from this that the red line boundary sits outside of a fluvial generator of flood water from any identified water body or river. It is considered therefore that the site lays outside of the active 100-year and extreme event floodplains, thus lying within 'Flood Zone 1 Classification' in accordance with the National Planning Policy Framework (NPPF) Flood Risk Guidance Notes, i.e. probability of annual fluvial flooding significantly less than 1 in 1000 in any one year (<0.1%). The risk from fluvial flood water is diminished to acceptable levels.

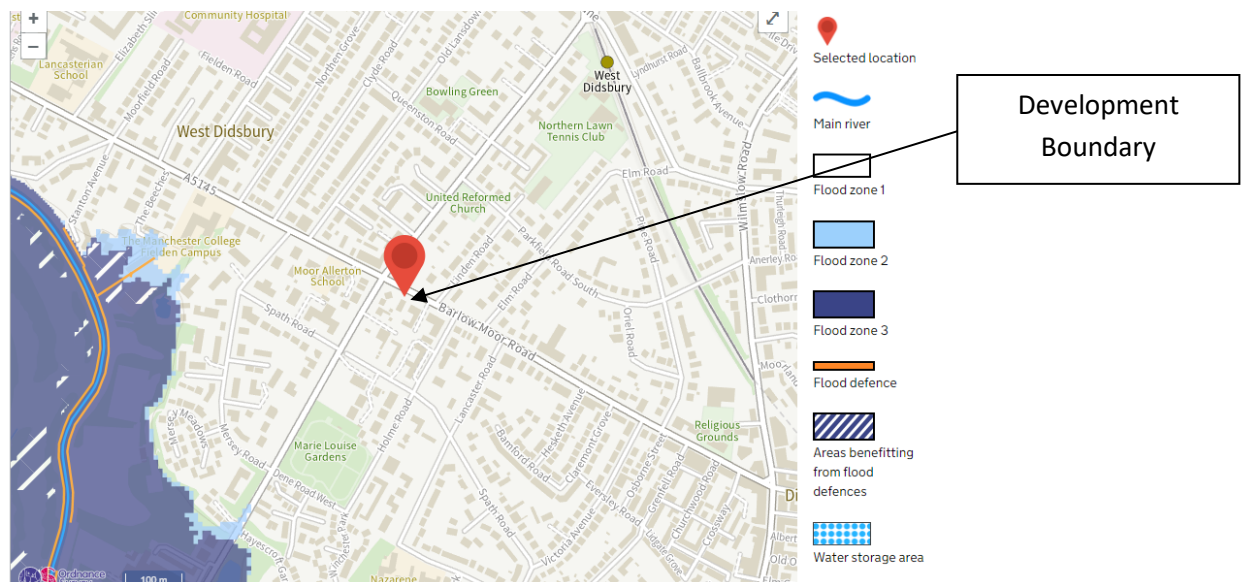


Figure 4 EA Indicative Flood Maps

- 3.1.2 In addition, the development application boundary is less than 1ha in plan area. In line with criteria set within the NPPF a Flood Risk Assessment is not required to support a planning application if the development is less than 1ha and in Flood Zone 1.

4.0 Drainage Strategy

4.1 Existing Drainage

4.1.1 United Utilities

The United Utilities sewer records have been reviewed and indicate a 1200mm diameter combined sewer that passes in a westerly direction beneath Barlow Moor Road at approximately 8m deep. A larger 2100mm diameter is located beyond this sewer, again flowing west.

Refer to Figure 5 below and Appendix E.



Figure 5 United Utilities Sewer Records

4.1.2 Private Drainage

The site encompasses an existing residential property.

An CCTV investigation has yet to be completed on the private drainage. At this time it is anticipated that a 150mm diameter combined drain connects from the current property to the 1200mm diameter sewer, though further investigation is required.

4.2 Existing Runoff

- 4.2.1 The current site can be classed as Brownfield. Figure 6 below defines the existing Brownfield runoff rates based on the modified rational method and respective rainfall intensities, with an impermeable area from the roof and driveway of 0.056ha.

Existing Impermeable Area (ha)	1yr Brownfield Rate (30mm/hr)	30yr Brownfield Rate (65mm/hr)	100yr Brownfield Rate (95mm/hr)
0.040	3.3 l/s	7.2 l/s	10.6 l/s

Figure 6 Existing Brownfield Runoff Rates

4.3 Geology

- 4.3.1 At this time a Phase 2 site Investigation has not been undertaken. The British Geological Survey dataset would indicate the superficial geology to encompass Devensian - Sands and Gravels. The Bedrock Geology comprises the Wilmslow Sandstone Formation. In light of these findings it is anticipated that infiltration will be a suitable means of draining the site.

4.4 Hydrological Assessment

- 4.4.1 As discussed in previous sections, a review of the topographical survey, OS Maps and Environment Agency maps would indicate the closest watercourse to be the River Mersey, located approximately 400m to the west.

4.5 Sustainable Drainage Systems (SuDS) Assessment

4.5.1 SuDS Objectives

Sustainable drainage developed in line with the ideals of sustainable development is collectively referred to as Sustainable Drainage Systems (SuDS). At a particular site, these systems are designed both to manage the environmental risks resulting from the urban runoff and to contribute wherever possible to environmental enhancement. SuDS objectives are therefore to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).

4.5.2 SuDS Design Themes

The 'Management Train Approach' should be central to the surface water drainage strategy of the proposed site. The main objective is treatment and control of runoff as near to the source as possible protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:

- i. **Prevention** – The use of good site design and housekeeping measures to prevent runoff and pollution and includes the use of rainwater reuse / harvesting.
- ii. **Source Controls** – Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).
- iii. **Site Control** – Management of water in a local area and can include below ground storage / attenuation, detention basins, large infiltration devices.
- iv. **Regional Control** – Management of water from a site or various sites and can include wetlands and balancing ponds.

4.5.3 SuDS Site Constraints

SuDS techniques are not suitable for all sites; therefore, an assessment of the existing site is required so that SuDS limitations can be determined.

- *Land Use Characteristics:* The size and type of development provides the opportunity to include prevention, source control and site control SuDS devices.
- *Site Characteristics:* The underlying ground is identified as comprising topsoil over sands and gravels. Therefore infiltration is considered to be a viable option for draining the site, subject to intrusive BRE 365 infiltration testing.
- *Catchment Characteristics:* The site is currently classed as Brownfield with having positive drainage to the existing combined sewer.
- *Environmental and Amenity Performance:* The inclusion of SuDS within the overall development is a key driver in providing both amenity and habitat creation. SuDS will be considered where feasible. Safety to all future users is paramount and so best practice guidance will be incorporated so that these devices blend into the surrounding without the need for significant safety precautions. Maintenance plans will be prepared for all SuDS devices that are included.

4.5.4 SuDS Methods

Figures 7 and 8 on the following pages provide an assessment of various above and below ground SuDS methods that can provide water quality treatment and management of flows to reduce runoff rates and volumes and whether they can be suitably incorporated at this development site. The purpose of this assessment is to set out options to be considered at the planning stage with consideration to time constraints, viability and lifetime maintenance of the residential development.

Method	Comment	Suitability for Development
Green Roofs	Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	<u>Not suitable:</u> Proposed roof profile would not enable a green roof to be incorporated.
Water Butts	Plastic tanks placed at the base of rainwater down pipes to collect rainwater runoff from the roof areas.	<u>Suitable:</u> Water butts can be located at the base of the rear RWP to be used by the residents, subject to client approval.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site and reduces treated water consumption.	<u>Not Suitable:</u> - Additional costs of installation would have severe effect on viability of the development. - Running and maintenance costs would not be acceptable to our client and future occupiers. - The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs.
Infiltration Options	Reduces total run off volume from the development.	<u>Suitable:</u> Soakaway test has confirmed that the underlying soils would be suitable for infiltration options.
Permeable Surfacing (Infiltration)	- Reduces total run off volume from the development. - Can be used to enhance water quality.	<u>Suitable:</u> Permeable paving to the driveway to be incorporated in the design layout.
Permeable Surfacing (Standard)	- Can be used to enhance quality of runoff water. - Sub-base provides 'source' storage and reduces the volume of storage downstream.	<u>Suitable:</u> Permeable paving to the driveway to be incorporated in the design layout.
Swales, basins and ponds	- Provide areas for above ground surface runoff storage. - Swales also allow filtering of particulate matter, improving water quality	<u>Not suitable:</u> No available area for attenuation pond to be allocated in a domestic setting.
Bio-Retention	Collect and retain run-off to help improve water quality, prior to discharge in piped system on infiltration.	<u>Not suitable:</u> Space constraints on site do not permit above ground areas for flood storage.

Figure 7 Surface SuDS Methods

Method	Comment	Suitability for Development
Geocellular Storage	- Suitable for sites with insufficient space for basins etc. - Suitable for sites where topography prevents the use of open basins etc. - Can be very effective infiltration devices subject to ground conditions.	<u>Suitable:</u> To be incorporated as part of the infiltration measures beneath the landscaping areas
Large Diameter Pipes, Culverts or Tanks	- Suitable for sites with insufficient space for basins etc. - Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. - Generally, be suitable for adoption by the statutory water company (e.g. Severn Trent Water).	<u>Not suitable:</u> Oversized pipes more suitable to larger developments where the drainage is adopted.

Figure 8 Sub-Surface SuDS Methods

4.5.5 SuDS Hierarchal Approach

Based on the SuDS assessment in Figure 7 and 8, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	Yes	Initial assessment has determined that the underlying ground is suitable for infiltration-based options subject to formal infiltration testing.
Connection to Watercourse	No	No watercourse in close proximity.
Connection to Surface Water Sewer	No	No surface water sewer in close proximity.
Connection to a Combined Sewer	No	Higher options available.

Figure 9 SuDS Hierarchal Approach

4.5.6 SuDS Design Philosophy

The SuDS philosophy for the development site is the promotion of Prevention, Source Control and Site Control techniques with discharge to the underlying sands and gravels.

The following design philosophy is proposed:

- Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to conveyance to the local watercourse.
- Reduce the impermeable fraction of the post development area.
- Include Water butts at the base of the rear rainwater pipes, subject to client approval.
- Include permeable surfacing to the driveway area.
- Geocellular Infiltration tank.

4.6 Outline Surface Water Drainage Strategy

- 4.6.1 The general principal of the surface water drainage strategy is to collect the runoff from the new residential properties and rear annex building and direct it to a below ground surface water drainage network that will outflow to a geocellular infiltration tank in the rear landscaping area. As no infiltration testing has been completed at this time, an infiltration rate of 2×10^{-5} m/s has been used in the design. The front parking areas will be constructed in permeable surfacing.
- 4.6.2 The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations part H guidance. This is to provide no flooding up to the 30-year storm return period criterion.
- 4.6.3 Flooding can occur on a local scale beyond the 30yr criterion due to runoff exceeding the capacity of the minor system during extreme events and it can only be addressed on a site-specific basis. In the case of this development, exceedance flows will be all those over and above the 30-year design criterion. Using storage within the external hard standing and soft landscaping areas would be achievable and would direct flood water away from the new property with flows directed back into the surface water drainage network as the water levels in the drainage network recede.
- 4.6.4 Although it is envisaged that Prevention and Source Controls measures could be included in the final scheme, this strategy will assume for outline calculations purposes that only Site Control methods are incorporated. Outline attenuation volumes have been determined in Figure 10 below using the Microdrainage Design Software. This takes into account the infiltration rate of 2×10^{-5} m/s, a factor of safety of 5, and assumes no prevention & source control measures are incorporated. It is noted that these rates and volumes are preliminary for this outline assessment and are likely to alter at detailed design stage when more site-specific information is made available.

New Impermeable Area	Attenuation Volume for 30-year Event	Attenuation Volume for 100 year + 40% CC Event
0.083 ha	9.5m ³	20m ³

Figure 10 Outline Attenuation Volumes

- 4.6.5 Drawing 2829-100 in Appendix C indicates the Drainage Strategy Plan based on the Architects master plan intent, with the hydraulic calculations in Appendix D.

4.7 Climate Change

- 4.7.1 In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Rather than nation wide allowances, each area will have its own peak rainfall allowances. In the case of the Didsbury area, this is the Upper Mersey Management Catchment peak rainfall allowances.
- 4.7.2 Based on the nature of the development, a lifespan in excess of 100 years is anticipated. Therefore, the potential climate change allowance for the 2070's ranges between 30% for the central allowance and 45% for the upper end allowance. As such, an allowance of 45% for climate change on peak rainfall intensity will be included in calculations.

4.8 Volume Control

- 4.8.1 The impermeable area of the application site will be increased as a result of the development and therefore the volume of run-off in the 100-year 6-hour storm event will be increased above the pre-development greenfield level. To order to mitigate against this increase to the public sewer network, the full volume of runoff will infiltrate to the underlying sands and gravels.

4.9 Pollution Control

- 4.9.1 Silt is to be prevented from entering the drainage system by the use of trapped gullies, channels with silt traps or by the use of Sustainable Drainage techniques. Being a residential led scheme, the pollution risk is considered to be very low.

4.10 Maintenance

- 4.10.1 The long-term maintenance of the new drainage and SuDS infrastructure will be with the owner of the property in line with best practice guidance. Annual inspections will need to be carried out and clearing of gullies, channel drains, catchpits constructed.

Typically the maintenance regime will be in line with Figure 11 below.

Future Maintenance of the Drainage System			
Responsibility	Feature	Maintenance	Frequency
Owner	Rainwater gutters, downpipes and above ground drainage.	Regular maintenance and inspections.	Ad-hoc sweeping and emptying of silt and debris required. Annual visual inspections to check for damage/leaks.
	Geocellular Infiltration Tank	Regular maintenance / removal of blockages and debris.	Annual inspection and following significant rainfall events.
	Permeable surfacing	Regular maintenance / removal of silts and debris from the surface.	Annual inspection and removal of silts if required.
	Pipes, sewers, manholes, outfall headwall.	Regular maintenance / removal of blockages and debris.	Annual inspection and removal of silts if required.

Figure 11 Outline Management and Maintenance Strategy

4.11 Foul Water Strategy

- 4.11.1 The foul water drainage strategy is to construct a new foul water drainage network around the properties with outfall to the combined public sewer via the existing connection. Further investigations to be undertaken to confirm the exact route, invert levels and condition of the connection.
- 4.11.2 The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2017 and Building Regulations Part H guidance.
- 4.11.3 An indicative foul water drainage layout can be found on the drainage strategy drawing in Appendix C.

Appendix A – Architects Drawings

Appendix B – Topographical Survey

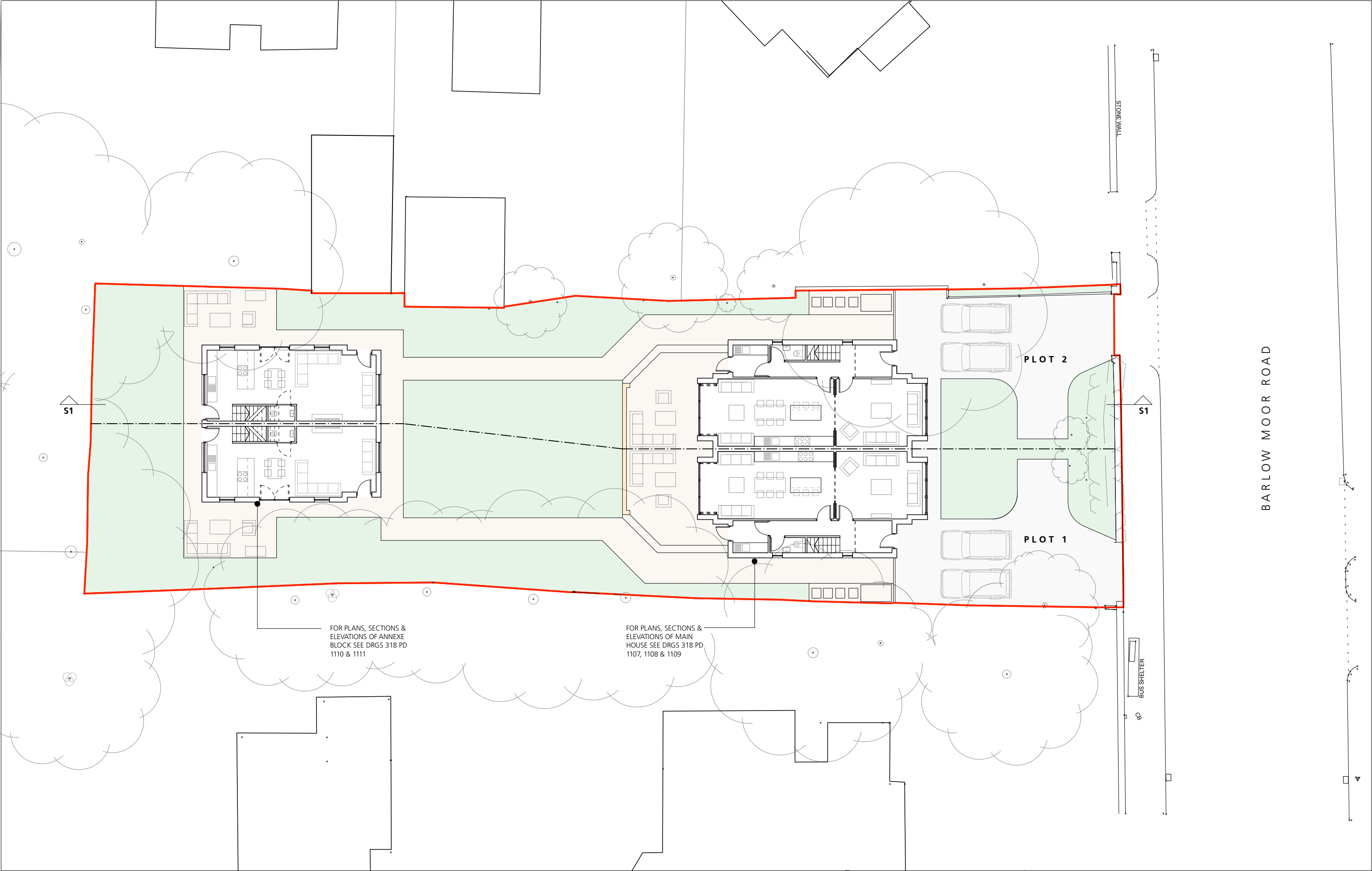
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Project No 2829-BCL-00-XX-RP-C-0001
Date 14th October 2022



Appendix C – Brennan Consult Drawings

Appendix D – Hydraulic Calculations

Appendix E – United Utilities Sewer Records



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Metres

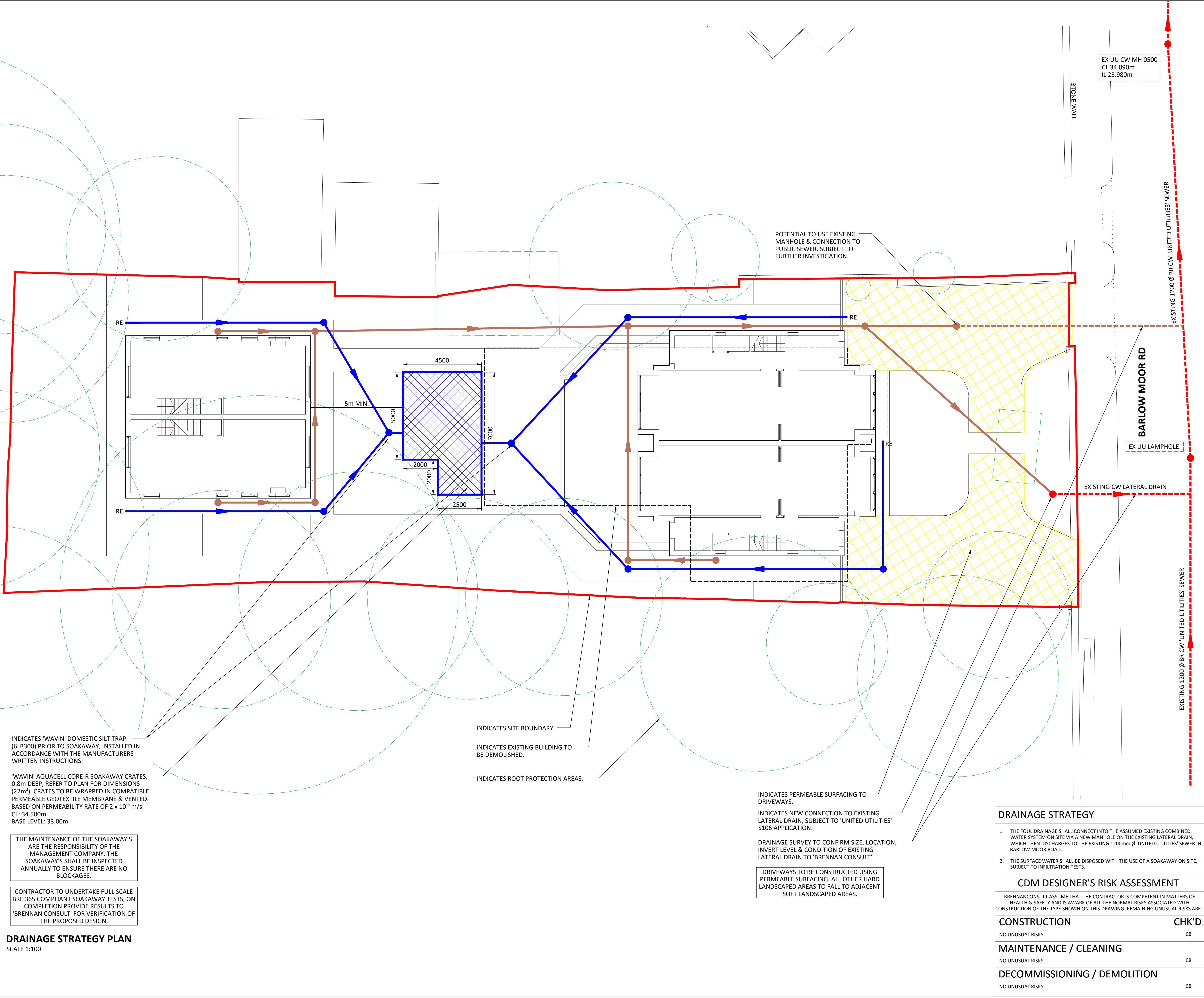
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Client Marco Investments
Project **123 Barlow Moor Road
Didsbury**
Scale 1:200 @ A3
Date Sept 2022

Document **Planning Drawing
Proposed Ground Floor Plan**
Status For information

Doc Ref	318	PD	1104	-
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- BUILDING CONTRACTOR TO ENSURE ALL WORKS COMPLY WITH THE CURRENT EDITION OF THE BUILDING REGULATIONS. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH APPROVED DOCUMENT REGULATION 7.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, FABRICATION, ERECTION AND REMOVAL OF ALL TEMPORARY WORKS AND SHALL PROVIDE ALL TEMPORARY BRACING AS NECESSARY TO MAINTAIN STRUCTURAL STABILITY DURING CONSTRUCTION.
- IF THE CONTRACTOR CONSIDERS THAT HE DOES NOT HAVE SUFFICIENT INFORMATION TO SAFELY COMPLETE THE WORKS DETAILED ON THIS DRAWING, HE SHOULD CONTACT THE ENGINEER.

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- THE CONTRACTOR SHALL ASCERTAIN THE DEPTHS, SIZES AND LOCATIONS OF ALL SERVICES TO BE CROSSED BEFORE EXCAVATION COMMENCES. ANY CONFLICT IN LEVELS BETWEEN NEW AND EXISTING SEWERS TO BE NOTIFIED TO THE ENGINEER.
- ALL PIPES, CONNECTIONS, GULLIES, ACCESS FITTINGS, INSPECTION CHAMBERS, AND MANHOLES ARE TO COMPLY WITH THE BUILDING REGULATIONS.
- PIPE BEDDING MATERIAL TO BE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS, TAKING ACCOUNT OF THE DEPTH & LOADING IN RELATION TO THE PIPE STRENGTH, AND MODIFIED IF NECESSARY WHERE BELOW WATER LEVEL BEDDING PROPOSALS ARE TO BE ISSUED FOR CONSIDERATION.
- PIPES CONNECTED TO CHAMBERS ARE TO HAVE SOFFITS LEVEL U.N.O. PIPES 150mm IN DIAMETER OR SMALLER MAY BE LOWERED TO CENTRE LINES LEVEL.
- ALL RWP CONNECTIONS TO BE 100mm DIAMETER U.N.O. LAID TO A FALL NO FLATTER THAN 1:40 AND WITH ROD ACCESS AT THE BASE.
- ALL BRICKWORK IN CONNECTION WITH DRAINAGE IS TO BE SOLID CLASS B ENGINEERING BRICK TO BS3921.
- ALL PRECAST CONCRETE PIPES, CHAMBER PRODUCTS AND ROAD GULLIES SHALL BE TO BS5911 AND BE KITE MARKED.
- ALL INSITU AND CONCRETE PRODUCTS SHALL COMPLY WITH CLASS DS1 REQUIREMENTS FOR SULPHATE EXPOSURE IN ACCORDANCE WITH BRE SPECIAL DIGEST 1, CONCRETE IN AGGRESSIVE GROUND (2001) PART 1: TABLE 2.
- UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAINAGE BY JETTING, REMOVING ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE EXISTING DRAINAGE SYSTEM.
- ALL PROPRIETARY PRODUCTS TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS WRITTEN INSTRUCTIONS.
- ALL RWP's TO DISCHARGE BY DIRECT CONNECTION INTO RODDABLE ACCESS GULLY, WITH INTEGRAL TRAP.
- ALL SVP's & WWP's POP UP's TO CONSIST OF SLOW BENDS.

DRAINAGE LEGEND

INDICATES NEW FW DRAINAGE	INDICATES EXISTING FW DRAINAGE
INDICATES NEW SW DRAINAGE	INDICATES EXISTING SW DRAINAGE
INDICATES NEW CW DRAINAGE	INDICATES EXISTING CW DRAINAGE

P02	PRELIMINARY ISSUE	WSS	14.10.22	LM
P01	PRELIMINARY ISSUE	WSS	07.10.22	LM
REV	REVISION DESCRIPTION	BY	DATE	CHECKED

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RESIDENTIAL DEVELOPMENT DRAINAGE STRATEGY PLAN

CONSTRUCTION		CHK'D.	
NO UNUSUAL RISKS		CB	
MAINTENANCE / CLEANING			
NO UNUSUAL RISKS		CB	
DECOMMISSIONING / DEMOLITION			
NO UNUSUAL RISKS		CB	

Status

PLANNING

Project No.	Originator	Zone	Level	Type	Role	Drawing No.	Revision
2829	BCL	00	XX	DR	D	0100	P02

Scale	Size	Drawn	Date	Checked	Passed
1:100	A1	WSS	SEPT 22	CB	CB

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<u>Summary of Results for 30 year Return Period</u> Half Drain Time : 618 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>33.143</td><td>0.143</td><td>0.1</td><td>3.7</td><td>O K</td></tr><tr><td>30 min Summer</td><td>33.188</td><td>0.188</td><td>0.1</td><td>4.8</td><td>O K</td></tr><tr><td>60 min Summer</td><td>33.234</td><td>0.234</td><td>0.1</td><td>6.0</td><td>O K</td></tr><tr><td>120 min Summer</td><td>33.277</td><td>0.277</td><td>0.1</td><td>7.1</td><td>O K</td></tr><tr><td>180 min Summer</td><td>33.299</td><td>0.299</td><td>0.1</td><td>7.7</td><td>O K</td></tr><tr><td>240 min Summer</td><td>33.311</td><td>0.311</td><td>0.1</td><td>8.0</td><td>O K</td></tr><tr><td>360 min Summer</td><td>33.320</td><td>0.320</td><td>0.1</td><td>8.2</td><td>O K</td></tr><tr><td>480 min Summer</td><td>33.321</td><td>0.321</td><td>0.1</td><td>8.2</td><td>O K</td></tr><tr><td>600 min Summer</td><td>33.319</td><td>0.319</td><td>0.1</td><td>8.2</td><td>O K</td></tr><tr><td>720 min Summer</td><td>33.317</td><td>0.317</td><td>0.1</td><td>8.1</td><td>O K</td></tr><tr><td>960 min Summer</td><td>33.310</td><td>0.310</td><td>0.1</td><td>7.9</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>33.293</td><td>0.293</td><td>0.1</td><td>7.5</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>33.266</td><td>0.266</td><td>0.1</td><td>6.8</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>33.239</td><td>0.239</td><td>0.1</td><td>6.1</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>33.192</td><td>0.192</td><td>0.1</td><td>4.9</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>33.152</td><td>0.152</td><td>0.1</td><td>3.9</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>33.119</td><td>0.119</td><td>0.1</td><td>3.1</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>33.093</td><td>0.093</td><td>0.1</td><td>2.4</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>33.073</td><td>0.073</td><td>0.1</td><td>1.9</td><td>O K</td></tr><tr><td>15 min Winter</td><td>33.161</td><td>0.161</td><td>0.1</td><td>4.1</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>66.656</td><td>0.0</td><td>38</td></tr><tr><td>30 min Summer</td><td>43.859</td><td>0.0</td><td>51</td></tr><tr><td>60 min Summer</td><td>27.653</td><td>0.0</td><td>78</td></tr><tr><td>120 min Summer</td><td>16.953</td><td>0.0</td><td>132</td></tr><tr><td>180 min Summer</td><td>12.607</td><td>0.0</td><td>188</td></tr><tr><td>240 min Summer</td><td>10.176</td><td>0.0</td><td>246</td></tr><tr><td>360 min Summer</td><td>7.480</td><td>0.0</td><td>364</td></tr><tr><td>480 min Summer</td><td>6.010</td><td>0.0</td><td>464</td></tr><tr><td>600 min Summer</td><td>5.069</td><td>0.0</td><td>516</td></tr><tr><td>720 min Summer</td><td>4.410</td><td>0.0</td><td>578</td></tr><tr><td>960 min Summer</td><td>3.537</td><td>0.0</td><td>706</td></tr><tr><td>1440 min Summer</td><td>2.589</td><td>0.0</td><td>980</td></tr><tr><td>2160 min Summer</td><td>1.893</td><td>0.0</td><td>1388</td></tr><tr><td>2880 min Summer</td><td>1.514</td><td>0.0</td><td>1792</td></tr><tr><td>4320 min Summer</td><td>1.105</td><td>0.0</td><td>2564</td></tr><tr><td>5760 min Summer</td><td>0.883</td><td>0.0</td><td>3304</td></tr><tr><td>7200 min Summer</td><td>0.741</td><td>0.0</td><td>4032</td></tr><tr><td>8640 min Summer</td><td>0.643</td><td>0.0</td><td>4680</td></tr><tr><td>10080 min Summer</td><td>0.570</td><td>0.0</td><td>5352</td></tr><tr><td>15 min Winter</td><td>66.656</td><td>0.0</td><td>38</td></tr></tbody></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	33.143	0.143	0.1	3.7	O K	30 min Summer	33.188	0.188	0.1	4.8	O K	60 min Summer	33.234	0.234	0.1	6.0	O K	120 min Summer	33.277	0.277	0.1	7.1	O K	180 min Summer	33.299	0.299	0.1	7.7	O K	240 min Summer	33.311	0.311	0.1	8.0	O K	360 min Summer	33.320	0.320	0.1	8.2	O K	480 min Summer	33.321	0.321	0.1	8.2	O K	600 min Summer	33.319	0.319	0.1	8.2	O K	720 min Summer	33.317	0.317	0.1	8.1	O K	960 min Summer	33.310	0.310	0.1	7.9	O K	1440 min Summer	33.293	0.293	0.1	7.5	O K	2160 min Summer	33.266	0.266	0.1	6.8	O K	2880 min Summer	33.239	0.239	0.1	6.1	O K	4320 min Summer	33.192	0.192	0.1	4.9	O K	5760 min Summer	33.152	0.152	0.1	3.9	O K	7200 min Summer	33.119	0.119	0.1	3.1	O K	8640 min Summer	33.093	0.093	0.1	2.4	O K	10080 min Summer	33.073	0.073	0.1	1.9	O K	15 min Winter	33.161	0.161	0.1	4.1	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	66.656	0.0	38	30 min Summer	43.859	0.0	51	60 min Summer	27.653	0.0	78	120 min Summer	16.953	0.0	132	180 min Summer	12.607	0.0	188	240 min Summer	10.176	0.0	246	360 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Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY		Barlow Moor Road 30yr Attenuation			
Date 03/10/2022 File Barlow Moor Road - 30yr...		Designed by paulg Checked by			
Innovyze		Source Control 2017.1.2			
Summary of Results for 30 year Return Period					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	33.212	0.212	0.1	5.4	O K
60 min Winter	33.263	0.263	0.1	6.8	O K
120 min Winter	33.314	0.314	0.1	8.0	O K
180 min Winter	33.339	0.339	0.1	8.7	O K
240 min Winter	33.354	0.354	0.1	9.1	O K
360 min Winter	33.368	0.368	0.1	9.4	O K
480 min Winter	33.372	0.372	0.1	9.5	O K
600 min Winter	33.370	0.370	0.1	9.5	O K
720 min Winter	33.365	0.365	0.1	9.4	O K
960 min Winter	33.356	0.356	0.1	9.1	O K
1440 min Winter	33.332	0.332	0.1	8.5	O K
2160 min Winter	33.291	0.291	0.1	7.5	O K
2880 min Winter	33.251	0.251	0.1	6.4	O K
4320 min Winter	33.180	0.180	0.1	4.6	O K
5760 min Winter	33.123	0.123	0.1	3.1	O K
7200 min Winter	33.079	0.079	0.1	2.0	O K
8640 min Winter	33.053	0.053	0.1	1.4	O K
10080 min Winter	33.046	0.046	0.1	1.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	43.859	0.0	51		
60 min Winter	27.653	0.0	78		
120 min Winter	16.953	0.0	132		
180 min Winter	12.607	0.0	188		
240 min Winter	10.176	0.0	244		
360 min Winter	7.480	0.0	358		
480 min Winter	6.010	0.0	468		
600 min Winter	5.069	0.0	574		
720 min Winter	4.410	0.0	664		
960 min Winter	3.537	0.0	754		
1440 min Winter	2.589	0.0	1062		
2160 min Winter	1.893	0.0	1508		
2880 min Winter	1.514	0.0	1936		
4320 min Winter	1.105	0.0	2728		
5760 min Winter	0.883	0.0	3464		
7200 min Winter	0.741	0.0	4112		
8640 min Winter	0.643	0.0	4592		
10080 min Winter	0.570	0.0	5240		
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Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY	Barlow Moor Road 30yr Attenuation	
Date 03/10/2022 File Barlow Moor Road - 30yr...	Designed by paulg Checked by	
Innovyze	Source Control 2017.1.2	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.377	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.031

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)
0 4 0.005	8 12 0.005	16 20 0.003	24 28 0.001				
4 8 0.010	12 16 0.004	20 24 0.003					

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Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY	Barlow Moor Road 30yr Attenuation	
Date 03/10/2022 File Barlow Moor Road - 30yr...	Designed by paulg Checked by	
Innovyze Source Control 2017.1.2		

Model Details

Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

Invert Level (m) 33.000 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.07200 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.07200

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	27.0	27.0	5.200	0.0	43.6
0.400	27.0	35.3	5.600	0.0	43.6
0.800	27.0	43.6	6.000	0.0	43.6
0.801	0.0	43.6	6.400	0.0	43.6
1.600	0.0	43.6	6.800	0.0	43.6
2.000	0.0	43.6	7.200	0.0	43.6
2.400	0.0	43.6	7.600	0.0	43.6
2.800	0.0	43.6	8.000	0.0	43.6
3.200	0.0	43.6	8.400	0.0	43.6
3.600	0.0	43.6	8.800	0.0	43.6
4.000	0.0	43.6	9.200	0.0	43.6
4.400	0.0	43.6	9.600	0.0	43.6
4.800	0.0	43.6	10.000	0.0	43.6

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Summary of Results for 100 year Return Period (+45%) Half Drain Time : 1089 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>33.274</td><td>0.274</td><td>0.1</td><td>7.0</td><td>O K</td></tr><tr><td>30 min Summer</td><td>33.363</td><td>0.363</td><td>0.1</td><td>9.3</td><td>O K</td></tr><tr><td>60 min Summer</td><td>33.457</td><td>0.457</td><td>0.1</td><td>11.7</td><td>O K</td></tr><tr><td>120 min Summer</td><td>33.549</td><td>0.549</td><td>0.2</td><td>14.1</td><td>O K</td></tr><tr><td>180 min Summer</td><td>33.599</td><td>0.599</td><td>0.2</td><td>15.4</td><td>O K</td></tr><tr><td>240 min Summer</td><td>33.629</td><td>0.629</td><td>0.2</td><td>16.1</td><td>O K</td></tr><tr><td>360 min Summer</td><td>33.661</td><td>0.661</td><td>0.2</td><td>17.0</td><td>O K</td></tr><tr><td>480 min Summer</td><td>33.676</td><td>0.676</td><td>0.2</td><td>17.3</td><td>O K</td></tr><tr><td>600 min Summer</td><td>33.682</td><td>0.682</td><td>0.2</td><td>17.5</td><td>O K</td></tr><tr><td>720 min Summer</td><td>33.682</td><td>0.682</td><td>0.2</td><td>17.5</td><td>O K</td></tr><tr><td>960 min Summer</td><td>33.673</td><td>0.673</td><td>0.2</td><td>17.3</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>33.651</td><td>0.651</td><td>0.2</td><td>16.7</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>33.614</td><td>0.614</td><td>0.2</td><td>15.8</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>33.578</td><td>0.578</td><td>0.2</td><td>14.8</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>33.512</td><td>0.512</td><td>0.2</td><td>13.1</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>33.451</td><td>0.451</td><td>0.1</td><td>11.6</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>33.396</td><td>0.396</td><td>0.1</td><td>10.2</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>33.346</td><td>0.346</td><td>0.1</td><td>8.9</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>33.302</td><td>0.302</td><td>0.1</td><td>7.7</td><td>O K</td></tr><tr><td>15 min Winter</td><td>33.307</td><td>0.307</td><td>0.1</td><td>7.9</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>124.851</td><td>0.0</td><td>39</td></tr><tr><td>30 min Summer</td><td>82.938</td><td>0.0</td><td>52</td></tr><tr><td>60 min Summer</td><td>52.627</td><td>0.0</td><td>80</td></tr><tr><td>120 min Summer</td><td>32.334</td><td>0.0</td><td>136</td></tr><tr><td>180 min Summer</td><td>24.014</td><td>0.0</td><td>194</td></tr><tr><td>240 min Summer</td><td>19.336</td><td>0.0</td><td>252</td></tr><tr><td>360 min Summer</td><td>14.125</td><td>0.0</td><td>368</td></tr><tr><td>480 min Summer</td><td>11.301</td><td>0.0</td><td>486</td></tr><tr><td>600 min Summer</td><td>9.501</td><td>0.0</td><td>604</td></tr><tr><td>720 min Summer</td><td>8.242</td><td>0.0</td><td>722</td></tr><tr><td>960 min Summer</td><td>6.581</td><td>0.0</td><td>846</td></tr><tr><td>1440 min Summer</td><td>4.784</td><td>0.0</td><td>1096</td></tr><tr><td>2160 min Summer</td><td>3.471</td><td>0.0</td><td>1496</td></tr><tr><td>2880 min Summer</td><td>2.762</td><td>0.0</td><td>1908</td></tr><tr><td>4320 min Summer</td><td>1.998</td><td>0.0</td><td>2732</td></tr><tr><td>5760 min Summer</td><td>1.586</td><td>0.0</td><td>3528</td></tr><tr><td>7200 min Summer</td><td>1.325</td><td>0.0</td><td>4328</td></tr><tr><td>8640 min Summer</td><td>1.144</td><td>0.0</td><td>5096</td></tr><tr><td>10080 min Summer</td><td>1.010</td><td>0.0</td><td>5848</td></tr><tr><td>15 min Winter</td><td>124.851</td><td>0.0</td><td>39</td></tr></tbody></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	33.274	0.274	0.1	7.0	O K	30 min Summer	33.363	0.363	0.1	9.3	O K	60 min Summer	33.457	0.457	0.1	11.7	O K	120 min Summer	33.549	0.549	0.2	14.1	O K	180 min Summer	33.599	0.599	0.2	15.4	O K	240 min Summer	33.629	0.629	0.2	16.1	O K	360 min Summer	33.661	0.661	0.2	17.0	O K	480 min Summer	33.676	0.676	0.2	17.3	O K	600 min Summer	33.682	0.682	0.2	17.5	O K	720 min Summer	33.682	0.682	0.2	17.5	O K	960 min Summer	33.673	0.673	0.2	17.3	O K	1440 min Summer	33.651	0.651	0.2	16.7	O K	2160 min Summer	33.614	0.614	0.2	15.8	O K	2880 min Summer	33.578	0.578	0.2	14.8	O K	4320 min Summer	33.512	0.512	0.2	13.1	O K	5760 min Summer	33.451	0.451	0.1	11.6	O K	7200 min Summer	33.396	0.396	0.1	10.2	O K	8640 min Summer	33.346	0.346	0.1	8.9	O K	10080 min Summer	33.302	0.302	0.1	7.7	O K	15 min Winter	33.307	0.307	0.1	7.9	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	124.851	0.0	39	30 min Summer	82.938	0.0	52	60 min Summer	52.627	0.0	80	120 min Summer	32.334	0.0	136	180 min Summer	24.014	0.0	194	240 min Summer	19.336	0.0	252	360 min Summer	14.125	0.0	368	480 min Summer	11.301	0.0	486	600 min Summer	9.501	0.0	604	720 min Summer	8.242	0.0	722	960 min Summer	6.581	0.0	846	1440 min Summer	4.784	0.0	1096	2160 min Summer	3.471	0.0	1496	2880 min Summer	2.762	0.0	1908	4320 min Summer	1.998	0.0	2732	5760 min Summer	1.586	0.0	3528	7200 min Summer	1.325	0.0	4328	8640 min Summer	1.144	0.0	5096	10080 min Summer	1.010	0.0	5848	15 min Winter	124.851	0.0	39
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Brennan Consult				Page 2	
Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY		Barlow Moor Road 100yr + 45% CC Attenuation			
Date 03/10/2022 File Barlow Moor Road - 100y...		Designed by paulg Checked by			
Innovyze		Source Control 2017.1.2			
Summary of Results for 100 year Return Period (+45%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	33.408	0.408	0.1	10.5	O K
60 min Winter	33.513	0.513	0.2	13.2	O K
120 min Winter	33.619	0.619	0.2	15.9	O K
180 min Winter	33.676	0.676	0.2	17.3	O K
240 min Winter	33.713	0.713	0.2	18.3	O K
360 min Winter	33.752	0.752	0.2	19.3	O K
480 min Winter	33.773	0.773	0.2	19.8	O K
600 min Winter	33.784	0.784	0.2	20.1	O K
720 min Winter	33.787	0.787	0.2	20.2	O K
960 min Winter	33.782	0.782	0.2	20.1	O K
1440 min Winter	33.752	0.752	0.2	19.3	O K
2160 min Winter	33.705	0.705	0.2	18.1	O K
2880 min Winter	33.654	0.654	0.2	16.8	O K
4320 min Winter	33.556	0.556	0.2	14.3	O K
5760 min Winter	33.467	0.467	0.1	12.0	O K
7200 min Winter	33.388	0.388	0.1	9.9	O K
8640 min Winter	33.318	0.318	0.1	8.2	O K
10080 min Winter	33.256	0.256	0.1	6.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	82.938	0.0	52		
60 min Winter	52.627	0.0	80		
120 min Winter	32.334	0.0	136		
180 min Winter	24.014	0.0	192		
240 min Winter	19.336	0.0	248		
360 min Winter	14.125	0.0	362		
480 min Winter	11.301	0.0	478		
600 min Winter	9.501	0.0	590		
720 min Winter	8.242	0.0	702		
960 min Winter	6.581	0.0	916		
1440 min Winter	4.784	0.0	1152		
2160 min Winter	3.471	0.0	1612		
2880 min Winter	2.762	0.0	2072		
4320 min Winter	1.998	0.0	2948		
5760 min Winter	1.586	0.0	3800		
7200 min Winter	1.325	0.0	4608		
8640 min Winter	1.144	0.0	5368		
10080 min Winter	1.010	0.0	6144		
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Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY	Barlow Moor Road 100yr + 45% CC Attenuation	
Date 03/10/2022	Designed by paulg	
File Barlow Moor Road - 100y...	Checked by	
Innovyze	Source Control 2017.1.2	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.377	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.031

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)
0 4 0.005	8 12 0.005	16 20 0.003	24 28 0.001				
4 8 0.010	12 16 0.004	20 24 0.003					

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Oak House, 2 Gatley Road Cheadle Stockport, SK8 1PY	Barlow Moor Road 100yr + 45% CC Attenuation	
Date 03/10/2022 File Barlow Moor Road - 100y...	Designed by paulg Checked by	
Innovyze Source Control 2017.1.2		

Model Details

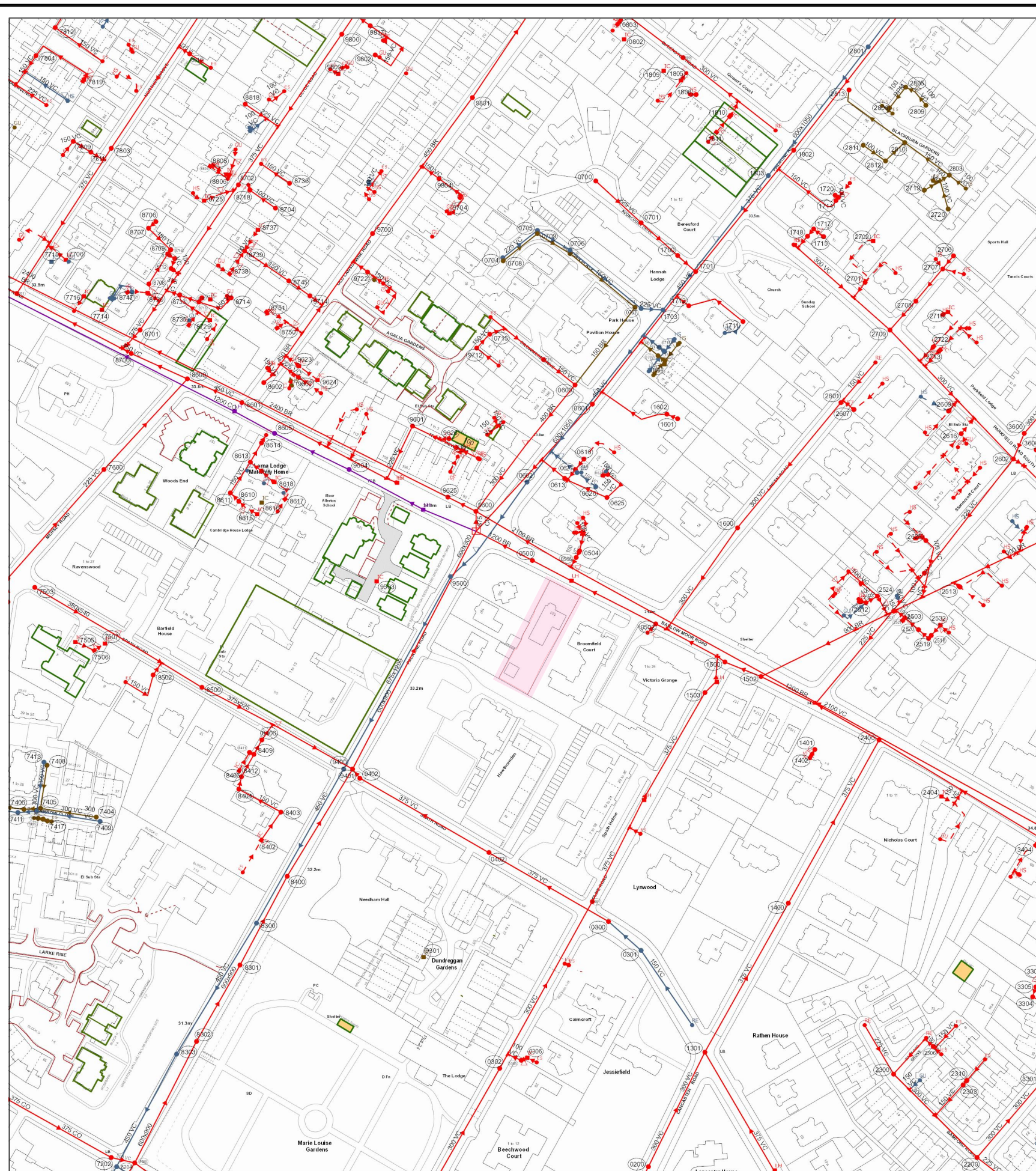
Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

Invert Level (m) 33.000 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.07200 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.07200

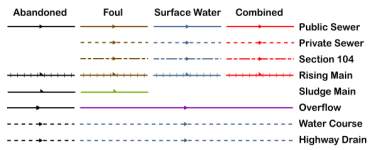
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	27.0	27.0	5.200	0.0	43.6
0.400	27.0	35.3	5.600	0.0	43.6
0.800	27.0	43.6	6.000	0.0	43.6
0.801	0.0	43.6	6.400	0.0	43.6
1.600	0.0	43.6	6.800	0.0	43.6
2.000	0.0	43.6	7.200	0.0	43.6
2.400	0.0	43.6	7.600	0.0	43.6
2.800	0.0	43.6	8.000	0.0	43.6
3.200	0.0	43.6	8.400	0.0	43.6
3.600	0.0	43.6	8.800	0.0	43.6
4.000	0.0	43.6	9.200	0.0	43.6
4.400	0.0	43.6	9.600	0.0	43.6
4.800	0.0	43.6	10.000	0.0	43.6

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Resho	Cover	Fo	Invert	Size	Size	Y	Shape	Mat	Length	Grid
8300	33.14	FO	24.41	600	0	0	0	BR	48.3755	1 in 605
8301	33.14	FO	24.41	600	0	0	0	BR	48.3755	1 in 605
8303	31.1	SW	0	450	0	0	0	VC	70.20325	1 in 1
8304	34.69	FO	21.88	375	0	0	0	VC	53.8673	1 in 1
7410	33.57	SW	31.32	300	0	0	0	VC	102.4188	1 in 142
8710	33.17	FO	21.14	375	0	0	0	VC	22.22095	1 in 10
0715	FO	0	0	100	0	0	0	VC	8.86647	1 in 1
0615	FO	0	0	100	0	0	0	VC	7.44232	1 in 1
2318	FO	0	0	100	0	0	0	VC	2.22034	1 in 1
8736	FO	0	0	150	0	0	0	VC	19.03505	1 in 1
8736	33.68	SW	29.27	600	0	0	0	BR	47.57054	1 in 1
2519	FO	0	0	100	0	0	0	VC	7.343177	1 in 1
2368	FO	0	0	100	0	0	0	VC	5.15231	1 in 1
8301	31.61	FO	28.31	600	0	0	0	BRP	47.55205	1 in 1
7589	FO	0	0	150	0	0	0	VC	7.45871	1 in 1
8711	FO	0	0	150	0	0	0	VC	5.784056	1 in 1
8710	33.1	FO	28.74	225	0	0	0	VC	67.8415	1 in 119
1711	FO	0	0	100	0	0	0	VC	34.71708	1 in 1
2812	FO	0	0	100	0	0	0	VC	14.68358	1 in 1
8715	FO	0	0	375	0	0	0	VC	27.27143	1 in 1
8710	FO	0	0	100	0	0	0	VC	2.84394	1 in 1
7210	FO	0	0	100	0	0	0	VC	48.77448	1 in 1
7210	34.38	FO	30.35	300	0	0	0	GRP	2.87597	1 in 149
2707	FO	0	0	0	0	0	0	VC	70.13196	1 in 149
2707	FO	0	0	0	0	0	0	VC	23.19665	1 in 149
3304	FO	0	0	100	0	0	0	VC	12.5714	1 in 1073
8704	FO	0	0	100	0	0	0	BR	75.1332	1 in 1073
8704	33.66	FO	31.47	100	0	0	0	VC	17.16688	1 in 1073
7406	33.58	FO	31.57	300	0	0	0	VC	33.58105	1 in 1073
8701	33.58	FO	29.54	375	0	0	0	VC	16.8271	1 in 1073
7406	33.61	FO	31.82	150	0	0	0	VC	16.20241	1 in 1073
0709	FO	0	0	100	0	0	0	VC	9.18424	1 in 37
0502	34.11	FO	28.27	1200	0	0	0	BR	70.47964	1 in 283
7804	SW	0	450	0	0	0	0	VC	46.6671	1 in 283
9600	33.93	FO	23.2	2400	0	0	0	BR	35.61518	1 in 283
9600	33.93	FO	23.2	2400	0	0	0	VC	8.26512	1 in 283
9600	33.83	SW	25.75	1200	0	0	0	VC	45.07178	1 in 912
9605	FO	0	0	100	0	0	0	VC	45.07178	1 in 912
2811	FO	0	0	225	0	0	0	VC	14.8351	1 in 912
9607	FO	0	0	225	0	0	0	VC	12.13337	1 in 912
2710	FO	0	0	150	0	0	0	VC	17.68465	1 in 912
7408	34.34	FO	32.65	300	0	0	0	VC	55.90487	1 in 109
7408	FO	0	0	100	0	0	0	VC	7.92006	1 in 109
3301	34.87	FO	31.48	300	0	0	0	VC	29.03916	1 in 129
2805	FO	0	0	100	0	0	0	VC	3.12373	1 in 129
8704	FO	0	0	100	0	0	0	RPM	45.17595	1 in 129
0616	FO	0	0	100	0	0	0	VC	7.37994	1 in 129
8704	33.51	FO	31.11	375	0	0	0	VC	76.37272	1 in 224
8611	FO	0	0	150	0	0	0	VC	20.0823	1 in 224
4603	FO	0	0	100	0	0	0	VC	6.45424	1 in 224
1000	34.12	FO	30.61	300	0	0	0	VC	68.22422	1 in 224
8717	FO	0	0	100	0	0	0	VC	11.7177	1 in 224
0704	SW	0	225	0	0	0	0	VC	24.2684	1 in 224
8708	FO	0	0	150	0	0	0	VC	19.35641	1 in 224
8708	FO	0	0	150	0	0	0	VC	5.40731	1 in 224
9605	33.74	FO	25.69	1200	0	0	0	VC	184.2705	1 in 138
9614	FO	0	0	100	0	0	0	VC	5.145125	1 in 138
0701	33.57	FO	31.06	225	0	0	0	VC	26.50725	1 in 171
8702	32.74	FO	29.93	225	0	0	0	VC	6.50772	1 in 171
8612	FO	0	0	100	0	0	0	VC	7.882948	1 in 171
7417	FO	0	0	150	0	0	0	GRP	2.61551	1 in 171
3310	FO	0	0	100	0	0	0	VC	3.37110	1 in 171
8702	FO	0	0	150	0	0	0	VC	92.10334	1 in 171
8710	FO	0	0	150	0	0	0	VC	2.83427	1 in 171
1408	FO	0	0	100	0	0	0	VC	1.84523	1 in 171
8739	FO	0	0	100	0	0	0	VC	29.4763	1 in 171
2524	FO	0	0	100	0	0	0	VC	3.58817	1 in 171
7202	30.64	FO	27.89	100	0	0	0	VC	13.3416	1 in 11
2303	FO	0	0	100	0	0	0	VC	22.8439	1 in 11
3000	32.05	SW	0	450	0	0	0	VC	24.34305	1 in 11
2303	FO	0	0	100	0	0	0	VC	13.84267	1 in 11
7312	FO	0	0	150	0	0	0	VC	23.9033	1 in 11
0705	SW	0	225	0	0	0	0	VC	21.11447	1 in 11
9402	33.12	FO	30.76	375	0	0	0	VC	81.8878	1 in 195
9402	FO	0	0	100	0	0	0	VC	11.5068	1 in 195
0302	33.82	FO	30.13	300	0	0	0	VC	105.1903	1 in 206
8400	32.16	FO	28.3	600	0	0	0	VC	71.1192	1 in 206
8400	32.12	FO	28.3	600	0	0	0	BR	69.11584	1 in 206
8704	FO	0	0	100	0	0	0	VC	99.3708	1 in 206
8700	33.64	FO	0	450	0	0	0	VC	5.839292	1 in 206
0711	FO	0	0	100	0	0	0	BR	53.8663	1 in 198
8713	FO	0	0	100	0	0	0	BR	101.8442	1 in 198
8714	FO	0	0	100	0	0	0	VC	40.45756	1 in 198
1901	34.16	FO	29.86	375	0	0	0	VC	12.3304	1 in 198
8701	FO	0	0	100	0	0	0	VC	94.02127	1 in 261
8690	33.69	FO	25.64	450	0	0	0	VC	12.2554	1 in 261
8690	33.69	FO	25.64	450	0	0	0	VC	30.6167	1 in 261
9400	32.78	SW	0	450	0	0	0	VC	10.03324	1 in 261
1500	34.37	FO	27.11	1200	0	0	0	BR	43.47297	1 in 52
8709	FO	0	0	150	0	0	0	VC	2.8502	1 in 52
8709	FO	0	0	150	0	0	0	VC	5.45819	1 in 52
1100	FO	0	0	100	0	0	0	VC	2.10808	1 in 52
2803	FO	0	0	150	0	0	0	VC	44.88358	1 in 52
9604	FO	0	0	100	0	0	0	VC	19.8831	1 in 52
7404	33.91	FO	32.29	300	0	0	0	VC	31.1575	1 in 66
7409	33.94	SW	32.06	300	0	0	0	VC	35.16837	1 in 66
8702	33.44	FO	28.24	375	0	0	0	VC	8.60956	1 in 280
8702	33.44	FO	28.24	375	0	0	0	VC	59.07793	1 in 280
2801	33.58	SW	29.27	600	0	0	0	BR	44.20407	1 in 280
8701	33.58	FO	29.27	600	0	0	0	BR	43.57957	1 in 280
0301	33.63	SW	32.19	150	0	0	0	VC	24.0819	1 in 67
7413	34.33	SW	32.39	300	0	0	0	VC	27.35994	1 in 172
1403	34.75	FO	29.49	450	0	0	0	VC	13.03167	1 in 172
9700	33.78	FO	30.49	450	0	0	0	VC	9.23212	1 in 26
9712	FO	0	0	375	0	0	0	BR	93.05305	1 in 266
1603	FO	0	0	100	0	0	0	VC	4.49748	1 in 266
9500	33.8	SW	29.03	675	0	0	0	BR	40.16329	1 in 266
8714	FO	0	0	150	0	0	0	VC	21.02461	1 in 17
9500	34.32	FO	32.34	300	0	0	0	VC	81.723	1 in 17
9712	FO	0	0	150	0	0	0	VC	10.46955	1 in 17
2803	FO	0	0	100	0	0	0	VC	12.26567	1 in 17
2803	FO	0	0	100	0	0	0	VC	30.56534	1 in 17
0708	FO	0	0	225	0	0	0	VC	50.68959	1 in 15
0713	33.58	SW	30.66	225	0	0	0	VC	11.1625	1 in 15
1602	FO	0	0	100	0	0	0	VC	12.08104	1 in 15
9602	33.93	FO	30.23	225	0	0	0	VC	40.8957	1 in 15
0813	FO	0	0	100	0	0	0	VC	32.22406	1 in 15
1802	33.79	SW	28.16	375	0	0	0	VC	3.744948	1 in 15
0504	FO	0	0	100	0	0	0	VC	10.36406	1 in 15
9505	FO	0	0	100	0	0	0	VC	2.20556	1 in 15
9600	33.93	FO	20.03	2400	0	0	0	VC	86.05231	1 in 143
1712	FO	0	0	0	0	0	0	VC	5.131754	1 in 143
1718	FO	0	0	0	0	0	0	VC	1.19021	1 in 143
2001	34	FO	0	0	0	0	0	VC	3.97461	1 in 143
2001	34.34	FO	31.12	300	0	0	0	BR	7.17458	1 in 143
8713	33.08	FO	30.12	300	0	0	0	VC	24.0819	1 in 143
0703	FO	0	0	100	0	0	0	VC	12.12484	1 in 143
8713	FO	0	0	375	0	0	0	VC	83.53496	1 in 152
8611	FO	0	0	150	0	0	0	VC	7.91504	1 in 152
9602	33.78	SW	29.27	600	0	0	0	VC	26.82373	1 in 152
8708	FO	0	0	100	0	0	0	VC	5.973446	1 in 152
0902	33.88	SW	29.2	600	0	0	0	BR	48.00141	1 in 1994
8302	33.76	SW	29.27	600	0	0	0	BR	59.61358	1 in 1994
9817	FO	0	0	225	0	0	0	VC	7.136762	1 in 1994
8404	FO	0	0	150	0	0	0	VC	43.76177	1 in 1994
8404	FO	0	0	150	0	0	0	VC	10.56468	1 in 1994
8500	33.01	FO	30.03	375	0	0	0	VC	8.98514	1 in 1994
8406	FO	0	0	150	0	0	0	VC		

LEGEND



All point assets follow the standard colour convention:

red	- combined	blue	- surface water
brown	- foul	purple	- overflow

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

MANHOLE FUNCTION

- | | |
|----|---------------|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

SEWER SHAPE

- | | | | |
|----|-------------|----|-------------|
| CI | Circular | TR | Trapezoidal |
| EG | Egg | AR | Arch |
| OV | Oval | BA | Barrel |
| FT | Flat Top | HO | HorseShoe |
| RE | Rectangular | UN | Unspecified |
| SQ | Square | | |

SEWER MATERIAL

- | | |
|-----|---------------------------|
| AC | Asbestos Cement |
| BR | Brick |
| PE | Polyethylene |
| RP | Reinforced Plastic Matrix |
| CO | Concrete |
| CSB | Concrete Segment Bolted |
| CSU | Concrete Segment Unbolted |
| CB | Concrete Box Culverted |
| PS | Plastic / Steel Composite |
| GRC | Glass Reinforced Plastic |
| DI | Ductile Iron |
| PVC | Polyvinyl Chloride |
| CI | Cast Iron |
| SI | Spun Iron |
| ST | Steel |
| VC | Vitrified Clay |
| PP | Polypropylene |
| PF | Pitch Fibre |
| MAC | Masonry, Coursed |
| MAR | Masonry, Random |
| U | Unspecified |

Address or Site Reference:

CREATIVE SUPPORT LTD 123 BARLOW MOOR
ROAD,
MANCHESTER,
M20 2TS

Scale: 1:1250 **Date:** 18/12/2019

Sheet: 1 of 1

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SEWER RECORDS

