



26 FALCON CLOSE,
ROCHDALE

DRAINAGE STRATEGY

JUNE 2024

26 FALCON CLOSE, ROCHDALE

DRAINAGE STRATEGY

Fairway Building and Remedial Contractors
Ltd

Drainage Strategy

CONFIDENTIAL

Project no: 22833 -DS-001

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1 INTRODUCTION

- 1.1.1 This Drainage Strategy (DS) has been provided at the request of Fairway Building and Remedial Contractors Ltd, hereafter referred to as “the client”, to assess the possible ways of discharging surface and foul water from the site while analysing the flood risks associated with the proposed development of 26 Falcon Close, Rochdale, hereafter referred to as “the site”.
- 1.1.2 The purpose of this Drainage Strategy is to:
- ▶ Investigate and define any potential drainage impacts associated with the site;
 - ▶ Conceptually determine and define necessary surface water management controls to ensure no exacerbation of flood risk on the site or to external receptors due to any increase in surface water run-off; and
 - ▶ Recommend appropriate and necessary mitigation measures and additional assessments that may be required to progress the sustainable development of the site.
- 1.1.3 The Drainage Strategy comprises the following:
- ▶ A desktop review of publicly available information, including information from the Environment Agency (EA) and Rochdale Borough Council who are the Lead Local Flood Authority (LLFA) for the proposed development area; and
 - ▶ An assessment and outline design of hydraulic controls and drainage requirements and drainage elements required to support the development of the site.
- 1.1.4 This report further details the methodologies employed within this study and provides recommendations as to any further work or investigations required to support the development of the site through the planning application process.

1.2 REGULATORY POLICY AND LEGISLATION

- 1.2.1 This assessment has been carried out in line with the current Government legislation, the National Planning Policy Framework (NPPF) 2023.
- 1.2.2 It has been assessed with reference to the following documents and legislative guidelines:
- ▶ CIRIA 753 The SUDS Manual V6 (2016);
 - ▶ DEFRA “Flood Risk Assessment Guidance for New Developments” (2006);
 - ▶ DEFRA “Surface Water Management Plan Technical Guidance” (2010);
 - ▶ BS 8533 2011 Assessing & Managing Flood Risk in Development Code of Practice (2011);
 - ▶ BS 8582:2013 Code of practice for surface water management for development Sites (2013);
 - ▶ National Planning Practice Guidance (2012 – updated 2016);
 - ▶ C624 Development and Flood Risk – Guidance for the Construction Industry’ (2004);
 - ▶ Design and Construction Guidance for Sewage Sector (DCGSS) (2020);
 - ▶ Planning Policy Guidance – Flood Risk and Climate Change (2014 and as amended).
- 1.2.3 In addition to the above, this report has also been informed by the following documents:
- ▶ Rochdale Adopted Core Strategy (2016)

1.3 SCOPE OF DETAILED DRAINAGE STRATEGY

- 1.3.1 Surface water run-off must be effectively managed to ensure that there is no exacerbation of potential surface water flooding issues on the site, or at any external receptors, due to any potential increases in surface water run-off rates and volumes.
- 1.3.2 The drainage hierarchy will be applied in determining the most suitable type and point of discharge of surface waters run-off from impermeable areas on the site. This will ensure that surface water is sustainably managed on the site, and that there is no exacerbation of flood risk elsewhere as a result of undertaking the development. This will be undertaken in accordance with industry best practice principles and guidance, such as the C753 SUDS Manual (2016), Design and Construction Guidance for Sewage Sector (DCGSS) (2020) and applicable sections of the Planning Policy Guidance (PPG).
- 1.3.3 Any increase in surface water run-off rate associated with the development of the site must also be managed in accordance with the guidelines set by LPA, the LLFA for the area.
- 1.3.4 The Drainage Strategy will identify potential opportunities and locations for attenuation infrastructure, as well as potential connection points and provide calculations of permissible discharge rates for run-off generated on site.
- 1.3.5 The Drainage Strategy therefore aims to provide surety that any drainage provided as part of the project development can safely and appropriately convey all flows from the site to appropriate discharge locations. This is to ensure sustainable and safe operation within the site, as well as ensuring sustainable operation of any receiving infrastructure. These assessments have been undertaken in accordance with prescribed best practice and building codes, including prioritising the incorporation of SuDS, where appropriate and practicable for the management of surface water.
- 1.3.6 Following the completion of a final site masterplan the drainage scheme proposed within this report should be reassessed to ensure surface water run-off and foul water drainage can be appropriately managed in accordance with best practise and local and national standard requirements.

2 METHODOLOGY

2.1 INTRODUCTION

- 2.1.1 This report aims to demonstrate that the proposed development is sustainable and will not be impacted by or exacerbate flood risk elsewhere through the development of the site. This assessment will account for the effects of climate change, as well as identifying further opportunities to reduce the probability and consequences of flooding within the site locality.
- 2.1.2 This report aims to identify constraints and opportunities for the site based on the development proposals provided by the client (**Appendix A**) and provide recommendations for the sustainable provision of drainage and mitigation of any potential flood risk for the site.
- 2.1.3 The assessment methodology is as follows:
- ▶ Desktop review of the geology, hydrology, and other pertinent environmental characteristics of the site, and how these affect flood risk of the proposed development and site drainage.
 - ▶ Produce indicative design calculations for the Drainage Strategy to determine the requirements for developing the site's surface water drainage and providing adequate storage in line with local planning policy and guidance. This will include the presentation of drawings with an indicative layout for any additional drainage and attenuation infrastructure located on the site.
 - ▶ Review the findings from the above and advise on the suitability of developing the site for the proposed development in consideration of the applicable flood risk and drainage and comment on limitations and opportunities for the site, with recommendations of further mitigation where applicable and appropriate.

3 PROJECT BACKGROUND

3.1 DEVELOPMENT DESCRIPTION AND LOCATION

- 3.1.1 Andrew Moseley Associates (AMA) was appointed by Fairway Building and Remedial Contractors Ltd to provide a Drainage Strategy in support of a residential development, located at 26 Falcon Close, Norden North, Rain Shore, Rochdale, OL12 7RY at NGR: SD 86007 14785.
- 3.1.2 The proposed development is located in the area of Norden North, approximately 2.4 miles from Rochdale. Proposals for the site are for residential use, consisting of two residential dwellings with associated hardstanding, landscaping and infrastructure A site layout can be found in **Appendix A**.
- 3.1.3 The Local Planning Authority for this development is Rochdale Metropolitan Borough Council who are also the Lead Local Flood Authority for the area.
- 3.1.4 This report has been prepared in accordance with the National Planning Policy Framework (NPPF) and the accompanying technical guidance to assess all forms of flooding including the management of surface water on-site.
- 3.1.5 The site is referenced in **Table 3-1** and **Figure 1** below.

Table 3-1. Site Context

Site Name	26 Falcon Close
Location	Rochdale
NGR (approx.)	SD 86007 14785
Application Site Area (ha)	0.11
General Locality	The site is located on undeveloped greenfield land and borders residential development to its north, east, and south. The site borders undeveloped greenfield to its west. Pedestrian and vehicular access to the site is provided via Falcon Close, which is located along the southern boundary of the site. Additional pedestrian access is provided via a pathway between Falcon Close and Woodhouse Lane, located along the eastern boundary of the site.
Development Type	Residential
EA Flood Zone	Flood Zone 1

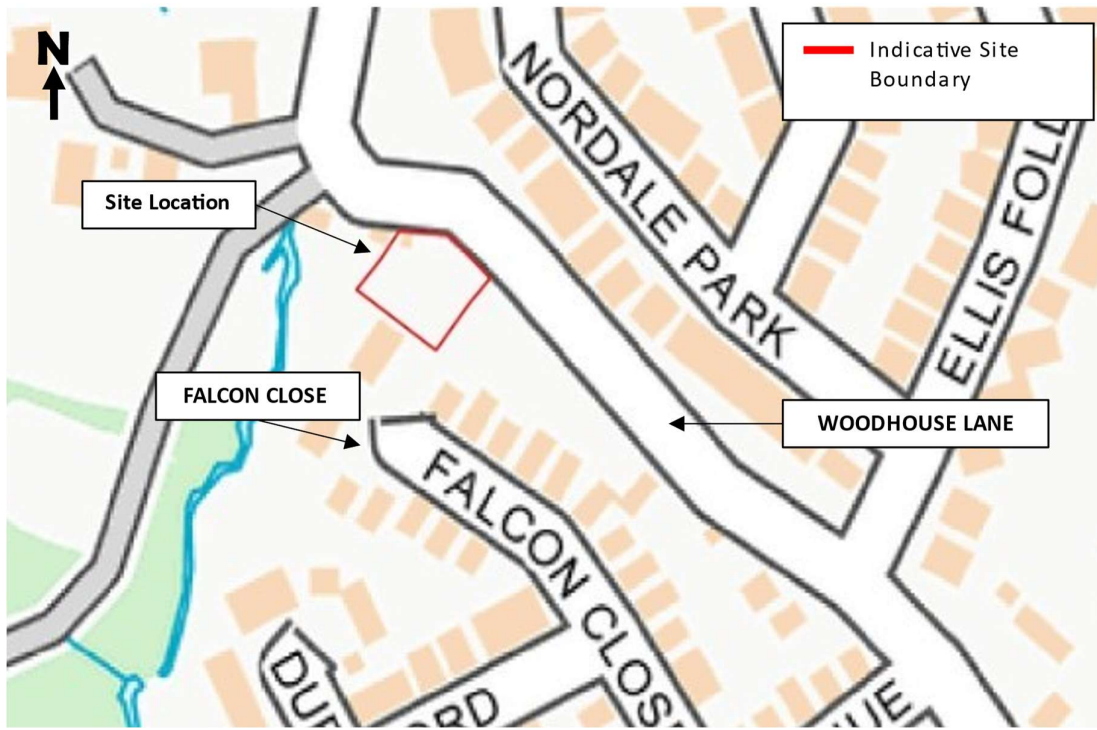


Figure 1. Site Location

3.2 TOPOGRAPHY

- 3.2.1 A topographic survey provided by the client and undertaken by Topographical.co.uk (Ref: P2143 S3212_2D 1.TOPO_A1_H) shows ground levels at the site are shown to be in the region of 190 to 193 m Above Ordnance Datum (m AOD). The topographic survey can be seen in **Appendix B**.
- 3.2.2 Further review of topographical data shows site levels to be lowest in the south of the site, while greatest levels are located in the north. A general fall in gradient from north to south is observed across the site.

3.3 GEOLOGY AND GROUND CONDITIONS

- 3.3.1 British Geological Survey (BGS) Open Geoscience website¹ indicates that the entire site is underlain by Rough Rock – Sandstone, with overlying superficial deposits of Till, Devensian – Diamicton.
- 3.3.2 The BGS website information indicates that there is no borehole record within close proximity.
- 3.3.3 As indicated by aerial imagery, the site consists of grass land consisting of light vegetation.

¹ Available at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> accessed on 30/05/2024

- 3.3.4 Information obtained from the Cranfield University's Soilscape website indicates that the site is located in an area classified as being Soilscape 17 which is defined as having slowly permeable seasonally wet acid loamy and clayey soils.

3.4 HYDROGEOLOGY

- 3.4.1 According to the Department for Environment, Food and Rural Affairs (DEFRA) MAGIC map², the site is indicated as not being located in a Groundwater Source Protection Zone (SPZ), as defined by the Environment Agency (EA) for the protection of a potable groundwater supply.
- 3.4.2 The site is located as being in an area of low groundwater vulnerability and located above a Secondary A bedrock, and a Secondary (undifferentiated) superficial aquifer.

3.5 HYDROLOGY

- 3.5.1 There are no main rivers near the site. However, there is an unnamed watercourse located to the west of the site.
- 3.5.2 The EA's Catchment Data Explorer website³ indicates that the site resides within the Roch Irk Medlock operational catchment and the Naden Brook sub catchment.

² Available at: <https://magic.defra.gov.uk/MagicMap.aspx?startTopic>, accessed on 30/05/2024

³ Available at: <https://environment.data.gov.uk/catchment-planning/>, accessed on 30/05/2024

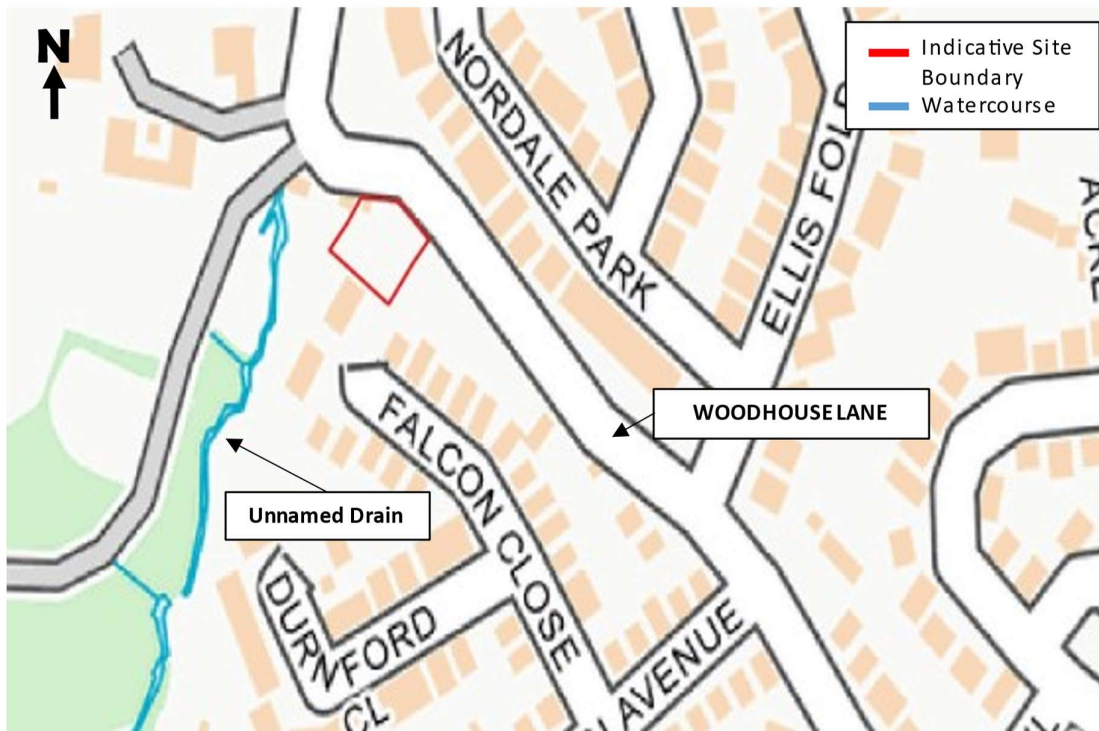


Figure 2. Watercourse Location

4 FOUL WATER DRAINAGE

4.1 INTRODUCTION

- 4.1.1 It is proposed to install a new foul drainage system to serve the proposed residential development.
- 4.1.2 The foul water system will be designed and constructed in accordance with the current Building Regulations, BS EN:752 'Drainage and Sewer Systems Outside Buildings', the Local Authority Building Control specifications and requirements, Sewers for Adoption 7th Edition and the Civil Engineering Specification for the Water Industry.

4.2 EXISTING SEWERS

- 4.2.1 AMA attained a United Utilities pre-development enquiry which can be seen in **Appendix C**. They state that there is a foul water sewer located to the south of the site, within Falcon Close.
- 4.2.2 Within further correspondence between AMA and United Utilities, shown in **Appendix D**, they also state that there is a surface water sewer located to the south of the site, within Falcon Close.

4.3 FOUL WATER DISCHARGE RATES

- 4.3.1 The estimate design Dry Weather Flow (DWF) generated by the proposed development, based on a gravity system, has been calculated as 0.093 litres per second.
- 4.3.2 This figure is based on two dwellings at 4,000 litres per dwelling as prescribed in Sewers for Adoption.

4.4 FOUL WATER CAPACITY AND POINT OF CONNECTION

- 4.4.1 United Utilities have advised that foul water can discharge to the existing 150mm foul water sewer located to the south of the site, located within Falcon Close. They have not advised of any known capacity issues with the public sewer network in the area which would hinder development at the site.
- 4.4.2 No depth/level information is available for these sewers and therefore further survey work in the form of a drainage CCTV and tracing survey will be required to confirm whether a gravity connection will be feasible.
- 4.4.3 Any proposed connection onto the public recorded sewers will require a S106 connection application.

5 SURFACE WATER DRAINAGE STRATEGY

5.1 INTRODUCTION

- 5.1.1 The National Planning Policy Framework (NPPF) and accompanying Technical Guidance indicate that surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.
- 5.1.2 Consideration should therefore firstly be given to using sustainable drainage (SuDS) techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements. Approved document Part H of the Building Regulations (2015) sets out a hierarchy for the disposal of surface water which encourages a SuDS approach.

5.2 OVERVIEW AND CONCEPT

- 5.2.1 As detailed in Section 3.1, development proposals for the site consist of residential use consisting of two residential dwellings with associated hardstanding, landscaping, and infrastructure. The site plan shows the developable area of the site to be restricted to the red line boundary, as shown in **Appendix A**, with an approximate total developable area of 0.11 ha.
- 5.2.2 Review of the site plan shows proposals to consist of an approximate total impermeable area of 0.049ha, which equates to approximately 45% of the total proposed developable area. The contributing areas have been identified within the Drainage Layout Drawing, in **Appendix E**.
- 5.2.3 It is considered that green open space and landscaped areas will not produce or contribute run-off to the surface water management infrastructure proposed as part of this strategy. This has been taken into account when deriving the impermeable area for the site.

5.3 PRE-DEVELOPMENT SURFACE WATER RUN-OFF

Greenfield

- 5.3.1 The site is approximately 0.11 ha in area and currently comprises of greenfield land.
- 5.3.2 For the purposes of determining the existing rate of surface water run-off the site is considered to greenfield therefore the run-off will be estimated using the IH124 method.
- 5.3.3 The table below summarises the existing greenfield run-off rates generated by the development for a range of storm return periods. A calculation summary sheet from the UK SuDS website can be found in **Appendix F**.

Table 5-1. Existing Run-Off Rates

Area (Ha)	Q _{BAR} (L/S)	Q ₁ (l/s)	Q ₃₀ (L/S)	Q ₁₀₀ (L/S)	Q ₂₀₀ (L/S)
0.11	1.31	1.14	2.23	2.73	3.11

5.4 GROUNDWATER PROTECTION

- 5.4.1 The proposed development site is not identified as being within a groundwater source protection zone (SPZ), as such no special measures are required to prevent risk to drinking water supplies.

5.5 METHODS OF SURFACE WATER MANAGEMENT

- 5.5.1 There are three methods that have been reviewed for the management and discharge of surface water which are detailed below; these may be applied individually or collectively to form a complete strategy. They should be applied in the order of priority as listed:

- ▶ Discharge via Infiltration
- ▶ Discharge to a Watercourse
- ▶ Discharge to Surface Water Sewer or Highway Drain
- ▶ Discharge to Public Sewer

5.6 INFILTRATION

- 5.6.1 Any impermeable areas that can drain to a soakaway or an alternative method of infiltration would significantly improve the sustainability of any surface water systems.
- 5.6.2 The British Geological Society (BGS) Geology of Britain Viewer indicates that the entire site is underlain by Rough Rock – Sandstone (Coarse-grained feldspathic sandstone, cross-bedded) with superficial Till, Devensian – Diamicton.
- 5.6.3 Information obtained from the Cranfield University's Soilscape website indicates that the site is in an area classified as being Soilscape 17, which is defined as slowly permeable seasonally wet acid loamy and clayey soils.
- 5.6.4 From a desktop review of the geology and soil at the site, it is believed that infiltration would not be an acceptable way of discharging surface water from the site.
- 5.6.5 Percolation testing has not yet been carried out on this site. It is recommended that infiltration testing to BRE 365 digest is undertaken as part of any future site investigations works at the site so that this can be used as satisfactory evidence for the LLFA or United Utilities as necessary. The results of a percolation test will also be required to produce infiltration/soakaway designs.

5.7 WATERCOURSE

- 5.7.1 As discussed in Section 3.5 there are there are no main Rivers near the site. However, there is an unnamed watercourse located to the west of the site.

- 5.7.2 Although the site is located within close proximity of the unnamed watercourse, in order to discharge surface water here third-party land would have to be crossed. Therefore, it would not be possible to discharge surface water from the site into the watercourse.

5.8 PUBLIC SEWERS

- 5.8.1 As a last resort and following the hierarchy of surface water, disposal discharge to the public sewer system may need to be considered.
- 5.8.2 In the United Utilities pre development enquiry in **Appendix C**, they state that surface water should discharge through infiltration or to a watercourse where feasible.
- 5.8.3 AMA contacted United Utilities regarding the possibility of discharging surface water from the site into the public sewer network. They stated that given discharge via infiltration or to a watercourse would not be possible, surface water could discharge to the United Utilities surface water sewer to the south of the site, within Falcon Close, at a restricted discharge rate of no greater than 5.0 l/s. This correspondence can be found in **Appendix D**.
- 5.8.4 Therefore, it would be possible to discharge surface water from the site into a public sewer.

5.9 PROPOSED DISCHARGE RATES

- 5.9.1 Surface water from the site will be discharged via a connection into the United Utilities surface water sewer.
- 5.9.2 As the site will be drained by discharging surface water into the public sewer, surface water will be restricted to 5.0 l/s, as stated by United Utilities.
- 5.9.3 Typically, any discharge rate less than 5.0 l/s is prone to blockage and will create maintenance issues because of the small size of the orifice required. Where the greenfield discharge suggests a discharge rate of less than 3.0 l/s the figure of 3.0 l/s shall be used to reduce the risk of blockages. This would need to be confirmed by the approving authority.

5.10 ATTENUATION REQUIREMENTS

- 5.10.1 As discussed earlier the site will be drained into a public sewer at a restricted discharge rate of 5.0 l/s. Therefore, attenuation will have to be provided.
- 5.10.2 Causeway Flow drainage design software has been used to estimate the maximum storage volume required on-site for the 100-year storm event plus 40% (30% allowance for climate change and 10% for urban creep). The results of these calculations can be found in **Appendix G**.
- 5.10.3 The results below are based on an attenuation tank in the south of the site discharging surface water from the site to the public sewer at a restricted discharge rate of 5.0 l/s.
- 5.10.4 A Drainage Layout Drawing can be found in **Appendix E**.

Total Impermeable Area

- 5.10.5 This volume is based on using an attenuation tank with a discharge rate of 5.0 l/s. The details on the attenuation of the tank can be found in **Table 5-2** below.

Table 5-2. Attenuation Volume

Gross Area (ha)	Max Discharge (l/s)	Impermeable Area (ha)	Q100+40% Volume (m ³)
0.11	5.0	0.049	11.2

6 SUSTAINABLE DRAINAGE SYSTEMS

- 6.1.1 Where possible, Sustainable drainage (SuDS) systems/techniques should be used to drain the site of surface water run-off. These could be in the form of permeable paving, rainwater harvesting, ponds, and other above ground green systems. Swales could also be incorporated into the layout to convey surface run-off rather than below ground pipes (which tend to have a higher velocity).

6.2 SUSTAINABLE DRAINAGE (OVERVIEW)

- 6.2.1 Drainage systems can contribute to sustainable development and improve urban design, by balancing the different issues that influence the development of communities. Approaches to manage surface water that take account of water quantity (flooding), water quality (pollution) and amenity issues are collectively referred to as Sustainable Drainage Systems (SuDS).
- 6.2.2 SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to slow water down (attenuate) before it enters streams, rivers, and other watercourses, they provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or evaporated from surface water and lost or transpired from vegetation (known as evapotranspiration).
- 6.2.3 SuDS are technically regarded a sequence of management practices, control structures and strategies designed to drain surface water efficiently and sustainably, while minimising pollution and managing the impact on water quality of local water bodies.
- 6.2.4 SuDS are more sustainable than traditional drainage methods because they:
- ▶ Manage run-off volumes and flow rates from hard surfaces, reducing the impact of urbanisation on flooding,
 - ▶ Protect or enhance water quality (reducing pollution from run-off),
 - ▶ Protect natural flow regimes in watercourses,
 - ▶ Are sympathetic to the environment and the needs of the local community,
 - ▶ Provide an attractive habitat for wildlife in urban watercourses,
 - ▶ Provide opportunities for evapotranspiration from vegetation and surface water,
 - ▶ Encourage natural groundwater/aquifer recharge (where appropriate),
 - ▶ Create better places to live, work and play.

6.3 SUDS PRINCIPALS

- 6.3.1 Sustainable drainage is a departure from the traditional approach to draining sites. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:
- ▶ Storing run-off and releasing it slowly (attenuation)
 - ▶ Allowing water to soak into the ground (infiltration)
 - ▶ Slowly transporting (conveying) water on the surface
 - ▶ Filtering out pollutants
 - ▶ Allowing sediments to settle out by controlling the flow of the water

6.3.2 The above was replicated from www.susdrain.org

6.4 SUDS TECHNIQUES

6.4.1 The following table is a list of SuDS features that may/may not be feasible for the proposed site.

Table 6-1. SuDS Feasibility Table

SuDS Technique	Can they be feasibly incorporated into the site?	Comments
Green Roofs	×	The sloping roofs of the proposed development would not permit a green roof design.
Basins and Ponds	×	The proposed development could not be designed to incorporate these elements due to site constraints such as the topography.
Filter Strips, Swales, and Bio-Retention	×	The proposed development could not be designed to incorporate these elements due to site constraints.
Infiltration Techniques	×	Desktop review of the available data indicate that infiltration would not be feasible at the site.
Permeable Surfaces and Tree Pits	✓	Surfacing of the external areas could be in a permeable material, such as permeable paved access roads and driveways.
Rainwater Harvesting	✓	New roofs could be directed to rainwater harvesting tanks for reuse.

7 SUDS MAINTENANCE PLAN

7.1 SURFACE WATER DRAINAGE MAINTENANCE AND MANAGEMENT SCHEDULE

Attenuation Tank Maintenance Schedule

Table 7-1. Attenuation Tank Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Inspect and identify areas that are not operating correctly. If required, take remedial action.	Monthly for the first 3 months of operation, then annually.
	Recover debris from catchment surface area where it may cause risk to performance.	Monthly
	Remove sediment and debris from pre-tank system.	Annually
Remedial Actions	Repair inlets/outlets/vents/overflows.	As necessary
Monitoring	Inspect all inlets/outlets and upstream drainage system to ensure they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment and build up and remove if necessary.	Every 5 years

Hydrobrake Manhole Maintenance Schedule

Table 7-2. Hydrobrake Manhole Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from flow control chambers and upstream manholes.	Monthly for first 12 months, then 6 monthly.
Remedial Actions	Replace or clean hydrobrake if performance deteriorates or failure occurs.	As necessary
Monitoring	Check flow control to ensure emptying is occurring.	Quarterly and post high intensity storm event

Channel Drains Maintenance Schedule

Table 7-3. Channel Drains Maintenance Schedule

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices.	Monthly
	Inspect channel drain surface, inlet and outlet pipework and control system for blockages, clogging, standing water and structural damage.	Monthly
Occasional Maintenance	Remove to control tree roots where they are encroaching to sides of channel drain using recommended methods (NJUG, 2007 or BS 3998:2010).	As necessary
	Clear perforated pipework of blockages.	As necessary

8 SUMMARY & CONCLUSION

- 8.1.1 The site is in an area identified as having a low probability of flooding on the EA Flood Map and is located in Flood Zone 1.
- 8.1.2 As with any drainage system, blockages within the surface water sewer systems constructed to serve the development has the potential to cause flooding or disruption. Any drainage systems which are not to be offered for adoption to either the Water Company or the Local Authority will have a suitable maintenance regime scheduled and an appropriate management company appointed to carry out the works.
- 8.1.3 The primary option for surface water disposal is to use a connection into the public sewer system.
- 8.1.4 From a desktop review of ground conditions on site, infiltration methods will not be viable.
- 8.1.5 There is not a suitable watercourse in the vicinity of the site which could be utilised to dispose of surface water from the site.
- 8.1.6 There is a suitable public sewer in the vicinity of the site which could be utilised to dispose of the surface water. It is proposed that surface water will discharge through a connection into the United Utilities surface water sewer located to the south of the site, in Falcon Close.
- 8.1.7 Attenuation is required as the means of surface water disposal is through a connection into the public sewer system. Furthermore, there will be a restricted discharge limit of 5.0 l/s, as stated by United Utilities.
- 8.1.8 There is a formal point of connection into a United Utilities public foul/combined water sewer in close proximity to the site. Foul water domestic waste can discharge to the 150mm diameter public foul/combined sewer recorded in Falcon Close, at a point to the south of the site.

9 LIMITATIONS

9.1 LIMITATIONS

- 9.1.1 This report has been prepared for exclusive use by Fairway Building and Remedial Contractors Ltd for the purpose of assisting them in evaluating the potential constraints imposed by flood risk and drainage in making a Planning Application.
- 9.1.2 AMA accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of AMA. Any advice, opinions or recommendations within this document should be read and relied upon only in the context of the document as a whole.
- 9.1.3 AMA has endeavoured to assess all information provided to them during this appraisal. The report summarises from several external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.
- 9.1.4 This report has been undertaken with the assumption that the site will be developed in accordance with the above proposals without significant change. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.
- 9.1.5 A topographic survey has been completed for the site and was supplied to AMA by the client. AMA accepts no liability for the accuracy of this survey, and it is recommended that it is verified on-site prior to the commencement of any construction work.
- 9.1.6 Existing drainage information is based on third party survey data and record information which is considered to be incomplete. It is therefore recommended that a FULL drainage investigation survey is commissioned to establish the precise alignment, level, and condition of ALL existing drainage within the development site to inform the masterplan and future detailed design proposals.

APPENDICES

APPENDIX A – PROPOSED SITE LAYOUT

APPENDIX B – TOPOGRAPHIC SURVEY

APPENDIX C – UNITED UTILITIES PRE DEVELOPMENT ENQUIRY

APPENDIX D – CORRESPONDENCE WITH UNITED UTILITIES

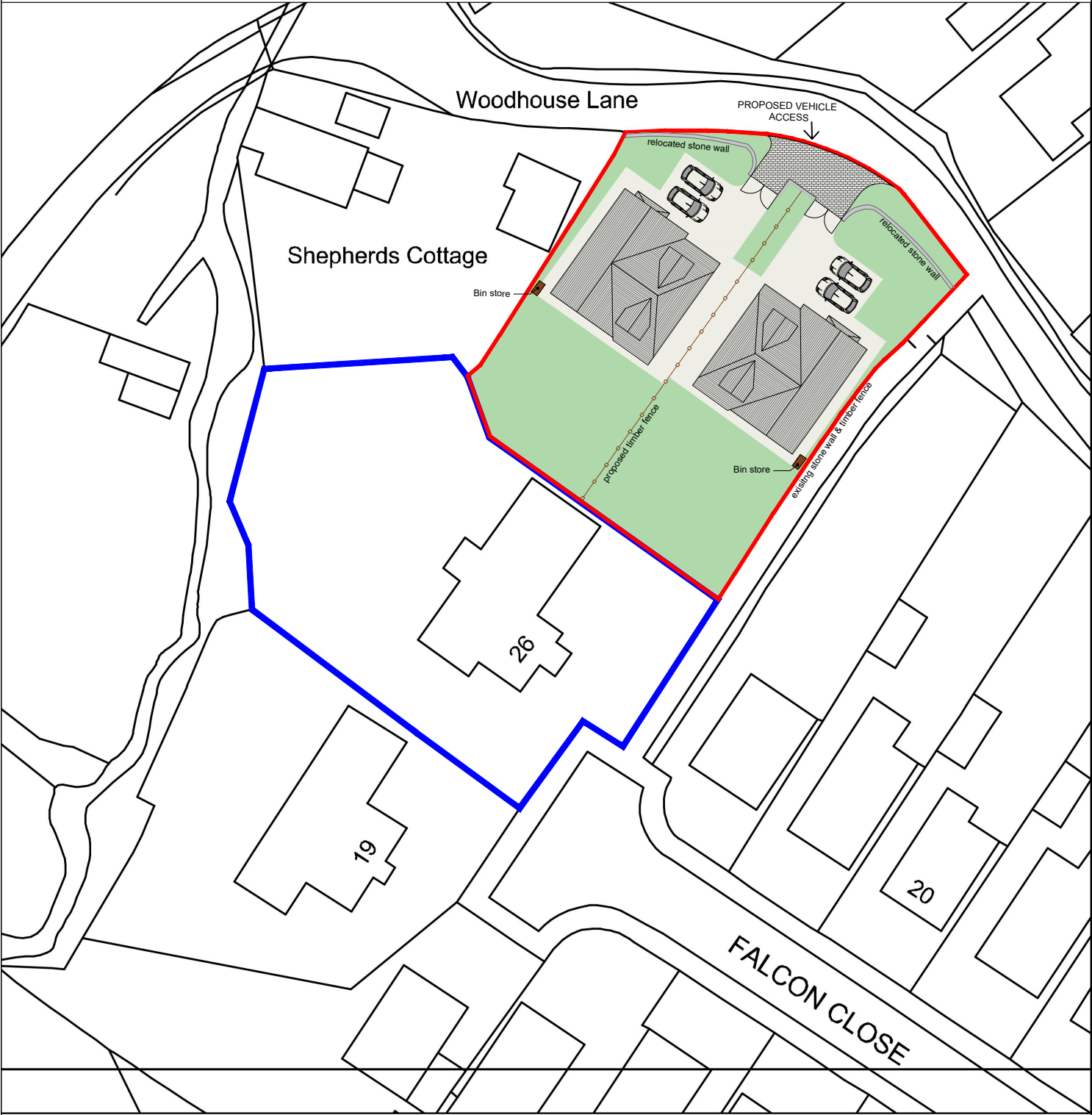
APPENDIX E – DRAINAGE LAYOUT DRAWING

APPENDIX F – UK SUDS GREENFIELD RUN-OFF RATES

APPENDIX G – CAUSEWAY FLOW CALCULATIONS

Appendix A

PROPOSED SITE LAYOUT



**northern
planners**
A trading name of Energyline Ltd

tel: 01423 799954
www.northernplanners.co.uk

Project Title. Falcon Close, Rochdale			
Title. Proposed Site Plan		Date. April 2024	
Drawing No. 24NP504/01/003		Client.	
Scale. 1:500 @ A4	Format. PDF	Sheet. 1	Rev. A

Appendix B

TOPOGRAPHIC SURVEY



Notes

This drawing should be used in fulfillment of it's original purpose and in conjunction with the agreed survey specification. Background mapping should be used as a guide only. Remotely surveyed features such as offsite buildings and heights should be used as a guide.

Features may be omitted where obscured or inaccessible at the time of the survey. Identification of utility/statutory authority plant and apparatus has been made by visual inspection only. All dimensions should be checked on site prior to design and construction.

Unless stated, boundaries have been surveyed according to a physical definition and no assumption or representation is given in respect of legal boundary position.

© 2024 Survey & Mapping UK Ltd.

Legend

Topographic			
AV	Air Valve	MkG	Marker post gas
BB	Bellisha beacon	MkOF	Marker post oil/fuel
Bdy	Boundary post/peg	MkU	Marker unidentified
BH	Borehole	MkW	Marker post water
Bol	Bollard	PIrv	Pipe invert level
BP	Block paving	PM	Parking meter
Com.	Comms. point	PR	Pipe riser
CCab	Comms. cabinet	PU	Point unidentified
CCTV	Closed circuit tv	RA	Rodding access
CP	Crossing point	RBol	Reflective bollard
CPS	Concrete paving slabs	RP	Rainwater pipe
CR	Cable riser	Sag	Overhead sag level
DCL	Drainage cover level	Sof	Soffit level
DR	Duct riser	SP	Sign post
Elec	Electric feature	ST	Stop tap
E Cab	Electricity cabinet	SV	Stop valve
ER	Earth rod	SY	Slay
FH	Fire hydrant	Tac	Tactile paving
FS	Flag staff	TH	Top of hedge
G	Gully	ThL	Threshold level
Gas	Gas unidentified	TL	Top of fence
GCab	Gas cabinet	TL	Traffic light
GL	Ground light	TPW	Top of parapet wall
GM	Gas meter	TS	Traffic signals
GP	Guide post	TT	Top of tree
GV	Gas valve	TV	Top of vegetation
IBol	Illuminated bollard	TW	Top of wall
InV	Invert level	UCab	Unidentified cabinet
ISign	Illuminated sign	UCL	Unidentified cover level
ISP	Illuminated sign post	UP	Utility pole
KI	Kerb inlet	VP	Vent pipe
LB	Letter box	WCL	Water cover level
LC	Lighting column	WL	Water level
MkC	Marker post comms.	WM	Water meter
MkD	Marker post drainage	WO	Wash out
MkE	Marker post electric	WU	Water unidentified

	Bank top		Footpath or track
	Breakline		Kerb or Rail line
	Bank bottom		Kerb (dropped)
	Bank bottom (water)		Kerb Inlet
	Building overhead		Miscellaneous
	Cable overhead		Roadmarkings
	Concrete/Tarmac		Section position
	Contour		Street furniture
	Gate		Vegetated light/dense
	Grass		Wall
	Fence (labelled)		Waterline

	Building		OS Data
	Minor Building		© Crown copyright
	Avg. tree spread		Hedge
	10.50 Ground level		Bush
	0.15 Trunk Diam.		Sapling
	MB Multi bole		
	TT Top of tree (M AOD)		

Utility covers/cabinets etc above ground			
	Drainage (general)		Survey Station
	Electric		PK1 100.000
	Gas		3rd party station
	Traffic signals		Viewpoint hold CTRL
	Communications		
	Unidentified		
	Water		

Coordinate reference system

This survey uses an arbitrary grid at a scale factor of 1 and relates to the Ordnance Survey National Grid. Please use the station table below to re-establish the onsite grid.

Stations

Name	Easting	Northing	Level
PG1	385971.398	414881.709	192.312
PG2	385985.123	414872.662	192.603
PK1	385949.964	414858.331	190.483
PK2	385956.697	414865.017	190.842
PK3	385937.361	414835.558	189.245
PK4	385951.172	414825.780	190.734

Revisions

REV.	DESCRIPTION	BY:	DATE:

SURVEYOR:			
TOPOGRAFICAL -CO-UK			
Regulated by RICS			
CLIENT: Fairway Building & Remedial Contractors Ltd			
CONSULTANT: Northern Planners			
SITE: 26 Falcon Close, Rochdale OL12 7RY			
TITLE: Topographic Survey			
SCALE AT A1: 200	SURVEY DATE: 03.06.2024	ISSUE DATE: 05.06.2024	QA REF: QA3212
PROJECT REF: P2143	MODEL REF: S3212_2D	LAYOUT REF: 1.TOPO_A1_H	

Appendix C

UNITED UTILITIES PRE DEVELOPMENT ENQUIRY

From: seweradoptions@uuplc.co.uk
To: [Jasmine Ellenor](#)
Cc: [Aaron Yesudian](#)
Subject: RE: 05775823 - Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale
Date: 23 May 2024 14:19:44

Good afternoon Jasmine,

Pre Development Enquiry for: Land North East of 26 Falcon Close, OL12 7RY UU
Reference Number : 05775823

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

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

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

Foul Water

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

Our preferred point of discharge would be to the 150mm diameter public foul water sewer within Falcon Close located to the South of your proposed development at an unrestricted rate. If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

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

Surface Water

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

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

This is outlined as follows, in order of priority:

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

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate

evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

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

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

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

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

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

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

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the waterbody Approx 40mm West of the proposed site.

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

Highway Drainage

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

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below

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

Land drainage / Overland flows / track drainage

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

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Existing Water Assets Crossing the Site

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

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

Connection Application

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

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

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

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

Kind Regards

Lewis Barr
Assistant Developer Engineer
Developer Services & Metering



Assistant Developer Engineer
Developer Services & Metering
Customer Services
07827286541
unitedutilities.com

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

From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]

Sent: 23/05/2024 13:30

To: jasmine@amatp.co.uk

Cc: aaron@amatp.co.uk

Subject: 05775823 - Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale

Good Afternoon

Please accept this email as receipt of your application received on 22/05/2024 for the above development. This has now been logged on our system and the job reference is 05775823 we would ask that you quote this reference in all future correspondence.

I have reviewed your application (and attachments) and can confirm this is suitable to be passed to Lana Jaundrell for technical assessment. You will receive their response within 10 working days.

Kind regards

Lois Williams

Developer Services Assistant
Developer Services & Metering
Customer Services
unitedutilities.com

Tel: 0345 072 6067 Option 2 for Wastewater Services)

Direct Tel:

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



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



Developer Services & Metering
Customer Services
unitedutilities.com
Tel: 0345 072 6067 Option 2 for Wastewater
Services)
Direct Tel:

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



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

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

From: Jasmine Ellenor [jasmine@amatp.co.uk]

Sent: 22/05/2024 14:51

To: seweradoptions@uuplc.co.uk

Cc: aaron@amatp.co.uk

Subject: Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale

Dear Sir/Madam,

Please see attached the completed wastewater pre-development enquiry form for 26 Falcon Close, Rochdale. I have also attached the site location plan, a plan of preferred drainage outfall locations, and the greenfield run-off rates for the site.

If you require any further information, please let me know.

Thank you!

Kind regards,

Jasmine

Jasmine Ellenor

Graduate Flood Risk Engineer

[\[Image is no longer available\]](#)

[\[Image is no longer available\]](#)

Web: www.amatp.co.uk

DD: 0113 418 2615

Mob: 0774 266 8250

Andrew Moseley Associates

15 St Paul's Street

Second Floor

Leeds

LS1 2JG

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www.unitedutilities.com/subsidiaries

Appendix D

CORRESPONDENCE WITH UNITED UTILITIES

From: seweradoptions@uuplc.co.uk
To: [Jasmine Ellenor](#)
Cc: [Aaron Yesudian](#)
Subject: RE: 05775823 - Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale
Date: 27 June 2024 09:59:36
Attachments: [image002.png](#)
[image003.png](#)

Good Morning Jasmine,

Please be advised United Utilities would accept a connection to the 150mm surface water sewer within Falcon Close located south of your proposed development. We would expect the discharge rate to be restricted to no more than 5 l/s

Kind Regards

Lewis Barr

Assistant Developer Engineer
Developer Services & Metering
Customer Services
01925 429064
unitedutilities.com

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

From: Jasmine Ellenor [jasmine@amatp.co.uk]
Sent: 25/06/2024 11:30
To: seweradoptions@uuplc.co.uk
Cc: aaron@amatp.co.uk
Subject: RE: 05775823 - Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale

Hi Lewis,

Hope you're well. Thank you for providing the below information. We are currently looking at our options for draining surface water from the site at 26 Falcon Close, Rochdale. Infiltration testing is to be undertaken at a later date however, from a desktop review of ground conditions at the site it is unlikely that infiltration will be viable here. Furthermore, the site is separated from the watercourse to the west by third party land and as such, this is also not an option for draining the site. Therefore, we would look to propose a connection into the public sewer network. Do you have any information regarding any surface water or combined systems located within the vicinity of the site, as well as any restrictions on discharge that may be required to do so? If possible, could you also please provide any depth information for the surrounding network so that we can assess whether a gravity connection would be viable here.



Assistant Developer Engineer
Developer Services & Metering
Customer Services
01925 429064
unitedutilities.com

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

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

From: Jasmine Ellenor [jasmine@amatp.co.uk]

Sent: 25/06/2024 11:30

To: seweradoptions@uuplc.co.uk

Cc: aaron@amatp.co.uk

Subject: RE: 05775823 - Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale

Hi Lewis,

Hope you're well. Thank you for providing the below information. We are currently looking at our options for draining surface water from the site at 26 Falcon Close, Rochdale. Infiltration testing is to be undertaken at a later date however, from a desktop review of ground conditions at the site it is unlikely that infiltration will be viable here. Furthermore, the site is separated from the watercourse to the west by third party land and as such, this is also not an option for draining the site. Therefore, we would look to propose a connection into the public sewer network. Do you have any information regarding any surface water or combined systems located within the vicinity of the site, as well as any restrictions on discharge that may be required to do so? If possible, could you also please provide any depth information for the surrounding network so that we can assess whether a gravity connection would be viable here.

Finally, within your prior response you mention a foul water sewer in Falcon Close to the south for the discharge of foul water from the development. Do you have any mapping available of the sewer network surrounding the site?

Thank you in advance!

Kind regards,

Jasmine

Jasmine Ellenor

Graduate Flood Risk Engineer



Web: www.amatp.co.uk

DD: 0113 418 2615

Mob: 07742 668 250

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: Thursday, May 23, 2024 2:20 PM
To: Jasmine Ellenor <jasmine@amatp.co.uk>
Cc: Aaron Yesudian <aaron@amatp.co.uk>
Subject: RE: 05775823 - Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale

Good afternoon Jasmine,
Pre Development Enquiry for: Land North East of 26 Falcon Close, OL12 7RY UU
Reference Number : 05775823

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

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

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

Foul Water

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

Our preferred point of discharge would be to the 150mm diameter public foul water sewer within Falcon Close located to the South of your proposed development at an unrestricted rate. If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

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

Surface Water

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

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

This is outlined as follows, in order of priority:

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

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

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

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

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the waterbody Approx 40mm West of the proposed site.

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

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Levels

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Land drainage / Overland flows / track drainage

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

Connection Application

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

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

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

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

Kind Regards



Lewis Barr

Assistant Developer Engineer
Developer Services & Metering
Customer Services
07827286541
unitedutilities.com

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

From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]

Sent: 23/05/2024 13:30

To: jasmine@amatp.co.uk

Cc: aaron@amatp.co.uk

Subject: 05775823 - Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale

Good Afternoon

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I have reviewed your application (and attachments) and can confirm this is suitable to be passed to Lana Jaundrell for technical assessment. You will receive their response within 10 working days.

Kind regards



Lois Williams

Developer Services Assistant
Developer Services & Metering
Customer Services
unitedutilities.com

Tel: 0345 072 6067 Option 2 for Wastewater Services)

Direct Tel:

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



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

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

From: Jasmine Ellenor [jasmine@amatp.co.uk]

Sent: 22/05/2024 14:51

To: seweradoptions@uuplc.co.uk

Cc: aaron@amatp.co.uk

Subject: Wastewater Pre-Development Enquiry - 26 Falcon Close, Rochdale

Dear Sir/Madam,

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If you require any further information, please let me know.

Thank you!

Kind regards,

Jasmine

Jasmine Ellenor

Graduate Flood Risk Engineer

[\[Image is no longer available\]](#)

[\[Image is no longer available\]](#)

Web: www.amatp.co.uk

DD: 0113 418 2615

Mob: 0774 266 8250

Andrew Moseley Associates

15 St Paul's Street

Second Floor

Leeds

LS1 2JG

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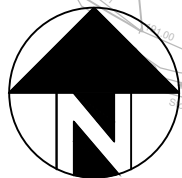
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Appendix E

DRAINAGE LAYOUT DRAWING

**Key:**

---○--- Proposed Surface Water Drainage

---●--- Proposed Foul Water Drainage

Drainage Strategy**Surface Water**

Flow restriction 5.0 l/s.

The proposed impermeable area is 490m². Based on a flow restriction of 5.0 l/s and modeling using Causeway Flow software, the attenuation requirement for a 1in100year + 30% climate change + 10% urban creep storm event is **11.2m³**.

Attenuation will be provided via **ATTENUATION TANK 4.0 x 3.5 x 0.8m DEEP**. The flows will be restricted via a Hydrobrake Model No:- CTL-SHE-0106-5000-1000-5000.

Foul Water

Foul water from the proposed development will discharge into the United Utilities foul water sewer located in Falcon Close to the south of the site, subject to agreement with United Utilities.

Notes

Exact level and location of the connections into United Utilities infrastructure to be confirmed prior to work commencing on site.

Proposed Impermeable Area (1:500) = 490m²



Attenuation tank 4.0 x 3.5 x 0.8m deep to provide 11.2m³ of storm water storage for a 1in100year + 30% climate change + 10% urban creep.
Tank CL: 191.49
Tank IL: 190.09

Hydrobrake flow control to restrict discharge rate to 5.0 l/s. Model No:- CTL-SHE-0106-5000-1000-5000.

Form foul water connection into existing United Utilities foul water sewer in Falcon Close, subject to agreement with United Utilities. Exact level and location of connection to be confirmed prior to work commencing on site.

Form surface water connection into existing United Utilities surface water sewer in Falcon Close, subject to agreement with United Utilities. Exact level and location of connection to be confirmed prior to work commencing on site.

P01	Preliminary Issue	28.06.24	JE
 ANDREW MOSELEY ASSOCIATES Project: 26 Falcon Close, Rochdale			
Client: Fairway Building and Remedial Contractors Ltd			
Drawing: Drainage Layout Drawing			
Drawn By: JE	Date: 28.06.2024		
Checked: TM	Scale: 1:250	Paper: A3	
Drawing No. AMA-22833-DS-001		Rev. P01	

Appendix F

UK SUDS GREENFIELD RUN-OFF RATES

Calculated by:	Jasmine Ellenor
Site name:	26 Falcon Close
Site location:	Rochdale

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

Site Details

Latitude:	53.62993° N
Longitude:	2.21339° W
Reference:	3175535516
Date:	Jun 28 2024 12:20

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.11
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Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Notes

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

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

Soil characteristics

	Default	Edited
SOIL type:	5	5
HOST class:	N/A	N/A
SPR/SPRHOST:	0.53	0.53

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

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

Hydrological characteristics

	Default	Edited
SAAR (mm):	1213	1213
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

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

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

Greenfield runoff rates

Default

Edited

Q_{BAR} (l/s):	1.31	1.31
1 in 1 year (l/s):	1.14	1.14
1 in 30 years (l/s):	2.23	2.23
1 in 100 year (l/s):	2.73	2.73
1 in 200 years (l/s):	3.11	3.11

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

Appendix G

CAUSEWAY FLOW CALCULATIONS



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	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	0.300	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
MH 1	0.007	5.00	192.190	450	0.750
MH 2	0.007	5.00	192.000	450	0.760
MH 3	0.007	5.00	191.530	450	0.750
MH 4	0.007	5.00	191.540	450	0.750
MH 5	0.007	5.00	191.880	450	1.290
MH 6	0.007	5.00	191.450	450	1.080
MH 7	0.007	5.00	191.070	1200	0.750
Tank	0.000	5.00	191.490	1200	1.400
Flow Control	0.000	5.00	191.460	1200	1.420

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	MH 1	MH 2	11.400	0.600	191.440	191.240	0.200	57.0	100	5.19	50.0
1.001	MH 2	MH 3	10.800	0.600	191.240	190.780	0.460	23.5	100	5.37	50.0
1.002	MH 3	MH 7	3.400	0.600	190.780	190.320	0.460	7.4	100	5.43	50.0
2.000	MH 4	MH 5	11.800	0.600	190.790	190.590	0.200	59.0	100	5.20	50.0
2.001	MH 5	MH 6	12.800	0.600	190.590	190.370	0.220	58.2	100	5.41	50.0
2.002	MH 6	MH 7	2.400	0.600	190.370	190.320	0.050	48.0	100	5.45	50.0
1.003	MH 7	Tank	10.600	0.600	190.320	190.090	0.230	46.1	150	5.60	50.0
1.004	Tank	Flow Control	3.900	0.600	190.090	190.040	0.050	78.0	150	5.67	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	1.022	8.0	1.3	0.650	0.660	0.007	0.0	27	0.746
1.001	1.600	12.6	2.5	0.660	0.650	0.014	0.0	30	1.243
1.002	2.861	22.5	3.8	0.650	0.650	0.021	0.0	28	2.128
2.000	1.004	7.9	1.3	0.650	1.190	0.007	0.0	27	0.733
2.001	1.012	7.9	2.5	1.190	0.980	0.014	0.0	39	0.897
2.002	1.115	8.8	3.8	0.980	0.650	0.021	0.0	46	1.072
1.003	1.486	26.3	8.9	0.600	1.250	0.049	0.0	60	1.344
1.004	1.139	20.1	8.9	1.250	1.270	0.049	0.0	69	1.102

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	11.400	57.0	100	Circular	192.190	191.440	0.650	192.000	191.240	0.660
1.001	10.800	23.5	100	Circular	192.000	191.240	0.660	191.530	190.780	0.650
1.002	3.400	7.4	100	Circular	191.530	190.780	0.650	191.070	190.320	0.650
2.000	11.800	59.0	100	Circular	191.540	190.790	0.650	191.880	190.590	1.190
2.001	12.800	58.2	100	Circular	191.880	190.590	1.190	191.450	190.370	0.980
2.002	2.400	48.0	100	Circular	191.450	190.370	0.980	191.070	190.320	0.650
1.003	10.600	46.1	150	Circular	191.070	190.320	0.600	191.490	190.090	1.250
1.004	3.900	78.0	150	Circular	191.490	190.090	1.250	191.460	190.040	1.270

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	MH 1	450	Manhole	Adoptable	MH 2	450	Manhole	Adoptable
1.001	MH 2	450	Manhole	Adoptable	MH 3	450	Manhole	Adoptable
1.002	MH 3	450	Manhole	Adoptable	MH 7	1200	Manhole	Adoptable
2.000	MH 4	450	Manhole	Adoptable	MH 5	450	Manhole	Adoptable
2.001	MH 5	450	Manhole	Adoptable	MH 6	450	Manhole	Adoptable
2.002	MH 6	450	Manhole	Adoptable	MH 7	1200	Manhole	Adoptable
1.003	MH 7	1200	Manhole	Adoptable	Tank	1200	Manhole	Adoptable
1.004	Tank	1200	Manhole	Adoptable	Flow Control	1200	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
MH 1	192.190	0.750	450				
				0	1.000	191.440	100
MH 2	192.000	0.760	450				
				0	1.001	191.240	100
MH 3	191.530	0.750	450				
				0	1.002	190.780	100
MH 4	191.540	0.750	450				
				0	2.000	190.790	100
MH 5	191.880	1.290	450				
				0	2.001	190.590	100
MH 6	191.450	1.080	450				
				0	2.002	190.370	100
MH 7	191.070	0.750	1200				
				1	2.002	190.320	100
				2	1.002	190.320	100
				0	1.003	190.320	150

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Tank	191.490	1.400	1200	1	1.003	190.090	150
				0	1.004	190.090	150
Flow Control	191.460	1.420	1200	1	1.004	190.040	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
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	0	0	0
100	30	10	0

Node Flow Control Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	190.040	Product Number	CTL-SHE-0106-5000-1000-5000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	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)	190.090
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	43
Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	14.0	0.0	0.800	14.0	0.0
			0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.06%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	MH 1	11	191.465	0.025	1.1	0.0087	0.0000	OK
15 minute summer	MH 2	11	191.270	0.030	2.2	0.0102	0.0000	OK
15 minute summer	MH 3	11	190.806	0.026	3.3	0.0090	0.0000	OK
15 minute summer	MH 4	11	190.815	0.025	1.1	0.0087	0.0000	OK
15 minute summer	MH 5	11	190.626	0.036	2.2	0.0096	0.0000	OK
15 minute summer	MH 6	11	190.420	0.050	3.3	0.0145	0.0000	OK
15 minute summer	MH 7	10	190.379	0.059	7.7	0.0775	0.0000	OK
30 minute summer	Tank	21	190.181	0.091	7.7	1.3823	0.0000	OK
30 minute summer	Flow Control	21	190.180	0.140	4.7	0.1583	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	MH 1	1.000	MH 2	1.1	0.635	0.137	0.0198	
15 minute summer	MH 2	1.001	MH 3	2.2	1.240	0.175	0.0192	
15 minute summer	MH 3	1.002	MH 7	3.3	1.067	0.147	0.0109	
15 minute summer	MH 4	2.000	MH 5	1.1	0.543	0.139	0.0241	
15 minute summer	MH 5	2.001	MH 6	2.2	0.683	0.277	0.0413	
15 minute summer	MH 6	2.002	MH 7	3.3	0.775	0.377	0.0104	
15 minute summer	MH 7	1.003	Tank	7.8	1.346	0.295	0.0792	
30 minute summer	Tank	1.004	Flow Control	4.7	0.473	0.231	0.0553	
30 minute summer	Flow Control	Hydro-Brake®		4.5				4.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.06%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	MH 1	10	191.481	0.041	2.8	0.0141	0.0000	OK
15 minute summer	MH 2	10	191.290	0.050	5.6	0.0170	0.0000	OK
15 minute summer	MH 3	10	190.822	0.042	8.3	0.0146	0.0000	OK
15 minute summer	MH 4	10	190.831	0.041	2.8	0.0142	0.0000	OK
15 minute summer	MH 5	10	190.651	0.061	5.6	0.0164	0.0000	OK
15 minute summer	MH 6	11	190.500	0.130	8.3	0.0377	0.0000	SURCHARGED
30 minute summer	MH 7	20	190.436	0.116	18.0	0.1529	0.0000	OK
30 minute summer	Tank	24	190.426	0.336	17.6	5.0902	0.0000	SURCHARGED
30 minute summer	Flow Control	24	190.421	0.381	5.8	0.4312	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	MH 1	1.000	MH 2	2.8	0.807	0.346	0.0393	
15 minute summer	MH 2	1.001	MH 3	5.5	1.578	0.441	0.0379	
15 minute summer	MH 3	1.002	MH 7	8.3	1.354	0.370	0.0186	
15 minute summer	MH 4	2.000	MH 5	2.8	0.689	0.352	0.0475	
15 minute summer	MH 5	2.001	MH 6	5.5	0.780	0.694	0.0823	
15 minute summer	MH 6	2.002	MH 7	8.1	1.038	0.928	0.0188	
30 minute summer	MH 7	1.003	Tank	17.6	1.287	0.671	0.1708	
30 minute summer	Tank	1.004	Flow Control	5.8	0.526	0.288	0.0687	
30 minute summer	Flow Control	Hydro-Brake®		5.0				11.7

Results for 100 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 99.06%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	MH 1	10	191.500	0.060	5.2	0.0219	0.0000	OK
15 minute summer	MH 2	11	191.316	0.076	10.3	0.0274	0.0000	OK
30 minute summer	MH 3	20	191.053	0.273	14.5	0.0995	0.0000	SURCHARGED
30 minute summer	MH 4	20	191.169	0.379	4.9	0.1379	0.0000	SURCHARGED
30 minute summer	MH 5	20	191.130	0.540	8.6	0.1502	0.0000	SURCHARGED
30 minute summer	MH 6	21	190.970	0.600	10.8	0.1813	0.0000	SURCHARGED
60 minute summer	MH 7	46	190.901	0.581	22.6	0.7758	0.0000	FLOOD RISK
60 minute summer	Tank	47	190.891	0.801	21.1	12.1133	0.0000	SURCHARGED
60 minute summer	Flow Control	47	190.887	0.847	6.0	0.9578	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	MH 1	1.000	MH 2	5.1	0.948	0.639	0.0632	
15 minute summer	MH 2	1.001	MH 3	10.3	1.644	0.818	0.0766	
30 minute summer	MH 3	1.002	MH 7	13.2	1.694	0.585	0.0266	
30 minute summer	MH 4	2.000	MH 5	4.2	0.725	0.539	0.0923	
30 minute summer	MH 5	2.001	MH 6	6.3	0.832	0.792	0.1002	
30 minute summer	MH 6	2.002	MH 7	9.5	1.211	1.082	0.0188	
60 minute summer	MH 7	1.003	Tank	21.1	1.323	0.805	0.1866	
60 minute summer	Tank	1.004	Flow Control	6.0	0.543	0.297	0.0687	
60 minute summer	Flow Control	Hydro-Brake®		5.0				28.2



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