



Project Title

Drainage and SuDS Strategy Report

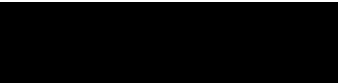
At

**404 Wilbraham Road,
Chorlton-Cum-Hardy,
Manchester,
M21 0UF**

For



PG Consulting
108 Ack Lane West
Cheadle Hulme
Cheshire
SK8 7ES



Paul Graveney Consulting Ltd Trading as PG Consulting
Company Registration 11238546

Document Management

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Executive Summary

Figure 1: Drainage & SuDS Strategy Summary

Item	Brief Description
Proposed Development	Construction of a building encompassing 8 apartments, with access, informal amenity space, landscaping and associated works on land at 404 Wilbraham Road, Chorlton-Cum-Hardy, Manchester M21 0UF.
Flood Zone Classification	Flood Zone 1 – Low Risk
Geology	At this time no site-specific intrusive Phase 2 Site Investigation has been carried out at the site. A review of the Geological Mapping on the BGS website would indicate that the superficial deposits comprise Glaciofluvial Sheet Deposits, Devensian Sand and Gravel. The Bedrock Geology comprises the Wilmslow Sandstone Formation – Sandstone. A local BGS borehole would indicate the ground to encompass shallow Top Soil and a thin layer of clay over 1.5m of Loose Brown Sand, over firm boulder Clay from 2.5m depth.
Infiltration Rate	Based on the assessment of the BGS data set, the shallow sand layer has the potential to be suitable for infiltration. However, due to the lower ground floor level the base of the soakaway would be at the clay layer. Furthermore, the 5m offset distance from the soakaway to foundations and boundaries could not be achieved. In light of this infiltration as a means of draining the site is discounted.
Nearest Watercourses	Chorlton Brook is located approximately 800m to the south of the site flowing in a westerly direction.
Nearest Adopted Sewers and onsite private drainage	The United Utilities (UU) sewer records have been reviewed and indicate no public sewers passing through the site. Within Wilbraham Road to the south of the site is a 450mm diameter combined sewer that flows east and merges with a 900x600mm combined brick egg sewer flowing south down Egerton Road North. No surface water sewer has been identified in close proximity. The site is undeveloped with no positive drainage identified.
Existing Discharge Rate	In terms of this drainage assessment the site is classed as Greenfield. With the site being small, the greenfield rates have not been defined.
Proposed Discharge Rate and Outfall Location	Connection made to the combined water sewer at a peak discharge rate of 2l/s, plus also considered the minimum flow control size to prevent blockage and in line with Manchester Council local policy.
Allowance for Climate Change	45% - based on a >100-year design life to 'the 2100's'.
SuDS features & Attenuation	Reduced impermeable areas, water butts, attenuation tank and flow controls.
Maintenance Responsibility	Management Company
Foul Drainage Strategy	New foul drainage generated by the development to outfall unrestricted to the UU adopted combined water sewer via the same exiting connection.

1. Introduction

- 1.1 Paul Graveney Consulting Ltd (PGC) has been appointed by Armstead Property Ltd to prepare this Drainage and Sustainable Drainage Systems (SuDS) Strategy Report to support a full planning permission for the construction of a building for 8 flats, with access, informal amenity space, landscaping and associated works on land at 404 Wilbraham Road, Chorlton-Cum-Hardy, Manchester, M21 0UF. The Site Masterplan as indicated in Appendix A provides details of the proposed development intent.
- 1.2 The assessment has been undertaken in line with the following:
- Section 14 of the 2024 'National Planning Policy Framework', plus the accompanying Technical Guidance on Flood Risk and any local policies.
 - Places for Everyone Joint Development Plan Document; Policy JP-S4.
 - National Standards for SuDS (July 2025)
- 1.3 This report has been commissioned by Armstead property Ltd and is specific to their interests in the development proposals as described by the Architectural plan in Appendix A.
- 1.4 The report has been commissioned to identify any drainage-related issues associated with the proposed development and any likely constraints that could be imposed. The following issues have been addressed within this report.
- Determine the current surface water drainage regime and assess any potential increase in surface water runoff as a result of the proposed development.
 - Assess local and national policy in relation to the inclusion of SuDS.
 - Discuss Sustainable Drainage Systems (SUDS) as an option for reducing surface water flood risk and devise an outline Drainage layout.
 - Devise an appropriate outline surface water drainage strategy (including calculation where appropriate) to deal with any potential increase in surface water runoff and include for climate change.
 - Devise an appropriate outline foul water drainage strategy.

2. Development Description and Location

2.1 Site Location

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

Item	Brief Description
Project name	404 Wilbraham Road, Chorlton-Cum-Hardy.
Site address and location	Land at 404 Wilbraham Road, Chorlton-Cum-Hardy, Manchester, M21 0UF.
Council Area	Manchester City Council (MCC)
Approximate Grid Reference	OS: 382063, 393984
General Locality	The site is located some 500m to the north east of Chorlton-Cum-Hardy village Centre.

Figure 2: Site Referencing Information

2.2 Existing Site Description

- 2.2.1 The development site (Red Line Boundary) is largely rectangular in plan shape and currently encompasses a former garden centre with hoardings to all boundaries. There are multiple dilapidated outhouses and greenhouses throughout the site. To the northwest of the plot there are overgrown shrubs and woodland.
- 2.2.2 The site is located within a predominantly residential and commercial led area. Residential areas exist to the north and the east of the proposed development with commercial buildings locally in all other directions. The site sits on a crossroads with Egerton Road North to the eastern periphery.
- 2.2.3 Figure 3 identifies the overall site location details. Further details of the existing layout can be seen on the Red Line Plans in Appendix A.

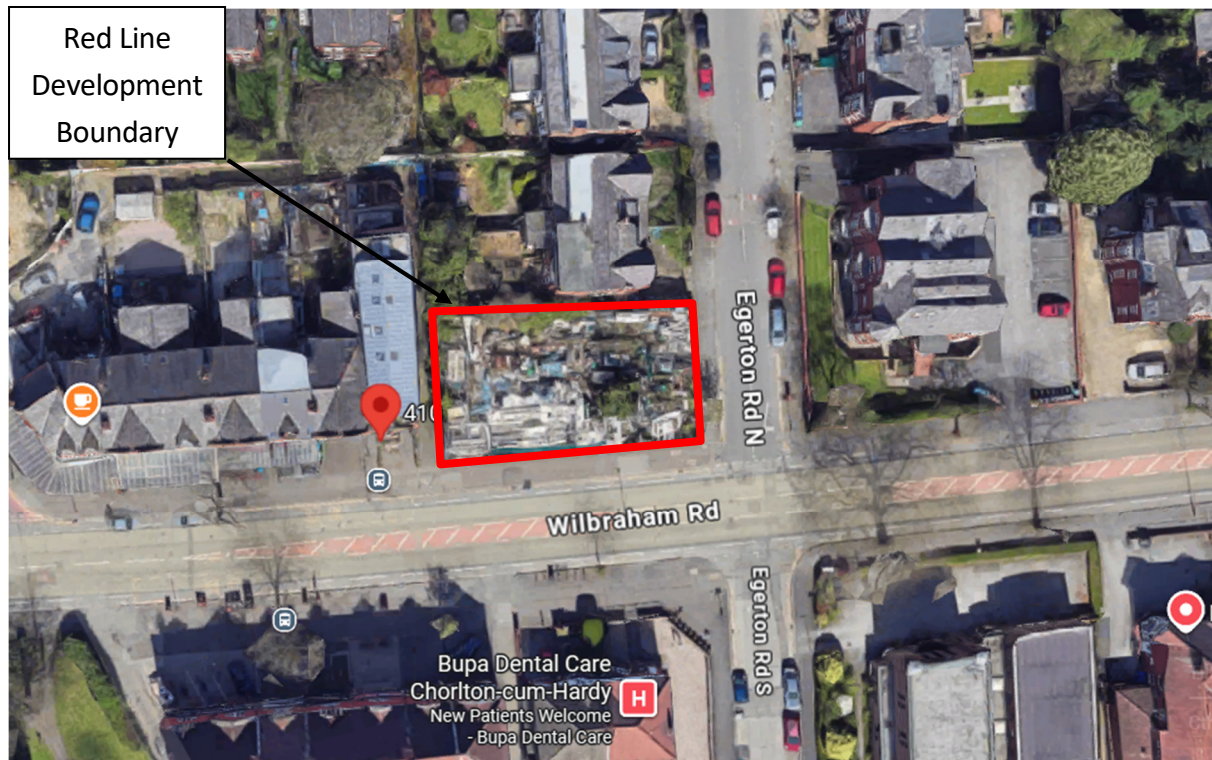


Figure 3: Location Plan as taken from Google Maps (2026)

2.3 Topography

- 2.3.1 A full topographical survey has been undertaken around the periphery of the site. This has identified the footpath of both Wilbraham Road and Egerton Road North to be flat and holding a level of circa 28.50m AOD. Refer to Appendix B for details.

3. Fluvial Flood Risk Review

- 3.1 Figure 4 below locates the site on the Environment Agency's indicative floodplain map. It is clear from this that the red line boundary sits outside of a fluvial generator of flood water from any identified water body or river. It is considered therefore that the site lays outside of the active 100-year and extreme event floodplains, thus lying within 'Flood Zone 1 Classification' in accordance with the 2024 National Planning Policy Framework (NPPF) Flood Risk Guidance Notes, i.e., probability of annual fluvial flooding significantly less than 1 in 1000 in any one year (<0.1%). The risk from fluvial flood water is diminished to acceptable levels, removing the requirement for further investigation and assessment of the fluvial flood regime.

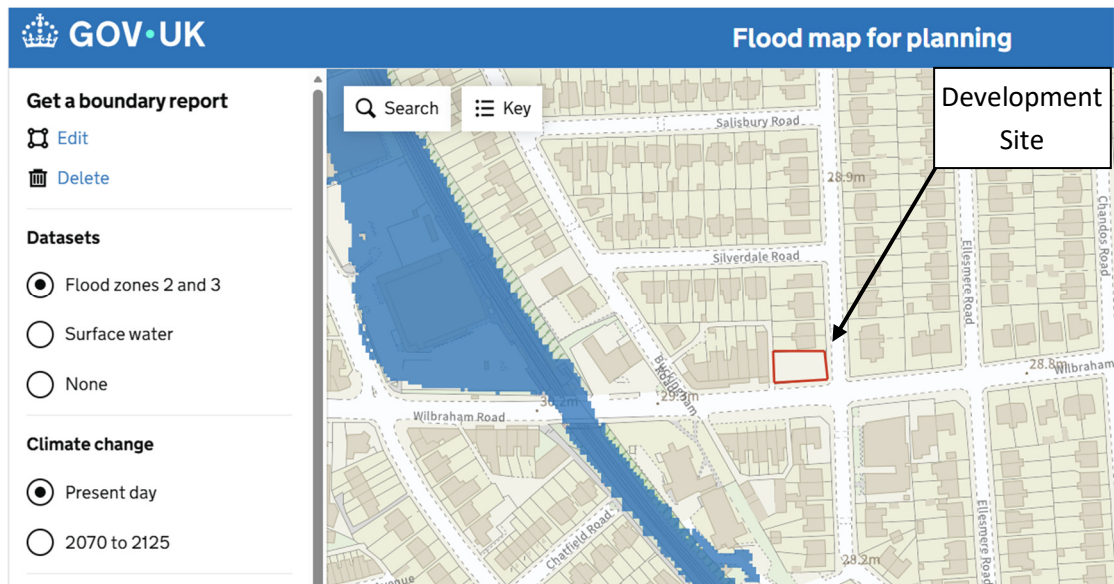


Figure 4: EA Indicative Flood Maps

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

4. Planning Policy

4.1 Manchester Sustainable Drainage

4.1.1 Manchester City Council (MCC) and Partners have prepared the Greater Manchester Sustainable Drainage Design Guide that provides details for the Management of Surface Water, defining how SuDS can be integrated into the fabric of development starting at the planning stage and leading through the concept, outline and detailed design stages.

4.1.2 The main principles of the integration of SuDS for Major developments are summarised below and as taken from the CIRIA SuDS Manual:

- Sustainable surface water management is a material consideration for all planning applications. This means all development proposals must include a site-specific surface water drainage strategy following sustainable urban drainage guidelines (SuDS).
- On greenfield sites, surface water run off must be managed to achieve at least no increase in run off rates. Where possible, there should be a reduction in rates.
- On previously developed sites, run off proposals should demonstrate a reduction in rates in line with the non-Statutory Technical Standards for Sustainable Drainage Systems (2015) (or any later replacement standards).
- In line with Part H of the building regulations and the National Standards for SuDS (2025), surface water drainage options must be considered in the following order. An option higher in the hierarchy can only be agreed if it can be demonstrated that earlier options are not feasible.
 - i. Into the ground (infiltration)
 - ii. To a surface water body
 - iii. To a surface water sewer
 - iv. To a combined sewer
- Development in a critical drainage area should not result in the loss of open watercourses. Culverts should be opened where possible. We will only permit the culverting of existing watercourses if there is an overriding need. proposals must show how watercourses and riverside habitats will be conserved and enhanced.
- The Council as Lead Local Flood Authority are a statutory consultee for surface water drainage on all major planning applications. To approve an application, we need to be satisfied that:
 - i. The proposals are appropriate in relation to flood risk and pollution control.
 - ii. There are clear arrangements in place for ongoing maintenance.

5. Outline Drainage Strategy

5.1 External Consultation

5.1.1 At this time United Utilities (UU) have not been consulted via a predevelopment drainage enquiry for the development site. However, from experience on other schemes, their considered response would be that they require evidence that the SuDS Hierarchy has been assessed. Should it be proven that infiltration is not feasible then UU would allow connection to the combined water sewer in Wilbraham Road at a peak rate not exceeding 2l/s.

5.2 Existing Drainage

5.2.1 The United Utilities (UU) sewer records have been reviewed and indicate no public sewers passing through the site. Within Wilbraham Road to the south of the site is a 450mm diameter combined sewer that flows east and merges with a 900x600mm brick egg sewer flowing south down Egerton Road North. No surface water sewer has been identified in close proximity. Refer to Figure 5 below.

5.2.2 For the purpose of this drainage strategy, the site is classed as undeveloped with no positive drainage identified.

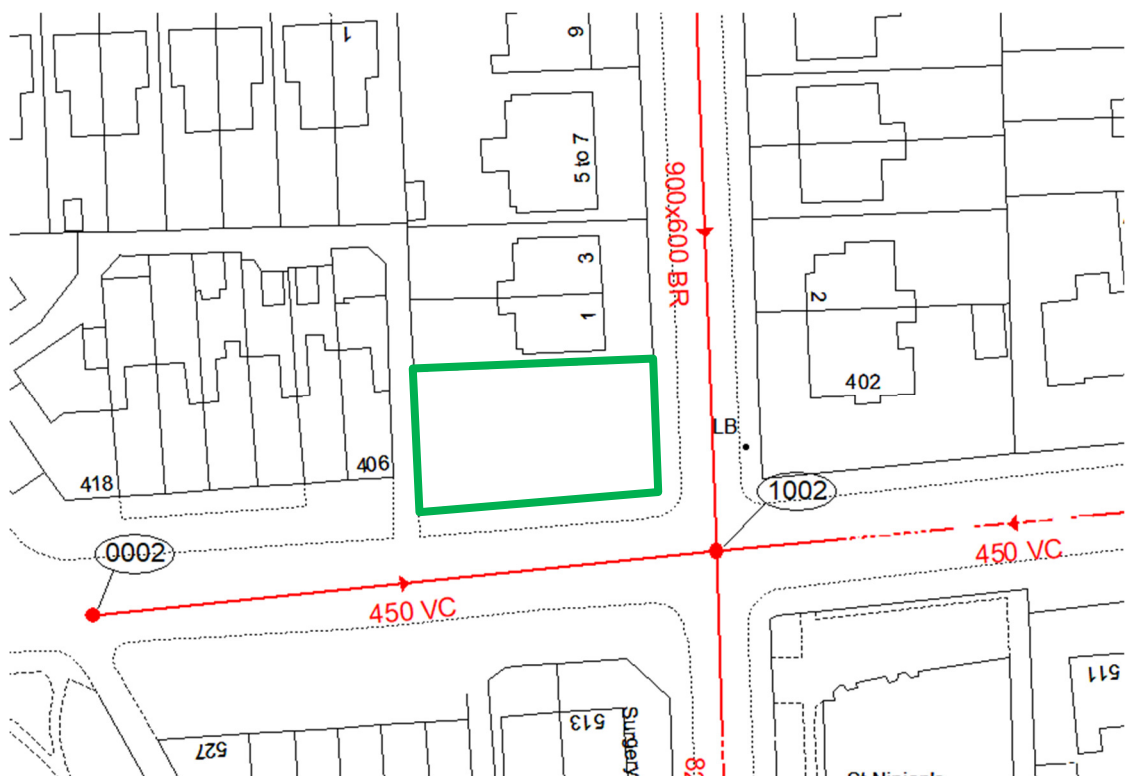


Figure 5: UU Sewer Records

5.3 Existing Runoff

5.3.1 The site area is undeveloped and so is considered to be greenfield. As the site is relatively small the greenfield runoff rates have not been defined.

5.4 Hydrological Assessment

- 5.4.1 As mentioned previously within this report the closest identified watercourse is the Chorlton Brook, located approximately 800m to the south of the site flowing in a westerly direction.

5.5 Geology

- 5.5.1 At this time no site-specific intrusive Phase 2 Site Investigation has been carried out at the site. A review of the Geological Mapping on the BGS website would indicate that the superficial deposits comprise Glaciofluvial Sheet Deposits, Devensian Sand and Gravel. The Bedrock Geology comprises the Wilmslow Sandstone Formation – Sandstone. A local BGS borehole would indicate the ground to encompass shallow Topsoil and a thin layer of clay over 1.5m of Loose Brown Sand, over firm boulder Clay from 2.5m depth.
- 5.5.2 Based on the assessment of the BGS data set, the shallow sand layer has the potential to be suitable for infiltration. However, due to the lower ground floor level the base of the soakaway would be in the clay layer. Furthermore, the 5m offset distance from foundations and boundaries could not be achieved. In light of this infiltration as a means of draining the site is discounted.

5.6 Sustainable Drainage Systems (SuDS) Assessment

5.6.1 SuDS Objectives

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

5.6.2 SuDS Design Themes

- 5.6.2.1 The 'Management Train Approach' should be central to the surface water drainage strategy of the proposed site. The main objective is treatment and control of runoff as near to the source as possible protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:
- i. **Prevention** – The use of good site design and housekeeping measures to prevent runoff and pollution and includes the use of rainwater reuse / harvesting.
 - ii. **Source Controls** – Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).
 - iii. **Site Control** – Management of water in a local area and can include below ground storage / attenuation, detention basins, large infiltration devices.
 - iv. **Regional Control** – Management of water from a site or various sites and can include wetlands and balancing ponds.

5.6.3 SuDS Site Constraints

5.6.3.1 SuDS techniques are suitable for all sites; therefore an assessment of the existing site is required so that SuDS limitations can be determined.

- *Land Use Characteristics:* The type of development and with it taking up the majority of the red line boundary restricts the opportunities on the use of various SuDS devices.
- *Site Characteristics:* Based on a review of the desktop investigations, infiltration would not be suitable.
- *Catchment Characteristics:* The site is currently classed for drainage purposes as 'Greenfield'.
- *Environmental and Amenity Performance:* The inclusion of SuDS within the overall development is a key driver in providing both amenity and habitat creation. All types of SuDS will be considered and blended into the project where feasible. Maintenance plans will be prepared for all SuDS devices that are included.

5.6.4 SuDS Methods

5.6.4.1 Figure 6 and 7 on the following pages provide an assessment of various above and below ground SuDS methods that can provide water quality treatment and management of flows to reduce runoff rates & volumes, and whether they can be suitably incorporated at this development site. The purpose of this assessment is to set out options to be considered at the planning stage with consideration to time constraints, viability and lifetime maintenance of the residential development.

Method	Comment	Suitability for Development
Green Roofs	Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater. Promotes evaporation and local biodiversity.	<u>Not suitable:</u> The pitched roof profile would preclude the inclusion of green roofs for this development'.
Water Butts	Plastic tanks placed at the base of rainwater down pipes to collect rainwater runoff from the roof areas for reuse by the property owners.	<u>Suitable:</u> To be incorporated to the base of the rear rainwater pipes.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site by reusing as 'Grey' water. Also reduces treated water consumption.	<u>Not suitable:</u> - Additional costs of installation would have a severe effect on the viability of the development. - The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs.
Infiltration Options	Reduces total run off volume from the development by allowing water to infiltrate to suitable sub strata.	<u>Not suitable:</u> Underlying deeper cohesive ground conditions and close proximity to foundations would preclude infiltration.
Permeable Surfacing (Infiltration)	- Reduces total run off volume from the development by allowing water to infiltrate to suitable sub strata. - Can be used to enhance water quality.	<u>Not suitable:</u> No access roads or driveways proposed.
Permeable Surfacing (Standard)	- Can be used to enhance quality of runoff water. - Sub-base provides 'source' storage and reduces the volume of storage downstream with selection of stone fill or use of plastic box stems. - Impermeable membrane at base of construction to prevent impact on pavement stability.	<u>Not suitable:</u> No access roads or driveways proposed. Pathways to drain onto the adjacent soft landscaping.
Bio-Retention	Collect and retain run-off within tree pits or above ground planers to help improve water quality, prior to discharge in piped system or infiltration.	<u>Not Suitable:</u> The size and type of development restricts the use of above ground surface runoff storage.
Swales, basins and ponds	- Provide areas for above ground surface runoff storage. - Swales also improve water quality through filtration.	<u>Not Suitable:</u> The size and type of development restricts the use of above ground surface runoff storage.

Figure 6: Surface SuDS Methods

Method	Comment	Suitability for Development
Geocellular Storage	• Suitable for sites with insufficient space for basins etc. • Suitable for sites where topography prevents the use of open basins etc.	<u>Suitable:</u> • Subject to detailed design and drainage layout to be used to attenuate the peak flows.
Large Diameter Pipes, Culverts or Tanks	• Suitable for sites with insufficient space for basins etc. • Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. • Generally, it would be suitable for adoption by the statutory water company (e.g., United Utilities).	<u>Not Suitable:</u> • The use of oversized pipes is more suited to large residential schemes.

Figure 7: Sub-Surface SuDS Methods

5.6.5 SuDS Hierarchal Approach

5.6.5.1 Based on the SuDS assessment in Tables 6 & 7, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	BGS mapping and local site investigations would indicate the deeper cohesive ground and close proximity to foundations and boundaries would preclude infiltration.
Connection to Watercourse	No	Chorlton Brook located some 800m from the site boundary.
Connection to Surface Water Sewer	No	No surface water sewers in close proximity.
Connection to a Combined Water Sewer	Yes	Connect to the combined water sewer in Wilbraham Road at a peak rate not exceeding 2l/s.

Figure 8: SuDS Hierarchal Approach

5.6.6 SuDS Design Philosophy

5.6.6.1 SuDS assessment and hierarchal approach discussed in Figure 6, 7 and 8 above has defined the overall SuDS strategy. Thus, the SuDS philosophy for the development site is where feasible the promotion of prevention and site control techniques with discharge to the adjacent combined water sewer at a restricted rate.

The following design philosophy is proposed:

- Aim to reduce the impermeable fraction of development.
- Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to conveyance to the existing drainage infrastructure.
- Prevention measures in the form of water butts.
- Site control in the form of a geocellular attenuation tank with controlled outflow.

5.7 Climate Change

- 5.7.1 In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Rather than nationwide allowances, each area will have its own peak rainfall allowances. In the case of the Manchester area, this is the Upper Mersey Management Catchment peak rainfall allowances.
- 5.7.2 Based on the nature of the development, a lifespan in excess of 100 years is anticipated. Therefore, the potential climate change allowance for the 2070's Upper End Allowance for a Church development is 45%, which will be included in the hydraulic calculations.

5.8 Outline Surface Water Drainage Strategy

- 5.8.1 The general principal of the surface water drainage strategy is to collect the runoff from the roof areas of the new residential building and direct it into an underground drainage network that will outfall to a geocellular attenuation tank located beneath the rear landscaping area. The water will then outflow at a peak runoff rate of 2l/s to the combined water sewer in Wilbraham Road via a new connection. SuDS in the form of water butts will also be incorporated to slow the rate of runoff and provide treatment.
- 5.8.2 The proposed drainage layout for the new development site will be designed in accordance with BS EN 752: 2008, Building Regulations Part H, and tested for the 1 in 100-year return period including a 45% increase to account for climate change to confirm that there is no flood risk to the building.
- 5.8.3 A hydraulic model of the proposed surface water network has been simulated within the Causeway Flow design software and confirms that no flooding will occur up to the extreme 100 year + 45% CC storm event.
- 5.8.4 Drawing PGC1463-DR-C-001 in Appendix C indicates the Drainage Strategy based on the Architects masterplan intent with the outline hydraulic calculations in Appendix D.

5.9 Pollution Control

- 5.9.1 Runoff from roofs is generally considered to be clean and will be discharged directly into the new drainage network. Surface water run-off from hard paved areas will flow into the adjoining soft landscaping areas to provide the required treatment prior to outfall.

5.10 Maintenance

5.10.1 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints. The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

5.10.2 There are three types of maintenance activities associated with surface water drainage systems. The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – *'basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections.'*
- Occasional Maintenance – *'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).'*
- Remedial Maintenance – *'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.'*

5.10.3 Piped Networks, Inspection, Manhole and Catchpit Chambers

The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained where required.

Pipes are proprietary products, and the materials can vary across the site and as such where used the manufacture's recommendations should be followed.

Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

Access for maintenance is provided through access chambers and manholes.

Regular inspection and maintenance are important to identify areas which may have been obstructed / clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required, take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Figure 9: Operation and Maintenance Requirements of Piped Networks and Inspection Chambers

5.10.4 Attenuation Storage

Geocellular tanks are modular storage systems made with plastic units. These units can be assembled to achieved re required volume and usually on multiple layers. Generally, the units have 95% of voids content and are used to create an efficient below ground structure to store surface water.

The geocellular units and geotextile are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.

Access for maintenance should be provided by an access shaft located on the tank and from the manhole chambers downstream of the tank.

Regular inspection and maintenance are important for the effective operation of attenuation tanks as designed. As the feature is buried, a regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	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 blockages by sediment, algae or other matter; remove and replace surface infiltration medium as required.	Annually.
	Remove sediments from pre-treatment structures and/or internal forebays.	Annually, or as required.
Occasional Maintenance	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
Remedial Actions	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

Figure 10: Operation and Maintenance Requirements for Attenuation Crates

5.10.5 Flow Control Units

The flow control units are intended for flood control and flow restriction.

The flow control is specified as an orifice plate and is a proprietary product; therefore, manufacturer's recommendations should also be taken into consideration.

Access for maintenance has been provided by locating within manhole chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre- treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

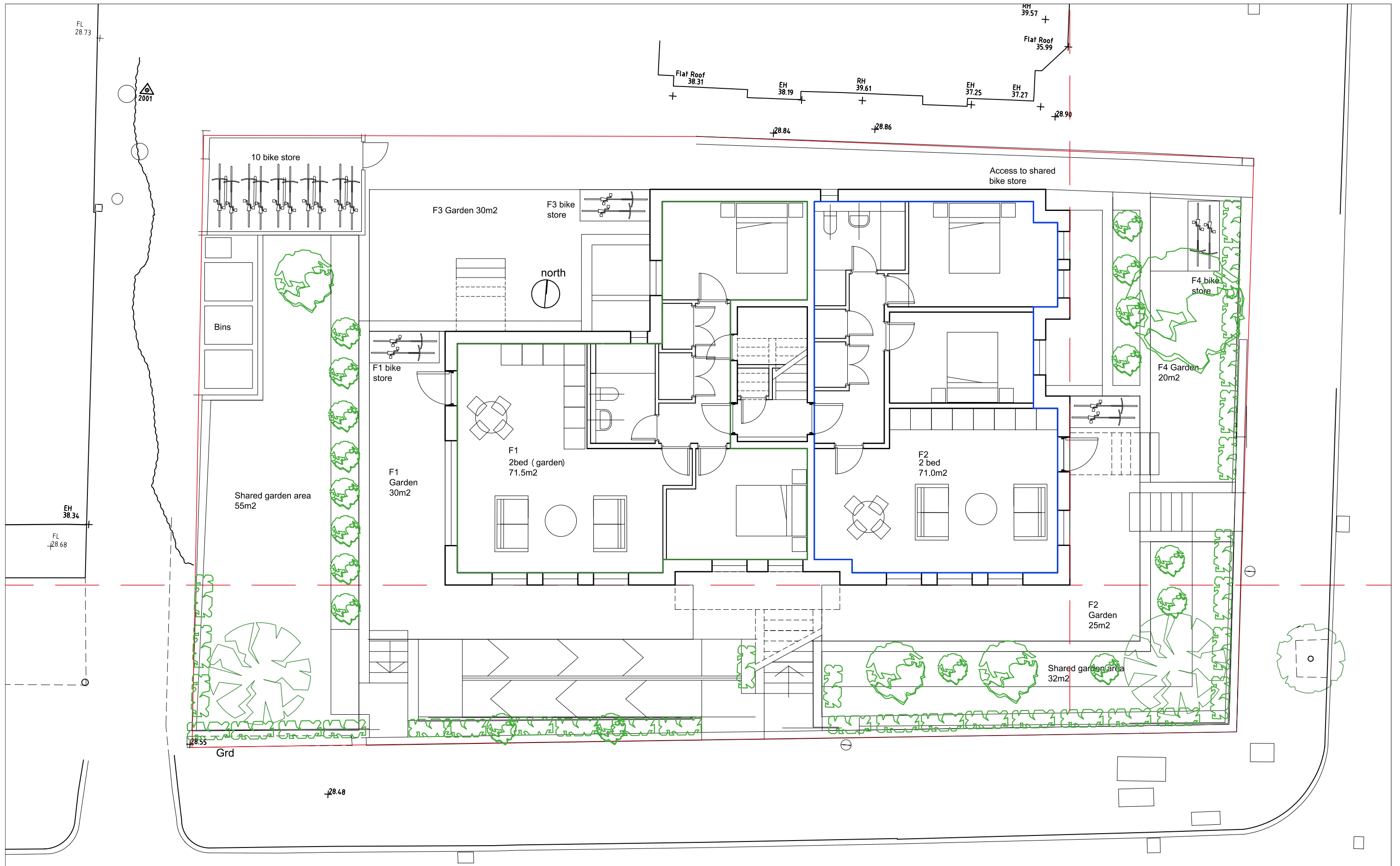
Figure 11: Operation and Maintenance Requirements for Flow Controls

5.11 Foul Water Drainage

5.11.1 Foul flows generated by the new residential dwelling will discharge via a new below ground foul drainage network and outfall to the same combined water drain to the UU combined sewer in Wilbraham Road.

5.11.2 Drawing PGC1463-DR-C-001 in Appendix C indicates the outline foul water Drainage Strategy.

Appendix A – Architects Drawings



PROJECT		CLIENT		PHASE		DATE	REV	DATE	REV
404W Manchester		APL		Planning - PL		26/01/26			
PROJECT NO	SITE	PHASE	DWG NO	REV	SCALE	SHEET			
177 -	404W -	PL -	GL1	-	1 : 200	A3			
DRAWING TITLE					DRAFT simon james /architect				
Proposed Landscape plan									

Appendix B – Topographical Survey

Appendix C – PGC Drawings

SURFACE WATER DRAINAGE

CONSIDERATION HAS BEEN GIVEN TO THE HIERARCHY OF DRAINAGE OPTIONS FOR THE SITE AS FOLLOWS:

- DISCHARGE INTO GROUND - UNDERLYING COHESIVE GROUND IS UNSUITABLE FOR INFILTRATION BASED OPTIONS.
- DISCHARGE TO SURFACE WATER BODY - NO WATERCOURSE IN CLOSE PROXIMITY.
- DISCHARGE TO SURFACE WATER SEWER, HIGHWAY DRAIN OR OTHER DRAINAGE SYSTEM - NO SURFACE WATER SEWER IN CLOSE PROXIMITY.
- DISCHARGE TO COMBINED WATER SEWER - NEW OUTFALL TO ADJACENT COMBINED WATER SEWER AT RESTRICTED RATES.

SUMMARY

NEW CONNECTION TO COMBINED SEWER MANHOLE WITH FLOWS RESTRICTED TO A PEAK RATE OF 2L/S.

SUDS TO ENCOMPASS:

- FLOW CONTROLS.
- GEOCELLULAR ATTENUATION TANK.

SUMMARY

IMPERMEABLE AREA: 280m² (NEW)
SEWER
OUTFALL LOCATION: 2.0 L/S (100YR + 45%)
PEAK DISCHARGE RATE: 2.0 L/S (100YR + 45%)
ATTENUATION VOLUME: 7.2m³ (100YR + 45% CC)

FOUL WATER DRAINAGE

FOUL WATER GENERATED BY THE NEW RESIDENTIAL BUILDING WILL DISCHARGE TO THE COMBINED SEWER VIA THE SAME NEW CONNECTION AS THE SURFACE WATER SEWER.



GENERAL NOTES

- DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- DO NOT SCALE FROM THIS DRAWN. WORK TO DIMENSIONS OR COORDINATES PROVIDED. ALL LEVELS ARE IN MILLIMETRES. UNLESS OTHERWISE NOTED, ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.

KEY

- EXISTING COMBINED PUBLIC SEWER
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED COMBINED WATER DRAINAGE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED RETAINING WALL
- SITE BOUNDARY

NOTE ALL RWP AND SVP LOCATIONS AND PROPOSED LEVELS TO BE CONFIRMED BY OTHERS

ALL PIPEWORK TO BE 1000 UNLESS NOTED OTHERWISE

EGERTON ROAD NORTH

900x600 COMBINED WATER PUBLIC SEWER

WILBRAHAM ROAD

4500 COMBINED WATER PUBLIC SEWER

UU MH 1002
CL: 28.50
IL: 24.34

NEW JUNCTION CONNECTION TO EXISTING UU COMBINED SEWER SUBJECT TO APPROVAL FROM STW VIA A S106 APPLICATION.

NOTE THIS DRAWING IS ISSUED TO SUPPORT THE PLANNING APPLICATION ONLY. FINAL DRAINAGE LAYOUT AND SUDS CONFIGURATION SUBJECT TO FINAL SITE LAYOUT AND DETAILED DESIGN

GEOCELLULAR STORAGE TANK, TO PROVIDE 7.2m³ ATTENUATION (6m x 3m x 0.4m HIGH). TANK TO BE VENTED AND DESIGNED TO SUIT BOTH THE TEMPORARY AND PERMANENT SCENARIO.
CL: 28.45
IL: 26.30
HEIGHT OF UNIT: 0.4m
MIN 1.75m COVER

MH SW 01
CL: 28.45
IL: 26.35

LGF FFL
27.150

MH SW 02
CL: 27.15
IL: 26.26

MH SW 05
CL: 27.15
IL: 26.10

MH SW 04
CL: 27.15
IL: 26.20

MH SW 03
CL: 27.15
IL: 26.35

MH CW 01
CL: 28.45
IL: 26.00

HYDROBREAK FLOW CONTROL DEVICE PLACED WITHIN MANHOLE TO RESTRICT OUTFLOWS TO A MAXIMUM OF 2.0L/S FOR ALL EVENTS

Appendix D – Outline Hydraulic Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	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	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	✓
Barrels	1		

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
YG	0.007	4.00	27.150	100	0.700
SW01			28.450	450	2.100
TANK			28.450		2.150
SW02	0.012	4.00	27.150	450	0.890
SW03	0.006	4.00	27.150	450	0.800
SW04	0.003	4.00	27.150	450	0.950
SW05			27.150	1200	1.050
CW01			28.450	450	2.450
SEWER			28.500	100	3.300

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)
1.000	YG	SW01	9.000	0.600	26.450	26.350	0.100	90.0	100	4.18	50.0
1.001	SW01	TANK	4.000	0.600	26.350	26.300	0.050	80.0	100	4.26	50.0
1.002	TANK	SW02	3.000	0.600	26.300	26.260	0.040	75.0	100	4.32	50.0
1.003	SW02	SW05	13.000	0.600	26.260	26.100	0.160	81.3	100	4.57	50.0
2.000	SW03	SW04	11.000	0.600	26.350	26.200	0.150	73.3	100	4.20	50.0
2.001	SW04	SW05	6.000	0.600	26.200	26.100	0.100	60.0	100	4.30	50.0
1.004	SW05	CW01	2.000	0.600	26.100	26.050	0.050	40.0	100	4.60	50.0
1.005	CW01	SEWER	7.000	0.600	26.000	25.200	0.800	8.8	150	4.63	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.811	6.4	1.3	0.600	2.000	0.007	0.0	30	0.629
1.001	0.861	6.8	1.3	2.000	2.050	0.007	0.0	29	0.658
1.002	0.889	7.0	1.3	2.050	0.790	0.007	0.0	29	0.670
1.003	0.854	6.7	3.4	0.790	0.950	0.019	0.0	50	0.857
2.000	0.900	7.1	1.1	0.700	0.850	0.006	0.0	26	0.645
2.001	0.996	7.8	1.6	0.850	0.950	0.009	0.0	31	0.784
1.004	1.223	9.6	5.1	0.950	2.300	0.028	0.0	52	1.242
1.005	3.427	60.6	5.1	2.300	3.150	0.028	0.0	29	2.078

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	9.000	90.0	100	Circular	27.150	26.450	0.600	28.450	26.350	2.000
1.001	4.000	80.0	100	Circular	28.450	26.350	2.000	28.450	26.300	2.050
1.002	3.000	75.0	100	Circular	28.450	26.300	2.050	27.150	26.260	0.790
1.003	13.000	81.3	100	Circular	27.150	26.260	0.790	27.150	26.100	0.950
2.000	11.000	73.3	100	Circular	27.150	26.350	0.700	27.150	26.200	0.850
2.001	6.000	60.0	100	Circular	27.150	26.200	0.850	27.150	26.100	0.950
1.004	2.000	40.0	100	Circular	27.150	26.100	0.950	28.450	26.050	2.300
1.005	7.000	8.8	150	Circular	28.450	26.000	2.300	28.500	25.200	3.150

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	YG	100	Manhole	Adoptable	SW01	450	Manhole	Adoptable
1.001	SW01	450	Manhole	Adoptable	TANK		Junction	
1.002	TANK		Junction		SW02	450	Manhole	Adoptable
1.003	SW02	450	Manhole	Adoptable	SW05	1200	Manhole	Adoptable
2.000	SW03	450	Manhole	Adoptable	SW04	450	Manhole	Adoptable
2.001	SW04	450	Manhole	Adoptable	SW05	1200	Manhole	Adoptable
1.004	SW05	1200	Manhole	Adoptable	CW01	450	Manhole	Adoptable
1.005	CW01	450	Manhole	Adoptable	SEWER	100	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
YG	25.944	85.254	27.150	0.700	100				
						0	1.000	26.450	100
SW01	2.215	78.475	28.450	2.100	450		1	1.000	26.350
						0	1.001	26.350	100
TANK	1.706	47.119	28.450	2.150			1	1.001	26.300
						0	1.002	26.300	100
SW02	27.299	46.780	27.150	0.890	450		1	1.002	26.260
						0	1.003	26.260	100
SW03	83.910	82.881	27.150	0.800	450		0	2.000	26.350
SW04	83.910	48.305	27.150	0.950	450		1	2.000	26.200
						0	2.001	26.200	100
SW05	62.045	46.441	27.150	1.050	1200		1	2.001	26.100
						2	1.003	26.100	100
						0	1.004	26.100	100
CW01	55.435	30.169	28.450	2.450	450		1	1.004	26.050
						0	1.005	26.000	150
SEWER	54.927	3.559	28.500	3.300	100		1	1.005	25.200
									150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	40	0	0
100	45	0	0

Node SW05 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	26.100	Product Number	CTL-SHE-0067-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	43

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	18.0	18.0	0.400	18.0	24.0	0.401	0.0	24.0

Approval Settings

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m³)	
Full Bore Velocity	✓		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	1 year 240 minute summer	18.475	4.882
1 year 15 minute winter	76.857	30.991	1 year 240 minute winter	12.274	4.882
1 year 30 minute summer	71.439	20.215	1 year 360 minute summer	14.169	3.646
1 year 30 minute winter	50.133	20.215	1 year 360 minute winter	9.210	3.646
1 year 60 minute summer	48.435	12.800	1 year 480 minute summer	11.185	2.956
1 year 60 minute winter	32.179	12.800	1 year 480 minute winter	7.431	2.956
1 year 120 minute summer	30.053	7.942	1 year 600 minute summer	9.182	2.511
1 year 120 minute winter	19.966	7.942	1 year 600 minute winter	6.274	2.511
1 year 180 minute summer	23.233	5.979	1 year 720 minute summer	8.203	2.199
1 year 180 minute winter	15.102	5.979	1 year 720 minute winter	5.513	2.199

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 960 minute summer	6.768	1.782	30 year +40% CC 1440 minute summer	14.225	3.812
1 year 960 minute winter	4.483	1.782	30 year +40% CC 1440 minute winter	9.560	3.812
1 year 1440 minute summer	4.949	1.326	100 year +45% CC 15 minute summer	505.670	143.087
1 year 1440 minute winter	3.326	1.326	100 year +45% CC 15 minute winter	354.856	143.087
30 year +40% CC 15 minute summer	376.189	106.449	100 year +45% CC 30 minute summer	332.000	93.944
30 year +40% CC 15 minute winter	263.992	106.449	100 year +45% CC 30 minute winter	232.982	93.944
30 year +40% CC 30 minute summer	244.900	69.298	100 year +45% CC 60 minute summer	222.268	58.739
30 year +40% CC 30 minute winter	171.860	69.298	100 year +45% CC 60 minute winter	147.669	58.739
30 year +40% CC 60 minute summer	163.225	43.136	100 year +45% CC 120 minute summer	134.215	35.469
30 year +40% CC 60 minute winter	108.443	43.136	100 year +45% CC 120 minute winter	89.169	35.469
30 year +40% CC 120 minute summer	98.613	26.061	100 year +45% CC 180 minute summer	101.219	26.047
30 year +40% CC 120 minute winter	65.516	26.061	100 year +45% CC 180 minute winter	65.795	26.047
30 year +40% CC 180 minute summer	74.617	19.202	100 year +45% CC 240 minute summer	78.690	20.795
30 year +40% CC 180 minute winter	48.503	19.202	100 year +45% CC 240 minute winter	52.280	20.795
30 year +40% CC 240 minute summer	58.245	15.393	100 year +45% CC 360 minute summer	58.701	15.106
30 year +40% CC 240 minute winter	38.697	15.393	100 year +45% CC 360 minute winter	38.157	15.106
30 year +40% CC 360 minute summer	43.710	11.248	100 year +45% CC 480 minute summer	45.550	12.038
30 year +40% CC 360 minute winter	28.413	11.248	100 year +45% CC 480 minute winter	30.262	12.038
30 year +40% CC 480 minute summer	34.053	8.999	100 year +45% CC 600 minute summer	36.875	10.086
30 year +40% CC 480 minute winter	22.624	8.999	100 year +45% CC 600 minute winter	25.195	10.086
30 year +40% CC 600 minute summer	27.658	7.565	100 year +45% CC 720 minute summer	32.556	8.725
30 year +40% CC 600 minute winter	18.898	7.565	100 year +45% CC 720 minute winter	21.879	8.725
30 year +40% CC 720 minute summer	24.485	6.562	100 year +45% CC 960 minute summer	26.340	6.936
30 year +40% CC 720 minute winter	16.456	6.562	100 year +45% CC 960 minute winter	17.448	6.936
30 year +40% CC 960 minute summer	19.901	5.240	100 year +45% CC 1440 minute summer	18.700	5.012
30 year +40% CC 960 minute winter	13.183	5.240	100 year +45% CC 1440 minute winter	12.567	5.012

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	YG	10	26.483	0.033	1.4	0.0068	0.0000	OK
15 minute summer	SW01	10	26.383	0.033	1.4	0.0052	0.0000	OK
30 minute summer	TANK	21	26.335	0.035	2.0	0.5993	0.0000	OK
15 minute summer	SW02	11	26.340	0.080	2.5	0.0342	0.0000	OK
15 minute summer	SW03	10	26.378	0.028	1.2	0.0086	0.0000	OK
15 minute summer	SW04	11	26.344	0.144	1.8	0.0319	0.0000	SURCHARGED
15 minute summer	SW05	11	26.339	0.239	3.6	0.2706	0.0000	SURCHARGED
15 minute summer	CW01	12	26.019	0.019	1.9	0.0030	0.0000	OK
15 minute summer	SEWER	12	25.218	0.018	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	YG	1.000	SW01	1.4	0.626	0.220	0.0201	
15 minute summer	SW01	1.001	TANK	1.4	1.110	0.208	0.0067	
30 minute summer	TANK	1.002	SW02	1.2	0.425	0.171	0.0131	
15 minute summer	SW02	1.003	SW05	2.4	0.560	0.359	0.0943	
15 minute summer	SW03	2.000	SW04	1.2	0.559	0.170	0.0528	
15 minute summer	SW04	2.001	SW05	1.4	0.257	0.181	0.0469	
15 minute summer	SW05	1.004	CW01	1.9	0.882	0.199	0.0043	
15 minute summer	CW01	1.005	SEWER	1.9	1.532	0.032	0.0087	2.1

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	YG	46	26.585	0.135	3.0	0.0281	0.0000	SURCHARGED
60 minute summer	SW01	46	26.584	0.234	3.0	0.0373	0.0000	SURCHARGED
60 minute summer	TANK	46	26.584	0.284	7.4	4.8551	0.0000	SURCHARGED
60 minute summer	SW02	46	26.584	0.324	5.4	0.1388	0.0000	SURCHARGED
15 minute summer	SW03	11	26.612	0.262	4.1	0.0811	0.0000	SURCHARGED
15 minute summer	SW04	12	26.587	0.387	5.0	0.0859	0.0000	SURCHARGED
60 minute summer	SW05	45	26.577	0.476	2.8	0.5389	0.0000	SURCHARGED
15 minute summer	CW01	35	26.019	0.019	2.0	0.0030	0.0000	OK
15 minute summer	SEWER	35	25.219	0.019	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	YG	1.000	SW01	3.0	0.759	0.468	0.0704	
60 minute summer	SW01	1.001	TANK	2.5	0.849	0.371	0.0313	
60 minute summer	TANK	1.002	SW02	-4.9	-0.629	-0.705	0.0235	
60 minute summer	SW02	1.003	SW05	1.8	0.550	0.265	0.1017	
15 minute summer	SW03	2.000	SW04	3.0	0.553	0.428	0.0861	
15 minute summer	SW04	2.001	SW05	4.2	0.531	0.531	0.0469	
60 minute summer	SW05	1.004	CW01	2.0	0.887	0.203	0.0044	
15 minute summer	CW01	1.005	SEWER	2.0	1.543	0.032	0.0089	7.4

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	YG	57	26.868	0.418	2.8	0.0869	0.0000	FLOOD RISK
60 minute winter	SW01	58	26.867	0.517	2.7	0.0823	0.0000	SURCHARGED
60 minute winter	TANK	58	26.867	0.567	6.8	6.8486	0.0000	SURCHARGED
60 minute winter	SW02	58	26.867	0.607	5.2	0.2604	0.0000	FLOOD RISK
60 minute winter	SW03	58	26.863	0.513	2.4	0.1585	0.0000	FLOOD RISK
60 minute winter	SW04	58	26.862	0.662	3.2	0.1470	0.0000	FLOOD RISK
60 minute winter	SW05	58	26.861	0.761	2.8	0.8612	0.0000	FLOOD RISK
15 minute summer	CW01	58	26.019	0.019	2.0	0.0030	0.0000	OK
15 minute summer	SEWER	58	25.219	0.019	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	YG	1.000	SW01	2.7	0.718	0.421	0.0704	
60 minute winter	SW01	1.001	TANK	2.3	0.908	0.338	0.0313	
60 minute winter	TANK	1.002	SW02	-4.9	-0.620	-0.695	0.0235	
60 minute winter	SW02	1.003	SW05	1.8	0.540	0.266	0.1017	
60 minute winter	SW03	2.000	SW04	2.0	0.440	0.282	0.0861	
60 minute winter	SW04	2.001	SW05	2.8	0.357	0.357	0.0469	
60 minute winter	SW05	1.004	CW01	2.0	0.887	0.203	0.0044	
15 minute summer	CW01	1.005	SEWER	2.0	1.543	0.032	0.0089	9.9