

whitby wood

Carmoor Road

Drainage Strategy Report

Client: Tiger Developments Limited

Date: 18/11/2022

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whitby wood

91-94 LOWER MARSH
LONDON SE1 7AB
UNITED KINGDOM

+44 (0)20 7442 2216

www.whitbywood.com

Whitby Wood Limited
reg in England and Wales
reg no 07786822

91-94 Lower Marsh
London SE1 7AB

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Prepared by:



Tom Tosetti

Graduate Engineer – Civils

Reviewed by:



Ryan Williams

Senior Engineer - Civils

Approved by:



Ryan Saunders

Design Engineer - Civils

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1 INTRODUCTION

Whitby Wood have been commissioned for the design of the below ground foul and surface water drainage systems for the development at Carmoor Road. This includes drainage that is suspended or cast into the structure below the building as well as below ground external drainage up to and including the connections into the public sewer.

1.1 Sources of Information

A review of the relevant information from a range of sources has been undertaken and includes the following:

- Leachler Hayes Architects, Pre-Application Design Statement (2022);
- United Utilities, Asset Location Report (2022);
- Manchester City Council, Manchester's local Development Framework 2012);
- BS EN12056-2:2000, Gravity drainage systems inside buildings (2010);
- CIRIA, The SuDs Manual (2016);
- National Planning Policy Framework (2022); and
- Whitby Wood, Flood Risk Assessment (2022).

1.2 Site Location and Description

The site is located within the development plan defined central area of Manchester. It sits just outside of the defined city centre, just beyond the Corridor Manchester sub-area of the city centre. It is also just outside of and within easy walking distance of the defined Oxford Road Corridor regeneration area. The Oxford Road Corridor is a focus for the University of Manchester teaching departments. The site is very close to the Manchester University NHS Foundation Trust hospitals on Upper Brook Street and Oxford Road.

The site is not allocated for any specific use in the development plan.

Existing uses on the site includes a garage workshop and a building used previously as a private day nursery which is now vacant. None of the buildings are of any architectural merit or are subject to statutory protection. The nearest statutorily listed asset (Victoria Baths on Hathersage Road) is some distance away. The application site is not within a conservation area. It is situated some 250 metres north of Victoria Park conservation area.

There are limited trees on-site and adjacent to the site. An arboricultural impact assessment and arboricultural management strategy are submitted with the planning application.

The site is located immediately south of a community centre managed by the West Indian Organisations Co-ordinating Committee (WIOCC). The immediate area comprises a mix of residential and commercial uses, including offices and other Class E uses. Opposite the site is the Octagon office building, a private car park and an electricity sub-station. The Octagon is a multi-level office building of significant scale and massing. To the north and west of the site is the Liberty Park student accommodation. To the south are the

rear of commercial uses fronting Hathersage Road. St Mary's Hospital occupies a significant site to the west side of Upper Brook Street. Layout, scale and massing locally is varied but it is generally to a suburban scale and relatively low-rise.

The site extends approximately 0.21 ha, and its approximate centre is located at a national grid reference of 385510, 395940. The nearest postcode to the site is M13 0FB. Figure 1 below shows the site location.

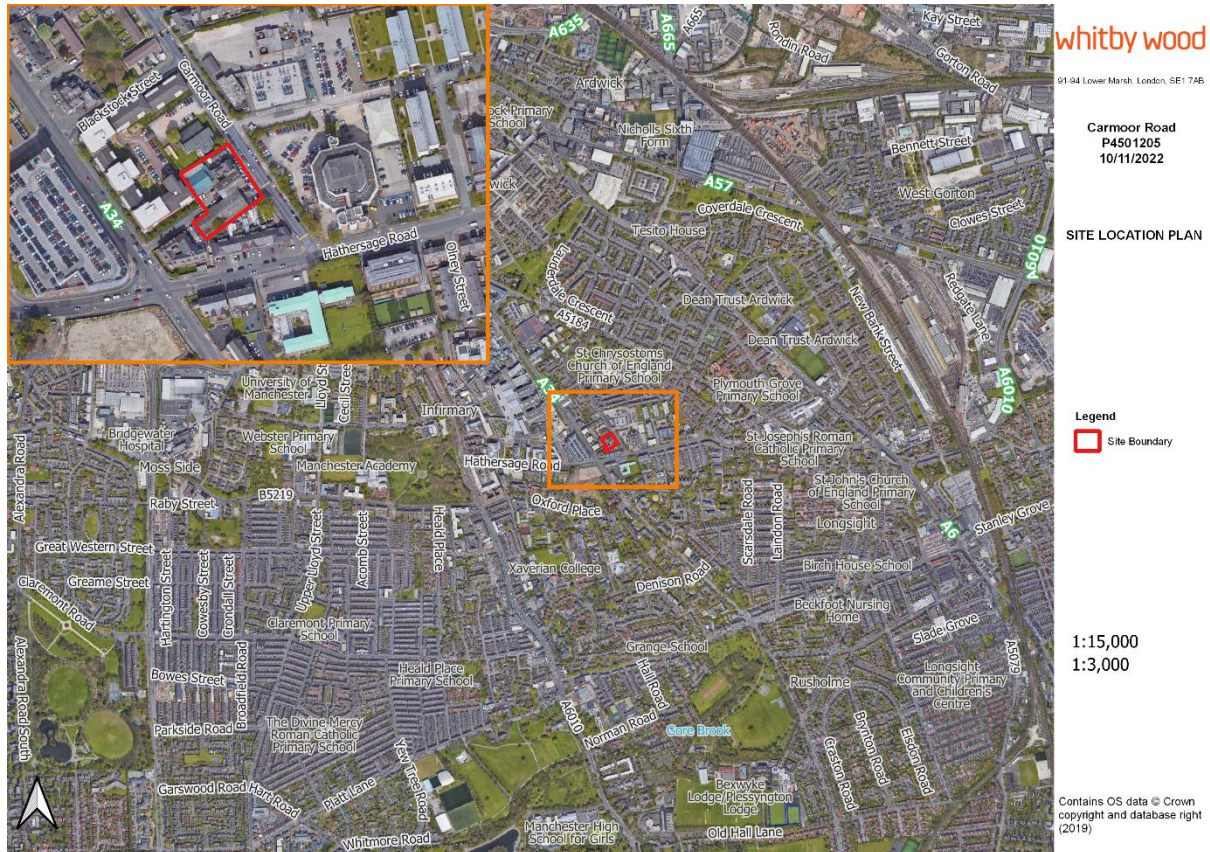


FIGURE 1 - SITE LOCATION PLAN

1.3 Existing Drainage

A United Utilities Asset Search has shown that there is existing drainage surrounding the site, with combined foul and surface water sewers to the north of the site along Carmoor Road and to the south along Autumn Street. The asset search has been added to Appendix A. A GPR or CCTV survey will be carried out to confirm the location of any private sewers on site and the cover and invert levels the United Utilities manholes which are potential outfalls.

1.4 Geology

From a review of the British Geological Survey's (BGS) Geology of Britain Viewer suggests that the site is underlined with a bedrock geology of Collyhurst Sandstone formation. The maps shows that the superficial

deposits are Till, Devensian- Diamiction. This will need to be confirmed by site investigations. The presence of Collyhurst Sandstone indicates that infiltration is potential.

1.5 Proposed Development

The proposed development includes the demolition of existing buildings and construction of purpose-built student accommodation with 172 beds in a mix of studio and cluster units alongside ancillary facilities and shared amenity space, site access and other associated works in a development of three to six storeys.

2 DRAINAGE DESIGN POLICIES

The following design guidance will need to be adhered to for the proposed foul and surface water drainage system that will serve the site.

- Building Regulations Part H;
- National Planning Policy Framework (NPPF);
- Design and Construction Guidance (DCG) – Sewerage Sector Guidance (for adopted connections);
- BS EN 752:2017, Drainage & Sewer Systems Outside Buildings; and
- BS EN 12056-1:2000, Gravity Drainage Inside Buildings

2.1 Overall Site Drainage Requirements

There are a range of requirements which the proposed drainage system is expected to meet. These have been set out by various guidance documents and stakeholders. The main requirements from each guidance document or stakeholder have been set out in Table 1 below.

TABLE 1 - REQUIREMENTS FOR THE PROPOSED DRAINAGE SYSTEM

Source/Stakeholder	Requirements
DEFRA Non-statutory technical standards for sustainable drainage systems	• Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (i below) and volume control technical standards (ii below) need not apply. i) For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100-year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event. ii) Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event. • The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event. • The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

	The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.
Design and Construction Guidance – Sewerage Sector Guidance Appendix C (2020)	- Where a component is designed to convey or store flows in excess of the 1 in 30-year return period event, the designer should demonstrate that the upstream system (including any inlets such as gullies or pervious paving) has the capacity to allow the flows to reach the component. - Where an overland flow route is used, it should not be designed to operate more frequently than in a 1 in 30-year return period design rainfall event. - Design foul water peak flow rates should be 4000L per dwelling per day.
Building Regulations Approved Document H	- Surface water shall discharge to one of the following listed in order of priority: - An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable, - A watercourse; or where that is not reasonably practicable, - A sewer.
Sewerage Undertaker (United Utilities)	- A pre-development application is required to check the public sewer has capacity for the proposed discharge rates. At the time of writing no application has been submitted. - A section 106 application to connect to the public sewer will need to be submitted for any new connections to the public sewer. - If the network is to be adopted, then a S104 application will need to be made in this instance. - If any existing sewers require diverting, then an application to United Utilities to divert a public sewer under section 185 will need to be made. - A section 116 application for the removal of public sewers will be required for any abandoned public sewers. - A build-over agreement is required to build over any existing assets.
Manchester City Council (LLFA)	- Acting as the LLFA, any guidelines and policies outlined in the local Surface Water Management Plan or Local Plan should be adhered to. - Where possible the proposed discharge rates should be discussed and approved with the LLFA as early as possible. Conversations with the LLFA to agree discharge rates are ongoing.

2.2 Planning Policy Requirements

The NPPF (National Planning Policy Framework) specifies that surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development. Opportunities to reduce the flood risk to the site itself and elsewhere, taking climate change into account, should be investigated. The drainage proposals within this strategy have been prepared to meet planning policy requirements.

2.3 Manchester's Local Development Framework Policies

The Manchester Plan forms a framework for development within Greater Manchester taking account of the principal purposes of the Greater Manchester Authority. Policy EN 14 of the Development plan is specific to Flood risk and sets the guidance for drainage strategies. Each of the policies within EN 14 have been detailed below:

- In line with the risk-based sequential approach contained within PPS25, development should be directed away from sites at the greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account of all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA).
- In addition to the requirements for site-specific Flood Risk Assessments (FRAs) set out in PPS25, an appropriate FRA will also be required for all development proposals, including changes of use, on sites greater than 0.5ha within Critical Drainage Areas (CDAs) and Canal Hazard Zones identified in the SFRA.
- All new development should minimise surface water run-off, including through Sustainable Drainage Systems (SUDS) and the appropriate use of Green Infrastructure. Developers should have regard to the surface water run-off rates in the SFRA User Guide. In CDAs, evidence to justify the surface water run-off approach / rates will be required. The City of Manchester contains many sections of rivers which are culverted or 'hidden'; where these are indicated in the SFRA beneath the proposed development site, further investigation will be required and the development proposal should take this into account; where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure.

2.4 Greenfield Runoff Rates and Volumes

As identified in the FRA, greenfield runoff rates have been calculated using IH124 method and a 6-hour rainfall event, these can be found in Appendix B. Table 2 shows the greenfield runoff rates for the whole development site approximately 0.2 ha and factored to provide a runoff rate per hectare. The table also illustrates the current discharge rates based on existing site conditions. The existing discharge rates have been calculated using the Modified Rational Method as presented in Equation 1. A percentage of impermeable area (PIMP) of 100% and a time of concentration of 5 minutes were assumed at this stage. A runoff coefficient (C_v) of 1 has been used in the calculations due to the entirely urbanised area.

$$Q = 2.78 C_v C_r i A_i \quad (1)$$

Where;

C_v is the volumetric runoff coefficient;

C_r is the dimensionless routing coefficient, with a value of 1.3 used;

i is the rainfall intensity; and

A_i is the impermeable area.

TABLE 2 - GREENFIELD RUNOFF AND EXISTING DISCHARGE RATES

Return Period	Greenfield runoff rates		Existing Discharge Rates (l/s)
	Whole Site [0.2 ha] (l/s)	Per hectare (l/s/ha)	
QBAR	1.32	6.6	-
1-year	1.15	5.75	33.7
30-year	2.25	11.25	78.7
100-year	2.75	13.75	99.2

2.4.1 Proposed Discharge Rate

The proposed discharge rate for the site is 2l/s. These rates will need to be approved by United Utilities via a pre-planning enquiry, an application will be submitted in alignment with this report.

2.5 Delivering a SuDS Scheme

The philosophy of SuDS is about maximising the benefits and minimising the negative impacts of surface water runoff from developed areas. The ‘four pillars’ of SuDS design as described by the SuDS Manual are;

- Water Quantity;
- Water Quality;
- Amenity; and
- Biodiversity.

SuDS deliver high quality drainage while supporting areas to cope better with severe rainfall both now and in the future. SuDS can improve the quality of life in developments by making them more vibrant, visually attractive, sustainable and more resilient to change, by improving urban air quality, regulating building temperatures, reducing noise and delivering recreation and education opportunities.

SuDS design should maximise the use of the available space by delivering efficient drainage together with other functions to help meet the objectives of the site. The SuDS design should, as much as possible, be based around the following;

- Using surface water runoff as a resource;
- Managing rainwater close to where it falls;
- Managing runoff on the surface;
- Allowing rainfall to soak into the ground;
- Promoting evapotranspiration;
- Slowing and storing runoff to mimic natural runoff characteristics;
- Reducing contamination of runoff through pollution prevention and controlling the runoff at source; and

- Treating runoff to reduce the risk of urban contaminants causing environmental pollution.

Any proposed development on the site has the potential to maximise SuDS and conform to SuDS best practice. Ultimately a well designed and constructed SuDS scheme will provide a robust and reliable surface water drainage network, whilst providing increased amenity and biodiversity.

2.5.1 SuDS Component Performance

The effectiveness of SuDS components in improving development surface water run-off quality is summarised in, **Table 3** on the following page. Combinations of treatments can be used to reduce potential pollutants from reaching the receiving course.

TABLE 3 - SUDS TREATMENT TRAIN

SuDS Component	Interception	Peak flow control: Low	Peak flow control: High	Volume reduction	Volume control	Gross sediments	Fine sediments	Hydrocarbons/PAHs	Metals	Nutrients
Rainwater Harvesting	Y	Y	S	Y	N	N	N	N	N	N
Pervious Pavement	Y	Y	Y	Y	Y	Y	Y	Y	Y	Varies
Filter Strips	Y	N	N	N	N	Y	N	Y	Y	Varies
Swales	Y	Y	S	Y (*)	N	Y	Y (+)	Y	Y	Y (-)
Trenches	Y	Y	S	Y (*)	N	N	N	Y	Y	Y (-)
Detention Basins	Y	Y	Y	N	Y	Y	Y (+)	Y	Y	Varies
Ponds	N	Y	Y	N	Y	N (~)	Y	Limited	Y	Varies
Wetlands	N	Y	S	N	Y	N (~)	Y	Limited	Y	Y
Green Roofs	Y	Y	N	N	N	N	N	Y	N	N
Bioretention Systems	Y	Y	S	Y (*)	N	N (~)	Y	Y	Y	Y
Proprietary Treatment Systems	N	N	N	N	N	Y	Y	Y (!)	Y (!)	Y (!)
Subsurface Storage	N	Y	Y	N	Y	N (~)	N	N	N	N
Subsurface Conveyance Pipes	N	N	N	N	Y	N (~)	N	N	N	N

Notes:

- S: Not normally with standard designs, but possible where space is available and designs mitigate impact of high flow rates.
- Y (*): Where infiltration is facilitated by the design.
- N (~): Gross sediment retention is possible, but not recommended due to negative maintenance and performance implications.
- Y (+): Where designs minimise the risk of fine sediment mobilisation during larger events.
- Y (!): Where designs specifically promote the trapping and breakdown of soils and PAH based constituents.
- Y ("): Where subsurface soil structure facilitates the trapping and breakdown of oils and PAH based constituents.
- Varies: The nutrient removal performance is variable, and can be negative in some situations.

- Y (~): Good nutrient removal performance where subsurface bio-filtration system with a permanently saturated zone included within the design.

2.5.2 Hydraulic Design Criteria

The below outlines the best practice criteria for hydraulic control required for interception, runoff rate control and volume control.

- **Interception**

To fulfil the requirements for Interception, there should normally be no runoff from the site for an initial depth of rainfall, usually 5mm. This is usually achieved through the use of infiltration, evapotranspiration, or rainwater harvesting. Introducing soft landscaping to brownfield sites will also help achieve this.

- **Flow and Volume Control**

Discharge rates for all storm events should be restricted to current Greenfield run-off rates or as close as is reasonably practicable.

- **Attenuation and hydraulic controls will be used to manage flow rates**

Rainwater harvesting, or the use of Long-Term Storage can be used to achieve Greenfield runoff volume control. An additional 96m³ of flood compensation storage will be provided.

- **Water Quality Design Criteria**

Current best practice takes a risk-based approach to managing discharges of surface runoff to the receiving environment. The following text provides guidance on the extent of water quality management likely to be appropriate for the site.

- **Hazard Classification**

Runoff from clean roof surfaces (i.e. not metal roofs, roofs close to polluted atmospheric discharges, or roofs close to populations of flocking birds) is classified as Low in terms of hazard status.

Runoff from roads, parking and other areas of residential, commercial and industrial sites (that are not contaminated with waste, high levels of hydrocarbons, or other chemicals) is classified as Medium in terms of hazard status.

- **Treatment requirements for disposal to surface water systems**

As the site is brownfield, roof runoff will require at least 1 treatment stage prior to discharge. Runoff from other parts of this site such as roads, parking and other areas will require ideally 2 treatment stages prior to discharge.

3 DRAINAGE DESIGN PROPOSALS

3.1 Surface Water

The design of a surface water drainage system to serve the new development considers both water treatment and on-site attenuation in accordance with CIRIA C753. The SuDS components proposed aim to emulate the natural drainage system of the site through attenuation of flows and imitating natural percolation where possible. This has the added benefit of alleviating water quality issues associated with urban drainage runoff.

The current proposal for the surface water drainage strategy can be found in Appendix C which includes the introduction of green roofs to provided attenuation of surface water and including the 1in100 year storm event. Green roofs will be implemented where there is community amenity proposed as these areas will be easily accessible for maintenance purposes.

The proposal also includes the introduction of permeable paving to attenuate all the runoff up to and including the 1in100 year including climate change storm event. Permeable paving is introduced on the surround area of the external site in alignment with the landscape architect's proposals.

3.1.1 Drainage Hierarchy

The drainage hierarchy that should be considered for any new development. The following list details these requirements and which elements can be achieved for this site. Where possible elements as high up the hierarchy have been selected:

- Rainwater use a resource (for example rainwater harvesting, green roofs for irrigation);
 - Green roofs are proposed on site, vegetation (where feasible) will allow water to seep into the green roof subbase and be attenuated and drained away.
- Rainwater infiltration to ground at or close to source;
 - Infiltration is not currently deemed feasible due to areas external being within 5 meters of the building.
- Rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens);
 - This is currently proposed via the green roof.
- Attenuate rainwater by storing in tanks or sealed water features for gradual release;
 - The storage volume required can be achieved through the implementation of permeable paving and green roofs alone.
- Discharge rainwater direct to a watercourse;
 - As identified in the FRA, the nearest watercourse is over 1 km from the site, therefore it would be deemed unfeasible.
- Discharge rainwater to a surface water sewer/drain;
 - This is unfeasible.
- Discharge rainwater to the combined sewer;

- This is the proposed method.

3.1.2 Water Cycle

The water cycle strategy puts emphasis on four key areas of interest:

- Consumption;
- Quality;
- Re-use; and
- Re-cycle.

Water consumption is covered as part of the Environmental Standards Strategy. Rainwater will be heavily 'treated' through its discharge process by passing through numerous stages through its cycle. Green roofs will provide treatment at roof level to improve water quality of runoff. Rainwater will also be reused by the vegetation on the green roof through evapotranspiration.

3.2 Foul Water

Foul wastewater is to increase from the previously consented scheme due to the increase in number of units and change in building use, as there is an increase in the number of appliances required for the purpose-built student accommodation. Foul water design flow rates have been estimated using 4000L/dwelling/day and 0.6l/hectare of developable land for commercial uses. The design flow rate for the entire site was estimated to be 7.96l/s, subject to capacity in the public sewer. The foul water is discharge to the south of the site in line with the drawing in Appendix C.

3.3 Internal Drainage

Foul water stacks and rainwater pipes dropping below slab level internal to the building will be picked up by inspection chambers situated outside the building. Where this is not possible, due to site constraints and building foundations, inspection chambers may need to be positioned internally. In this instance, the chambers will be double sealed and situated within areas that are publicly accessible to ensure the system can be inspected or accessed at all times. Any internal chambers will be positioned at the next design stage once a set of frozen MEP drawings are available.

4 ADOPTION AND MAINTENANCE

It is assumed that drainage on site may be adopted by United Utilities under a Section 104 agreement and so, where applicable, drainage will be designed to adoptable standards set out by the Design and Construction Guidance; Sewerage Sector Guidance Appendix C.

4.1 Typical SuDS Maintenance Schedule

The CIRIA SuDS manual has been reviewed and the operation and maintenance guidance for different surface water systems has been extracted and is provided in the following tables.

4.1.1 Green Roofs

Green roofs are a planted soil layer constructed on the roof of a building, water is stored in the soil layer and absorbed by vegetation. In the event of storage exceedance, an overflow system drains excess surface water from the roof. Intensive green roofs are likely to require regular inspection and maintenance. **Table 4** below has been extracted from table 16.1 operation and maintenance requirements for green roofs.

TABLE 4 - MAINTENANCE REQUIREMENTS FOR GREEN ROOFS

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (i.e. year one), replace dead plant as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where >5% coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation including weeds	Six monthly or as required

	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be established with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlets has settled, cracked, or moved, investigate and repair as appropriate	As required

4.1.2 Permeable Paving

Regular inspection and maintenance are required to ensure the effective long-term operation of below-ground storage systems. Maintenance responsibility for systems should be placed with a responsible organisation. The table below is extracted from table 21.3 of the SuDS manual and provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive, and some actions may not always be required.

TABLE 5 - MAINTENANCE REQUIREMENTS FOR PERMEABLE PAVING

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action. Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations—pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration

		performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth- if required, take remedial action.	Three-monthly, 48 hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements

4.1.3 Pipework

In addition to the above pipework should usually be jetted and cleaned as and when blockages appear to have occurred. Pipes should be checked for build-up of debris and other waste that could cause blockages or damage to the pipework. Occasional maintenance should be carried out annually or as required.

4.1.4 Flow Controls

Little maintenance is required as there are no moving parts within the Flow Control. Experience has shown that if blockages occur, they do so at the intake.

Following the installation of the Flow Control it is vitally important that any extraneous material i.e. building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced contact the manufacturer so that an investigation may be made.

All Flow Control units are typically manufactured from grade 304 Stainless Steel, and if required they can also be manufactured in grade 316 Stainless Steel. Both materials have an estimated life span in excess of the design life of drainage systems.

4.1.5 Timetable

Maintenance should be carried out and timetabled from the date of installation. Each SuDS feature and component has a recommended and typical frequency for inspection which should be adhered to as close as practically possible. Where not adopted, the landowner or private management company are responsible for its implementation.

5 RISKS AND UNCERTAINTIES

The following outlines the current uncertainties and associated risks for aspects related to drainage for this development.

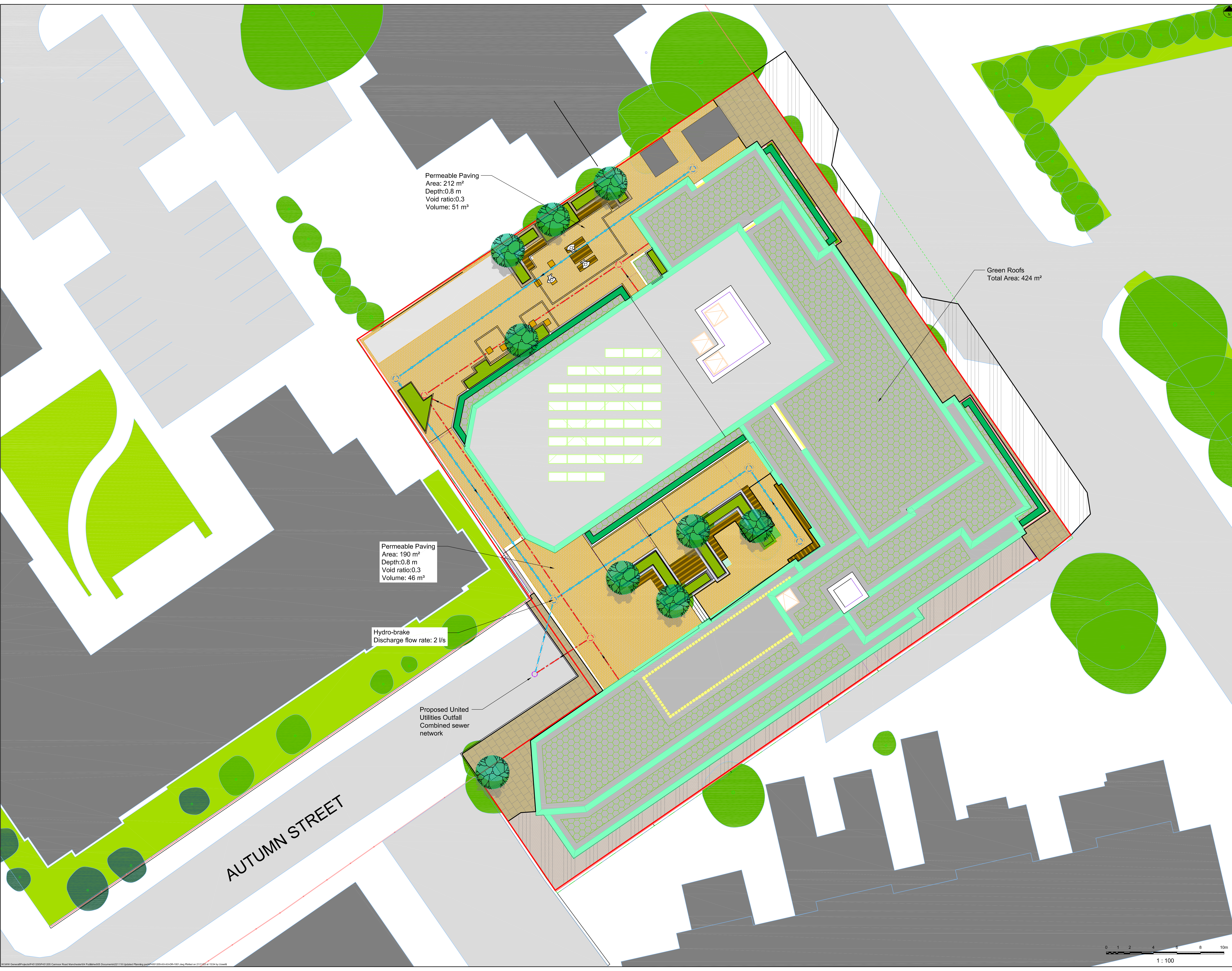
- **MEP coordination** – The proposed drainage layout is subject to change upon receipt of a proposed above ground drainage plan from the appointed MEP engineer. Any amendments made to the above ground drainage design is likely to cause subsequent changes to the below ground drainage design.
- **Green roof design** – The modelled network includes green roofs where community amenity is proposed. If the gross area of community amenity on roofs reduces, then calculations will need to be revisited.
- **Connection Levels** – The network is designed on the assumption that a gravity network connection is feasible. This is expected given the existing drainage information but should be confirmed on site prior to installation.
- **Foul Water capacity** – A pre-planning enquiry will be submitted in to ensure that there is sufficient capacity.

6 CONCLUSIONS AND RECOMMENDATIONS

The main conclusions from this drainage strategy report are detailed below.

- Greenfield runoff rates have been calculated and identified a QBar of 1.32 l/s. The site will be restricted to 2 l/s which is as close to greenfield as can practically be achieved as lower discharge rates would require orifice plates lower than 50mm;
- The discharge of foul water is calculated to be 7.96 l/s;
- The attenuation required for storage is 96 cubic meters;
- A pre-planning enquiry with United Utilities has not been submitted but will is currently in the process of being implemented;
- The surface water network will utilise green roofs, to attenuate peak flows and provide water quality, biodiversity and amenity benefits with permeable paving to provide additional attenuation;
- Peak foul water flows have been calculated to be approximately 7.96 l/s; and
- Typical maintenance for the drainage network has been identified in section 4.

Appendix A – PROPOSED DRAINAGE LAYOUT



HEALTH AND SAFETY INFORMATION

CONSTRUCTION
THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

IN ADDITION TO THE HAZARDS/ RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

MAINTENANCE/ CLEANING/ OPERATION
MAINTENANCE OF SLOPS, FEATURES AND THE DRAINAGE SYSTEM SHOULD BE CARRIED OUT IN ACCORDANCE WITH THE CERA SLOPS MANUAL AND MANUFACTURERS SPECIFICATIONS

DECOMMISSIONING/ DEMOLITION
REFER TO DRAWING FOR EXTENT OF EXISTING SITE DRAINAGE TO BE ABANDONED/ REMOVED

NOTES

- DO NOT SCALE FROM THIS DRAWING. ONLY FIGURED DIMENSIONS ARE TO BE USED.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- ALL LEVELS ARE IN METRES ABOVE OR DRAINAGE DATUM UNLESS NOTED OTHERWISE.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
- ALL FOUL AND SURFACE WATER PIPES/WORKS TO BE LAID AT MINIMUM GRADIENTS OF 1:40 AND 1:100 RESPECTIVELY UNLESS NOTED OTHERWISE.
- ALL PIPING TO BE 100mm DIAMETER UNLESS NOTED OTHERWISE.
- ROCKER PIPES TO BE INSTALLED AT CONNECTION POINTS TO STRUCTURES TO ALLOW FOR MOVEMENT CAUSED BY SETTLEMENT.
- ALL DRAINAGE IS DESIGNED TO ADAPT TO ADAPTABLE STANDARDS WHERE POSSIBLE, AND BUILDING REGULATIONS PART K.

KEY

RED LINE	RED LINE BOUNDARY
DASHED LINE	EXISTING COMBINED SEWER
SOLID LINE	EXISTING FOUL WATER SEWER
DASHED LINE	EXISTING SURFACE WATER SEWER
SOLID LINE	PROPOSED COMBINED WATER SEWER
SOLID LINE	PROPOSED FOUL WATER SEWER
SOLID LINE	PROPOSED SURFACE WATER SEWER
SOLID LINE	PROPOSED PERFORATED PIPE
SOLID LINE	PROPOSED FILTER PIPE
SOLID LINE	SEWER TO BE REMOVED / ABANDONED
Blue box	ATTENUATION TANK
Orange box	PERMEABLE PAVING
Green box	RAIN GARDEN
Blue box	BLUE / GREEN ROOF
SS	STUB STACK / SOL VENT PIPE / RAIN WATER PIPE
SV	SURFACE WATER BACKSTOP
NRV	FOUL / SURFACE WATER NON RETURN VALVE
RE	FOUL / SURFACE WATER RISING EYE
FG	FLOOR GULLY / ROAD GULLY
CD	CHANNEL DRAIN
EM	EXISTING MANHOLE
AC	ACCESS FITTING CHAMBER
CL	COVER LEVEL
C	COMBINED WATER
EXT	EXISTING
F	FOUL WATER
IC	INSPECTION CHAMBER
IL	INVERT LEVEL
MAN	MANHOLE
S	SURFACE WATER
SL	SOFT LEVEL
TBC	TO BE CONFIRMED

P4	REVISION	TT	RW	21.11.22
P3	FOR DRAFT ISSUE	TT	RW	18.11.22
P2	FOR DRAFT ISSUE	TT	RW	15.11.22
P1	FOR DRAFT ISSUE	TT	RW	04.11.22
REV	DESCRIPTION	CHK	APP	DATE

whitby wood

91-94 LOWER MARSH
LONDON SE1 7AB, UNITED KINGDOM
+44 (0)20 7442 2216 www.whitbywood.com

CLIENT
TIGER DEVELOPMENT LIMITED

PROJECT
CARMOOR ROAD

PRELIMINARY

DRAWING TITLE
PROPOSED DRAINAGE LAYOUT

DATE 21.11.2022	SCALE @ A4 1:100	DRAWN BY TT	CHECKED RW	APPROVED RW
DRAWING NUMBER P4501205-WW-XX-DR-C-1001				REVISION P4

Appendix B – HYDRAULIC SHEETS

[Print](#)[Close Report](#)

Surface water storage requirements for sites

www.uksubs.com | Storage estimation tool

Calculated by:

Site name:

Site location:

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:

Longitude:

Reference:

Date:

Site characteristics

Total site area (ha):

Significant public open space (ha):

Area positively drained (ha):

Impermeable area (ha):

Percentage of drained area that is impermeable (%):

Impervious area drained via infiltration (ha):

Return period for infiltration system design (year):

Impervious area drained to rainwater harvesting (ha):

Return period for rainwater harvesting system (year):

Compliance factor for rainwater harvesting system (%):

Net site area for storage volume design (ha):

Net impermeable area for storage volume design (ha):

Pervious area contribution to runoff (%):

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:

Urban creep allowance factor:

Volume control approach:

Interception rainfall depth (mm):

Minimum flow rate (l/s):

Methodology

esti

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics	Default	Edited
Rainfall 100 yrs 6 hrs:	--	55
Rainfall 100 yrs 12 hrs:	--	72.45
FEH / FSR conversion factor:	1.15	1.15
SAAR (mm):	879	879
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.38	1.38
Growth curve factor 30 year:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Q_{BAR} for total site area (l/s):	1.32	1.32
Q_{BAR} for net site area (l/s):	1.32	1.32

Site discharge rates	Default	Edited	Estimated storage volumes	Default	Edited
1 in 1 year (l/s):	2	2	Attenuation storage 1/100 years (m³):	82	82
1 in 30 years (l/s):	2.2	2.2	Long term storage 1/100 years (m³):	14	14
1 in 100 year (l/s):	2.8	2.8	Total storage 1/100 years (m³):	96	96

This report was produced using the storage estimation tool developed by HRWallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at <http://uksuds.com/terms-and-conditions.htm>. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Calculated by:

Site name:

Site location:

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

Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	879	879
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

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

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

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

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

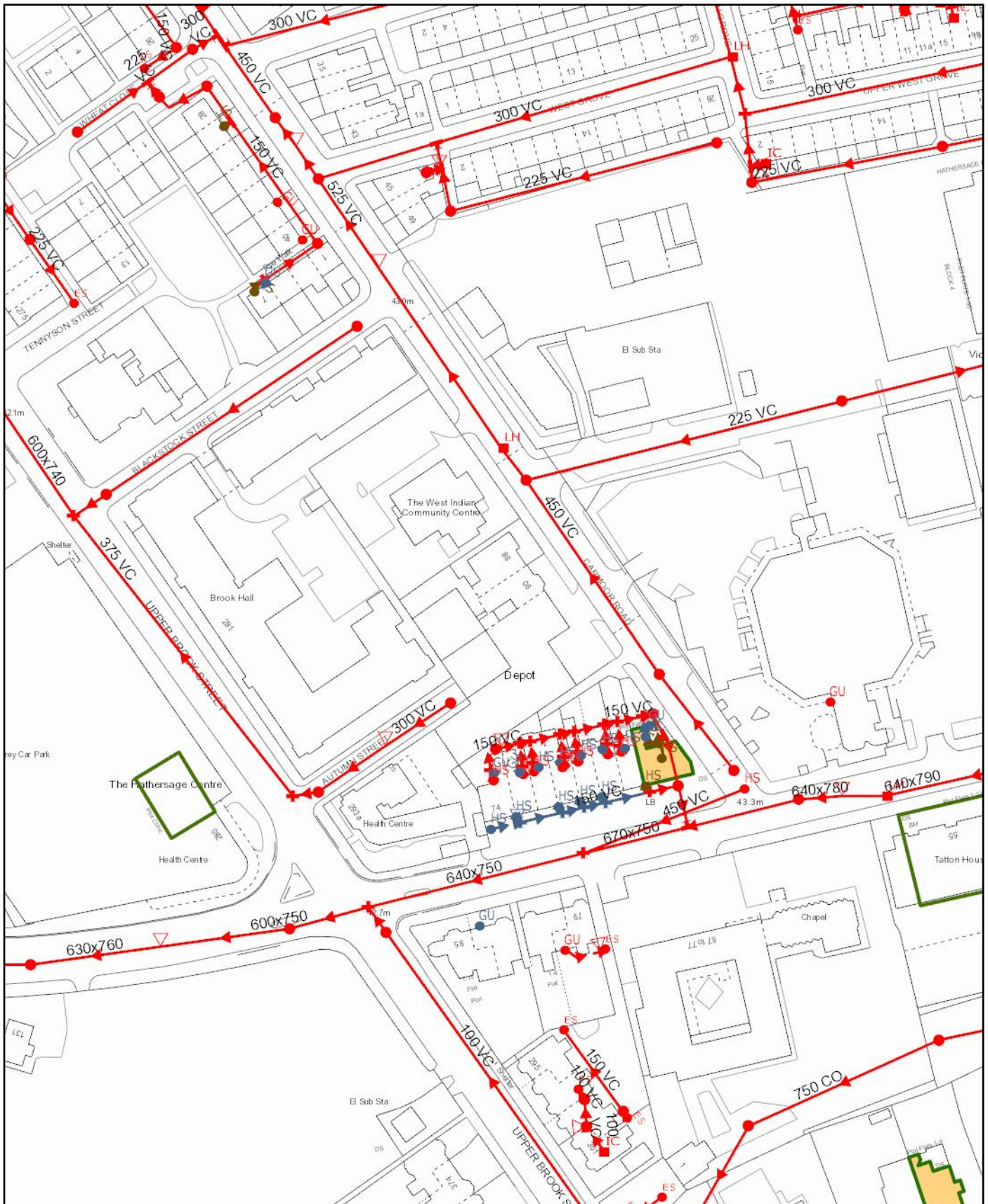
(3) Is $SPR/SPRHOST \leq 0.3$?

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

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	1.32	1.32
1 in 1 year (l/s):	1.15	1.15
1 in 30 years (l/s):	2.25	2.25
1 in 100 year (l/s):	2.75	2.75
1 in 200 years (l/s):	3.14	3.14

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

Appendix C – ASSET LOCATION MAP



Scale: 1:1480
Date: 02/11/2022

SEWER RECORDS



Address or Site Reference: Carmoor Road 74-90 Carmoor Road, Manchester, M31 0FB
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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whitby wood

91-94 LOWER MARSH
LONDON SE1 7AB, UNITED KINGDOM
+44 (0)20 7442 2216 www.whitbywood.com