

SCC Capital Delivery Service

Stocksbridge Community Hub

Stocksbridge Towns Fund Community Hub Drainage Strategy

Reference: PC06176-ARP-ZZ-ZZ-RP-CD-50701

P02 | 14 December 2023

Job number 286736

Ove Arup & Partners Limited
3 St Paul's Place
Norfolk Street
Sheffield S1 2JE
United Kingdom
arup.com

Contents

1.	Introduction	1
2.	Site Overview	1
2.1	Development Description	2
2.2	Ground Conditions	3
3.	Flood Risk	3
4.	Existing Drainage	4
4.1	Foul Drainage	5
4.2	Surface Drainage	5
5.	Proposed drainage	6
5.1	Foul Drainage	6
5.2	Surface water Drainage	6
6.	SuDS	8
6.1	System I – Blue Roof	8
6.2	System II - Raingardens	8
7.	Conclusion	11

1. Introduction

This report summarises the key engineering features of the design for RIBA Stage 3. The report details the design aspirations of the project and the driving principles behind the design.

Ove Arup and Partners Ltd (Arup) has been commissioned by Sheffield City Council to develop the engineering design for ‘Stocksbridge’.

The proposal for the development is to revitalise the library and convert it into a mixed-use development, retaining the library functionality whilst adding a Grade A office commercial offering.

The document defines the existing drainage infrastructure and outlines the proposed drainage strategy for the development. This also includes the application of SuDS to reduce and improve the quantity and quality of water discharged from the site.

2. Site Overview

The Stocksbridge Library is located in Stocksbridge, Sheffield between Manchester Road and Button Row as shown in Figure 1 below. The grid reference is E 427000, N 398491

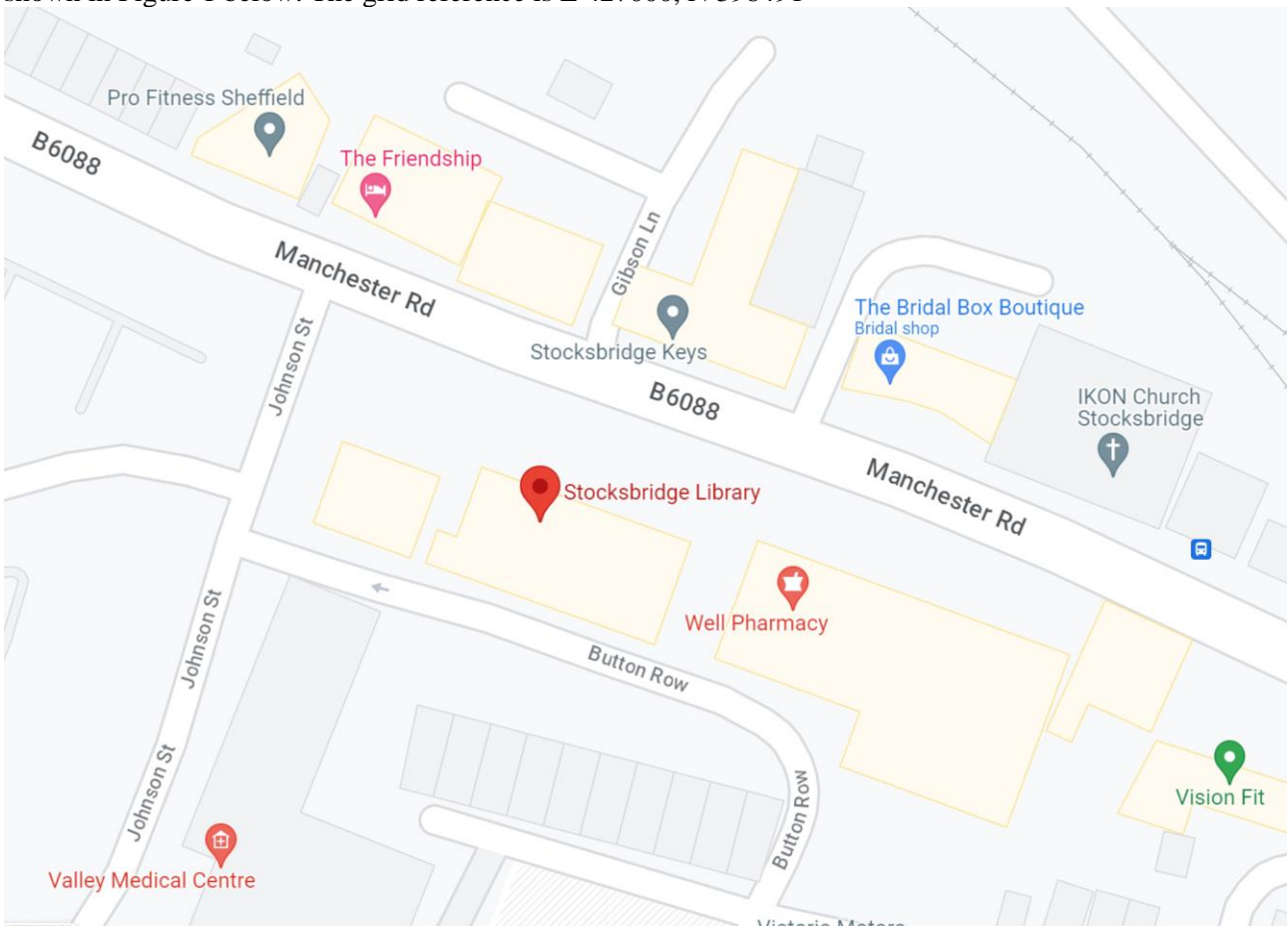


Figure 1 - Location of Site in Stocksbridge

2.1 Development Description

The proposed site is located south of Manchester Road and to the East of Johnson Street. It will be in the same location as the existing Stocksbridge library. The Site covers an area of approximately 0.19Ha. Stocksbridge Library was built in 1968 and has undergone several refurbishments over the course of its lifetime. It is a key location for the Town and still has frequent visitors.

The project aspiration is to revitalise the library and convert it into a mixed-use development. The plan below shows the red line boundary for the development which outlines the area where proposed works will be undertaken.

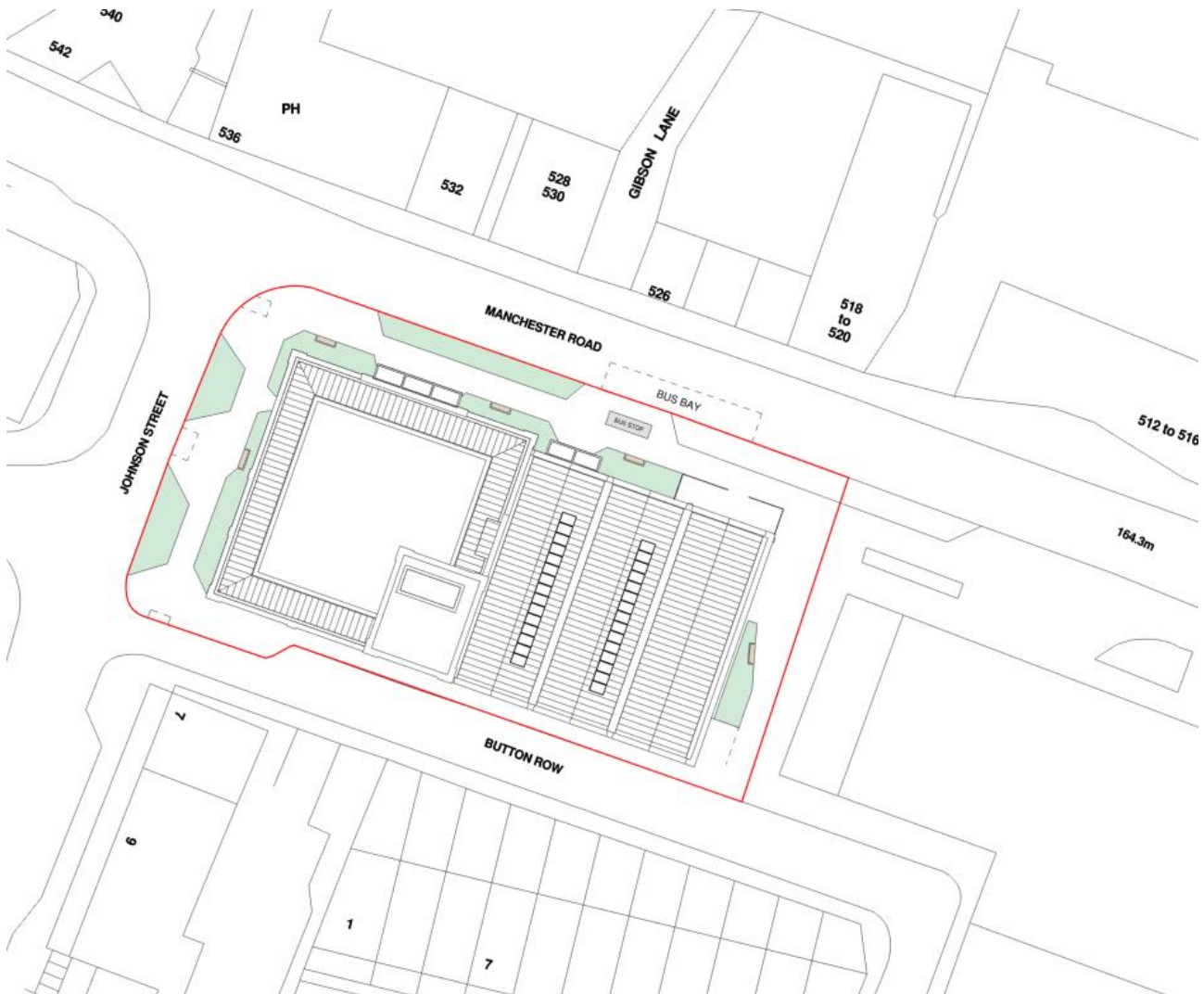


Figure 2 - Community hub red line boundary

2.2 Ground Conditions

The following information is based on British Geological Survey 1:10,000 geological mapping of the site. There is no site-specific ground investigation data. A ground investigation is proposed at the site.

2.2.1 Stratigraphy

Made ground is anticipated below the site to varying depths associated with the historical site uses including residential properties.

No superficial deposits are mapped within the site. Alluvium (clay and silt) is mapped to the north of the site, relating to the Little Don River.

The site is shown to be underlain by weathered Pennine Lower Coal Measures of mudstone, siltstone and sandstone. This is likely to have been weathered to a clay close to the surface.

2.2.2 Ground water

There is no site-specific ground water data.

3. Flood Risk

Flood risk has been assessed using the Environmental Agency flood maps and based on this data the proposed site area is shown to be located within Flood Zone 1. This means the site has a low probability of flooding. Most developments that are less than 1 hectare in flood zone 1 do not require a flood risk assessment.

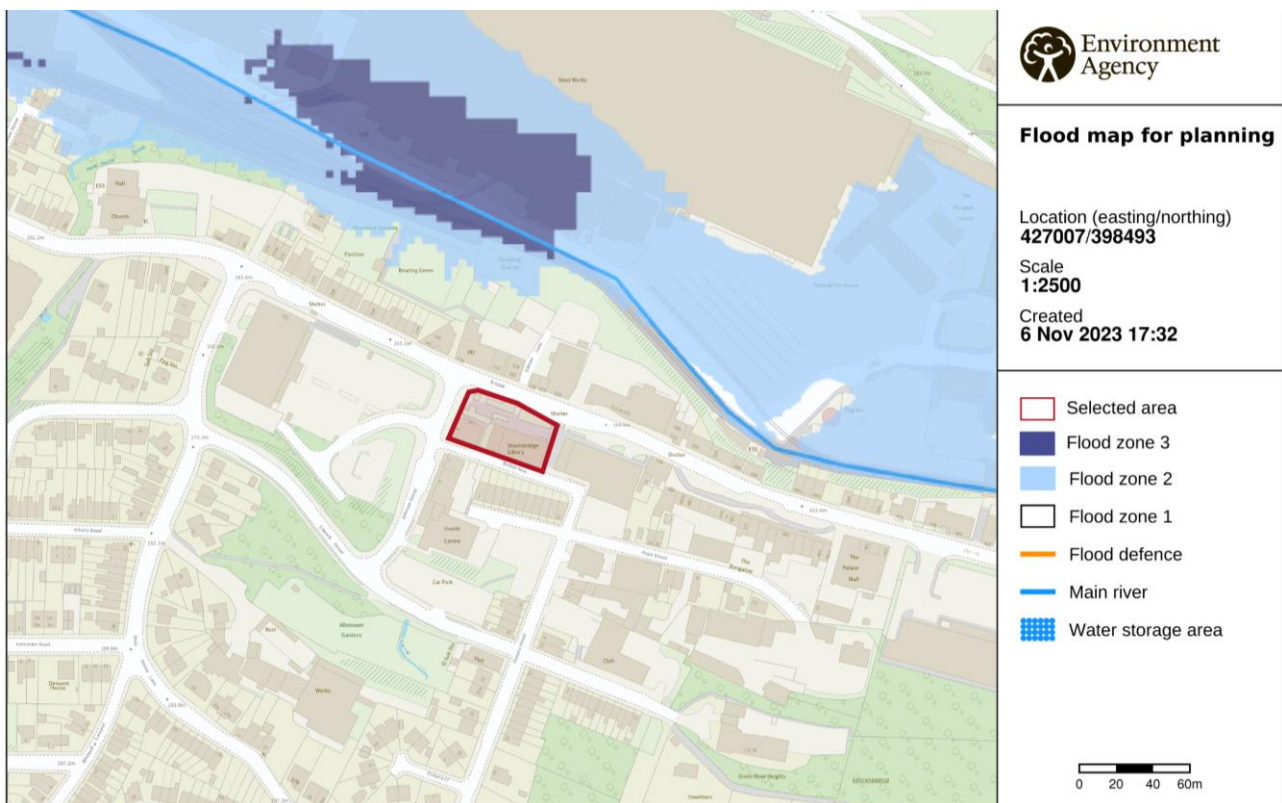


Figure 3 - Extract from EA Flood Map

4. Existing Drainage

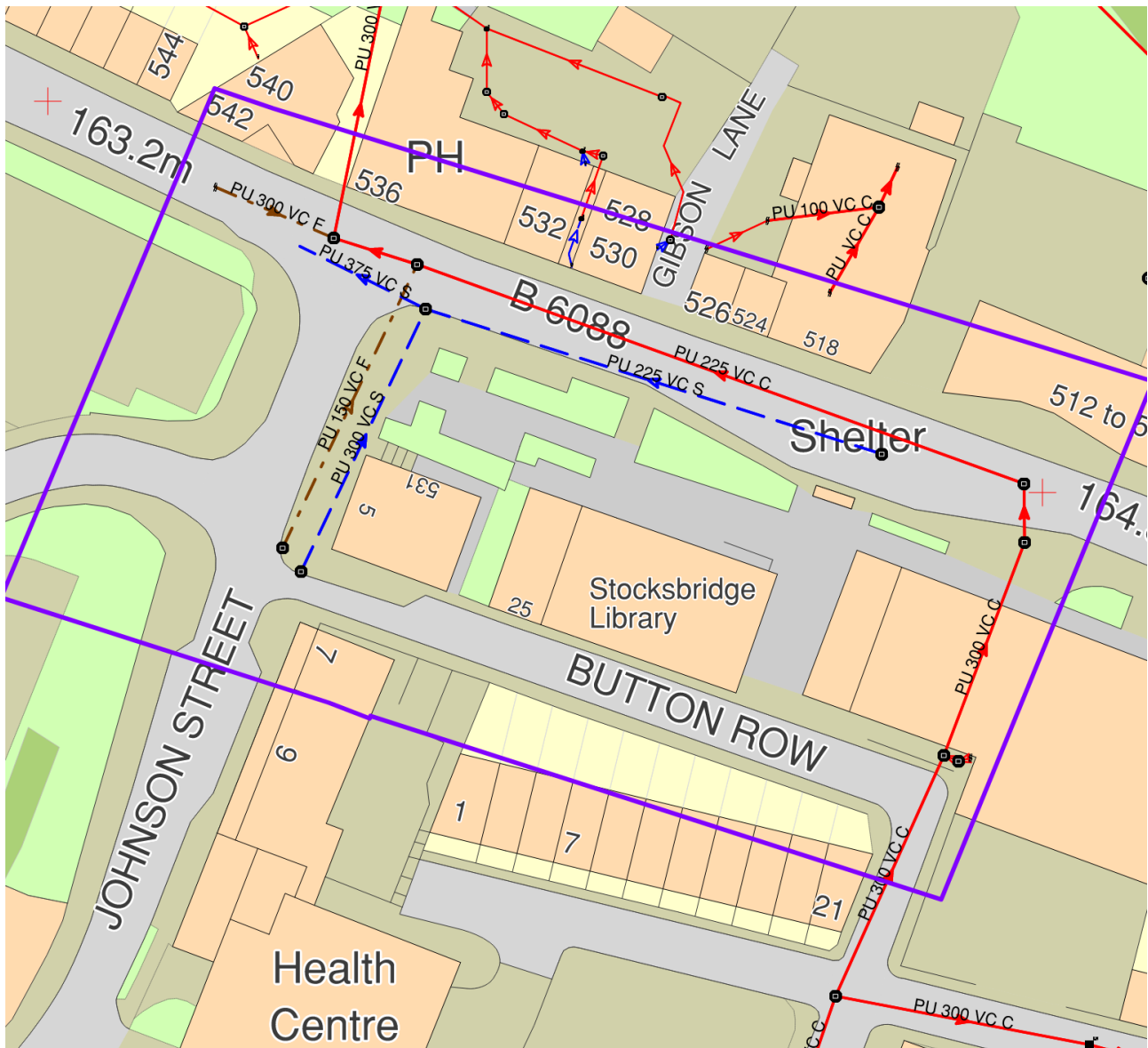


Figure 4 - Yorkshire water existing public sewer network around site

The figure above is an extract from the ground sure report. This shows the surface water and foul water drainage runs that exist around the site's vicinity.

The information indicates that the foul water drainage flows into a combined sewer which drains towards the north of the site. The proposed building is in close proximity to the existing surface water sewer on Johnson Street. Existing drainage information has been obtained from a Groundsure utility report. To supplement this, a GPR survey has been conducted around the community hub. The result of the GPR survey dated 24th May 2023 is depicted below.

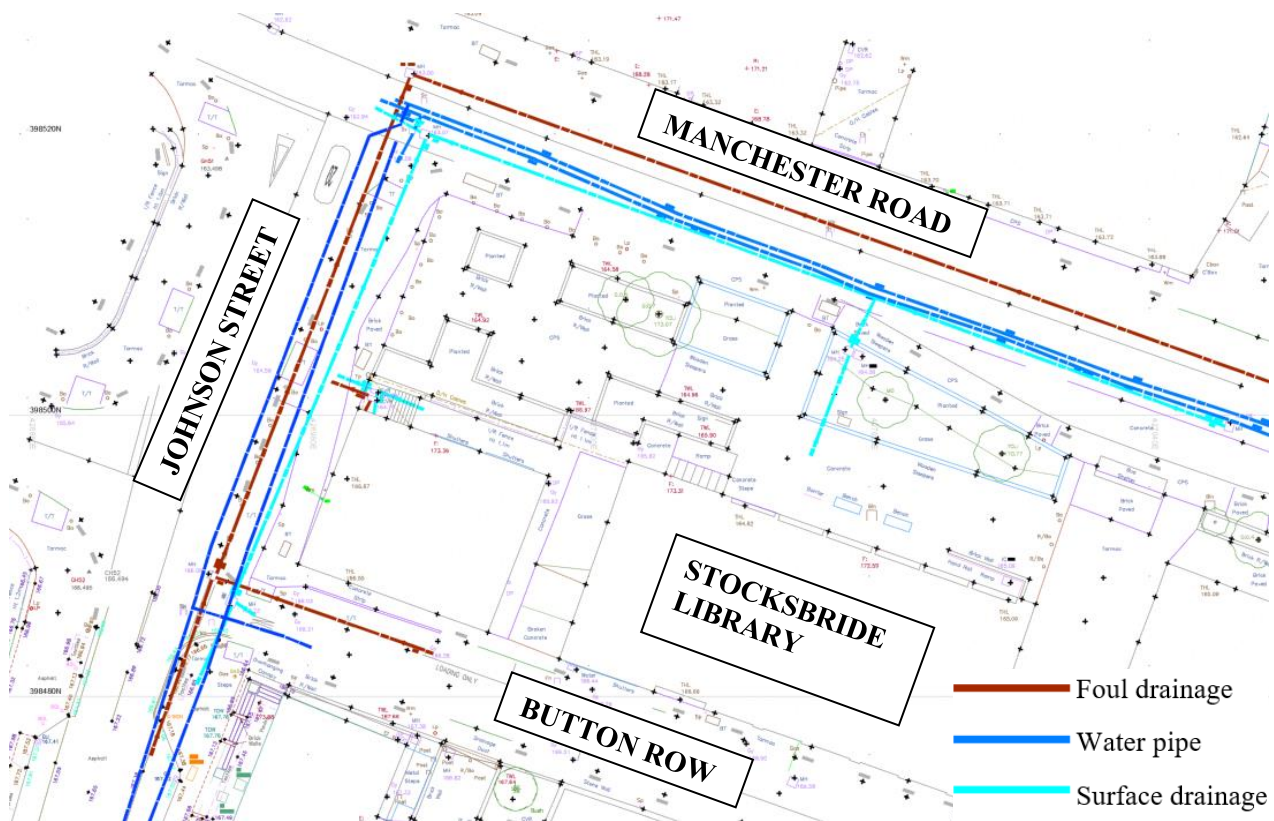


Figure 5 - GPR survey

The Yorkshire Water records coincide with the data from the GPR survey. This information has been used to understand the existing drainage on the site to inform the drainage strategy.

4.1 Foul Drainage

There are some inconsistencies in the CCTV survey. The location of foul water drainage and surface water drainage seems to be different when comparing it to the GPR and Groundsure utility reports. Nonetheless the location of the chambers and Invert levels can be utilised from the CCTV survey.

On the western part of the site there is a 100mm diameter drain recorded by the GPR survey. Although the GPR survey does not pick up the full extent of the drain, it is assumed this discharges in the main foul drain on Johnson street.

The CCTV survey suggests that the foul water from the existing library discharges into a foul water line on Manchester Road. The Yorkshire water record authenticates the existence of this combined sewer as a 225mm diameter vitrified clay drain.

4.2 Surface Drainage

Similar to the foul water there is a surface water sewer on Manchester Road and Johnson Street. The 300mm diameter surface water drain on Johnson Street flows to the north in the direction of Manchester road. The surveys show that surface water sewer on Manchester Road flows to the west.

Site specific LLFA advice indicates that there is a culverted watercourse around the vicinity of the site, it is assumed that the surface water sewer drains into the watercourse.

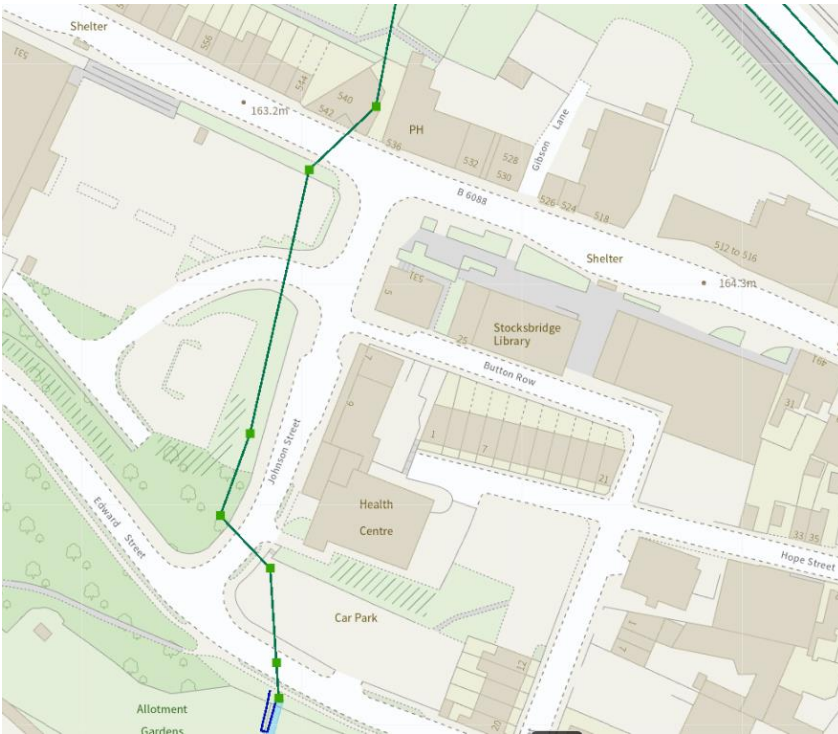


Figure 6 - Location of Culverted watercourse

5. Proposed drainage

Foul and surface water drainage will be required for the development at Stocksbridge Community Hub. Appendix A of this document presents initial drainage strategy layouts for the proposed development.

5.1 Foul Drainage

The foul drainage system will be designed in accordance with the current Building Regulations – Approved Document H – Drainage and Waste Disposal and Waste Disposal & Sewer for Adoption 8th Edition.

The foul water from the proposed new development will be gravity driven and connect into the existing Yorkshire Water sewer network. A likely connection point is the existing foul chamber within the site opposite Manchester Road. This existing chamber currently discharges foul water into the combined sewer on Manchester Road.

To review the foul water drainage proposals in more detail, refer to drawing PC06176-ARP-ZZ-XX-DR-CD-50102 within Appendix B.

5.2 Surface water Drainage

The surface water drainage systems will be designed in accordance with Sheffield City Council’s planning policy CS63 and 67, to adapt to the expected climate change and consider Flood risk management. This development will aim to significantly limit the surface water runoff from the site and adopt SuDS where practicable in accordance with CIRIA C753.

The proposed building will be designed using a blue roof to collect most of the rainwater from the western building. A combination of rain gardens and attenuation tank storage would be used to drain the remaining roof areas.

Planning Practice Guidance states that “Generally the aim should be to discharge surface runoff as high up the following hierarchy of drainage options as reasonably practicable:

1. Into the ground (infiltration);
2. To a surface water body.
3. To a surface water sewer, highway drain or another drainage system.
4. To a combined sewer.”

5.2.1 Infiltration

Infiltration of surface water has been ruled out. This a brownfield development and not suitable for discharge of surface water run off through infiltration.

5.2.2 Surface water Body

The nearest surface water body is the Underbank Reservoir. The reservoir is located approximately 1.91km Northwest of the site. Discharge into the reservoir although possible would be an inefficient solution due to the large distance and potential costs.

This would require significantly extending the red-line boundary for the site and would require work in areas of land owned by others. For this reason this option has also been discontinued.

5.2.3 Surface water Sewer

Yorkshire water records indicate a surface water sewer flowing across Johnson Street into Manchester Road. New connections are proposed to discharge into this existing sewer.

5.2.4 Combined sewer

As there is already a potential discharge point in the existing surface water sewer. Discharging into the combined sewer has been abandoned as it is lower down the SuDS hierarchy.

6. SuDS

Surface water runoff from the catchment associated with the site red line boundary will require attenuation in order to comply with Sheffield City Council Strategic Flood Risk Assessment (SFRA).

The site is considered brownfield so is restricted to brownfield runoff site rates. Considering a 30% reduction from existing, the maximum allowable discharge is 11.32 l/s. This is using the rational method where the rainfall intensity is assumed to be 50 mm/hr. Storage calculations have been completed based on a 1 in 100 year return period with 40%CC.

A combination of SuDs is proposed for this development to meet the attenuation requirements. These systems are summarised below:

	Catchment (m²)	Discharge Rate (l/s)	Attenuation Storage (m³)
System I – Blue Roof	360	0.6	24
System II – Raingardens/Attenuation storage	803	10.72	15

6.1 System I – Blue Roof

A blue roof is proposed for surface water attenuation. This would be utilised on the western side of the building on the proposed flat roof. The blue roof would have an approximate area of 255 m² and a catchment area of 360m².

The roof attenuation will be restricted to 0.6 l/s requiring a storage volume of 24 m³. It is assumed the blue roof will attenuate most of the western building. If the entire flat area were to be utilised the maximum depth of water held would be around 108mm. Two main outlets should be installed to transfer the rainwater from the blue roof to the below ground drainage network. The below ground drainage will saddle onto the existing 300 diameter surface water pipe on Johnson Street.

6.2 System II – Raingardens & Attenuation tanks

The blue roof would be unable to attenuate the whole site as it is raised above the other half of the building. It is suggested that rain gardens be implemented to cater for the remainder of the buildings catchment. The eastern part of the building consists of a pitched roof which will collect water in between the gables of the structure. Down pipes externally to transfer the rainwater from the gable roof to the proposed rain gardens.

The remaining building area on the western building is approximately 803m². The discharge from this area will be restricted to 10.72 l/s to ensure that the total discharge from the site meets the 11.32 l/s limit. To achieve this approximately 15 m³ of storage is required.

The downpipe from the Western and Northern elevations will discharge directly onto raingardens located beneath the downpipes. Beneath the raingardens will be a series of geo-cellular storage crates to provide the necessary attenuation volume.

There is no space to the Southern elevation to allow the downpipes to discharge into raingardens. Instead, these downpipes are connected directly to the geo-cellular storage beneath the raingardens on the Northern side of the building.

In total, the geo-cellular storage beneath the raingardens provides 15m³ of storage. It is possible that storage within the raingardens can be used to reduce the size of the geo-cellular storage – this can be considered as

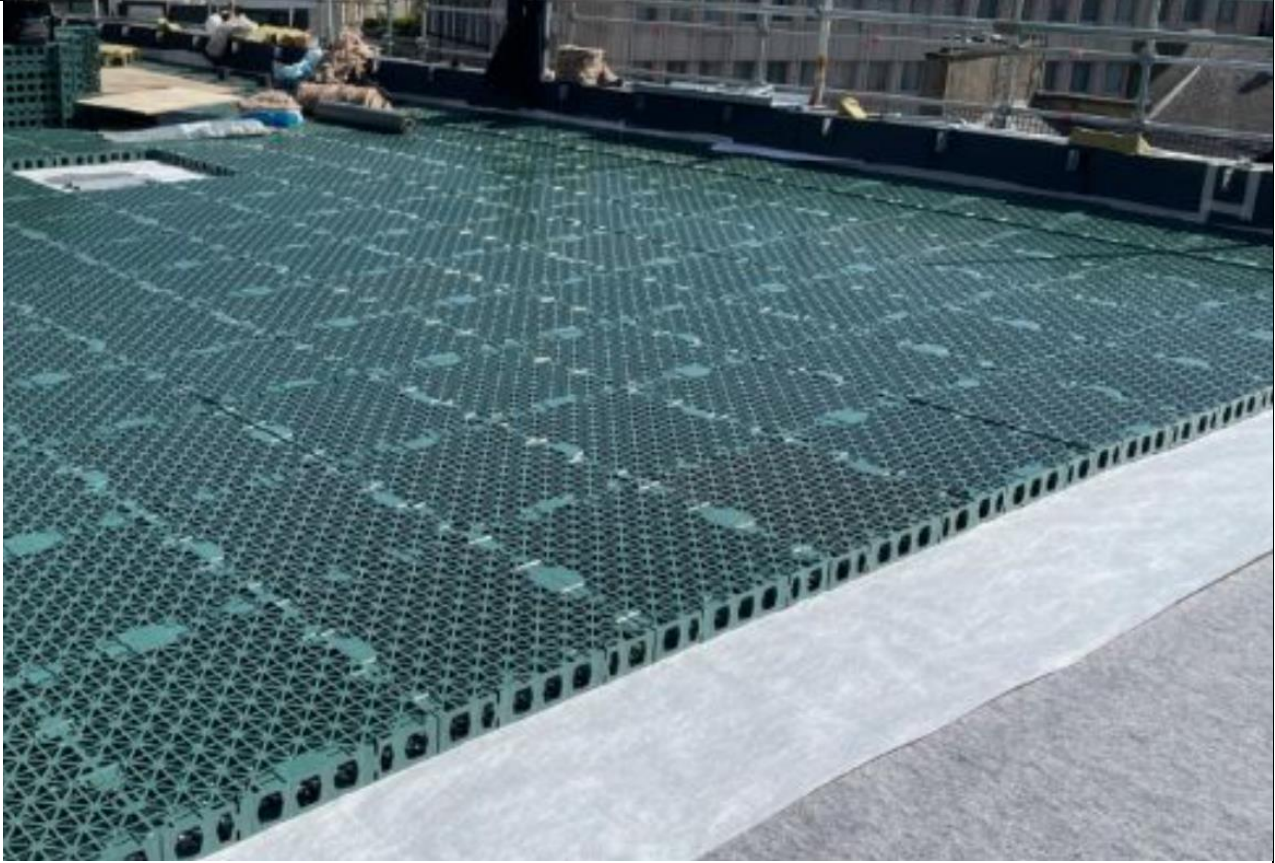
part of future design development. This part of the building discharges to the existing manhole on the surface water sewer on Manchester Road.

To review the surface water drainage proposals in more detail, refer to drawing PC06176-ARP-ZZ-XX-DR-CD-50101 within Appendix B.

Table 1 - Proposed SuDS Features



Rain Graden



Blue roof



Cellular Storage

7. Conclusion

The above Sustainable Urban Drainage SuDS Design Statements have considered the site in regards to SuDS and meets the planning policy requirements outlined by Sheffield City Council.



- Notes**
- Do not scale from this drawing or the computer digital data.
 - This drawing has been produced for RIBA3.
 - This drawing is to be read in conjunction with Sustainable Urban Drainage Design Statement PC06176-ARP-ZZ-RP-CD-50701.
 - Refer to drawing 3042-CDA-00-SL-DR-A-09500 for the Proposed Site Plan.
 - Refer to drawing 3042-CDA-00-SL-DR-A-090600 for the Lower Ground Floor Layout.
 - Refer to drawing 0523-SIL-002 for the drainage utility survey.
 - The level for outfall connection points have been extrapolated based on GPR survey data. The Invert levels of the existing combined sewers will need to be surveyed before construction.

- Legend**
- Site Boundary
 - Proposed Foul Water Drainage
 - Existing Combined Sewer
 - Rodding Point

P02	08/14/23	AA	RG	RG
Updated drainage layout				
P01	17/11/23	AA	AA	RG
RIBA 3 Issue				
Rev	Date	By	Chkd	Appd

ARUP

9th Floor, 3 St Paul's Place,
 Norfolk Street, Sheffield S1 2JE
 Tel: +44 (0)114 2728247 Fax: +44 (0)114 2759553
 www.arup.com

Client
Sheffield City Council

Project Title
**Stocksbridge Towns Fund
 Community Hub**

Drawing Title
**Foul Water Drainage
 General Arrangement**

Scale at A1	1:100
Role	Civil
Suitability	S2 - Suitable for Information
Arup Job No	286763
Rev	P02
Name	PC06176-ARP-ZZ-XX-DR-CD-50102