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# Old Mill Street

## Drainage Strategy

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# 1. INTRODUCTION

## *1.1 Purpose of this Report*

This Drainage Strategy has been prepared to support the planning application for the proposed development at Old Mill Street, Manchester.

The assessment includes: a summary of the site, an estimate of the existing and proposed surface water discharge rates, infiltration assessment, SUDs assessment, drainage proposals and performance criteria.

This report should be read in conjunction with the Flood Risk Assessment report, OMS-REN-XX-XX-RP-C-00001.

The proposals within this report are intended to demonstrate the feasibility of the overarching drainage strategy to support the planning proposal.

# 2. THE SITE

## 2.1 Site Location

The site is located at the corner of Old Mill Street and Lampwick Lane in Manchester.

The site location is described below:

- Post Code M4 6BU
- OS X (Easting) 385485
- OS Y (Northing) 398440

The site location is illustrated in Figure 2.1 below.




***Figure 2.1: Site Location***

## 2.2 Site Description

The site is circa 0.067 hectares and currently comprises land with a tarmac and gravel surface used for car parking.

The site is bounded by Old Mill Street to the north, residential housing to the east, and Lampwick Lane to the south and west.

The site elevation is circa + 50.0m AOD.

Refer to Appendix A for the Existing Site Topography.

## 2.3 Existing Site Drainage

There is no apparent formal drainage on the site. It is assumed that the site is entirely impermeable, with any runoff entering the surrounding sewer network via nearby highway drainage.

Refer to Appendix B for Existing Drained Areas Plan.

## 2.4 Geology

A Phase 1 Desk Study for the site was published by Wardell Armstrong in November 2023, and a Geo-Environmental Appraisal report was published in June 2024 by Groundtech Consulting Limited. The information found in these these reports is used within the rest of this Section and in parts of Section 4 of this report.

The site was entirely surfaced by gravel to a maximum depth of 0.25m bgl. Made Ground was encountered beneath the site to maximum depths of between 1.65m and 1.8m bgl and generally comprised brown sandy gravelly clay with minor constituents of brick, ash and sandstone, brown fine to coarse sand with minor constituents of brick, concrete and sandstone, or brown sandy angular to subangular gravel of brick and concrete.

Natural strata was encountered at minimum depths of between 1.0m and 1.8m bgl and generally comprised firm to stiff brown sandy gravelly Clay with minor constituents of sandstone and mudstone to a maximum depth of 12.0m bgl underlain by brown gravelly fine to coarse Sand in CP01 and CP02 from 12.0m bgl to a maximum depth of 17.4m bgl.

Extremely weak red brown Mudstone residually weathered recovered as brown slightly clayey sandy angular to subangular gravel was encountered in CP01 and CP02 from between 17.1m and 17.4m bgl respectively.

## 2.5 Hydrogeology & Hydrology

The site is underlain by a Secondary Undifferentiated superficial aquifer. The underlying solid strata is of the Manchester Marls Formation, designated a Secondary B aquifer of low permeability fracture flow. The Collyhurst Sandstone Formation underlying the east of the site is designated a principal bedrock aquifer of high permeability intergranular flow.

There are no groundwater, surface water or potable water abstraction licences or Source Protection Zones within 500m of the site.

The nearest watercourse is the Ashton Canal, which runs east-west circa 63m southeast of the site.

## 2.6 Proposed Development

The proposed development is residential end use comprising a six-storey structure and surrounding external landscaping at street level.

Refer to Appendix C for Proposed Development Plans.

# 3. SURFACE WATER DISCHARGE ASSESSMENT

## *3.1 Surface Water Drainage Hierarchy*

In accordance with the National Standards for SuDS, Standard 1: runoff destinations, the following hierarchy of surface water drainage options should be considered:

- Priority 1: Collected for non-potable use;
- Priority 2: Discharge into the ground (infiltration);
- Priority 3: Discharge to an above ground surface water body;
- Priority 4: Discharge to a surface water sewer, or another piped surface water drainage system;
- Priority 5: Discharge to a combined sewer.

'The SuDS approach to managing surface water runoff' as set out in the 'CIRIA SuDS Manual 2015' expands on the NPPF hierarchy and advises that the prescribed list below should be evaluated:

1) Control at Source - Infiltration, Re-Use, Green Roofs, Run-off to grass or verge, Harvesting, Water Butts, and Permeable Layers

2) On Site Treatment with Other SuDS Techniques - Collection for Infiltration and Detention

3) Local Treatment with Other SuDS Techniques - Collection away from the Site

4) Regional Treatment with Other SuDS Techniques - Collection in Wetlands and Balancing Ponds

5) Watercourse - including streams, ditches or existing swales.

6) Surface Water Sewers

7) Combined Sewers

### *Non-potable Use*

Although rainwater harvesting systems can provide some attenuation, their primary purpose is to satisfy the demand for non-potable water on the site, as set out in the National Standards for SuDS.

Given the scale of the development at Old Mill Street, the capacity of such a system would not be considered to contribute as part of the surface water drainage strategy.

The implementation of a rainwater harvesting system should therefore be considered separately by a building services engineer at a later design stage.

### *Infiltration-based Systems*

Infiltration as the primary runoff destination is currently not deemed to be viable. This is due to the presence of Made Ground underlain by Clay, which are likely to be incapable of suitable infiltration rates.

In the event that infiltration rates were adequate to allow for infiltration-based systems, the available space on site for such features is highly limited. Any such systems implemented on-site would not be capable of delivering the discharge rates to be the

primary method of discharge for surface water, and thus a further method of discharge would be required.

Further infiltration testing on the site will confirm the potential infiltration rates that can be achieved, allowing for a final decision on its inclusion as part of the drainage strategy at a later design stage.

### *Surface Waterbody*

The nearest watercourse is the Ashton Canal, which runs east-west circa 63mm southeast of the site.

Publicly available map data indicates that the Canal is circa 2m higher in elevation than the site itself. Any drainage connection to the canal would be constantly surcharged, with the greater pressure head from the canal surface preventing any discharge from the site.

### *Surface Water Sewer*

United Utilities asset maps indicate that there are no surface water sewers within the vicinity of the site.

### *Combined Water Sewer*

It is proposed that surface water and foul flows combine on site and discharge to the United Utilities combined water sewer within Lampwick Lane.

Refer to Appendix D for United Utilities Sewer Maps.

# 4. SURFACE WATER RUNOFF, DISCHARGE AND INTERCEPTION

A review of the topographical survey and aerial images indicate that the site is brownfield.

## 4.1 Greenfield Run-Off Rates

The equivalent greenfield run-off rate has been calculated using the UK SuDS Greenfield Runoff Rate Estimation Tool, utilising FEH data for the site. The area used is based on the full site area, as the existing condition is assumed to be entirely impermeable.

Refer to Appendix E for Greenfield calculations, the results are summarised in the table below.

| Areas (ha) | Greenfield Runoff Rates (l/s) | | | |
|---|---|---|---|---|
| | 1 in 2 Year | 1 in 30 Year | 1 in 100 Year | $Q_{bar}$ |
| 0.067 | 0.6 | 1.0 | 1.2 | 0.6 |

***Table 4.1 – Greenfield Run-Off Rates for the Proposed Site***

## 4.2 Existing Brownfield Run-Off Rates

The brownfield run off rates for the area of the site have been calculated using the Modified Rational Method based on the 15-minute rainfall profiles provided in Appendix F.

Modified Rational Method: $\boldsymbol{Q = 2.78Ci_{(average)}A}$

$$\boldsymbol{C = C_V C_R}$$

$$\boldsymbol{C = 0.84 \times 1.3}$$

| Return Period | $I_{(avg)}$ (mm/hr) | Area (ha) | Peak Runoff (l/s) |
|---|---|---|---|
| 1 in 2 Year | 33.8 | 0.067 | 6.875 |
| 1 in 30 Year | 73.6 | 0.067 | 14.970 |
| 1 in 100 Year | 93.1 | 0.067 | 18.936 |

***Table 4.2 – Existing Brownfield Run-Off Rates***

## 4.3 Proposed Surface Water Discharge Rates and Volume

The UK National Standards for SuDS states that where the volume of runoff discharged from the development to surface waters or sewers for the 1% AEP, 6-hour rainfall event is greater than the volume of greenfield runoff for the same rainfall event, the peak allowable discharge rate from the development for the 1% AEP event shall be limited to the 50% AEP greenfield runoff rate or 3l/s/ha, whichever is the greater. The corresponding required discharge rate would therefore be limited to the 50% AEP greenfield runoff rate of 0.6 l/s.

The HR Wallingford UK SuDS Surface water storage volume estimation tool has been used to calculate the required storage volume for the 50% AEP greenfield runoff rate of 0.6 l/s for the proposed development.

The resulting required storage volume of 55m$^3$ is not considered practicable due to the space constraints on site. With the maximum available roof space of 444m$^2$ used, a standard 100mm deep blue roof attenuation system can provide circa 42.18m$^3$ of

storage volume. A supplementary attenuation system of circa 13m³ would therefore be required at below ground level in order to satisfy the attenuation requirements.

Due to the building footprint and proposed foundations, there is no appropriate space for a supplementary attenuation tank at below ground level.

Standard 3.21 of the National Standards for SuDS allows for a 'relaxation factor' of up to 5 can be applied to the greenfield runoff rates when determining the proposed discharge rate.

Based on a total attenuation volume of 42.18m³ that can be practicably accommodated within the site, the minimum discharge rate that the surface water can be restricted to is 1.2 l/s.

This results in a subsequent relaxation factor of 2 which is considered to be acceptable in accordance with Standard 3.21.

A discharge rate of 1.2 l/s is therefore proposed. This rate is equal to that of the 1% AEP greenfield runoff rate and provides a 93.7% betterment on the calculated 1-in-100-year brownfield runoff rate of 18.936 l/s for the site in its current state.

A pre-development enquiry will be submitted to United Utilities to confirm the acceptability of the proposed discharge rate.

Refer to Appendix G for the HR Wallingford Storage Estimation Calculations.

## *4.4 Potential Methods of Interception*

National SuDS Standard 2 requires the first 5mm of rainfall to be intercepted for the majority of rainfall events, with 80% interception during summer and 50% during winter. The requirement applies to runoff from each positively drained surface.

The current drainage strategy provides a basis for compliance through the use of a blue/green roof system, with 66% of the total site area intercepted.

Some areas of the site, such as the portion of roof not covered by green roof, or the impermeable surfaces at ground level offer limited potential for interception.

Further interception may be required. This could be provided by a rainwater harvesting system designed based on the regular daily non-potable demand for the site. The capacity of such a system, given the low demand across the site, would not be sufficient to be included in the attenuation volume for the site and thus is not included in the current below ground drainage strategy.

# 5. ATTENUATION AND SUDS ASSESSMENT

## 5.1 Climate Change and Extreme Rainfall

The development is residential and is therefore assessed over a minimum lifetime of 100 years. In accordance with the National SuDS Standards and Environment Agency climate change guidance, upper-end peak rainfall allowances are used for both the 3.3% AEP and 1% AEP design events for the relevant 2070s epoch.

For the Irwell Management Catchment, the drainage model applies a 40% uplift to the 3.3% AEP event and a 45% uplift to the 1% AEP event. The climate change allowances should be checked at detailed design to confirm that the latest published values remain applicable.

The drainage system will be designed using critical duration events and will assess the effect of any potential outfall surcharge or flood-locking. Exceedance routes will be identified so that flows in events greater than the 1% AEP design event are directed away from buildings, sensitive plant and safe access routes and do not increase flood risk elsewhere.

## 5.2 Attenuation Requirements

The total proposed drained area is 0.064 ha. This comprises of the building footprints and external hard landscaping.

Refer to Appendix H for the proposed drained areas plan.

Due to the nature of the development and the space constraints of the site, urban creep has not been considered as it is unlikely that the percentage of impermeable area will increase during the lifetime of the development.

The post development discharge rates will include for an increase in the rainfall intensity of 45% for the 1% annual exceedance probability (AEP), to allow for climate change as is consistent with a design life of the development of 100 years, as outlined by the National Planning Practice Framework (NPPF).

InfoDrainage storage calculations indicate that the approximate attenuation volumes shown in Table 5.1 are required to limit the peak surface water discharge to 1.2 l/s. The table also gives an indication of the attenuation volumes should infiltration be confirmed as viable.

| Proposed Impermeable Area (ha) | 1:100 Year +45%CC Attenuation Volume ($m^3$) | | |
|---|---|---|---|
| | No Infiltration | $1x10^{-5}$ m/s | $1x10^{-6}$ m/s |
| 0.064 | 30-48 | 23-40 | 29-47 |

***Table 5.1 – Attenuation Volumes***

Refer to Appendix I for the InfoDrainage Quick Storage Estimate Calculations.

## 5.3 Sustainable Drainage Systems

Table 5.2 below provides a summary of typical SuDS techniques outlined within 'CIRIA - The SuDS Manual C753'. Based on a review of the suitability of the SuDS techniques it is proposed that the Old Mill Steet development may incorporate the following:

| SuDS Technique | Description | Suitability for Development Site | |
|---|---|---|---|
| Rainwater Harvesting | Collection of rainwater run-off for use | To be confirmed by building services engineer. | ? |
| Green Roof | Vegetated roof area that reduces runoff and increases time of concentration. | Suitable. | ✓ |
| Blue Roof | Roof area designed to store and reduce peak runoff rates during intense storms. | Suitable | ✓ |
| Infiltration systems | Systems that collect and store runoff allowing it to infiltrate into the ground. | Not currently considered feasible. Further infiltration and contamination testing required to inform final detailing | × |
| Proprietary treatment systems | Underground structures designed to provide treatment to runoff | Not required, Pollution mitigation measures met through proposed vortex separator. | × |
| Filter Strips | Grass strips that promote sedimentation and filtration as runoff is conveyed over the surface | Not required due to limited external space on site. | × |
| Filter Drains | Granular filled Linear drains / soakaway with either granular fill and perforated pipe, or dense vegetation that treat runoff from adjacent impermeable areas | Not required due to limited external space on site. | × |
| Swales | Shallow landscape channels that treat and convey runoff. | Not required due to limited external space on site. | × |
| Bioretention systems | Shallow landscape depressions that allow runoff to pond temporarily on the surface, before filtering through vegetation and underling soils. Can either infiltrate or convey via perforated pipes. | Not required due to limited external space on site. | × |
| Trees | Trees within soil filled pits or permeable paving that can collect, store and treat run off | Not required due to limited external space on site. | × |
| Pervious Paving | Granular build-up beneath permeable paving systems that can be used to either store runoff (lined system) and increase time of concentration or allow percolation into the ground. | Little opportunity or requirement due to limited external space on site. | × |
| Attenuation Storage tanks/ large diameter pipes | Large underground voided spaces used to storage runoff before infiltration or controlled discharge | Attenuation achieved via blue/green roof. Limited space on site for tank installation. | × |
| Ponds and wetlands | Permanent pools of water used to treat run-off and | Not required due to limited external space on site. | × |

| | | | |
|---|---|---|---|
| | provide attenuation above normal water level | | |
| Detention Basins | Dry basins that are designed to temporarily store runoff providing water quality treatment. Can either be positively drained or infiltrate or both. | Not required due to limited external space on site. | × |

× Not suitable
? Potentially suitable subject to further investigation
✓ Suitable

***Table 5.2 – SuDS Assessment***

Following the above assessment, it is proposed that development will utilise a blue roof attenuation layer, overlain with a green roof finish.

## 5.4 Water Quality Assessment

Water quality is generally affected by frequent rainfall events, 1-in-1-year events or less. To assess the water quality consideration will be given to the guidance with CIRIA Guide C753 The SuDS Manual. The pollution hazard levels for different land uses are presented in the table below.

| Land Use | Pollution Hazard Level | Total Suspended Solids | Metals | Hydro-carbons |
|---|---|---|---|---|
| Residential Roofs | Very Low | 0.2 | 0.2 | 0.05 |
| Other roofs (typically commercial/ industrial roofs) | Low | 0.3 | 0.2 (up to 0.8 where there is potential for metals to leach from the roof) | 0.05 |
| Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking within infrequent change (eg schools, offices) ie <300 traffic movements/day | Low | 0.5 | 0.4 | 0.4 |
| Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways | Medium | 0.7 | 0.6 | 0.7 |
| Site with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), site where chemical and other fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured, industrial sites; trunk roads and motorways | High | 0.8 | 0.8 | 0.9 |

***Table 5.3 – Pollution Hazard Levels (Table 26.2 - CIRIA SuDS Manual C753)***

The SuDS Manual sets out various approaches to water quality risk management. The Simple Index approach uses hazard mitigation indices to ensure sufficient treatment is provided before discharge to a surface water body or groundwater. If infiltration is found to be viable, treatment will be required prior to discharge to ground. Table 26.4 extracted from the SuDS Manual sets out the characteristics of potential systems.

| Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates | Total Suspended Solids | Metals | Hydro-carbons |
|---|---|---|---|
| A layer of dense vegetation underlain by a soil with good contaminant attenuation potential of at least 300 mm in depth | 0.6 | 0.5 | 0.6 |
| A soil with good contaminant attenuation potential of at least 300 mm in depth | 0.4 | 0.3 | 0.3 |
| Infiltration trench (where a suitable depth of filtration material is included that provides treatment, i.e. graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20mm gravel) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth | 0.4 | 0.4 | 0.4 |
| Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential of at least 300 mm in depth | 0.7 | 0.6 | 0.7 |
| Bioretention underlain by a soil with good contaminant attenuation potential of at least 300 mm in depth | 0.8 | 0.8 | 0.8 |
| Proprietary treatment systems | These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area. | | |

***Table 5.4 – Indicative SuDS Mitigation Indices for discharges to groundwater (Table 26.4 - The SuDS Manual C753)***

Given the nature of the development, runoff from the site will be mostly from residential roofs resulting in a "Very Low" Pollution Hazard Level.

Adequate treatment to runoff from the site will be provided, prior to discharge to the public sewer network, by a Hydro Downstream Defender vortex separator.

See Appendix J for Downstream Defender Pollution Indices.

## 5.5 Amenity

In accordance with National SuDS Standard 5 the drainage system will be coordinated with the landscape and public open space design so that surface water management contributes positively to placemaking.

The proposed strategy recognises that the size and nature of the development limit the scope for SuDS features which contribute to amenity design. However, a green roof will be used where reasonably practicable to keep runoff close to the surface and to provide a multifunctional drainage feature.

## 5.6 Biodiversity

In accordance with National SuDS Standard 6, the final surface water design will be developed in coordination with the project ecologist and landscape architect so that drainage features add biodiversity value where practicable. The proposed green roof provides an opportunity for the integration of SuDS with the wider green infrastructure and biodiversity net gain strategy. Where this feature or other SuDS features contribute to biodiversity net gain, the relevant ecological and SuDS good-practice requirements should be applied together.

## 5.7 SuDS Maintenance and Management Plan

In order to ensure the ongoing functioning of the below ground drainage networks, a suitable maintenance strategy is to be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

The SuDS and below ground drainage network are to be maintained by the building owners or a maintenance company employment on their behalf. They will be required to maintain the SuDS in line with the recommendations set out within the 'The SuDS Manual C753' and the suppliers' requirements.

The following table is extracted from The SuDS Manual and provides an indication of the operation and maintenance requirements for the SuDS that are proposed. These requirements should be reviewed as part of the detailed design.

The Main Contractor delivering the development is to update the general requirements to reflect the product specific requirements of the as installed proprietary SuDS and incorporate these into the Operation & Maintenance manual for the building. A Verification Report, including photographic evidence, to demonstrate that the drainage has been constructed as per the design drawings. As-built drawings should be supplied by the Main Contractor where the construction of the drainage varies from the design drawings.

| Maintenance Schedule | Required Action | Typical Frequency |
|---|---|---|
| Regular Inspection | Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability | Annually and after severe storms |
| | Inspect soil substrate for evidence of erosion channels and identify any sediment sources | Annually and after severe storms |
| | Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system | Annually and after severe storms |
| | Inspect underside of roof for evidence of leakage | Annually and after severe storms |
| Regular Maintenance | Remove debris and litter to prevent clogging of inlet drains and interference with plant growth | Six monthly and annually or as required |
| | During establishment (ie year one), replace dead plants as required | Monthly (but usually responsibility of manufacturer) |
| | Post establishment, replace dead plants as required (where > 5% of coverage) | Annually (in autumn) |
| | Remove fallen leaves and debris from deciduous plant foliage | Six monthly or as required |
| | Remove nuisance and invasive vegetation, including weeds | Six monthly or as required |
| | Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate | Six monthly or as required |
| Remedial Actions | If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled | As required |
| | If drain inlet has settled, cracked or moved, investigate and repair as appropriate | As required |

***Table 5.9 - Operation and Maintenance requirements for Green Roofs (CIRIA C753 – The SuDS Manual 2015, Table 12.5)***

# 6. OUTLINE DRAINAGE STRATEGY

## 6.1 Surface Water Drainage System

The development is to have a dedicated surface water network that collects the runoff from the proposed building roof and external hard landscaping. The runoff is to discharge into the United Utilities public combined water sewer within Lampwick Lane.

Surface water attenuation will be provided by a blue/green roof attenuation system, provided by a 100mm deep blue roof attenuation storage layer overlain with a layer of vegetation. A Hydro-Brake flow control will limit outflow to ensure the target flow rate of 1.2 l/s is achieved.

Full treatment will be provided using a Hydro Downstream Defender vortex separator.

The proposed strategy and discharge rates are subject to confirmation by the Lead Local Flood Authority and United Utilities.

The surface water drainage system will be designed in accordance with Building Regulations Part H, BS EN 752, the Sewerage Sector Guidance - Design and Construction Guidance, CIRIA C753 and the National Standards for Sustainable Drainage Systems, together with any project-specific LLFA requirements.

- No flooding shall occur on areas not designated to store or convey water for events up to the 3.3% AEP event, including the 40% climate change allowance.
- No flooding shall occur within buildings, susceptible utility plant or designated safe access/escape routes for events up to the 1% AEP event, including the 45% climate change allowance.
- The critical duration events will be used to determine peak flows, water levels and attenuation storage.
- Exceedance events greater than the 1% AEP event will be routed safely through or around the development without increasing flood risk elsewhere.
- The detailed design will demonstrate Standard 2 interception where practicable, and the model will be updated if infiltration is confirmed as viable.

Refer to Appendix K for the Below Ground Drainage Plan.

Refer to Appendix L for the Surface Water Drainage Calculations.

## 6.2 Foul Water Drainage System

The development is to have a dedicated foul water network that will collect the foul water, combining with surface water within the final manhole on site before discharging to the United Utilities combined sewer within Lampwick Lane.

The network is to be designed in accordance with Building Regulation Part H, BS EN 752 and the Appendix C of the Sewerage Sector Guidance – Design and Construction Guidance.

Refer to Appendix K for the Below Ground Drainage Plan.

# 7. REFERENCES

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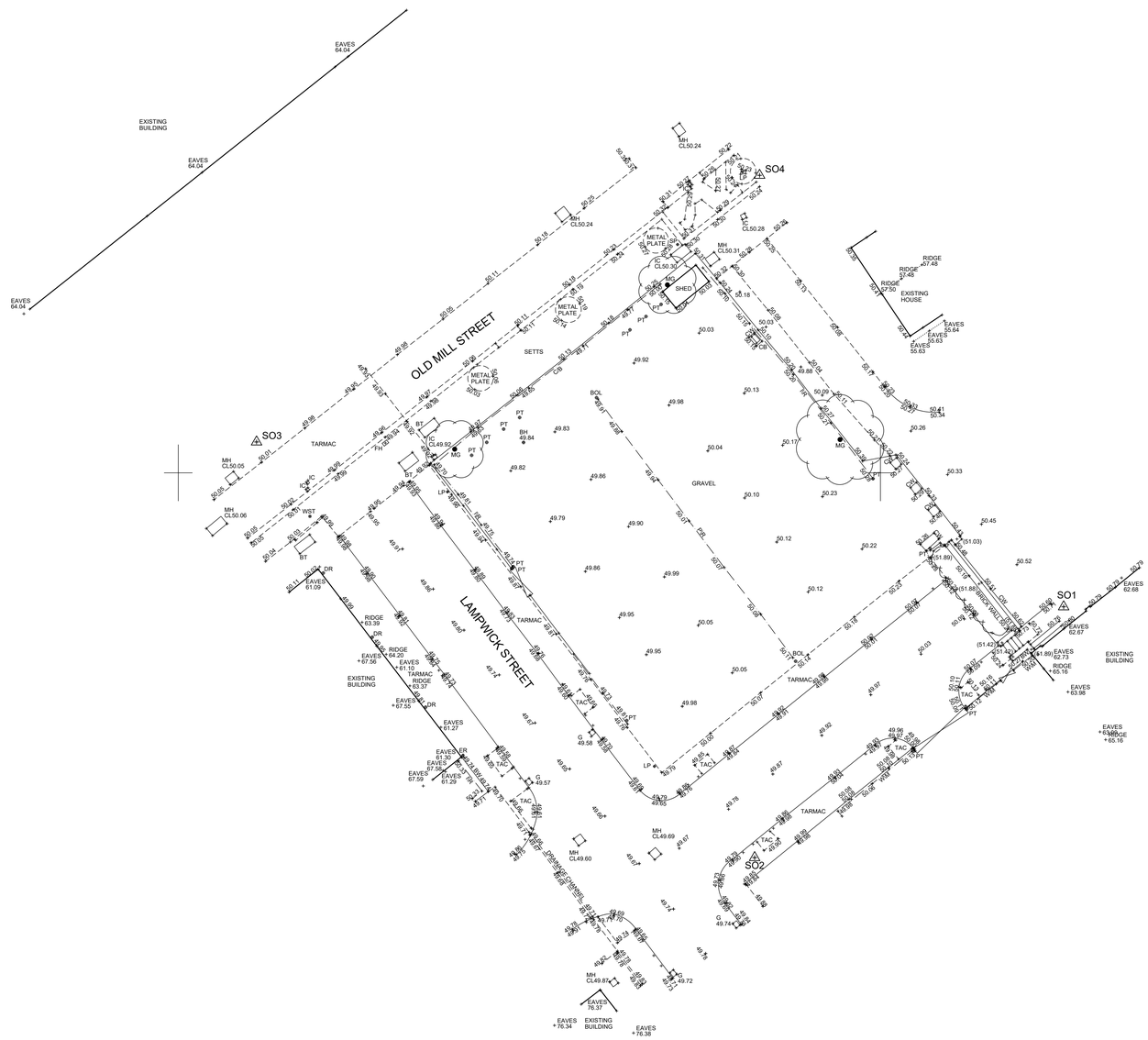
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# APPENDIX A
# Topographical Survey




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Note:

The survey is plotted on a plane local Grid. Orientation to National Grid.

All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

SURVEY STATIONS

| Name | Easting | Northing | Height |
|---|---|---|---|
| SO1 | 385513.04 | 398440.47 | 50.73 |
| SO2 | 385491.04 | 398422.61 | 49.89 |
| SO3 | 385455.58 | 398452.20 | 50.01 |
| SO4 | 385491.39 | 398471.17 | 50.23 |

## STANDARD REFERENCE & ABBREVIATIONS

(AB).....Assumed Route
AB.....Air Brick
AV.....Air Valve
B/W.....Barbed Wire
BAR.....Barrier
BB.....Belisha Beacon
BH.....Borehole
BL.....Bed Level
BOL.....Bollard
BS.....Bus Stop
BT Box.....British Telecom Box
BT.....British Telecom IC
BRTW.....Brick Retaining Wall
BW.....Brick Wall
C/B.....Close Boarded
C/I.....Corrugated Iron
C/P.....Chestnut Paling
CB.....Control Box
CBW.....Concrete Block Wall
CCTV.....Closed Circuit TV
CD.....Cable Duct
CEL.....Cellar Light
CH/L.....Chain Link
CHY.....Chimney
CL.....Cover Level
CM.....Cable Marker
COL.....Column
CONC.....Concrete
CP.....Catch Pit
CRTW.....Concrete Retaining Wall
CTV.....Cable Television
CUL.....Culvert
CW.....Concrete Block Wall
DC.....Drainage Channel
DPC.....Damp Proof Course
DR.....Drain
DSW.....Dry Stone Wall
ECP.....Electricity Cable Pit
EIC.....Electricity Inspection Cover
EJ.....Expansion Joint
EJB.....Electricity Junction Box
EL SUB STN..Electricity Sub Station
EL.....Eaves Level
ELB.....Electricity Box
EP.....Electricity Pole
ER.....Earth Rod
ETL.....Electricity Transmission Line
FB.....Flower Bed
FH.....Fire Hydrant
FL.....Floor Level
FP.....Flagpole
G*.*.....Girth (of tree)
G.....Gulley
GAB.....Gabion
GIP.....Gas Inlet Pipe
GMKR.....Gas Marker
GST.....Gas Stop Tap (Domestic)
GSV.....Gas Stop Valve (Mains)
HSE.....Housing
Ht.....Height
HV.....High Voltage
I/R.....Iron Railing
IC.....Inspection Cover
Il.....Invert Level
IP.....Inlet Pipe
KD.....Kerb Outlet
LB.....Letter Box
LP.....Lamp Post
MG.....Multi-Girth
MH.....Manhole
MKR.....Marker
MP.....Mooring Point
NP.....Street Name Plate
O/H.....Overhead
O/P.....Open Paling
OE.....Overhead Electric Wire
OF.....Outfall Pipe
OSBM.....Ordnance Survey Bench Mark
OT.....Overhead Telecom Wire
P/C.....Post & Chain
P/R.....Post & Rail
P/W.....Post & Wire
PAV.....Paving
PB.....Pillar Box
PC.....Pedestrian Crossing
PP.....Petrol Pump
PT.....Post or Pillar
RE.....Rodding Eye
RS.....Road Sign
RTW.....Retaining Wall
RWP.....Rain Water Pipe
SAP.....Sapling
SL.....Sump Level
SoL.....Soffit Level
SP.....Sign Post
SPL.....Springing Level
SRTW.....Stone Retaining Wall
SV.....Stop Valve (unspecified)
SVP.....Soil Vent Pipe
SW.....Stone Wall
TAC.....Tactile Paving
TB.....Traffic Bollard
TBM.....Temporary Bench Mark
TCB.....Telephone Call Box
TFR.....Taken From Records
TIE.....Anchor Point (Masts/Poles)
TL.....Traffic Light
TLB.....Traffic Light Control Box
TM.....Ticket Machine
TMC.....Tarmac
TP.....Telecommunications Pole
TPIT.....Trial Pit
TS.....Trash Screen
U/C.....Under Construction
U/G.....Underground
UTL.....Unable to Lift (BM,IC etc)
UTS.....Unable to Survey
VDP.....Vehicle Detector Pad
VP.....Vent Pipe
W/M.....Wire Mesh
WL.....Water Level
WM.....Water Meter
WO.....Wash Out
WP.....Waste Pipe
WST.....Water Stop Tap (Domestic)
WSV.....Water Stop Valve (mains)

SurveY OPERATIONS
Smith Street, Skelmersdale, Lancs. WN8 8LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@survops.co.uk – www.survops.co.uk

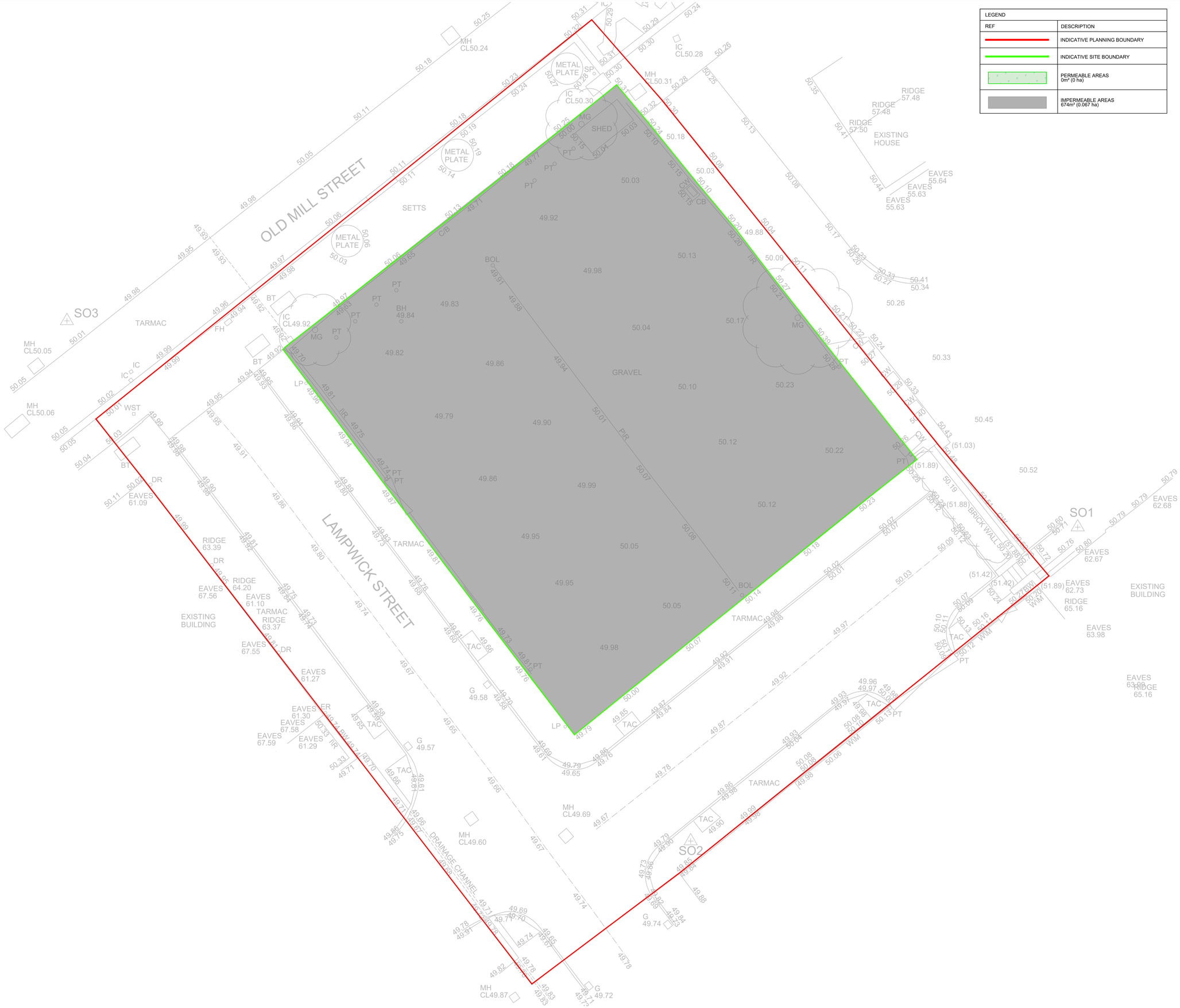
Client: Zerum

Drawing Title: Topographical Survey of Land at:
Old Mill St
Manchester

| | |
|---|---|
| Scale(s) 1:200 | Surveyor ES |
| Date AUG 25 | Drawn JG |
| Job Number 25G226 | Checked SO/MH |

Sheet Size & Drg Number & Revision: A1 25G226/001

# APPENDIX B
# Existing Drained Areas Plan




| LEGEND | |
|---|---|
| REF | DESCRIPTION |
| | INDICATIVE PLANNING BOUNDARY |
| | INDICATIVE SITE BOUNDARY |
| | PERMEABLE AREAS 0m² (0 ha) |
| | IMPERMEABLE AREAS 674m² (0.067 ha) |

NOTES

1. THIS DRAWING IS INTENDED TO INDICATE THE EXISTING DRAINED AREAS OF THE OLD MILL STREET SITE. IT IS BASED ON A REVIEW OF THE TOPOGRAPHICAL SURVEY AND AERIAL IMAGES OF THE SITE.
2. FOR TOPOGRAPHICAL SURVEY REFER TO SURVEY OPERATIONS DRAWING 25G226.

| Rev: | Description: | Date: | By: | Chkd: |
|---|---|---|---|---|
| P02 | ISSUED FOR PLANNING | 12.10.26 | JAB | PC |
| P01 | STAGE 3 ISSUE | 30.10.25 | JAB | AS |


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Renaissance Associates Ltd
2nd Floor Tribeca House
21-27 Dale Street
Manchester
M1 1EY


Project:

OLD MILL STREET
MANCHESTER

Drawing Title:

*EXISTING DRAINED AREAS PLAN*

Status:

STAGE 2

| Size: | Date: | Drawn by: | Designed by: | Checked by: |
|---|---|---|---|---|
| A1 | OCT 25 | JAB | JAB | AS |

| Scale: | Project No: |
|---|---|
| 1:100 | 2503-04 |

Project – Originator – Volume – Level – Type – Role – Number: OMS-REN-XX-00-DR-C-00050

Revision: P02


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# APPENDIX C
# Proposed Development Plans




1 00 Ground Floor General Arrangement Plan

1 : 100

Note:
Do Not Scale from this drawing.
Dimensions are to be checked on site.
If in doubt please ask.

N

1 0 1 2 3 4 5 m

SCALE 1:100

**By Department Legend**

- 2B4P
- 2B4P Duplex
- 3B6P
- 4B7P
- Amenity
- Bike Store
- Bin Store
- Utility
- Vertical Circulation
- Circulation

| Rev | Date | Intls | Details |
|---|---|---|---|
| P04 | 15.09.26 | JE | Planning Reissue |
| P03 | 03.09.26 | JE | Planning Issue |
| P02 | 24.08.26 | JE | Interim Planning Issue |
| P01 | 18.08.26 | JE | Draft |

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Certified B Corporation

**Project Title** Old Mill Street
**Client** Zentra
**Location** Manchester

**Drawing ref** Ground Floor GA Plan - Planning

**Date** 15/09/2026
**Scale** 1 : 100
**Checker** AB
**Size** A1
**Job No:** 10042
**Status** S0

Project Origin Volume Level Type Role Number Rev
**OLDMS-BUT-01-00-DR-A-94000-P04**

# APPENDIX D
# United Utilities Sewer Maps

United Utilities
Water for the North West

**How to contact us:**

**United Utilities Water Limited**
**Property Searches**
**Haweswater House**
**Lingley Mere Business Park**
**Great Sankey**
**Warrington**
**WA5 3LP**

**Telephone: 0370 7510101**

**E-mail: propertysearches@uuplc.co.uk**

**James Albert**

**Tribeca House, 21-27**
**Dale Street,**
**Manchester,**
**M1 1EY**

**FAO:**

**Your Ref: Old Mill Street**
**Our Ref: UUPS-ORD-764160**
**Date: 12/10/2026**

**Dear Sirs**

## Location: Old Mill Street

I acknowledge with thanks your request dated 09/10/2026 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

[redacted]



*United Utilities Water Limited*
*Registered In England & Wales No. 2366678*
*Registered Office Haweswater House, Lingley Mere Business Park,*
*Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP*

Water for the North West

# TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

**TERMS AND CONDITIONS:**

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



*United Utilities Water Limited*
*Registered In England & Wales No. 2366678*
*Registered Office Haweswater House, Lingley Mere Business Park,*
*Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP*




| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 7703 | 51.98 | CO | 47.46 | 225 | | | VC | 38.48376 | 1 in 20 |
| 7708 | | CO | | 150 | | | VC | 16.58382 | |
| 7719 | 51.52 | SW | 44.21 | 225 | | | VC | 18.72924 | 1 in 12 |
| 7709 | 51.5 | CO | 47 | 375 | | | CO | 14.79482 | 1 in 492 |
| 7709 | | CO | | 150 | | | VC | 40.65066 | |
| 7718 | 51.65 | SW | 49.94 | 225 | | | VC | 12.21045 | 1 in 153 |
| 7717 | 52.32 | SW | | 225 | | | VC | 37.21154 | |
| 7600 | 54.6 | SW | 41.91 | 1200 | | | BR | 235.4835 | 1 in 84 |
| 7411 | | CO | | 150 | | | VC | 29.98018 | |
| 7413 | | CO | | 150 | | | VC | 5.596747 | |
| 7501 | 53.19 | CO | 51.13 | 150 | | | VC | 8.485281 | |
| 7300 | 48.47 | CO | 38.86 | 560 | | | BR | 15 | 1 in 31 |
| 6203 | 51.47 | CO | 46.97 | 225 | | | VC | 33.98664 | |
| 7105 | 46.36 | CO | 37.74 | 1520 | | | CO | 73.4705 | |
| 7201 | 47.01 | CO | 44.35 | 450 | | | BR | 12.80625 | 1 in 3 |
| 6401 | 53.5 | CO | 50.08 | 490 | | | BR | 25 | 1 in 8 |
| 7401 | 52.95 | CO | 45.19 | 675 | | | CO | 49.20366 | 1 in 24 |
| 6501 | 52.83 | CO | 48.37 | 510 | | | BR | 23.43075 | 1 in 130 |
| 6506 | | CO | | 150 | | | VC | 16.58629 | |
| 6507 | | CO | | 150 | | | VC | 5.600549 | |
| 7502 | 53.07 | CO | 51.56 | 150 | | | VC | 10 | |
| 6503 | 52.43 | CO | 48.87 | 450 | | | BR | 25.6125 | 1 in 107 |
| 6505 | | CO | | 150 | | | VC | 14.53968 | |
| 6503 | | CO | | 100 | | | VC | 4.488545 | |
| 7500 | 53.15 | CO | 49.79 | 450 | | | BR | 59.66574 | 1 in 84 |
| 6702 | 51.42 | CO | 46.7 | 225 | | | VC | 87.23531 | 1 in 582 |
| 6714 | | CO | | 150 | | | VC | 15.08999 | |
| 6719 | | CO | | 150 | | | VC | 14.44504 | |
| 6604 | | CO | | 150 | | | VC | 15.98479 | |
| 6600 | 51.71 | CO | 49.99 | 225 | | | VC | 32.80244 | 1 in 76 |
| 6628 | | CO | | 150 | | | VC | 21.83116 | |
| 6610 | | CO | | 150 | | | VC | 24.22489 | |
| 6602 | 53.39 | CO | 49.44 | 300 | | | VC | 39.81206 | 1 in 124 |
| 6609 | | CO | | 150 | | | VC | 1.644597 | |
| 6603 | 53.04 | CO | 49.76 | 300 | | | VC | 40.24522 | 1 in 57 |
| 6703 | 51.84 | CO | 49.6 | 225 | | | VC | 66.03786 | 1 in 120 |
| 6704 | 51.17 | CO | 49.27 | 225 | | | VC | 38.07887 | |
| 7701 | 51.39 | SW | 42.6 | 1200 | | | BR | 74.74218 | |
| 6712 | | CO | | 150 | | | VC | 13.48748 | |
| 6701 | 51.51 | CO | 46.83 | 450 | | | CO | 14.76482 | 1 in 369 |
| 6710 | | CO | | 150 | | | VC | 15.25552 | |
| 6711 | | CO | | 150 | | | VC | 10.29502 | |
| 7702 | 51.5 | CO | 46.92 | 375 | | | VC | 26 | 1 in 1300 |
| 6720 | | CO | | 150 | | | VC | 11.56456 | |
| 5304 | | FO | | 225 | | | VC | 29.34731 | |
| 5202 | 51.58 | CO | 47.24 | 440 | | | BR | 64.2028 | |
| 7404 | 52.87 | CO | 46.99 | 780 | | | BR | 7.000584 | 1 in 2 |
| 7400 | 52.73 | CO | 43.95 | 600 | | | BR | 58.04549 | 1 in 26 |
| 7405 | 52.1 | CO | 47.85 | 450 | | | CO | 33.96891 | |
| 7302 | 50.72 | CO | 41.67 | 540 | | | BR | 27.58623 | |
| 7313 | | CO | | 100 | | | VC | 2.366167 | |
| 7314 | | CO | | 100 | | | VC | 3.797978 | |
| 7416 | | CO | | 100 | | | VC | 5.024453 | |
| 7301 | 49.63 | CO | 0 | 570 | | | BR | 25.6125 | |
| 7307 | | CO | | 100 | | | VC | 11.22172 | |
| 7305 | | CO | | 100 | | | VC | 7.78817 | |
| 7410 | | CO | | 150 | | | VC | 5.743129 | |
| 7306 | | CO | | 100 | | | VC | 10.05182 | |
| 5704 | 50.4 | CO | 40.3 | 375 | | | CO | 63.28507 | 1 in 11 |
| 5703 | 49.11 | CO | 46.36 | 150 | | | VC | 8.162983 | 1 in 24 |
| 5703 | 49.28 | CO | 46.55 | 225 | | | VC | 38.27532 | 1 in 638 |
| 5710 | | CO | | 100 | | | VC | 8.039244 | |
| 6601 | 52.33 | CO | 49.05 | 300 | | | CO | 72.47068 | 1 in 8 |
| 5711 | | CO | | 150 | | | VC | 8.781826 | |
| 5705 | 49.92 | CO | 47.63 | 225 | | | VC | 48.75449 | 1 in 50 |
| 5707 | | CO | | 150 | | | VC | 18.73779 | |
| 5402 | 50.4 | CO | 47.62 | 420 | | | BR | 19.41649 | |
| 5408 | | CO | | 100 | | | PSC | 11.90754 | |
| 5401 | 50.36 | CO | 47.57 | 460 | | | BR | 15 | |
| 5409 | | CO | | 255 | | | PSC | 7.996535 | |
| 5414 | | CO | | 150 | | | VC | 5.870586 | |
| 4401 | 49.94 | CO | 47.16 | 375 | | | VC | 12.20656 | |
| 5400 | 50.92 | CO | 47.97 | 470 | | | BR | 18.02776 | 1 in 100 |
| 5505 | 51.07 | CO | 48.31 | 400 | | | VC | 59.40539 | |
| 5502 | 51.78 | CO | 48.99 | 400 | | | VC | 54.67175 | 1 in 80 |
| 5504 | 50.64 | CO | 48.41 | 225 | | | VC | 28.16026 | 1 in 32 |
| 5503 | 49.34 | CO | 47.52 | 225 | | | VC | 63.82816 | 1 in 100 |
| 4521 | | CO | | 150 | | | VC | 14.44239 | |
| 5507 | | CO | | 100 | | | VC | 26.10942 | |
| 5500 | 50.89 | CO | 48.93 | 225 | | | VC | 25.6125 | 1 in 53 |
| 5501 | 51.46 | CO | 49.51 | 225 | | | VC | 20.61553 | 1 in 19 |
| 5602 | 51.25 | CO | 48.45 | 225 | | | VC | 34.20526 | 1 in 95 |
| 5601 | 51.13 | CO | 48.09 | 225 | | | VC | 80.05625 | 1 in 95 |
| 5607 | | CO | | 225 | | | VC | 17.19638 | |
| 5600 | 51.68 | CO | 49.56 | 225 | | | VC | 45.09989 | 1 in 31 |
| 5605 | | CO | | 150 | | | VC | 11.3897 | |
| 4502 | 49.44 | CO | 46.87 | 225 | | | VC | 32.98838 | 1 in 409 |
| 4510 | | CO | | 100 | | | VC | 13.45718 | |
| 4610 | | CO | | 100 | | | VC | 10.29758 | |
| 4613 | | CO | | 100 | | | VC | 10.95113 | |
| 4603 | 49.4 | CO | 46.54 | 225 | | | VC | 41.04875 | 1 in 108 |
| 5203 | 51.54 | CO | 48.31 | 300 | | | VC | 40.22437 | 1 in 4022 |
| 5201 | 51.57 | CO | 48.28 | 300 | | | VC | 29.41088 | |
| 5204 | 51.34 | CO | 46.36 | 300 | | | VC | 36.22783 | 1 in 141 |
| 5200 | 51.24 | CO | 46.1 | 300 | | | VC | 49.64877 | 1 in 146 |
| 6200 | 51.14 | CO | 45.71 | 300 | | | VC | 51.86521 | 1 in 162 |
| 6202 | 51.41 | CO | 45.38 | 400 | | | BR | 9.433981 | |
| 4711 | 48.31 | CO | 41.09 | 1350 | | | BR | 102.6969 | 1 in 34 |
| 4703 | 49.03 | CO | 46.18 | 375 | | | CO | 20.39608 | 1 in 185 |
| 4705 | 48.85 | CO | 46.51 | 225 | | | VC | 80.80223 | 1 in 184 |
| 4707 | 48.4 | SW | 45.57 | 900 | | | CO | 7.601104 | 1 in 380 |
| 4704 | 48.46 | SW | 45.55 | 900 | | | CO | 46.04562 | 1 in 460 |
| 4701 | | CO | | 225 | | | VC | 7.167521 | |
| 4400 | 49.5 | CO | 47.44 | 225 | | | VC | 82.61961 | 1 in 40 |
| 4505 | | CO | | 150 | | | UN | 27.94873 | |
| 4507 | 0.7 | CO | | 150 | | | UN | 2.445271 | |
| 4515 | | CO | | 150 | | | VC | 13.58437 | |
| 4520 | | CO | | 100 | | | VC | 2.530957 | |
| 4502 | 49.44 | CO | 46.87 | 225 | | | VC | 16.05242 | 1 in 134 |
| 4501 | 48.23 | CO | 45.34 | 225 | | | VC | 37.80212 | 1 in 140 |
| 4700 | 47.47 | CO | 44.72 | 1350 | | | BR | 77.5901 | 1 in 16 |
| 4614 | | CO | | 150 | | | VC | 7.616911 | |
| 4619 | | CO | | 150 | | | VC | 6.889436 | |
| 4601 | 48.2 | CO | 45.03 | 375 | | | CO | 18.02776 | 1 in 82 |
| 4620 | | CO | | 150 | | | VC | 6.912516 | |
| 3700 | 47.03 | CO | 41.1 | 300 | | | VC | 45.90343 | |
| 3624 | | CO | | 150 | | | VC | 14.91191 | |
| 4605 | 49.52 | CO | 46.32 | 225 | | | VC | 14.03567 | 1 in 83 |
| 4604 | 48.97 | CO | 46.15 | 225 | | | VC | 16.76305 | 1 in 17 |
| 5604 | | CO | 0 | 225 | | | VC | 23.02173 | |
| 4702 | 48.61 | CO | 46.07 | 375 | | | CO | 61.40033 | 1 in 60 |
| 3723 | 48.35 | FO | 47.3 | 150 | | | PVC | 49.72738 | 1 in 151 |
| 3716 | 47.65 | SW | 45.92 | 450 | | | PVC | 16.29123 | 1 in 272 |
| 3727 | 47.5 | FO | 46.45 | 150 | | | PVC | 46.868 | 1 in 142 |
| 3615 | 47.4 | CO | 40.63 | 1500 | | | VC | 16.0003 | |
| 3717 | 47.75 | SW | 45.86 | 450 | | | PVC | 20.65639 | 1 in 295 |
| 3701 | 48.86 | CO | 44.33 | 510 | | | VC | 55.95925 | 1 in 28 |
| 3702 | 49.49 | CO | 44.63 | 525 | | | CO | 43.04649 | 1 in 536 |
| 3724 | 48.15 | FO | 46.97 | 150 | | | PVC | 7.680057 | 1 in 110 |
| 3725 | 49.35 | FO | 47.4 | 150 | | | PVC | 9.708146 | 1 in 23 |
| 3718 | 48 | SW | 45.79 | 450 | | | PVC | 14.98432 | 1 in 71 |
| 3605 | 45.96 | CO | | 1500 | | | UN | 37.46088 | |
| 3726 | 49 | FO | 46.12 | 150 | | | PVC | 13.33085 | 1 in 14 |
| 3719 | 49.1 | SW | 45.58 | 600 | | | PVC | 5.918771 | 1 in 296 |
| 3720 | 48.8 | SW | 45.56 | 600 | | | PVC | 5.907987 | 1 in 295 |
| 3720 | 48.8 | SW | | 0 | | | UN | 2.948704 | |
| 3722 | 48.5 | CO | 45.2 | 225 | | | PVC | 6.973606 | 1 in 5 |
| 3721 | 48.6 | SW | | 0 | | | UN | 0.3206754 | |
| 3703 | 48.2 | CO | 43.87 | 675 | | | CO | 1.524333 | |
| 3704 | 48.23 | CO | 43.83 | 675 | | | CO | 18.08129 | 1 in 452 |
| 3600 | 46.49 | CO | 43.09 | 450 | | | CO | 25.83092 | |
| 4500 | 48.27 | CO | 45.05 | 225 | | | VC | 34.71311 | 1 in 46 |
| 3609 | 47.07 | CO | 44.65 | 225 | | | VC | 20 | 1 in 26 |
| 3622 | 47.86 | CO | | 450 | | | CO | 11.64022 | |
| 3625 | 47.7 | SW | 46 | 450 | | | PVC | 22.85441 | 1 in 286 |
| 3601 | 48.69 | CO | 42.87 | 900 | | | CO | 32.9511 | 1 in 412 |
| 3603 | 47.41 | CO | 39.86 | 1350 | | | BR | 36.44084 | |
| 3610 | 47.44 | CO | 44.36 | 525 | | | CO | 11.6619 | 1 in 24 |
| 3608 | 46.96 | CO | 43.18 | 600 | | | CO | 39.81206 | |
| 3604 | 46.58 | CO | 40.14 | 225 | | | VC | 26.25187 | |
| 4602 | 48.2 | CO | 45.32 | 225 | | | VC | 33.06055 | 1 in 100 |
| 4600 | 47.43 | CO | 44.78 | 450 | | | CO | 54.20332 | 1 in 151 |
| 3611 | 46.55 | CO | 40.28 | 225 | | | VC | 13.41641 | 1 in 103 |
| 3602 | 46.34 | CO | 43.75 | 300 | | | BR | 27.01851 | 1 in 61 |
| 2610 | 47.54 | CO | 44.47 | 450 | | | PVC | 1.067193 | |
| 3200 | 49.57 | CO | 46.77 | 300 | | | VC | 54.26297 | |
| 2200 | 46.17 | CO | 0 | 1500 | | | CO | 11.6619 | |
| 2305 | 47.1 | CO | 35.99 | 1500 | | | CO | 45.95942 | |
| 3308 | | CO | | 300 | | | VC | 39.76894 | |
| 2303 | 45.2 | CO | 36.78 | 1500 | | | BR | 92.61726 | 1 in 117 |
| 3305 | 48.88 | CO | | 375 | | | VC | 14.82339 | |
| 3309 | | CO | | 375 | | | VC | 73.04881 | |
| 2302 | 45.17 | CO | 36.87 | 1500 | | | BR | 4.144212 | 1 in 46 |
| 2404 | 45.87 | CO | 37.7 | 1500 | | | BR | 96.22354 | 1 in 116 |
| 4402 | | CO | | 600 | | | CO | 101.8557 | |
| 3401 | | CO | | 900 | | | CO | 12.2098 | |
| 4404 | 49.79 | CO | 48.68 | 225 | | | VC | 25.23886 | 1 in 22 |
| 3402 | | CO | | 900 | | | CO | 57.4232 | |
| 4403 | 49.58 | CO | 47.49 | 225 | | | VC | 35 | |
| 3403 | | CO | | 900 | | | CO | 41.62712 | |
| 4405 | | CO | | 600 | | | CO | 14.30672 | |
| 2704 | | CO | | 406 | | | CO | 40.16472 | |

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|

# LEGEND

Abandoned · Foul · Surface Water · Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined · blue - surface water
brown - foul · purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

| | | | |
|---|---|---|---|
| CI | Circular | TR | Trapezoidal |
| EG | Egg | AR | Arch |
| OV | Oval | BA | Barrel |
| FT | Flat Top | HO | HorseShoe |
| RE | Rectangular | UN | Unspecified |
| SQ | Square | | |

**SEWER MATERIAL**

| | |
|---|---|
| AC | Asbestos Cement |
| BR | Brick |
| PE | Polyethylene |
| RP | Reinforced Plastic Matrix |
| CO | Concrete |
| CSB | Concrete Segment Bolted |
| CSU | Concrete Segment Unbolted |
| CC | Concrete Box Culverted |
| PSC | Plastic / Steel Composite |
| GRC | Glass Reinforced Plastic |
| DI | Ductile Iron |
| PVC | Polyvinyl Chloride |
| CI | Cast Iron |
| SI | Spun Iron |
| ST | Steel |
| VC | Vitrified Clay |
| PP | Polypropylene |
| PF | Pitch Fibre |
| MAC | Masonry, Coursed |
| MAR | Masonry, Random |
| U | Unspecified |

**Address or Site Reference:**

Old Mill Street,

**Scale:** 1:1250 **Date:** 12/10/2026

**Sheet:** 1 of 1

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
Water for the North West

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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# APPENDIX E
# Greenfield Runoff Rate Calculations

# Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

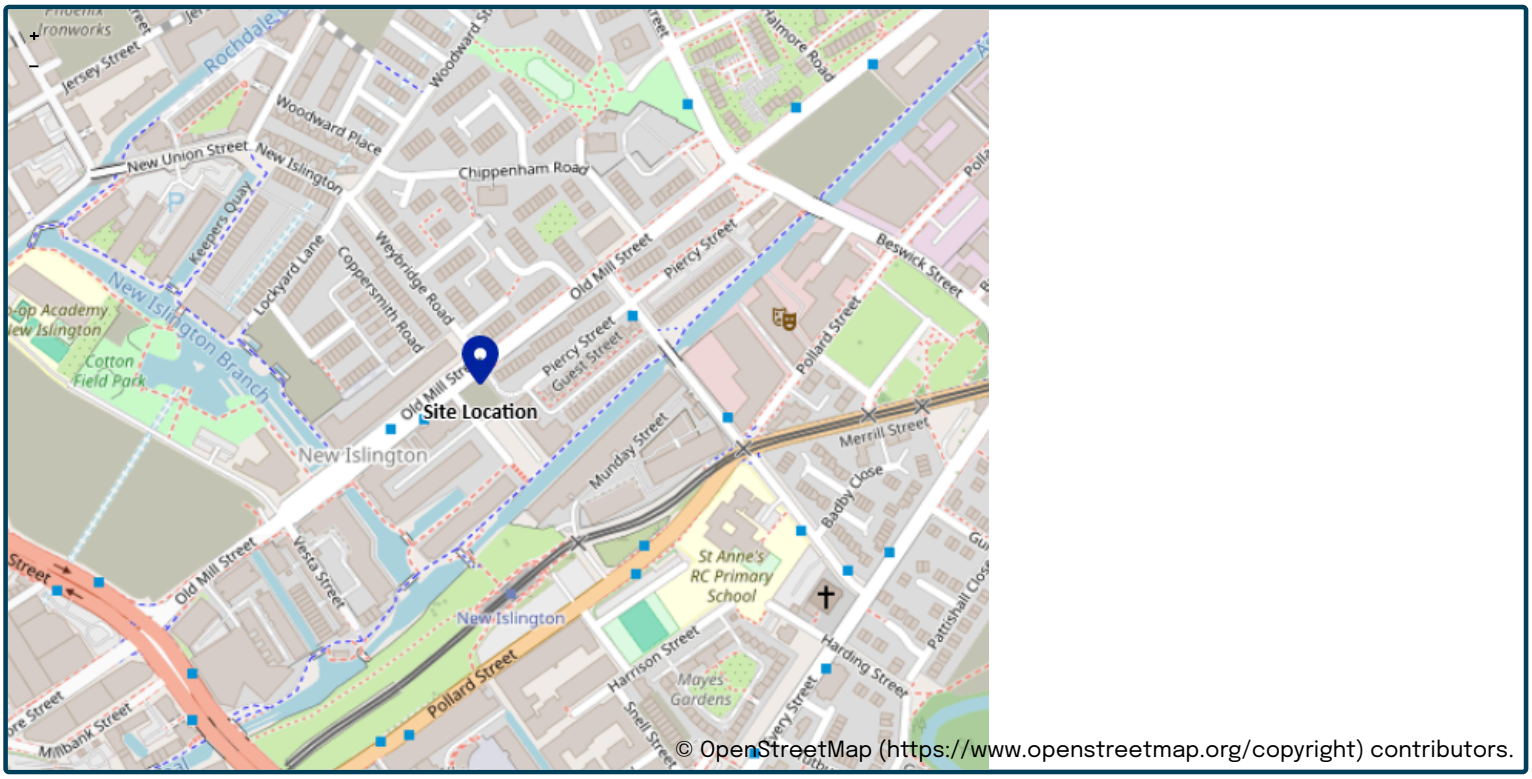
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

## Project details

| | |
|---|---|
| Date | 09/10/2026 |
| Calculated by | |
| Reference | |
| Model version | 2.2.3 |

## Location

| | |
|---|---|
| Site name | Old Mill Street |
| Site location | |




| | |
|---|---|
| Site easting (British National Grid) | 385486 |
| Site northing (British National Grid) | 398441 |

## Site details

| | |
|---|---|
| Total site area (ha) | 0.07 ha |


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# Greenfield runoff

## Method

| | |
|---|---|
| Method | FEH statistical (2025) |

## FEH statistical (2025)

| | My value | | Map value |
|---|---|---|---|
| SAAR9120 (mm) | 916 mm | | |
| BFIHOST19scaled | 0.333 | | |
| QMed-QBar conversion | 1.075 | | 1.075 |
| QMed (l/s) | 0.6 l/s | | |
| QBar (FEH statistical 2025) (l/s) | 0.6 l/s | | |

## Growth curve factors

| | My value | | Map value |
|---|---|---|---|
| Hydrological region | 10 | | 10 |
| 1 year growth factor | 0.87 | | |
| 2 year growth factor | 0.93 | | |
| 10 year growth factor | 1.38 | | |
| 30 year growth factor | 1.7 | | |
| 100 year growth factor | 2.08 | | |
| 200 year growth factor | 2.37 | | |

## Results

| | |
|---|---|
| Method | FEH statistical (2025) |
| Flow rate 1 year (l/s) | 0.5 l/s |
| Flow rate 2 year (l/s) | 0.6 l/s |
| Flow rate 10 years (l/s) | 0.8 l/s |
| Flow rate 30 years (l/s) | 1.0 l/s |
| Flow rate 100 years (l/s) | 1.2 l/s |
| Flow rate 200 years (l/s) | 1.4 l/s |

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

### Disclaimer

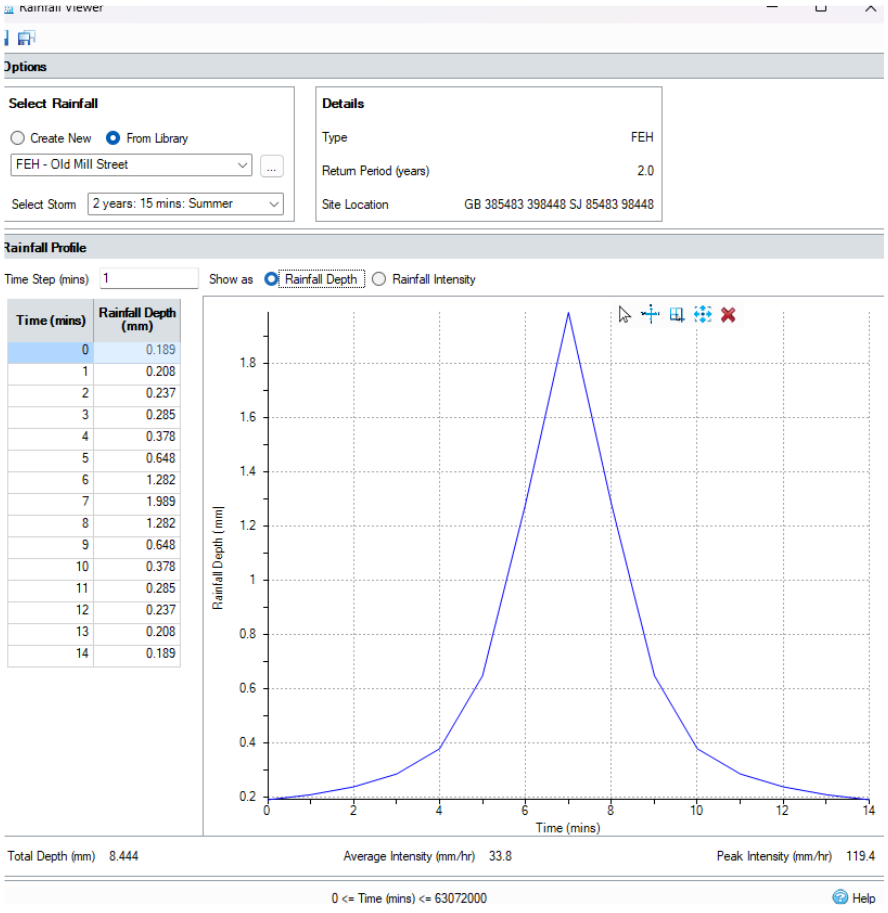
This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate 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, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

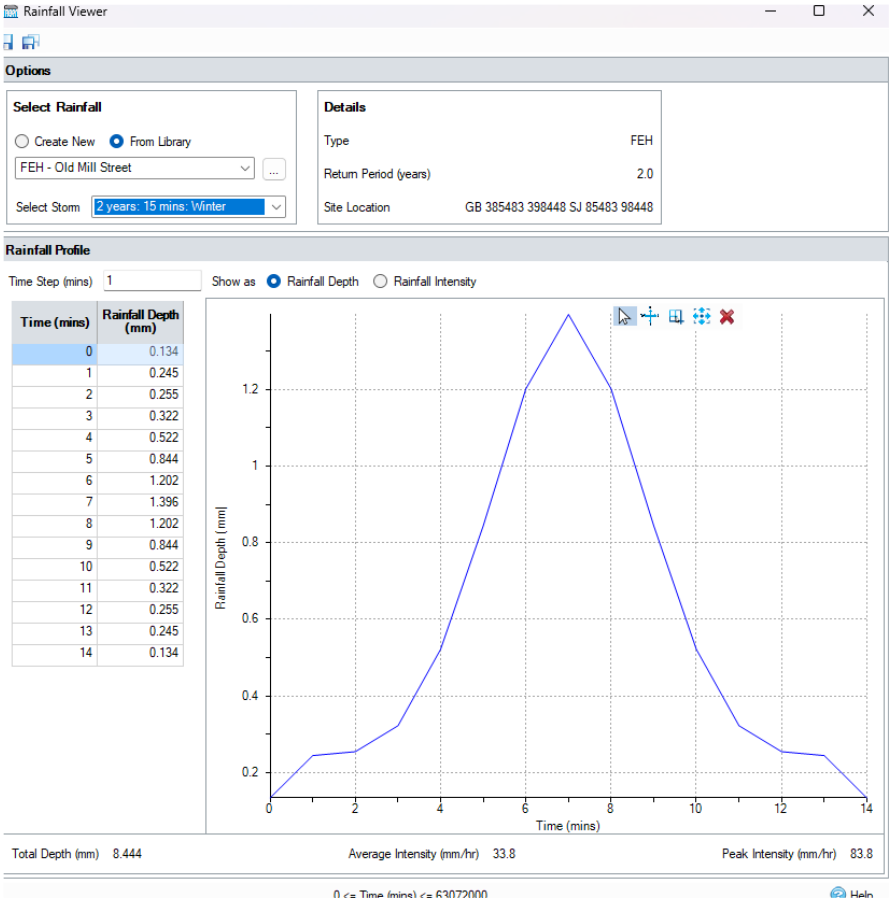
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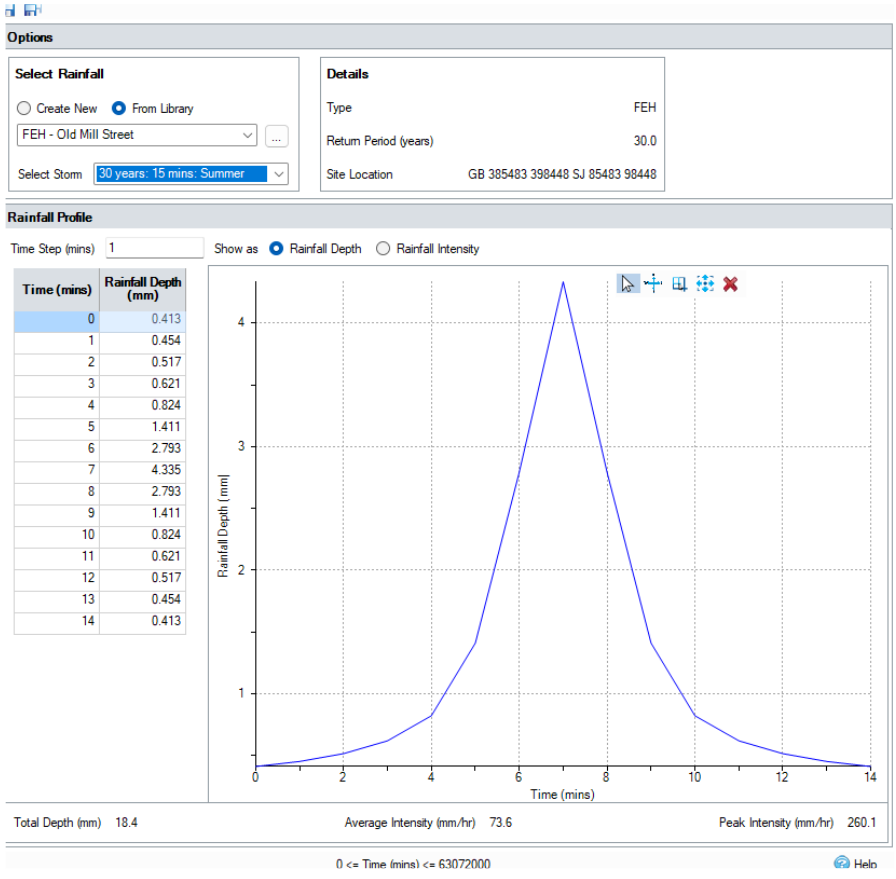
# APPENDIX F
# Rainfall Profiles

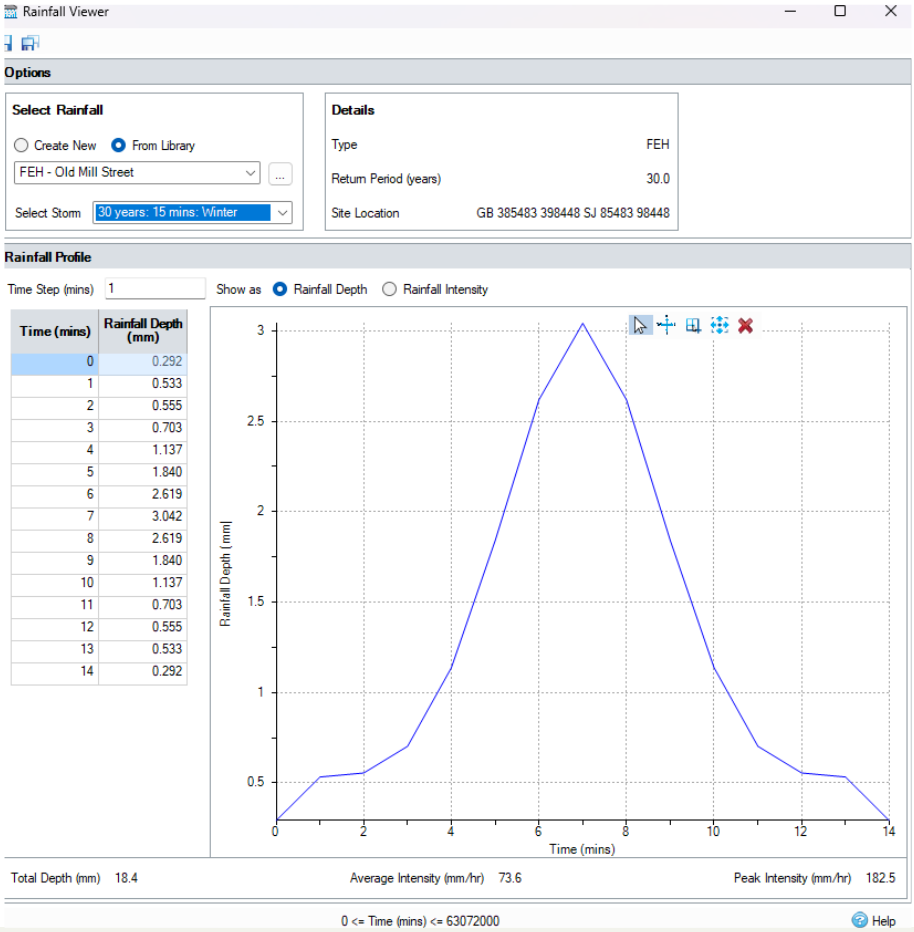
## 1-in-2-Year Storm Profiles



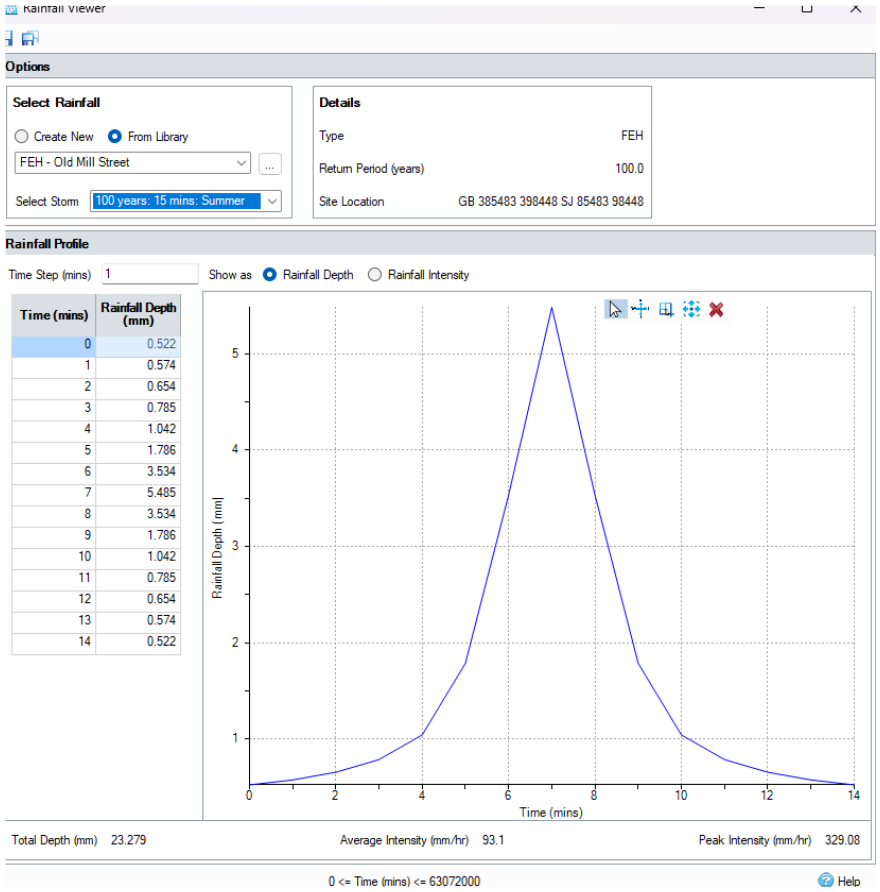



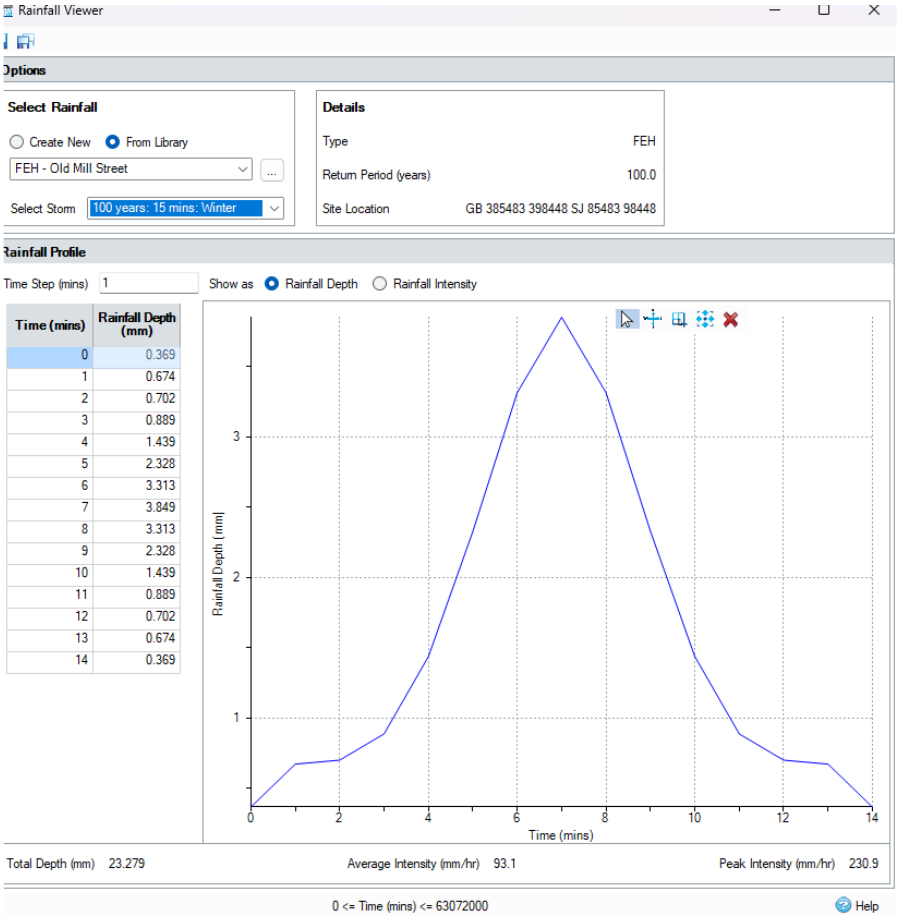
## 1-in-30-Year Storm Profiles



## 1-in-100-Year Storm Profiles



# APPENDIX G
# HR Wallingford Storage Estimation Calculations

# Surface water storage volume design tool



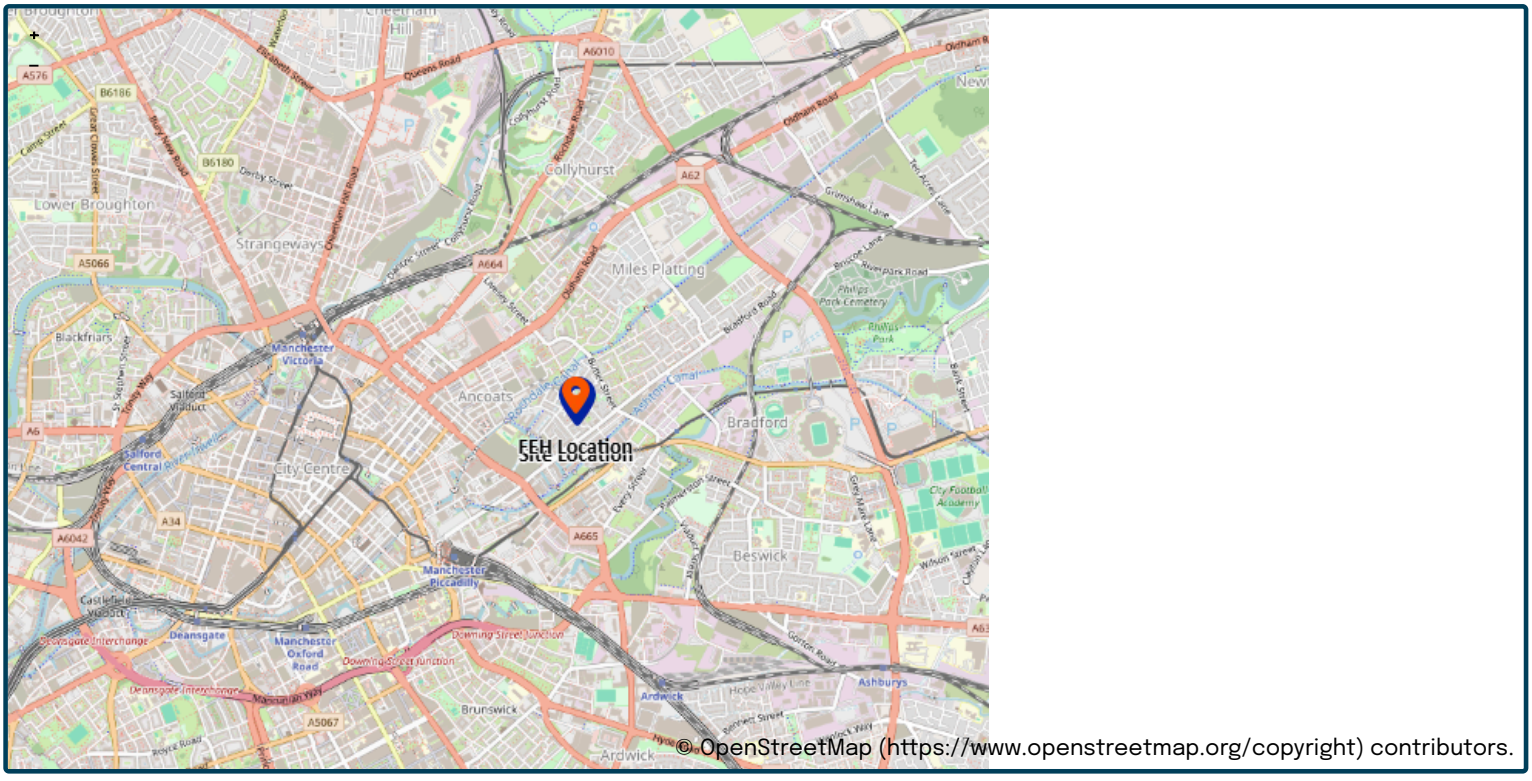
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

## Project details

| | |
|---|---|
| Date | 12/10/2026 |
| Calculated by | |
| Reference | OMS - NO RELAXATION FACTOR |
| Model version | 2.2.3 |

## Location

| | |
|---|---|
| Site name | Old Mill Street |
| Site location | |




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| | |
|---|---|
| Site easting (British National Grid) | 385488 |
| Site northing (British National Grid) | 398446 |

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MORE INFO

## Site areas

| | | |
|---|---|---|
| Total site area (ha) | 0.067 | ha |

## Roof area

| | | |
|---|---|---|
| Total roof area (ha) | 0 | ha |
| Contributing roof area (ha) | 0 | ha |
| Non-contributing roof area (ha) | 0 | ha |

## Paved area

| | | |
|---|---|---|
| Total paved area (ha) | 0.064 | ha |
| Contributing paved area (ha) | 0.064 | ha |
| Non-contributing paved area (ha) | 0 | ha |

## Grass / vegetated area

| | | |
|---|---|---|
| Total grass / vegetated area (ha) | 0.003 | ha |
| Contributing grass / vegetated area (ha) | 0.003 | ha |
| Non-contributing grass / vegetated area (ha) | 0 | ha |

## Total area

| | | |
|---|---|---|
| Total contributing area (ha) | 0.067 | ha |

## Contributing areas with urban creep allowance

| | |
|---|---|
| Urban creep allowance factor | +0% (no creep) |

## Storage design parameters

| | | |
|---|---|---|
| Storage base shape | Rectangular / square | |
| Storage base length to width ratio | 3:1 | |
| Storage design depth (m) | 1 | m |
| Storage side slope (1 in x) | 1 in 3 | |
| Storage voids ratio (%) | 100% (all voids) | |
| Storage volume design return period (years) | 1:100 years | |

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# Discharge flow rate from the site

## Method

| | |
|---|---|
| Type of site | Previously developed |
| Specify the method | FEH statistical (2025) + relaxation |

## FEH statistical (2025)

| | My value | | Map/default value |
|---|---|---|---|
| SAAR9120 (mm) | 916 mm | | |
| BFIHOST19scaled | 0.333 | | |
| QMed (l/s) | 0.5 l/s | | |
| QMed-QBar conversion | 1.075 | | 1.075 |
| Total area for greenfield runoff calculation (ha) | 0.067 ha | | 0.067 |
| QBar (l/s) | 0.6 l/s | | |
| Hydrological region | 10 | | 10 |
| Return period (years) | Qbar (1:2.3 years) | | |
| Growth curve factor | 1 | | |
| Relaxation factor | 1x | | |

## Final discharge rate

| | |
|---|---|
| Runoff calculation method | FEH statistical (2025) + relaxation |
| Design flow rate (l/s) | 0.6 l/s |

## Blockage risk

| | |
|---|---|
| Specify the method | Orifice diameter |
| Minimum orifice diameter to prevent blockage (mm) | mm |

| | My value | | Calculated value |
|---|---|---|---|
| Design orifice diameter (mm) | 17 mm | | 16 |
| Flow rate of orifice (l/s) | 0.6 l/s | | |

## Rainfall and runoff

| | |
|---|---|
| Rainfall input type | FEH22 CSV file |
| | FEH_Point_Rainfall_FEH22_AM_385483_398448.csv |
| Distance from FEH location to site (km) | 0 km |
| Climate change allowance factor | 145% |
| Specify the runoff method from grass / vegetated areas | Fixed percentage - based on rainfall event depth and SPR |

| | My value | | Map value |
|---|---|---|---|
| How should SPR be derived? | WRAP soil type | | |
| WRAP soil type | 4 | | 4 |

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| | |
|---|---|
| SPR | 0.47 |

## Model results

- **Maximum discharge flow rate:** 0.6 (l/s)
- **Outflow orifice diameter:** 17 (mm)
- **Storage base length:** 6.9 (m)
- **Storage base width:** 2.3 (m)
- **Storage base area:** 16 ($m^2$)
- **Storage total volume:** 55 ($m^3$)
- **Storage total water volume:** 55 ($m^3$)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

| Return Period (years) | Critical Duration (minutes) | Peak Flow Rate (l/s) | Max Depth (m) | Max water volume ($m^3$) | Max storage volume ($m^3$) |
|---|---|---|---|---|---|
| 1 | 720 | 0.4 | 0.46 | 14 | 14 |
| 2 | 720 | 0.4 | 0.52 | 17 | 17 |
| 10 | 720 | 0.5 | 0.71 | 30 | 30 |
| 30 | 1080 | 0.6 | 0.84 | 40 | 40 |
| 100 | 1440 | 0.6 | 1.00 | 55 | 55 |
| 200 | 1440 | 0.6 | 1.09 | 65 | 65 |

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 $m^3$ value, unless storage volumes are less than 10 $m^3$, in which case, storage volumes are provided to 1 decimal place.


### Disclaimer

This report was produced using the surface water storage volume design tool (2.2.3) developed by HR Wallingford and available at uksuds.com (https://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 uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate surface water storage volumes for the whole site based on a limiting discharge rate from the site. 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, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

HR Wallingford are not responsible for any rainfall data shared that is subject to licensing terms imposed by UK Centre for Ecology & Hydrology's Flood Estimation Handbook web service (https://fehweb.ceh.ac.uk/Home/Terms (https://fehweb.ceh.ac.uk/Home/Terms)).

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# Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

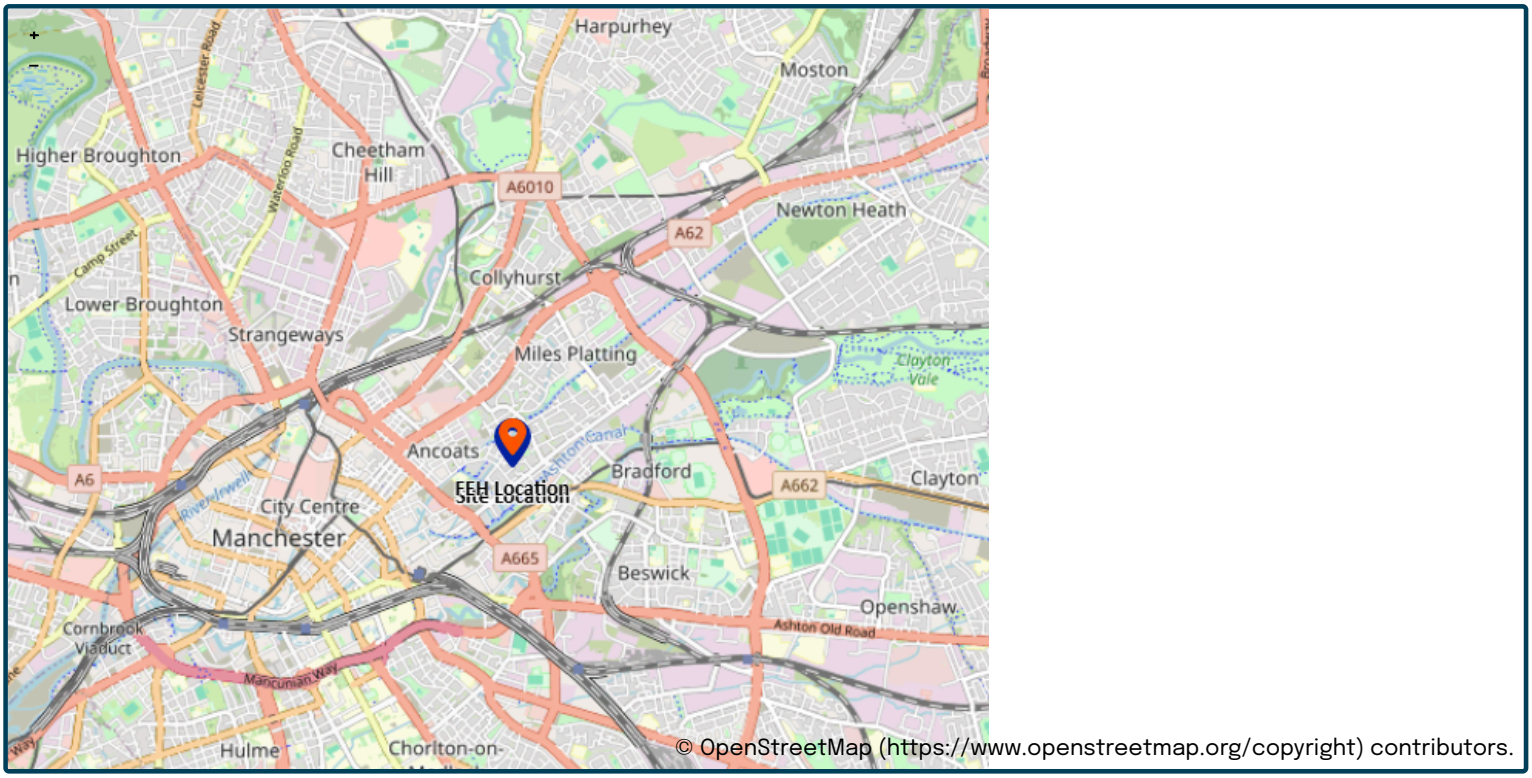
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

## Project details

| | |
|---|---|
| Date | 12/10/2026 |
| Calculated by | |
| Reference | OMS - RELAXATION FACTOR 2 |
| Model version | 2.2.3 |

## Location

| | |
|---|---|
| Site name | Old Mill Street |
| Site location | |




| | |
|---|---|
| Site easting (British National Grid) | 385488 |
| Site northing (British National Grid) | 398446 |


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## Site areas

| | | |
|---|---|---|
| Total site area (ha) | 0.067 | ha |

## Roof area

| | | |
|---|---|---|
| Total roof area (ha) | 0 | ha |
| Contributing roof area (ha) | 0 | ha |
| Non-contributing roof area (ha) | 0 | ha |

## Paved area

| | | |
|---|---|---|
| Total paved area (ha) | 0.064 | ha |
| Contributing paved area (ha) | 0.064 | ha |
| Non-contributing paved area (ha) | 0 | ha |

## Grass / vegetated area

| | | |
|---|---|---|
| Total grass / vegetated area (ha) | 0.003 | ha |
| Contributing grass / vegetated area (ha) | 0.003 | ha |
| Non-contributing grass / vegetated area (ha) | 0 | ha |

## Total area

| | | |
|---|---|---|
| Total contributing area (ha) | 0.067 | ha |

## Contributing areas with urban creep allowance

| | |
|---|---|
| Urban creep allowance factor | +0% (no creep) |

## Storage design parameters

| | | |
|---|---|---|
| Storage base shape | Rectangular / square | |
| Storage base length to width ratio | 3:1 | |
| Storage design depth (m) | 1 | m |
| Storage side slope (1 in x) | 1 in 3 | |
| Storage voids ratio (%) | 100% (all voids) | |
| Storage volume design return period (years) | 1:100 years | |

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# Discharge flow rate from the site

## Method

| | |
|---|---|
| Type of site | Previously developed |
| Specify the method | FEH statistical (2025) + relaxation |

## FEH statistical (2025)

| | My value | | Map/default value |
|---|---|---|---|
| SAAR9120 (mm) | 916 mm | | |
| BFIHOST19scaled | 0.333 | | |
| QMed (l/s) | 0.5 l/s | | |
| QMed-QBar conversion | 1.075 | | 1.075 |
| Total area for greenfield runoff calculation (ha) | 0.067 ha | | 0.067 |
| QBar (l/s) | 0.6 l/s | | |
| Hydrological region | 10 | | 10 |
| Return period (years) | Qbar (1:2.3 years) | | |
| Growth curve factor | 1 | | |
| Relaxation factor | 2x | | |

## Final discharge rate

| | |
|---|---|
| Runoff calculation method | FEH statistical (2025) + relaxation |
| Design flow rate (l/s) | 1.1 l/s |

# Blockage risk

| | |
|---|---|
| Specify the method | Orifice diameter |
| Minimum orifice diameter to prevent blockage (mm) | mm |

| | My value | | Calculated value |
|---|---|---|---|
| Design orifice diameter (mm) | 24 mm | | 23 |
| Flow rate of orifice (l/s) | 1.2 l/s | | |

# Rainfall and runoff

| | |
|---|---|
| Rainfall input type | FEH22 CSV file |
| | FEH_Point_Rainfall_FEH22_AM_385483_398448.csv |
| Distance from FEH location to site (km) | 0 km |
| Climate change allowance factor | 145% |
| Specify the runoff method from grass / vegetated areas | Fixed percentage - based on rainfall event depth and SPR |

| | My value | | Map value |
|---|---|---|---|
| How should SPR be derived? | WRAP soil type | | |
| WRAP soil type | 4 | | 4 |

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| | |
|---|---|
| SPR | 0.47 |

## Model results

- **Maximum discharge flow rate:** 1.2 (l/s)
- **Outflow orifice diameter:** 24 (mm)
- **Storage base length:** 5.0 (m)
- **Storage base width:** 1.7 (m)
- **Storage base area:** 8.4 ($m^2$)
- **Storage total volume:** 40 ($m^3$)
- **Storage total water volume:** 40 ($m^3$)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

| Return Period (years) | Critical Duration (minutes) | Peak Flow Rate (l/s) | Max Depth (m) | Max water volume ($m^3$) | Max storage volume ($m^3$) |
|---|---|---|---|---|---|
| 1 | 360 | 0.8 | 0.47 | 9.6 | 9.6 |
| 2 | 360 | 0.9 | 0.53 | 12 | 12 |
| 10 | 240 | 1.0 | 0.75 | 23 | 23 |
| 30 | 360 | 1.1 | 0.87 | 30 | 30 |
| 100 | 540 | 1.2 | 1.00 | 40 | 40 |
| 200 | 540 | 1.2 | 1.09 | 48 | 48 |

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 $m^3$ value, unless storage volumes are less than 10 $m^3$, in which case, storage volumes are provided to 1 decimal place.

### Disclaimer

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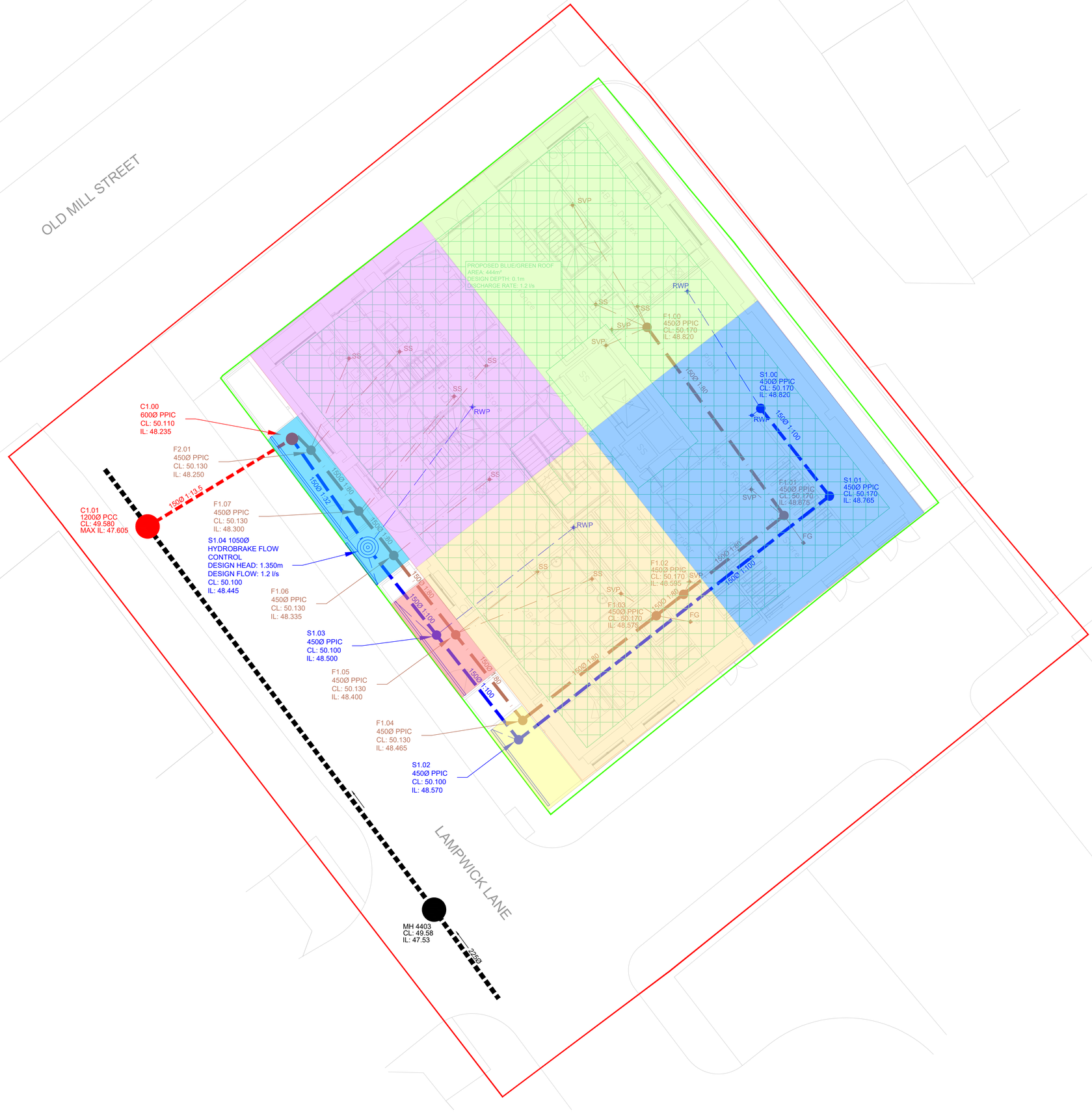
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# APPENDIX H
# Proposed Drained Areas Plan

**NOTES**

1. DO NOT SCALE FROM THIS DRAWING
2. THIS DRAWING IS INTENDED TO INDICATE THE ANTICIPATED DRAINED AREAS FROM THE OLD MILL STREET SITE. IT IS BASED UPON A REVIEW OF THE ARCHITECTURAL AND LANDSCAPE SITE PLAN DRAWINGS.
3. REFER TO DRAWING OMS-REN-00-XX -DR-C-01100 FOR THE GROUND FLOOR BELOW GROUND DRAINAGE PLAN.




| LEGEND | | |
|---|---|---|
| HATCH | AREA (ha) | COMMENTS |
| | 0.015 | 25% ROOF AREA |
| | 0.015 | 25% ROOF AREA |
| | 0.015 | 25% ROOF AREA |
| | 0.015 | 25% ROOF AREA |
| | 0.001 | S1.02 |
| | 0.001 | S1.03 |
| | 0.002 | S1.04 |
| TOTAL | 0.064 | |

| Rev: | Description: | Date: | By: | Chkd: |
|---|---|---|---|---|
| P02 | ISSUED FOR PLANNING | 12.10.26 | JAB | PC |
| P01 | STAGE 3 ISSUE | 30.10.25 | JAB | AS |


renaissance

Renaissance Associates Ltd
2nd Floor Tribeca House
21-27 Dale Street
Manchester
M1 1EY


Project:

OLD MILL STREET
MANCHESTER

Drawing Title:

*PROPOSED DRAINED AREAS PLAN*

Status:

STAGE 2

| Size: | Date: | Drawn by: | Designed by: | Checked by: |
|---|---|---|---|---|
| A1 | OCT 25 | JAB | JAB | AS |

| Scale: | Project No: |
|---|---|
| 1:100 | 2503-04 |

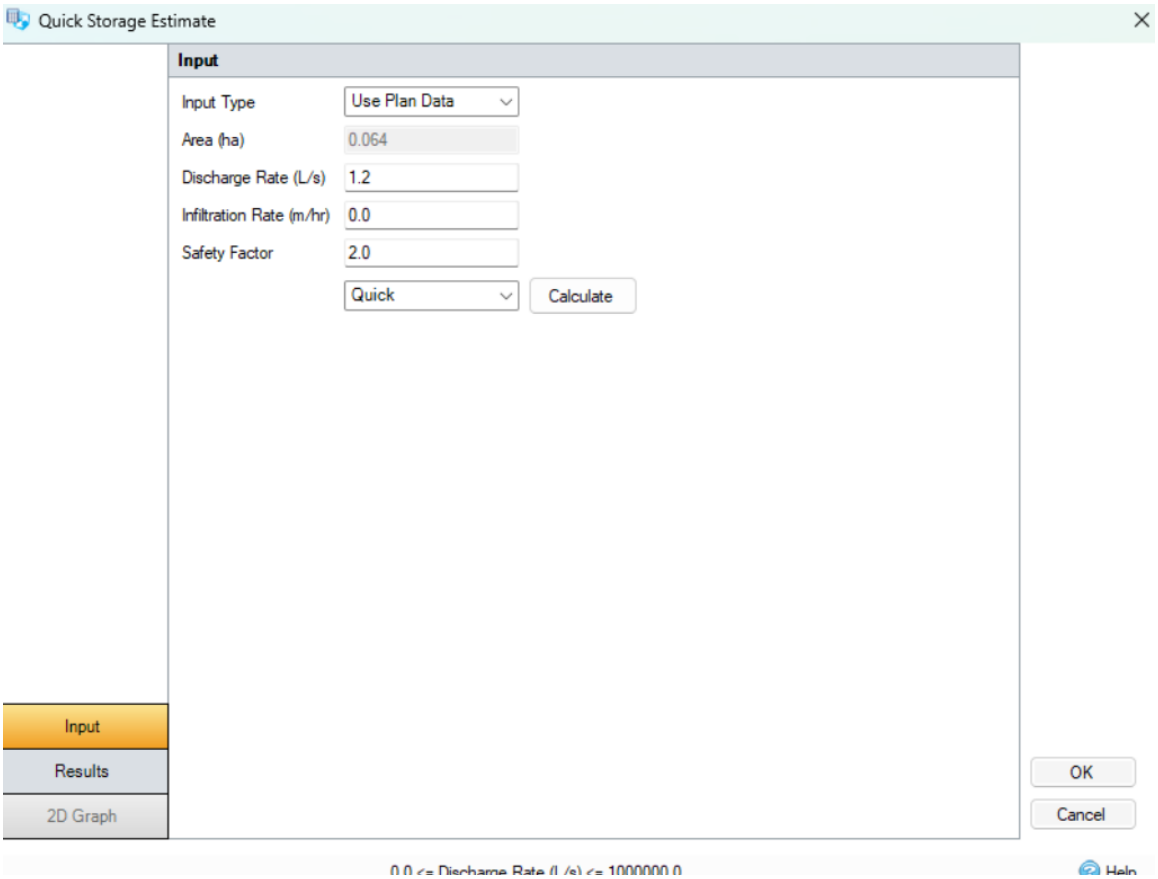
Project – Originator – Volume – Level – Type – Role – Number: OMS-REN-XX-00-DR-C-00060

Revision: P02

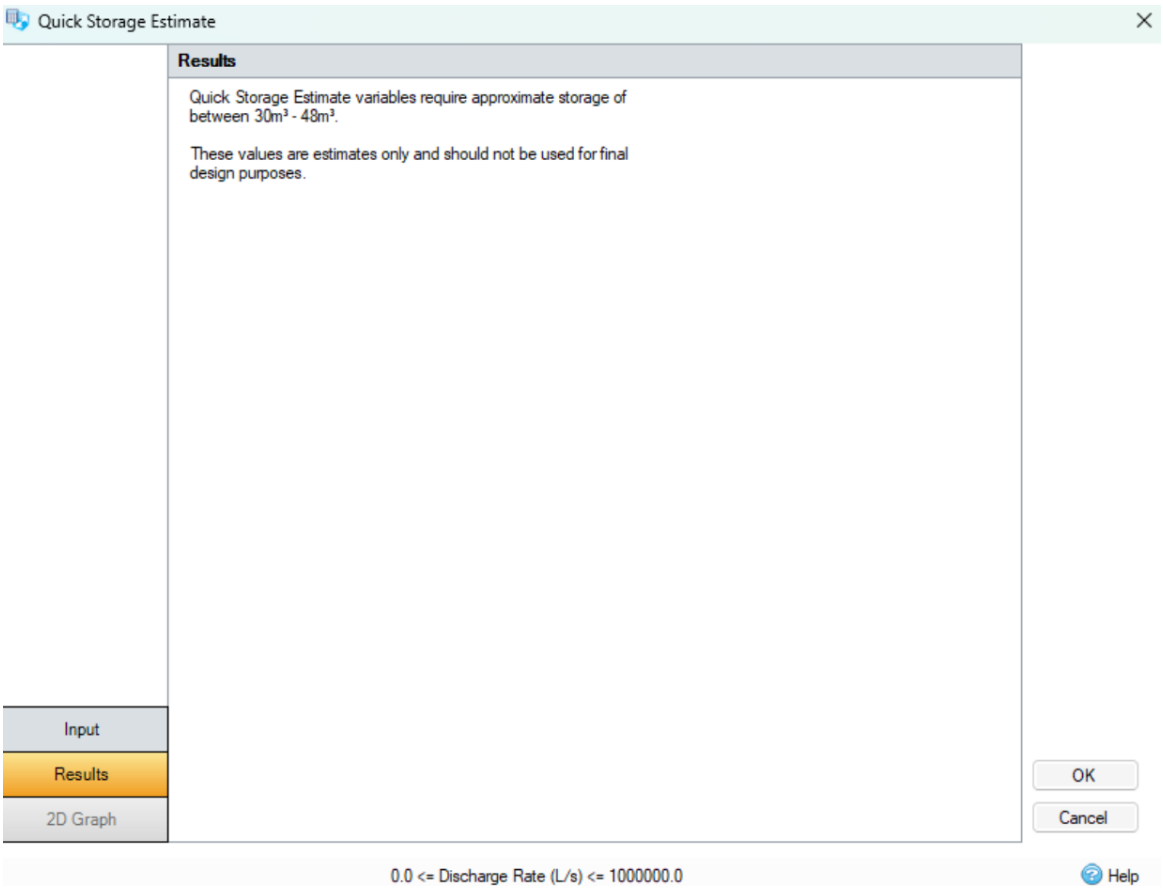

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# APPENDIX I
# Quick Storage Estimates

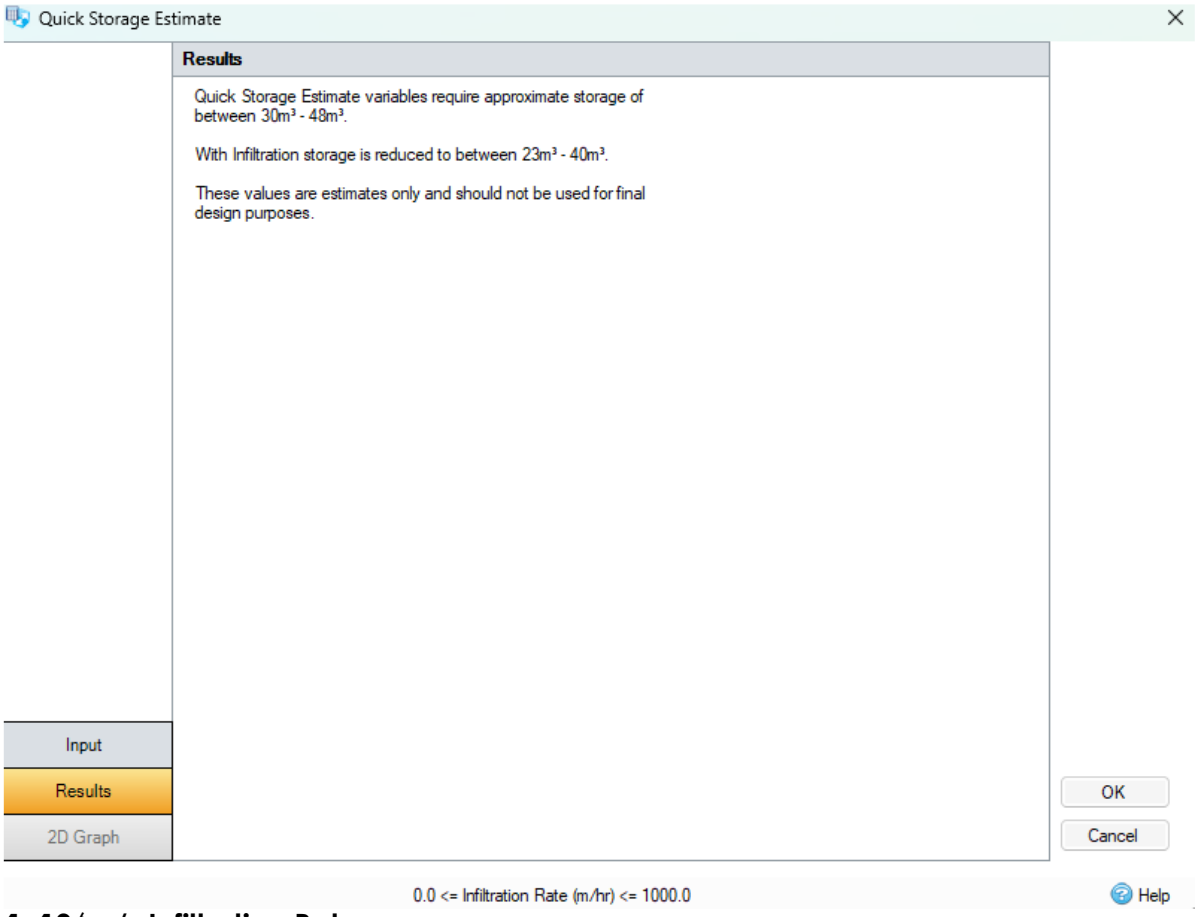
## Quick Storage Parameters



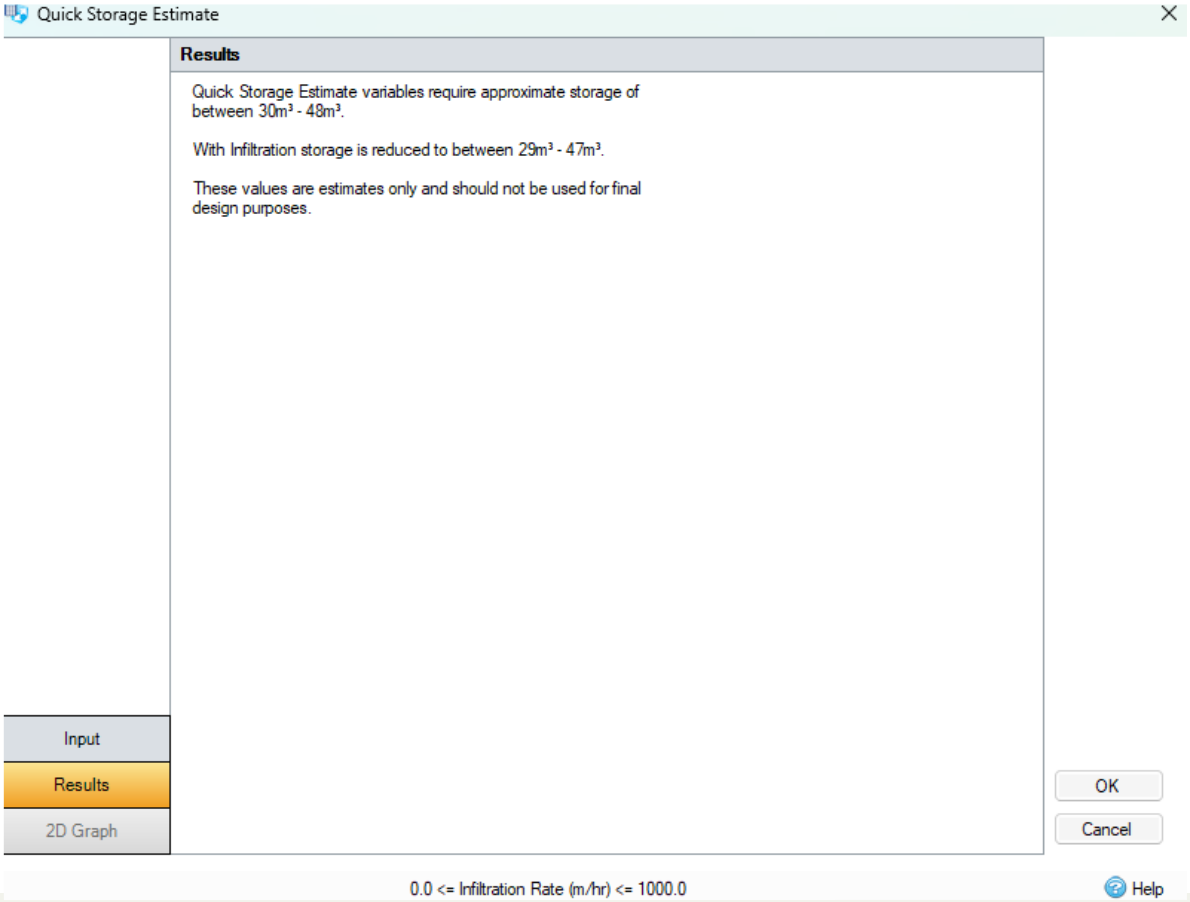

## Zero Infiltration



## 1x10$^{-5}$m/s Infiltration Rate




## 1x10$^{-6}$m/s Infiltration Rate



# APPENDIX J
# Downstream Defender Pollution Mitigation Indices

# Technical Statement

# Downstream Defender® Select and the Simple Index Approach (SIA)

## The Simple Index Approach (SIA)

The Simple Index Approach, outlined in CIRIA C753 The SuDS Manual, is a water quality design method for sites with a low to medium risk pollution hazard level. The approach assigns pollution hazard indices to the given land use for three pollutant groups: total suspended solids (TSS), metals and hydrocarbons. Sustainable Drainage System (SuDS) components are then selected until their combined pollution mitigation index score is greater than the pollution hazard index for each pollutant group.

Please note that sites with a high risk pollution hazard level should consider a more precautionary approach.

## Manufactured Treatment Devices

Manufactured treatment devices, otherwise known as proprietary treatment systems, can be applied as SuDS components in the Simple Index Approach. The SuDS Manual states in Table 26.3 that these systems must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.

Therefore the pollution mitigation indices supplied by Hydro International Ltd for the Downstream Defender® Select are calculated using the methods laid out in the British Water How To Guide: Applying the CIRIA SuDS Manual Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. The Downstream Defender® Select Advanced Vortex and Vortex Plus models have also been independently verified by the WRc, with the WRc Performance Declaration available on request.

| Downstream Defender® Select Mitigation Indices | | | |
|---|---|---|---|
| **Model** | **Total Suspended Solids (TSS)** | **Metals** | **Hydrocarbons (Oils)** |
| **Vortex** | 0.3 | 0.2 | 0.2 |
| **Vortex Plus** | 0.5 | 0.4 | 0.5 |
| **Advanced Vortex** | 0.5 | 0.4 | 0.5 |

*Table 1 - SuDS Mitigation Indices for Downstream Defender® Select*

## British Water Assessment Procedure

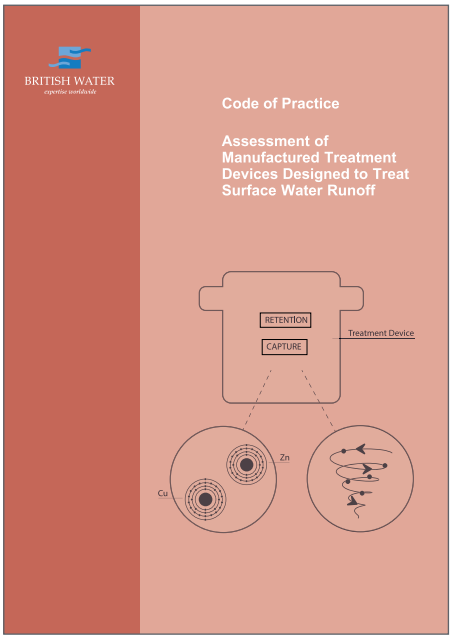
British Water represent the interests of UK water supply chain companies, together with wider stakeholders, through technical forums that promote best practice and tackle challenges facing the sector. The British Water Sustainable Water Management Group have developed an assessment procedure that provides a standard test approach for manufactured treatment devices and a method to calculate SIA pollution mitigation indices from the resulting test data. The purpose of these two documents is to provide consistent pollution mitigation indices across the sector as well as giving transparency to designers on how indices are calculated.

Firstly, in the procedure, products are tested in line with the British Water Code of Practice: Assessment of Manufactured Treatment Devices Designed to Treat Surface Water Runoff. This Code of Practice is the first standardised test method for manufactured treatment devices that is representative of design conditions in the United Kingdom.

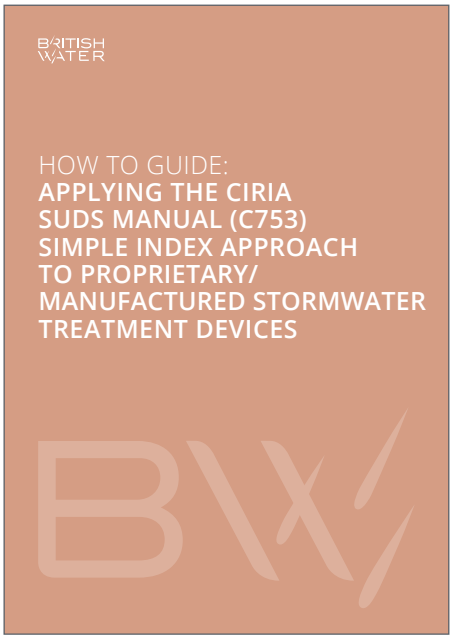
Test data from the British Water Code of Practice is then used to calculate the pollution mitigation indices of a device through the methods outlined in the British Water How to Guide. These have been reviewed by CIRIA and authors of The SuDS Manual to ensure the approaches presented are in keeping with The SuDS Manual and are scientifically robust. The How to Guide is also compatible with the international test protocols from NJDEP and DIBt.

Finally, the product specific test report and pollution mitigation indices claim should be independently verified before being submitted to the public for use in the Simple Index Approach.

The Downstream Defender® Select has been assessed in accordance with this procedure and all supporting documents are available on request.

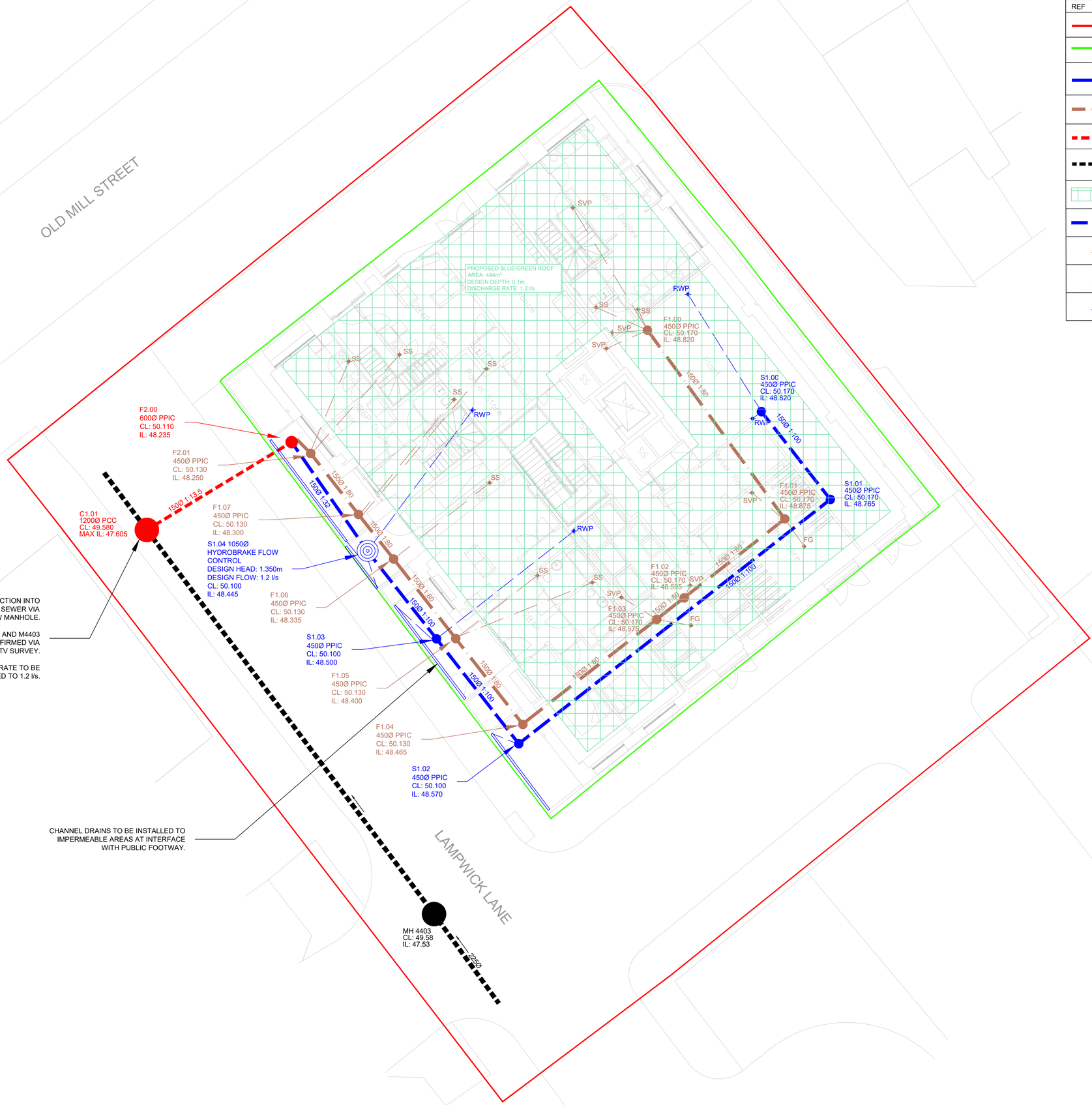



*British Water Code of Practice: Assessment of Manufactured Treatment Devices Designed to Treat Surface Water Runoff*




*British Water How to Guide: Applying the CIRIA SuDS Manual (C753) Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices.*

# APPENDIX K
# Below Ground Drainage Plan




LEGEND

| REF | DESCRIPTION |
|---|---|
| | INDICATIVE PLANNING BOUNDARY |
| | INDICATIVE SITE BOUNDARY |
| | PROPOSED SURFACE WATER DRAINAGE |
| | PROPOSED FOUL WATER DRAINAGE |
| | PROPOSED COMBINED WATER DRAINAGE |
| | EXISTING UNITED UTILITIES COMBINED SEWER |
| | 0.1m DEEP BLUE/GREEN ROOF |
| | HYDROBRAKE VORTEX FLOW CONTORL |
| SS / SVP | STUB STACK / SOIL VENT PIPE |
| FG | FLOOR GULLY |
| RWP | RAINWATER PIPE |

**NOTES**

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RENAISSANCE, ARCHITECTS, LANDSCAPE ARCHITECTS AND BUILDING SERVICES ENGINEERS DRAWINGS.
2. THE FINAL CONNECTION TO THE PUBLIC SEWER IS SUBJECT TO UNITED UTILITIES APPROVAL AND IS TO BE IN ACCORDANCE WITH THIER AGREED DETAILS.
3. ALL BELOW GROUND DRAINAGE WORKS TO BE IN ACCORDANCE WITH RELEVANT BUILDING REGULATIONS AND SEWER SECTOR GUIDANCE APPENDIX C- DESIGN AND CONSTRUCTION GUIDANCE. IF DISCREPANCIES ARE NOTED BETWEEN SSG AND DRAWINGS THESE SHOULD BE BROUGHT TO THE ATTENTION OF RENAISSANCE FOR REVIEW.
4. RWPs, SVPs, SSs AND FLOOR GULLEYS ARE TO HAVE RODDABLE ACCESS POINTS ABOVE GROUND FLOOR TO BUILDING SERVICES DETAILS.
5. SEWERS TO BE LAID IN CLASS S BEDDING (150mm DIA GRANULAR BED AND SURROUND). WHERE DEPTH OF COVER TO TOP OF THE SEWER IS LESS THAN; 1.2m IN HIGHWAYS OR VERGES, OR LESS THAN 0.9m IN PEDESTRIAN AREAS, THEN A 150mm DIA CONCRETE SLAB SHOULD BE PROVIEDED ABOVE THE GRANULAR RED AND SURROUND.REFER TO DETAILS SHEETS.
6. THE CONTRACTOR IS TO UNDERTAKE A FULL CCTV SURVEY AT COMPLETION OF THE PROJECT TO DEMONSTRATE THAT THE DRAINAGE IS CLEAN ANY DEFECTS ARE TO BE CORRECTED BY THE CONTRACTOR PRIOR TO HANDOVER OF THE SYSTEM TO THE CLIENT.
7. THE CONTRACTOR IS TO KEEP A RECORD SET OF THE AS INSTALLED DRAINAGE ON SITE AND PROVIDE THIS TO RENAISSANCE UPON COMPLETION OF THE WORKS TO ALLOW FOR PRODUCTION OF A 'FINAL CONSTRUCTION' ISSUE DRAWING.
8. DURING THE WORKS ALTERATIONS TO THE DRAINAGE LAYOUT ARE TO BE MARKED UP BY THE CONTRACTOR AND AGREED WITH RENAISSANCE IN WRITING.
9. THE CHAMBER SIZE OF PCC MANHOLES WITH MORE THAN ONE CONNECTION IN THEM MAY NEED TO BE INCREASED AN INCREMENT TO ACCOMMODATE THE CONNECTIONS AND BENDS.
10. MANHOLE COVERS ARE TO BE IN ACCORDANCE WITH BS EN 124 FOR THE RATING INDICATED IN THE MANHOLE SCHEDULE. THE CONTRACTOR IS TO SUBMIT DETAILS FOR THE PROPOSED MANHOLE COVERS TO THE ENGINEER AND LANDSCAPE ARCHITECT FOR REVIEW PRIOR TO INSTALLATION.
11. ALL INTERNAL COVERS TO BE RECESSED AND TRIPLE SEALED
12. COVER SLABS MUST CARRY THE BSI KITEMARK. WHERE THE CLEAR OPENING OF THE KITEMARKED PRODUCT IS DIFFERENT TO THAT OF THE COVER AND FRAME, A LOAD BEARING REDUCING SLAB SHOULD BE FITTED ABOVE THE COVER SLAB TO BRING THE SIZE DOWN TO REQUIRED SIZE.
13. ALL SEWERS TO BE BSI KITEMARK (CERTIFIED TO WIS 4-35-01)
14. ALL CONCRETE PIPES TO BE TO ES EN 1916 CLASS 120 (54kN/m).
15. BEDDING AND BACKFILL MATERIAL TO CONFORM TO THE REQUIREMENTS OF THE WATER INDUSTRY SPECIFICATION 4-08092 (TABLE A2).
16. IF PLASTIC PIPES ARE TO BE USED THEN THE FOLLOWING MUST APPLY:
A.BSI KITEMARK (CERTIFIED TO BS EN 13476-1 AND WIS 4-35-01)
B.PIPES LESS THAN OR EQUAL TO 500mm DIA
C.BEDDING AND BACKFILL MATERIAL TO CONFORM TO THE REQUIREMENTS OF THE WATER INDUSTRY SPECIFICATION 4-08092 (TABLE A2)
17. THE MINIMUM CRUSHING STRENGTH FOR CLAY PIPES SHOULD BE AS FOLLOWS: 100mm DIA. 40kN/m, 150mm DIA DIA. 40kN/m, 225mm DIA. 45kN/m AND 300mm DIA. 72kN/m.
18. THE MINIMUM CRUSHING STRENGTH FOR CONCRETE PIPES SHOULD BE -(CLASS 120 TO EN 1916/BS5911-1 2002). PLASTIC PIPES SHOULD CONFORM TO WIS 4-35-01 AND BS EN13476.
19. SULPHATE RESISTANT CEMENT (C20-DC3) AND PRECAST CONCRETE PRODUCTS MUST BE USED OR A LABORATORY REPORT PROVIDING THAT SUCH PRECAUTIONS ARE NOT NECESSARY.
20. SEWER PIPES TO BE LAID IN MAXIMUM 3 METER LENGTHS UNLESS THERE IS A SPECIFIC OPERATIONAL NEED TO LAY LONGER PIPES, AND THIS IS AGREED BY THE CONTRACTOR WITH THE PIPE MANUFACTURER.
21. ALL FOUL AND SURFACE WATER BELOW GROUND SYSTEMS ARE TO BE VENTED WITHIN THE ABOVE GROUND DRAINAGE TO THE BUILDING SERVICES ENGINEERS DETAILS.
22. ALLOW FOR ALL THE EXISTING SURFACE WATER DRAINAGE ON SITE TO BE GRUBBED UP AND BACKFILLED. ANY CONNECTIONS FROM THE SITE TO THE PUBLIC SEWER TO THE SITE ARE TO BE CAPPED AND GROUTED.

| Rev: | Description: | Date: | By: | Chkd: |
|---|---|---|---|---|
| P02 | ISSUED FOR PLANNING | 12.10.26 | JAB | PC |
| P01 | STAGE 3 ISSUE | 30.10.25 | JAB | AS |

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Project:
OLD MILL STREET
MANCHESTER

Drawing Title:
*GROUND FLOOR BELOW GROUND DRAINAGE PLAN*

Status:
STAGE 2

| Size: | Date: | Drawn by: | Designed by: | Checked by: |
|---|---|---|---|---|
| A1 | OCT 25 | JAB | JAB | AS |

| Scale: | Project No: |
|---|---|
| 1:100 | 2503-04 |

Project – Originator – Volume – Level – Type – Role – Number: OMS-REN-XX-00-DR-C-01100
Revision: P02

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# APPENDIX L
# Surface Water Drainage Calculations

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Inflow Summary Storm Phase: Storm | Company Address: | | |

| Inflow Label | Connected To | Flow (L/s) | Runoff Method | Area (ha) | Percentage Impervious (%) | Urban Creep (%) | Adjusted Percentage Impervious (%) | Area Analysed (ha) |
|---|---|---|---|---|---|---|---|---|
| AREA A - ROOF | BLUE/GREEN ROOF | | Time of Concentration | 0.015 | 100 | 0 | 100 | 0.015 |
| AREA B - ROOF | BLUE/GREEN ROOF | | Time of Concentration | 0.015 | 100 | 0 | 100 | 0.015 |
| AREA C - ROOF | BLUE/GREEN ROOF | | Time of Concentration | 0.015 | 100 | 0 | 100 | 0.015 |
| AREA D - ROOF | BLUE/GREEN ROOF | | Time of Concentration | 0.015 | 100 | 0 | 100 | 0.015 |
| AREA E (1) | S1.02 | | Time of Concentration | 0.001 | 100 | 0 | 100 | 0.001 |
| AREA F (1) | S1.03 | | Time of Concentration | 0.001 | 100 | 0 | 100 | 0.001 |
| AREA G | S1.04 | | Time of Concentration | 0.002 | 100 | 0 | 100 | 0.002 |
| **TOTAL** | | **0.0** | | **0.063** | | | | **0.063** |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Network Design Criteria Storm Phase: Storm | Company Address: | | |

## Flow Options

| | |
|---|---|
| Peak Flow Calculation | (UK) Modified Rational Method |
| Min. Time of Entry (mins) | 5 |
| Max. Travel Time (mins) | 30 |

## Pipe Options

| | |
|---|---|
| Lock Slope Options | None |
| Design Options | Minimise Excavation |
| Design Level | Level Soffits |
| Min. Cover Depth (m) | 1.200 |
| Min. Slope (1:X) | 500.00 |
| Max. Slope (1:X) | 40.00 |
| Min. Backdrop (m) | 0.200 |
| Max. Backdrop (m) | 1.500 |
| Min. Velocity (m/s) | 1.0 |
| Max. Velocity (m/s) | 3.0 |
| Use Flow Restriction | ☑ |
| Reduce Channel Depths | ☑ |

## Pipe Size Library

### STANDARD

| | |
|---|---|
| Add. Increment (mm) | 75 |
| Max. Diameter (mm) | 0 |

| Diameter (mm) | Min. Slope (1:X) | Max. Slope (1:X) |
|---|---|---|
| 100 | 0.00 | 0.00 |
| 150 | 0.00 | 0.00 |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Network Design Criteria Storm Phase: Storm | Company Address: | | |

## Manhole Options

| | |
|---|---|
| Apply Offset | ☐ |

## Manhole Size Library

## STANDARD

## Diameter / Width

| Connection (mm) | Diameter / Length (m) | Width (m) |
|---|---|---|
| 0 | 1.200 | 0.000 |
| 375 | 1.350 | 0.000 |
| 500 | 1.500 | 0.000 |
| 750 | 1.800 | 0.000 |

## Additional Sizing

| | |
|---|---|
| Connection (mm) | 900 |
| Diameter / Length (m) | 0.900 |
| Width (m) | 0.000 |

## Depth

| Depth (m) | Diameter / Length (m) | Width (m) |
|---|---|---|
| 0.000 | 1.050 | 0.000 |
| 1.500 | 1.200 | 0.000 |

## Access

| Depth (m) | Ladder Protrusion (mm) |
|---|---|
| 0.000 | 130 |
| 3.000 | 230 |

## Benching Requirements

| | |
|---|---|
| Landing Width (mm) | 500 |
| Benching Width (mm) | 225 |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Outfall Details Storm Phase: Storm | Company Address: | | |

## Outfalls

| Outfall | Outfall Type | Gated | Fixed Surcharged Level (m) | Level Curve |
|---|---|---|---|---|
| S1.04 | Free Discharge | | | |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Title: Rainfall Analysis Criteria | Company Address: | | |

| | |
|---|---|
| Runoff Type | Dynamic |
| Output Interval (mins) | 5 |
| Time Step | Reduced |
| Urban Creep | Apply Global Value |
| Urban Creep Global Value (%) | 0 |
| Junction Flood Risk Margin (mm) | 0 |
| Perform No Discharge Analysis | ☐ |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Inflows Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow**

| Inflow | Storm Event | Inflow Area (ha) | Max. Inflow (L/s) | Total Inflow Volume (m³) |
|---|---|---|---|---|
| AREA E (1) | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 0.00 | 0.2 | 0.093 |
| AREA A - ROOF | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 0.01 | 2.5 | 1.113 |
| AREA B - ROOF | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 0.01 | 2.5 | 1.113 |
| AREA C - ROOF | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 0.01 | 2.5 | 1.113 |
| AREA D - ROOF | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 0.01 | 2.5 | 1.113 |
| AREA F (1) | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 0.00 | 0.2 | 0.099 |
| AREA G | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 0.00 | 0.4 | 0.174 |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Inflows Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow**

| Inflow | Storm Event | Inflow Area (ha) | Max. Inflow (L/s) | Total Inflow Volume (m³) |
|---|---|---|---|---|
| AREA E (1) | FEH - Old Mill Street: 30 years: +40 %: 15 mins: Summer | 0.00 | 0.6 | 0.276 |
| AREA A - ROOF | FEH - Old Mill Street: 30 years: +40 %: 15 mins: Summer | 0.01 | 7.8 | 3.399 |
| AREA B - ROOF | FEH - Old Mill Street: 30 years: +40 %: 15 mins: Summer | 0.01 | 7.8 | 3.399 |
| AREA C - ROOF | FEH - Old Mill Street: 30 years: +40 %: 15 mins: Summer | 0.01 | 7.8 | 3.399 |
| AREA D - ROOF | FEH - Old Mill Street: 30 years: +40 %: 15 mins: Summer | 0.01 | 7.8 | 3.399 |
| AREA F (1) | FEH - Old Mill Street: 30 years: +40 %: 15 mins: Summer | 0.00 | 0.7 | 0.309 |
| AREA G | FEH - Old Mill Street: 30 years: +40 %: 15 mins: Summer | 0.00 | 1.2 | 0.528 |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Inflows Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow**

| Inflow | Storm Event | Inflow Area (ha) | Max. Inflow (L/s) | Total Inflow Volume (m³) |
|---|---|---|---|---|
| AREA E (1) | FEH - Old Mill Street: 100 years: +45 %: 15 mins: Summer | 0.00 | 0.8 | 0.366 |
| AREA A - ROOF | FEH - Old Mill Street: 100 years: +45 %: 15 mins: Summer | 0.01 | 10.2 | 4.453 |
| AREA B - ROOF | FEH - Old Mill Street: 100 years: +45 %: 15 mins: Summer | 0.01 | 10.2 | 4.453 |
| AREA C - ROOF | FEH - Old Mill Street: 100 years: +45 %: 15 mins: Summer | 0.01 | 10.2 | 4.453 |
| AREA D - ROOF | FEH - Old Mill Street: 100 years: +45 %: 15 mins: Summer | 0.01 | 10.2 | 4.453 |
| AREA F (1) | FEH - Old Mill Street: 100 years: +45 %: 15 mins: Summer | 0.00 | 0.9 | 0.405 |
| AREA G | FEH - Old Mill Street: 100 years: +45 %: 15 mins: Summer | 0.00 | 1.6 | 0.696 |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Junctions Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth**

| Junction | Storm Event | Cover Level (m) | Invert Level (m) | Max. Level (m) | Max. Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.03 | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 50.170 | 48.499 | 48.514 | 0.015 | 0.4 | 0.002 | 0.000 | 0.4 | 0.236 | OK |
| S1.01 | FEH - Old Mill Street: 2 years: +0 %: 960 mins: Summer | 50.170 | 48.764 | 48.778 | 0.014 | 0.3 | 0.002 | 0.000 | 0.3 | 15.227 | OK |
| S1.04 | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | 50.170 | 48.443 | 48.497 | 0.053 | 0.8 | 0.046 | 0.000 | 0.6 | 0.393 | OK |
| S1.02 | FEH - Old Mill Street: 2 years: +0 %: 960 mins: Summer | 50.170 | 48.566 | 48.580 | 0.015 | 0.3 | 0.002 | 0.000 | 0.3 | 15.514 | OK |
| S1.00 | FEH - Old Mill Street: 2 years: +0 %: 960 mins: Summer | 50.170 | 48.820 | 48.834 | 0.014 | 0.3 | 0.002 | 0.000 | 0.3 | 15.233 | OK |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Junctions Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth**

| Junction | Storm Event | Cover Level (m) | Invert Level (m) | Max. Level (m) | Max. Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.03 | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | 50.170 | 48.499 | 49.019 | 0.520 | 0.9 | 0.083 | 0.000 | 0.9 | 43.905 | Surcharged |
| S1.01 | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | 50.170 | 48.764 | 49.020 | 0.255 | 0.9 | 0.041 | 0.000 | 0.9 | 41.735 | Surcharged |
| S1.04 | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | 50.170 | 48.443 | 49.019 | 0.575 | 0.9 | 0.498 | 0.000 | 0.9 | 45.675 | OK |
| S1.02 | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | 50.170 | 48.566 | 49.019 | 0.453 | 0.9 | 0.072 | 0.000 | 0.9 | 42.774 | Surcharged |
| S1.00 | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | 50.170 | 48.820 | 49.020 | 0.200 | 0.9 | 0.032 | 0.000 | 0.9 | 41.744 | Surcharged |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Junctions Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth**

| Junction | Storm Event | Cover Level (m) | Invert Level (m) | Max. Level (m) | Max. Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.03 | FEH - Old Mill Street: 100 years: +45 %: 1440 mins: Summer | 50.170 | 48.499 | 49.442 | 0.943 | 1.0 | 0.150 | 0.000 | 1.0 | 70.629 | Surcharged |
| S1.01 | FEH - Old Mill Street: 100 years: +45 %: 1440 mins: Summer | 50.170 | 48.764 | 49.443 | 0.679 | 1.1 | 0.108 | 0.000 | 1.0 | 67.343 | Surcharged |
| S1.04 | FEH - Old Mill Street: 100 years: +45 %: 1440 mins: Summer | 50.170 | 48.443 | 49.442 | 0.998 | 1.0 | 0.865 | 0.000 | 1.0 | 73.324 | OK |
| S1.02 | FEH - Old Mill Street: 100 years: +45 %: 1440 mins: Summer | 50.170 | 48.566 | 49.442 | 0.876 | 1.0 | 0.139 | 0.000 | 1.0 | 68.925 | Surcharged |
| S1.00 | FEH - Old Mill Street: 100 years: +45 %: 1440 mins: Summer | 50.170 | 48.820 | 49.443 | 0.623 | 1.1 | 0.099 | 0.000 | 1.1 | 67.349 | Surcharged |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Stormwater Controls Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth**

| Storm Event | Stormwater Control | Max. US Level (m) | Max. DS Level (m) | Max. US Depth (m) | Max. DS Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Total Lost Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Half Drain Down Time (mins) | Percentage Available (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEH - Old Mill Street: 2 years: +0 %: 960 mins: Summer | BLUE/GREEN ROOF | 69.829 | 69.829 | 0.029 | 0.029 | 1.3 | 12.157 | 0.000 | 0.000 | 0.3 | 15.242 | | 71.179 |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Stormwater Controls Summary Storm Phase: Storm | Company Address: | | |

| Status |
|---|
| OK |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Stormwater Controls Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth**

| Storm Event | Stormwater Control | Max. US Level (m) | Max. DS Level (m) | Max. US Depth (m) | Max. DS Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Total Lost Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Half Drain Down Time (mins) | Percentage Available (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | BLUE/GREEN ROOF | 69.867 | 69.867 | 0.067 | 0.067 | 3.2 | 28.194 | 0.000 | 0.000 | 0.9 | 41.755 | 310 | 33.157 |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Stormwater Controls Summary Storm Phase: Storm | Company Address: | | |

| Status |
|---|
| OK |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Stormwater Controls Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Avg. Depth**

| Storm Event | Stormwater Control | Max. US Level (m) | Max. DS Level (m) | Max. US Depth (m) | Max. DS Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Total Lost Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Half Drain Down Time (mins) | Percentage Available (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FEH - Old Mill Street: 100 years: +45 %: 960 mins: Summer | BLUE/GREEN ROOF | 69.890 | 69.890 | 0.090 | 0.090 | 4.3 | 37.881 | 0.000 | 0.000 | 1.1 | 56.504 | 490 | 10.192 |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Stormwater Controls Summary Storm Phase: Storm | Company Address: | | |

| Status |
|---|
| OK |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Connections Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow**

| Connection | Storm Event | Connection Type | From | To | Upstream Cover Level (m) | Max. US Water Level (m) | Max. Flow Depth (m) | Discharge Volume (m³) | Max. Velocity (m/s) | Flow / Capacity | Max. Flow (L/s) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.003 | FEH - Old Mill Street: 2 years: +0 %: 15 mins: Summer | Pipe | S1.03 | S1.04 | 50.170 | 48.514 | 0.034 | 0.236 | 0.1 | 0.02 | 0.4 | OK |
| S1.002 | FEH - Old Mill Street: 2 years: +0 %: 960 mins: Summer | Pipe | S1.02 | S1.03 | 50.170 | 48.580 | 0.014 | 15.514 | 0.4 | 0.02 | 0.3 | OK |
| S1.000 | FEH - Old Mill Street: 2 years: +0 %: 960 mins: Summer | Pipe | S1.00 | S1.01 | 50.170 | 48.834 | 0.014 | 15.233 | 0.4 | 0.02 | 0.3 | OK |
| ROOF OUTLET | FEH - Old Mill Street: 2 years: +0 %: 960 mins: Summer | Pipe | BLUE/GREEN ROOF | S1.00 | 70.000 | 69.829 | 0.009 | 15.240 | 0.9 | 0 | 0.3 | OK |
| S1.001 | FEH - Old Mill Street: 2 years: +0 %: 960 mins: Summer | Pipe | S1.01 | S1.02 | 50.170 | 48.778 | 0.014 | 15.227 | 0.4 | 0.02 | 0.3 | OK |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Connections Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow**

| Connection | Storm Event | Connection Type | From | To | Upstream Cover Level (m) | Max. US Water Level (m) | Max. Flow Depth (m) | Discharge Volume (m³) | Max. Velocity (m/s) | Flow / Capacity | Max. Flow (L/s) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.003 | FEH - Old Mill Street: 30 years: +40 %: 1440 mins: Summer | Pipe | S1.03 | S1.04 | 50.170 | 49.000 | 0.150 | 52.093 | 0.2 | 0.05 | 0.9 | Surcharged |
| S1.002 | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | Pipe | S1.02 | S1.03 | 50.170 | 49.019 | 0.150 | 42.774 | 0.4 | 0.05 | 0.9 | Surcharged |
| S1.000 | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | Pipe | S1.00 | S1.01 | 50.170 | 49.020 | 0.150 | 41.744 | 0.5 | 0.05 | 0.9 | Surcharged |
| ROOF OUTLET | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | Pipe | BLUE/GREEN ROOF | S1.00 | 70.000 | 69.867 | 0.100 | 41.752 | 1.3 | 0.01 | 0.9 | OK |
| S1.001 | FEH - Old Mill Street: 30 years: +40 %: 960 mins: Summer | Pipe | S1.01 | S1.02 | 50.170 | 49.020 | 0.150 | 41.735 | 0.5 | 0.05 | 0.9 | Surcharged |

| Project: | Date: 16/10/2025 | | |
|---|---|---|---|
| | Designed by: JamesAlbert | Checked by: | Approved By: |
| Report Details: Type: Connections Summary Storm Phase: Storm | Company Address: | | |

**FEH - Old Mill Street: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flow**

| Connection | Storm Event | Connection Type | From | To | Upstream Cover Level (m) | Max. US Water Level (m) | Max. Flow Depth (m) | Discharge Volume (m³) | Max. Velocity (m/s) | Flow / Capacity | Max. Flow (L/s) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.003 | FEH - Old Mill Street: 100 years: +45 %: 1440 mins: Summer | Pipe | S1.03 | S1.04 | 50.170 | 49.442 | 0.150 | 70.629 | 0.2 | 0.06 | 1.0 | Surcharged |
| S1.002 | FEH - Old Mill Street: 100 years: +45 %: 960 mins: Summer | Pipe | S1.02 | S1.03 | 50.170 | 49.435 | 0.150 | 57.770 | 0.4 | 0.06 | 1.0 | Surcharged |
| S1.000 | FEH - Old Mill Street: 100 years: +45 %: 960 mins: Summer | Pipe | S1.00 | S1.01 | 50.170 | 49.436 | 0.150 | 56.490 | 0.5 | 0.06 | 1.1 | Surcharged |
| ROOF OUTLET | FEH - Old Mill Street: 100 years: +45 %: 960 mins: Summer | Pipe | BLUE/GREEN ROOF | S1.00 | 70.000 | 69.890 | 0.100 | 56.500 | 1.3 | 0.01 | 1.1 | OK |
| S1.001 | FEH - Old Mill Street: 100 years: +45 %: 960 mins: Summer | Pipe | S1.01 | S1.02 | 50.170 | 49.436 | 0.150 | 56.480 | 0.5 | 0.06 | 1.0 | Surcharged |