



JNP GROUP
CONSULTING ENGINEERS

Drainage Strategy

Project: Prickleden Mills
Holmfirth

Client: Eliston Homes Ltd

Reference: B24120-JNP-XX-XX-RP-C-1006 P02

Date: February 2025

DOCUMENT CONTROL SHEET

Prepared by.....

Sarah Longstaff

BSc (Hons) MSc FGS

Principal Hydrogeologist

Approved by.....

Lee Carl

BSc (Hons) MSc CEng MICE

Senior Civil Engineer

FOR AND ON BEHALF OF JNP GROUP

Date: February 2025

Document Issue Record

Rev	Date	Description	Prepared	Checked	Approved
P01	16/2/2021	First Issue	SLL	LC	LC
P02	19/2/2025	Update for a revised layout	SLL	LC	LC

This document is for the sole use and reliance of JNP Group's Client and has been prepared in accordance with the scope of the appointment of JNP Group and is subject to the terms of that appointment.

JNP Group accepts no liability for any use of this document other than by its Client and only for the purposes for which it has been prepared.

No person other than the Client may copy (in whole or in part) or use the contents of this document, without the prior written permission of JNP Group.

Any advice, opinions or recommendations within this document should be read and relied upon only in the context of this document as a whole.

Any comments given within this document are based on the understanding that the proposed works to be undertaken will be as described in the introduction. The information referred to and provided by others and will be assumed to be correct and will not have been checked by JNP Group, JNP Group will not accept any liability or responsibility for any inaccuracy in such information.

Any deviation from the recommendations or conclusions contained in this document should be referred to JNP Group in writing for comment and JNP Group reserve the right to reconsider their recommendations and conclusions contained within. JNP Group will not accept any liability or responsibility for any changes or deviations from the recommendations noted in this document without prior consultation and our full approval.

Contents

1	INTRODUCTION	3
1.1	Terms of Reference	3
1.2	Sources of Information.....	3
2	DEVELOPMENT SITE	4
2.1	Location	4
2.2	Topography	5
2.3	Geology.....	5
3	PROPOSED DEVELOPMENT.....	7
4	FLOOD RISK ASSESSMENT	8
4.1	Overview.....	8
4.2	Climate Change.....	8
5	SURFACE WATER DRAINAGE STRATEGY	9
5.1	Existing Drainage (Greenfield Runoff).....	9
5.2	Hierarchy for Surface Water Disposal	9
5.3	Proposed Drainage Strategy.....	9
5.4	Sustainable Drainage Systems (SuDS)	10
5.5	Exceedance Events	13
5.6	Water Quality Management	13
5.7	Operation and Maintenance	14
5.8	Drainage During Construction.....	15
6	FOUL WATER DRAINAGE STRATEGY.....	17
7	CONCLUSIONS AND RECOMMENDATIONS.....	18
8	LIMITATIONS	20
APPENDIX A:	TOPOGRAPHICAL SURVEY	21
APPENDIX B:	PROPOSED DEVELOPMENT.....	22
APPENDIX C:	GREENFIELD RUNOFF CALCULATIONS	23
APPENDIX D:	LLFA CORRESPONDENCE.....	24
APPENDIX E:	DRAINAGE STRATEGY DRAWING	25
APPENDIX F:	MICRODRAINAGE CALCULATIONS	26
APPENDIX G:	YORKSHIRE WATER SEWER RECORDS	27

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 JNP Group has been commissioned by Eliston Homes Ltd to prepare a drainage strategy for the proposed residential development in Holmfirth, West Yorkshire.

1.2 Sources of Information

1.2.1 This drainage strategy has been based on the following sources of information:

- Bespoke topographic survey undertaken by AIRD Group (Ref. M811- Revision C, May 2011);
- Bespoke topographic survey undertaken by Met geo Environmental (Ref. P20-01038 Rev. 01, October 2020);
- British Geological Survey's *Geoindex Tool*;
(<http://mapapps2.bgs.ac.uk/geoindex/home.html>)
- DEFRA / EA's aquifer and source protection data
(<https://magic.defra.gov.uk/MagicMap.aspx>)
- EA's Flood Map for Planning;
(<https://flood-map-for-planning.service.gov.uk/>)
- EA's Long Term Flood Risk Information;
(<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>)
- YW's Asset Location Plan;
- FRA report B24120-JNP-XX-XX-RP-1001 P04, February 2025.

2 DEVELOPMENT SITE

2.1 Location

2.1.1 The site is located approximately 0.45 km west of Holmfirth town centre (Figure 2.1, Table 2.1). The site covers an area of approximately 1.11 hectares.

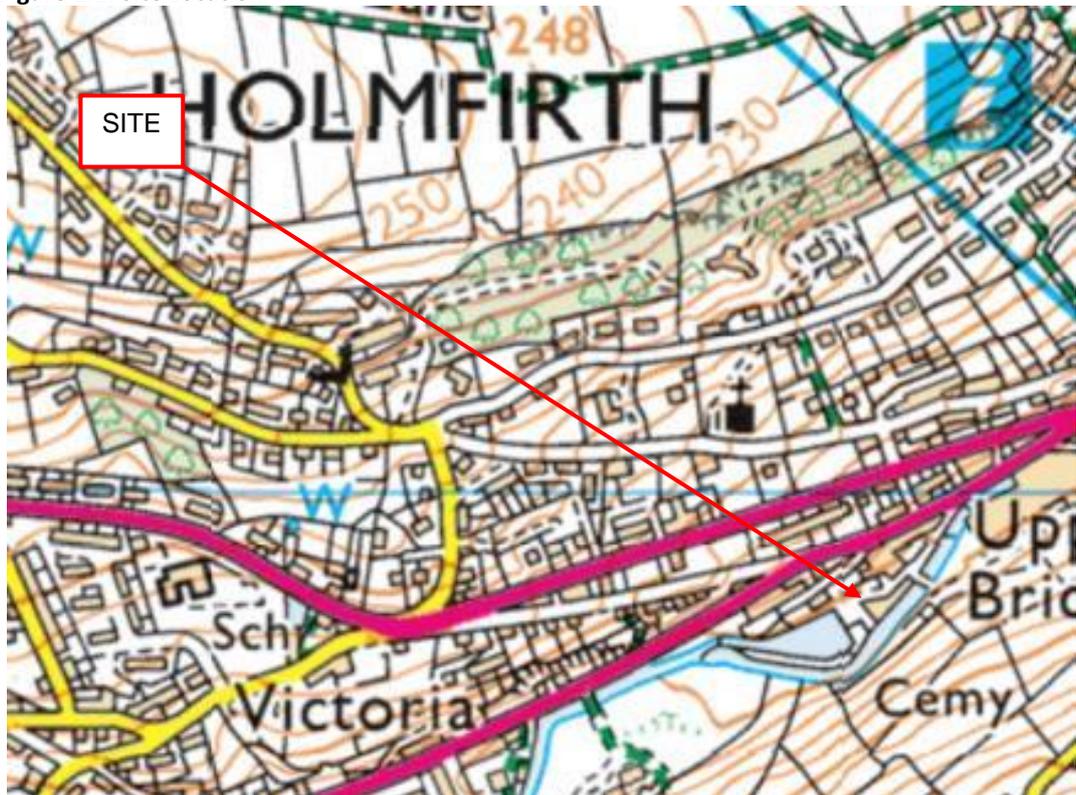
Table 2.1: Site Location

OS X	OS Y	Nearest Postcode
413787	407894	HD9 2NW

2.1.2 The site is a former mill site; the mill buildings have been demolished leaving it vacant. In the rest of the site is a small mill pond, with a pond wall in the centre of the site.

2.1.3 Land to the south of the river is also included in the application. This is vacant land between the river and a steep wooded bank to the south.

Figure 2.1: Site Location



2.1.4 The surrounding land uses are summarised in the following table.

Table 2.2: Surrounding Land Use

Direction	Land Use
North	Residential with Woodhead Road beyond
East	Small industrial unit; River Holm
South	River Holm
West	Residential

2.2 Topography

- 2.2.1 The site is located in the bottom of the valley with steep slopes to the north and south. The site itself is relatively flat. Two topographical surveys have been undertaken at the site in 2011 and 2020. The 2011 survey has a larger extent and includes some of the river features. Demolition has occurred on the site since 2011 so the levels recorded on the 2020 survey for the site are considered to accurately represent current conditions (Appendix A).
- 2.2.2 The western area is dominated by the mill pond which has an inlet from the River Holme in the far west with a mill race connecting this to the pond. The wall to the north of the mill race is 151.69m aOD or higher in this location and the bank to the south, between the mill race and the River Holm, is at 150.0m to 150.5m aOD. At the eastern end of the pond, the top of the bank to the north is c. 150.5m aOD or higher and the pond wall in the east is at 149.9m aOD. The southern bank of the pond is at an elevation between c. 149.7m and 150.0m aOD.
- 2.2.3 The area to the east of the pond wall is lower, at an elevation down to 148.25m aOD. The ground then rises to the north and east.
- 2.2.4 The plot of land to the south of the river is at an elevation of c. 148.5m to 149.1m aOD, then rises very steeply to the south.

2.3 Geology

- 2.3.1 The geology of the site has been determined by reference to the 1:50,000 scale British Geological Survey (BGS) online Geindex Tool <http://mapapps2.bgs.ac.uk/geoindex/home.html>
- 2.3.2 No artificial or Made Ground is indicated to be present underlying the site, however, from a ground investigation undertaken on site in 2011, Made ground up to 3.2m thick was found. Demolition since then may have contributed to or removed some of this material.
- 2.3.3 The superficial geology of the site is indicated to be Alluvium, which is described by the BGS as *“Normally soft to firm, consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel.”*
- 2.3.4 The underlying geology is indicated to be the Readycon Dean Flags, for which the BGS do not provide a lithological description. These are part of the Millstone Grit Group which the BGS describe as *“Fine- to very coarse-grained feldspathic sandstones, interbedded with grey siltstones and mudstones, with subordinate marine shaly mudstone, claystone, coals and seatearths.”*
- 2.3.5 There is a fault to the north of the site running close to the southern side of Woodhead Road.
- 2.3.6 JNP Group have consulted online borehole records held by the BGS. There are no accessible borehole records close to the site.
- 2.3.7 The Environment Agency’s website indicates that the site is underlain by a Secondary A Aquifer. The aquifer status refers to both the Alluvium and Millstone grit Group.

2.3.8 The Environment Agency define a Secondary-A Aquifer as:

“Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.”

2.3.9 The site’s proximity to groundwater Source Protection Zones (SPZs) was determined by reference to the Environment Agency’s website. These zones show the risk of contamination from any activities that might cause pollution in the area, with the closer the activity, the greater the associated risk. The site is not located within or close to a SPZ.

2.3.10 A ground investigation at the site noted the water table between 1m and 5m bgl.

2.3.11 Based on the available geological and hydrogeological information, namely the presence of Made Ground, the superficial geology and the likely depth to groundwater, infiltration drainage is deemed unfeasible at the development site.

2.4 Hydrology

2.4.1 The River Holme flows west to east along the southern site boundary of the development site. It is classified by the EA as a ‘main river’ and defines a total catchment area of 26 km² at the point where it leaves the vicinity of the site.

2.4.2 There is a weir in the river immediately downstream of the inlet to the mill race with a fall of over 1m over the weir. There is a second weir to the south of the mill pond with a fall of c. 0.6m across the weir.

2.4.3 The water level in the mill pond is at a higher level than the site and is controlled by a sluice gate at the upstream entrance to the pond.

2.4.4 At the mill end of the pond is a further sluice gate, which in the past would have been used to drain the pond through a mill race to operate the mill.

2.4.5 At this end of the mill pond, there is also an overflow pipe discharging into the lower level river where it flows past the site.

2.4.6 Based on the available hydrological information, namely the proximity of the site to surface water, discharge to surface water is deemed feasible at the development site.

3 PROPOSED DEVELOPMENT

- 3.1.1 The proposed development (and Appendix B) comprises 61 age-restricted apartments with ancillary accommodation including separate residents lounge and manager facilities and associated external works, including the erection of access bridge and riverside walk featuring two pedestrian bridges (within a Conservation Area).
- 3.1.2 This application comprises a revised scheme to the planning application that was approved in December 2013 (Ref: 2012/90738) and was commenced by the demolition of the existing buildings adjacent to the river. A later variation was approved in January 2018 (Ref: 2018/90031).
- 3.1.3 The proposed apartments are contained within five multi-storey blocks (A to E) with parking beneath some of the blocks and the central garden area, located to the east of the pond wall. A residents lounge is located to the west of these adjacent to the mill pond. Cross sections of the proposed development are also included in Appendix B.
- 3.1.4 Under the Flood Risk and Coastal Change – Annexe 3: Flood Risk Vulnerability Classification, the proposed residential development is classified as more vulnerable.

Figure 3.1: Proposed Development



4 FLOOD RISK ASSESSMENT

4.1 Overview

4.1.1 All potential sources of flood risk at the development site have been assessed and are summarised in Table 4.1. Further detail is provided in the FRA report (B24120-JNP-XX-XX-RP-C-0001 P03). The key sources of flood risk to the proposed development are further described within the above mentioned report.

Table 4.1: Potential Sources of Flood Risk

Source	Flood Risk
<i>Coastal</i>	<i>Low risk.</i>
Fluvial	Low to high risk of flooding.
Surface Water	Very low to high risk..
<i>Groundwater</i>	<i>EA indicate groundwater flooding is unlikely in this area.</i>
Sewers	Site is crossed by a YW sewer..
Infrastructure Failure	Potential for flooding from failure of the Digley, Riding Wood, Ramsden and Brownhill Reservoirs.

4.1.2 Refer to the FRA report for further details.

4.2 Climate Change

4.2.1 The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. This includes demonstrating how flood risk will be managed now and over the development’s lifetime, taking climate change into account.

4.2.2 In accordance with the EA’s guidance Flood Risk Assessment: Climate Change Allowances (July 2021), the proposed development with anticipated life span into the 2080’s (2070 to 2115) must take account of the following allowances:

- Peak Rainfall Intensity
 - Upper End 45%

5 SURFACE WATER DRAINAGE STRATEGY

5.1 Existing Drainage (Greenfield Runoff)

5.1.1 The development site does not benefit from a formal surface water drainage system. Runoff generated within the site is expected to infiltrate into the ground or flow overland towards the River Holme.

5.1.2 Greenfield runoff rates of 4.7 l/s (100.0% AEP), 5.4 l/s (Q_{BAR}), 9.5 l/s (3.3% AEP) and 11.3 l/s (1.0% AEP) have been established for the development site using the *IH124* methodology with *ICP SuDS* correction for small catchments (Appendix C). These rates have been calculated using the proposed impermeable area (0.418 ha) of the site.

5.1.3 Greenfield runoff volumes of 177.585 m³ have been estimated for the 1.0% AEP and 6 hour duration event using the Source Control module within Microdrainage (Appendix C).

5.2 Hierarchy for Surface Water Disposal

5.2.1 The National Standards for Sustainable Drainage Systems (Defra, 2011) state that the following options must be considered in accordance with the hierarchy for surface water disposal:

Discharge to Ground (Infiltration)

5.2.2 Based on the available geologic and hydrogeological information (Section 2.3 of this report), infiltration drainage is deemed unfeasible at the development site.

Discharge to Surface Water Body

5.2.3 There are appropriate surface water bodies on-site, into which it is proposed to discharge surface water, as detailed further in the following sections.

Discharge to Sewer

5.2.4 As discharge to surface water is proposed, discharge to sewer is not considered further.

5.3 Proposed Drainage Strategy

5.3.1 The proposed surface water drainage strategy has been designed in accordance with the *NPG* and / or *Building Regulations Part H* and in compliance with the *NPPF*, local requirements and current best practices¹, to collect, convey and attenuate runoff from all impermeable areas (0.418 ha) before discharging into the River Holme that runs through the centre of the site from west to east.

5.3.2 Given the unfeasibility of infiltration drainage, the volume of runoff leaving the proposed development cannot be reduced to greenfield values and the excess volume must be discharged at a low rate that will not pose an increase to flood risk downstream of the site.

¹ e.g. *Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)* and *The SuDS Manual (2015)*.

- 5.3.3 The proposed drainage network has been designed with three separate catchments and three separate outfalls to the river. Each outfall is limited to 3 l/s (total for the site 9 l/s) as agreed with Kirklees LLFA (Appendix D).
- 5.3.4 Flow controls are provided in the form of Hydrobrakes, and attenuation is provided in the form of cellular crate tanks.
- 5.3.5 The proposed drainage strategy (Appendix E) has been designed so that:
- flooding does not occur on any part of the site for all events up to the 1.0% AEP return period (1 in 100 years) + 45% climate change allowance.
- 5.3.6 The performance of the proposed surface water drainage strategy has been simulated against the following return periods:
- 100.0% AEP (1 in 1 year)
 - 3.3% AEP (1 in 30 years) and,
 - 1.0% AEP (1 in 100 years) + 45% climate change
- 5.3.7 Due to the nature of the outfalls and adjacent river levels, the proposed outfalls will be surcharged during various return periods. These outfalls have been modelled within Microdrainage so that the downstream water levels within the River Holme are reflective of the 1.0% AEP (1 in 100 year) + 30% climate change allowance flood levels, as defined within the Flood Modelling Report (included in B24120-JNP-XX-XX-RP-C-1001, rev: P04).
- 5.3.8 The results of the simulations are included in Appendix F and demonstrate how the proposed surface water drainage strategy can manage surface water flood risk at the development site without increasing flood risk elsewhere for storm events up to the 1.0% AEP + 45% climate change allowance.
- 5.4 Sustainable Drainage Systems (SuDS)**
- 5.4.1 In accordance with the *NPPF*, (major) developments should incorporate sustainable drainage systems (SuDS) unless there is clear evidence that this would be inappropriate. In addition to water quantity control, SuDS should consider opportunities to provide water quality and amenity / biodiversity benefits (i.e. multifunctionality approach).
- 5.4.2 While the proposed drainage strategy is largely reliant on permeable paving to manage runoff quantity, Table 5.1 shortlists other SuDS deemed compatible with the site's characteristics and which inclusion in the proposed development must be continuously assessed as the design progresses.
- 5.4.3 It is important to note the need to remove silt from runoff prior to discharge into SUDS features. SuDS such as filter drains, swales, bioretention systems and pervious pavements are sustainable alternatives to proprietary treatment systems otherwise required to manage silt.

Table 5.1: Sustainable Drainage Systems (SuDS)

SuDS Component	Description and Opportunities
Green / Blue Roofs	<p>Green roofs are areas of living vegetation installed on the top of buildings for a range of reasons including visual benefit, ecological value, enhanced building performance and reduction of surface water runoff. A blue roof is a roof designed explicitly to store water for use within the building (rainwater harvesting) or controlled discharge. Green roofs that include reservoir storage zones beneath the growing medium could also be considered blue roofs.</p> <p>Green roofs can improve the thermal performance of buildings, help combat the urban heat island effect and contribute to improved air quality.</p> <p>Through evapotranspiration, green roofs can reduce peak flow rates to a site drainage system (principally for small and medium-sized events) but are unlikely to have a significant impact on downstream attenuation storage requirements. Blue roofs can be designed to provide significant attenuation (and evapotranspiration).</p> <p>The proposed residential buildings have pitched roofs which will make implementing green or blue roofs difficult. The opportunity to provide green / blue roofs over the smaller non-habitable buildings should be explored further at a later design stage.</p>
Filter Drains/Strips	<p>Filter drains are trenches filled with stone/gravel that create temporary subsurface storage for the filtration, attenuation and conveyance of surface water runoff. Ideally, filter drains receive lateral inflow from adjacent impermeable surfaces pre-treated over a filter strip.</p> <p>Filter drains can help manage peak flows by naturally limiting rates of conveyance through the filter medium and by providing attenuation storage when the rate of flow at the outlet is controlled.</p> <p>Filter drains can be effectively incorporated into the landscape and public open spaces and can have minimal land-take requirements. The use of filter drains is typically restricted to flat sites (unless placed parallel to contours).</p> <p>Filter drains are best located adjacent to (small) impermeable surfaces such as car parks and roads / highways.</p> <p>Due to the nature of the site layout and hydrogeological conditions, filter drains are not considered suitable for this site.</p>
Swales	<p>Swales are shallow, flat bottomed, vegetated open channels designed to treat, convey and often attenuate surface water runoff. Swales can also provide aesthetic and biodiversity benefits.</p> <p>Swales can help reduce flow rates by facilitating infiltration and / or providing attenuation storage when flow at the outlet is controlled. Coarse to medium sediments and associated pollutants can be removed by filtration through surface vegetation and ground cover.</p> <p>Swales are well suited for managing runoff from linear features such as main roads / highways. Swales are generally difficult to incorporate into dense urban developments, where space is limited.</p> <p>Due to the nature of the site layout swales are not considered suitable for this site. However, it may be suitable to utilise depressions in the soft landscaping areas to direct exceedance flows through the site.</p>

SuDS Component	Description and Opportunities
Bioretention Systems	<p>Bioretention systems (including rain gardens) are shallow landscaped depressions that can reduce runoff rates and volumes and treat pollution. They also provide attractive landscape features and biodiversity.</p> <p>Bioretention systems can help reduce flow rates from a site by promoting infiltration / evapotranspiration and providing some attenuation storage.</p> <p>Bioretention systems can also provide very effective treatment functionality.</p> <p>Bioretention systems are a very flexible surface water management component that can be integrated into a wide variety of developments / densities using different shapes, materials, planting and dimensions.</p> <p>There are very limited opportunities to utilise bioretention systems across this site due to restrictions on space and depth.</p>
Permeable paving	<p>Permeable paving provides a pavement suitable for pedestrian and / or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying structural layers. The water is temporarily stored beneath the overlying surface before use, infiltration to the ground or controlled discharge downstream.</p> <p>Permeable paving helps reduce flow rates from a site by providing attenuation storage. A flow control structure is required to constrain the rate of water discharged from the sub-base via an outlet pipe. Pervious pavement drainage has been shown to have decreased concentrations of a range of surface water pollutants, including heavy metals, oil and grease, sediment and some nutrients.</p> <p>Permeable paving is typically built as an alternative to impermeable surfaces and therefore require no extra development space for their construction.</p> <p>Permeable paving is proposed across all parking bays on the site. These will be tanked and outfall into the proposed drainage system.</p>
Detention Basins	<p>Detention basins are landscaped depressions that are normally dry expect during and immediately following storm events. They can be on-line components where surface runoff from regular events is routed through the basin or off-line components into which runoff is diverted once flows reach a specific threshold.</p> <p>Detention basins can be vegetated depressions (providing treatment in on-line components) or hard landscaped storage areas. Off-line basins will normally have an alternative principal use (e.g. amenity or recreational facility or urban (hard) landscaping).</p> <p>There are no open spaces to include detention basins on this site.</p>

SuDS Component	Description and Opportunities
Attenuation Storage Tanks	<p>Attenuation storage tanks are used to create a below-ground void space for the temporary storage of surface water before use, infiltration or controlled release. Attenuation storage tanks can help reduce flow rates from a site by providing significant attenuation storage. Storage tanks do not provide any form of treatment of surface water runoff and therefore need to be combined in a “management train” with other methods that do provide suitable treatment of all relevant pollutants (coarse sediment must always be removed upstream of a storage tank).</p> <p>The inherent flexibility in size and shape of the typical attenuation storage tank systems means that they can be tailored to suit the specific characteristics and requirements of any site. However, the lack of amenity and biodiversity benefits means that storage tanks should be a last resource in any surface water drainage strategy for a major development.</p> <p>Attenuation tanks are proposed across the site to restrict runoff rates to greenfield conditions.</p>

5.5 Exceedance Events

- 5.5.1 Post development, external land levels in the east will be raised to or above the 1 in 100 year + 30% climate change level (149.58m aOD), except around Block E in the east.
- 5.5.2 The revised proposals for the site incorporate finished floor level for the accommodation blocks at 150.23m aOD, some 0.65m above the required level (1.0% AEP + 30% climate change allowance + 600mm freeboard), and 150.53m aOD for the residents lounge, above the required level near the Mill Pond.
- 5.5.3 The northern and eastern banks of the Mill Pond must be raised to a minimum level of 150.51 m aOD to prevent overflows towards the proposed development. This includes freeboards of 600 mm and 330 mm over the maximum flood levels of 149.91 m aOD (1.0% AEP + 30% climate change allowance) and 150.18 m aOD (0.1% AEP).
- 5.5.4 As a result of the above, exceedance flows will be directed away from building finished floor levels and will mostly flow towards the River Holme or Mill Pond, as currently occurs in the pre-development case.
- 5.5.5 Exceedance flows in the north-eastern parcel of the site will flow towards the low point of this area, down the ramp and towards the undercroft basement. Drainage measures will be required to intercept these flows prior to entering the undercroft area, most likely in the form of a linear drainage channel, oversized to allow for some storage capacity during extreme events.

5.6 Water Quality Management

- 5.6.1 The suitability of the proposed drainage strategy to manage the development’s pollution risk has been assessed using the simple index approach in *The SuDS Manual (2015)*, as summarized in Table 5.2.

Table 5.2: Surface Water Quality Management (Simple Index Approach)

Runoff Route / Treatment Train 1				
Land Use / SuDS	Hazard Level	TSS	Metals	Hydrocarbons
Pollution Hazard Indices				
Residential Roofs	Very Low	0.20	0.20	0.05
Driveways, residential car parks and low traffic roads	Low	0.50	0.40	0.40
SuDS Mitigation Indices				
Permeable paving	-	0.70	0.60	0.70
Total SuDS Mitigation Index \geq Pollution Hazard Index (for each contaminant type)				

5.7 Operation and Maintenance

- 5.7.1 The function of the surface water drainage system must be understood by those responsible for maintenance, regardless of whether individual components are below ground or on the surface. In any system properly designed, monitored and maintained, performance deterioration can usually be minimised.
- 5.7.2 The long-term operation and maintenance of the proposed surface water drainage strategy will be the responsibility of the site owner or private management company, as detailed in Table 5.3. Appropriate legal agreements defining maintenance responsibilities and access rights over the lifetime of the proposed development must be established prior to construction.

Table 5.3: Entities Responsible for SuDS Maintenance

SuDS Component	Location	Function	Responsible Entity
Green Roof (where possible to include)	Communal roofs	Store & treat runoff	Private management company
Permeable paving	Private / public parking areas	Store & treat runoff	Private management company
Attenuation Storage Tank	Public open spaces	Store runoff	Private management company

- 5.7.3 Where the user / benefiter of a system is not responsible for maintenance, then it is important to ensure that they know when the SuDS is not functioning correctly and who to contact if any issue arises.
- 5.7.4 Maintenance plans are often required to clearly identify who is responsible for maintaining proposed SuDS as well as the maintenance regime to be applied. Maintenance plans can also form a useful tool for public engagement with SuDS and understanding their wider

benefits. The maintenance requirements of the proposed surface water drainage strategy are summarised in Table 5.4.

Table 5.4: Typical Operation and Maintenance Requirements

Operation and Maintenance Activity	SuDS Component		
	Green Roof	Permeable paving	Attenuation Storage Tank
Inspection	■	■	■
Litter and debris removal		■	□
Grass cutting		□	□
Weed and invasive plant control	■	□	
Shrub management (including pruning)		□	
Shoreline vegetation management			
Aquatic vegetation management			
Occasional Maintenance			
Sediment management		■	■
Vegetation replacement	■		
Vacuum sweeping and brushing		■	
Structure rehabilitation/repair	□	□	□
Infiltration surface reconditioning		□	
Key: ■ Will be required □ May be required			

5.8 Drainage During Construction

- 5.8.1 Drainage is typically an early activity in the construction of a development, taking form during the earthworks phase. However, the connection of piped drainage system to SuDS components should not take place until the end of construction works, unless a robust strategy for silt removal prior to occupation of the site is implemented.
- 5.8.2 Silt-laden runoff from construction sites represents a common form of waterborne pollution and cannot enter SuDS components not specifically designed to manage this, as it can overwhelm the system and pollute receiving water features. Any gullies and piped systems should be capped off during construction and fully jetted and cleaned prior to connection to SuDS components.

- 5.8.3 The three principal aspects of drainage during construction are conveying runoff, controlling runoff and trapping sediments:
- Conveyance of runoff can be achieved through small ditches / swales, channels and drains. Runoff control measures should be implemented to ensure that runoff does not overwhelm the temporary drainage system causing flooding on site or elsewhere.
 - Control of runoff can be achieved through perimeter ditches or appropriate grading to ensure that any runoff from the construction site stays on site. Runoff rates leaving the site should be managed so they do not exceed pre-development conditions.
 - Construction runoff should be directed to dedicated infiltration basins with adequate upstream sediment and pollution control such as sediment basins, silt fences and straw bales prior to infiltration or off-site discharge.
- 5.8.4 Additional conveyance, control and treatment measures should be installed as needed during grading. Slope stability needs to be considered when using open water features to convey, control and treat runoff across the site. Any necessary surface stabilisation measures should be applied immediately on all disturbed areas where construction work is either delayed or incomplete.
- 5.8.5 Maintenance inspections should be performed weekly, and maintenance repairs should be made immediately after periods of rainfall.
- 5.8.6 All drainage infrastructure (namely underground features) must be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers and storing construction materials away from the drainage infrastructure.

6 FOUL WATER DRAINAGE STRATEGY

- 6.1.1 Sewerage undertakers have a legal obligation under the Water Industries Act 1991 to provide developers with the right to connect to public (foul) networks. The Water Industries Act 1991 also contains safeguards to ensure that flows resulting from new developments do not cause detriment to the existing public sewerage networks by imposing a duty on sewerage undertakers to carry out works required to accommodate additional flows into their networks.
- 6.1.2 The undeveloped (greenfield) development site does not benefit from a formal foul water drainage system, but in accordance with records obtained from Yorkshire Water (YW) (Appendix G), there is a 300 diameter combined public sewer that crosses the site. The sewer flows from west to east, and roughly follows the route of the river. It is not clear from the records where exactly the sewer sits within the site as it is shown within the river corridor on the YW records.
- 6.1.3 Note that the sewers have not been shown on the drainage strategy layout drawing for clarity purposes.
- 6.1.4 The proposed foul water will drain by gravity to the existing combined sewer described above, assuming there is sufficient depth to do so. This is expected to be feasible as the site falls towards the river. This will be subject to a S106 application to connect to the sewer.
- 6.1.5 Further to the above, there are also several other YW water combined sewers that pass through the site. Some of these sewers clash with the proposed buildings and will require diverting as part of the works. It is likely that the main sewer mentioned above may also require diversion, which is to be investigated further once the exact route is confirmed. Any diversion works will be subject to YW approval and a formal S185 application prior to undertaking the works.

7 CONCLUSIONS AND RECOMMENDATIONS

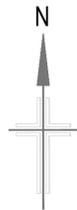
- 7.1.1 JNP Group has been commissioned by Eliston Homes Ltd. to prepare a Drainage Strategy report for the proposed Prickleden Mill development in Holmfirth.
- 7.1.2 The site is a brownfield former mill site but is considered greenfield for the purpose of this strategy as there is no existing surface water drainage on the site, and is approximately 1.11 ha and is located to the west of the town centre of Holmfirth and spans the River Holme.
- 7.1.3 The nearest natural watercourse is the River Holme which flows through the site from west to east.
- 7.1.4 The proposed development comprises 61 age restricted apartments, external residents lounge, Managers office, residents and visitor parking, new bridge access and a riverside walkway.
- 7.1.5 The Flood Risk Assessment section of this report demonstrates that the risk of flooding from coastal, groundwater and sewer sources is low. Further details of the associated flood risk are available in the separate Flood Risk Assessment report.
- 7.1.6 Most of the site where development is planned is in Flood Zone 1. However, there is an area in the eastern part of the site predicted to be in Flood Zone 2 / 3. The mill pond is also predicted to be in Flood Zone 3 and parts of the land to the south of the river are in Flood Zone 2. The only parts of the development located in an area designated as Flood Zone 2/3 are parts of the eastern accommodation block (Block E), the access road to this accommodation block and parts of the car park to the south of the river.
- 7.1.7 Predicted surface water flooding on site is minimal and will be managed by the drainage system. Surface water generated by the development will also be managed by a proposed drainage system.
- 7.1.8 Measures to mitigate the flood risk from the mill pond will again centre around management of the pond with a regular inspection and maintenance programme. It is requested that investigation to determine the current condition of the pond, and the subsequent inspection and maintenance plan is conditioned, so it can be based on reliable information.
- 7.1.9 Surface water generated on site will be managed by the proposed drainage system.
- 7.1.10 The existing development site does not benefit from a formal surface water drainage system. Runoff generated within the site is expected to infiltrate into the ground or flow overland towards the River Holme.
- 7.1.11 Based on the available geologic and hydrogeological information (Section 2.3 of this report), infiltration drainage is deemed unfeasible at the development site.
- 7.1.12 There are appropriate surface water bodies on-site, into which it is proposed to discharge surface water to, as detailed further in the following sections.
- 7.1.13 As discharge to surface water is proposed, discharge to sewer is not considered further.

- 7.1.14 Given the unfeasibility of infiltration drainage, the volume of runoff leaving the proposed development cannot be reduced to greenfield values and the excess volume must be discharged at a low rate that will not pose an increase to flood risk downstream of the site. The proposed drainage strategy has therefore been designed to limit discharge to 9 l/s, the rate agreed with the LLFA, which is based on a minimum practicable rate of 3 l/s p/outfall.
- 7.1.15 Flow controls are provided in the form of Hydrobrakes, and attenuation is provided in the form of cellular crate tanks.
- 7.1.16 The proposed drainage strategy (Appendix E) has been designed so that:
- flooding does not occur on any part of the site for all events up to the 1.0% AEP return period (1 in 100 years) + 45% climate change allowance.
- 7.1.17 The performance of the proposed surface water drainage strategy has been simulated against the following return periods:
- 100.0% AEP (1 in 1 year)
 - 3.3% AEP (1 in 30 years) and,
 - 1.0% AEP (1 in 100 years) + 45% climate change
- 7.1.18 Due to the nature of the outfalls and adjacent river levels, the proposed outfalls will be surcharged during various return periods. These outfalls have been modelled within Microdrainage so that the downstream water levels within the River Holme are reflective of the 1.0% AEP (1 in 100 year) + 30% climate change allowance flood levels, as defined within the Flood Modelling Report (included in B24120-JNP-XX-XX-RP-C-1001, rev: P04).
- 7.1.19 The results of the simulations are included in Appendix F and demonstrate how the proposed surface water drainage strategy can manage surface water flood risk at the development site without increasing flood risk elsewhere for storm events up to the 1.0% AEP + 45% climate change allowance.
- 7.1.20 This report is intended for the use of the developer of the site in support of their planning application for the site only.

8 LIMITATIONS

- 8.1.1 The information, conclusions and recommendations presented within this report are deemed to be current at the time of issue. No guarantee can be given to the status of this information other than at the time of issuing. Where necessary, the user shall confirm the status of any applicable assessments and consents.
- 8.1.2 This report has been commissioned by Eliston Homes Ltd. No third party may receive a copy of this report without first obtaining our permission in writing.
- 8.1.3 This report is confidential and has been prepared solely for the benefit of Eliston Homes Ltd and those parties with whom a warranty agreement has been executed or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of this report, written approval must be sought from JNP Group and a charge may be levied against such approval. JNP Group accepts no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned, or this document being used by any third party with whom an agreement has not been executed.
- 8.1.4 The copyright of this report remains with JNP Group at all times.

APPENDIX A: TOPOGRAPHICAL SURVEY



Notes
 This drawing and the information contained therein is issued in confidence and is the copyright of Met Geo Environmental Limited. Disclosure of this information to Third Parties and unauthorised copying or replication of this data without approval is forbidden.

Grid : OS National Grid.
 Using the OS GPS Network and applying OSTN15 transformation and then removing the scale factor for true distances with a one-step transformation centred on ****

Datum : OS Level Datum.
 Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Station	Easting	Northing	Level
B1	413775.031	407900.350	150.357
B2	413837.322	407900.692	148.828
B3	413854.176	407964.303	151.140
B4	413853.800	407928.939	148.782
B5	413878.225	407967.790	149.392
H1	413774.924	407853.763	149.875
H2	413751.508	407846.785	149.909
H3	413728.278	407853.717	149.945
H4	413701.961	407859.826	149.923
H5	413671.820	407868.294	150.968
H6	413797.265	407922.060	156.660
S1	413877.667	407993.069	153.505
S2	413823.737	407920.343	147.942
S3	413790.972	407869.987	149.932

KEY			
AIR VALVE	AV	KERB OUTLET	KO
BENCH MARK	BM	LAMP POST	LP
BN	BN	MANHOLE (CIRCULAR)	MC
BOLLARD	B	MANHOLE (RECTANGULAR)	MR
BORE HOLE	BH	MANHOLE (TRIANGULAR)	MT
BUS STOP	BS	MANHOLE (SQUARE)	MS
BUS STOP	BS	MANHOLE (RECTANGULAR)	MR
CABLE TV COVER	CTV	RODDING EYE	RE
CABLE TV SUPPLY	CTS	SIGN POST	SP
COLUMN	C	TELECOM COVER	TC
DROPPED KERB	DK	TELECOM POLE	TP
EXTRINSIC POINT	EP	THRESHOLD LEVEL	TL
ELECTRICITY COVER	EC	TRAFFIC LIGHT	TL
ELECTRICITY POLE	EP	TRIAL PIT	TP
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GV	WATER METER	WM
GATE	G	WATER STOP COCK	WSC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	WSV
INSPECTION COVER (RECTANGULAR)	IR		
COVER LEVEL	CL	CHAMBER BASE LEVEL	CB
INVERT LEVEL	IL	WATER SURFACE LEVEL	WSL
UNABLE TO RAISE	UR	UNABLE TO MEASURE	UM
GIRTH OF TREE TRUNK	GT	DIAMETER OF TREE TRUNK	DT
HEIGHT TO TOP OF TREE CANOPY	HT	MATHS BOLE TREE	MB

Rev	Date	Drawn	Description	Check

Southgate House
 Pontefract Road T: +44 (0) 1132 008 900
 Stourton F: +44 (0) 1132 008 901
 Leeds E: admin@metgeoenvironmental.com
 West Yorkshire W: www.metgeoenvironmental.com
 LS10 1SW

Client
ACUMEN DESIGNERS & ARCHITECTS

Site
**PRICKLEDON MILLS, WOODHEAD ROAD
 HOLMFIRTH, HD9 2JU**

Title
**TOPOGRAPHICAL
 SURVEY**

Survised	BH, HR	Drawn	BH, HR, MR
Check	DA	Date	09/10/2020
Scale	Job No	Sheet Size	Rev
1:200	P20-01038	A0	01
DWG Ref	Project Number	Origin	Zone
	P20-01038	MET	EXT
	XX	TOP	M2
	G	00	

APPENDIX B: PROPOSED DEVELOPMENT

Only figured dimensions should be used.
 Scaled dimensions should be checked with the Architect.
 This drawing together with the design, is the property and copyright of the Architect and must not be reproduced without written permission Aerial photography copyright Google.



PROPOSED SITE PLAN



H	Amended bridge soffit level as per engineers comments	AD	JC	18.02.2025
G	Turning heads amended following highway consultant feedback. Bridge proposal updated.	JF	JC	11.11.2024
F	Amended roof plans shown. Parking to south bank amended following LPA comment.	JF	JC	08.08.2024
E	Amended site plan to show the updated roof plans of each block. Also amended parking P00-P13 and site entrance road width.	AD	JC	06.10.2023
D	Service vehicle tracking shown. Bridge plans updated.	JF	JC	19.06.2023
C	Amended block C3 roof plan to show the modified angled windows on the ground floor and first floor plan.	AD	JC	10.05.2023
B	Site plan amended to show the reduced blocks roof plans and site context and levels changed to suit & 4 new parking places added.	AD	JC	21.09.2022
A	Blocks amended to show reduced pitch and updated layouts. Undercroft parking FFL raised to 147.30. Road bridge deck lowered. New raised bund around lake formed at 150.25. Emergency access road off Woodhead road added. Pedestrian escape route shown to north. Residents lounge raised to 150.53. Mill pond outlet dropped by 400mm to 149.00. Solar PV shown to south roof of all blocks. aerial context added.	JF	JC	25.11.2021

DO NOT SCALE OFF THIS DRAWING

rev	description	drawn	auth	date
-----	-------------	-------	------	------

ACUMEN
 DESIGNERS & ARCHITECTS

acumenarchitects.co.uk 01484 546 000
 Headrow House, Old Leeds Road, Huddersfield, HD1 1SG

Client
ELISTON HOMES

Project
**PRICKLEDEN MILLS
 HOLMFIRTH**

Project No 2659 Drawing No (100)10 Rev H

Description
PROPOSED SITE PLAN

Scale 1:500 @ A1 Date Drawn APR'21 Drawn By JF Authorised By JC

Purpose of Issue
 Planning Building Regs Tender Construction Comment Info

APPENDIX C: GREENFIELD RUNOFF CALCULATIONS

No. 1 Meadowhall Riverside
Meadowhall Road
Sheffield S9 1BW



Date 19/02/2025 09:33
File

Designed by Lee.Carl
Checked by

Innovyze Source Control 2020.1.3

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.500
Area (ha)	0.418	Urban	0.000
SAAR (mm)	1450	Region Number	Region 3

Results 1/s

QBAR Rural	5.4
QBAR Urban	5.4

Q1 year 4.7

Q1 year	4.7
Q30 years	9.5
Q100 years	11.3

No. 1 Meadowhall Riverside
Meadowhall Road
Sheffield S9 1BW



Date 19/02/2025 12:32
File

Designed by Lee.Carl
Checked by

Innovyze Source Control 2020.1.3

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.500
Ratio R	0.281
Areal Reduction Factor	1.00
Area (ha)	0.418
SAAR (mm)	1450
CWI	124.372
Urban	0.000
SPR	53.000

Results

Percentage Runoff (%)	58.06
Greenfield Runoff Volume (m ³)	177.585

APPENDIX D: LLFA CORRESPONDENCE

APPENDIX E: DRAINAGE STRATEGY DRAWING

APPENDIX F: MICRODRAINAGE CALCULATIONS

JNP Group		Page 1
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57	Designed by Lee.Carl	
File 25-01-28 Surface Water ...	Checked by	
Innovyze		Network 2020.1.3

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	5	PIMP (%)	100
M5-60 (mm)	20.500	Add Flow / Climate Change (%)	0
Ratio R	0.281	Minimum Backdrop Height (m)	0.500
Maximum Rainfall (mm/hr)	500	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	13.557	0.400	33.9	0.012	2.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	12.265	0.450	27.3	0.017	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	8.621	0.150	57.5	0.015	2.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	13.832	0.092	150.3	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	14.725	0.142	103.7	0.033	2.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	18.692	0.125	149.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	14.987	0.100	149.9	0.027	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	100.18	2.13	150.300	0.012	0.0	0.0	0.0	1.73	30.7	3.2
1.001	99.05	2.24	149.900	0.029	0.0	0.0	0.0	1.94	34.2	7.8
2.000	100.42	2.11	149.600	0.015	0.0	0.0	0.0	1.33	23.5	3.9
1.002	96.18	2.52	149.450	0.052	0.0	0.0	0.0	0.82	14.4	13.6
3.000	98.91	2.25	149.500	0.033	0.0	0.0	0.0	0.99	17.4	8.8
1.003	93.87	2.76	149.283	0.085	0.0	0.0	0.0	1.28	90.7	21.6
1.004	92.34	2.93	149.083	0.112	0.0	0.0	0.0	1.48	163.2	28.1

JNP Group		Page 2
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57	Designed by Lee.Carl	
File 25-01-28 Surface Water ...	Checked by	
Innovyze		Network 2020.1.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.005	5.444	0.036	150.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.000	4.258	0.100	42.6	0.032	2.00	0.0	0.600	o	100	Pipe/Conduit	
4.001	15.714	2.210	7.1	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
4.002	7.377	0.104	70.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.000	5.022	0.034	147.7	0.017	2.00	0.0	0.600	o	150	Pipe/Conduit	
6.000	6.969	0.034	205.0	0.015	2.00	0.0	0.600	o	150	Pipe/Conduit	
4.003	6.289	0.034	185.0	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.004	9.496	0.052	182.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.005	10.431	0.052	200.6	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.006	5.474	0.029	188.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.007	14.581	0.076	191.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.008	6.017	0.040	150.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.000	29.538	0.520	56.8	0.041	2.00	0.0	0.600	o	150	Pipe/Conduit	
8.000	20.473	0.181	113.1	0.020	2.00	0.0	0.600	o	225	Pipe/Conduit	
9.000	7.613	0.256	29.7	0.011	2.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.005	91.80	2.99	148.983	0.112	0.0	0.0	0.0	1.48	163.1	28.1
4.000	100.95	2.06	149.700	0.032	0.0	0.0	0.0	1.18	9.3	8.8
4.001	99.97	2.15	149.600	0.032	0.0	0.0	0.0	2.92	22.9	8.8
4.002	98.87	2.25	147.340	0.032	0.0	0.0	0.0	1.20	21.1	8.8
5.000	100.49	2.10	147.320	0.017	0.0	0.0	0.0	0.82	14.6	4.7
6.000	99.79	2.17	147.320	0.015	0.0	0.0	0.0	0.70	12.3	4.1
4.003	97.74	2.36	147.286	0.080	0.0	0.0	0.0	0.96	38.1	21.3
4.004	96.10	2.53	147.252	0.080	0.0	0.0	0.0	0.96	38.3	21.3
4.005	94.29	2.72	147.200	0.114	0.0	0.0	0.0	0.92	36.6	29.2
4.006	93.40	2.81	147.148	0.114	0.0	0.0	0.0	0.95	37.7	29.2
4.007	91.50	3.03	147.119	0.114	0.0	0.0	0.0	1.13	80.0	29.2
4.008	90.45	3.15	147.043	0.114	0.0	0.0	0.0	0.82	14.4	29.2
7.000	97.68	2.37	147.765	0.041	0.0	0.0	0.0	1.34	23.6	10.8
8.000	98.61	2.28	147.500	0.020	0.0	0.0	0.0	1.23	48.8	5.4
9.000	100.86	2.07	147.700	0.011	0.0	0.0	0.0	1.85	32.7	3.0

JNP Group		Page 3
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze		Network 2020.1.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
8.001	11.069	0.074	149.6	0.021	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.001	3.165	0.021	150.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.002	5.320	0.035	152.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
8.001	96.84	2.45	147.319	0.052	0.0	0.0	0.0	1.07	42.4	13.8
7.001	96.43	2.49	147.245	0.093	0.0	0.0	0.0	1.28	90.4	24.4
7.002	95.37	2.60	147.224	0.093	0.0	0.0	0.0	0.81	14.4	24.4

JNP Group		Page 4
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57	Designed by Lee.Carl	
File 25-01-28 Surface Water ...	Checked by	
Innovyze	Network 2020.1.3	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.005, Volume (m³): 3.7

Unit Reference	MD-SHE-0082-3000-1000-3000
Design Head (m)	1.000
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	148.983
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.0
Flush-Flo™	0.297	3.0
Kick-Flo®	0.623	2.4
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)						
0.100	2.4	1.200	3.3	3.000	5.0	7.000	7.4
0.200	2.9	1.400	3.5	3.500	5.4	7.500	7.7
0.300	3.0	1.600	3.7	4.000	5.7	8.000	7.9
0.400	2.9	1.800	3.9	4.500	6.0	8.500	8.2
0.500	2.8	2.000	4.1	5.000	6.3	9.000	8.4
0.600	2.5	2.200	4.3	5.500	6.6	9.500	8.6
0.800	2.7	2.400	4.5	6.000	6.9		
1.000	3.0	2.600	4.7	6.500	7.2		

Hydro-Brake® Optimum Manhole: 15, DS/PN: 4.004, Volume (m³): 1.5

Unit Reference	MD-SHE-0049-1000-0800-1000
Design Head (m)	0.800
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	49
Invert Level (m)	147.252
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Hydro-Brake® Optimum Manhole: 15, DS/PN: 4.004, Volume (m³): 1.5

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	1.0
Flush-Flo™	0.215	0.9
Kick-Flo®	0.437	0.8
Mean Flow over Head Range	-	0.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)						
0.100	0.8	1.200	1.2	3.000	1.8	7.000	2.7
0.200	0.9	1.400	1.3	3.500	1.9	7.500	2.8
0.300	0.9	1.600	1.4	4.000	2.1	8.000	2.9
0.400	0.8	1.800	1.4	4.500	2.2	8.500	2.9
0.500	0.8	2.000	1.5	5.000	2.3	9.000	3.0
0.600	0.9	2.200	1.6	5.500	2.4	9.500	3.1
0.800	1.0	2.400	1.6	6.000	2.5		
1.000	1.1	2.600	1.7	6.500	2.6		

Hydro-Brake® Optimum Manhole: 14, DS/PN: 4.008, Volume (m³): 2.4

Unit Reference	MD-SHE-0085-3000-0800-3000
Design Head (m)	0.800
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	85
Invert Level (m)	147.043
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	3.0
Flush-Flo™	0.239	3.0
Kick-Flo®	0.517	2.5
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)						
0.100	2.6	0.300	3.0	0.500	2.6	0.800	3.0
0.200	3.0	0.400	2.9	0.600	2.6	1.000	3.3

JNP Group		Page 6
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze		Network 2020.1.3

Hydro-Brake® Optimum Manhole: 14, DS/PN: 4.008, Volume (m³): 2.4

Depth (m)	Flow (l/s)						
1.200	3.6	2.400	5.0	5.000	7.0	8.000	8.8
1.400	3.9	2.600	5.2	5.500	7.4	8.500	9.0
1.600	4.1	3.000	5.5	6.000	7.7	9.000	9.3
1.800	4.4	3.500	6.0	6.500	8.0	9.500	9.6
2.000	4.6	4.000	6.3	7.000	8.3		
2.200	4.8	4.500	6.7	7.500	8.5		

Hydro-Brake® Optimum Manhole: 20, DS/PN: 7.002, Volume (m³): 2.0

Unit Reference	MD-SHE-0079-3000-1200-3000
Design Head (m)	1.200
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	79
Invert Level (m)	147.224
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.0
Flush-Flo™	0.348	2.9
Kick-Flo®	0.707	2.4
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)						
0.100	2.3	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.8	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.9	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.9	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.8	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.7	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

JNP Group		Page 7
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57	Designed by Lee.Carl	
File 25-01-28 Surface Water ...	Checked by	
Innovyze	Network 2020.1.3	

Storage Structures for Storm

Cellular Storage Manhole: 6, DS/PN: 1.003

Invert Level (m) 149.283 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	110.0	0.0	0.801	0.0	0.0
0.800	110.0	0.0			

Cellular Storage Manhole: 11, DS/PN: 4.003

Invert Level (m) 147.286 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	90.0	0.0	0.801	0.0	0.0
0.800	90.0	0.0			

Cellular Storage Manhole: 13, DS/PN: 4.005

Invert Level (m) 147.200 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	115.0	0.0	0.401	0.0	0.0
0.400	115.0	0.0			

Cellular Storage Manhole: 18, DS/PN: 4.007

Invert Level (m) 147.119 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	80.0	0.0	0.801	0.0	0.0
0.800	80.0	0.0			

Cellular Storage Manhole: 19, DS/PN: 7.001

Invert Level (m) 147.245 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

No. 1 Meadowhall Riverside
 Meadowhall Road
 Sheffield S9 1BW



Date 19/02/2025 12:57
 File 25-01-28 Surface Water ...

Designed by Lee.Carl
 Checked by

Innovyze Network 2020.1.3

Cellular Storage Manhole: 19, DS/PN: 7.001

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	135.0	0.0	0.801	0.0	0.0
0.800	135.0	0.0			

No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
---	--	---

Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by
--	------------------------------------

Innovyze	Network 2020.1.3
----------	------------------

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000	Additional Flow - % of Total Flow 0.000	
Hot Start (mins) 0	MADD Factor * 10m ³ /ha Storage 2.000	
Hot Start Level (mm) 0	Inlet Coefficient 0.800	
Manhole Headloss Coeff (Global) 0.500	Flow per Person per Day (l/per/day) 0.000	
Foul Sewage per hectare (l/s) 0.000		

Number of Input Hydrographs 0	Number of Storage Structures 5
Number of Online Controls 4	Number of Time/Area Diagrams 0
Number of Offline Controls 0	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R 0.281
Region England and Wales	Cv (Summer) 0.750	
M5-60 (mm)	20.500	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep 2.5 Second Increment (Extended)	
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440	
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Summer	1	+0%					150.327
1.001	2	15 Summer	1	+0%	100/15 Summer				149.934
2.000	3	15 Summer	1	+0%	100/15 Summer				149.635
1.002	4	15 Summer	1	+0%	30/15 Summer				149.528
3.000	5	15 Summer	1	+0%	100/15 Summer				149.562
1.003	6	60 Winter	1	+0%	100/30 Winter				149.326
1.004	7	60 Winter	1	+0%	100/15 Summer				149.299
1.005	8	60 Winter	1	+0%	30/15 Summer				149.297
4.000	9	15 Summer	1	+0%	30/15 Summer				149.762
4.001	10	15 Summer	1	+0%					149.635
4.002	11	15 Summer	1	+0%	30/120 Summer				147.397
5.000	12	240 Winter	1	+0%	30/60 Winter				147.381
6.000	13	240 Winter	1	+0%	30/60 Winter				147.381
4.003	11	240 Winter	1	+0%	30/120 Winter				147.381
4.004	15	240 Winter	1	+0%	30/60 Winter				147.380
4.005	13	1440 Winter	1	+0%	30/960 Summer				147.349
4.006	17	1440 Winter	1	+0%	30/360 Winter				147.349
4.007	18	1440 Winter	1	+0%	30/960 Summer				147.349
4.008	14	1440 Winter	1	+0%	1/120 Summer				147.349

JNP Group		Page 10
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze	Network 2020.1.3	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.123	0.000	0.07		2.0	OK	
1.001	2	-0.116	0.000	0.12		3.7	OK	
2.000	3	-0.115	0.000	0.12		2.5	OK	
1.002	4	-0.072	0.000	0.52		6.9	OK	
3.000	5	-0.088	0.000	0.35		5.6	OK	
1.003	6	-0.257	0.000	0.05	37	3.9	OK	
1.004	7	-0.159	0.000	0.04		4.5	OK	
1.005	8	-0.061	0.000	0.03		3.0	OK	
4.000	9	-0.038	0.000	0.70		5.6	OK	
4.001	10	-0.065	0.000	0.25		5.6	OK	
4.002	11	-0.093	0.000	0.30		5.5	OK	
5.000	12	-0.089	0.000	0.05		0.6	OK	
6.000	13	-0.089	0.000	0.05		0.5	OK	
4.003	11	-0.130	0.000	0.03	147	0.8	OK	
4.004	15	-0.097	0.000	0.03		0.8	OK	
4.005	13	-0.076	0.000	0.06	95	1.9	OK	
4.006	17	-0.024	0.000	0.07		1.9	OK	
4.007	18	-0.070	0.000	0.04	138	2.9	OK	
4.008	14	0.156	0.000	0.25		3.0	SURCHARGED	

JNP Group		Page 11
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze		Network 2020.1.3

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.
7.000	15	15 Summer	1	+0%	100/15 Summer			
8.000	16	15 Summer	1	+0%	30/1440 Winter			
9.000	17	15 Summer	1	+0%	100/360 Winter			
8.001	18	1440 Winter	1	+0%	30/360 Winter			
7.001	19	1440 Winter	1	+0%	30/360 Winter			
7.002	20	1440 Winter	1	+0%	1/240 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
7.000	15	147.822	-0.093	0.000	0.31		7.0	OK
8.000	16	147.542	-0.183	0.000	0.08		3.5	OK
9.000	17	147.725	-0.125	0.000	0.07		1.9	OK
8.001	18	147.508	-0.036	0.000	0.02		0.6	OK
7.001	19	147.508	-0.037	0.000	0.06	109	3.1	OK
7.002	20	147.516	0.142	0.000	0.25		2.9	SURCHARGED

PN	US/MH Name	Level Exceeded
7.000	15	
8.000	16	
9.000	17	
8.001	18	
7.001	19	
7.002	20	

JNP Group		Page 12
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze		Network 2020.1.3

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 5
Number of Online Controls 4 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.500 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Summer	30	+0%					150.342
1.001	2	15 Summer	30	+0%	100/15 Summer				149.961
2.000	3	15 Summer	30	+0%	100/15 Summer				149.688
1.002	4	15 Summer	30	+0%	30/15 Summer				149.669
3.000	5	15 Summer	30	+0%	100/15 Summer				149.608
1.003	6	120 Winter	30	+0%	100/30 Winter				149.459
1.004	7	120 Winter	30	+0%	100/15 Summer				149.457
1.005	8	120 Winter	30	+0%	30/15 Summer				149.450
4.000	9	15 Summer	30	+0%	30/15 Summer				149.958
4.001	10	15 Summer	30	+0%					149.655
4.002	11	360 Winter	30	+0%	30/120 Summer				147.547
5.000	12	360 Winter	30	+0%	30/60 Winter				147.546
6.000	13	360 Winter	30	+0%	30/60 Winter				147.546
4.003	11	360 Winter	30	+0%	30/120 Winter				147.546
4.004	15	360 Winter	30	+0%	30/60 Winter				147.545
4.005	13	1440 Winter	30	+0%	30/960 Summer				147.482
4.006	17	1440 Winter	30	+0%	30/360 Winter				147.482
4.007	18	1440 Winter	30	+0%	30/960 Summer				147.482
4.008	14	1440 Winter	30	+0%	1/120 Summer				147.482

JNP Group		Page 13
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.108	0.000	0.18		5.0	OK	
1.001	2	-0.089	0.000	0.34		10.5	OK	
2.000	3	-0.062	0.000	0.26		5.4	OK	
1.002	4	0.069	0.000	1.35		17.9	SURCHARGED	
3.000	5	-0.042	0.000	0.86		13.8	OK	
1.003	6	-0.124	0.000	0.06	78	4.4	OK	
1.004	7	-0.001	0.000	0.04		5.4	OK	
1.005	8	0.092	0.000	0.03		3.0	SURCHARGED	
4.000	9	0.158	0.000	1.50		12.0	SURCHARGED	
4.001	10	-0.045	0.000	0.56		12.2	OK	
4.002	11	0.057	0.000	0.10		1.8	SURCHARGED	
5.000	12	0.076	0.000	0.08		0.9	SURCHARGED	
6.000	13	0.076	0.000	0.08		0.8	SURCHARGED	
4.003	11	0.035	0.000	0.03	391	1.0	SURCHARGED	
4.004	15	0.068	0.000	0.03		0.9	SURCHARGED	
4.005	13	0.057	0.000	0.07	191	2.1	SURCHARGED	
4.006	17	0.109	0.000	0.08		2.1	SURCHARGED	
4.007	18	0.063	0.000	0.05	244	3.1	SURCHARGED	
4.008	14	0.289	0.000	0.25		3.0	SURCHARGED	

JNP Group		Page 14
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze		Network 2020.1.3

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.
7.000	15	15 Summer	30	+0%	100/15 Summer			
8.000	16	1440 Winter	30	+0%	30/1440 Winter			
9.000	17	15 Summer	30	+0%	100/360 Winter			
8.001	18	1440 Winter	30	+0%	30/360 Winter			
7.001	19	1440 Winter	30	+0%	30/360 Winter			
7.002	20	1440 Winter	30	+0%	1/240 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
7.000	15	147.863	-0.052	0.000	0.75		17.0	OK
8.000	16	147.740	0.015	0.000	0.01		0.4	SURCHARGED
9.000	17	147.740	-0.110	0.000	0.16		4.6	OK
8.001	18	147.740	0.196	0.000	0.03		1.0	SURCHARGED
7.001	19	147.740	0.195	0.000	0.06	198	3.1	SURCHARGED
7.002	20	147.764	0.390	0.000	0.25		2.9	SURCHARGED

PN	US/MH Name	Level Exceeded
7.000	15	
8.000	16	
9.000	17	
8.001	18	
7.001	19	
7.002	20	

JNP Group		Page 15
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze		Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 5
Number of Online Controls 4 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.281
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.500 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Summer	100	+45%					150.359
1.001	2	15 Winter	100	+45%	100/15 Summer				150.079
2.000	3	15 Summer	100	+45%	100/15 Summer				149.973
1.002	4	15 Winter	100	+45%	30/15 Summer				149.948
3.000	5	15 Summer	100	+45%	100/15 Summer				149.842
1.003	6	240 Winter	100	+45%	100/30 Winter				149.740
1.004	7	240 Winter	100	+45%	100/15 Summer				149.787
1.005	8	240 Winter	100	+45%	30/15 Summer				149.795
4.000	9	15 Summer	100	+45%	30/15 Summer				150.445
4.001	10	15 Summer	100	+45%					149.679
4.002	11	480 Winter	100	+45%	30/120 Summer				147.896
5.000	12	480 Winter	100	+45%	30/60 Winter				147.896
6.000	13	480 Winter	100	+45%	30/60 Winter				147.896
4.003	11	480 Winter	100	+45%	30/120 Winter				147.895
4.004	15	480 Winter	100	+45%	30/60 Winter				147.896
4.005	13	1440 Winter	100	+45%	30/960 Summer				147.783
4.006	17	1440 Winter	100	+45%	30/360 Winter				147.782
4.007	18	1440 Winter	100	+45%	30/960 Summer				147.782
4.008	14	1440 Winter	100	+45%	1/120 Summer				147.782

JNP Group		Page 16
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze		Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.091	0.000	0.33		9.3	OK	
1.001	2	0.029	0.000	0.54		16.7	SURCHARGED	
2.000	3	0.223	0.000	0.38		7.8	SURCHARGED	
1.002	4	0.348	0.000	2.18		28.9	FLOOD RISK	
3.000	5	0.192	0.000	1.43		23.0	FLOOD RISK	
1.003	6	0.157	0.000	0.09	190	6.8	SURCHARGED	
1.004	7	0.329	0.000	0.04		5.0	SURCHARGED	
1.005	8	0.437	0.000	0.03		3.0	SURCHARGED	
4.000	9	0.645	0.000	2.61		20.8	SURCHARGED	
4.001	10	-0.021	0.000	0.96		21.0	OK	
4.002	11	0.406	0.000	0.15		2.7	SURCHARGED	
5.000	12	0.426	0.000	0.12		1.4	SURCHARGED	
6.000	13	0.426	0.000	0.11		1.2	SURCHARGED	
4.003	11	0.384	0.000	0.04		1.0	SURCHARGED	
4.004	15	0.419	0.000	0.03		0.9	SURCHARGED	
4.005	13	0.358	0.000	0.07	465	2.2	FLOOD RISK	
4.006	17	0.409	0.000	0.08		2.2	FLOOD RISK	
4.007	18	0.363	0.000	0.05	380	3.1	SURCHARGED	
4.008	14	0.589	0.000	0.25		3.0	SURCHARGED	

JNP Group		Page 17
No. 1 Meadowhall Riverside Meadowhall Road Sheffield S9 1BW		
Date 19/02/2025 12:57 File 25-01-28 Surface Water ...	Designed by Lee.Carl Checked by	
Innovyze		Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.
7.000	15	1440 Winter	100	+45%	100/15 Summer			
8.000	16	1440 Winter	100	+45%	30/1440 Winter			
9.000	17	1440 Winter	100	+45%	100/360 Winter			
8.001	18	1440 Winter	100	+45%	30/360 Winter			
7.001	19	1440 Winter	100	+45%	30/360 Winter			
7.002	20	1440 Winter	100	+45%	1/240 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
7.000	15	148.450	0.535	0.000	0.07		1.6	SURCHARGED
8.000	16	148.449	0.724	0.000	0.02		0.7	FLOOD RISK
9.000	17	148.449	0.599	0.000	0.02		0.5	SURCHARGED
8.001	18	148.449	0.905	0.000	0.05		1.9	SURCHARGED
7.001	19	148.448	0.903	0.000	0.06	538	3.1	SURCHARGED
7.002	20	148.448	1.074	0.000	0.25		2.9	SURCHARGED

PN	US/MH Name	Level Exceeded
7.000	15	
8.000	16	
9.000	17	
8.001	18	
7.001	19	
7.002	20	

APPENDIX G: YORKSHIRE WATER SEWER RECORDS

YORKSHIRE WATER PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the **general** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.
2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.
3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will **generally** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will **generally** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.
4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.
5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45° and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter (*see illustration below*). Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.
6. All excavation works near to YW apparatus should be by hand digging only.
7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.
8. Adequate support must be provided where any works pass under YW apparatus.
9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.
10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.
11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.
12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.
13. **Under no circumstances** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.
14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionary Works).
15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.
16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.
17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available*" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.
18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.

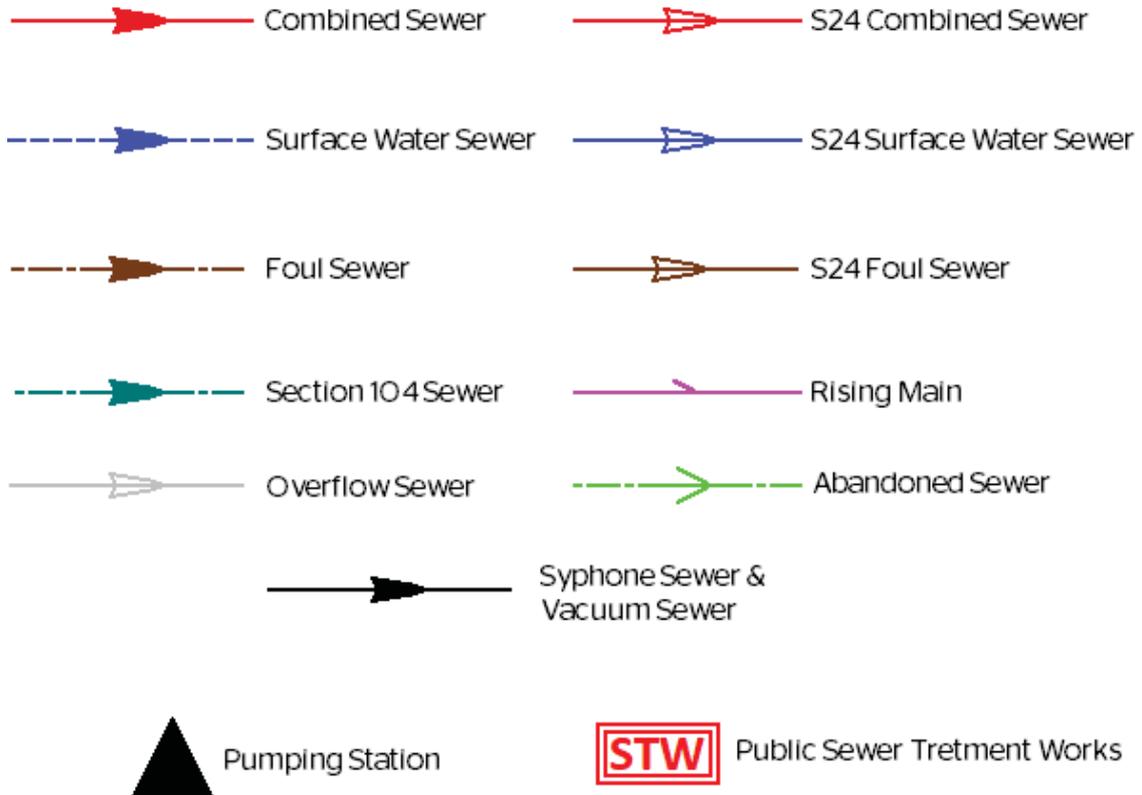
Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

19. Please note that the information supplied on the enclosed plans is reproduced from Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number 1000019559.
20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trial holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0845 124 24 24.

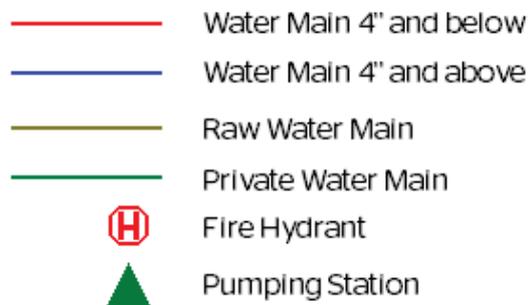
Property Identifier

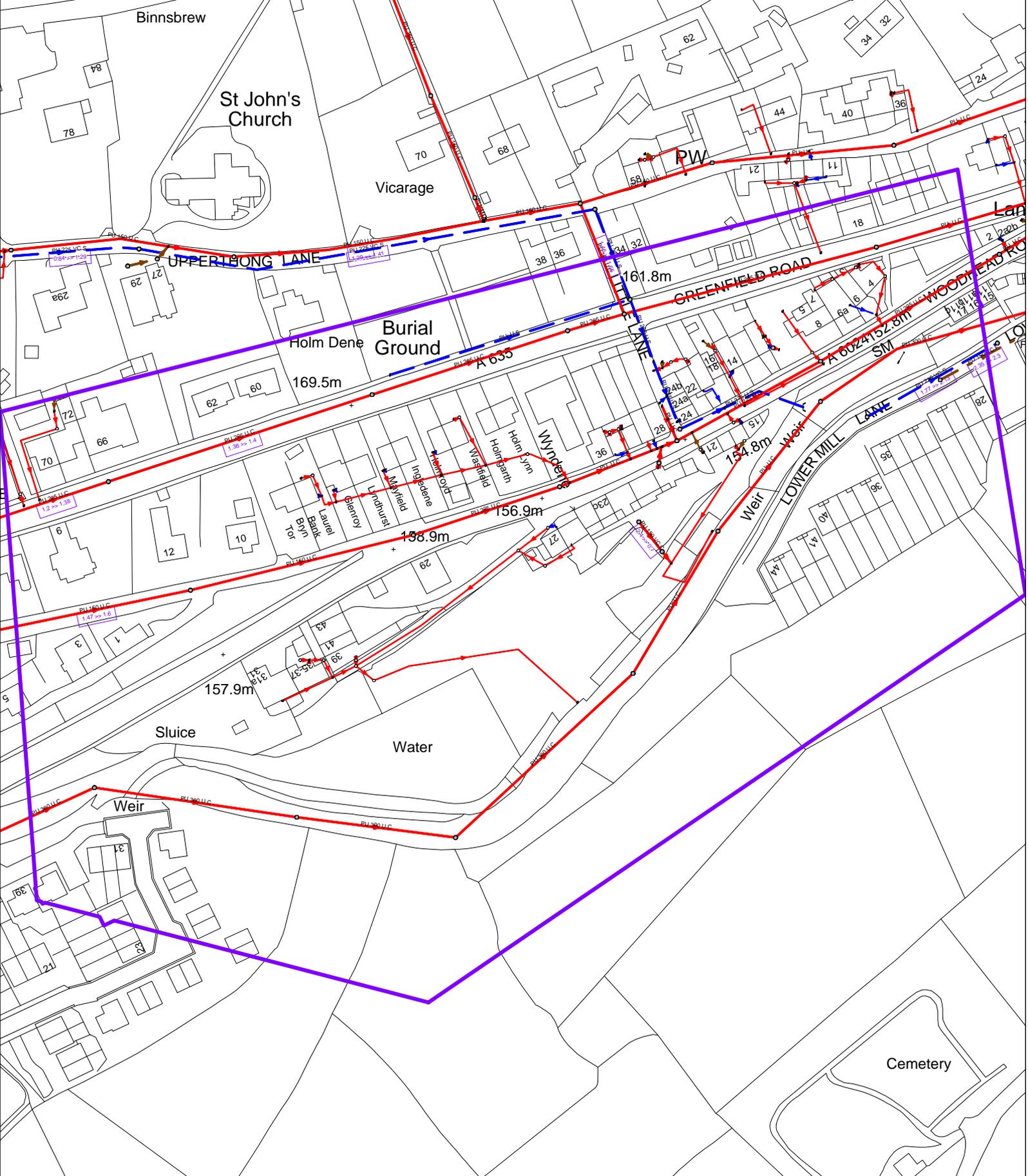


Sewer Legend

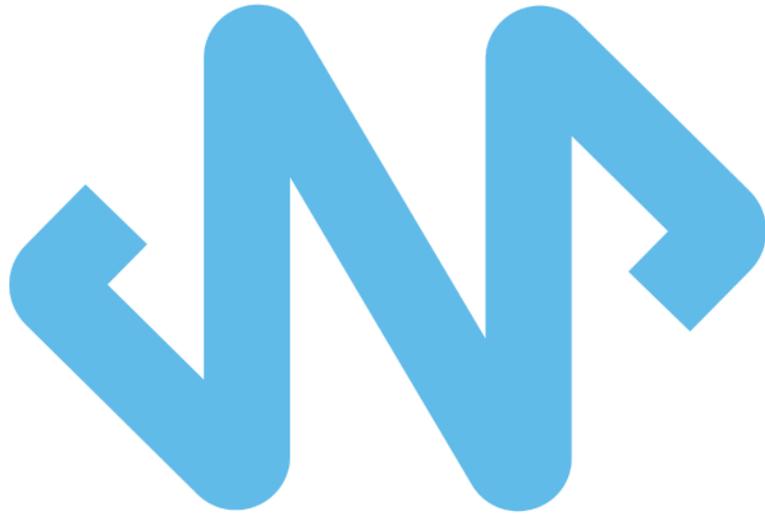


Water Legend





Public Waste Water Network 14/12/2021 11:20:03 OS Grid Coordinates: 413606 : 407723 Map Name : SE1307NE svcGISSafeMovePD



JNP GROUP

CONSULTING ENGINEERS

Brighouse

Woodvale House
Woodvale Road
Brighouse
West Yorkshire
HD6 4AB

telephone

01484 400691

email

brighouse@jnpgroup.co.uk

Chesham (HQ)

Link House
St Mary's Way
Chesham
Buckinghamshire
HP5 1HR

telephone

01494 771221

email

chesham@jnpgroup.co.uk

Glasgow

Oxford House
71 Oxford Street
Glasgow
G59 5EP

telephone

0141 378 0808

email

glasgow@jnpgroup.co.uk

Hartlepool

The Innovation Centre
Venture Court
Queens Meadow Business Park
Hartlepool
TS25 5TG

telephone

01429 239539

email

hartlepool@jnpgroup.co.uk

Leamington Spa

Marlborough House
48 Holly Walk
Leamington Spa
Warwickshire
CV32 4XP

telephone

01926 889955

email

leamingtonspa@jnpgroup.co.uk

Sheffield

MBP2 Meadowhall Business Park
Carbrook Hall Road
Sheffield
South Yorkshire
S9 2EQ

telephone

0114 244 3500

email

sheffield@jnpgroup.co.uk