University of Huddersfield
Site 3 – Former Faith Centre

Flood Risk Assessment
& Drainage Strategy

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Revision: P01

Engineering opportunity.

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Revision	Description	Issued	Checked	Date
P01	Initial Issue	SWM	KMJ	19/02/26

Author	Date
Sam McGill Senior Engineer BSc (Hons)	19/01/26

Checker	Date
Kristen Jones Associate BSc MSc MICE	19/01/26

Contents

1.0 Introduction

1.1 Scope

Hexa have been appointed by GSS Architecture Ltd to produce a Flood Risk Assessment (FRA) and Drainage Strategy to support a planning application for the development of the University of Huddersfield Site 3 – Former Faith Centre, off Queen Street, Huddersfield, HD1 3BZ.

1.2 Flood Risk Assessment and Drainage Strategy

This report will review the sources of flood risk on site, their effect on the development, and assess the site's suitability for the proposed development in line with the government guidance relating to development and flood risk. Additionally, the report will assess the site's existing drainage provision and provide a drainage strategy for the proposed development.

The assessment has been undertaken in accordance with the national requirements for FRAs and best practice guidance, including but not limited to the following:

- National Planning Policy Framework (NPPF)
- Development and Flood Risk (CIRIA C624)
- The SuDS Manual (CIRIA C753)
- Flood Risk Assessments: Climate Change Allowances 2022
- DEFRA R&D Technical Report W5-074/A/TR/1 Revision D
- Rainfall Runoff Management for Developments Report – SC030219
- Calder Catchment Strategic Flood Risk Assessment – Volume I
- Calder Catchment Strategic Flood Risk Assessment – Volume II (Kirklees Council)

2.0 Development Site and Location

2.1 Location

The site is located to the South East of Huddersfield City Centre off Queen Street, West Yorkshire, England, HD1 2SP.

National Grid Reference: SE 14608 16198

To the north of the site is part of the existing University (Queen Street Building), and to the south by an existing soft landscaping breakout space. To the East of the site is part of the existing University (School of Art and Design). The site is bound to the West by Queen Street.

The approximate site extent and the areas subject to the Planning application is shown in **Figure 2-1**.

Figure 2-1 Site location plan showing approximate development boundary

2.2 Current Usage

As outlined in the diagram above, the site was previously occupied by part of the existing Huddersfield University Queen's Saint South Annexe and a small private car park. This building has been demolished and is now covered with hardcore. The small amount of parking has been retained and is still used.

2.3 Topography and Levels

The topography of the site has a steady crossfall. The approximate change in elevation is Circa 1.90m, and this is generally from North-West to South-East. The highest point onsite is along the Northern Boundary at (circa 89.90m AOD), the lowest point is along the South-East boundary at (circa 88.00m AOD).

2.4 Watercourses and Water Features

Huddersfield Broad Canal is the closest Watercourse and is located approximately 100m to the East of the site. Further East is the River Colne, located approximately 200m to the East of the site and Huddersfield Broad Canal, which flows from South to North.

2.5 Existing Private Drainage

The existing drainage only consists of a small surface water drainage network comprising pipes and gullies. This private surface water system runs under the current hardcore and eastwards to the outfall. This drainage outflows into a 300mm diameter combined public sewer owned by Yorkshire Water.

2.6 Existing Public Sewers

Yorkshire Water sewer records indicate that a combined water public sewer runs along the Eastern boundary from North to South. The diameter of the public combined sewer is shown as a 300mm diameter and is to be confirmed via CCTV survey. Based on information available, it is assumed that this drainage run flows south to the southern end of Chapel Street. It is then directed east to flow under Commercial Street before being picked up by the main sewer in Firth Street.

A Yorkshire Water Asset Map is contained within **Appendix A.**

2.7 Site Investigation

A phase 1 Desk Study was undertaken by Gelo in January 2026, which described the ground conditions as:

The presence of building rubble and hard-standing surfacing on the site a nominal thickness (<2m) of made ground deposits, is anticipated to be initially present.

The bedrock deposits beneath the site are shown to comprise Pennine Lower Coal Measures Formation, comprising alternations of mudstone, siltstone, sandstone and coal. No geological faults are mapped below the site within the bedrock geology.

The conjectured position of the Soft Bed (SB) coal seam is recorded c.200m south of the site and dips in a northeastern direction toward the site and is anticipated to be present below the site at a shallow depth (<30m). The Soft Bed coal seam is recorded to be 0.60m in thickness in this area. Following a review of nearby BGS borehole data, the Soft Bed coal seam is anticipated to be present between a depth of c.15m to c.20m below ground level.

In the phase 1 report, it was recommended that additional testing be undertaken to fully understand the geology of the site. It was recommended that a Phase II Ground Investigation be completed for the site.

2.8 Groundwater Sources

When reviewing the Calder Catchment Strategic Flood Risk Assessment – Volume II (Kirklees Council SFRA), the area which encompasses the site is potentially susceptible to groundwater flooding. This SFRA is deemed as a moderate risk of groundwater flooding within the site, which is shown as 50% - 75% chance. See **Figure 2-2** below.

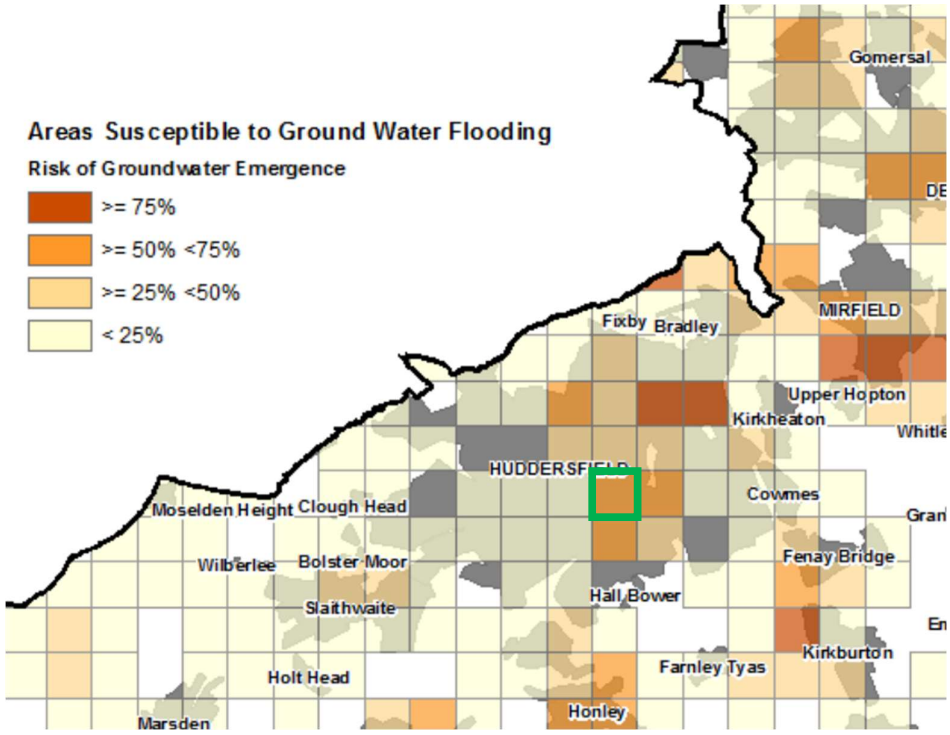


Figure 2-2 Calder Catchment Strategic Flood Risk Assessment – Volume II (Kirklees Council)

2.9 Flood Zone

An initial observation of the Environment Agency's Flood Map for Planning shows the site is located within Flood Zone 1, indicating a low probability of flooding. National Planning Policy Guidance Table 1: Flood Zones advises that Flood Zone 1 Low Probability comprises land having a less than 0.1% annual probability of flooding from rivers or the sea. Further assessment is made later in this report.

2.10 Strategic Flood Risk Assessment

The documents mentioned below have been reviewed when assessing historical flooding, local flood risk sources and flood risk in the future: -

- Calder Catchment Strategic Flood Risk Assessment – Volume I
- Calder Catchment Strategic Flood Risk Assessment – Volume II (Kirklees Council)

The above documents do not indicate any historical flooding events within the site boundary or state that the site will be at risk of flooding in the future due to climate change.

Yorkshire Water information does not include any records of public sewer flooding within the site boundary.

The above information is reviewed further and expanded upon in Section 6.0.

3.0 Development Proposals

3.1 Development Summary

The proposed development will comprise an extension of the hardstanding for parking, with vehicles up to 7.5 tons using the proposed turning circle. Additionally, an outside amenity space will be developed to the South of the proposed carpark, which will include soft landscaping and footways.

The proposed total site boundary covers an area of approximately 0.210 hectares and is predominantly a mixture of hard standing and soft landscaping.

The proposed site plan can be found in **Appendix B**.

3.2 Vulnerability

The NPPF guidance specifies five categories of developments based on their perceived vulnerability to flood risk. These categories are as follows:

- Essential infrastructure
- Highly vulnerable
- More vulnerable
- Less vulnerable
- Water-compatible

Car parking developments fall under the 'Less vulnerable' category. The NPPF guidance provides guidance based on the flood risk vulnerability in specific flood zones. **Table 3-1** below summarises this compatibility assessment.

Table 3-1 NPPF guidance on Flood Zone and flood risk vulnerability compatibility

Flood Zone	**Flood Risk Vulnerability Classification**				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required*	×	Exception Test required	✓	✓
Zone 3b	Exception Test required**	×	×	×	✓**

Key:

✓ Development is appropriate.

× Development is unsuitable and should not be permitted.

* Within Flood Zone 3a, essential infrastructure should be designed and constructed to ensure it remains operational and safe during flood events.

** Within Flood Zone 3b, essential infrastructure should be designed and constructed with the same objective in mind as Flood Zone 3a, with the additional aim that it must also cause no net losses in floodplain storage and must not interfere with water flow or aggravate flood risk elsewhere in the catchment.

Notes:

1. This table does not show the application of the Sequential Test, which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea.
2. The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site.
3. Some developments may contain different elements of vulnerability and the highest vulnerability category should be used unless the development is considered in its component parts.

3.3 Estimated Lifecycle of Development

For the purposes of the Flood Risk Assessment, the development will be assessed against a 75 year lifetime, as per the government's guidance on Flood Risk and Coastal Change guidance for non-residential development

3.4 Consultation with Flood Risk and Drainage Consultees

At this stage, no correspondence has been undertaken with the LLFA. This section will be updated.

4.0 Sequential Test

Initial observation of the Environment Agency's Flood Map for Planning and Surface Water flood maps and the City of Bradford Metropolitan District Council Strategic Flood Risk Assessment all show the site to be at low risk. On this basis it is considered that there is no requirement for Sequential Testing.

5.0 Climate Change

On the basis that the site at the University of Huddersfield will be designed for a commercial 75-year lifecycle, the impacts of climate change on the assessed flood risk must be considered. The site falls within the Aire and Calder Management Catchment, as per the below **Figure 5-1**.

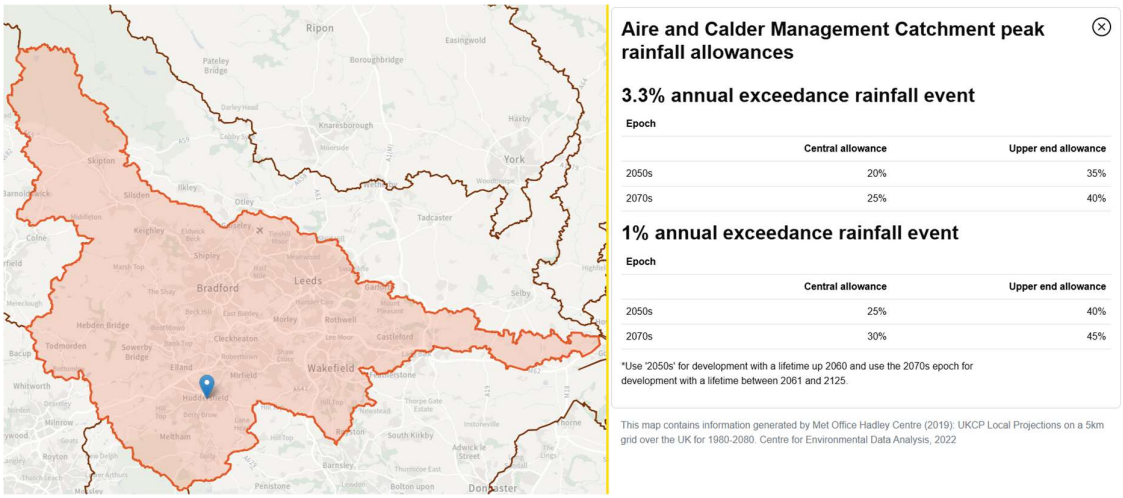


Figure 5-1 Environment Agency Climate Change Allowance Map

6.0 Site Specific Flood Risk

6.1 Environment Agency Flood Map for Planning

Based on the review of the Environment Agency's website, the site has been identified as lying entirely within Flood Zone 1, that is, land assessed as having less than 1 in 1,000 annual probabilities of river or sea flooding (<0.1%).

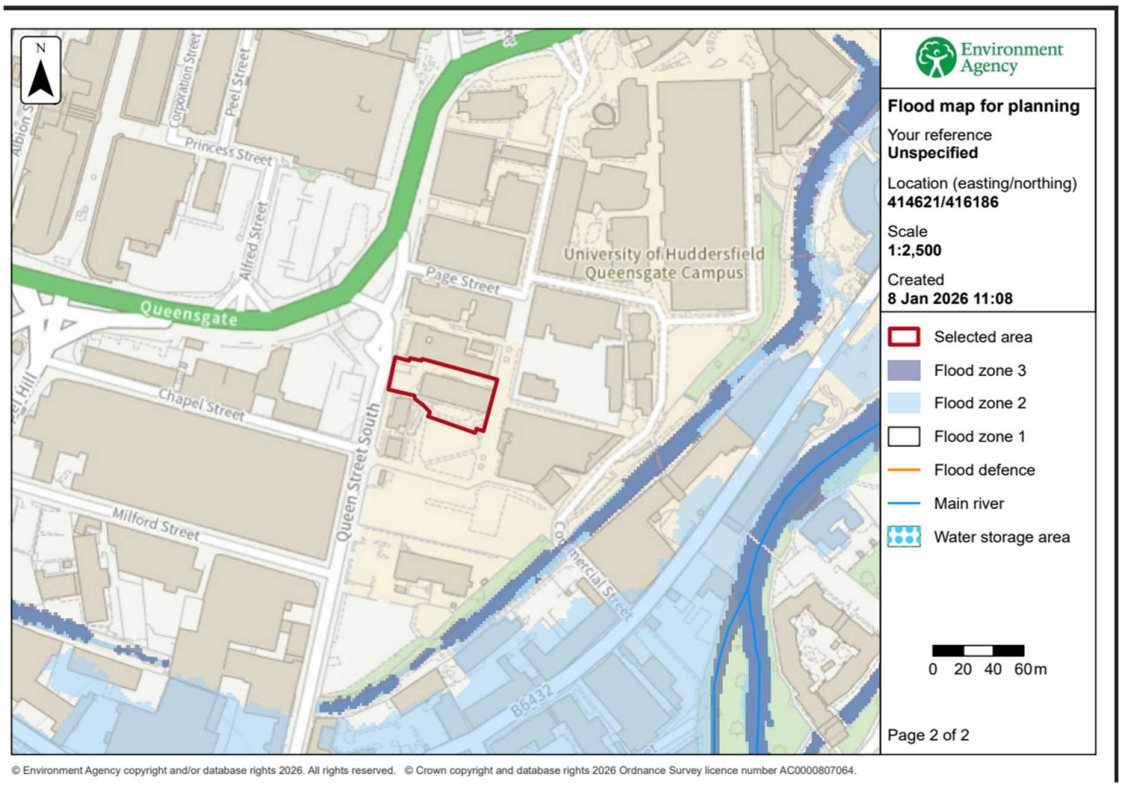


Figure 6-1 Flood Map for Planning

6.2 Environment Agency Surface Water Flood Risk Mapping

The EA 'Flood Risk from Surface Water' map shown in Figure 3-2 indicates that the risk of surface water flooding in the area of the proposed development is low. The map shows some risk of localised surface water flooding to the North wider University site. This appears to be associated with surface water being trapped within the lower-lying areas and topography of the wider area.

As shown in Figure 3-2 where our proposed development is situated, the risk of surface water flooding on the site is concluded to be low.

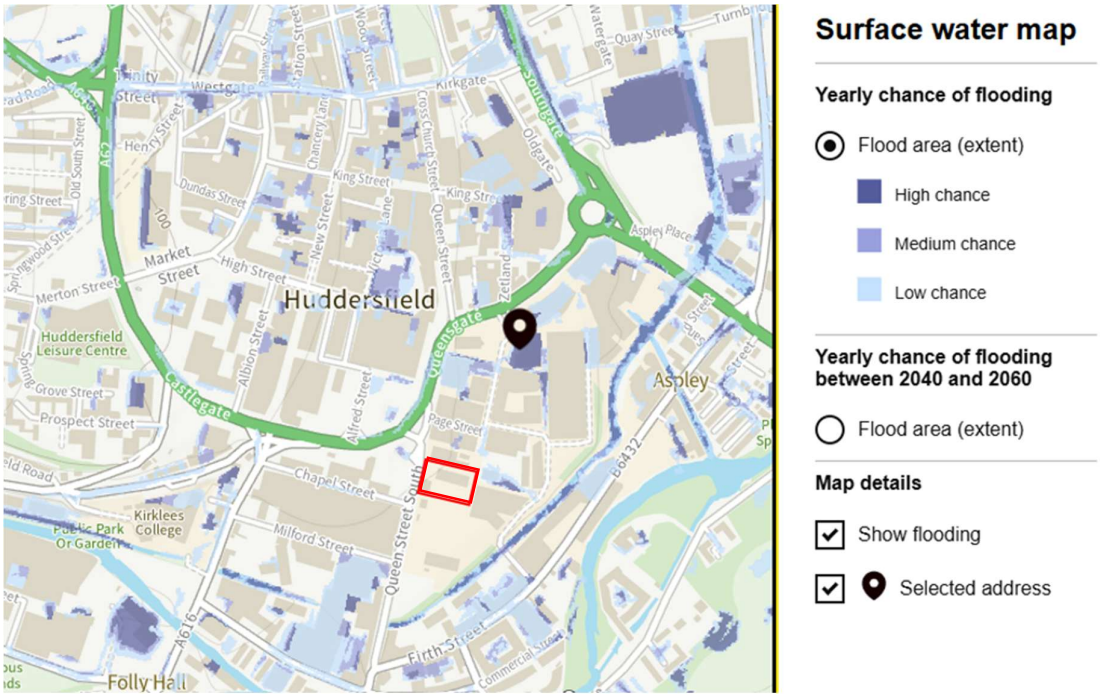


Figure 6-2 EA Surface water flooding map

6.3 Kirklees Council Flood Risk Information

A typical assumption based on the site being less than 1ha and located within Flood Zone 1 is that it would not require a Flood Risk Assessment. However, a review of recent planning history for the wider site (Kirklees Planning Application Number 2013/92907) has highlighted the requirement for a Flood Risk Assessment and detailed drainage strategy for the discharge of conditions.

A review of the documentation listed within Section 2.10 has also been undertaken to assess any records of historical flooding, review local flood risk sources and assess flood risk in the future:

A review of Calder Catchment Strategic Flood Risk Assessment Vol 1 and 2 (SFRA) confirms that the site is not projected to face significant flood risk in the future.

Considering the above and flood mitigation measures, the risk of flooding in the future has been classified as low.

The mitigation to this flooding is considered and addressed further **Section 6.7** and **Section 7.0**.

6.4 Flooding from Other Sources

Due to the site's location and elevation level, the risk of flooding arising from sewers is considered to be low.

According to the DEFRA groundwater vulnerability map, the location of the proposed site is identified as having a 50% - 75% chance of groundwater flooding as noted within **Section 2.8** of this assessment. However, the SFRA and the EA do not have any past records of the site undergoing groundwater flooding. In addition, large areas of the site are currently paved, with further increases in hardstanding proposed. On this basis, the risk of groundwater flooding is considered to be low.

The risk of reservoir flooding has been determined as unlikely in this area.

6.5 Flood Risk Summary

Following the review of available flood information, the following can therefore be summarised in terms of flood risk:

River Flood Risk	**LOW**
Surface Water Flood Risk	**LOW**
Reservoir Flood Risk	**LOW**
Existing Drainage Flood Risk	**LOW**
New Drainage Flood Risk	**LOW**
Groundwater Flood Risk	**LOW**
Risk from Climate Change	**LOW**
Residual (Lifecycle) Primary River Flood Risk	**LOW**

6.6 Flood Mitigation

The drainage system proposed as part of this development will further reduce the risk of surface water flooding. The drainage scheme for the site will be designed to accommodate a 1-in-100-year storm event, with a 45% allowance for climate change, thereby ensuring robust protection against increased rainfall intensity. This approach will provide a standard protection level but will also aim to deliver a betterment to the existing system, reducing flood risk to both the site and adjacent properties.

The discharge rate from the site will be restricted to a 50% betterment in existing discharge rate, to restrict flows as closely as possible to the natural (greenfield) runoff rate, with any excess water effectively attenuated on-site to prevent downstream flooding. The use of SuDS features will help to slow down water movement across the site, manage runoff sustainably, and contribute to enhanced water quality before any discharge into the surrounding network.

7.0 Surface Water Management

7.1 Existing Drainage

The existing site is currently drained by a combined sewer located within hardstanding to the East of the boundary. This public combined sewer flows from North to South.

The topographical and utility survey included at **Appendix C** indicates that the entire site currently discharges via the single outfall to the East. This is assumed to discharge into the public combined sewer, subject to confirmatory CCTV survey. The existing positively drained area totals 0.177 Ha. Using the Wallingford Modified Rational Method the existing discharge rate is calculated as 25.8l/s.

7.2 Drainage Proposals & Discharge

In order to calculate the proposed development discharge rate, we have reviewed the positively drained areas to determine an allowable discharge rate. As the site is currently drained, we have used the brownfield runoff rate noted above and applied a 50% betterment. Refer to **Appendix E** for the hydraulic calculations.

The site will therefore aim to achieve a total allowable discharge rate of **12.9l/s.**

7.3 NPPG SuDS Hierarchy

The National Planning Practice Guidance (NPPG) sets out the drainage hierarchy for all developments with the aim of any development to provide a system designed to the highest step first before continuing to the next lower step as required. The hierarchy, in order is to drain:

- Via infiltration (into the ground)
- To a surface water body
- To a surface water sewer or highway drainage system
- To a combined sewer.

Below we explain how the hierarchical approach has been assessed in relation to the development:

7.3.1 Infiltration (into the ground)

It is expected that infiltration of surface water is unlikely to be feasible due to the proximity to the River Colne, the potential for high groundwater, and the existing discharge method. Although unlikely, infiltration testing may be needed at detailed design to confirm suitability.

7.3.2 To a surface water body

The closest watercourse to the site is the River Colne, which is approximately 200m to the East of the boundary. Therefore, there are no available watercourses within a reasonable vicinity of the site, without significant crossing of 3rd party land. This method of surface water disposal has been assessed as unsuitable.

7.3.3 To a surface water sewer or highway Drain

As there are no existing surface water sewers in the vicinity of the site, a connection to this receptor will not be viable.

7.3.4 To a Combined Sewer

An existing public combined water sewer currently runs through hardstanding areas to the East of the site. This sewer serves as an existing outfall to the existing drainage network. Therefore, this is considered the most viable option of discharge.

7.4 Sustainable Drainage Systems

The proposed development works comprise an area of 0.177ha. The proposed discharge rate is 12.9/s. A 45% climate change allowance within the 1 in 100 year storm has been allowed for, as per best practice guidance.

The volume of below-ground storage required to balance the surface water run-off from the proposed impermeable area with a discharge rate as stated above is approximately 105m3. The storage is proposed to be provided in a combination of the proposed drainage network, permeable paving and a geocellular attenuation tank.

Rain gardens have been proposed as part of the surface water drainage network. This will allow for some of the carriageway/ parking area to be taken. A Class 1 bypass separator has also been designed into the drainage to take the remaining areas tracked by vehicles.

The contractor is responsible for obtaining approvals from Yorkshire Water (i.e. S106).

7.5 Source Control

Source Control is described within the SuDS Management train by the LLFA as:

"Control of runoff at or very near its source (e.g., the use of permeable/infiltrating drainage or green roofs)"

7.6 Site Control

Site Control is described within the SuDS Management train by the LLFA as:

"management of runoff from specific site sections (e.g., routing water from roofs and car parks to infiltration or using swales to transport water through the site allowing infiltration and evaporation)"

Where possible, areas of hard standing will drain to areas of soft landscaping, filter drains and permeable surfaces. The SuDS used on-site are shown on the drainage layout in **Appendix D**.

7.7 Surface Water Quality

The water quality treatment train has been determined based on CIRIA 753 The SuDS Manual. The appraisal of the potential development characteristics and relevant SuDS components is presented below, demonstrating that the relevant indices can be met through the use of the SuDS Management Train.

Minimum water quality management requirements for discharges to receiving surface waters and groundwater (The SuDS Manual, 2015, Table 4.3)		
Land use	**Pollution hazard level**	**Requirement for discharge to surface waters and groundwater**
Individual property driveways and hardstanding	Low	Simple index approach
Steps in the simple index approach (The SuDS Manual, 2015, Box 26.2): 1. Allocate suitable pollution hazard indices for the proposed land use. 2. Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index. **3.** Where the discharge is to protected surface waters or groundwater, consider the need for a more precautionary approach.		
Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required: Total SuDs mitigation index = mitigation index 1 + 0.5 * mitigation index 2 etc. A factor of 0.5 is used to account for the reduced performance of secondary or tertiary components where the discharge is of already reduced inflow concentrations to protected waters.		

Pollution hazard indices for different land use classifications (The SuDS Manual, 2015, Table 26.3)				
Land use	**Pollution hazard level**	**Total suspended solids TSS**	**Metals**	**Hydrocarbons**

Parking	Low	0.5	0.4	0.4

Indicative SuDS mitigation indices for discharges to surface water (SuDS Manual, 2015, Table 26.4)

Type of SuDS component	TSS	Metals	Hydrocarbons
Bioretention rain gardens & tree pits	0.8	0.8	0.8
Filter drains	0.4	0.4	0.4
Bypass petrol interceptor	0.8	0.6	0.7

The above demonstrates that there is sufficient scope to provide the required mitigation against potential pollution.

8.0 Occupants and Users of the Development (Access & Egress)

8.1 Flood Warnings

It is an important consideration of a Flood Risk Assessment to consider access and egress arrangements for the occupants and users of the development, should they encounter major flooding as outlined within this flood risk assessment, occurring within the development lifecycle. It should be noted that the development is not in an area covered by the Environment Agency Flood Warnings.

8.2 Access and Egress

There are areas of low flood risk around the site, and the site is assessed to be at a low flood risk, so the risk of impacts to access and egress is low. It should be noted that the drainage system is designed for events up to a 1 in 100-year event plus 45% climate change.

9.0 Exception Test

As per the Environment Agency Map for Rivers and Flooding, the site is in Flood Zone 1 and therefore an Exception Test is not required.

10.0 Residual Risk

A Flood Risk Assessment should consider the residual risk to a proposed development for its intended lifecycle. In this case, with the master plan consisting of non-residential development, a 75 year lifecycle is assumed.

The detailed assessment of predicted extreme 1 in 100-year plus climate change flood extents mitigation, and displacement assessment provided shows the site will be safe and not increase risk to others for its intended lifecycle. The residual risk is therefore considered **LOW**.

11.0 Flood Risk Assessment Credentials

This Flood Risk Assessment has been undertaken by Hexa Civil Engineering team, who have extensive combined experience of civil engineering and flood risk assessment preparation. This Flood Risk Assessment has been carried out following the general requirements of the NPPF.

12.0 Summary

Environment Agency Flood Map for Planning shows the site to be located fully within Flood Zone 1, representing low flood risk. Surface water flood risk has been assessed, and the risk is identified generally as low. However, consideration of doorway and external paving levels will be needed to provide a high level of mitigation against the most extreme surface water flood event.

Reservoir flooding has also been assessed, and the site is considered to be at low risk from all other sources. Risk from climate change and long-term residual risk has been assessed against the proposed lifecycle, and risk is considered very low. The risk of groundwater flooding has been found to be between 50%-75%, giving a moderate groundwater flood risk status. However, the SFRA and the EA do not have any past records of the site undergoing groundwater flooding.

The proposed drainage has been designed to ensure that any flooding is mitigated up to the 100 year + 45% climate change, and any flooding that occurs on this storm event can be controlled onsite. This will ultimately be discharged into a combined public sewer East of the site owned by Yorkshire Water.

The drainage strategy employs a sustainable approach, integrating features to control peak flow rates, manage runoff, and improve water quality. By managing water close to the source and slowing its movement across the site, the strategy aims to reduce pressure on the downstream drainage network.

On-site storage will be provided via permeable paving, bio-retention systems, and a geocellular attenuation tank to attenuate excess water during heavy rainfall. The above flood mitigation recommendations and surface water drainage strategy meet requirements and create a sustainable, long-term solution that effectively addresses flood risk in the present and future.

13.0 Appendices

Appendix A – Yorkshire Water Asset Map

Appendix B – Proposed Site Plan

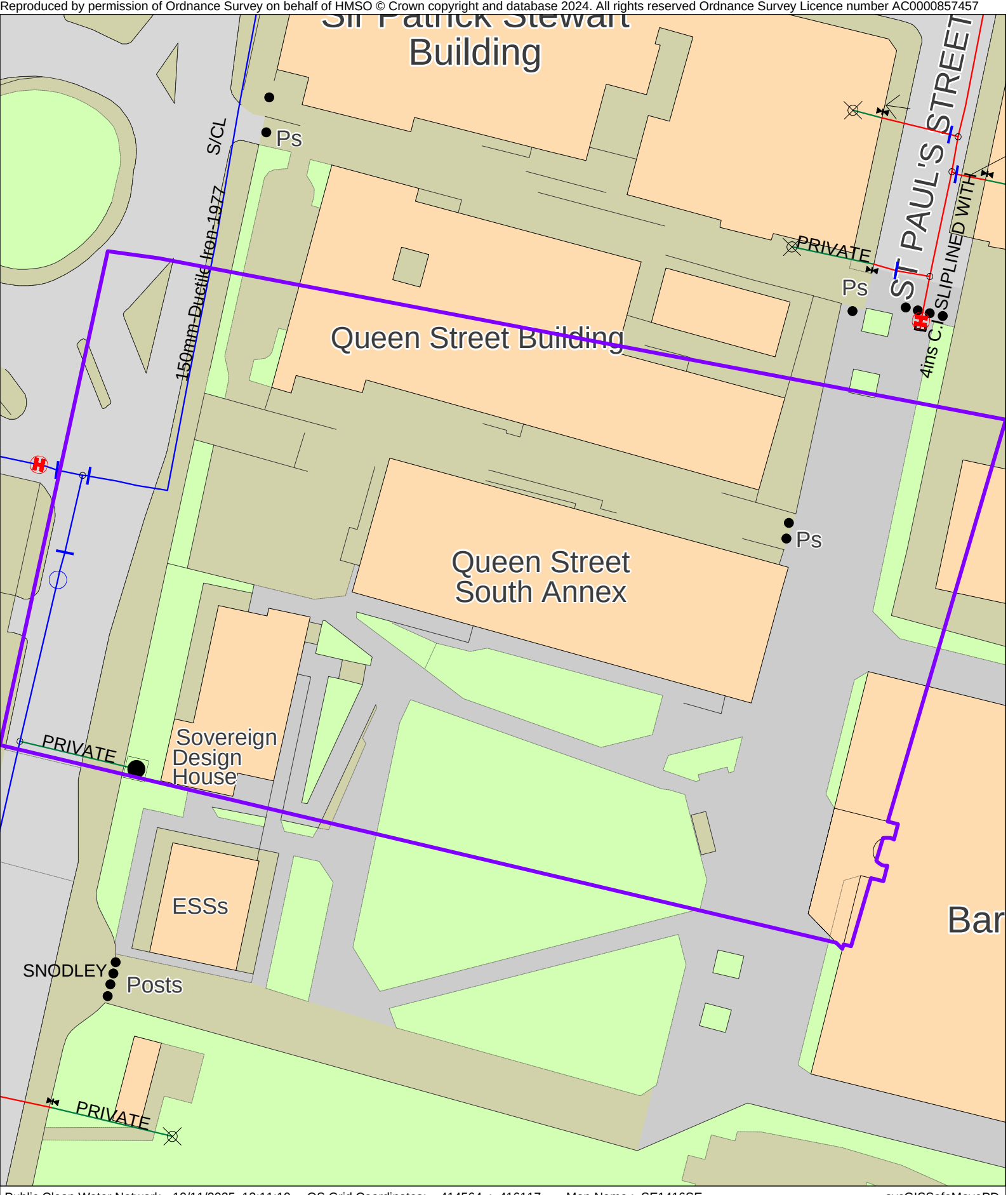
Appendix C – Topographical and Utility Survey

Appendix D – Proposed Drainage Layout

Appendix E – Flow Calculation

Appendix A – Yorkshire Water Asset Map

www.yorkshirewater.co.uk



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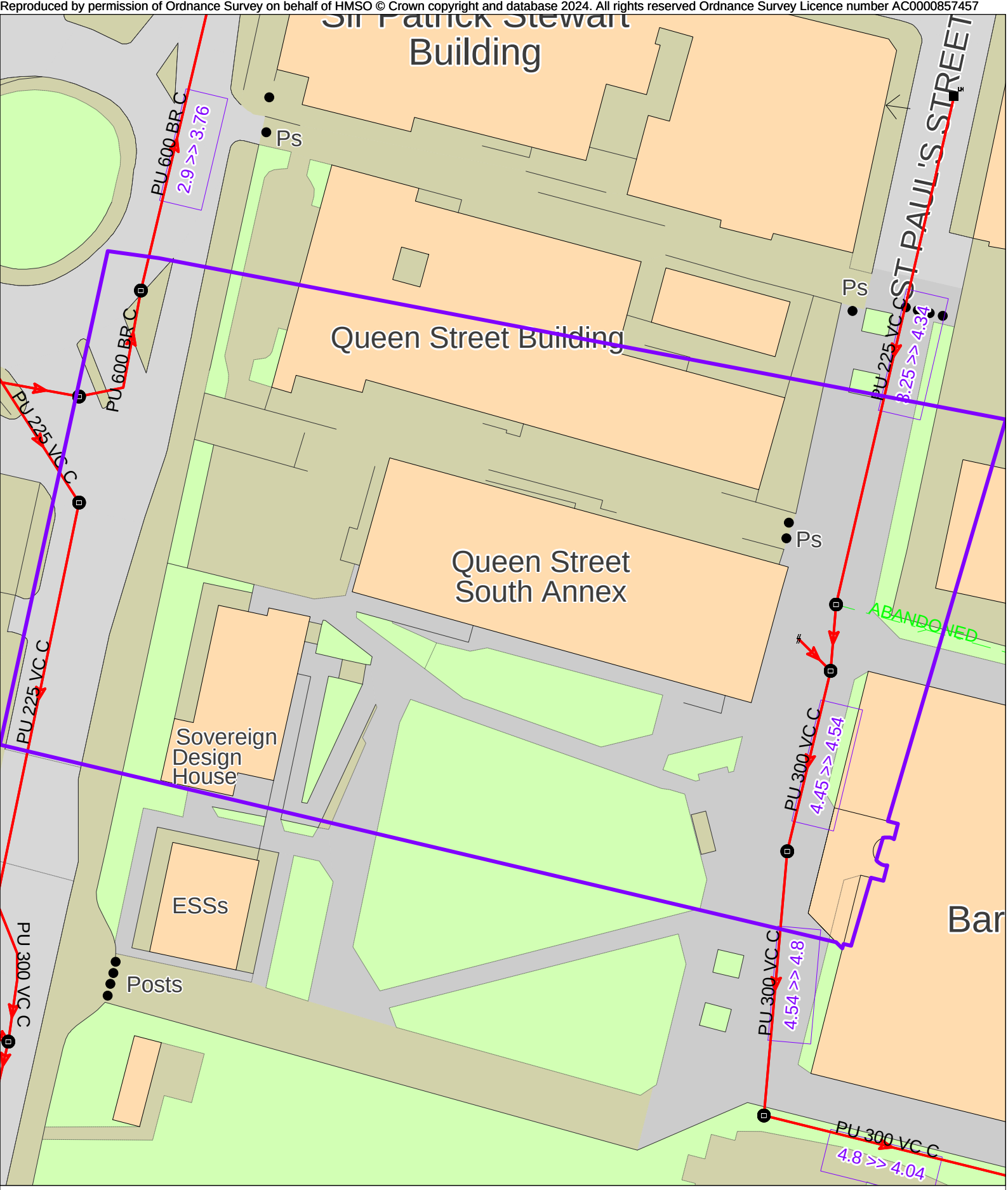
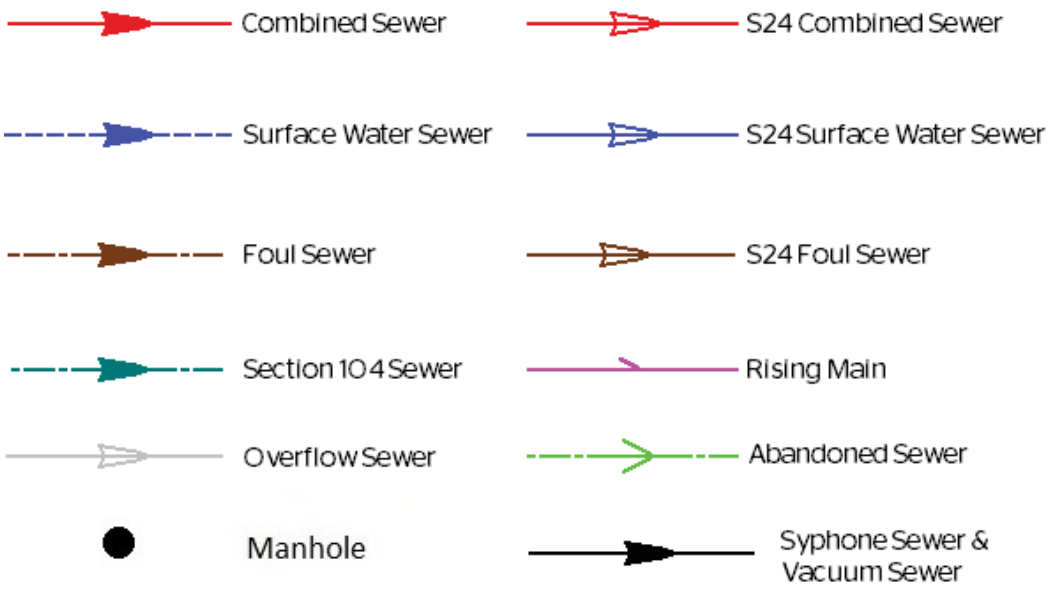


Public Waste Water Network 10/11/2025 13:11:20 OS Grid Coordinates: 414564 : 416117 Map Name : SE1416SE svcGISSafeMovePD

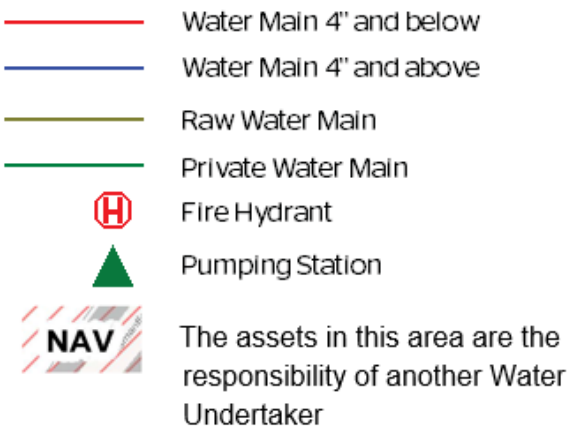
Property Identfier

Sewer Legend

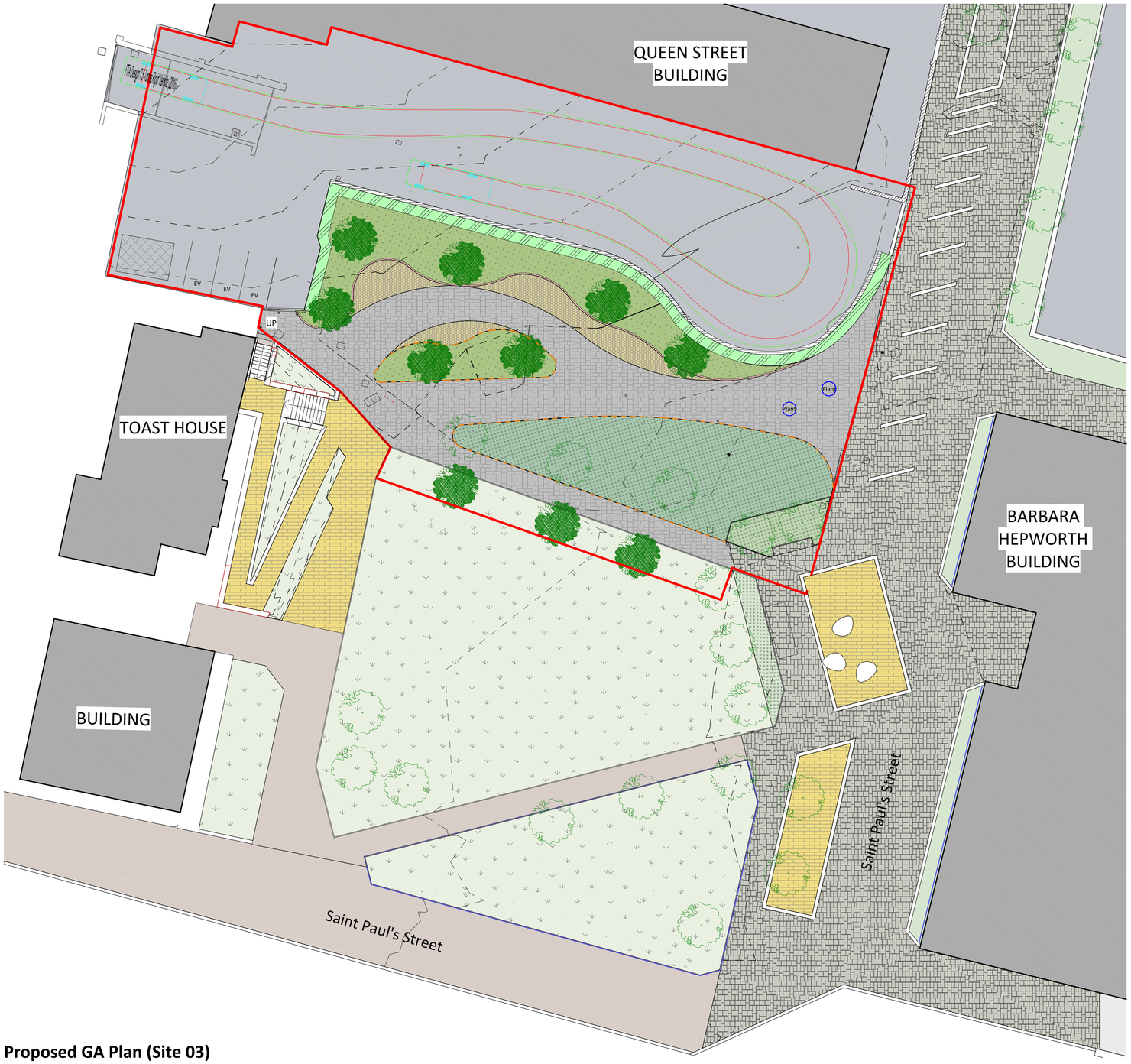


Please note that the direction of flow arrows may not always appear depending on the scale of the map.

Water Legend



Appendix B – Proposed Site Plan



1. Proposed GA Plan (Site 03)

SCALE - 1 : 200@A1

1:200 Scale 0 2m 4m 10m 20m

- Site Boundaries
- Existing Tactile Paving
- Existing Grass Areas
- Existing Balustrade
- Existing Buildings
- Existing Seating
- Existing Lighting
- Battery storage
- Existing Ornamental Planting
- Existing Marshals Modal Paving Slabs 300/200 X 200 X 80mm Colour: 80% Light Granite, 20% Mid Grey Granite
- Existing Paving
- Existing Conservation Kerb - Flush Type: Marshalls Conservation Kerb. Size: 255 x 145 X915mm Finish: Silver Grey, Textured
- Existing Timber Fence Retained and Enhanced
- Existing Wall Retained
- Existing Johnsons of Wellfield Classic Buff Sandstone Paving Planks 75 x 150 x length (300-750mm), Joints: Steintec Tufftop natural Grey, 5mm
- Existing Streetlife Mobile Green Isle Module IV Planter
- Exiting Tree
- Existing Artform Urban Stone Bench
- Exiting DW Windsor Sephora Radius Halo Light Column
- Existing Streetlife Podium Isle
- Proposed Raingardens
- Proposed Wildflower Mix
- Proposed Hedge
- Proposed Topography/ Contours
- 10 x Proposed Trees
- Conservation Kerb 100mm Upstand Type: Marshalls Conservation Kerb Size: 255x 205 x 915mm Finish: Silver Grey, Textured.
- Proposed Bonded Resin
- Red Brick Edging
- Proposed Stone Wall
- Relocated planter
- Proposed Marshals Paving Slabs to match existing
- Proposed Tarmac

Rev	Date	Drn	Chk	Description
P05	28.01.26	AMG	CJPW	Revised to remove proposed logic edging and furniture, change kerb type and capture client comment amendements.
P04	19.12.25	CJPW	ADP	Planning Issue
P03	17.12.25	CJPW	ADP	Wall removed, paving areas updated
P02	09.12.25	CJPW	ADP	Design updates
P01	02.12.25	SR	CJPW	Preliminary Issue

GSSarchitecture
KETTERING | GLOUCESTER | HARROGATE | LEEDS | MILTON KEYNES | NEWCASTLE

Project Title: Campus Landscaping Schemes

Client: University of Huddersfield

Drawing Title: Proposed GA Plan (Site 03)

Drawn By:	Checked By:	Scale @A1:	Date:
YR	CJPW	As indicated	02.01.2025

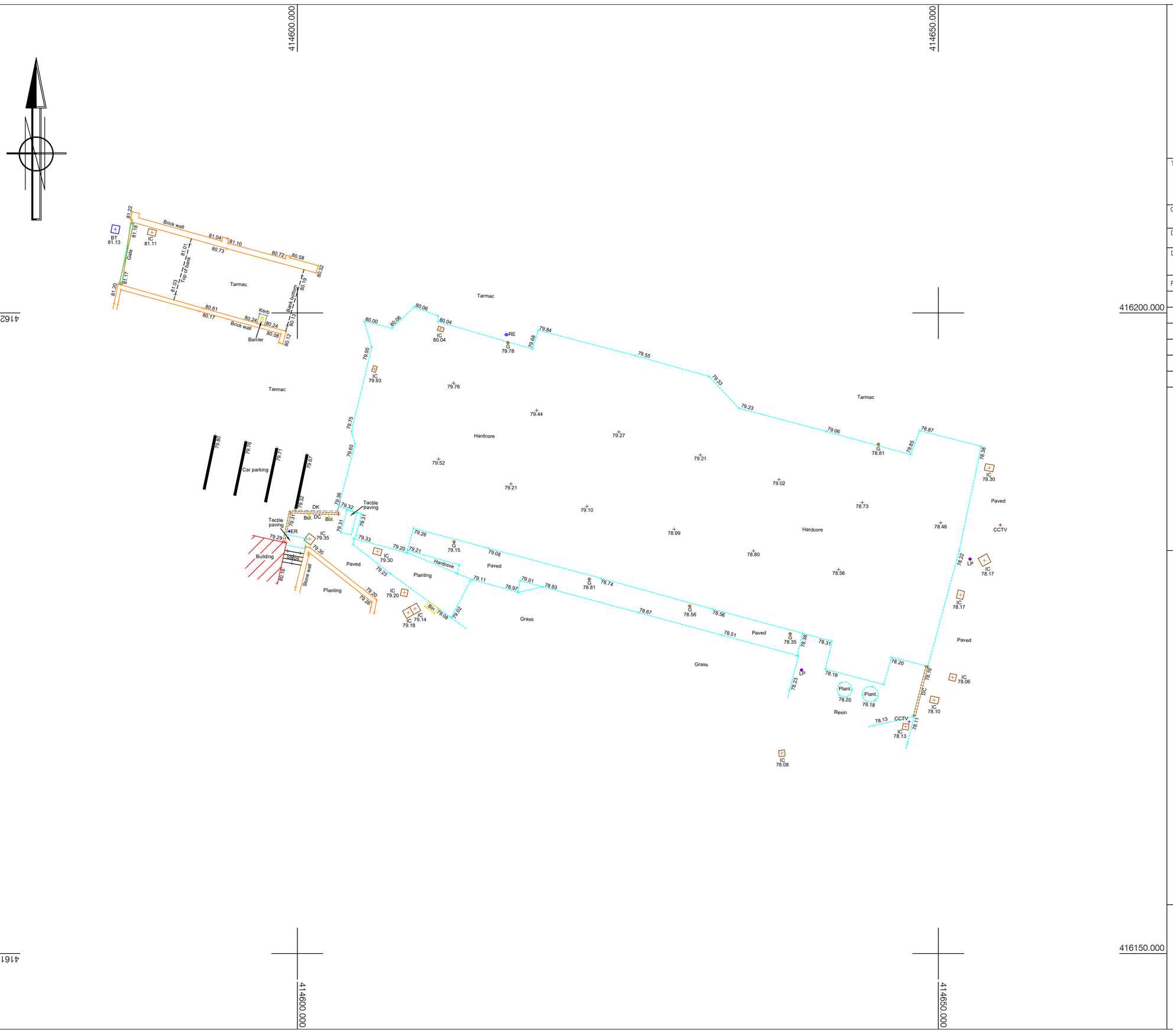
Status: Preliminary Issue

File No: UNI049H

Drwg No: (00)300

Rev: P05

Appendix C – Topographical and Utility Survey



CSL SURVEYS Est.1971

CONSULTING SURVEYORS
LAND-BUILDING-ENGINEERING

751 Scott Hall Road ▪ Moortown ▪ Leeds
Tel 0132 893924 ▪ Tel 07739 753 651
Email info@cslsurveys.co.uk ▪ www.cslsurveys.co.uk

TITLE
Topographical Survey
Former Faith Building, Queensgate
University of Huddersfield

CLIENT
GSS Architecture

DATE	DRAWN BY	CHECKED BY
Nov 2025	EK	SA

DRAWING NO.	PLOT SCALE
16091 - 01	1:200 @ A2

REV	AMENDMENT	DATE	BY	CHKD.

NOTES

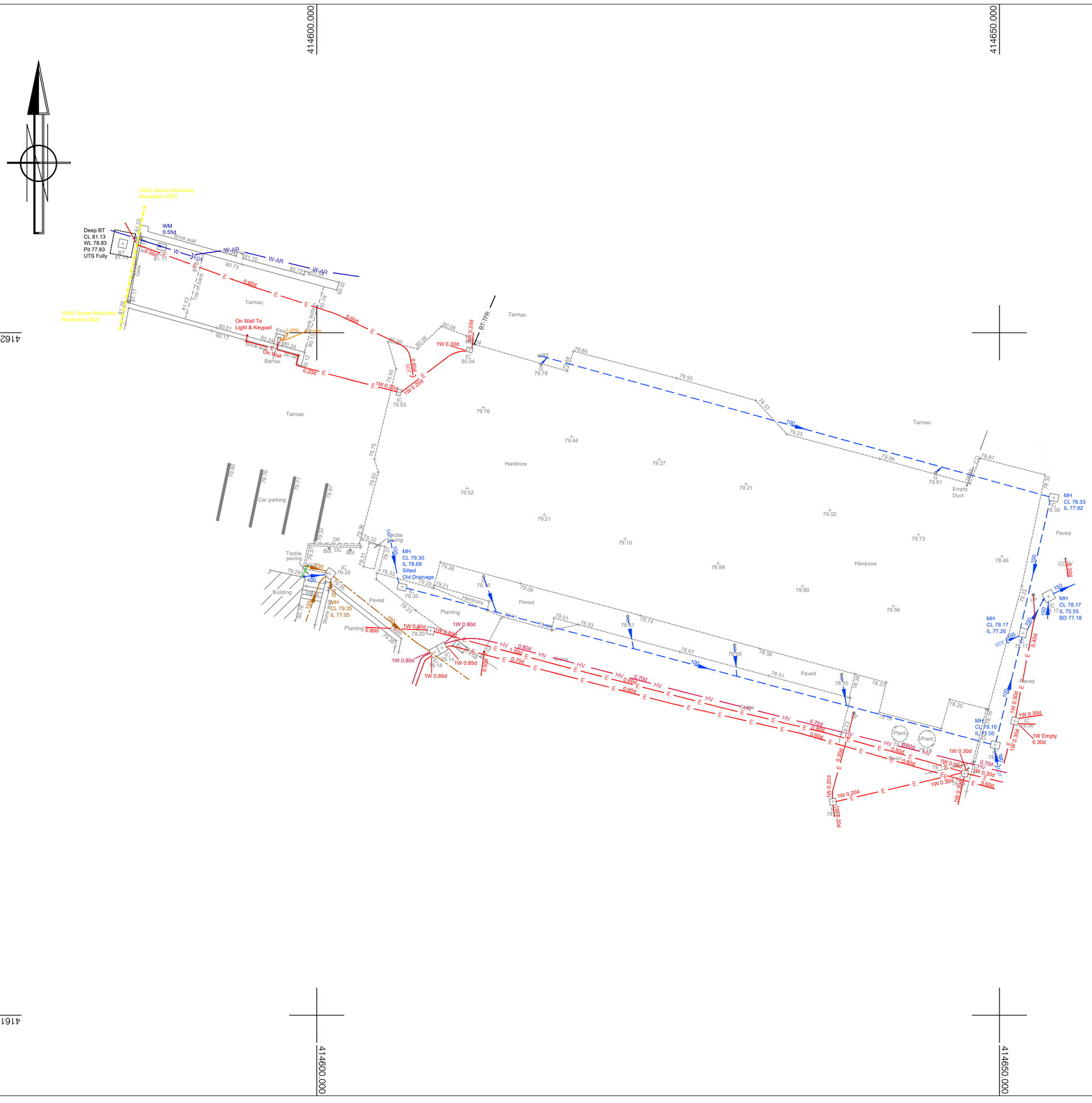
This survey has been fitted to Ordnance Survey Grid and Datum using GPS coordinates system OSGB36-15 and has been drawn at a scale factor of 1.0000.

Although this survey is tied to Ordnance Survey, due to the scale factor, any setting out or design works should strictly use the control co-ordinates contained within the table.

Boundaries shown are physical features on site and do not necessarily represent the legal extents of ownership.

KEY

AC	-	Air Conditioning	GT	-	Gate
ARMC.	-	Armco Barrier	GV	-	Gas Valve
AV	-	Air Valve	H	-	Hedge
BALC.	-	Balcony	12.34	-	Hedge Height
BD	-	Building	IC	-	Inspection Chamber
BDCAN	-	Building Canopy	IL	-	Invert Level
BH	-	Borehole	K	-	Kerb
12.34	-	Bed Level	LP	-	Lamp post
BOB	-	Bottom Of Bank	MK	-	Marker
BOL	-	Bollard	NB	-	Notice Board
BRDG	-	Bridge	OC	-	Overhead Cable
BSHEL	-	Bus Shelter	PI	-	Pipe
BSTOP	-	Bus Stop	PE	-	Playground Equipment
BT	-	British Telecom	PRT	-	Portacabin
BUSH	-	Bush	PST	-	Post
CARA.	-	Caravan	RD	-	Ridge
CATV	-	CATV	RE	-	Rodding Eye
CB	-	Control Box	RM	-	Road Markings
CBL	-	Cable	RMP	-	Ramp
CCTV	-	CCTV	RS	-	Road Sign
COL.	-	Column	SF	-	Street Furniture
CON.	-	Contour	SHD	-	Shed
CP	-	Car Parking	ST	-	Stone
CPY	-	Canopy	STP	-	Steps
CSL	-	Survey Station	SV	-	Stop Valve
CTR	-	Container	12.34	-	Threshold
DC	-	Drainage Channel	TL	-	Traffic Light
DIA	-	Diameter	TNK	-	Tank
DK	-	Drop Kerb	TOB	-	Top Of Bank
EA	-	Edge Area	TP	-	Telegraph Pole
EP	-	Electric Pole-Pylon	TPT	-	Telegraph Pole Tie
ER	-	Earth Rod	12.34	-	Tree Height
EV	-	Eaves	TT	-	Tree Trunk
F	-	Fence	UTL	-	Unable To Lift
FE	-	Fire Escape	V	-	Vegetation
FH	-	Fire Hydrant	12.34	-	Vegetation Height
12.34	-	Fence Height	VN	-	Vent
12.34	-	Floor Level	W	-	Wall
FP	-	Flag Pole	12.34	-	Wall Height
FR	-	Flat Roof	12.34	-	Water Level
G	-	Gully	WM	-	Water Meter
GARG	-	Garage	WO	-	Water Orifice
GH	-	Greenhouse	WTR	-	Water



CSL SURVEYS

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751 Scott Hall Road ▪ Moortown ▪ Leeds
Tel 0132 893924 ▪ Tel 07739 753 651
Email info@cslsurveys.co.uk ▪ www.cslsurveys.co.uk

TITLE

Utility Survey
Former Faith Building, Queensgate
University of Huddersfield

CLIENT

GSS Architecture

DATE	DRAWN BY	CHECKED BY
Nov 2025	EK	SA

DRAWING NO.	PLOT SCALE
16091 - 02	1:200 @ A2

REV	AMENDMENT	DATE	BY	CHKD.

NOTES

This survey has been fitted to Ordnance Survey Grid and Datum using GPS coordinates system OSGB36-15 and has been drawn at a scale factor of 1.0000.

Although this survey is tied to Ordnance Survey, due to the scale factor, any setting out or design works should strictly use the control co-ordinates contained within the table.

Boundaries shown are physical features on site and do not necessarily represent the legal extents of ownership.

UTILITY KEY

- Foul Water Drain
- Foul Water 300ø and above
- Surface Water Drain
- Surface Water Drain 300ø and above
- Combined Water Drain
- Combined Water Drain 300ø and above
- End of trace — EOT
- Electric cables
- HV cables
- Gas
- Water
- Telephone
- Catv
- CCTV
- Comms
- Fibre Optics
- Pipe
- Vents
- Unidentified GPR
- Unidentified EML
- Taken From Records
- Assumed Routes
- Trench Scar
- Service Duct

Where chamber extents are significantly greater than the cover size, their approximat extents are shown thus;

Appendix D – Proposed Drainage Layout

QUEEN STREET BUILDING

TOAST HOUSE

RAIN GARDENS ARE PROPOSED WITHIN THE LANDSCAPING AREAS. TO BE CONFIRMED BY THE LANDSCAPE ARCHITECT

EXISTING SURFACE WATER DRAINAGE RUN AND ASSOCIATED GULLIES TO BE REMOVED

ASSUMED OUTLET BOX TO BE LOCATED AT LOW SPOT. TO BE CONFIRMED AT DETAILED DESIGN

EXISTING SURFACE WATER DRAINAGE FROM CAR PARK TO DRAIN IN A SOUTH-EAST DIRECTION TO THE RAIN GARDEN

PROPOSED SURFACE WATER TO DRAIN FROM FOOTPATH TO RAIN GARDEN

EXISTING SURFACE WATER DRAINAGE RUN AND ASSOCIATED GULLIES TO BE ABANDONED

PROPOSED SURFACE WATER TO DRAIN FROM FOOTPATH TO LANIER DRAINAGE

PROPOSED FLOW CONTROL

PROPOSED OUTFALL TO EXISTING SURFACE WATER MANHOLE

PROPOSED CLASS 1 BYPASS SEPARATOR. MODEL AND SPEC TBC

FLOW ROUTE

SW MH 01
CL: 79.760
IL: 78.671
DEPTH: 1.089

SW RE 01
CL: 79.360
IL: 78.760
DEPTH: 0.600

SW RE 02
CL: 79.150
IL: 78.550
DEPTH: 0.600

SW MH 02
CL: 79.100
IL: 78.452
DEPTH: 0.648

SW MH 03
CL: 79.520
IL: 77.440
150mm IL IN: 78.36
150mm IL IN: 78.52
225mm IL IN: 77.44
225mm IL OUT: 77.44
CATCHPIT

SW MH 05
1,200 dia PCC
CL: 78.900
IL: 77.481
CATCHPIT

SW RE 03
CL: 78.750
IL: 78.150
DEPTH: 0.600

SW MH 06
CL: 78.460
IL: 75.934
DEPTH: 2.526

EX SW
CL: 78.170
IL: 75.550
DEPTH: 2.620

Geocelluar Attenuation Tank
CL 78.81
TOT 77.61
BOT 76.410
Vol 57m³ with 95% voids
Gradient 1:500

TANK IN 77.428m
TANK IN 77.396m
TANK OUT 76.410m

150Ø 1:100 Perforated Pipe
225Ø 1:100
225Ø 1:24
225Ø 1:34
225Ø 1:13
225Ø 1:10

Silted Old Drainage

MH CL 78.33 IL 77.82
MH CL 78.17 IL 77.26
MH CL 78.10 IL 77.50

Plant

EV
UP

Notes

1. Do no⁽ scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in meters unless notec otherwise. All levels in metres unless notec otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. This drawing should be printed and read in colour.

Design Notes

1. DESIGN ASSUMES SURFACE WATER FLOWS RESTRICTED TO EXISTING 1 IN 1 YEAR BROWNFIELD RUN-OFF RATES WITH 50% BETTERMENT AND USING THE MODIFIED RATIONAL METHOD :
   - EXISTING DISCHARGE RATE:
     BASED ON 53.7mm/hr RAINFALL INTENSITY =
     2.78 x 0.975 x 53.7 x 0.177 = 25.8l/s
   - PROPOSED DISCHARGE RATE
     BASED ON 50% BETTERMENT =
     25.8l/s x 50% = 12.9l/s
2. DRAINAGE LAYOUT SHOWN IN ABEYANCE SUBJECT TO RECEIPT OF PROPOSED LEVELS DESIGN.

Legend

- RED LINE BOUNDARY
- PROPOSED SURFACE WATER
- PROPOSED LEANER DRAINAGE
- EXISTING SURFACE WATER
- PROPOSED ATTENUATION TANK
- PROPOSED BACKDROP
- PROPOSED RAIN GARDEN AS PER LANDSCAPE ARCHITECTS DETAIL
- PROPOSED 150mm PERFORATED PIPE (WRAPPED IN GEOTEXTILE MEMBRANE)
- PROPOSED LINEAR DRAINAGE SUMP AND ACCESS
- OVERLAND FLOW ROUTING

Rev	Date	Details of issue	Drawn	R'wd
P02	19.02.26	PRELIMINARY ISSUE	SWM	KMJ
P01	17.12.25	PRELIMINARY ISSUE	SWM	KMJ

Issues & Revisions

Consultant

HEXA

Client

UNIVERSITY OF HUDDERSFIELD

Project Title

SITE 3 - FORMER FAITH BUILDING

Drawing Title

PROPOSED DRAINAGE

Drawn By	SWM	Reviewed By	KMJ
Hexa Ref	700342	Scale at A1	1:100

Purpose of Issue: PRELIMINARY

Status: S1

Project - Originator - Zone - Level - Type - Role - Number: 700324-HEX-XX-XX-D-C-9200

Revision: P02

1m SCALE 1:100

Appendix E – Flow Calculation

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.310	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
SW RE 01	0.027	5.00	79.360	450	414604.882	416186.380	0.600	78.760
SW MH 01	0.007	5.00	79.760	450	414609.593	416193.981	1.089	78.671
SW RE 02	0.022	5.00	79.150	450	414612.227	416182.137	0.600	78.550
SW MH 02			79.100	450	414621.974	416182.793	0.648	78.452
SW RE 03	0.029	5.00	78.750	450	414638.970	416182.078	0.600	78.150
SW MH 03			79.520	1050	414624.533	416191.463	2.080	77.440
TANK IN 1			79.520	1	414624.868	416192.656	3.067	76.453
OUTLET BOX	0.083	5.00	78.730	450	414645.878	416183.742	1.184	77.546
SW MH 05			78.900	1200	414639.697	416185.571	1.418	77.482
TANK IN 2			78.950	1	414640.467	416188.378	2.529	76.421
TANK OUT			78.900		414646.125	416187.576	2.490	76.410
SW MH 06			78.460	1800	414649.851	416182.382	2.526	75.934
EX SW			78.170	675	414653.446	416181.025	2.620	75.550

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	SW RE 01	SW MH 01	8.943	0.600	78.760	78.671	0.089	100.0	150	5.15	50.0
1.001	SW MH 01	SW MH 03	15.151	0.600	78.671	78.519	0.152	100.0	150	5.40	50.0
2.000	SW RE 02	SW MH 02	9.769	0.600	78.550	78.452	0.098	100.0	150	5.16	50.0
2.001	SW MH 02	SW MH 03	9.040	0.600	78.452	78.362	0.090	100.0	150	5.31	50.0
3.000	SW RE 03	SW MH 03	17.219	0.600	78.150	77.440	0.710	24.3	225	5.11	50.0
1.002	SW MH 03	TANK IN 1	1.239	0.600	77.440	77.428	0.012	103.3	255	5.41	50.0
T1	TANK IN 1	TANK IN 2	16.175	0.600	76.453	76.421	0.032	500.0	225	5.88	50.0
4.000	OUTLET BOX	SW MH 05	6.446	0.600	77.546	77.482	0.064	100.0	225	5.08	50.0
4.001	SW MH 05	TANK IN 2	2.911	0.600	77.482	77.396	0.086	33.8	225	5.10	50.0
T2	TANK IN 2	TANK OUT	5.715	0.600	76.421	76.410	0.011	500.0	225	6.05	50.0
1.003	TANK OUT	SW MH 06	6.392	0.600	76.410	75.934	0.476	13.4	225	6.08	50.0
1.004	SW MH 06	EX SW	3.843	0.600	75.934	75.550	0.384	10.0	150	6.10	50.0

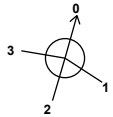
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.005	17.8	4.9	0.450	0.939	0.027	0.0	54	0.858
1.001	1.005	17.8	6.1	0.939	0.851	0.034	0.0	61	0.912
2.000	1.005	17.8	4.0	0.450	0.498	0.022	0.0	48	0.813
2.001	1.005	17.8	4.0	0.498	1.008	0.022	0.0	48	0.813
3.000	2.667	106.1	5.2	0.375	1.855	0.029	0.0	34	1.399
1.002	1.394	71.2	15.4	1.825	1.837	0.085	0.0	80	1.118
T1	0.578	23.0	15.4	2.842	2.304	0.085	0.0	135	0.619
4.000	1.307	52.0	15.0	0.959	1.193	0.083	0.0	82	1.131
4.001	2.256	89.7	15.0	1.193	1.329	0.083	0.0	62	1.685
T2	0.578	23.0	30.4	2.304	2.265	0.168	0.0	225	0.589
1.003	3.589	142.7	30.4	2.265	2.301	0.168	0.0	70	2.861
1.004	3.204	56.6	30.4	2.376	2.470	0.168	0.0	78	3.259

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	8.943	100.0	150	Circular	79.360	78.760	0.450	79.760	78.671	0.939
1.001	15.151	100.0	150	Circular	79.760	78.671	0.939	79.520	78.519	0.851
2.000	9.769	100.0	150	Circular	79.150	78.550	0.450	79.100	78.452	0.498
2.001	9.040	100.0	150	Circular	79.100	78.452	0.498	79.520	78.362	1.008
3.000	17.219	24.3	225	Circular	78.750	78.150	0.375	79.520	77.440	1.855
1.002	1.239	103.3	255	Circular	79.520	77.440	1.825	79.520	77.428	1.837
T1	16.175	500.0	225	Circular	79.520	76.453	2.842	78.950	76.421	2.304
4.000	6.446	100.0	225	Circular	78.730	77.546	0.959	78.900	77.482	1.193
4.001	2.911	33.8	225	Circular	78.900	77.482	1.193	78.950	77.396	1.329
T2	5.715	500.0	225	Circular	78.950	76.421	2.304	78.900	76.410	2.265
1.003	6.392	13.4	225	Circular	78.900	76.410	2.265	78.460	75.934	2.301
1.004	3.843	10.0	150	Circular	78.460	75.934	2.376	78.170	75.550	2.470

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW RE 01	450	Manhole	Adoptable	SW MH 01	450	Manhole	Adoptable
1.001	SW MH 01	450	Manhole	Adoptable	SW MH 03	1050	Manhole	Adoptable
2.000	SW RE 02	450	Manhole	Adoptable	SW MH 02	450	Manhole	Adoptable
2.001	SW MH 02	450	Manhole	Adoptable	SW MH 03	1050	Manhole	Adoptable
3.000	SW RE 03	450	Manhole	Adoptable	SW MH 03	1050	Manhole	Adoptable
1.002	SW MH 03	1050	Manhole	Adoptable	TANK IN 1	1	Manhole	Adoptable
T1	TANK IN 1	1	Manhole	Adoptable	TANK IN 2	1	Manhole	Adoptable
4.000	OUTLET BOX	450	Manhole	Adoptable	SW MH 05	1200	Manhole	Adoptable
4.001	SW MH 05	1200	Manhole	Adoptable	TANK IN 2	1	Manhole	Adoptable
T2	TANK IN 2	1	Manhole	Adoptable	TANK OUT		Junction	
1.003	TANK OUT		Junction		SW MH 06	1800	Manhole	Adoptable
1.004	SW MH 06	1800	Manhole	Adoptable	EX SW	675	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW RE 01	414604.882	416186.380	79.360	0.600	450				
						0	1.000	78.760	150
SW MH 01	414609.593	416193.981	79.760	1.089	450	1	1.000	78.671	150
									
						0	1.001	78.671	150
SW RE 02	414612.227	416182.137	79.150	0.600	450				
						0	2.000	78.550	150
SW MH 02	414621.974	416182.793	79.100	0.648	450		1	2.000	78.452	150
							0	2.001	78.452	150
SW RE 03	414638.970	416182.078	78.750	0.600	450				
						0	3.000	78.150	225
SW MH 03	414624.533	416191.463	79.520	2.080	1050		1	3.000	77.440	225
							2	2.001	78.362	150
							3	1.001	78.519	150
							0	1.002	77.440	255
TANK IN 1	414624.868	416192.656	79.520	3.067	1	1	1.002	77.428	255
									
						0	T1	76.453	225
OUTLET BOX	414645.878	416183.742	78.730	1.184	450				
						0	4.000	77.546	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW MH 05	414639.697	416185.571	78.900	1.418	1200	1	4.000	77.482	225
						0	4.001	77.482	225
TANK IN 2	414640.467	416188.378	78.950	2.529	1	1	4.001	77.396	225
						2	T1	76.421	225
						0	T2	76.421	225
TANK OUT	414646.125	416187.576	78.900	2.490		1	T2	76.410	225
						0	1.003	76.410	225
SW MH 06	414649.851	416182.382	78.460	2.526	1800	1	1.003	75.934	225
						0	1.004	75.934	150
EX SW	414653.446	416181.025	78.170	2.620	675	1	1.004	75.550	150

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Additional Storage (m³/ha)	20.0
Rainfall Events	Singular	Winter CV	1.000	Starting Level (m)	
FSR Region	England and Wales	Analysis Speed	Normal	Check Discharge Rate(s)	x
M5-60 (mm)	19.000	Skip Steady State	x	Check Discharge Volume	x
Ratio-R	0.310	Drain Down Time (mins)	240		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	30	0	0	0
2	0	0	0	100	45	0	0

Node SW MH 06 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	75.934	Product Number	CTL-SHE-0138-1290-2750-1290
Design Depth (m)	2.750	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	12.9	Min Node Diameter (mm)	1500

Node TANK OUT Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	76.410
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	54

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	1.200	50.0	80.1	1.201	0.0	80.1

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW RE 01	10	78.812	0.052	4.2	0.0549	0.0000	OK
15 minute summer	SW MH 01	10	78.728	0.057	5.3	0.0165	0.0000	OK
15 minute summer	SW RE 02	10	78.596	0.046	3.4	0.0411	0.0000	OK
15 minute summer	SW MH 02	10	78.498	0.046	3.4	0.0073	0.0000	OK
15 minute summer	SW RE 03	10	78.181	0.031	4.5	0.0354	0.0000	OK
15 minute summer	SW MH 03	11	77.528	0.088	13.0	0.0760	0.0000	OK
15 minute summer	TANK IN 1	11	76.592	0.139	12.9	0.0000	0.0000	OK
15 minute summer	OUTLET BOX	10	77.629	0.083	12.9	0.1297	0.0000	OK
15 minute summer	SW MH 05	10	77.550	0.068	12.8	0.0765	0.0000	OK
15 minute summer	TANK IN 2	11	76.574	0.153	25.8	0.0000	0.0000	OK
30 minute summer	TANK OUT	23	76.507	0.096	28.9	4.5837	0.0000	OK
30 minute summer	SW MH 06	21	76.559	0.625	28.5	1.5915	0.0000	SURCHARGED
30 minute summer	EX SW	21	75.595	0.045	11.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW RE 01	1.000	SW MH 01	4.2	0.718	0.234	0.0518	
15 minute summer	SW MH 01	1.001	SW MH 03	5.2	0.857	0.290	0.0914	
15 minute summer	SW RE 02	2.000	SW MH 02	3.4	0.736	0.190	0.0449	
15 minute summer	SW MH 02	2.001	SW MH 03	3.4	0.753	0.189	0.0403	
15 minute summer	SW RE 03	3.000	SW MH 03	4.5	0.673	0.042	0.1519	
15 minute summer	SW MH 03	1.002	TANK IN 1	12.9	0.939	0.181	0.0171	
15 minute summer	TANK IN 1	T1	TANK IN 2	13.3	0.498	0.579	0.4403	
15 minute summer	OUTLET BOX	4.000	SW MH 05	12.8	1.101	0.247	0.0752	
15 minute summer	SW MH 05	4.001	TANK IN 2	12.7	1.424	0.142	0.0261	
15 minute summer	TANK IN 2	T2	TANK OUT	28.2	1.615	1.228	0.1060	
30 minute summer	TANK OUT	1.003	SW MH 06	28.5	0.945	0.200	0.1791	
30 minute summer	SW MH 06	1.004	EX SW	11.2	2.300	0.198	0.0188	15.2

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW RE 01	10	78.820	0.060	5.4	0.0635	0.0000	OK
15 minute summer	SW MH 01	10	78.737	0.066	6.8	0.0191	0.0000	OK
15 minute summer	SW RE 02	10	78.603	0.053	4.4	0.0473	0.0000	OK
15 minute summer	SW MH 02	10	78.505	0.053	4.4	0.0084	0.0000	OK
15 minute summer	SW RE 03	10	78.186	0.036	5.8	0.0401	0.0000	OK
15 minute summer	SW MH 03	11	77.541	0.101	16.7	0.0874	0.0000	OK
15 minute summer	TANK IN 1	10	76.619	0.166	16.7	0.0000	0.0000	OK
15 minute summer	OUTLET BOX	10	77.642	0.096	16.7	0.1503	0.0000	OK
15 minute summer	SW MH 05	10	77.561	0.079	16.6	0.0890	0.0000	OK
15 minute summer	TANK IN 2	10	76.597	0.176	33.1	0.0000	0.0000	OK
30 minute summer	TANK OUT	23	76.560	0.150	35.8	7.1226	0.0000	OK
30 minute winter	SW MH 06	24	76.589	0.655	30.2	1.6659	0.0000	SURCHARGED
30 minute winter	EX SW	24	75.595	0.045	11.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW RE 01	1.000	SW MH 01	5.4	0.761	0.302	0.0630	
15 minute summer	SW MH 01	1.001	SW MH 03	6.7	0.915	0.375	0.1105	
15 minute summer	SW RE 02	2.000	SW MH 02	4.4	0.785	0.246	0.0543	
15 minute summer	SW MH 02	2.001	SW MH 03	4.3	0.804	0.243	0.0486	
15 minute summer	SW RE 03	3.000	SW MH 03	5.8	0.759	0.054	0.1828	
15 minute summer	SW MH 03	1.002	TANK IN 1	16.7	1.005	0.234	0.0205	
15 minute summer	TANK IN 1	T1	TANK IN 2	16.6	0.542	0.722	0.5232	
15 minute summer	OUTLET BOX	4.000	SW MH 05	16.6	1.164	0.319	0.0921	
15 minute summer	SW MH 05	4.001	TANK IN 2	16.5	1.514	0.184	0.0318	
15 minute summer	TANK IN 2	T2	TANK OUT	36.5	1.898	1.588	0.1413	
30 minute summer	TANK OUT	1.003	SW MH 06	29.5	0.983	0.207	0.2169	
30 minute winter	SW MH 06	1.004	EX SW	11.2	2.300	0.198	0.0188	19.7

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW RE 01	10	78.851	0.091	10.3	0.0959	0.0000	OK
15 minute summer	SW MH 01	10	78.771	0.100	12.9	0.0288	0.0000	OK
15 minute summer	SW RE 02	10	78.627	0.077	8.4	0.0691	0.0000	OK
15 minute summer	SW MH 02	10	78.529	0.077	8.3	0.0123	0.0000	OK
15 minute summer	SW RE 03	10	78.199	0.049	11.1	0.0550	0.0000	OK
15 minute summer	SW MH 03	10	77.586	0.146	32.0	0.1261	0.0000	OK
30 minute summer	TANK IN 1	20	76.836	0.383	30.2	0.0000	0.0000	SURCHARGED
15 minute summer	OUTLET BOX	10	77.689	0.143	31.7	0.2227	0.0000	OK
15 minute summer	SW MH 05	10	77.599	0.117	31.5	0.1320	0.0000	OK
60 minute summer	TANK IN 2	43	76.829	0.408	45.8	0.0000	0.0000	SURCHARGED
60 minute summer	TANK OUT	44	76.825	0.415	45.2	19.7339	0.0000	SURCHARGED
60 minute summer	SW MH 06	44	76.822	0.888	31.9	2.2587	0.0000	SURCHARGED
240 minute summer	EX SW	124	75.595	0.045	11.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW RE 01	1.000	SW MH 01	10.2	0.865	0.575	0.1055	
15 minute summer	SW MH 01	1.001	SW MH 03	12.7	1.061	0.715	0.1818	
15 minute summer	SW RE 02	2.000	SW MH 02	8.3	0.910	0.469	0.0895	
15 minute summer	SW MH 02	2.001	SW MH 03	8.2	0.945	0.465	0.0789	
15 minute summer	SW RE 03	3.000	SW MH 03	11.0	0.847	0.104	0.2885	
15 minute summer	SW MH 03	1.002	TANK IN 1	31.7	1.194	0.446	0.0329	
30 minute summer	TANK IN 1	T1	TANK IN 2	29.5	0.742	1.284	0.6433	
15 minute summer	OUTLET BOX	4.000	SW MH 05	31.5	1.331	0.606	0.1525	
15 minute summer	SW MH 05	4.001	TANK IN 2	31.4	1.749	0.350	0.0523	
60 minute summer	TANK IN 2	T2	TANK OUT	45.2	1.541	1.969	0.2273	
60 minute summer	TANK OUT	1.003	SW MH 06	31.9	1.032	0.223	0.2542	
60 minute summer	SW MH 06	1.004	EX SW	11.2	2.300	0.198	0.0188	49.0

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW RE 01	11	79.085	0.325	19.3	0.3438	0.0000	FLOOD RISK
15 minute summer	SW MH 01	11	78.954	0.283	23.2	0.0816	0.0000	SURCHARGED
15 minute summer	SW RE 02	10	78.674	0.124	15.7	0.1104	0.0000	OK
15 minute summer	SW MH 02	10	78.572	0.120	15.5	0.0191	0.0000	OK
15 minute summer	SW RE 03	10	78.217	0.067	20.7	0.0754	0.0000	OK
15 minute summer	SW MH 03	11	77.656	0.216	58.3	0.1867	0.0000	OK
30 minute summer	TANK IN 1	19	77.574	1.121	56.1	0.0000	0.0000	SURCHARGED
15 minute summer	OUTLET BOX	10	77.817	0.271	59.3	0.4237	0.0000	SURCHARGED
15 minute summer	SW MH 05	10	77.662	0.180	58.8	0.2037	0.0000	OK
60 minute winter	TANK IN 2	60	77.588	1.167	62.8	0.0000	0.0000	SURCHARGED
60 minute winter	TANK OUT	58	77.546	1.136	61.8	53.9572	0.0000	SURCHARGED
120 minute summer	SW MH 06	92	77.543	1.609	28.0	4.0957	0.0000	SURCHARGED
600 minute winter	EX SW	345	75.595	0.045	11.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW RE 01	1.000	SW MH 01	18.4	1.043	1.035	0.1574	
15 minute summer	SW MH 01	1.001	SW MH 03	23.1	1.312	1.300	0.2603	
15 minute summer	SW RE 02	2.000	SW MH 02	15.5	1.014	0.876	0.1498	
15 minute summer	SW MH 02	2.001	SW MH 03	15.4	1.075	0.867	0.1295	
15 minute summer	SW RE 03	3.000	SW MH 03	20.6	0.880	0.194	0.4210	
15 minute summer	SW MH 03	1.002	TANK IN 1	58.4	1.400	0.820	0.0513	
30 minute summer	TANK IN 1	T1	TANK IN 2	53.7	1.350	2.337	0.6433	
15 minute summer	OUTLET BOX	4.000	SW MH 05	58.8	1.506	1.131	0.2380	
15 minute summer	SW MH 05	4.001	TANK IN 2	58.5	1.995	0.652	0.0847	
60 minute winter	TANK IN 2	T2	TANK OUT	61.8	1.553	2.687	0.2273	
60 minute winter	TANK OUT	1.003	SW MH 06	30.7	1.154	0.215	0.2542	
120 minute summer	SW MH 06	1.004	EX SW	11.2	2.300	0.198	0.0188	118.2