

Chorlton Precinct

Flood Risk Assessment & Drainage Strategy

NOVEMBER 2024

PREPARED FOR
PJ Livesey

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Flood Risk Assessment & Drainage Strategy

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1. Introduction

This document has been prepared on behalf of PJ Livesey (“the Applicant”) to support a Full Planning Application for the development of Chorlton Precinct, Chorlton-cum-Hardy (“the Site”).

This report provides a full justification as to why the proposals for the site should be deemed acceptable in relation to flood risk and drainage.

This report has been created in support of the planning application for the proposed development. The report aims to assess the application proposals against the risk of flooding and to establish the principles of the drainage scheme in line with the National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG) and the Non-Statutory Technical Standards for Sustainable Drainage Systems, as well as local/regional policy and guidance such as the Chorlton Public Realm Plan and Places for Everyone Joint Development Plan 2022 to 2039. The report has also been informed by pre-planning advice provided by Manchester City Council, the lead local flood authority (“the LLFA”), and United Utilities (“UU”).

2. Development Proposal

The planning application is seeking full planning permission for a residential-led, mixed-use development comprising of 262 residential units, ground floor commercial space (Use Class E(a-e)), a linear park and car parking. The eastern building, the largest one proposed, will include a basement. The development will be located on an existing brownfield site in Chorlton-cum-Hardy.

Civic Engineers (CE) have been appointed as civil and structural engineering consultants for the development of the site.

The landscape general arrangement, illustrating the development proposals, can be seen in Figure 1.



Figure 1: Proposed Landscape Layout

3. Existing Site

The existing site is located in the centre of Chorlton-cum-Hardy. The site is bounded by Nicolas Road and Chorlton Health Centre to the north, Barlow Moor Road to the east, Wilbraham Road and commercial units to the south and residential units car park to the west. The site is brownfield, currently consisting of Chorlton Cross Shopping Centre, Graeme House and car parking. The total site area is approximately 1.27ha and the site location is shown below in Figure 2.

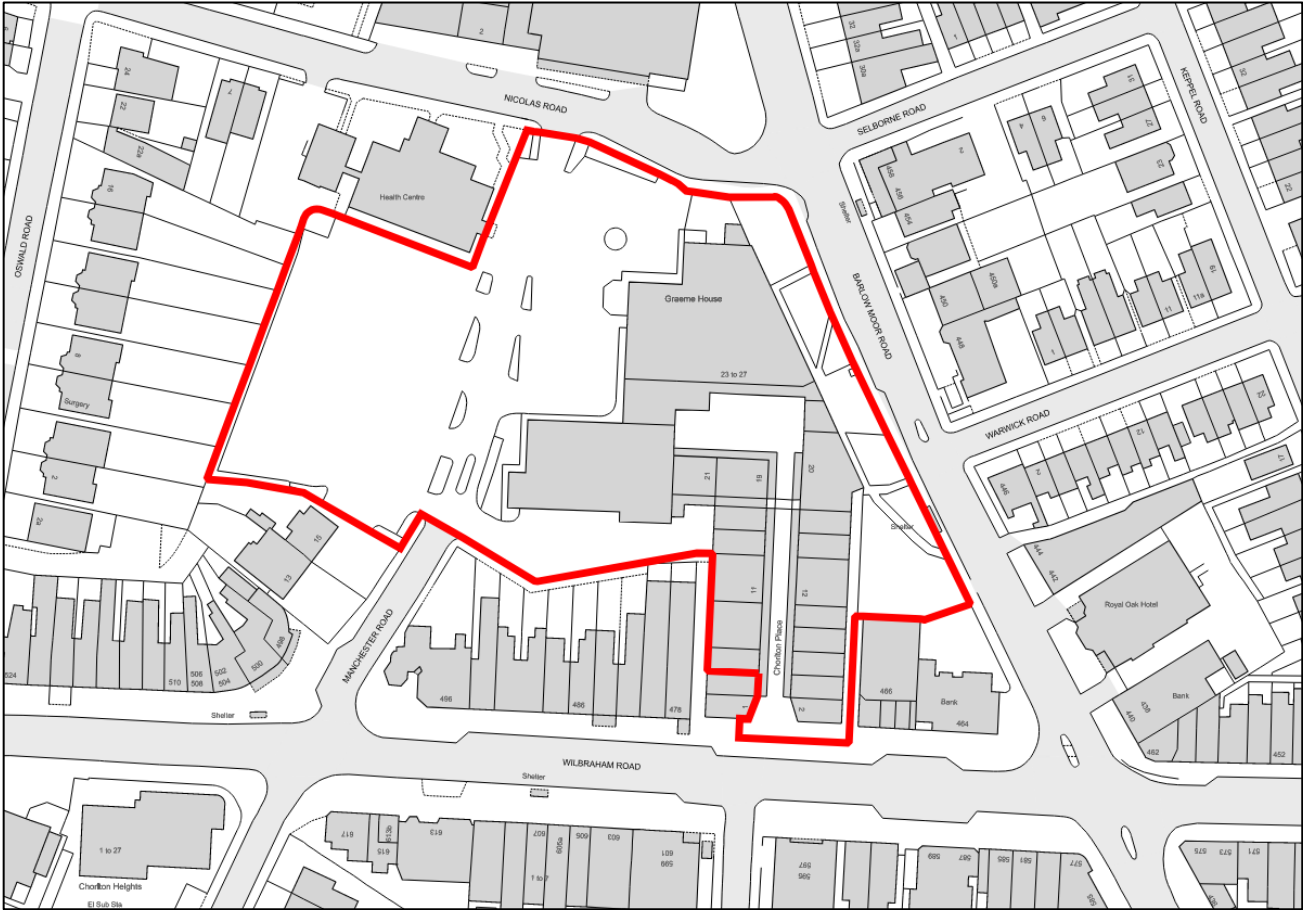


Figure 2: Existing Site Location and Boundary

A separate Prior Notice for Demolition application, *LPA ref. 141706/DEM/2024*, was approved by Manchester City Council, the Local Planning Authority, in January 2025; confirming that the proposed demolition of the existing shopping precinct and Greme House office building can be undertaken under permitted development rights. The approved demolition works are intended to commence in Q2 2025 for a period of circa 20 weeks.

3.1. Topography

Ground levels on the existing site vary approximately between 27.9 – 29.3 mAOD. The site is relatively flat in the across the site – with a gradual increase in level from the east side of the site along Barlow Moor Road to the west of the site.

A topographic survey by JLP Surveying has been included in Appendix A.

3.2. Waterbodies

Chorlton Brook is a tributary of the River Mersey which flows through Chorlton-cum-Hardy running approximately 700m south of the site. The local waterbodies can be seen in Figure 3.

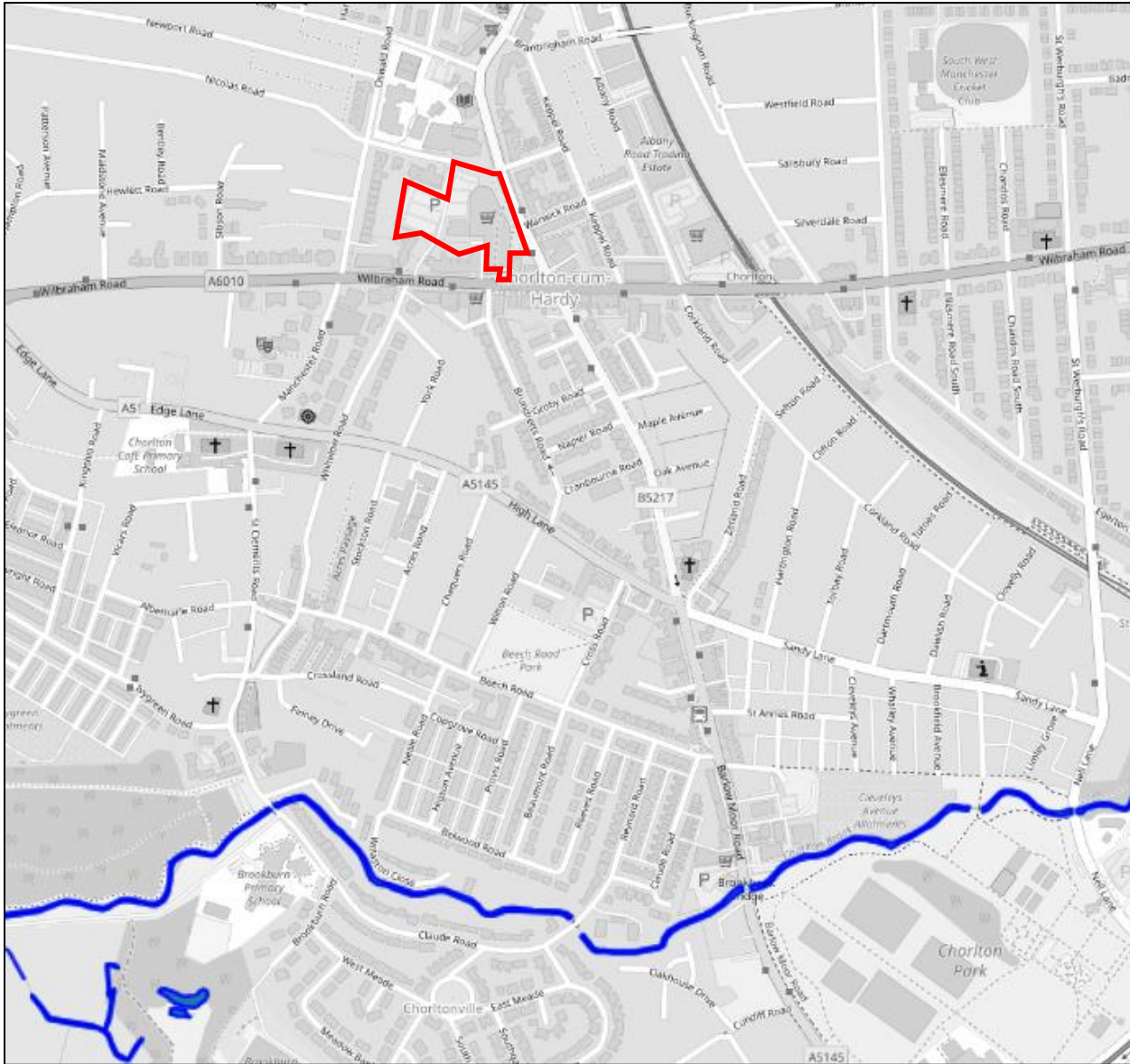


Figure 3: Local Waterbodies, Natural England Blue Infrastructure Map

3.3. Existing Public Sewers

Asset records from United Utilities dated September 2023 (see Figure 4) show an existing 1400mm diameter combined sewer running through the middle of the site from north to south. There is also an existing 150mm diameter combined sewer running northward from Wilbraham Road through an alleyway between the shopping centre and 478 Wilbraham Road, and an existing 150mm diameter combined sewer running westerly to the north of the commercial units on Wilbraham Road. According to the asset mapping, both of these 150mm combined sewer do not connect to the wider sewer network

A CCTV survey was undertaken by Pure in April 2023, which indicates that the two 150mm combined sewers are connected together and discharge into the 1400mm combined sewer.

The full extent of the existing asset mapping can be found appended in Appendix B.

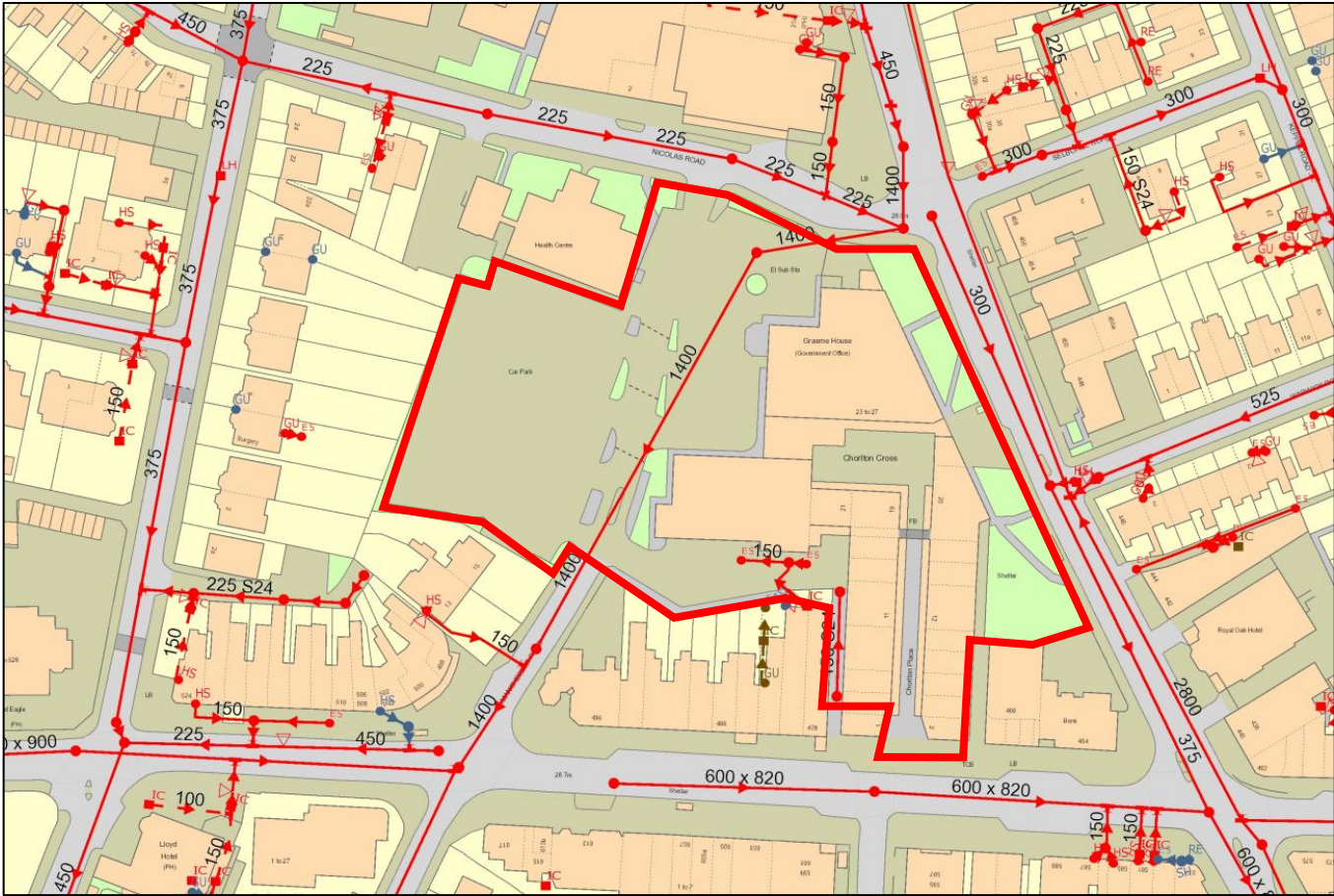


Figure 4: Existing Public Sewers, Severn Trent Asset Maps

3.4. Existing Private Drainage

A PAS128 utility survey was undertaken by JLP Surveying in May 2023, which includes partial information on the existing drainage network. This, along with gully and inspection chamber locations shown on the topographic survey, indicate that there is an existing drainage network of private foul and surface water sewer pipes which serve the existing development.

As outlined in Section 3.3, a CCTV survey was undertaken by Pure in April 2023. The survey provides partial information on the existing foul network. These surveys can be found in Appendix C.

The existing private drainage infrastructure is to be abandoned or demolished as shown in the existing drainage easement and clearance plan in Appendix F, to enable construction of the proposed development.

3.5. Geology

The British Geological Survey (BGS) data available online identifies the following, see Figure 5, geological strata beneath the site:

Superficial Deposits: Glaciofluvial Sheet Deposits, Devensian – Sand and Gravel
 Till, Devensian - Diamicton

Bedrock Geology: Wilmslow Sandstone Formation - Sandstone

The BGS viewer indicates that the bedrock geology is consistent across the site.

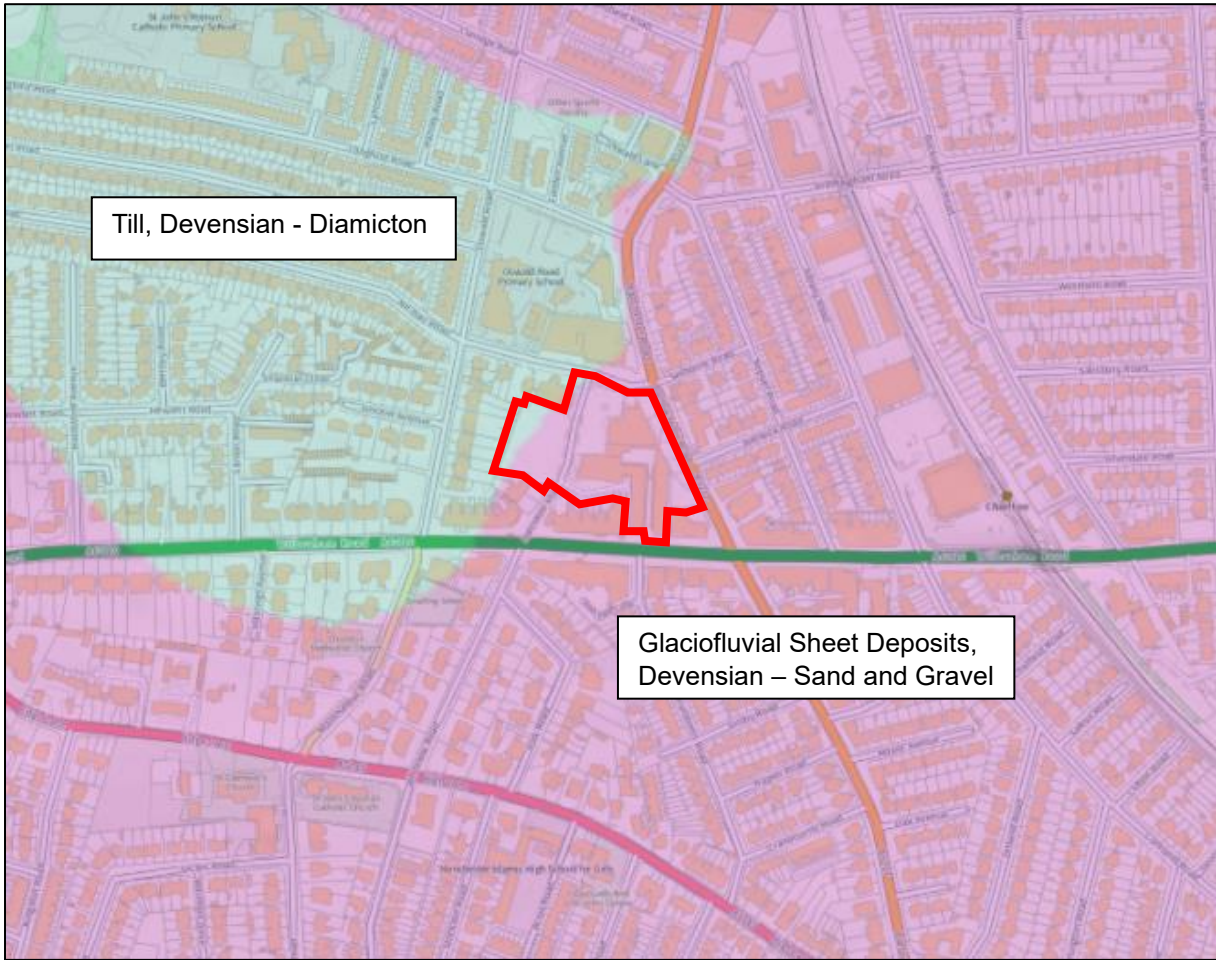


Figure 5: Superficial Deposits - BGS GeoIndex Onshore

A Phase 2 site investigation was undertaken by Civic Earth between 29th April 2024 and 15th May 2024. This is provided within Appendix D. The PRA confirms the BGS findings detailed above, along with the present of made ground associated with the existing development.

3.6. Hydrogeology

The Glaciofluvial Sheet Deposits are designated a Secondary A aquifer whilst the Till (potentially present within the west of the site) is designated a Secondary (undifferentiated) aquifer. The bedrock geology of the Wilmslow Sandstone Formation is designated a Principal Aquifer.

The site is not located within a groundwater Source Protection Zone (SPZ) and there are no groundwater or potable abstraction points located within 1km of the site.

Boreholes undertaken as part of the Phase 2 site investigation, available in Appendix D, identified groundwater bodies within the Glaciofluvial Sheet Deposits as levels between 27.04mOD and 23.88mOD. Perched groundwater within the made ground was found at levels between 28.58mAOD and 26.70mAOD, however this was not present in the boreholes where the groundwater was enabled to drain through the clay layer due to deeper excavation. Locations of these boreholes are provided within Figure 6 and associated groundwater levels are provided within Table 1.



Figure 6: Borehole locations from Phase 2 site investigation

Table 1: Groundwater levels within boreholes - taken from Phase 2 Site Investigation report by Civic Earth

LOCATION	STRATUM	DATE	GROUNDWATER DEPTH (MBGL)	GROUNDWATER LEVEL (MOD)
BH01D	Glaciofluvial Sheet Deposits	21/05/24	4.49	24.02
		31/05/24	4.47	24.04
		07/06/24	4.47	24.04
BH01S	Made Ground	21/05/24	1.73	26.78
		31/05/24	1.71	26.80
		07/06/24	1.69	26.82
BH02	Glaciofluvial Sheet Deposits	21/05/24	4.84	24.04
		31/05/24	4.77	24.11
		07/06/24	4.83	24.05
BH03	Glaciofluvial Sheet Deposits	21/05/24	4.43	23.96
		31/05/24	4.37	24.02
		07/06/24	3.99	24.40
BH04D	Glaciofluvial Sheet Deposits	21/05/24	4.26	23.89
		31/05/24	4.26	23.89
		07/06/24	4.27	23.88
BH04S	Made Ground	21/05/24	1.16	26.99
		31/05/24	1.14	27.01
		07/06/24	1.14	27.01
WS02	Made Ground	21/05/24	0.95	27.57
		31/05/24	0.96	27.56
		07/06/24	DRY	DRY
WS04	Made Ground	21/05/24	0.45	28.57
		31/05/24	0.44	28.58
		07/06/24	0.45	28.57
WS06	Glaciofluvial Sheet Deposits	21/05/24	1.56	26.73
		31/05/24	1.45	26.84
		07/06/24	1.25	27.04
WS07	Made Ground	21/05/24	1.32	26.85
		31/05/24	1.21	26.96
		07/06/24	1.32	26.85
WS10	Made Ground	21/05/24	1.47	26.71
		31/05/24	1.48	26.70
		07/06/24	1.47	26.71

In addition, there is the potential for further shallow perched water across the site given the variable nature of the Made Ground, Glacial Till, and Glaciofluvial Sheet Deposits

The site lies within a medium – high vulnerability, second aquifer groundwater vulnerability zone, as indicated by Figure 7.

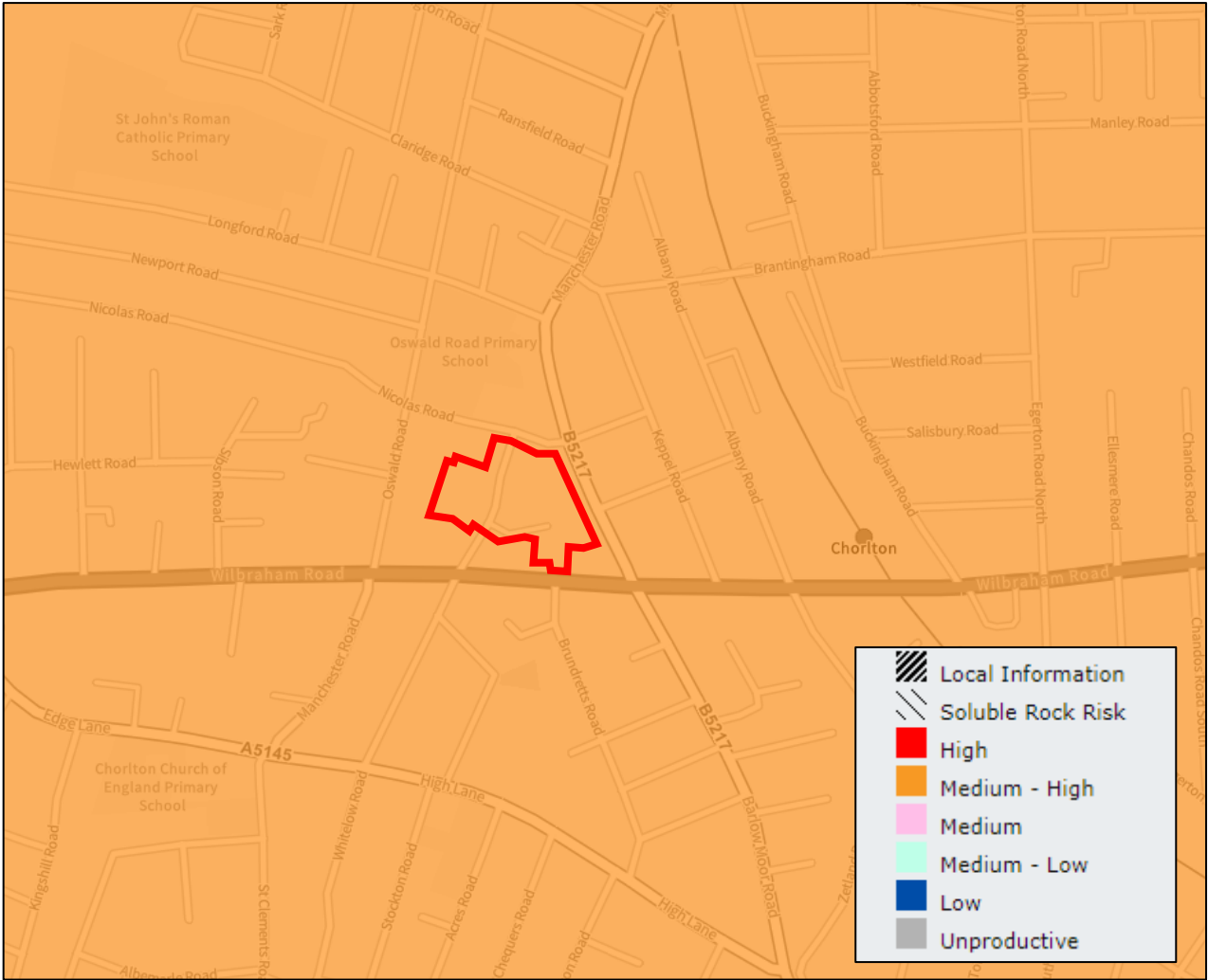


Figure 7: Groundwater vulnerability (site boundary shown in purple)

4. Relevant Policy and Guidance

4.1. National Planning Policy Framework 2024 & Planning Policy Guidance 2022

The National Planning Policy Framework (“NPPF”) is planning policy set out by the UK government, which guides local authorities on the preparation of local and neighbourhood plans, and to decisions on planning applications. The purpose of this policy is to guide development towards sustainable practices.

Flood Risk Categorisation

The NPPF refers to the Flood Zones shown on the EA Flood Map for Planning (Rivers and Sea), and establishes the range of uses which are appropriate, or compatible for each Flood Zone. Table 2, extracted from the Flood Risk and Coastal Change PPG (Table 1), summarises the Flood Zones.

Table 2: Flood Zone

FLOOD ZONE	DEFINITION
ZONE 1 LOW PROBABILITY	Land having a less than 1 in 1,000 (0.1%) annual probability of river or sea flooding. (Shown as ‘clear’ on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
ZONE 2 MEDIUM PROBABILITY	Land having between a 1 in 100 and 1 in 1,000 (1% and 0.1%) annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 (0.5% and 0.1%) annual probability of sea flooding. (Land shown in light blue on the Flood Map for Planning)
ZONE 3A HIGH PROBABILITY	Land having a 1 in 100 (1%) or greater annual probability of river flooding; or Land having a 1 in 200 (0.5%) or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map for Planning)
ZONE 3B FUNCTIONAL FLOODPLAIN	<div>This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:<ul style="list-style-type: none">- Land having a 1 in 30 (3.3%) or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively- Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding)</div> <div>Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (No separately distinguished from Zone 3a on the Flood Map)</div>

The EA Flood Map for Planning (see Figure 8) indicates that the site lies within Flood Zone 1.

Sequential Test

A sequential test is one of the primary measures of mitigating flood risk and considers alternative available sites within the vicinity of a proposed development, assessing whether these have a lower risk of flooding than the currently proposed development location with the intention of prioritising development within areas with reduced flood risk.

Whilst the development has been identified as being subject to surface water flooding (as discussed in Section 6), the development is for the regeneration of an existing brownfield site. A review of the Environment Agency Flood Map for Planning indicates extensive localised pockets of surface water flooding in the wider vicinity of the development site. It is therefore considered that a comparable site with a lower risk of flooding from surface water will not be available and therefore the sequential test has been satisfied.

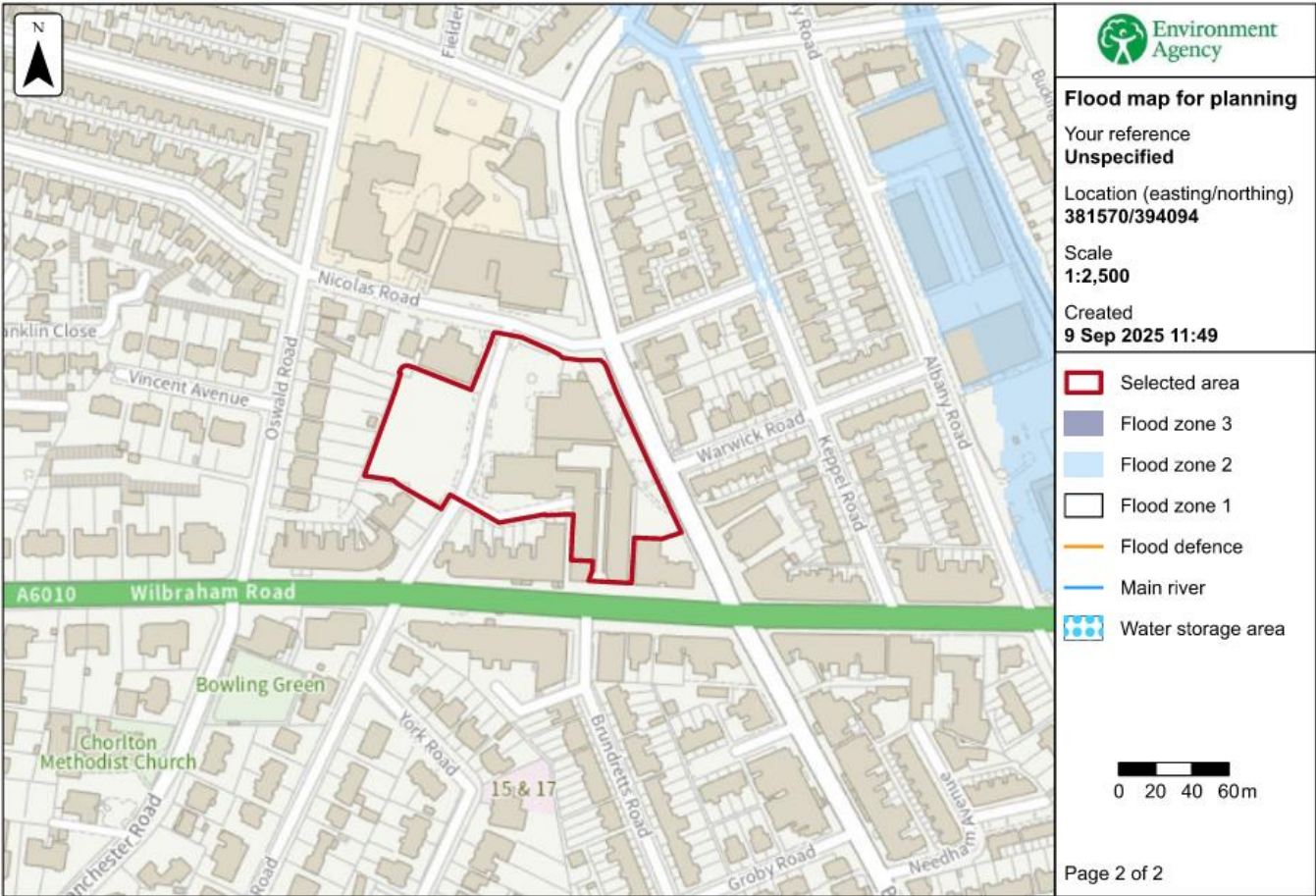


Figure 8: EA Flood Map for Planning

Flood risk vulnerability and flood zone compatibility

Annex 3 of the NPPR defines the type and nature of different development classifications in the context of their flood risk vulnerability. The information in Annex 3 was extracted and is presented in Table 3.

Table 3: Flood risk vulnerability classification

CLASSIFICATION	DESCRIPTION
ESSENTIAL INFRASTRUCTURE	<ul style="list-style-type: none">- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage, and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood.- Wind turbines.- Solar farms.
HIGHLY VULNERABLE	<ul style="list-style-type: none">- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.- Emergency dispersal points.- Basement dwellings.- Caravans, mobile homes, and park homes intended for permanent residential use.- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or waterside locations or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure'.)
MORE VULNERABLE	<ul style="list-style-type: none">- Hospitals- Residential institutions such as residential care homes, children's homes, social services homes, prisons, and hostels.- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs, and hotels.- Non-residential uses for health services, nurseries, and educational establishments.- Landfill* and sites used for waste management facilities for hazardous waste.- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
LESS VULNERABLE	<ul style="list-style-type: none">- Police, ambulance, and fire stations which are not required to be operational during flooding.- Buildings used for shops; financial, professional, and other services; restaurants, cafes, and hot food takeaways; offices; general industry, storage, and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.- Land and buildings used for agriculture and forestry.- Waste treatment (except landfill* and hazardous waste facilities).- Minerals working and processing (except for sand and gravel working).

	<ul style="list-style-type: none">- Water treatment works which do not need to remain operational during times of flood.- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.- Car parks.
WATER-COMPATIBLE DEVELOPMENT	<ul style="list-style-type: none">- Flood control infrastructure.- Water transmission infrastructure and pumping stations.- Sewage transmission infrastructure and pumping stations.- Sand and gravel working.- Docks, marinas, and wharves.- Navigation facilities.- Ministry of Defence installations.- Ship building, repairing, and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.- Water-based recreation (excluding sleeping accommodation).- Lifeguard and coastguard stations.- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

The flood risk vulnerability and flood zone 'incompatibility' extracted from the PPG (flood zone and coastal change, Table 2) is presented below in Table 4.

Table 4: Flood risk vulnerability and flood zone 'incompatibility'

FLOOD ZONES	ESSENTIAL INFRASTRUCTURE	HIGHLY VULNERABLE	MORE VULNERABLE	LESS VULNERABLE	WATER COMPATIBLE
ZONE 1	√	√	√	√	√
ZONE 2	√	Exception Test Required	√	√	√
ZONE 3A	Exception Test Required †	×	Exception Test Required	√	√
ZONE 3B (FUNCTIONAL FLOODPLAIN)	Exception Test Required *	×	×	×	√
√ Development is appropriate × Development should not be permitted.					

The proposals for the development of the site fall within the category of more vulnerable under the definition of 'Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.'

More Vulnerable development is appropriate in Flood Zone 1 and does not require an exception test.

4.1.1. Flood risk assessments: climate change allowances

The site lies within the Upper Mersey Management Catchment, as defined by the Department for Environment Food and Rural Affairs (Defra) Climate Change Allowances Map. Table 5 shows the anticipated increases in rainfall intensity over time, for this catchment, for the 3.3% and 1% annual exceedance rainfall events.

Table 5: Upper Mersey Management Catchment peak rainfall climate change allowances

EPOCH	CENTRAL ALLOWANCE	UPPER END ALLOWANCE
3.3% ANNUAL EXCEEDANCE EVENT		
2050s	20%	35%
2070s	30%	40%
1% ANNUAL EXCEEDANCE EVENT		
2050s	25%	40%
2070s	30%	45%

*Use '2050s' for development with a lifetime up to 2060 and use the 2070s epoch for development between 2061 and 2125.

The EA guidance provides advice on using the peak rainfall intensity allowances to assess surface water flood risk, as quoted below:

'Use the development lifetime guidance to work out the lifetime of your development. You should consider residential development to have a minimum lifetime of a 100 years.

Development with a lifetime beyond 2100:

This includes development proposed in applications or local plan allocations.

For flood risk assessments and strategic flood risk assessments assess the upper end allowances. You must do this for both the 1% and 3.3% annual exceedance probability events for the 2070s epoch (2061 to 2125).

Design your development so that for the upper end allowance in the 1% annual exceedance probability event:

- *There is no increase in flood risk elsewhere.*
- *Your development will be safe from surface water flooding.'*

The proposed development is considered to have a minimum lifetime of 100 years meaning that the 2070s epoch applies. To comply with previously stated guidance, the surface water drainage system will be designed based on a 40% climate change allowance to the 1% annual exceedance rainfall event and designed to ensure there is no increase in flood risk elsewhere and the site is safe from surface water flooding.

4.2. Strategic Flood Risk Assessment (SFRA)

The Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA outlines standards for sustainable drainage (SUDS) from new developments and ensures that developments are designed to take account of the risk from surface water flooding. The SFRA does not define Chorlton-cum-Hardy as a critical drainage area based on surface water flood risk data.

4.3. Manchester Core Strategy Development Plan 2012-2027

The Core Strategy was adopted by Manchester City Council in July 2012, which outlines planning policies to deliver developments within the local development framework.

Policy EN 14: Flood Risk

Flood risk has become a key issue at the national policy level, as the number and severity of recent floods seems to be on the increase. Flooding can lead to serious problems in social, economic and environmental terms, depending on the location of the flood. Some land uses are more vulnerable than others, but flood risk must be considered in all cases. PPS25 (Development and Flood Risk) sets out the approach Local Authorities and Developers should follow in considering flood risk, including a hierarchy of flood risk assessment documents.

PPS25 requires local authorities to identify flood risk in their area through an appropriately detailed Strategic Flood Risk Assessment (SFRA) which covers all sources of flood-risk; for Manchester this is flooding from rivers (fluvial), canals and reservoirs, groundwater, surface-water and sewers, and the implications of climate change. The Council (working with the neighbouring authorities of Salford and Trafford in recognition of the cross-boundary nature of flood risk) has produced an SFRA to inform future development which consists of a Level 1 and a Level 2 report and a mapping volume. The SFRA informs policies in the Core Strategy and provides a context for developers' site-specific Flood Risk Assessments (FRA)

- 1. 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).*
- 2. 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.*
- 3. 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.*
- 4. 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. Flood Risk Assessments should:*

Policy EN17: Water Quality

With reference to the Manchester-Salford-Trafford SFRA and other relevant documents:

- 1. Development should avoid any adverse impact on water quality, including during the construction phase, and wherever possible should seek to enhance water quality, both chemical and ecological;*
- 2. Development should minimise surface water run-off from development and associated roads, and maximise the use of appropriate sustainable drainage systems, to minimise groundwater contamination, and to avoid pollutants reaching watercourses;*
- 3. Development close to a watercourse should also ensure that waste or litter cannot enter the watercourse from the site;*
- 4. Development should, where feasible and appropriate, seek to open up any culverted or hidden watercourse beneath the site to improve the ecological status of that watercourse.*

4.4. Places for Everyone Joint Development Plan 2022 to 2039

The Places for Everyone Joint Development Plan 2022 to 2039 prepared by Greater Manchester Combined Authority outlines the long-term plan for jobs, new homes and sustainable growth for the Greater Manchester area. Guidance on flood risk and water environment factors are specified within Policy JP-S4.

Policy JP-S4: Flood Risk and the Water Environment

An integrated catchment-based approach will be taken to protect the quantity and quality of water bodies with reference to the North West River Basin Management Plan and managing flood risk, by;

1. Returning rivers to a more natural state, where practicable;
2. Working with natural processes and adopting a natural flood management approach to slow the speed of water drainage and intercept water pollutants;
3. Locating and designing development so as to minimise the impacts of current and future flood risk, including retrofitting or relocating existing developments, infrastructure and places to increase resilience to flooding;
4. Expecting developments to manage surface water runoff through sustainable drainage systems and as close to source as possible. Development should achieve greenfield run-off rates unless it is demonstrated to be impracticable. District local plans should consider setting more detailed surface water drainage policies to reflect local circumstances, including alternative surface water discharge rates, such as in areas with critical drainage issues;
5. Ensuring that sustainable drainage systems:
 - a. Are designed to provide multifunctional benefits wherever possible, including for water quality, nature conservation and recreation;
 - b. Avoid adverse impacts on water quality and any possibility of discharging hazardous substances to ground;
 - c. Are delivered in a holistic and integrated manner, including on larger sites split into different phases; and
 - d. Are managed and maintained appropriately to ensure their proper functioning over the lifetime of the development.
6. Securing the remediation of contaminated land and the careful design of developments to minimise the potential for urban diffuse pollution to affect the water environment; and
7. As a minimum, residential development should meet the mandatory water efficiency standard of 125 litres/person/day as set out in Building Regulations. District local plans may and should consider setting a tighter water efficiency standard of 110 litres/person/day where there is a clear local need with reference to national guidance on housing optional technical standards.

5. Consultation

5.1. Lead Local Flood Authority Pre-development Enquiry Response

A pre-development enquiry was issued to Manchester City Council, the lead local flood authority, on 26th September 2024. This enquiry sought to seek advice on planning considerations for the development ahead of application.

A response was received on 1st November 2024 and has been included in Appendix E. Outside of the standard pre-commencement condition clauses; the following advice was provided:

- The site must consider progression through the drainage hierarchy with evidence, supported by site investigation and infiltration testing in accordance with BRE365.
- Agreement in principle is required with United Utilities for proposed connection into a surface water sewer.
- Rate of discharge into sewer assets must be acceptable for United Utilities
- Maximised integration of green SuDS components (utilising infiltration or attenuation) where practicable.
- Private connections into the local authorities highway drainage system will not be permitted.
- Hydraulic calculations of the proposed drainage system, including all design parameters, are required to be submitted for planning. Calculations must include Critical Storm Events for the 1 in 2, 1 in 30 and 1 in 100 + 45% Climate Change. Results must demonstrate no surcharge for the 1 in 2, no flooding in the 1 in 30 and no flooding of buildings for the 1 in 100 + 45% Climate Change.

5.2. United Utilities Pre-development Enquiry Response

A pre-development enquiry was issued to United Utilities, the local water company, on 26th September 2024. This enquiry sought to seek advice on discharge into their assets, along with general advice on planning considerations for the development.

A response was received on 10th October 2024 and has been included in Appendix E. The response outlined the following advice:

- The preferred point of discharge for foul water flow from the site is the 1400mm sewer at unrestricted rates.
- Surface water discharge should adhere to the drainage hierarchy, in line with guidance provided with the North West SuDS Pro-forma.
- United Utilities will consider surface water discharge into public sewers in line with the drainage hierarchy, and request that the agreed rate does not exceed 10l/s for the proposed development.
- If utilising the brownfield method, United Utilities will not accept the modified rational method for large development. Evidence of existing drainage must be surveyed and submitted alongside hydraulic models in order to determine the brownfield rate, plus betterment.

Following further engagement with United Utilities following submission of the pre-development enquiry response, an easement of 5m from the centreline has been advised for the 1400mm brick sewer which runs through the site. United Utilities have also been provided with a typical section showing the proposals for Manchester Road above the sewer, see **Appendix L**, and have offered the following initial feedback with regards to the construction of SuDS above their sewer asset;

- Raingarden will require removal if sewer requires excavation post-development.
- No infiltration risk should be posed to their sewer from SuDS. United Utilities have therefore requested that raingardens should be impermeably lined.
- Any trees must be located outside of the easement.
- Risk of piling through the sewer needs to be assessed.

In line with the comments rain gardens will not have any trees within the easement area of the sewer, and they will be lined with an impermeable membrane to prevent infiltration above the sewer asset. In addition, the sewer has been surveyed via CCTV as shown in **Appendix C** which demonstrates that the nearest pile is located around 6880mm away from the sewer. This is shown in the section of Manchester Road included in **Appendix L**.

6. Hydrological Assessment

6.1. Flooding History

There is no record of flooding within the Historic Flood Map published by the Environment Agency which has recorded major flood data since records began in 1946. Furthermore, no historic flood risk is highlighted within the local SFRA.

6.2. Fluvial Flood Risk

The EA Flood Risk from Rivers or the Sea map (see Figure 9) indicates that the site lies within Flood Zone 1, meaning that there is a less than 0.1% change of flooding from rivers of the sea each year. The site is, therefore, considered to be at very low risk of fluvial flooding.

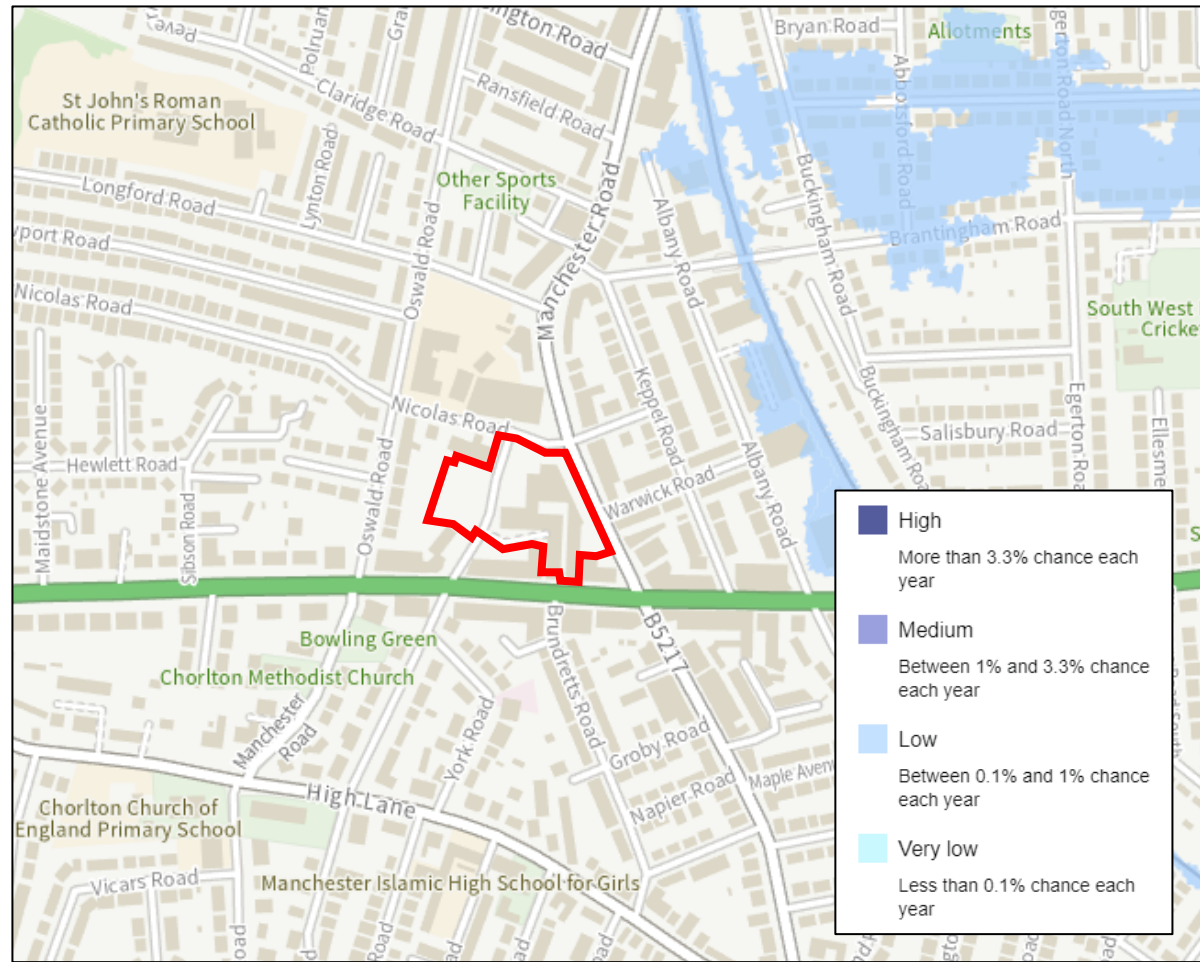


Figure 9: EA Flood Risk from Rivers or the Sea Map

6.3. Pluvial Flood Risk

The EA Flood Risk from Surface Water Map (see Figure 10) indicates that whilst the majority of the site is at low to medium risk of surface water flooding, localised pockets are shown to have a high risk, meaning there is more than 3.3% change of flooding each year. The site is considered to be at medium risk of surface water flooding overall.

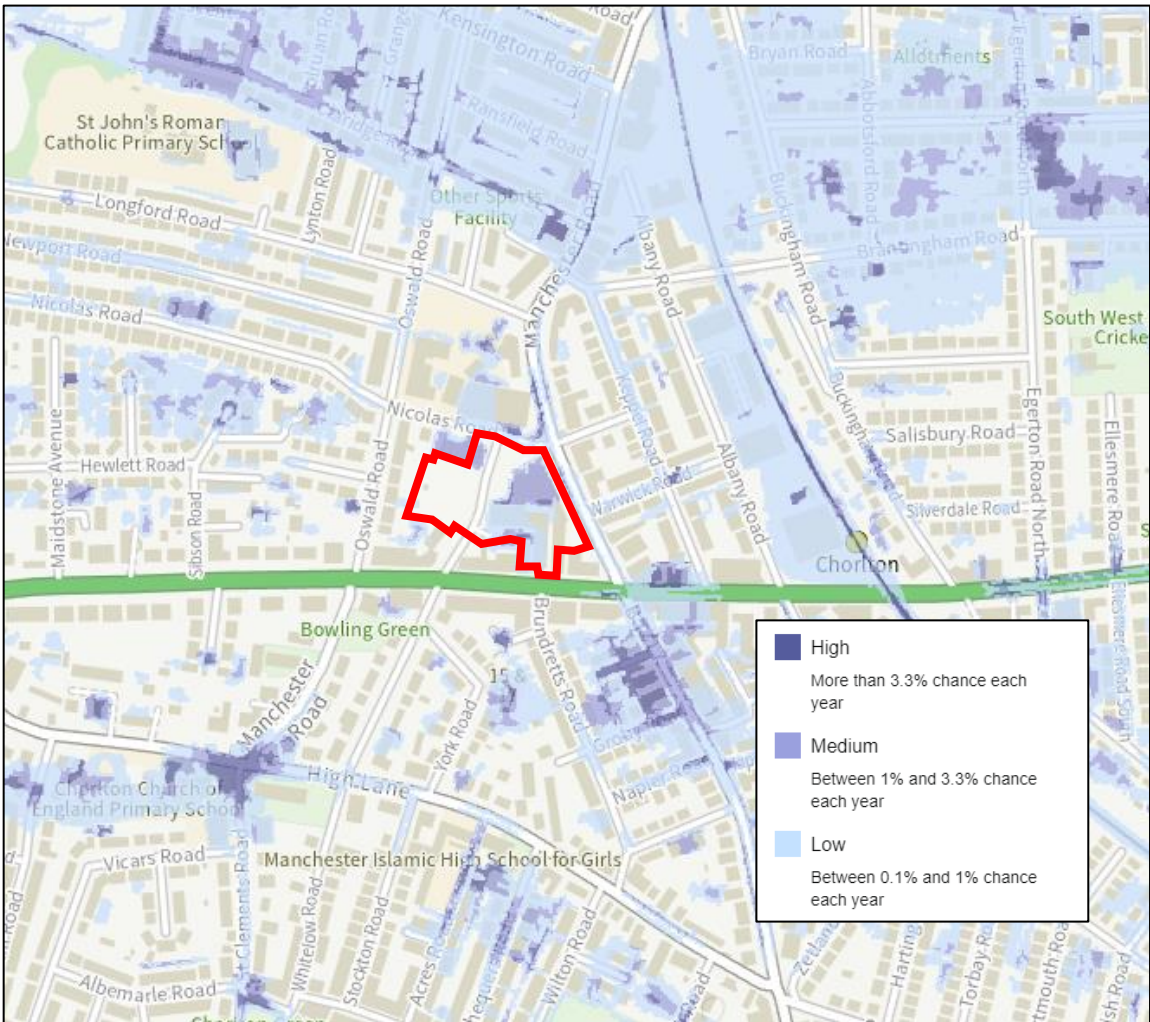


Figure 10: EA Flood Risk from Surface Water Map

6.4. Tidal Flood Risk

The site is approximately 50km from the Irish Sea and sits approximately 28m above sea level. The site is therefore considered to be at insignificant risk from tidal flooding.

6.5. Reservoir Flood Risk

Reservoir flooding is extremely unlikely to happen and there has been no recorded loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

Flood risk to the site from reservoirs is shown in Figure 11. This indicates that the site is at risk of flooding when both the reservoir fails, and the rivers are a flooding. This is considered to be an extremely unlikely event therefore the risk from flooding from reservoirs is considered to be low.

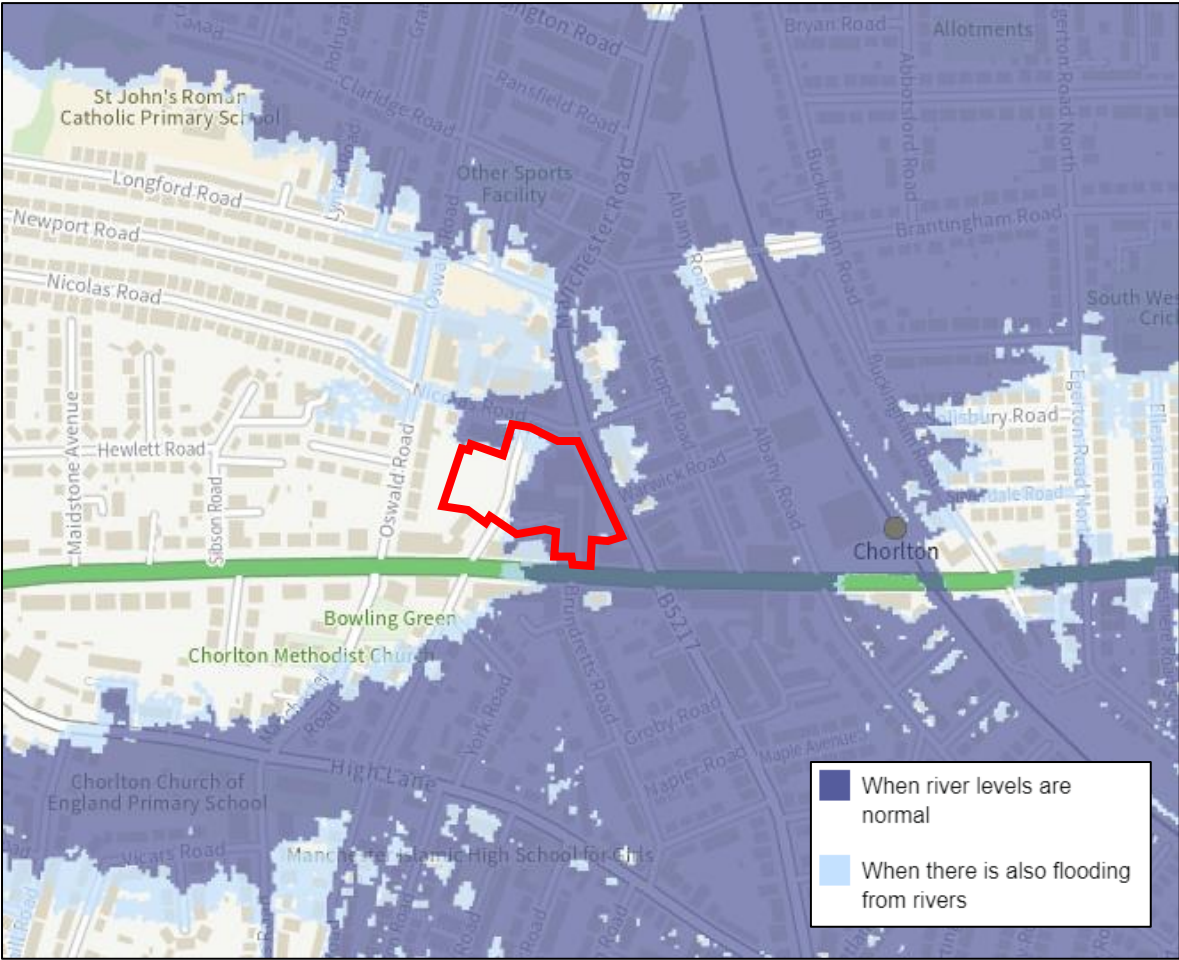


Figure 11: EA Flood Risk from Reservoirs Map

6.6. Groundwater Flood Risk

The local SFRA indicates that the site does not lie within an area at risk of groundwater flooding. However, the Phase 2 site investigation undertaken by Civic Earth (see Section 3.6) identifies perched groundwater within the made ground at levels between 28.58mAOD and 26.70mAOD. The potential for perched water and groundwater ingress during excavation and construction and in the permanent case should be considered by the contractor during construction. Furthermore, a capping layer of concrete may be required to prevent flotation of drainage assets such as attenuation tanks below the groundwater levels to prevent flotation. Details of these provisions will be set out with the manufacturer and supplier of the proposed drainage asset at detailed design.

Groundwater flooding tends to occur following longer periods of high rainfall, lasting longer than fluvial/pluvial flooding and with a later peak. Given the current understanding and considering the varying levels of groundwater identified on site – it is anticipated that any groundwater flooding issues are likely to be localised and that the overall risk to the site from groundwater flooding is medium. Where there is a higher risk of groundwater flooding, or the groundwater table is particularly high this will impact the type of SuDS feature chosen alongside its potential for infiltration. Infiltration is not to be considered in any areas where the base of the SuDS feature does not have 1m clearance to the highest known groundwater level.

6.7. Public sewer flooding, highway drainage flooding and infrastructure failure

The sewers and drains on the site are primarily public sewers maintained by United Utilities. The risk from public sewer and highway drainage is, therefore, considered low.

6.8. Summary of Flood Risk

A summary of the flood risk to the site is shown in Table 6: Summary of Flood Risk. Overall, flood risk to the site is low.

Table 6: Summary of Flood Risk

SOURCE OF FLOODING	RISK TO THE SITE
FLUVIAL (RIVER)	Low
PLUVIAL (SURFACE WATER)	Medium
TIDAL	Insignificant
RESERVOIR	Low
GROUNDWATER	Medium
INFRASTRUCTURE	Low

7. Proposed Surface Water Drainage Strategy

The proposed drainage strategy has been prepared with reference to pre-planning advice provided by the lead local flood authority and water company, along with reference to local and national planning guidance outlined in Section 4. The proposed drainage strategy plan is included in Appendix I.

7.1. Point of Discharge

The NPPF PPG - Flood risk and coastal change specifies the following hierarchy of drainage options for the discharge of surface water (Paragraph: 056, Reference ID: 7-056-20220825):

1. *Into the ground (infiltration);*
2. *To a surface water body;*
3. *To a surface water sewer, highway drain, or another drainage system;*
4. *To a combined sewer.*

An appraisal of the drainage hierarch follows, with a summary in Table 7:

Infiltration

An intrusive Phase 2 Site Investigation was undertaken in July 2024. The site investigation comprised boreholes across the proposed development. The site investigation confirmed that the ground underlying the development comprises made ground to variable depths overlaying natural strata of stiff clay with a thickness ranging between 11m – 15m. Infiltration is therefore not considered feasible as the primary means of surface water disposal.

Surface Waterbody

The closest open waterbody to the site is the Chorlton Brook, located approximately 700m south of the site. A connection to the Chorlton Brook is not considered a viable option as it would have to pass through third-party land.

Surface Water Sewer

There are no functional surface water sewers within the immediate vicinity of the site according to asset records and GPR surveying within and around the perimeter the site. Discharge into a surface water sewer is therefore not considered to be viable.

Combined Sewer

Combined surface water sewers run through the site, as outlined in Section 3.3. Combined sewers will therefore provide a viable method of discharge. The location of the existing combined sewers are shown in Figure 12, extracted from the existing drainage easement and clearance plan in Appendix F.

Table 7: Summary of Point of Discharge Suitability

POINT OF DISCHARGE	SUITABILITY
GROUND	x
WATERBODY	x
SURFACE WATER SEWER	x
COMBINED WATER SEWER	√
√ suitable	× unsuitable

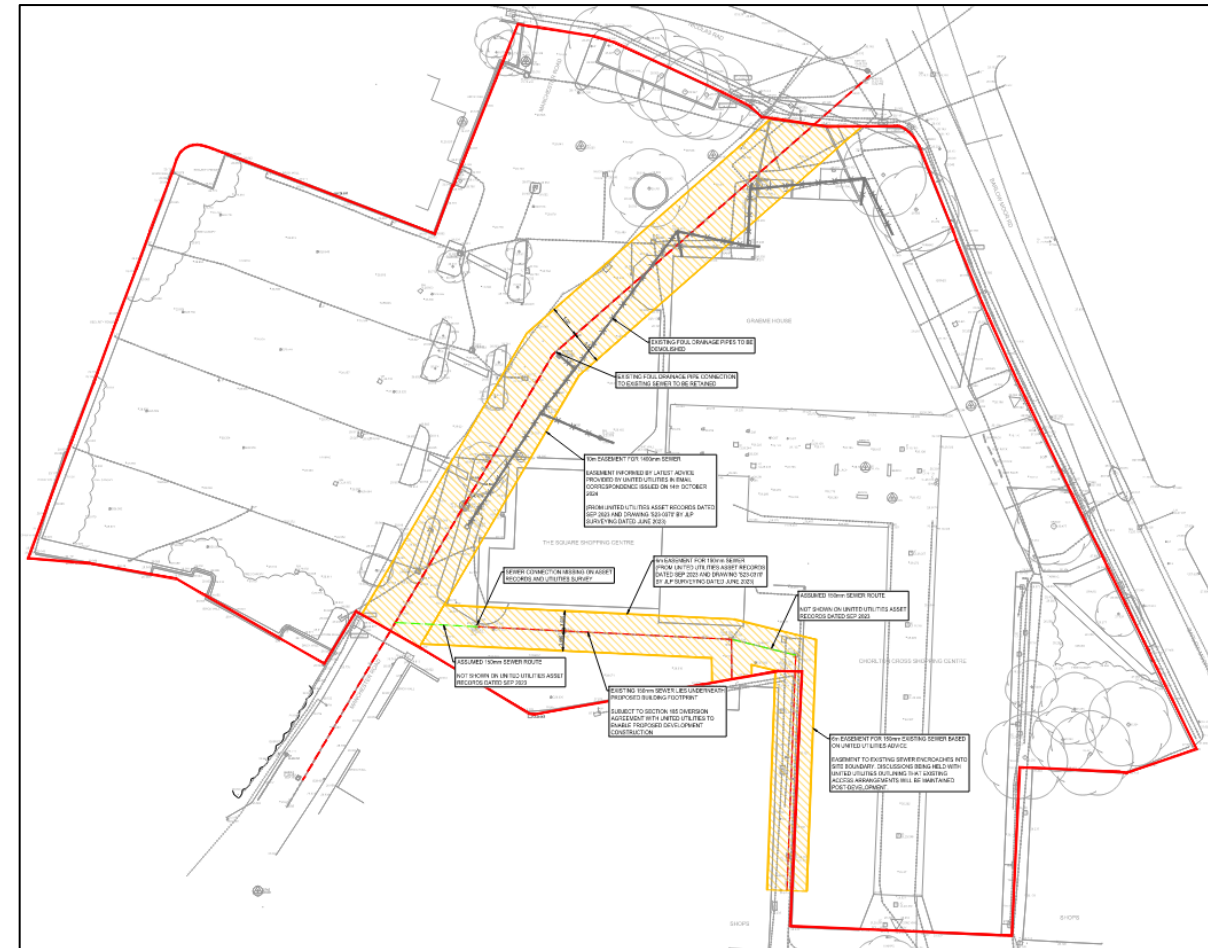


Figure 12: Extract from existing drainage easement and clearance plan

7.2. Detailed Site Areas

The overall site area is approximately 1.27ha.
The existing and proposed site impermeable/permeable split is shown in Table 8

Table 8: Existing and proposed detailed site areas

SCENARIO	PERMEABLE	IMPERMEABLE	TOTAL
EXISTING	0.11	1.16	1.27
PROPOSED	0.18	1.09	1.27

7.3. Proposed Discharge Rate

As the proposed method of discharge will require combined sewers, the lead local food authority have advised that the proposed discharge rate must be acceptable to United Utilities
United Utilities have requested that the maximum discharge rate from the development into their sewer assets should not exceed 10l/s, in line with the greenfield runoff rates for the site.
Therefore the proposed maximum discharge rate of surface water from the whole development is proposed as **10l/s**.
Discharge rates will be controlled through the use of hydro-brake devices.

7.4. Catchment Areas

To reflect the proposed topography of the site, account for the constraints posed by the building basement, and constraints posed to pipes crossing the existing 1400mm combined sewer at low levels, the proposed site has been subdivided into two primary catchments, 'east' and 'west'. The extent of the two primary catchments is shown in Figure 13.
As external land available for attenuation or SuDS provisions are limited within the east catchment, attenuation capacity will be provided through the use of an attenuation tank below the basement. Each network will attenuate for a maximum discharge rate of 5l/s, so that the total discharge rate does not exceed 10l/s as advised by United Utilities, and to mitigate against the risk of blockage at the flow controls as advised by the LLFA.

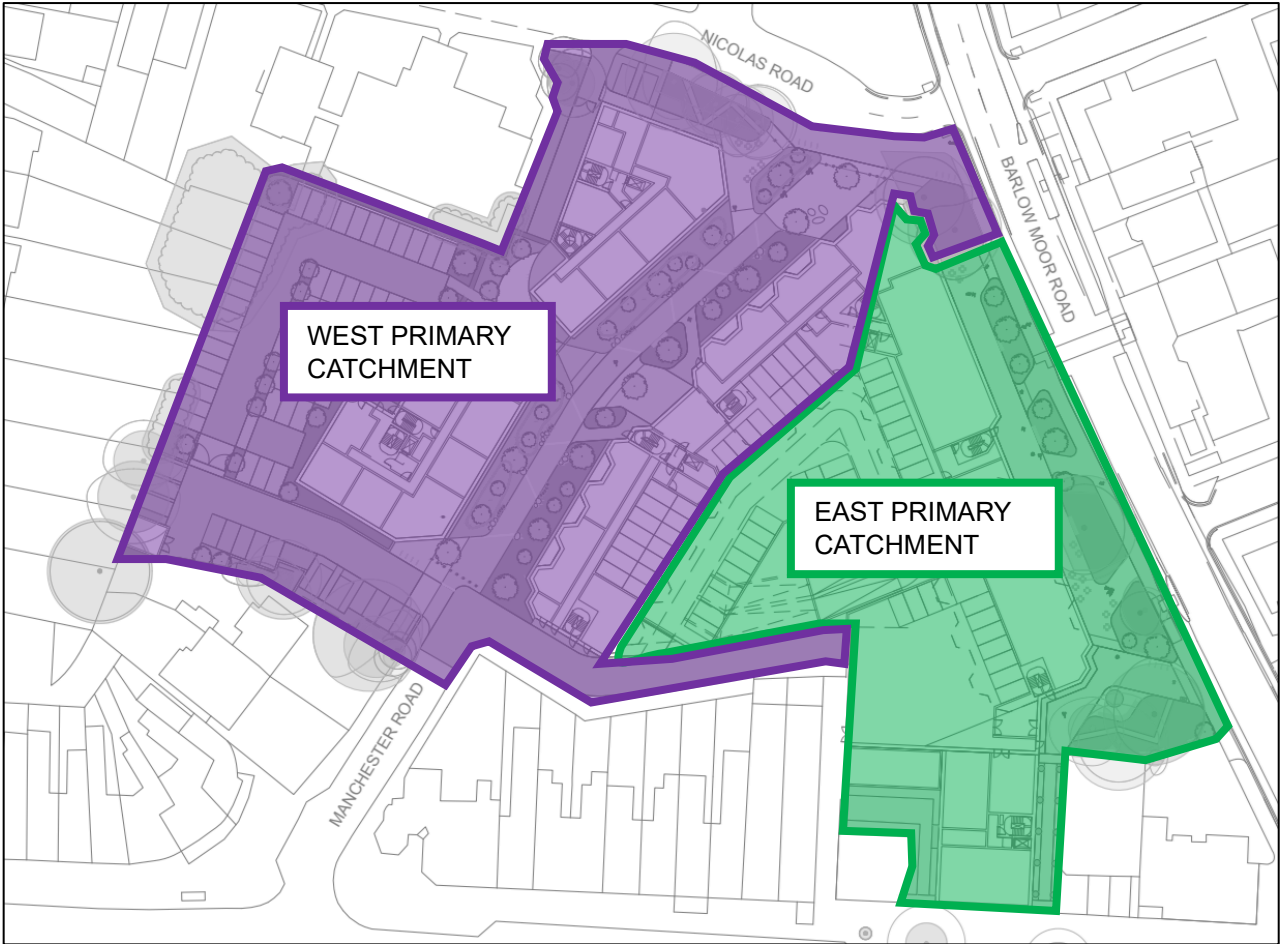


Figure 13: Indicative primary catchment areas

As shown in Figure 13, the two primary catchments are divided within the east building. An indicative section has been drawn to show how these two catchments are divided within the east building in Figure 14.
These primary catchments are further subdivided into small catchments. The drawing showing the catchment subdivision is available in Appendix H.

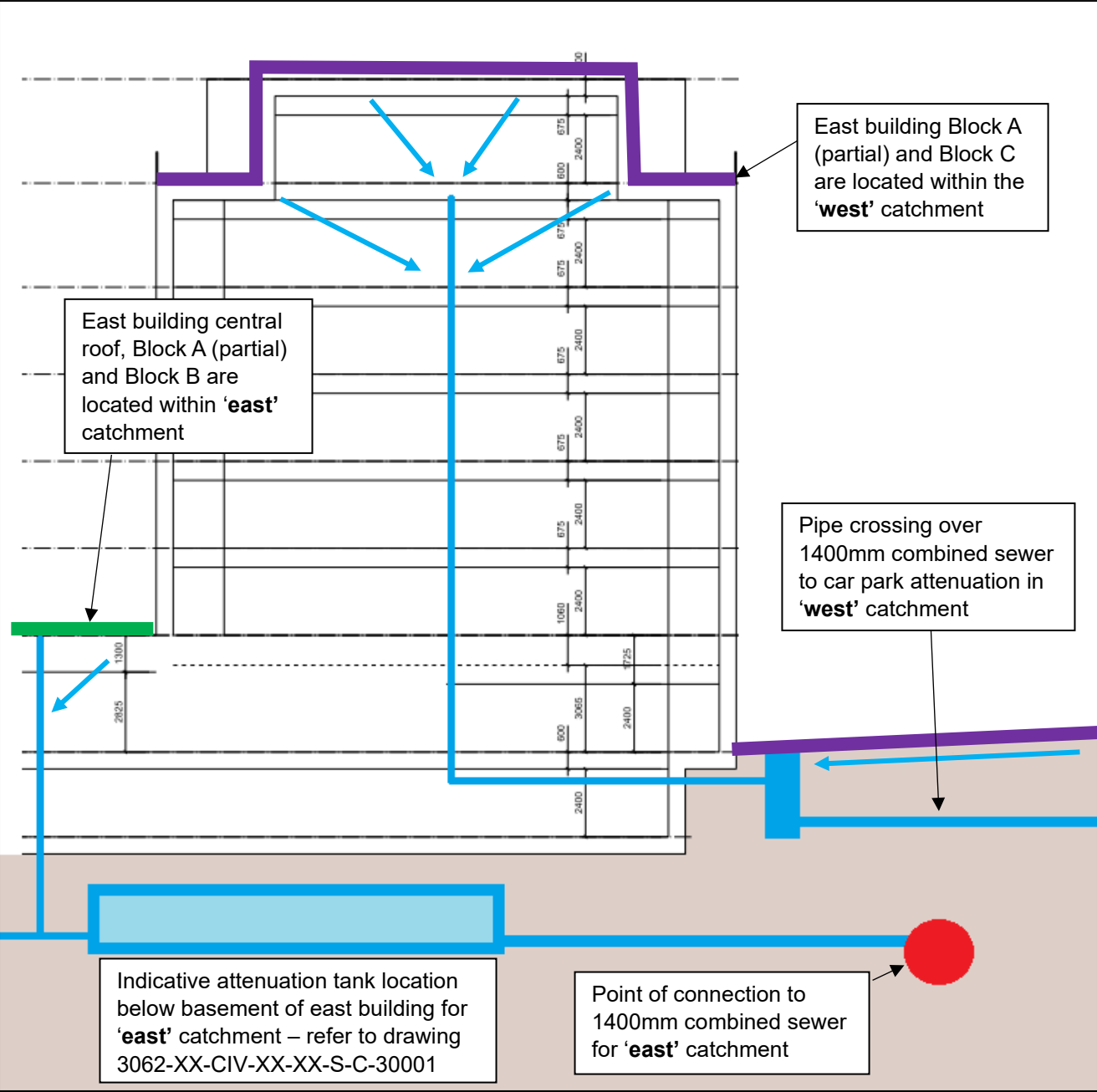


Figure 14: Indicative drainage section of east building Block C and Manchester Road

The catchment areas and their relevant area splits are shown in Table 9, along estimate storage values for each catchment based on the maximum discharge rate of 5l/s and the 100 year critical storm with climate change allowance using Causeway Flow, see Table 9.

Table 9: Proposed site – primary catchment areas

CATCHMENT	AREA (ha)	PERMEABLE AREA (m²)	IMPERMEABLE AREA (m²)	CV	PROPOSED MAX. DISCHARGE RATE (l/s)	REQUIRED STORAGE ESTIMATE (m³)
EAST	0.50	0.02	0.48	1.0	5	483
WEST	0.77	0.14	0.63	1.0	5	303

7.5. Proposed Surface Water Attenuation & Sustainable Drainage Systems (SuDS)

The SuDS features proposed for the site consist of the following:

- Attenuation Tank
- Permeable Paving
- Rain Gardens / Bioretention Systems

The layout and intended SuDS management train across the site can be seen in the outline drainage strategy available in Appendix I.

The attenuation for the site is provided within attenuation tanks, and free-from-fines aggregate (with 30% voids).

The proposed drainage system is of System Type C – no infiltration, pending confirmation of infiltration rates from on-site geological testing.

7.6. Attenuation Volumes

The SuDS features draining each catchment are broken down by effective storage volumes in Table 10.

Table 10: Breakdown of SuDS features by catchment and attenuation volume

SUDS FEATURE	LAYER	TOP AREA (m2)	BASE AREA (m2)	POROSITY (%)	DEPTH (m)	EFFECTIVE STORAGE (m3)
WEST CATCHMENT						
ATTENUATION TANK	ATTENUATION STORAGE	-	200	95	2	380
PERMEABLE PAVING*	SUB-BASE	-	1200	30	0.3	109*
BIORETENTION SYSTEMS	FREEBOARD	-	-	100	0.15	-
	BIORETENTION SOIL	-	-	30	0.75	-
	SUB-BASE	-	325	30	0.3	29
EAST CATCHMENT						
ATTENUATION TANK	ATTENUATION STORAGE	-	300	95	1	285
GREEN ROOF**	-	-	-	-	-	-

* Discharge limited by 100mm orifice– storage volume only partially utilised for attenuation due to high proposed ground levels at car park location.

** Green roof features to comprise of planters and grass areas, to be informed by building design. No attenuation capacity considered at this stage.

7.7. Network Modelling and Simulation

The proposed drainage network has been modelled in Causeway Flow and undergone simulation for the 1 in 2 year storm, 1 in 30 year storm and 1 in 100 year storm with 45% climate change allowance. This demonstrates that the network does not flood in all storm scenarios, and does not surcharge in the 1 in 2 year storm scenario (except at the hydro-brakes where head is required for flow control to function).

Results from the simulation are included in Appendix J.

7.8. Sustainable Drainage Systems (SuDS) Benefits

The SuDS manual CIRIA report C753 states that ‘surface water run-off should be managed for maximum benefit’. The types of benefits that can be achieved by Sustainable Drainage Systems (SuDS) can be put into four categories, the four pillars of SuDS (see Figure 15): water quantity, water quality, amenity and biodiversity. The likely SuDS benefits for each SuDS features can be seen in Table 11.

Table 12 shows what SuDS techniques are proposed to manage surface water on the site. These features are being in collaboration with the design team to control water quantity, improve water quality, provide amenity and promote biodiversity.

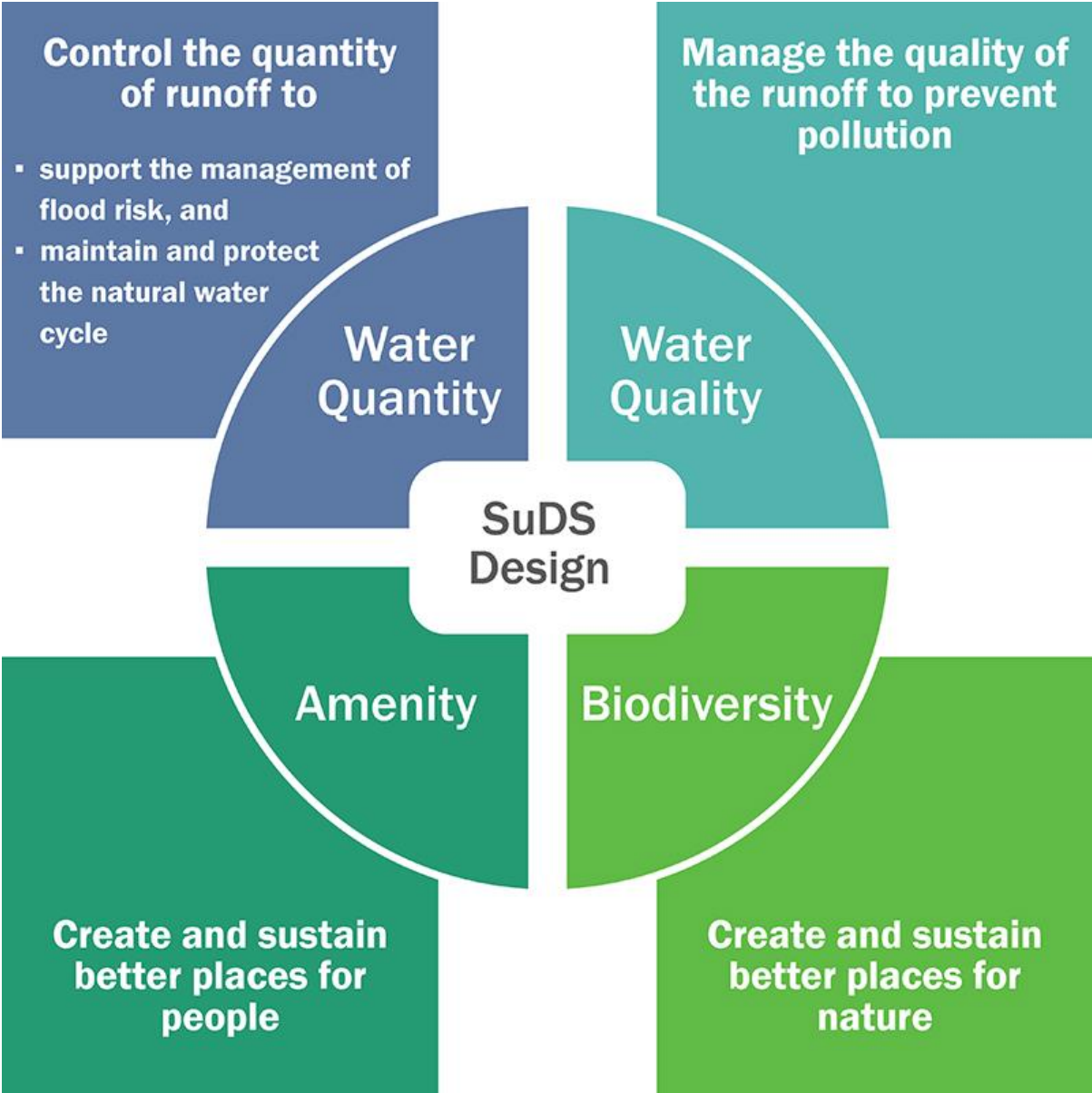


Figure 15: The Four Pillars of SuDS

Table 11: SuDS Likely Benefits

	SUDS FEATURE	WATER QUANTITY	WATER QUALITY	AMENITY	BIODIVERSITY
MOST BENEFITS ↑ ↓ LEAST BENEFITS	LIVING ROOFS	√	√	√	√
	INFILTRATION SYSTEMS	√	√	√	√
	DRY PLANTED FEATURES – SWALES, BIORETENTION AREAS, TREES, DETENTION BASINS	√	√	√	√
	PONDS AND WETLANDS	√	√	√	√
	PERVIOUS AND RESERVOIR PAVEMENTS	√	√		
	FILTER STRIPS	√	√		
	FILTER DRAINS	√	√		
	PROPRIETARY TREATMENT SYSTEMS		√		
LEAST BENEFITS	ATTENUATION STORAGE TANKS	√			

Table 12: Summary of SuDS Techniques Proposed

SUDS TECHNIQUE	PROPOSED?	COMMENT
LIVING ROOFS	Y	Green roof features integrated into podium of eastern building.
INFILTRATION SYSTEMS	N	Infiltration systems are not considered suitable for the project, based on current knowledge detailed in Section 3.6, pending on-site infiltration surveys.
DRY PLANTED FEATURES	Y	Bioretention systems proposed across the site, where appropriate.
OPEN WATER FEATURES	N	There are no suitable external areas for open water features, due to confined development area within a brownfield site with high concentrations of pedestrian activity.
PERVIOUS & RESERVOIR PAVEMENTS	Y	Permeable paving proposed on suitable surfaces within car park of western catchment.
ATTENUATION STORAGE TANKS.	Y	Attenuation tanks proposed to provide required storage capacity prior to discharge into combined sewer at maximum rates advised by United Utilities.

7.9. Water Quality

Designing for water quality involves the specification of SuDS components which adequately cleanse and filter pollutants arising from runoff draining into the system. Runoff from developments is shown to potentially have high levels of suspended solids, copper, zinc, nickel and hydrocarbons which have toxic effects to aquatic life and the general environmental standard of waterbodies.

The approach to providing treatment is closely related to source control. SUDS network should aim to use interception to prevent runoff from entering the SuDS system for the first 5mm of rainfall and should direct runoff through SuDS components providing major treatment/filtering up to the 1 in 1 year storm event.

The primarily inlets of the proposed SuDS system – blue roofs, bioretention systems, and permeable paving are all components providing interception storage.

A preliminary check of water quality performance has been undertaken at this design stage based on the Simple Index Approach detailed in Section 26.7.1 of CIRIA C753. The pollution hazard level of runoff from the site varies from very low to medium, with the hazard indices shown in Table 13.

Table 13: Pollution hazard indices for different land use classifications

LAND USE	POLLUTION HAZARD LEVEL	TOTAL SUSPENDED SOLIDS (TSS)	METALS	HYDROCARBONS
RESIDENTIAL ROOFS	Very Low	0.2	0.2	0.05
COMMERCIAL ROOFS, INDIVIDUAL PROPERTY DRIVEWAYS, RESIDENTIAL CAR PARKS, LOW TRAFFIC ROADS AND NON-RESIDENTIAL CAR PARKING WITH INFREQUENT CHANGE	Low	0.5	0.4	0.4

The proposed SuDS treatment train conveys the runoff through the primary inlets described above, which have the associated mitigation indices shown in Table 14. For the proposed SuDS system all proposed inlet features have mitigation indices greater than the highest level of anticipated pollutants. As such, the proposed system is considered to adequately mitigate the risks of water quality pollution. Where a greater pollutant hazard risk would be identified the proposed SuDS treatment train would provide the necessary treatment with the inclusion of secondary and tertiary features.

Table 14: SuDS mitigation indices for discharges to surface waters

PROPOSED SUDS COMPONENT	MITIGATION INDICES		
	TSS	METALS	HYDROCARBONS
BIORETENTION SYSTEM	0.8	0.8	0.8
PERMEABLE PAVING	0.7	0.6	0.7

Further to the SuDS mitigation features outlined above, it is proposed that a vortex separator is used to treat runoff from within the basement carpark in the eastern catchment in order to remove sediments, hydrocarbons and oils.

7.10. Amenity & Biodiversity

The landscaping strategy for the development has been coordinated with the proposed SuDS to provide amenity and biodiversity improvements across the site. Planting selection is to be appropriate for use within the proposed SuDS infrastructure. Further details of the amenity and biodiversity benefits provided by the proposed scheme may be found in the Landscape Architects reports.

Common benefits provided by the SuDS features forming the drainage strategy can be seen in Table 15.

Table 15: Adaptation of Table 5.1 of CIRIA C753, detailing pertinent amenity and biodiversity benefits delivered by SuDS

CATEGORY	EXAMPLE
AIR QUALITY IMPROVEMENTS	SuDS using blue and green areas, including grass and trees, provide significant air quality improvements by, for example, trees 'scrubbing' fine particulates from urban streets.
AIR AND BUILDING TEMEPRATURE REGULATION	Green infrastructure buffers and moderates extreme temperatures, which will become increasingly important in future, as the climate changes and cities get hotter.
BIODIVERSITY AND ECOLOGY	SuDS help to support flora and fauna for the benefit of communities, and it is here that SuDS amenity and biodiversity value come together.
CARBON EMISSION REDUCTION AND SEQUESTRATION	Plants and soils take in and store CO2 and other greenhouses gases, so where SuDS use plants, this potential can be exploited. SuDS tend to require less energy use in all stages of the supply chain and life cycle than conventional drainage and, by harvesting water at source, this also saves energy.
COMMUNITY COHESTION AND CRIME REDUCTION	SuDS can help bring communities together. By increasing opportunities for human interaction and creating more enjoyable environments, people are more likely to feel they belong to the community and take a greater pride in their neighbourhood. This is especially the case if the community has been involved in the SuDS design process and residents have ownership of the ongoing maintenance.
ECONOMIC GROWTH AND INWARD INVESTMENT	Attractive places (particularly where water is a feature of the design) tend to encourage and support inward investment. Productivity tends to be enhanced in attractive environments. SuDS have been shown to add value to land and property nearby.
EDUCATION	By using green spaces as part of the management of the water cycle this provides many opportunities to support education both formally in schools and in communities as a whole through environmental groups.
HEALTH AND WELL-BEING	Green infrastructure can play an important role in maintaining mental and physical health by providing places for recreation and relaxation.
NOISE REDUCTION	SuDS and associated trees and grassed areas can provide noise-absorbent barriers and surfaces. Green roofs provide sound insulation for buildings.
SECURITY OF WATER SUPPLY	Direct collection of rainwater to use for domestic and other purposes saves water, and potentially provides essential irrigation resources and long-term viability for amenity trees, vegetation and crops.
RECREATION	SuDS can deliver a wide range of green and blue spaces that can be used for walking, cycling, informal play, organised sports and games etc.

8. SuDS Management & Maintenance

The following section outlines management and maintenance considerations prior to submission of planning application. The planning application will typically be subject to imposition of planning conditions requiring submission drainage management and maintenance provisions. A schedule providing guidance on the type of operation and maintenance requirements based on the CIRIA C753 SuDS manual is contained within Appendix K.

Further details of these provisions will be provided at detailed design as required. This can be secured by way of appropriate planning condition(s).

8.1. SuDS -Normal Function

SuDS generally mimic the natural drainage patterns of the undeveloped site allowing infiltration into the ground/attenuation, improving water quality, and controlling outflow rates from the development. This reduces the impact and risk of flooding on downstream development alongside providing additional benefits such as pollution control, increasing biodiversity and providing water-based amenity.

The SuDS proposed for the site are listed below:

- Permeable Paving
- Bioretention Systems (including tree pits and raingardens)
- Green roofs on podium

In short, these drainage features will provide:

- A platform to capture surface water,
- A medium to attenuate, filter and treat surface water, and
- A means of conveying surface water.

8.2. Operation & Maintenance requirements

The maintenance regime of the SuDS on site can be divided into three categories – regular maintenance, occasional tasks, and remedial works. The frequency of regular maintenance will usually be monthly, the occasional tasks and remedial works should be conducted as required. Specific maintenance needs of the SuDS should be monitored, and maintenance schedules adjusted to suit requirements.

A schedule providing guidance on the type of operation and maintenance requirements that may be appropriate, based on the CIRIA C753 SuDS manual is contained within Appendix K.

The activities listed are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required.

All those responsible for maintenance should follow the relevant Health and Safety legislation for all the activities listed including lone working, if relevant, and risk assessments should always be undertaken.

Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.

Any parties involved with the disposal for any waste materials from the underground drainage system should hold appropriate management licenses to undertake any such activities. Disposal of any site activities is required to be made in accordance with current legislation and guidance.

The maintenance strategy for the specific SuDS proposed at the site will be dependent on the products used within the installation of the systems and is, therefore, subject to manufacturers guidance.

9. Proposed Foul Drainage Strategy

Foul water collected from the development will be discharged into the existing 1400mm combined sewer that runs through the centre of the site. The exact details of connections along the foul sewer within the site will be confirmed through detailed design and through consultation with United Utilities. All new connections to the sewer will be subject to a Section 106 agreement with United Utilities.

The site proposes 262 units, which based on a high-level calculation of the discharge using the 4000 litres per dwelling per day gives a discharge rate of 12.13l/s.

9.1. Existing Drainage Alterations

There are several existing private water drainage pipes running through the site. As part of the approved Prior Notice for Demolition submission, these will be removed as they are largely redundant following demolition of the existing development. The proposed S185 diversions of the 150mm combined sewer running through the south of the site can be seen in the drainage strategy layout drawings in Appendix I. Any diversion route will consider easement requirements from United Utilities.

The proposed alterations can be summarised as follows:

- Formal abandonment of all private drains within the site curtilage which are found to be redundant as a result of the change of use of the site
- Diversion of any public combined water sewers around the proposed building footprints as required to enable development construction

9.2. Conclusions

This document has been prepared to support a Full Planning Application for the residential-led mixed-use redevelopment of the currently vacant Chorlton Precinct site, Chorlton-cum-Hardy. This report provides a full justification as to why the proposals for the site should be deemed acceptable in relation to flood risk and drainage, and outlines the proposed drainage strategy to manage surface and foul water from the development.

The assessment has been undertaken in accordance with the National Planning Policy Framework (NPPF) and associated guidance on flood risk and coastal change contained within the Planning Practice Guidance. Local planning policy and the local SFRA have served as further sources of information and guidance where relevant, along with pre-planning advice provided by the lead local flood authority and water company.

According to EA flood mapping, the site is located in partially located in Flood Zone 1. As the proposed development is considered to be 'more vulnerable', it is therefore considered appropriate for this zone.

There is a medium risk of groundwater flooding due to the present of perched water identified in the Phase 1 site investigation. All other sources of flooding are deemed low risk.

Surface water runoff will be managed by the proposed surface water drainage strategy. The proposed strategy utilises SuDS features such as bioretention features, green roofs and permeable paving introduce greater biodiversity and pollution control to the existing site while reducing discharge into the existing 1400mm combined sewer owned by United Utilities, in line with the drainage hierarchy. These proposals replace the existing drainage infrastructure where surface water runoff is discharged from the site with no provisions for water treatment or biodiversity benefit. It is proposed that surface water is discharged from the site at a discharge rate of 10l/s as advised by United Utilities.

The site will comprise of two catchments, one covering the east side of the site and one covering the west side of the site. Each catchment will be managed by separate drainage networks, which will individually discharge into the 1400mm combined sewer at a rate of 5l/s. Any new connection to existing sewer assets is subject to a Section 106 agreement with United Utilities.

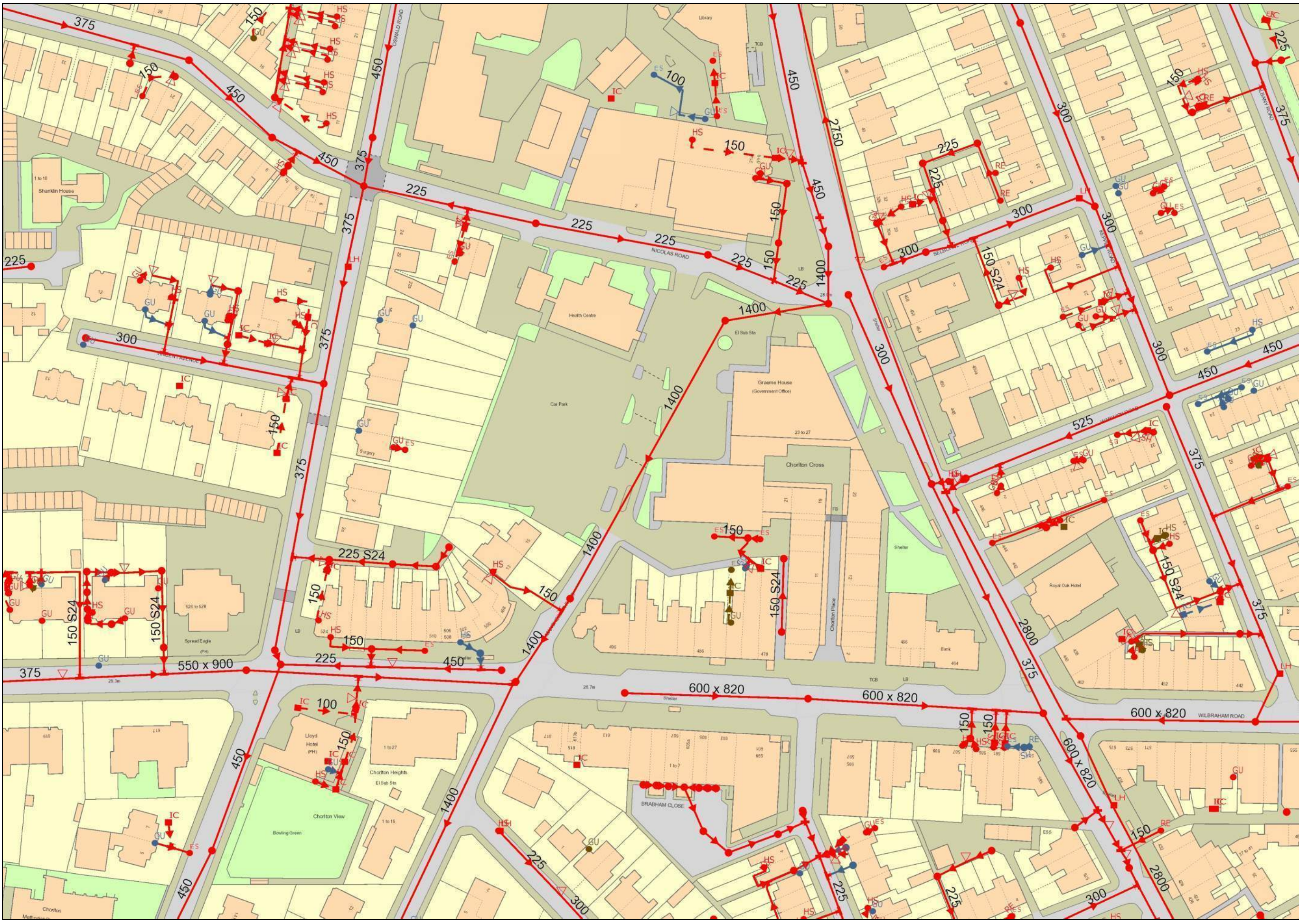
Attenuation provisions to achieve this proposed discharge rate include attenuation tanks, permeable paving subbase and bioretention subbase.

Foul water is proposed to discharge from the whole development into the 1400mm sewer at an unrestricted rate.

Alterations to the existing drainage features, including sewers owned by United Utilities, to enable the construction of the proposed development. Changes to existing sewer assets are subject to a Section 185 agreement with United Utilities. Appropriate planning conditions can be imposed to ensure that key requirements set out in this assessment can be formally designed and approved by the Local Planning Authority and statutory undertaker.

Appendix A: Topographic Survey

Appendix B: Asset Mapping from United Utilities



United Utilities Maps
for SafeDig

Date : 26/09/2023 16:20:47

Centre X: 381546

Centre Y: 394092

Scale : 1250

UserName: G4LG72Y

Extract from maps of United Utilities'
Underground Assets

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private service pipes may be shown by a blue broken line. United Utilities Water will not accept liability for any damage caused by the actual position being different from those shown.

Crown copyright and database rights 2023.Ordnance Survey 100022432 This plan is based on the Ordnance Survey Map with the sanction of the Controller of H.M. Stationary Office. Crown and United Utilities Water copyrights are reserved. Unauthorised reproduction will infringe these copyrights.



Appendix C: CCTV Survey



Project

Project Name: Vista, Manchester Road, Chorlton 24518 2023_04_05

Project Date: 05/04/2023

Inspection Standard: MSCC5 Sewers & Drainage GB (SRM5 Scoring)



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Vista, Manchester Road, Chorlton 24518 2023_04_05		05/04/2023

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WinCan

Project Information

Project Name	Project Number	Project Date
Vista, Manchester Road, Chorlton 24518 2023_04_05		05/04/2023



Scoring Summary

Project Name

Vista, Manchester Road, Chorlton 24518 2023_04_05

Project Number

Project Date

05/04/2023

Structural Defects

Section	PLR	Grade	Description
All inspected pipes are in an acceptable structural condition (< grade 3).			

Service / Operational Condition

- Grade 3: Best practice suggests consideration should be given to maintenance activities in the medium term.
- Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potential blockages.
- Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Section	PLR	Grade	Description
1	SJ81945105X	3	Multiple defects
2	SJ81946109X	4	Attached deposits, encrustation from 4 o'clock to 6 o'clock, 25% cross-sectional area loss
3	SJ81945002X	3	Multiple defects

Abandoned Surveys

Section	PLR	Description
All inspections complete, none are abandoned.		

Information

These scoring summaries are based on the SRM grading from the WRc.



Section Profile

Project Name
Vista, Manchester Road, Chorlton 24518 2023_04_05

Project Number

Project Date
05/04/2023

Circular, 225 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
9	FW6	FW5	05/04/2023	Car Park off Mcr Rd	Vitrified clay	10.12 m	10.12 m
10	FW7	FW6	05/04/2023	Car Park off Mcr Rd	Vitrified clay	13.69 m	13.69 m

Total: 2 Inspections x Circular 225 mm = 23.81 m Total Length and 23.81 m Inspected Length

Circular, 300 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
6	U/STREAM	FW2	05/04/2023	Car Park off Mcr Rd	Vitrified clay	19.04 m	19.04 m
8	FW5	FW4	05/04/2023	Car Park off Mcr Rd	Vitrified clay	19.09 m	19.09 m

Total: 2 Inspections x Circular 300 mm = 38.13 m Total Length and 38.13 m Inspected Length

Circular, 375 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
4	FW1	SJ81945105	05/04/2023	Car Park off Mcr Rd	Vitrified clay	0.60 m	0.60 m
5	FW2	FW1	05/04/2023	Car Park off Mcr Rd	Vitrified clay	7.20 m	7.20 m
7	FW4	FW2	05/04/2023	Car Park off Mcr Rd	Vitrified clay	8.22 m	8.22 m

Total: 3 Inspections x Circular 375 mm = 16.02 m Total Length and 16.02 m Inspected Length

Circular, 1400 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
1	SJ81945105	SJ81945002	05/04/2023	Car Park off Mcr Rd	Brick	73.35 m	73.35 m
2	SJ81946109	SJ81945105	05/04/2023	Car Park off Mcr Rd	Brick	68.95 m	68.95 m
3	SJ81945002	SJ81944008	05/04/2023	Car Park off Mcr Rd	Brick	33.65 m	33.65 m

Total: 3 Inspections x Circular 1400 mm = 175.95 m Total Length and 175.95 m Inspected Length

Total: 10 Inspections = 253.91 m Total Length and 253.91 m Inspected Length



Section Summary

Project Name Vista, Manchester Road, Chorlton 24518 2023_04_05	Project Number	Project Date 05/04/2023
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Number of sections	10
Total length of sections	253.91 m
Total length of inspected sections	253.91 m
Total length of not inspected sections	0.00 m
Number of abandoned inspections	0
Number of section inspection photos	14
Number of section inspection videos	10
Number of section inspection scans	0
Number of section inclination measurements	0

PLR:	SJ81945105X	Upstream Node:	SJ81945105
Inspection Direction:	Upstream	Downstream Node:	SJ81945002
Inspected Length:	73.35 m	Dia/Height:	1,400 mm
Total Length:	73.35 m	Material:	Brick

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: SJ81945002
2	0.00	WL	Water level, 15% of the vertical dimension
3	0.00	DEF	Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, start
4	19.64	CN	Connection other than junction at 2 o'clock, 150mm dia
5	19.64	RF	Roots, fine, start
6	22.69	CN	Connection other than junction at 2 o'clock, 225mm dia
7	23.31	CN	Connection other than junction at 10 o'clock, 150mm dia
8	45.38	CN	Connection other than junction at 10 o'clock, 150mm dia
9	45.38	DEE	Attached deposits, encrustation from 7 o'clock to 10 o'clock, 15% cross-sectional area loss
10	45.45	CN	Connection other than junction at 1 o'clock, 150mm dia
11	45.45	DEG	Attached deposits, grease from 1 o'clock to 5 o'clock, 15% cross-sectional area loss
12	50.57	RF	Roots, fine, finish
13	54.31	CN	Connection other than junction at 2 o'clock, 150mm dia
14	64.41	CN	Connection other than junction at 2 o'clock, 300mm dia
15	73.35	DEF	Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, finish
16	73.35	MHF	Finish node, manhole, reference: SJ81945105

PLR:	SJ81946109X	Upstream Node:	SJ81946109
Inspection Direction:	Upstream	Downstream Node:	SJ81945105
Inspected Length:	68.95 m	Dia/Height:	1,400 mm
Total Length:	68.95 m	Material:	Brick



Section Summary

Project Name Vista, Manchester Road, Chorlton 24518 2023_04_05	Project Number	Project Date 05/04/2023
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No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: SJ81945105
2	0.00	WL	Water level, 10% of the vertical dimension
3	7.36	CN	Connection other than junction at 10 o'clock, 150mm dia
4	26.87	CN	Connection other than junction at 2 o'clock, 150mm dia
5	30.43	CN	Connection other than junction at 2 o'clock, 150mm dia
6	33.26	DEE	Attached deposits, encrustation from 12 o'clock to 4 o'clock, 15% cross-sectional area loss
7	41.95	DEE	Attached deposits, encrustation from 4 o'clock to 6 o'clock, 20% cross-sectional area loss
8	50.40	DEE	Attached deposits, encrustation from 4 o'clock to 6 o'clock, 25% cross-sectional area loss
9	55.39	CN	Connection other than junction at 9 o'clock, 300mm dia
10	68.95	MHF	Finish node, manhole, reference: SJ81946109

PLR:	SJ81945002X	Upstream Node:	SJ81945002
Inspection Direction:	Downstream	Downstream Node:	SJ81944008
Inspected Length:	33.65 m	Dia/Height:	1,400 mm
Total Length:	33.65 m	Material:	Brick

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: SJ81945002
2	0.00	WL	Water level, 15% of the vertical dimension
3	0.00	DEF	Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, start
4	13.86	CN	Connection other than junction at 10 o'clock, 150mm dia
5	13.86	DEE	Attached deposits, encrustation from 7 o'clock to 10 o'clock, 15% cross-sectional area loss
6	20.54	CN	Connection other than junction at 2 o'clock, 150mm dia
7	20.54	DEE	Attached deposits, encrustation from 2 o'clock to 6 o'clock, 20% cross-sectional area loss
8	33.65	DEF	Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, finish
9	33.65	MHF	Finish node, manhole, reference: SJ81944008

PLR:	FW1X	Upstream Node:	FW1
Inspection Direction:	Downstream	Downstream Node:	SJ81945105
Inspected Length:	0.60 m	Dia/Height:	375 mm
Total Length:	0.60 m	Material:	Vitrified clay

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: FW1
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.60	JN	Junction at 6 o'clock, 300mm dia
4	0.60	MHF	Finish node, manhole, reference: SJ81945105

PLR:	FW2X	Upstream Node:	FW2
Inspection Direction:	Downstream	Downstream Node:	FW1
Inspected Length:	7.20 m	Dia/Height:	375 mm
Total Length:	7.20 m	Material:	Vitrified clay

No.	m+	Code	Observation
1	0.00	MH	Start node, manhole, reference: FW2
2	0.00	WL	Water level, 5% of the vertical dimension
3	7.20	MHF	Finish node, manhole, reference: FW1



Section Summary

Project Name Vista, Manchester Road, Chorlton 24518 2023_04_05	Project Number	Project Date 05/04/2023
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PLR:		U/STREAMX		Upstream Node:	U/STREAM
Inspection Direction:		Upstream		Downstream Node:	FW2
Inspected Length:		19.04 m		Dia/Height:	300 mm
Total Length:		19.04 m		Material:	Vitrified clay
No.	m+	Code	Observation		
1	0.00	MH	Start node, manhole, reference: FW2		
2	0.00	WL	Water level, 5% of the vertical dimension		
3	4.19	JN	Junction at 12 o'clock, 150mm dia		
4	19.04	MHF	Finish node, manhole, reference: U/STREAM		
PLR:		FW4X		Upstream Node:	FW4
Inspection Direction:		Upstream		Downstream Node:	FW2
Inspected Length:		8.22 m		Dia/Height:	375 mm
Total Length:		8.22 m		Material:	Vitrified clay
No.	m+	Code	Observation		
1	0.00	MH	Start node, manhole, reference: FW2		
2	0.00	WL	Water level, 5% of the vertical dimension		
3	8.22	MHF	Finish node, manhole, reference: FW4		
PLR:		FW5X		Upstream Node:	FW5
Inspection Direction:		Upstream		Downstream Node:	FW4
Inspected Length:		19.09 m		Dia/Height:	300 mm
Total Length:		19.09 m		Material:	Vitrified clay
No.	m+	Code	Observation		
1	0.00	MH	Start node, manhole, reference: FW4		
2	0.00	WL	Water level, 10% of the vertical dimension		
3	19.09	MHF	Finish node, manhole, reference: FW5		
PLR:		FW6X		Upstream Node:	FW6
Inspection Direction:		Upstream		Downstream Node:	FW5
Inspected Length:		10.12 m		Dia/Height:	225 mm
Total Length:		10.12 m		Material:	Vitrified clay
No.	m+	Code	Observation		
1	0.00	MH	Start node, manhole, reference: FW5		
2	0.00	WL	Water level, 5% of the vertical dimension		
3	3.53	JN	Junction at 12 o'clock, 150mm dia		
4	10.12	MHF	Finish node, manhole, reference: FW6		
PLR:		FW7X		Upstream Node:	FW7
Inspection Direction:		Upstream		Downstream Node:	FW6
Inspected Length:		13.69 m		Dia/Height:	225 mm
Total Length:		13.69 m		Material:	Vitrified clay
No.	m+	Code	Observation		
1	0.00	MH	Start node, manhole, reference: FW6		
2	0.00	WL	Water level, 5% of the vertical dimension		
3	13.69	MHF	Finish node, manhole, reference: FW7		



Project Summary

Project Name Vista, Manchester Road, Chorlton 24518 2023_04_05	Project Number	Project Date 05/04/2023
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Pipe Summary

No.	Type	PLR	Upstream Node	Downstream Node	Road	Town	Use	Mat.	Profile	Length
1	SEC	SJ81945105X	SJ81945105	SJ81945002	Car Park Off Mcr Rd	Chorlton	F	BR	Circular 1400mm	73.35 m
2	SEC	SJ81946109X	SJ81946109	SJ81945105	Car Park Off Mcr Rd	Chorlton	F	BR	Circular 1400mm	68.95 m
3	SEC	SJ81945002X	SJ81945002	SJ81944008	Car Park Off Mcr Rd	Chorlton	F	BR	Circular 1400mm	33.65 m
4	SEC	FW1X	FW1	SJ81945105	Car Park Off Mcr Rd	Chorlton	F	VC	Circular 375mm	0.60 m
5	SEC	FW2X	FW2	FW1	Car Park Off Mcr Rd	Chorlton	F	VC	Circular 375mm	7.20 m
6	SEC	U/STREAMX	U/STREAM	FW2	Car Park Off Mcr Rd	Chorlton	F	VC	Circular 300mm	19.04 m
7	SEC	FW4X	FW4	FW2	Car Park Off Mcr Rd	Chorlton	F	VC	Circular 375mm	8.22 m
8	SEC	FW5X	FW5	FW4	Car Park Off Mcr Rd	Chorlton	F	VC	Circular 300mm	19.09 m
9	SEC	FW6X	FW6	FW5	Car Park Off Mcr Rd	Chorlton	F	VC	Circular 225mm	10.12 m
10	SEC	FW7X	FW7	FW6	Car Park Off Mcr Rd	Chorlton	F	VC	Circular 225mm	13.69 m
Total:										253.91 m

Pipe Levels

No.	PLR	Upstream Node	Upstream C.L.	Upstream I.L.	Upstream I.D.	Downstream Node	Downstream C.L.	Downstream I.L.	Downstream I.D.
1	SJ81945105X	SJ81945105			0.000 m	SJ81945002			0.000 m
2	SJ81946109X	SJ81946109			0.000 m	SJ81945105			0.000 m
3	SJ81945002X	SJ81945002			0.000 m	SJ81944008			0.000 m
4	FW1X	FW1			0.000 m	SJ81945105			0.000 m
5	FW2X	FW2			2.780 m	FW1			3.000 m
6	U/STREAMX	U/STREAM			0.000 m	FW2			0.000 m



Project Summary

Project Name Vista, Manchester Road, Chorlton 24518 2023_04_05	Project Number	Project Date 05/04/2023
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No.	PLR	Upstream Node	Upstream C.L.	Upstream I.L.	Upstream I.D.	Downstream Node	Downstream C.L.	Downstream I.L.	Downstream I.D.
7	FW4X	FW4			0.000 m	FW2			0.000 m
8	FW5X	FW5			0.000 m	FW4			0.000 m
9	FW6X	FW6			0.000 m	FW5			0.000 m
10	FW7X	FW7			0.000 m	FW6			0.000 m

Pipe Summary by Profile

Profile	Total Length	No. Pipes
Circular 1400mm	73.35 m	
Circular 1400mm	68.95 m	
Circular 1400mm	33.65 m	
Circular 1400mm =	175.95 m	3
Circular 225mm	10.12 m	
Circular 225mm	13.69 m	
Circular 225mm =	23.81 m	2
Circular 300mm	19.04 m	
Circular 300mm	19.09 m	
Circular 300mm =	38.13 m	2
Circular 375mm	0.60 m	
Circular 375mm	7.20 m	
Circular 375mm	8.22 m	
Circular 375mm =	16.02 m	3
Total =	253.91 m	10

Inspection Summary

Pipe No.	Insp. No.	Upstream Node	Downstream Node	Dir.	Operator	Insp. Date	Insp. Time	Str	Ser	Final Observation	Length
1	1	SJ81945105	SJ81945002	US	Aw	05/04/2023	9:10	1	4	MHF	73.35 m
2	1	SJ81946109	SJ81945105	US	Aw	05/04/2023	9:47	1	4	MHF	68.95 m
3	1	SJ81945002	SJ81944008	DS	Aw	05/04/2023	10:08	1	3	MHF	33.65 m
4	1	FW1	SJ81945105	DS	Aw	05/04/2023	11:26	1	1	MHF	0.60 m
5	1	FW2	FW1	DS	Aw	05/04/2023	11:44	1	1	MHF	7.20 m



Project Summary

Project Name Vista, Manchester Road, Chorlton 24518 2023_04_05	Project Number	Project Date 05/04/2023
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Pipe No.	Insp. No.	Upstream Node	Downstream Node	Dir.	Operator	Insp. Date	Insp. Time	Str	Ser	Final Observation	Length
6	1	U/STREAM	FW2	US	Aw	05/04/2023	11:47	1	1	MHF, FW3	19.04 m
7	1	FW4	FW2	US	Aw	05/04/2023	12:00	1	1	MHF	8.22 m
8	1	FW5	FW4	US	Aw	05/04/2023	12:02	1	1	MHF	19.09 m
9	1	FW6	FW5	US	Aw	05/04/2023	12:08	1	1	MHF	10.12 m
10	1	FW7	FW6	US	Aw	05/04/2023	12:10	1	1	MHF	13.69 m
Total:											253.91 m

Inspection Summary by Profile

Profile	Total Length	No. Inspections
Circular 1400mm	73.35 m	
Circular 1400mm	68.95 m	
Circular 1400mm	33.65 m	
Circular 1400mm =	175.95 m	3
Circular 225mm	10.12 m	
Circular 225mm	13.69 m	
Circular 225mm =	23.81 m	2
Circular 300mm	19.04 m	
Circular 300mm	19.09 m	
Circular 300mm =	38.13 m	2
Circular 375mm	0.60 m	
Circular 375mm	7.20 m	
Circular 375mm	8.22 m	
Circular 375mm =	16.02 m	3
Total =	253.91 m	10



Project Summary

Project Name Vista, Manchester Road, Chorlton 24518 2023_04_05	Project Number	Project Date 05/04/2023
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Defect Summary				CCTV Drainage Survey Observation Count																				
				General				Structural Condition								Service Condition					Misc			
Sect. No.	Insp. No.	Upstream Node	Downstream Node	Insp. Length (m)	No. Grade 4/5 Obs.	Survey Abandoned	Camera Under Water	Cracks	Fractures	Broken	Deformed	Collapsed	Holes	Surface Damage	Displaced Joints	Open Joints	Roots	Infiltration	Encrustation	Silt	Grease	Obstruction	Water Level	Line Deviates
1	1	SJ81945105	SJ81945002	73.3													2		1		1		1	
2	1	SJ81946109	SJ81945105	69.0															3				1	
3	1	SJ81945002	SJ81944008	33.6															2				1	
4	1	FW1	SJ81945105	0.6																			1	
5	1	FW2	FW1	7.2																			1	
6	1	U/STREAM	FW2	19.0																			1	
7	1	FW4	FW2	8.2																			1	
8	1	FW5	FW4	19.1																			1	
9	1	FW6	FW5	10.1																			1	
10	1	FW7	FW6	13.7																			1	
Total:				253.9													2		6		1		10	



Section Inspection - 05/04/2023 - SJ81945105X



Item No. 1	Insp. No. 1	Date 05/04/23	Time 9:10	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR SJ81945105X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Upstream	Upstream Node:	SJ81945105
Road:	Car Park Off Mcr Rd	Inspected Length:	73.35 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	73.35 m	Downstream Node:	SJ81945002
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	1,400 mm		
Flow Control:	No flow control	Material:	Brick		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:
Recommendations:

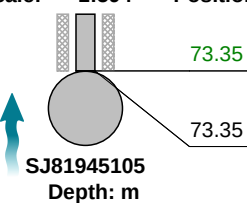
Scale: 1:594	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m SJ81945002						
0.00	MH		Start node, manhole, reference: SJ81945002	00:00:00		
0.00	WL		Water level, 15% of the vertical dimension	00:00:00		
0.00 S01	DEF		Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, start	00:00:00		
19.64	CN		Connection other than junction at 2 o'clock, 150mm dia	00:01:25	SJ81945105X_ca2eccad-58cb	
19.64 S02	RF		Roots, fine, start	00:01:33	SJ81945105X_53c3b958-0bc6	
22.69	CN		Connection other than junction at 2 o'clock, 225mm dia: LIVE	00:01:54	SJ81945105X_7b210389-2c95	
23.31	CN		Connection other than junction at 10 o'clock, 150mm dia	00:02:16	SJ81945105X_a8a3e0de-faef-	
45.38	CN		Connection other than junction at 10 o'clock, 150mm dia	00:04:35		
45.38	DEE		Attached deposits, encrustation from 7 o'clock to 10 o'clock, 15% cross-sectional area loss	00:04:36	SJ81945105X_3e792117-5b28	3
45.45	CN		Connection other than junction at 1 o'clock, 150mm dia	00:04:01		
45.45	DEG		Attached deposits, grease from 1 o'clock to 5 o'clock, 15% cross-sectional area loss	00:04:02	SJ81945105X_04cee7fd-6c33-	3
50.57 F02	RF		Roots, fine, finish	00:04:58		2
54.31	CN		Connection other than junction at 2 o'clock, 150mm dia	00:05:17	SJ81945105X_57c114b3-d95f-	
64.41	CN		Connection other than junction at 2 o'clock, 300mm dia	00:06:10		



Section Inspection - 05/04/2023 - SJ81945105X



Item No. 1	Insp. No. 1	Date 05/04/23	Time 9:10	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR SJ81945105X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Scale:	1:594	Position [m]	Code	Observation	MPEG	Photo	Grade		
		73.35	F01	DEF	Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, finish	00:07:44	3		
		73.35		MHF	Finish node, manhole, reference: SJ81945105	00:07:45			
Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	4	7.0	2.5	185.0	4.0



Section Inspection - 05/04/2023 - SJ81946109X



Item No. 2	Insp. No. 1	Date 05/04/23	Time 9:47	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR SJ81946109X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Upstream	Upstream Node:	SJ81946109
Road:	Car Park Off Mcr Rd	Inspected Length:	68.95 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	68.95 m	Downstream Node:	SJ81945105
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	1,400 mm		
Flow Control:	No flow control	Material:	Brick		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale: 1:595	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m SJ81945105						
	0.00	MH	Start node, manhole, reference: SJ81945105	00:00:00		
	0.00	WL	Water level, 10% of the vertical dimension	00:00:00		
	7.36	CN	Connection other than junction at 10 o'clock, 150mm dia	00:00:34		
	26.87	CN	Connection other than junction at 2 o'clock, 150mm dia	00:02:08		
	30.43	CN	Connection other than junction at 2 o'clock, 150mm dia	00:02:39		
	33.26	DEE	Attached deposits, encrustation from 12 o'clock to 4 o'clock, 15% cross-sectional area loss	00:02:59	SJ81946109X_7e52f047-1b02-	3
	41.95	DEE	Attached deposits, encrustation from 4 o'clock to 6 o'clock, 20% cross-sectional area loss	00:03:53	SJ81946109X_6df103b3-d081-	3
	50.40	DEE	Attached deposits, encrustation from 4 o'clock to 6 o'clock, 25% cross-sectional area loss	00:04:37	SJ81946109X_f3f6160e-3216-	4
	55.39	CN	Connection other than junction at 9 o'clock, 300mm dia: LIVE	00:05:07	SJ81946109X_47be5b5a-31cc	
	68.95	MHF	Finish node, manhole, reference: SJ81946109	00:06:42		
SJ81946109 Depth: m						

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	3	5.0	0.1	9.0	4.0



Section Inspection - 05/04/2023 - SJ81945002X



Item No. 3	Insp. No. 1	Date 05/04/23	Time 10:08	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR SJ81945002X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Downstream	Upstream Node:	SJ81945002
Road:	Car Park Off Mcr Rd	Inspected Length:	33.65 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	33.65 m	Downstream Node:	SJ81944008
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	1,400 mm		
Flow Control:	No flow control	Material:	Brick		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale: 1:291	Position [m]	Code	Observation	MPEG	Photo	Grade																																																												
<div><div><div>Depth: m</div><div>SJ81945002</div><div>SJ81944008</div><div>Depth: m</div></div><table><tr><th>Position [m]</th><th>Code</th><th>Observation</th><th>MPEG</th><th>Photo</th><th>Grade</th></tr><tr><td>0.00</td><td>MH</td><td>Start node, manhole, reference: SJ81945002</td><td>00:00:00</td><td></td><td></td></tr><tr><td>0.00</td><td>WL</td><td>Water level, 15% of the vertical dimension</td><td>00:00:00</td><td></td><td></td></tr><tr><td>0.00</td><td>S01 DEF</td><td>Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, start</td><td>00:00:00</td><td></td><td></td></tr><tr><td>13.86</td><td>CN</td><td>Connection other than junction at 10 o'clock, 150mm dia</td><td>00:01:30</td><td></td><td></td></tr><tr><td>13.86</td><td>DEE</td><td>Attached deposits, encrustation from 7 o'clock to 10 o'clock, 15% cross-sectional area loss</td><td>00:01:34</td><td>SJ81945002X_621807ff-7c02-</td><td>3</td></tr><tr><td>20.54</td><td>CN</td><td>Connection other than junction at 2 o'clock, 150mm dia</td><td>00:02:15</td><td></td><td></td></tr><tr><td>20.54</td><td>DEE</td><td>Attached deposits, encrustation from 2 o'clock to 6 o'clock, 20% cross-sectional area loss</td><td>00:02:19</td><td>SJ81945002X_3e48137c-7ede</td><td>3</td></tr><tr><td>33.65</td><td>F01 DEF</td><td>Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, finish</td><td>00:03:34</td><td></td><td>3</td></tr><tr><td>33.65</td><td>MHF</td><td>Finish node, manhole, reference: SJ81944008</td><td>00:03:43</td><td></td><td></td></tr></table></div>							Position [m]	Code	Observation	MPEG	Photo	Grade	0.00	MH	Start node, manhole, reference: SJ81945002	00:00:00			0.00	WL	Water level, 15% of the vertical dimension	00:00:00			0.00	S01 DEF	Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, start	00:00:00			13.86	CN	Connection other than junction at 10 o'clock, 150mm dia	00:01:30			13.86	DEE	Attached deposits, encrustation from 7 o'clock to 10 o'clock, 15% cross-sectional area loss	00:01:34	SJ81945002X_621807ff-7c02-	3	20.54	CN	Connection other than junction at 2 o'clock, 150mm dia	00:02:15			20.54	DEE	Attached deposits, encrustation from 2 o'clock to 6 o'clock, 20% cross-sectional area loss	00:02:19	SJ81945002X_3e48137c-7ede	3	33.65	F01 DEF	Attached deposits, fouling from 5 o'clock to 7 o'clock, 20% cross-sectional area loss, finish	00:03:34		3	33.65	MHF	Finish node, manhole, reference: SJ81944008	00:03:43		
Position [m]	Code	Observation	MPEG	Photo	Grade																																																													
0.00	MH	Start node, manhole, reference: SJ81945002	00:00:00																																																															
0.00	WL	Water level, 15% of the vertical dimension	00:00:00																																																															
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33.65	MHF	Finish node, manhole, reference: SJ81944008	00:03:43																																																															

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	3	4.0	2.1	72.0	3.0



Section Inspection - 05/04/2023 - FW1X



Item No. 4	Insp. No. 1	Date 05/04/23	Time 11:26	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR FW1X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Downstream	Upstream Node:	FW1
Road:	Car Park Off Mcr Rd	Inspected Length:	0.60 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	0.60 m	Downstream Node:	SJ81945105
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	375 mm		
Flow Control:	No flow control	Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:
Recommendations:

Scale:	1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
		0.00	MH	Start node, manhole, reference: FW1	00:00:00		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
		0.60	JN	Junction at 6 o'clock, 300mm dia: DROPSHAFT INTO MANHOLE	00:00:32		
		0.60	MHF	Finish node, manhole, reference: SJ81945105	00:00:32		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Inspection - 05/04/2023 - FW2X



Item No. 5	Insp. No. 1	Date 05/04/23	Time 11:44	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR FW2X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Downstream	Upstream Node:	FW2
Road:	Car Park Off Mcr Rd	Inspected Length:	7.20 m	Upstream Pipe Depth:	2.780 m
Location:	Road	Total Length:	7.20 m	Downstream Node:	FW1
Surface Type:		Joint Length:		Downstream Pipe Depth:	3.000 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	375 mm		
Flow Control:	No flow control	Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:63	Position [m]	Code	Observation	MPEG	Photo	Grade
<div> <div>Depth: 2.78 m</div> <div>FW2</div> <div> <div>0.00</div> <div>0.00</div> </div> <div> <div>7.20</div> <div>FW1</div> <div>Depth: 3.00 m</div> </div> </div>							
		0.00	MH	Start node, manhole, reference: FW2	00:00:00		
		0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
		7.20	MHF	Finish node, manhole, reference: FW1	00:00:35		

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Inspection - 05/04/2023 - U/STREAMX



Item No. 6	Insp. No. 1	Date 05/04/23	Time 11:47	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR U/STREAMX
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Upstream	Upstream Node:	U/STREAM
Road:	Car Park Off Mcr Rd	Inspected Length:	19.04 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	19.04 m	Downstream Node:	FW2
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Flow Control:	No flow control	Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale: 1:165	Position [m]	Code	Observation	MPEG	Photo	Grade
<div> <div>Depth: m</div> <div>FW2</div> <div> <div>0.00</div> <div>0.00</div> <div>4.19</div> <div>19.04</div> </div> <div>U/STREAM</div> <div>Depth: m</div> </div>						
	0.00	MH	Start node, manhole, reference: FW2	00:00:00		
	0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
	4.19	JN	Junction at 12 o'clock, 150mm dia	00:00:35	U_STREA MX_f24cc 725-c8e8-	
	19.04	MHF	Finish node, manhole, reference: U/STREAM: FW3	00:02:18		

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Inspection - 05/04/2023 - FW4X



Item No. 7	Insp. No. 1	Date 05/04/23	Time 12:00	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR FW4X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Upstream	Upstream Node:	FW4
Road:	Car Park Off Mcr Rd	Inspected Length:	8.22 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	8.22 m	Downstream Node:	FW2
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	375 mm		
Flow Control:	No flow control	Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:
Recommendations:

Scale:	1:71	Position [m]	Code	Observation	MPEG	Photo	Grade
<div> <div>Depth: m</div> <div>FW2</div> <div>0.00</div> <div>MH</div> <div>Start node, manhole, reference: FW2</div> <div>00:00:00</div> </div> <div> <div>0.00</div> <div>WL</div> <div>Water level, 5% of the vertical dimension</div> <div>00:00:00</div> </div> <div> <div>8.22</div> <div>MHF</div> <div>Finish node, manhole, reference: FW4</div> <div>00:00:39</div> </div> <div>FW4</div> <div>Depth: m</div>							

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Inspection - 05/04/2023 - FW5X



Item No. 8	Insp. No. 1	Date 05/04/23	Time 12:02	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR FW5X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Upstream	Upstream Node:	FW5
Road:	Car Park Off Mcr Rd	Inspected Length:	19.09 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	19.09 m	Downstream Node:	FW4
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Flow Control:	No flow control	Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:165	Position [m]	Code	Observation	MPEG	Photo	Grade
<div> <div>Depth: m</div> <div>FW4</div> <div>0.00</div> <div>MH</div> <div>Start node, manhole, reference: FW4</div> <div>00:00:00</div> </div> <div> <div>0.00</div> <div>WL</div> <div>Water level, 10% of the vertical dimension</div> <div>00:00:00</div> </div> <div> <div>19.09</div> <div>MHF</div> <div>Finish node, manhole, reference: FW5</div> <div>00:02:15</div> </div> <div>FW5</div> <div>Depth: m</div>							

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Inspection - 05/04/2023 - FW6X



Item No. 9	Insp. No. 1	Date 05/04/23	Time 12:08	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR FW6X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Upstream	Upstream Node:	FW6
Road:	Car Park Off Mcr Rd	Inspected Length:	10.12 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	10.12 m	Downstream Node:	FW5
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	225 mm		
Flow Control:	No flow control	Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:88	Position [m]	Code	Observation	MPEG	Photo	Grade
<div> <div>Depth: m</div> <div>FW5</div> <div>0.00</div> <div>MH</div> <div>Start node, manhole, reference: FW5</div> <div>00:00:00</div> </div>							
<div> <div>0.00</div> <div>WL</div> <div>Water level, 5% of the vertical dimension</div> <div>00:00:00</div> </div>							
<div> <div>3.53</div> <div>JN</div> <div>Junction at 12 o'clock, 150mm dia</div> <div>00:00:36</div> </div>							
<div> <div>10.12</div> <div>MHF</div> <div>Finish node, manhole, reference: FW6</div> <div>00:01:55</div> </div>							
<div> <div>FW6</div> <div>Depth: m</div> </div>							

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Inspection - 05/04/2023 - FW7X



Item No. 10	Insp. No. 1	Date 05/04/23	Time 12:10	Client's Job Ref Not Specified	Weather No Rain Or Snow	Pre Cleaned No	PLR FW7X
Operator AW		Vehicle OV71 BWL		Camera Mainline	Preset Length Not Specified	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Chorlton	Inspection Direction:	Upstream	Upstream Node:	FW7
Road:	Car Park Off Mcr Rd	Inspected Length:	13.69 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	13.69 m	Downstream Node:	FW6
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	225 mm		
Flow Control:	No flow control	Material:	Vitrified clay		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample condition survey	Lining Material:	No Lining		

Comments:

Recommendations:

Scale:	1:119	Position [m]	Code	Observation	MPEG	Photo	Grade
<div> <div>Depth: m</div> <div>FW6</div> <div>0.00</div> <div>MH</div> <div>Start node, manhole, reference: FW6</div> <div>00:00:00</div> </div> <div> <div>0.00</div> <div>WL</div> <div>Water level, 5% of the vertical dimension</div> <div>00:00:00</div> </div> <div> <div>13.69</div> <div>MHF</div> <div>Finish node, manhole, reference: FW7</div> <div>00:01:47</div> </div> <div>FW7</div> <div>Depth: m</div>							

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Appendix D: Phase 2 Site Investigation

Available upon request

Appendix E: Lead Local Flood Authority and United Utilities Pre-development Enquiry Responses

Case Ref:	MAN/M21/C/PRE
Site Name:	Manchester Road
LLFA Advice Suitability Stage:	☐ RIBA 0 – 2 (Strategic appraisals, feasibility, and concept design). ☒ RIBA 3 – 7 (to prepare a Planning application and to discharge Planning Conditions for pre-commencement through to handover & occupation).

LLFA Comments 01/11/2024

Site checked in Asset Register	Yes
Data Screen Recommended	Yes (due to applicant request for historic flood data screening) – commission link here
FRA Required	Yes (Flood Zone 1, site >1 Ha). Applicant should also note the site is in an area ‘at risk of groundwater rebound’ in the SFRA mapping.

Standard Condition Clauses (Pre-commencement)	Notes made during meeting to appraise proposals against the Clauses
Progression through the drainage hierarchy must be evidence based and supported by site investigation including assessments of ground conditions and infiltration testing in accordance with BRE365. Proposals of attenuation should achieve half drain time within 24 hours.	Required. Specific responses on applicant comments below. “Infiltration – Unlikely due to existing ground” – site investigation evidence required as per left column.
Where surface water is connected to the main river, any works within or adjacent to the river that would affect it would require consent from Environment Agency. An email of acceptance of proposed flows and/or new connection will suffice.	N/A

Where surface water is connected to the ordinary watercourse, agreement in principle from Manchester City Council as Lead Local Flood Authority is required. Please note that all new connections to the watercourses shall comply with reduction of flows to Greenfield runoff rates. An email of acceptance of proposed flows and/or new connection will suffice.	N/A
Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.	<p>Required. Specific responses on applicant comments below.</p> <p>“Combined sewer – Existing 1400mm combined sewer runs across site”:</p> <ul style="list-style-type: none"> • UU agreement required as per left column. <p>“May be possible to drain to surface water sewer at south of site – TBC.”:</p> <ul style="list-style-type: none"> • If this option is pursued, confirmation of whether it is a United Utilities asset would be required. • If it is a private sewer, evidence of owner’s consent to connect would be required (in addition to the UU agreement if it communicates with the public sewer). • If it is a Highway drain, please note we do not permit private connections to the Local Authority’s highway drainage systems.
Maximised integration of green SuDS components (utilising infiltration or attenuation) if practicable.	Required
Details of surface water attenuation to align with the Manchester, Trafford and Salford Strategic Flood Risk Assessment. For brownfield sites a minimum of 50% betterment is required for reduction in runoff rate compared to the existing rates with the aim of reducing to the Greenfield runoff rates.	Required. Note the proposed rate must be acceptable to United Utilities.
Development must be limited to greenfield runoff on Greenfield sites up to a 1 in 100-year event, including climate change allowance.	N/A

Manchester City Council LLFA

A finalised drainage layout showing all components, outfalls, levels and connectivity.	Required
An existing and proposed impermeable areas drawing to accompany all discharge rate calculations.	Required
Hydraulic calculations of the proposed drainage system, including all design parameters. Calculations must Include Critical Storm Events for the 1 in 2, 1 in 30 and 1 in 100 + 45% Climate Change. Results must demonstrate no surcharge for the 1 in 2, no flooding in the 1 in 30 and no flooding of buildings for the 1 in 100 + 45% Climate Change.	Required
Where a XXX diversion is proposed, agreement in principle from XXX is required. An email of acceptance will suffice.	This should be considered regarding the public sewer asset onsite. Evidence will be required of diversions, easements, or build over agreements in principle with United Utilities.
Where a XXX build-over is proposed, agreement in principle from XXX is required. An email of acceptance will suffice.	This should be considered regarding the public sewer asset onsite. Evidence will be required of diversions, easements, or build over agreements in principle with United Utilities.
A blockage risk assessment must be undertaken as part of the drainage strategy to support proposed flows less than 5 l/s.	To be submitted if less than 5 l/s.
An assessment of surface water pollution risk in-line with CIRIA C753 and, where required, evidence of pollution control measures (preferably through SuDS) to treat surface water prior to discharge.	N/A
A plan indicating surface water overland flow routes for extreme events to ensure flows are diverted away from existing and proposed buildings (including basements).	Required
Construction details of flow control and SuDS elements.	Required
A plan indicating easements. SuDS features (including attenuation tanks) should be appropriately positioned, including a 2.5m easement from the existing highway and a 5m easement from any dwellings, guaranteeing	Required

accessibility for future maintenance and contingency for asset failure. This practice is in accordance with SuDS Manual (C753).	
Finished floor levels and proposed ground levels plan.	N/A
Where an application is part of a larger site which already has planning permission it is essential that the new proposal does not compromise the drainage scheme already approved.	N/A

Important Information

- **Our review and advice are proportional to the development stage of the proposal. Details of LLFA Advice Suitability Stage are in the top table of page 1.**
- **Where LLFA Advice Suitability Stage is RIBA 3 – 7, formal Planning submissions must contain information at approvable standard for all above clauses to avoid or discharge a Condition.**
- **Some matters cannot be Conditioned because they affect proposal viability. The LLFA may recommend an Objection if applications do not contain viability information to support the Planning Application. This includes but is not limited to inconsideration of drainage assets near development, inconsideration of flood risk assessment, inconsideration of securing at least one viable option to drain the site.**
- **This review has been made based on information presented in the email:**
 From: [REDACTED]
 Sent: 26 September 2024 10:59
 To: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
 Subject: Pre-Development Enquiry - Chorlton Precinct

From: seweradoptions@uuplc.co.uk
Sent: 10 October 2024 15:25
To: [REDACTED]
Subject: Pre Development Enquiry for: Chorlton Precinct, Manchester Road, Chorlton-cum-Hardy, M21 9As UU Reference Number : 06384352

Good afternoon, Tom

Pre Development Enquiry for: Chorlton Precinct, Manchester Road, Chorlton-cum-Hardy, M21 9As UU Reference Number : 06384352

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 1400mm diameter public combined sewer located within the boundary of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

1. into the ground (infiltration);
2. to a surface waterbody;
3. to a surface water sewer or highway drain;
4. to a combined sewer.

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to

your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area). The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal. Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 1400mm diameter public combined sewer within the boundary of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed **10l/s**. This is line with the Greenfield method which is advised all sites must strive to in accordance with the Ciria SuDS guidance.

If utilising the brownfield method, please note we do not accept the modified rational method for large developments. Evidence of existing drainage must be surveyed and submitted alongside hydraulic models in order to determine the brownfield rate plus betterment.

Please note the given discharge rate is based on the full site area as the specifics of the area being developed are not yet clear. If there are significant areas of the site that will not be developed, the discharge rate should be reduced accordingly.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes. The 1400mm combined sewer at 6m deep will require an **easement of 13m** (6.5m from the centre line). The 150mm combined sewers require a **6m easement** (3m from the centre line).

If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer. *Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.*

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/>

Existing Water Assets Crossing the Site

There is watermain on site with a legal easement.

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further

kind regards,



[Redacted]
Developer Engineer
Developer Services & Metering
Customer Services
T: [Redacted]
[unitedutilities.com](https://www.unitedutilities.com)

If you have received a great service today why not tell us?
Visit: <http://unitedutilities.thewowawards.co.uk/nominate>

----- Original Message -----

From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 26/09/2024 13:23
To: [REDACTED]
Subject: RE: Pre-Development Enquiry - Chorlton Precinct Ref 06384352

Good Afternoon,

PRE DEVELOPMENT APPLICATION AT CHORLTON PRECINCT : – UU Ref 06384352

Please accept this email as receipt of your application received on 26/09/2024 for the above development. This has now been logged on our system and the job reference is 06384352 we would ask that you quote this reference in all future correspondence.

I have reviewed your application (and attachments) and can confirm this is suitable to be passed to Ashleigh Bellerby for technical assessment. You will receive their response on or before 10/10/2024.

Kind regards



[REDACTED]
Customer Advisor Advanced
Developer Services & Metering
Customer Services
T: 0345 026 8989 option 4
unitedutilities.com

If you feel you have received a good service from myself, please can you take two minutes to fill in the survey below. This will be much appreciated



Visit: <https://unitedutilities.thewowawards.co.uk/nominate>

----- Original Message -----

From: [REDACTED]

Sent: 26/09/2024 11:28

To: seweradoptions@uuplc.co.uk

Subject: Pre-Development Enquiry - Chorlton Precinct

Good Morning,

Civic Engineers have been instructed to develop a drainage strategy for our site at Manchester Road, Chorlton-cum-Hardy. Full site address:

Manchester Road,

Chorlton-cum-Hardy,

Manchester,

M21 9AS.

I have attached a sketch of the approximate RLB for the site as well as the PDE form. The approximate site area is 1.29ha.

The drainage discharge hierarchy has been evaluated for the site as follows:

1. Infiltration – Unlikely due to existing ground
2. Surface water body – No appropriate water bodies within the vicinity of the site.
3. Surface water sewer – May be possible to drain to surface water drain/sewer at south of site – TBC.
4. Combined sewer – Existing 1400mm combined sewer runs across site beneath Manchester Road.

At this stage in the design process the proposed drainage strategy is as follows:

Surface water

Discharge to:

1. Surface water drain/sewer or;
2. Combined water sewer if connection to the surface water drain/sewer is not possible.

Foul water

Discharge to the combined sewer beneath Manchester Road.

The site is currently made up of a shopping centre and a large car park. Therefore it may be possible to use a brownfield discharge rate with betterment. Please could you advise on this?

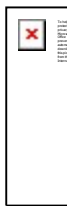
Any general advice you could provide on this development is much appreciated.

Kind regards,

[Redacted]

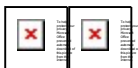
[Redacted]
Graduate Civil Engineer

Tel: [Redacted]
DDI: [Redacted]



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United Utilities Group PLC, Haweswater House, Lingley Mere
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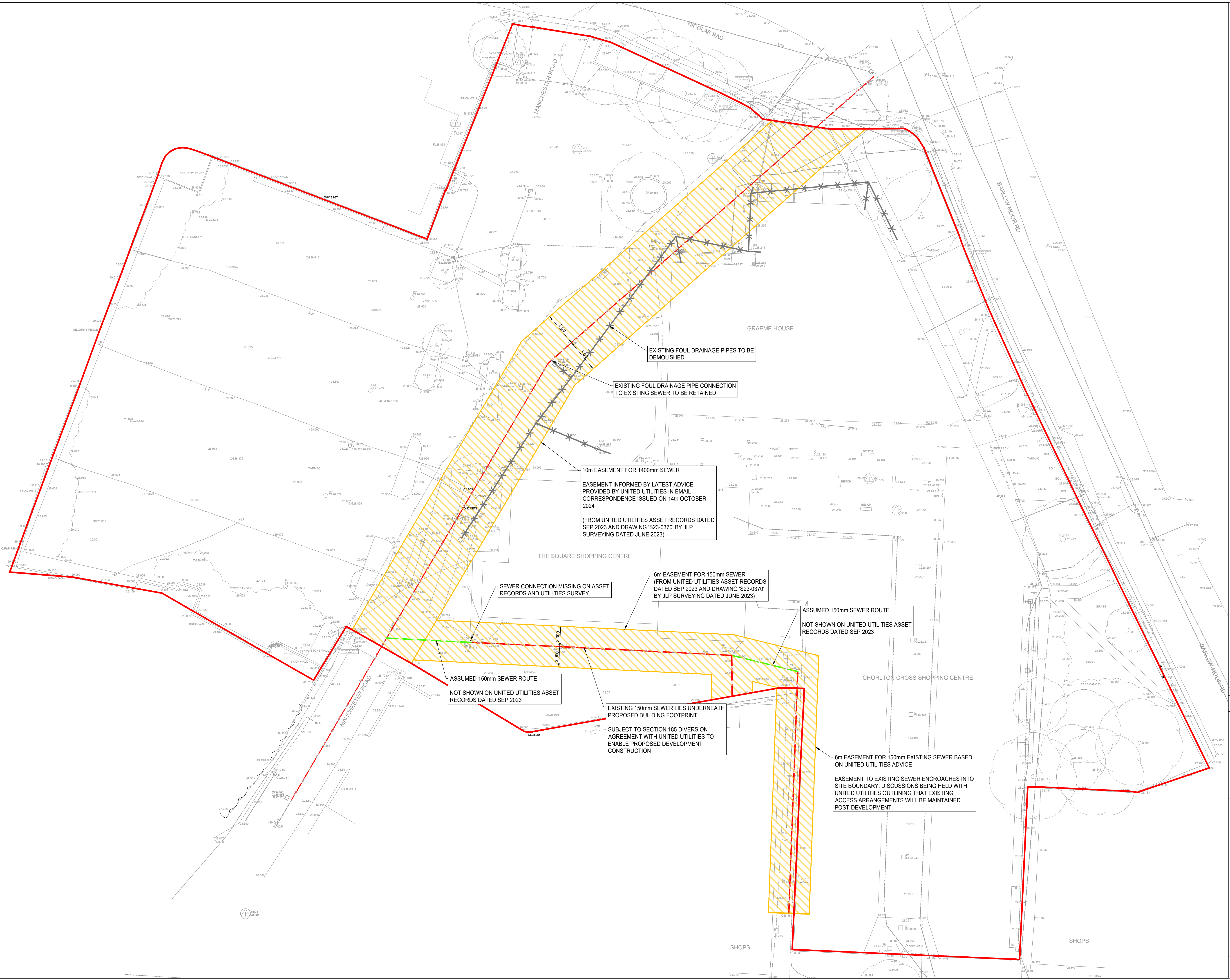
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Appendix F: Existing Drainage Easement and Clearance Plan

FILE LOCATION PATH: P:\PROJECTS\HOT\3062 CHORLTON PRECINCT\004 BIM\CIVIL\DRAWINGS\3062-CIV-XX-XX-S-C-3001 EXISTING SEWER EASEMENT AND CLEARANCE PLAN.DWG



- STANDARD NOTES
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATIONS.
 2. THIS DRAWING SHOULD NOT BE SCALED.
 3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.
 4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.A./E.A. PRIOR TO THE COMMENCEMENT OF WORKS.
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- DRAWING NOTES
1. TOPOGRAPHICAL SURVEY PROVIDED BY JLP SURVEYING - RECEIVED 17.10.23.
 2. CCTV SURVEY PROVIDED BY WINCAN - RECEIVED 17.10.23.
 3. UTILITY SURVEY PROVIDED BY JLP SURVEYING - RECEIVED 17.10.23
- KEY
- SITE BOUNDARY
 - - - EXISTING PUBLIC COMBINED SEWER
 - - - ASSUMED PUBLIC COMBINED SEWER (NOT SHOWN ON UNITED UTILITIES ASSET MAPS)
 - ✕ EXISTING DRAINAGE PIPE PROPOSED TO BE DEMOLISHED TO ENABLE DEVELOPMENT
 - EXISTING SEWER EASEMENT (BASED ON UNITED UTILITIES ADVICE TO DATE)

23.10.24	P02	1400mm EASEMENT UPDATED	LT	JF
22.10.24	P01	FIRST ISSUE	LT	JF
DATE	REV	DESCRIPTION	DRAWN	CHKD



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PROJECT
CHORLTON PRECINCT

TITLE
EXISTING DRAINAGE
EASEMENT AND CLEARANCE PLAN

DRAWING STATUS FOR INFORMATION					STATUS CODE -	
CE PROJECT No.	SCALE @ A1	DATE CREATED	DRAWN	CHECKED	LT	JF
3062	1:250	OCT 24	LT	JF		
DRAWING No.					REV	P02
3062-XX-CIV-XX-XX-S-C-30001						

Appendix G: HR Wallingford Greenfield Runoff Rate Estimation

Calculated by:

Lewis Towt

Site name:

Chorlton Precinct

Site location:

Chorlton-cum-Hardy

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:

53.44325° N

Longitude:

2.27932° W

Reference:

1905094533

Date:

Oct 29 2024 17:29

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

1

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

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.

Soil characteristics

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

(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.

Hydrological characteristics

	Default	Edited
SAAR (mm):	846	846
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

(3) Is SPR/SPRHOST ≤ 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

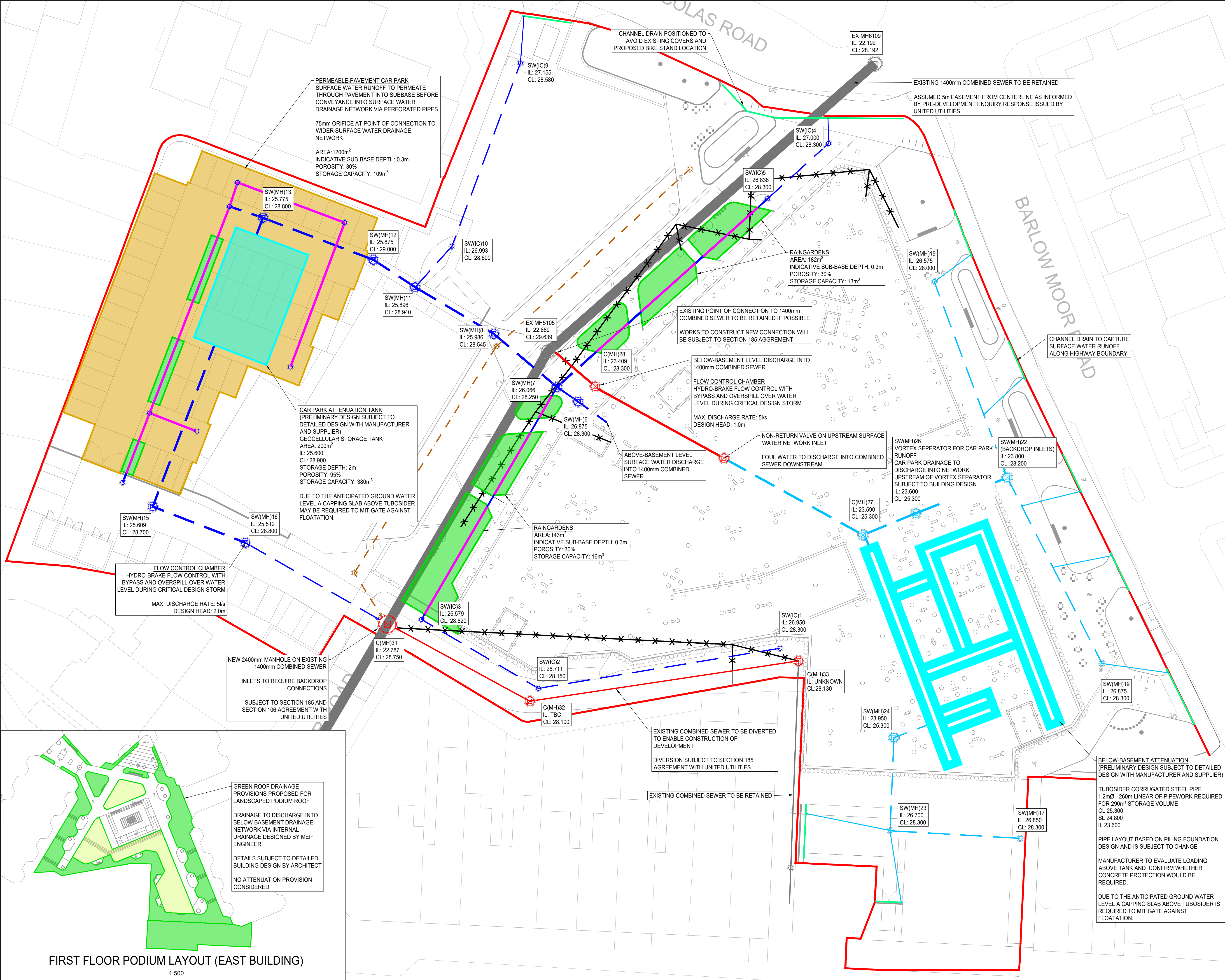
	Default	Edited
Q _{BAR} (l/s):	6.03	6.03
1 in 1 year (l/s):	5.24	5.24
1 in 30 years (l/s):	10.24	10.24
1 in 100 year (l/s):	12.53	12.53
1 in 200 years (l/s):	14.28	14.28

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 H: Proposed Catchment Plan

Appendix I: Proposed Drainage Strategy Plan

FILE LOCATION PATH: P:\PROJECTS\HOT\3062 CHORLTON PRECINCT\004 BIM\CIVIL\DRAWINGS\3062-CIV-XX-XX-D-C-30001_DRAINAGE STRATEGY.DWG



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NOTES

1. ALL PROPOSED DRAINAGE FEATURES ARE PRELIMINARY AND ARE SUBJECT TO A DETAILED DESIGN.
2. ANY NEW CONNECTIONS TO ADOPTED SEWER ASSETS ARE SUBJECT TO RELEVANT AGREEMENTS.
3. EXISTING DRAINAGE FEATURES ARE SHOWN INDICATIVELY BASED ON BEST AVAILABLE INFORMATION PROVIDED WITHIN CCTV SURVEYING UNDERTAKEN IN APRIL 2024 AND PAS128 UTILITY SURVEYING UNDERTAKEN BY JLP SURVEYING IN MAY 2023.
4. LANDSCAPE LAYOUT BASED ON PROPOSED LANDSCAPE PLAN PREPARED BY 1062-01G BY RANDALL THORP. ALL MANHOLE COVERS TO BE SET AT THE PROPOSED FINISHED PAVEMENT OR FLOOR LEVEL. INVERT LEVELS TO BE SET DURING THE DETAILED DESIGN STAGE.
5. ALL GULLY CONNECTIONS AND CHANNEL DRAIN SUMP/GULLY CONNECTIONS TO BE 150mm DIAMETER UNLESS OTHERWISE STATED. ALL GULLY AND CHANNEL DRAIN OUTLETS TO BE TRAPPED AND RODDABLE.
6. ALL MANHOLE COVERS LOCATED WITHIN THE ROAD AND CAR PARKING AREAS TO BE D400 CLASS. COVERS WITHIN HARD AND SOFT LANDSCAPED AREAS WITH PEDESTRIAN TRAFFIC ONLY TO BE C250 CLASS.

KEY

- RED LINE BOUNDARY
- PRIVATE SURFACE WATER DRAINAGE (WEST CATCHMENT)
- PRIVATE SURFACE WATER DRAINAGE (EAST CATCHMENT)
- PRIVATE FOUL WATER DRAINAGE
- ADOPTED COMBINED SEWER
- GEOCELL ATTENUATION TANK
- TUBOSIDER ATTENUATION TANK
- RAIN GARDEN
- PERMEABLE PAVEMENT
- SEWER/DRAINAGE PIPE TO BE ABANDONED
- CHANNEL DRAIN

31.03.25	P03	RED LINE BOUNDARY UPDATED	LT	JF
20.03.25	P02	ISSUED FOR PLANNING	LT	JF
12.12.24	P01	FIRST ISSUE	LT	JF
DATE	REV	DESCRIPTION	DRAWN	CHKD

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PROJECT
CHORLTON PRECINCT

TITLE
DRAINAGE STRATEGY
NETWORK LAYOUT

DRAWING STATUS					STATUS CODE	
PRELIMINARY					-	
CE PROJECT No.	SCALE @ A1	DATE CREATED	DRAWN	CHECKED		
3062	1:250	12.12.24	LT	JF		
DRAWING No.					REV	
3062-XX-CIV-XX-XX-D-C-30001						P03

Appendix J: Causeway Flow Modelling and Simulation Results

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
6109		5.00	28.992	2300	381604.837	394151.668	6.000
5105			28.639	2300	381556.936	394109.521	5.750
5002_OUT			28.953	2300	381519.224	394045.367	6.230
19	0.045	5.00	28.300	1200	381637.784	394061.367	1.425
22	0.137	5.00	28.200	1200	381623.844	394092.316	4.400
4	0.022	5.00	28.300	1200	381601.544	394143.179	1.300
5	0.023	5.00	28.300	1200	381589.126	394131.890	1.462
7	0.018	5.00	28.250	1350	381558.226	394104.240	2.184
1	0.023	5.00	28.300	1200	381590.927	394066.034	1.350
2	0.012	5.00	28.300	1200	381555.551	394060.165	1.589
3	0.038	5.00	28.820	1200	381538.439	394070.186	2.241
8			28.545	1350	381549.038	394112.079	2.560
11	0.009	5.00	28.940	1350	381537.334	394118.646	3.044
13			28.800	1350	381514.770	394128.255	3.025
15	0.045	5.00	28.700	1350	381499.081	394086.789	3.091
16			28.800	1350	381512.656	394081.492	3.288
31			28.750	2300	381533.444	394069.557	5.963
10			28.600	1200	381544.982	394131.111	1.607
9	0.086	5.00	28.580	1200	381554.776	394156.729	1.425
17	0.053	5.00	28.200	1200	381626.391	394039.543	1.350
26			25.300	1200	381610.799	394085.789	1.661
20	0.019	5.00	28.000	1200	381613.543	394119.754	1.425
WEST TANK			28.900		381509.808	394115.894	3.214
6	0.145	5.00	28.300	1200	381563.161	394101.817	1.425
28	0.000	5.00	28.300	1200	381564.523	394104.061	4.891
27			25.300	1200	381603.107	394082.628	1.710
EAST TANK			25.300		381604.122	394080.654	1.700
24	0.049	5.00	25.300	1200	381607.614	394052.951	1.425
23	0.016	5.00	28.300	1200	381607.164	394039.321	1.600
12			29.000	1350	381531.381	394122.946	3.125
PERMEABLE PAVEMENT	0.207	5.00	28.800		381514.296	394131.013	1.500
PODIUM ROOF	0.179	5.00	31.300		381602.286	394088.675	1.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
10.000	6109	5105	63.803	0.600	22.992	22.889	0.103	619.5	1400	5.65	50.0
6.006	5105	31	46.357	0.600	22.889	22.787	0.102	454.5	1400	7.18	50.0
7.000	19	22	33.943	0.600	26.875	26.649	0.226	150.0	225	5.53	50.0
7.001	22	26	14.587	0.600	23.800	23.714	0.086	169.6	225	5.77	50.0
2.000	4	5	16.782	0.600	27.000	26.888	0.112	150.0	100	5.45	50.0
2.001	5	7	41.465	0.600	26.838	26.562	0.276	150.0	150	6.29	50.0
1.000	1	2	35.860	0.600	26.950	26.711	0.239	150.0	150	5.73	50.0
1.001	2	3	19.830	0.600	26.711	26.579	0.132	150.0	150	6.13	50.0
1.002	3	7	39.385	0.600	26.579	26.316	0.263	150.0	150	6.94	50.0
1.003	7	8	12.078	0.600	26.066	25.985	0.081	150.0	400	7.07	50.0
1.011	31	5002_OUT	28.060	0.600	22.787	22.723	0.064	438.4	1400	9.15	50.0
1.004	8	11	13.420	0.600	25.985	25.896	0.089	150.0	400	7.21	50.0
1.005	11	12	7.344	0.600	25.896	25.875	0.021	349.7	400	7.34	50.0
1.007	13	WEST TANK	13.320	0.600	25.775	25.686	0.089	150.0	450	7.76	50.0
1.009	15	16	14.572	0.600	25.609	25.512	0.097	150.0	450	8.42	50.0
1.010	16	31	23.971	0.600	25.512	25.352	0.160	150.0	150	8.91	50.0
4.000	9	10	27.426	0.600	27.155	26.993	0.162	169.3	225	5.46	50.0
4.001	10	11	14.624	0.600	26.993	26.906	0.087	168.1	225	5.70	50.0
7.002	26	27	8.316	0.600	23.639	23.590	0.049	169.7	300	5.89	50.0
6.000	17	23	19.228	0.600	26.850	26.700	0.150	128.2	150	5.36	50.0
8.000	20	22	29.308	0.600	26.575	26.402	0.173	169.4	225	5.49	50.0
1.008	WEST TANK	15	31.019	0.600	25.686	25.609	0.077	402.8	450	8.27	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
10.000	1.644	2531.4	0.0	4.600	4.350	0.000	0.0	0	0.000
6.006	1.922	2958.6	67.5	4.350	4.563	0.498	0.0	143	0.824
7.000	1.065	42.3	6.1	1.200	1.326	0.045	0.0	58	0.762
7.001	1.001	39.8	27.2	4.175	1.361	0.201	0.0	137	1.075
2.000	0.625	4.9	3.0	1.200	1.312	0.022	0.0	56	0.654
2.001	0.818	14.5	6.1	1.312	1.538	0.045	0.0	68	0.782
1.000	0.818	14.5	3.1	1.200	1.439	0.023	0.0	47	0.653
1.001	0.818	14.5	4.7	1.439	2.091	0.035	0.0	59	0.732
1.002	0.818	14.5	9.9	2.091	1.784	0.073	0.0	91	0.880
1.003	1.538	193.3	38.1	1.784	2.160	0.281	0.0	120	1.207
1.011	1.957	3012.6	152.6	4.563	4.830	1.126	0.0	210	1.055
1.004	1.538	193.3	38.1	2.160	2.644	0.281	0.0	120	1.207
1.005	1.003	126.1	51.0	2.644	2.725	0.376	0.0	177	0.952
1.007	1.657	263.6	79.0	2.575	2.764	0.583	0.0	168	1.456
1.009	1.657	263.6	85.1	2.641	2.838	0.628	0.0	175	1.485
1.010	0.818	14.5	85.1	3.138	3.248	0.628	0.0	150	0.833
4.000	1.002	39.8	11.7	1.200	1.382	0.086	0.0	83	0.871
4.001	1.005	40.0	11.7	1.382	1.809	0.086	0.0	83	0.875
7.002	1.204	85.1	51.5	1.361	1.410	0.380	0.0	168	1.258
6.000	0.886	15.7	7.2	1.200	1.450	0.053	0.0	71	0.866
8.000	1.001	39.8	2.6	1.200	1.573	0.019	0.0	38	0.563
1.008	1.006	160.1	79.0	2.764	2.641	0.583	0.0	224	1.004

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	6	7	5.498	0.600	26.875	26.825	0.050	110.0	225	5.07	50.0
6.005	28	5105	9.347	0.600	23.409	23.370	0.039	239.7	300	6.78	50.0
6.004	27	28	44.137	0.600	23.590	23.409	0.181	243.9	300	6.62	50.0
6.001	23	24	13.637	0.600	26.700	23.950	2.750	5.0	150	5.41	50.0
6.002	24	EAST TANK	27.922	0.600	23.875	23.675	0.200	139.6	225	5.83	50.0
6.003	EAST TANK	27	2.220	0.600	23.600	23.590	0.010	222.0	300	5.87	50.0
1.006	12	13	17.439	0.600	25.875	25.825	0.050	348.8	400	7.62	50.0
5.000	PERMEABLE PAVEMENT	13	2.798	0.600	27.300	27.288	0.012	233.2	300	5.05	50.0
9.000	PODIUM ROOF	26	8.989	0.600	30.000	23.839	6.161	1.5	100	5.02	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.000	1.246	49.5	19.7	1.200	1.200	0.145	0.0	98	1.173
6.005	1.011	71.5	67.5	4.591	4.969	0.498	0.0	233	1.144
6.004	1.002	70.8	67.5	1.410	4.591	0.498	0.0	235	1.135
6.001	4.556	80.5	9.4	1.450	1.200	0.069	0.0	34	3.051
6.002	1.104	43.9	16.0	1.200	1.400	0.118	0.0	94	1.018
6.003	1.051	74.3	16.0	1.400	1.410	0.118	0.0	94	0.842
1.006	1.005	126.2	51.0	2.725	2.575	0.376	0.0	177	0.954
5.000	1.025	72.5	28.1	1.200	1.212	0.207	0.0	129	0.961
9.000	6.456	50.7	24.3	1.200	1.361	0.179	0.0	49	6.392

Pipeline Schedule

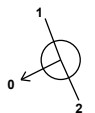
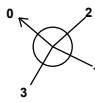
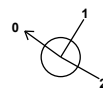
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
10.000	63.803	619.5	1400	Circular	28.992	22.992	4.600	28.639	22.889	4.350
6.006	46.357	454.5	1400	Circular	28.639	22.889	4.350	28.750	22.787	4.563
7.000	33.943	150.0	225	Circular	28.300	26.875	1.200	28.200	26.649	1.326
7.001	14.587	169.6	225	Circular	28.200	23.800	4.175	25.300	23.714	1.361
2.000	16.782	150.0	100	Circular	28.300	27.000	1.200	28.300	26.888	1.312
2.001	41.465	150.0	150	Circular	28.300	26.838	1.312	28.250	26.562	1.538
1.000	35.860	150.0	150	Circular	28.300	26.950	1.200	28.300	26.711	1.439
1.001	19.830	150.0	150	Circular	28.300	26.711	1.439	28.820	26.579	2.091
1.002	39.385	150.0	150	Circular	28.820	26.579	2.091	28.250	26.316	1.784
1.003	12.078	150.0	400	Circular	28.250	26.066	1.784	28.545	25.985	2.160
1.011	28.060	438.4	1400	Circular	28.750	22.787	4.563	28.953	22.723	4.830

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
10.000	6109	2300	Manhole	Adoptable	5105	2300	Manhole	Adoptable
6.006	5105	2300	Manhole	Adoptable	31	2300	Manhole	Adoptable
7.000	19	1200	Manhole	Adoptable	22	1200	Manhole	Adoptable
7.001	22	1200	Manhole	Adoptable	26	1200	Manhole	Adoptable
2.000	4	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
2.001	5	1200	Manhole	Adoptable	7	1350	Manhole	Adoptable
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	7	1350	Manhole	Adoptable
1.003	7	1350	Manhole	Adoptable	8	1350	Manhole	Adoptable
1.011	31	2300	Manhole	Adoptable	5002_OUT	2300	Manhole	Adoptable

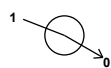
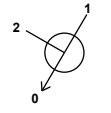
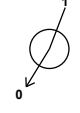
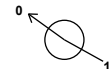
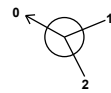
Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.004	13.420	150.0	400	Circular	28.545	25.985	2.160	28.940	25.896	2.644
1.005	7.344	349.7	400	Circular	28.940	25.896	2.644	29.000	25.875	2.725
1.007	13.320	150.0	450	Circular	28.800	25.775	2.575	28.900	25.686	2.764
1.009	14.572	150.0	450	Circular	28.700	25.609	2.641	28.800	25.512	2.838
1.010	23.971	150.0	150	Circular	28.800	25.512	3.138	28.750	25.352	3.248
4.000	27.426	169.3	225	Circular	28.580	27.155	1.200	28.600	26.993	1.382
4.001	14.624	168.1	225	Circular	28.600	26.993	1.382	28.940	26.906	1.809
7.002	8.316	169.7	300	Circular	25.300	23.639	1.361	25.300	23.590	1.410
6.000	19.228	128.2	150	Circular	28.200	26.850	1.200	28.300	26.700	1.450
8.000	29.308	169.4	225	Circular	28.000	26.575	1.200	28.200	26.402	1.573
1.008	31.019	402.8	450	Circular	28.900	25.686	2.764	28.700	25.609	2.641
3.000	5.498	110.0	225	Circular	28.300	26.875	1.200	28.250	26.825	1.200
6.005	9.347	239.7	300	Circular	28.300	23.409	4.591	28.639	23.370	4.969
6.004	44.137	243.9	300	Circular	25.300	23.590	1.410	28.300	23.409	4.591
6.001	13.637	5.0	150	Circular	28.300	26.700	1.450	25.300	23.950	1.200
6.002	27.922	139.6	225	Circular	25.300	23.875	1.200	25.300	23.675	1.400
6.003	2.220	222.0	300	Circular	25.300	23.600	1.400	25.300	23.590	1.410
1.006	17.439	348.8	400	Circular	29.000	25.875	2.725	28.800	25.825	2.575
5.000	2.798	233.2	300	Circular	28.800	27.300	1.200	28.800	27.288	1.212
9.000	8.989	1.5	100	Circular	31.300	30.000	1.200	25.300	23.839	1.361
Link	US Node		Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type	
1.004	8		1350	Manhole	Adoptable	11	1350	Manhole	Adoptable	
1.005	11		1350	Manhole	Adoptable	12	1350	Manhole	Adoptable	
1.007	13		1350	Manhole	Adoptable	WEST TANK		Junction		
1.009	15		1350	Manhole	Adoptable	16	1350	Manhole	Adoptable	
1.010	16		1350	Manhole	Adoptable	31	2300	Manhole	Adoptable	
4.000	9		1200	Manhole	Adoptable	10	1200	Manhole	Adoptable	
4.001	10		1200	Manhole	Adoptable	11	1350	Manhole	Adoptable	
7.002	26		1200	Manhole	Adoptable	27	1200	Manhole	Adoptable	
6.000	17		1200	Manhole	Adoptable	23	1200	Manhole	Adoptable	
8.000	20		1200	Manhole	Adoptable	22	1200	Manhole	Adoptable	
1.008	WEST TANK			Junction		15	1350	Manhole	Adoptable	
3.000	6		1200	Manhole	Adoptable	7	1350	Manhole	Adoptable	
6.005	28		1200	Manhole	Adoptable	5105	2300	Manhole	Adoptable	
6.004	27		1200	Manhole	Adoptable	28	1200	Manhole	Adoptable	
6.001	23		1200	Manhole	Adoptable	24	1200	Manhole	Adoptable	
6.002	24		1200	Manhole	Adoptable	EAST TANK		Junction		
6.003	EAST TANK			Junction		27	1200	Manhole	Adoptable	
1.006	12		1350	Manhole	Adoptable	13	1350	Manhole	Adoptable	
5.000	PERMEABLE PAVEMENT			Junction		13	1350	Manhole	Adoptable	
9.000	PODIUM ROOF			Junction		26	1200	Manhole	Adoptable	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
6109	381604.837	394151.668	28.992	6.000	2300		0	10.000	22.992	1400
5105	381556.936	394109.521	28.639	5.750	2300		1 2 0	10.000 6.005 6.006	22.889 23.370 22.889	1400 300 1400
5002_OUT	381519.224	394045.367	28.953	6.230	2300		1	1.011	22.723	1400
19	381637.784	394061.367	28.300	1.425	1200		0	7.000	26.875	225
22	381623.844	394092.316	28.200	4.400	1200		1 2 0	8.000 7.000 7.001	26.402 26.649 23.800	225 225 225
4	381601.544	394143.179	28.300	1.300	1200		0	2.000	27.000	100
5	381589.126	394131.890	28.300	1.462	1200		1 0	2.000 2.001	26.888 26.838	100 150
7	381558.226	394104.240	28.250	2.184	1350		1 2 3 0	3.000 2.001 1.002 1.003	26.825 26.562 26.316 26.066	225 150 150 400
1	381590.927	394066.034	28.300	1.350	1200		0	1.000	26.950	150
2	381555.551	394060.165	28.300	1.589	1200		1 0	1.000 1.001	26.711 26.711	150 150
3	381538.439	394070.186	28.820	2.241	1200		1 0	1.001 1.002	26.579 26.579	150 150
8	381549.038	394112.079	28.545	2.560	1350		1 0	1.003 1.004	25.985 25.985	400 400
11	381537.334	394118.646	28.940	3.044	1350		1 2 0	4.001 1.004 1.005	26.906 25.896 25.896	225 400 400

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
13	381514.770	394128.255	28.800	3.025	1350		1 2 0	5.000 1.006 1.007	27.288 25.825 25.775	300 400 450
15	381499.081	394086.789	28.700	3.091	1350		1 0	1.008 1.009	25.609 25.609	450 450
16	381512.656	394081.492	28.800	3.288	1350		1 0	1.009 1.010	25.512 25.512	450 150
31	381533.444	394069.557	28.750	5.963	2300		1 2 0	6.006 1.010 1.011	22.787 25.352 22.787	1400 150 1400
10	381544.982	394131.111	28.600	1.607	1200		1 0	4.000 4.001	26.993 26.993	225 225
9	381554.776	394156.729	28.580	1.425	1200		0	4.000	27.155	225
17	381626.391	394039.543	28.200	1.350	1200		0	6.000	26.850	150
26	381610.799	394085.789	25.300	1.661	1200		1 2 0	9.000 7.001 7.002	23.839 23.714 23.639	100 225 300
20	381613.543	394119.754	28.000	1.425	1200		0	8.000	26.575	225
WEST TANK	381509.808	394115.894	28.900	3.214			1 0	1.007 1.008	25.686 25.686	450 450
6	381563.161	394101.817	28.300	1.425	1200		0	3.000	26.875	225
28	381564.523	394104.061	28.300	4.891	1200		1 0	6.004 6.005	23.409 23.409	300 300
27	381603.107	394082.628	25.300	1.710	1200		1 2 0	7.002 6.003 6.004	23.590 23.590 23.590	300 300 300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
EAST TANK	381604.122	394080.654	25.300	1.700			1	6.002	23.675	225
24	381607.614	394052.951	25.300	1.425	1200		1	6.003	23.600	300
							0	6.001	23.950	150
23	381607.164	394039.321	28.300	1.600	1200		1	6.000	26.700	150
							0	6.001	26.700	150
12	381531.381	394122.946	29.000	3.125	1350		1	1.005	25.875	400
							0	1.006	25.875	400
PERMEABLE PAVEMENT	381514.296	394131.013	28.800	1.500						
PODIUM ROOF	381602.286	394088.675	31.300	1.300			0	5.000	27.300	300
							0	9.000	30.000	100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	45	0	0

Node 16 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	25.512	Product Number	CTL-SHE-0092-5000-2000-5000
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 28 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	23.409	Product Number	CTL-SHE-0101-5000-1300-5000
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node PERMEABLE PAVEMENT Online Orifice Control

Flap Valve	x	Invert Level (m)	27.300	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.100		

Node EAST TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	23.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	252.0	0.0	1.200	252.0	0.0	1.201	0.0	0.0

Node WEST TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	25.686
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	200.0	0.0	2.000	200.0	0.0	2.001	0.0	0.0

Node PERMEABLE PAVEMENT Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	27.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	0.0	0.0	0.600	1200.0	0.0	0.901	0.0	0.0
0.599	0.0	0.0	0.900	1200.0	0.0	1.200	0.0	0.0

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.579
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	0.0	0.0	1.000	182.0	0.0	1.301	0.0	0.0
0.999	0.0	0.0	1.300	182.0	0.0			

Node 5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.838
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0



Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	0.0	0.0	1.000	143.0	0.0	1.301	0.0	0.0
0.999	0.0	0.0	1.300	143.0	0.0			

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	6109	1	22.992	0.000	0.0	0.0000	0.0000	OK
60 minute winter	5105	61	22.932	0.043	5.0	0.1773	0.0000	OK
30 minute winter	5002_OUT	30	22.762	0.039	9.1	0.0000	0.0000	OK
15 minute winter	19	11	26.942	0.067	8.2	0.1176	0.0000	OK
15 minute winter	22	10	23.980	0.180	36.0	0.3164	0.0000	OK
15 minute winter	4	11	27.070	0.070	4.0	0.1022	0.0000	OK
15 minute winter	5	11	26.918	0.080	8.0	0.1152	0.0000	OK
15 minute winter	7	11	26.221	0.155	48.4	0.2478	0.0000	OK
15 minute winter	1	10	27.004	0.054	4.2	0.0794	0.0000	OK
15 minute winter	2	11	26.779	0.068	6.2	0.0871	0.0000	OK
15 minute winter	3	11	26.689	0.110	12.8	0.1616	0.0000	OK
15 minute winter	8	11	26.148	0.163	48.5	0.2337	0.0000	OK
15 minute winter	11	11	26.127	0.231	65.3	0.3451	0.0000	OK
180 minute winter	13	176	26.053	0.278	25.0	0.3974	0.0000	OK
180 minute winter	15	176	26.054	0.445	12.2	0.7661	0.0000	OK
180 minute winter	16	176	26.054	0.542	14.0	0.7751	0.0000	SURCHARGED
30 minute winter	31	29	22.844	0.057	9.1	0.2365	0.0000	OK
15 minute winter	10	11	27.095	0.102	15.4	0.1152	0.0000	OK
15 minute winter	9	10	27.255	0.100	15.7	0.2348	0.0000	OK
15 minute winter	17	10	26.943	0.093	9.7	0.1778	0.0000	OK
15 minute winter	26	10	23.857	0.218	67.6	0.2460	0.0000	OK
15 minute winter	20	11	26.620	0.045	3.5	0.0623	0.0000	OK
180 minute winter	WEST TANK	176	26.053	0.367	24.4	69.6898	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	6109	10.000	5105	0.0	0.000	0.000	0.4142	
60 minute winter	5105	6.006	31	5.0	0.328	0.002	0.7730	
15 minute winter	19	7.000	22	7.9	0.816	0.187	0.3294	
15 minute winter	22	7.001	26	35.3	1.108	0.888	0.4651	
15 minute winter	4	2.000	5	3.9	0.699	0.788	0.0930	
15 minute winter	5	2.001	7	7.8	0.829	0.537	0.3886	
15 minute winter	7	1.003	8	48.5	1.059	0.251	0.5614	
15 minute winter	1	1.000	2	4.0	0.612	0.279	0.2406	
15 minute winter	2	1.001	3	6.1	0.571	0.424	0.2140	
15 minute winter	3	1.002	7	12.3	0.921	0.849	0.5257	
15 minute winter	8	1.004	11	48.4	0.790	0.251	0.8264	
15 minute winter	11	1.005	12	65.1	0.915	0.516	0.5221	
180 minute winter	13	1.007	WEST TANK	24.4	1.152	0.092	1.6053	
180 minute winter	15	1.009	16	14.0	0.234	0.053	2.3065	
180 minute winter	16	Hydro-Brake®	31	4.1				
30 minute winter	31	1.011	5002_OUT	9.1	0.585	0.003	0.4441	112.7
15 minute winter	10	4.001	11	15.4	0.916	0.385	0.2455	
15 minute winter	9	4.000	10	15.4	0.900	0.387	0.4695	
15 minute winter	17	6.000	23	9.5	1.250	0.607	0.1475	
15 minute winter	26	7.002	27	67.1	1.385	0.789	0.4111	
15 minute winter	20	8.000	22	3.4	0.613	0.085	0.1613	
180 minute winter	WEST TANK	1.008	15	6.1	0.463	0.038	4.5982	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	6	10	27.007	0.132	26.4	0.4183	0.0000	OK
120 minute winter	28	112	23.805	0.396	7.6	0.4475	0.0000	SURCHARGED
120 minute winter	27	112	23.805	0.215	21.9	0.2437	0.0000	OK
120 minute winter	EAST TANK	112	23.805	0.205	22.8	49.1860	0.0000	OK
15 minute winter	24	11	23.985	0.110	21.2	0.2010	0.0000	OK
15 minute winter	23	10	26.741	0.041	12.4	0.0546	0.0000	OK
15 minute winter	12	11	26.086	0.211	65.1	0.3023	0.0000	OK
15 minute winter	PERMEABLE PAVEMENT	14	27.915	0.615	37.7	7.1731	0.0000	SURCHARGED
15 minute winter	PODIUM ROOF	10	30.063	0.063	32.6	0.1722	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	6	3.000	7	26.0	1.168	0.526	0.1226	
120 minute winter	28	Hydro-Brake®	5105	5.0				
120 minute winter	27	6.004	28	7.6	0.419	0.107	2.7492	
120 minute winter	EAST TANK	6.003	27	-16.1	-0.895	-0.217	0.1172	
15 minute winter	24	6.002	EAST TANK	20.9	1.093	0.476	0.5344	
15 minute winter	23	6.001	24	12.3	3.233	0.153	0.0518	
15 minute winter	12	1.006	13	64.4	1.060	0.510	1.0656	
15 minute winter	PERMEABLE PAVEMENT	Orifice	13	15.7				
15 minute winter	PODIUM ROOF	9.000	26	32.4	6.924	0.640	0.0421	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	6109	1	22.992	0.000	0.0	0.0000	0.0000	OK
960 minute summer	5105	795	22.932	0.043	5.0	0.1773	0.0000	OK
60 minute winter	5002_OUT	32	22.762	0.039	9.1	0.0000	0.0000	OK
15 minute winter	19	10	26.970	0.095	15.6	0.1679	0.0000	OK
15 minute winter	22	11	24.335	0.535	68.7	0.9379	0.0000	SURCHARGED
15 minute winter	4	11	27.193	0.193	7.6	0.2841	0.0000	SURCHARGED
15 minute winter	5	11	26.963	0.125	14.4	0.1804	0.0000	OK
240 minute winter	7	248	26.535	0.469	18.3	0.7491	0.0000	SURCHARGED
15 minute winter	1	10	27.028	0.078	8.0	0.1147	0.0000	OK
15 minute winter	2	12	26.986	0.275	12.0	0.3528	0.0000	SURCHARGED
15 minute winter	3	12	26.920	0.341	21.7	0.5007	0.0000	SURCHARGED
240 minute winter	8	236	26.534	0.549	18.3	0.7855	0.0000	SURCHARGED
240 minute winter	11	248	26.537	0.641	23.7	0.9553	0.0000	SURCHARGED
240 minute winter	13	240	26.531	0.756	34.9	1.0816	0.0000	SURCHARGED
240 minute winter	15	236	26.532	0.923	12.5	1.5898	0.0000	SURCHARGED
240 minute winter	16	236	26.532	1.020	14.8	1.4592	0.0000	SURCHARGED
60 minute winter	31	32	22.844	0.057	9.1	0.2365	0.0000	OK
15 minute winter	10	11	27.147	0.154	29.2	0.1737	0.0000	OK
15 minute winter	9	10	27.307	0.152	29.8	0.3543	0.0000	OK
15 minute winter	17	11	27.051	0.201	18.3	0.3844	0.0000	SURCHARGED
180 minute winter	26	180	24.090	0.451	30.3	0.5106	0.0000	SURCHARGED
15 minute winter	20	10	26.637	0.062	6.6	0.0862	0.0000	OK
240 minute winter	WEST TANK	236	26.532	0.846	33.6	160.6851	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	6109	10.000	5105	0.0	0.000	0.000	0.4165	
960 minute summer	5105	6.006	31	5.0	0.308	0.002	0.7721	
15 minute winter	19	7.000	22	15.1	0.971	0.357	0.5291	
15 minute winter	22	7.001	26	66.9	1.682	1.681	0.5801	
15 minute winter	4	2.000	5	6.8	0.878	1.386	0.1245	
15 minute winter	5	2.001	7	13.9	0.947	0.964	0.6104	
240 minute winter	7	1.003	8	18.3	0.938	0.095	1.5120	
15 minute winter	1	1.000	2	7.8	0.712	0.537	0.4795	
15 minute winter	2	1.001	3	9.8	0.607	0.678	0.3491	
15 minute winter	3	1.002	7	19.5	1.117	1.352	0.6618	
240 minute winter	8	1.004	11	17.7	0.648	0.091	1.6800	
240 minute winter	11	1.005	12	23.0	0.665	0.182	0.9194	
240 minute winter	13	1.007	WEST TANK	33.6	1.227	0.128	2.1105	
240 minute winter	15	1.009	16	14.8	0.273	0.056	2.3088	
240 minute winter	16	Hydro-Brake®	31	4.1				
60 minute winter	31	1.011	5002_OUT	9.1	0.585	0.003	0.4441	148.7
15 minute winter	10	4.001	11	29.1	1.059	0.729	0.4023	
15 minute winter	9	4.000	10	29.2	1.029	0.733	0.7785	
15 minute winter	17	6.000	23	17.2	1.387	1.097	0.2240	
180 minute winter	26	7.002	27	29.8	0.835	0.350	0.5856	
15 minute winter	20	8.000	22	6.4	0.734	0.160	0.2545	
240 minute winter	WEST TANK	1.008	15	5.4	0.456	0.034	4.9148	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	6	11	27.102	0.227	50.2	0.7175	0.0000	SURCHARGED
180 minute winter	28	180	24.090	0.681	6.9	0.7697	0.0000	SURCHARGED
180 minute winter	27	176	24.091	0.501	29.8	0.5664	0.0000	SURCHARGED
180 minute winter	EAST TANK	176	24.090	0.490	33.5	117.4230	0.0000	SURCHARGED
180 minute winter	24	176	24.091	0.216	9.4	0.3922	0.0000	OK
15 minute winter	23	11	26.754	0.054	22.4	0.0718	0.0000	OK
240 minute winter	12	240	26.532	0.657	23.0	0.9405	0.0000	SURCHARGED
30 minute winter	PERMEABLE PAVEMENT	25	27.952	0.652	55.0	20.7881	0.0000	SURCHARGED
15 minute winter	PODIUM ROOF	12	30.853	0.853	61.9	2.3494	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	6	3.000	7	48.3	1.306	0.975	0.2013	
180 minute winter	28	Hydro-Brake®	5105	5.0				
180 minute winter	27	6.004	28	6.9	0.459	0.098	3.1081	
180 minute winter	EAST TANK	6.003	27	-24.1	-0.643	-0.324	0.1563	
180 minute winter	24	6.002	EAST TANK	9.4	0.820	0.214	1.1021	
15 minute winter	23	6.001	24	22.4	3.210	0.278	0.1162	
240 minute winter	12	1.006	13	22.0	0.748	0.174	2.1832	
30 minute winter	PERMEABLE PAVEMENT	Orifice	13	16.2				
15 minute winter	PODIUM ROOF	9.000	26	48.9	7.224	0.964	0.0703	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	6109	1	22.992	0.000	0.0	0.0000	0.0000	OK
360 minute winter	5105	352	22.932	0.043	5.0	0.1776	0.0000	OK
360 minute winter	5002_OUT	352	22.766	0.043	10.0	0.0000	0.0000	OK
15 minute winter	19	10	27.016	0.141	29.3	0.2480	0.0000	OK
15 minute winter	22	11	25.503	1.703	129.5	2.9864	0.0000	SURCHARGED
15 minute winter	4	12	27.910	0.910	14.3	1.3363	0.0000	SURCHARGED
480 minute winter	5	480	27.507	0.669	3.2	0.9669	0.0000	SURCHARGED
480 minute winter	7	480	27.509	1.443	19.8	2.3027	0.0000	SURCHARGED
15 minute winter	1	12	27.968	1.018	15.0	1.4981	0.0000	SURCHARGED
15 minute winter	2	12	27.808	1.097	17.1	1.4067	0.0000	SURCHARGED
15 minute winter	3	13	27.604	1.025	37.2	2.8874	0.0000	SURCHARGED
480 minute winter	8	464	27.504	1.518	19.2	2.1730	0.0000	SURCHARGED
480 minute winter	11	480	27.510	1.614	25.6	2.4068	0.0000	SURCHARGED
480 minute winter	13	464	27.502	1.727	39.4	2.4719	0.0000	SURCHARGED
480 minute winter	15	464	27.503	1.894	10.4	3.2632	0.0000	SURCHARGED
480 minute winter	16	464	27.503	1.991	12.2	2.8489	0.0000	SURCHARGED
360 minute winter	31	352	22.846	0.059	10.0	0.2459	0.0000	OK
480 minute winter	10	480	27.504	0.511	6.1	0.5783	0.0000	SURCHARGED
15 minute winter	9	11	27.646	0.491	56.0	1.1480	0.0000	SURCHARGED
15 minute winter	17	11	27.592	0.742	34.5	1.4221	0.0000	SURCHARGED
240 minute winter	26	236	24.724	1.085	45.9	1.2269	0.0000	SURCHARGED
15 minute winter	20	10	26.662	0.087	12.4	0.1215	0.0000	OK
480 minute winter	WEST TANK	464	27.503	1.817	39.1	345.2283	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	6109	10.000	5105	0.0	0.000	0.000	0.4161	
360 minute winter	5105	6.006	31	5.0	0.306	0.002	0.8031	
15 minute winter	19	7.000	22	28.4	1.129	0.670	0.8583	
15 minute winter	22	7.001	26	123.5	3.106	3.104	0.5801	
15 minute winter	4	2.000	5	10.4	1.332	2.122	0.1313	
480 minute winter	5	2.001	7	3.2	0.656	0.221	0.7300	
480 minute winter	7	1.003	8	19.2	0.847	0.099	1.5120	
15 minute winter	1	1.000	2	11.0	0.737	0.761	0.6313	
15 minute winter	2	1.001	3	16.6	0.945	1.151	0.3491	
15 minute winter	3	1.002	7	29.1	1.654	2.014	0.6934	
480 minute winter	8	1.004	11	18.9	0.570	0.098	1.6800	
480 minute winter	11	1.005	12	25.3	0.584	0.201	0.9194	
480 minute winter	13	1.007	WEST TANK	39.1	1.134	0.149	2.1105	
480 minute winter	15	1.009	16	12.2	0.225	0.046	2.3088	
480 minute winter	16	Hydro-Brake®	31	5.0				
360 minute winter	31	1.011	5002_OUT	10.0	0.584	0.003	0.4862	317.5
480 minute winter	10	4.001	11	6.1	0.717	0.153	0.5816	
15 minute winter	9	4.000	10	53.4	1.343	1.341	1.0908	
15 minute winter	17	6.000	23	30.3	2.009	1.935	0.2532	
240 minute winter	26	7.002	27	45.6	0.838	0.535	0.5856	
15 minute winter	20	8.000	22	12.0	0.872	0.300	0.4041	
480 minute winter	WEST TANK	1.008	15	5.7	0.438	0.036	4.9148	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	6	480	27.508	0.633	10.2	2.0029	0.0000	SURCHARGED
360 minute winter	28	352	24.723	1.314	5.7	1.4858	0.0000	SURCHARGED
360 minute winter	27	352	24.724	1.134	33.3	1.2828	0.0000	SURCHARGED
360 minute winter	EAST TANK	352	24.724	1.124	38.7	269.0357	0.0000	SURCHARGED
360 minute winter	24	352	24.724	0.849	10.5	1.5440	0.0000	SURCHARGED
15 minute winter	23	11	26.775	0.075	40.1	0.0992	0.0000	OK
480 minute winter	12	464	27.504	1.629	25.3	2.3317	0.0000	SURCHARGED
30 minute winter	PERMEABLE PAVEMENT	30	28.044	0.744	104.4	54.0778	0.0000	SURCHARGED
15 minute summer	PODIUM ROOF	9	31.300	1.300	110.9	13.7465	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	6	3.000	7	10.2	0.926	0.206	0.2187	
360 minute winter	28	Hydro-Brake®	5105	5.0				
360 minute winter	27	6.004	28	5.7	0.312	0.081	3.1081	
360 minute winter	EAST TANK	6.003	27	-28.6	-0.586	-0.385	0.1563	
360 minute winter	24	6.002	EAST TANK	10.1	0.682	0.230	1.1105	
15 minute winter	23	6.001	24	40.0	3.295	0.497	0.1796	
480 minute winter	12	1.006	13	25.0	0.630	0.198	2.1832	
30 minute winter	PERMEABLE PAVEMENT	Orifice	13	17.4				
15 minute summer	PODIUM ROOF	9.000	26	61.1	7.806	1.204	0.0703	

Appendix K: SuDS Management and Maintenance

Chorlton Precinct - SuDS Maintenance Schedule

Rev P01 - 12/12/2024

For Planning

The below table is extracted from The SuDS Manual 2015 (CIRIA C753)

Activity / Maintenance Schedule	Required Action	Frequency	Maintenance Responsibility
Bioretention Systems			
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly	To be confirmed
	Check operation of underdrains by inspection of flows after rain	Annually	
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly	
	Inspect inlets and outlets for blockages	Quarterly	
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)	
	Replace any plants, to maintain planting density	As required	
	Remove sediment, litter, and debris build-up from around inlets or from forebays	Quarterly to biannually	
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required	
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required	
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years	
Pervious Pavements			
Regular maintenance	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 previous surface from adjacent impermeable areas as this area is most likely to collect the most sediment	To be confirmed
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	
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm 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 h after large storms in the first six months	
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually	
	Monitor inspection chambers	Annually	
Green Roofs			
Regular maintenance	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	To be confirmed
	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	
Occasional 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 (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)	
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)	
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required	
	Remove nuisance and invasive vegetation, including weed	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 stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required	

Activity / Maintenance Schedule	Required Action	Frequency	Maintenance Responsibility
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required	
Attenuation Storage Tanks			
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually	To be confirmed
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly	
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually	
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required	

Appendix L: Landscape Layout and Typical Section



Landscape Architecture
Landscape Assessment
Masterplanning
Urban Design
Expert Witness

**RANDALL
THORP**

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KEY

Ground Floor

Application red-line boundary

Indicative works outside the red-line
application boundary - details: TBC

Existing retained tree (RPA zones)

Proposed tree

Biodiverse, naturalistic planting areas

Rain garden

Hedge

Mounding

Amenity grass

Natural sandstone surfaces - laid in bands of varying sizes and finishes (light grey/buff colour)

Natural sandstone brick format units to define the apartment entrance spaces - laid in herringbone pattern (light grey/buff colour mix)

Resin-bound gravel-with natural sandstone cobble edges, thresholds and banding details (buff colour mix)

Resin bound gravel (no-dig specification) to define change in use to Pocket Park space (dark buff colour mix)

Block paving: to define transition spaces and key boundary edges (including adopted areas outside of the red-line up to the existing kerb-line) (natural aggregate concrete blocks, smaller block unit setts used for edges, thresholds and detailing - light grey colour)

Coloured permeable bitmac: to define private parking area access roads (buff colour)

Sealed bitmac: to define public parking areas and service access routes

Un-bound gravel chippings (grey granite)

Brick wall: brick to match FCBS specification for the proposed building

1.8m railings and pedestrian gates - to be visually permeable from 600mm upwards to ensure visual permeability for child pedestrians, all gates to open inwards (specification TBC)

Car park screen fence - vertical timber slats with steel frame, c.3m at highest point, height generally to match existing rear garden boundaries

Corten-steel raised planter edge (varies between 400-500mm high - naturally rusted brown colour)

Mild steel raised edge: 60mm thick with concealed joining system - naturally rusted brown colour (to be used around planting beds containing existing trees where ground levels are not to be raised significantly)

Natural sandstone kerb with dropped section inlets for rain garden drainage

Fixed seating: integrated: hardwood timber planter bench with back rest

Free standing: Solid timber beam bench - solid natural oak timber

Free standing sculptural feature seating blocks - black charred carved oak

Flexible seating: Indicative only - seating and tables to be provided by eventual retail tenants

Cycle stands: Stainless steel Sheffield hoops to match those existing locally

Bins: MCC specification recycle bins - black colour

Bollards: Access control steel bollards, RAL colour match to building metalwork

Polished pebble seats: Extra large, large and medium sizes - soft white, mid-grey and charcoal colours

Play/seating boulders: naturally weathered granite boulders (some selected boulders to have level cut tops with polished finish)

Stepping logs: naturally formed hardwood timber logs at varying heights

Dedicated mobility scooter parking spaces close to retail units (all public realm spaces designed to accommodate mobility scooter access and provide further informal parking opportunities)

Podium courtyard garden

Ornamental mixed planting areas in raised steel edge planters

Green roof lawn turf

Green roof native wildflower meadow turf

Multi-stem large shrub / small tree

Multi-stem large shrub / small tree in large feature pot

Resin bound gravel (buff colour mix)

Composite timber decking

Brick unit paver laid in herringbone pattern

Stepping stones

Aluminum feature pergola on raised platform

Climbing plant support structure and tensile wires (incorporating overhead lighting)

1.2m high steel powder coated railings (to match architectural specification and colour)

Decorative privacy screen boundary

Fixed bench seating

Moveable timber seating blocks

Raised platform feature (positioned over evaluated podium floor level over generator room below) constructed with composite wood (Willboard or similar approved). Incorporating steps, ramp, seating elements and planters.

Flexible seating: Indicative only (Hay Palisade table and chair collection - Iron Red colour or similar approved)

Outdoor entertainment features (potentially including outdoor kitchen and bar with stools)

Outdoor games features (potentially including table tennis and table football)

P J L I V E S E Y

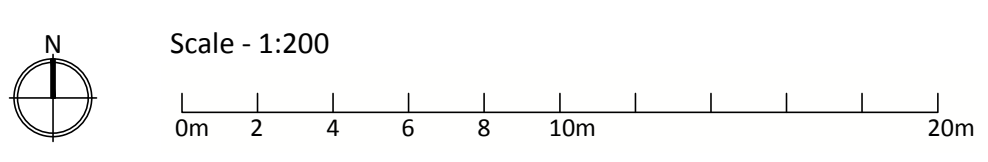
Chorlton Precinct, Manchester

Landscape Masterplan

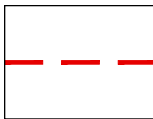
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Rev by: UN/LS
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Checker: LC
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Product Status: PLANNING

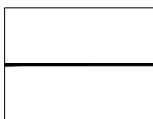
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Key



Estimated existing levels



Estimated proposed level



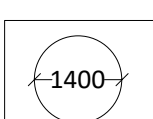
Proposed Root Barrier



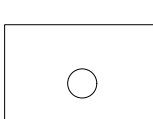
7.4m Easement



Proposed Rain Garden



United Utilities Pipe



Rain Garden Outlet

Location Plan NTS



Chorlton Precinct
Indicative Section Line through Manchester Road



Drwg No: 1062-03

Drawn by: LN

Rev by:

QM Status:

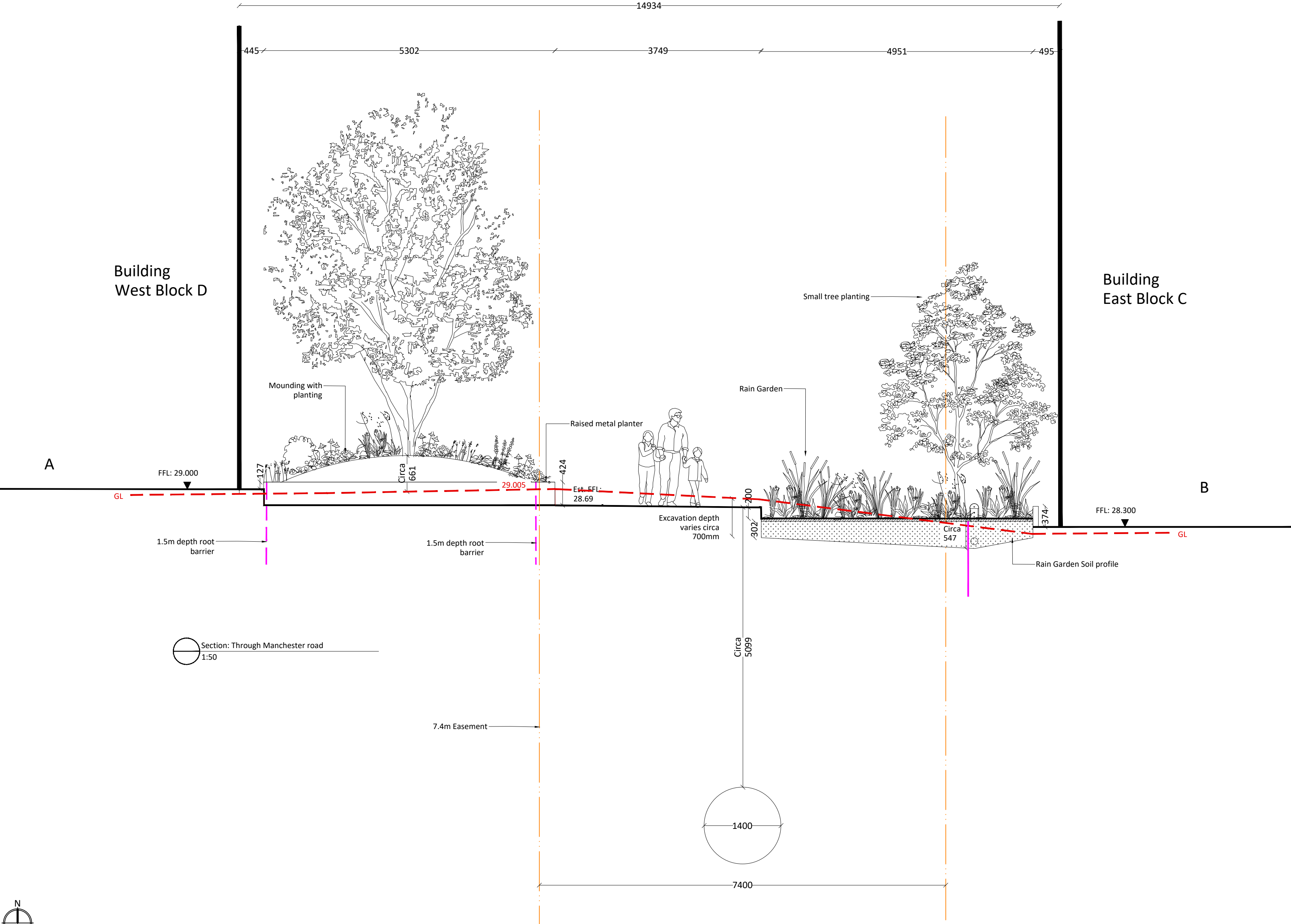
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Checker: LC

Rev Checker:

Product Status: For UU review



CIVIC