



Broadfield Slopes Rochdale

Drainage Strategy Report

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1

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Issued for Planning

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Acronyms	
AOD	Above Ordnance Datum
CIRIA	Construction Industry Research and Information Association
DCG	Design and Construction Guidance
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
FRA	Flood Risk Assessment
GMCA	Greater Manchester Combined Authority
LLFA	Lead Local Flood Authority
NPPF	National Planning Policy Framework
NSTS	Non-Statutory Technical Standards
RBC	Rochdale Borough Council
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
UDP	Unitary Development Plan

1 Introduction

This report has been compiled to discharge Planning Condition 9 for the proposed redevelopment at Broadfield Slopes, The Esplanade, Rochdale OL16 1AQ (planning reference: 23/01393/FUL). This report outlines the proposed drainage strategy for the site and includes a detailed Sustainable Drainage Systems (SuDS) assessment.

1.1 Planning Condition 9

No development shall take place (other than site clearance or preparation works) until such time as completed details of a sustainable surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. For the avoidance of doubt, the drainage scheme shall be based upon the following drawing:

- Phase 3 Enabling Works - South Slopes - Infrastructure (Drainage) dated 13.12.23, ref. 30217/9000/P08 by Price & Myers Consulting Engineers.

The drainage scheme shall also include the provision of a Maintenance Document explaining how the surface water scheme will be maintained and managed after completion.

The approved scheme shall also be in accordance with the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards. Prior to first occupation/use of the proposed development, the drainage scheme shall be completed in accordance with the approved details and retained thereafter for the lifetime of the development.

Reason: To secure proper sustainable drainage of the site to prevent an increased risk of flooding elsewhere in accordance with Places for Everyone joint development plan policies JP-S1 & JP-S4, policy G8 of the adopted Rochdale Core Strategy, saved Policy EM/7 of the adopted Rochdale Unitary Development Plan and the National Planning Policy Framework.

Reason for pre-commencement condition: Drainage infrastructure will need to be implemented prior to commencement of above ground works and a scheme therefore needs to be agreed in advance of the same. The Council's Environmental Management service also needs to review the drainage infrastructure design to ensure that they are able to adequately maintain it in the future.

1.2 Relevant Policy

This assessment has been carried out in accordance with the National Planning Policy Framework (NPPF), Rochdale Borough Council (RBC) Places for Everyone Joint Development Plan (March 2024), Rochdale Core Strategy (October 2016) and Rochdale Unitary Development Plan (UPD, June 2006).

This document also incorporates advice and guidance from the Environment Agency (EA), the Greater Manchester Combined Authority (GMCA) Level 1 Strategic Flood Risk Assessment (SFRA, March 2019), the Department for Environment, Food and Rural Affairs (DEFRA) "Non-Statutory Technical Standards (NSTS) for Sustainable Drainage Systems" and CIRIA documents.

2 Site Description and Location

2.1 Site overview

The Broadfield Slopes are located immediately south of the Rochdale Town Hall car park. The nearest postcode is OL16 1AQ and the OS grid reference is 389386, 413187. The slopes are bordered by Nelson Street and Packer Street to the north-east, Saint Chad's Parish Church and Partnership House to the south, and Broadfield Community Primary School to the south-west.

The existing site is shown in Figure 2.1.



Figure 2.1: Existing site, showing site boundary (Source: Google Earth)

2.2 Site History

Historical development around the Broadfield Slopes has been largely to do with managing and using water. The slopes contain a source of natural spring water, and the Broadfield Park plateau drains through the slopes.

In recent years the slopes have been neglected, and the failed drainage systems have caused the slopes to become waterlogged, damaging trees and increasing the risk of subsidence or landslip on the steep slopes. These problems are exacerbated by additional surface water that is channelled onto the slopes from the grounds of Saint Chad's Church. The Grade II listed Packer Spout has also transitioned from a clean public water source to a stagnant pond.

The Ambellia Consultancy Hydrology Studies report (August 2022) details the extensive history of water use on the Broadfield Slopes. A summary of this is presented in Table 2.1.

Year	Activity
1760	A stone reservoir was built for Packer Spout to capture the spring flows on the eastern side of the slope. This was used to supply water to Packer Street, Fleece Street and Church Street.
1764	Spring flows from the western side of the slope and overland flows from Saint Chad's Church, the Vicarage and western side of the slopes were used to power the textiles fulling mill.
1864	The fulling mill was demolished to facilitate the construction of Rochdale Town Hall.
1871	Rochdale Town Hall works were completed.
Early 1870s	A water powered corn mill was built adjacent to the Packer Spout reservoir. The fulling mill water supply is also possibly used to power a second smaller mill.
1934	The corn mill is demolished, and the associated spring / overland flows are diverted around the Packer Spout reservoir. This created small water features and connected into a drainage system under Packer Street. The fulling mill drainage system was significantly damaged by the associated works. An illustration of the post-1934 arrangement is shown on Figure 2.2.
1960s	Water was pumped into Packer Spout to fill it. Broadfield Community Primary School was also built on the western side of the vicarage garden.

Table 2.1: History of water use on the Broadfield Slopes

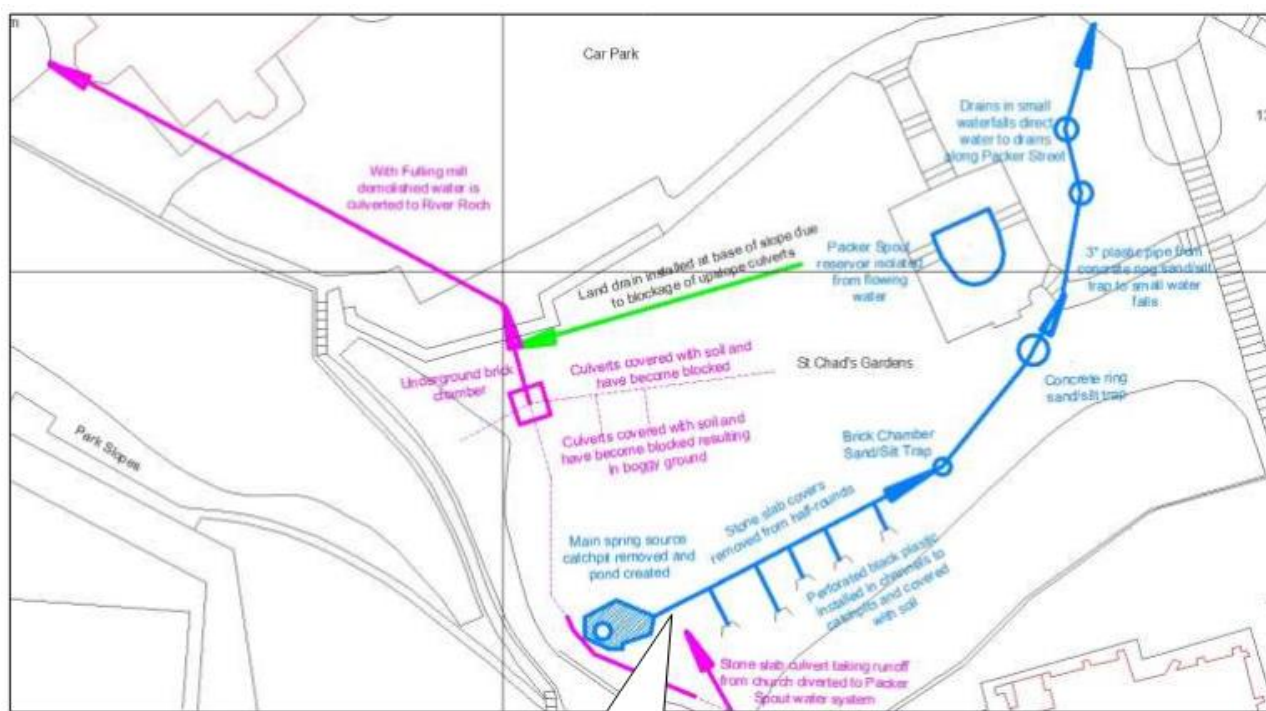


Figure 2.2: Indicative water supply system following demolition of the central corn mill in 1934 (extract from Ambellia Consultancy Hydrology Study)

2.3 Existing Drainage

The Ambellia Hydrology Study report identified a series of land drains across the slopes, which are used to convey overland flows and spring flows through the slopes. These drains are buried and appear to be heavily silted, which is a result of their limited maintenance access capability.

A CCTV drainage survey investigation was also completed by Survey Solutions in June 2023. This validates the arrangement shown in Figure 2.2: Indicative water supply system following demolition of the central corn mill in 1934 (extract from Ambellia Consultancy Hydrology Study), with the spring main emerging via a pond feature at the south-western boundary of the site. This then conveys flows around Packer Spout via a series of broken open channels, leaky pipework and catchpit manholes.

Due to the topography, runoff from the adjacent Saint's Chad's Churchyard naturally crosses into the slopes land at an uncontrolled rate.

Combined drainage serving Partnership House and surface water drainage serving the Broadfield Community Primary School playing fields appears to route through the slopes via a piped network. This drainage is in good condition and connects into the drainage network in the Rochdale Town Hall car park.

Extensive CCTV drainage survey investigation was completed during the Rochdale Town Hall restoration works, and all drainage from the slopes appears to enter the Town Hall's external drainage network, before connecting into the United Utilities public sewers either side of the Town Hall.

Immediately east of the Town Hall is a 300 mm diameter public sewer, which routes towards Packer Street; this continues north and connects into the 1500 mm diameter sewer under the Esplanade. A 450 mm diameter public sewer is located west of the Town Hall; this also routes north and connects into the Esplanade sewer. Refer to Appendix C for the United Utilities sewer records.

3 Development Proposal

The proposals aim to turn the Broadfield Slopes into a safe community space by introducing new pathways, improving visibility, lighting and CCTV. In turn, the goal is to help decrease anti-social behaviour and improve accessibility on the slopes.

Additional works include the restoration of the Grade II listed Packer Spout fountain and the introduction of a new maintainable drainage system to replace the series of failed land drains.

4 Spring Water Flows

4.1 Spring Water Flows

During the Ambellia Consultancy hydrology study, data loggers were installed in the pond near the south-western boundary. This is the main spring source for the former Packer Spout water supply and flow rates of 1 l/s to 8 l/s were estimated using the data logger water level recordings, as shown in Figure 4.1.

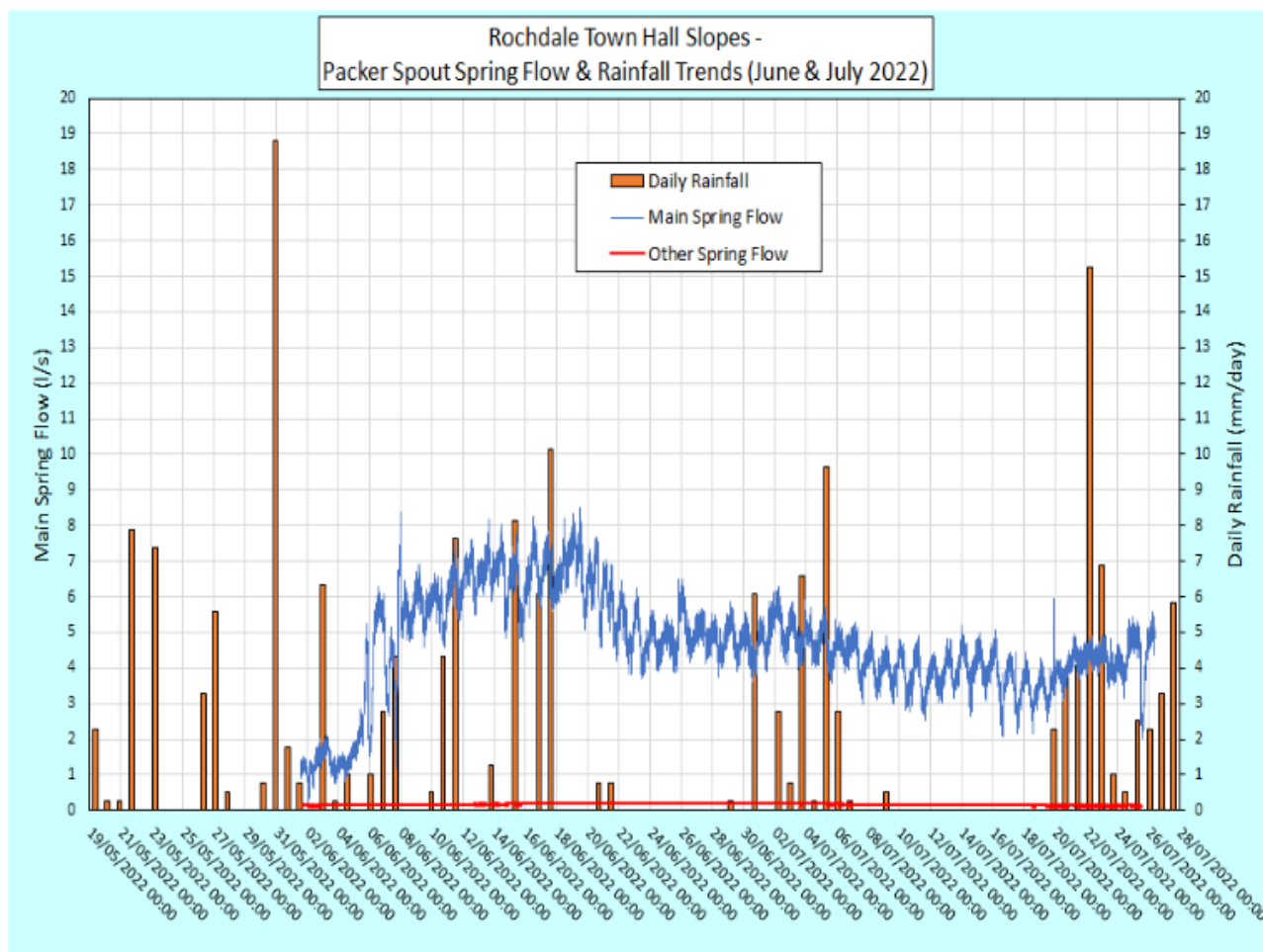


Figure 4.1: Data logger daily rainfall and spring source flow rates (extract from Ambellia Consultancy Hydrology Study)

These base flows are in general agreement with the Ambellia Consultancy's ReFH 2 modelling, which estimated base flows of approximately $0.039 \text{ m}^3/\text{s}$ ($= 3.9 \text{ l/s}$) from the Broadfield Park plateau catchment (10.24 Ha) through the slopes. The approximate catchment is shown in Figure 4.2, and the results of the ReFH urban catchment model are shown in Figure 4.3.

As noted in Section 2.3, lower spring lines are also evident towards the foot of the slopes. These base flows have not been quantified but will be linked to the ReFH 2 modelling estimates.



Figure 4.2: Approximate extent of the Broadfield Park Plateau catchment

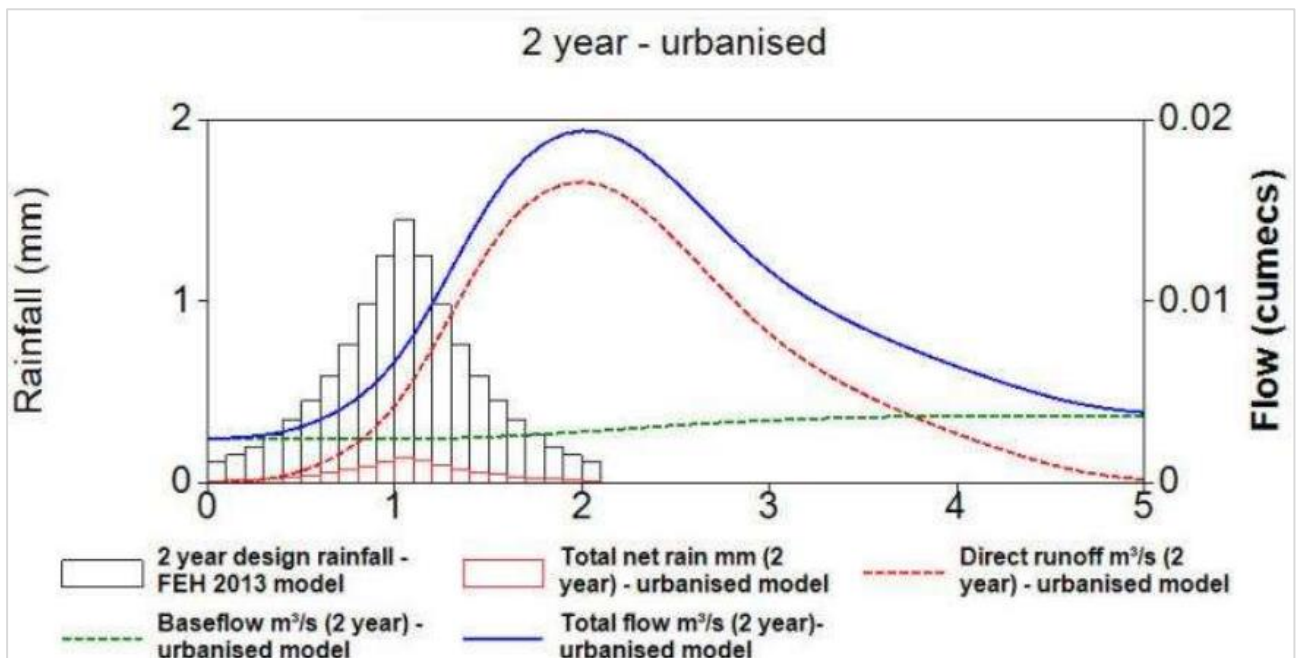


Figure 4.3: Spring flow base estimates (extract from Ambellia Consultancy Hydrology Study)

5 Surface Water Runoff Assessment

5.1 Existing Surface Water Runoff

The total site area is approximately 5380 m² or 0.54 Ha; of this approximately 588 m² or 0.06 Ha is impermeable, as shown in Figure 5.1. However, the hardstanding areas currently drain into the adjacent soft landscaping.

Overland flows from the neighbouring Saint Chad's Parish Church also cascade onto the slopes. This catchment area is approximately 1134 m² or 0.11 Ha.

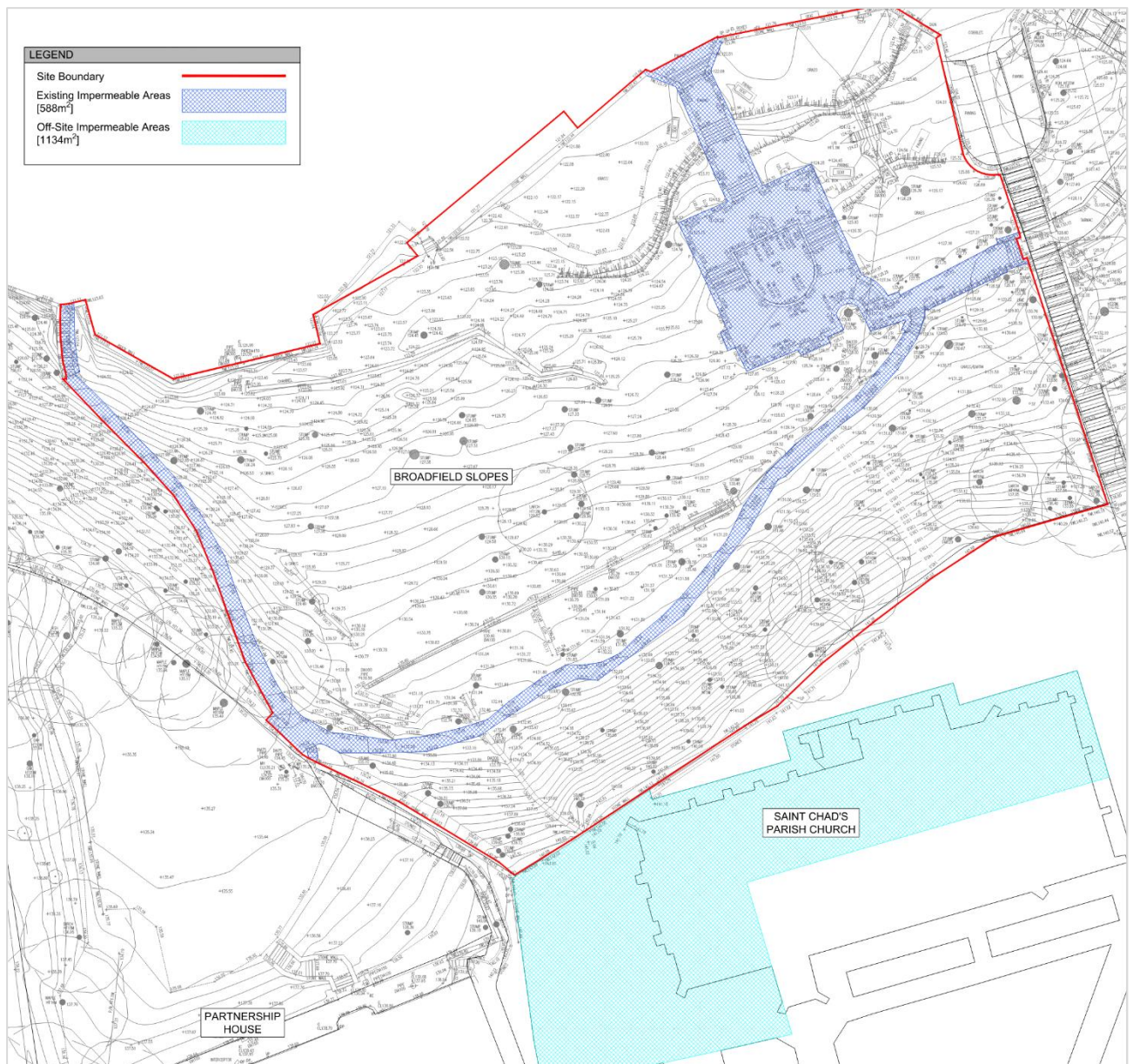


Figure 5.1: Existing impermeable areas

The greenfield runoff rates for the approximate 0.54 Ha area of the south slopes for different return periods were calculated using the UKSuDS tool and are summarised below. Supporting documentation is contained in Appendix D.

Q_{1Gr}	= 1.09 l/s
Q_{30Gr}	= 2.13 l/s
Q_{100Gr}	= 2.60 l/s

The corresponding peak runoff rate from Saint Chad's Parish Church has been calculated using the modified rational method as shown below:

$$Q_{x_{ex}} = 2.78 \times A \times i$$

Where 'x' is the return period in years, 'A' is the catchment area in ha and 'i' is the rainfall intensity in mm/hr provided by the FEH method.

$Q_{1_{ex}}$	= $2.78 \times 0.11 \times 14.3$	= 4.37 l/s
$Q_{30_{ex}}$	= $2.78 \times 0.11 \times 45.0$	= 13.76 l/s
$Q_{100_{ex}}$	= $2.78 \times 0.11 \times 56.8$	= 17.37 l/s

5.2 SuDS Strategy

In accordance with EA guidelines and CIRIA documents, surface water runoff should be managed as close to its source as possible. The GMCA Level 1 SFRA states that developments should ensure that surface water runoff is managed as close to its source as possible utilising sustainable methods. This has been assessed in the following drainage hierarchy:

5.2.1 Rainwater Used as a Resource

Historically, the spring main and overland flows from Saint Chad's Church were conveyed into the Packer Spout reservoir. The proposed scheme will restore this strategy and contribute to the reduction of runoff volume from the site post-development, as well as minimising the need for topping up of the water supply in the Packer Spout fountain.

Where possible, runoff will be managed and controlled at source using SuDS. These SuDS will include the landscaping and enhancement of the existing pond and swales, as well as restoration of the open channel. These measures will better convey flows into Packer Spout, whilst providing biodiversity, water quality and some attenuation benefits.

5.2.2 Infiltration into the ground

The Secondary A aquifer underlying the site does limit infiltration potential, however natural infiltration has been promoted as far as possible.

A series of French drains have been integrated into the proposals. These will be fully maintainable and replace the existing system. Additionally, new accessible footpaths will comprise a permeable paving system to mimic the existing greenfield condition. Due to the Grade II listed status of Packer Spout, the existing Yorkstone paving surrounding this will be retained and the associated runoff will be conveyed into the soft landscaping.

5.2.3 To a Surface Water Body

The River Roch runs approximately 110m to the north of the site and much of the river in the town centre is culverted. Due to Rochdale Town Hall sitting directly between the site and the river, and the complex arrangement of underground services between the two, it is not considered viable to make a new connection to the River Roch. Such connection would also require significant breaking out of the new urban realm area surrounding Rochdale Town Hall.

5.2.4 To a Surface Water Sewer, Highway Drain, or Another Drainage System

There are no surface water sewers in proximity to the site and this is therefore not considered a viable option.

5.2.5 To a Combined Sewer

It is proposed to reuse the existing connections to the public sewers, as described in Section 2.3.

5.3 Proposed Discharge Rates

In accordance with S2 and S4 of the NSTS the proposed development aims to mimic the existing greenfield condition. New footpaths are proposed to improve accessibility along the slopes, however these areas are fully permeable and will therefore not increase surface water runoff.

Though fully infiltrating French drains are proposed, these will continue to positively drain into the public sewer network via the existing connections. A series of orifice plates have been integrated into the drainage layout to restrict flows and maximise the attenuation storage in the coarse graded granular surround to the French drains. A fully infiltrating drainage system is not feasible due to the high groundwater levels and spring flows present across the site.

The restoration of the Packer Spout fountain and associated drainage works will also better convey overland flows from Saint Chad's Church and help to promote rainwater reuse.

The above measures will therefore ensure that the development does not impede the natural water flow and retain the existing greenfield condition.

5.4 Summary of SuDS

A summary of the proposed SuDS are outlined in Table 5.1 Summary of proposed SuDS. The locations are shown in the proposed below ground drainage layout drawings (Appendix D).

SuDS	Area Used on site:	Comment:
Pond	South-western boundary	The existing pond will be enhanced at the main spring water source. Currently the pond is blocked with debris; a catchpit will be installed in an adjacent manhole to remove silt and debris
Enhanced ditches/swale	South-western portion of the site	The existing ditch from the neighbouring church will be enhanced to better convey overland flows into the new piped network.
Surface water and spring water re-use	Packer Spout fountain	The water supply into Packer Spout will be reinstated to promote water use.
Permeable paving	Proposed accessible footpaths	Fully infiltrating permeable paving systems have been promoted and will help to mimic the existing greenfield condition.
French drains	Across the site	A series of infiltrating French drains will replace the failed existing land drainage system. These drains will outfall into the public sewer through the existing connection.

Table 5.1 Summary of proposed SuDS

6 Surface Water Maintenance Strategy

The successful implementation and operation of a SuDS system depends on a robust and clear maintenance strategy being implemented. It is envisaged that the majority of the SuDS will be maintained by RBC Environment Management and will form part of the overall maintenance regime for the site.

The following measures should form part of the site's proposed management plan.

Stormwater Runoff Quality:

The stormwater management system protects and enhances the stormwater runoff water quality through the removal of sediment and pollutants; catchpit manholes will reduce the amount of pollutants entering the system. Preventive maintenance of the system will include a comprehensive source reduction program of regular sweeping and litter removal from open features and permeable paving.

Drainage System:

Maintenance and cleaning of open channels, ponds, swales and stormwater manholes will assure adequate performance. This maintenance program is outlined in the Table 6.1.

Regular maintenance should include:

1. Inspect channel and gully inlet grates and remove any debris every 3 months or as determined to be reasonable based on experience with the installed systems to ensure that the gullies are working in their intended fashion and that they are free of debris; quarterly, inspect channel and slot drains and bottom of drain manholes; if depth of sediment exceeds 50% capacity, sediment must be removed. Excessive sediment shall be removed and properly disposed by a licensed drainage cleaning company.
2. Inspect all vegetated areas and remove litter and debris as necessary. Replant bare areas or areas with sparse growth.

Winter Maintenance Program:

Ensure that drainage structures are not blocked by ice, snow, debris or rubbish during winter months.

Fertiliser Use:

Only slow-release organic low-phosphorous fertilisers will be used in any landscaped areas in order to limit the amount of nutrients that could enter the stormwater system.

SuDS Element	Maintenance		
	Activity	Required Action	Typical Frequency
French Drains	Regular Maintenance	Remove litter (including leaf litter) and debris from French drain surface, access chambers and pre-treatment devices	Monthly, or as required
		Inspect French drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
		Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Half yearly
		Remove sediment from pre-treatment devices	Half yearly, or as required
	Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the French drain, using recommended methods e.g. NJUG, 2007 or BS 3998:2010	As required
		At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
		Clear perforated pipework of blockages	As required
Swale	Regular Maintenance	Remove litter and debris	Monthly, or as required
		Cut the grass, manage vegetation and remove nuisance plants	Monthly at start, then as required
		Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
		Inspect for ponding, compaction and silt accumulation	Monthly or when required
		Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
		Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
	Occasional Maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% of more of the swale treatment area.
	Remedial Actions	Repair erosion or other damage by re-turfing or reseedling	As required
		Relevel uneven surfaces and reinstate design levels	
Pond	Regular Maintenance	Remove litter and debris	Monthly, or as required
		Cut the grass – public areas	Monthly during growing season

SuDS Element	Maintenance		
	Activity	Required Action	Typical Frequency
		Cut the meadow grass	Half yearly – before nesting season in spring and in autumn
		Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly, at start, then as required
		Inspect inlets, outlets, banksides, structures, pipework etc. for evidence of blockage and/or physical damage	Monthly
		Inspect water body for signs of poor water quality	Monthly from May – October
		Inspect silt accumulation rates in the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
		Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
		Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	
		Tidy all dead growth before start of growing season	
		Remove sediment from any forebay.	Every 1–5 years, or as required
		Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
	Remedial Actions	Repair erosion or other damage	As required
		Replant, where necessary	
		Aerate pond when signs of eutrophication are detected	
		Realign rip-rap or repair other damage	
		Repair / rehabilitate inlets, outlets and overflows.	
Permeable Paving	Monitoring / Inspections	Initial inspection	Monthly for three months after installation
		Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 hours after large storms in first six months
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	Annually

SuDS Element	Maintenance		
	Activity	Required Action	Typical Frequency
	Regular Maintenance	Brushing and vacuuming - standard cosmetic sweep over whole surface	Once a year after autumn leaf fall
		Rubbish and litter removal	As required
	Remedial Actions	Remediate any landscaping which through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
		Remedial work to any depressions or rutting considered detrimental to the structural performance or a hazard to users	
		Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required

Table 6.1 SuDS Maintenance Strategy as taken from The SuDS Manual

Effective SuDS design must assess all foreseeable risks during construction and maintenance. These must be mitigated during the detailed design stages where effective design will aim to avoid, reduce and mitigate risks. This process will also require input from the principal contractor who will ensure the construction of SuDS components are carried out in a safe and sustainable manner.

7 Conclusions

- This report has been compiled to discharge Planning Condition 9 for the proposed redevelopment at the Broadfield Slopes, specifically the introduction of a new Sustainable Drainage System
- The site receives spring water flows, greenfield runoff and uncontrolled surface water discharge from the adjacent Saint Chads Church through their natural right of drainage. Combined flows from the nearby Partnership House are also piped through the site
- The current drainage system on the slopes has failed and is contributing to the saturation of the slopes and exacerbating the risk of destabilisation. An extensive stability assessment has been completed by RSK Geosciences (October 2023) considering the re-profiled slopes, which in turn will help to create a safer and more attractive community space
- The proposals aim to turn the Broadfield Slopes into a safe community space by introducing new pathways, improving visibility, lighting and CCTV in order to help decrease anti-social behaviour and improve accessibility on the slopes
- The overall drainage strategy will be retained so as not to impede natural water flow. The development will mimic the natural greenfield condition, and the existing connection to the public sewer will be reused. Runoff will be managed and controlled at source as far as possible using SuDS
- The introduction of a modern and maintainable drainage system may also reduce flood risk to the Grade I listed Town Hall. Water ingress from a series of decommissioned culverts is apparent in the Town Hall's basement; remediation of the failed drainage system may therefore protect the Town Hall
- The Grade II listed Packer Spout fountain is disused and has become stagnant. Restoration of the Packer Spout reservoir will allow the harvest of spring water flows and minimise potable water consumption by the feature
- The drainage strategy along Packer Spout will be retained, with an enhanced pond and repaired stone channel. Porous footpaths are promoted elsewhere to mimic the greenfield condition
- Features such as the restored Packer Spout, the spring pond and the stone channel provide multifunctional benefits through water quality, water re-use, biodiversity and amenity
- As part of the Rochdale Town Hall public realm works, low points have been set at the southern side of the car park and boundary to the Broadfield Slopes to protect the Grade I listed Town Hall from exceedance events on the slopes
- A comprehensive maintenance programme has been set out to ensure the successful implementation and operation of the SuDS system.

Appendix A

Hydrology Study Report

Refer to Ambellia Consultancy 'Rochdale Town Hall (RTH) Slopes Hydrology Studies – Final Report'.
Revision 00 (August 2022).

Appendix B

CCTV Drainage Survey

Project Details

Site Address	Broadfield Slopes
Town / City	Rochdale
Post Code	
Date	16-06-2023
Customer / Client	Price & Myers LLP

Manhole
Report

MH (Node) Reference: MH1	Date: 16-06-2023
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Location: MH1		Location Type: Difficult Access			
Function: Combined		Node Type: MH - Manhole		Status: PR - Private	
Latitude:	Longitude:	Year Installed: Z - Others			Area Code:

LEVELS	Depth (m):	Cover Level (m):	Invert Level (m):
COVER	Shape: C - Circular	Hinged? ☐	Dimension 1:
	Duty: Light	Locked? ☐	Dimension 2:

CHAMBER				
Construction: Brick	Access:	Access Shaft? ☐	Reducing Slab? ☐	Landing Slab? ☐
Chamber Dimensions	Dimension 1 (Dia.):		Shaft Dimensions(if present)	Dimension 1 (Dia.):
	Dimension 2:			Dimension 2:
Flow Depth (mm):		Sluice Gate? ☐	Grating? ☐	Penstock? ☐
Silt Depth (mm):		Flap Valve? ☐	Headwall? ☐	Screens? ☐
Surcharge Level (mm):		Orifice? ☐	Flume? ☐	Weir? ☐

Condition	Cover	Shaft	Step Irons/Ladders	Chamber	Benching	Half Channel
Good	☐	☐	☐	☐	☐	☐
Fair	☒	☒	☒	☒	☐	☐
Poor	☐	☐	☐	☐	☐	☐
Not Present	☐	☐	☐	☐	☐	☐

INCOMING PIPES

Letter	Upstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
A		Circular	100	x		VC - Vitrified Clay	Not present	1.62
B		Circular	150	x		VC - Vitrified Clay	Not present	
C		Circular	100	x		VC - Vitrified Clay	Not present	0.79

OUTGOING PIPES

Letter	Downstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
X		Circular	150	x		VC - Vitrified Clay	Not present	1.81

Evidence of misconnection? ☐

Manhole Images



Additional Notes and/or Recommendations

Manhole
Report

MH (Node) Reference: MH2	Date: 16-06-2023
--------------------------	------------------

Location: MH2		Location Type: Difficult Access			
Function: Combined		Node Type: MH - Manhole		Status: PR - Private	
Latitude:	Longitude:		Year Installed:		Area Code:

LEVELS	Depth (m):	Cover Level (m):	Invert Level (m):
COVER	Shape: C - Circular	Hinged? ☐	Dimension 1:
	Duty: Light	Locked? ☐	Dimension 2:

CHAMBER				
Construction: Brick	Access:	Access Shaft? ☐	Reducing Slab? ☐	Landing Slab? ☐
Chamber Dimensions	Dimension 1 (Dia.):		Shaft Dimensions(if present)	Dimension 1 (Dia.):
	Dimension 2:			Dimension 2:
Flow Depth (mm):		Sluice Gate? ☐	Grating? ☐	Penstock? ☐
Silt Depth (mm):0.8		Flap Valve? ☐	Headwall? ☐	Screens? ☐
Surcharge Level (mm):		Orifice? ☐	Flume? ☐	Weir? ☐

Condition	Cover	Shaft	Step Irons/Ladders	Chamber	Benching	Half Channel
Good	☐	☐	☐	☐	☐	☐
Fair	☐	☒	☐	☒	☐	☐
Poor	☒	☐	☐	☐	☐	☐
Not Present	☐	☐	☒	☐	☒	☒

INCOMING PIPES

Letter	Upstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
A		Circular	100	x		VC - Vitrified Clay	Not present	0.71
		Circular		x		VC - Vitrified Clay	Not present	

OUTGOING PIPES

Letter	Downstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
X		Circular	75	x		VC - Vitrified Clay	Not present	0.73

Evidence of misconnection? ☐

Manhole Images



Additional Notes and/or Recommendations

Manhole Report

MH (Node) Reference: MH3	Date: 16-06-2023
--------------------------	------------------

Location: MH3		Location Type: Difficult Access			
Function: Combined		Node Type: MH - Manhole		Status: PR - Private	
Latitude:	Longitude:		Year Installed:		Area Code:

LEVELS	Depth (m):	Cover Level (m):	Invert Level (m):
COVER	Shape: C - Circular	Hinged? ☒	Dimension 1:
	Duty: Heavy	Locked? ☐	Dimension 2:

CHAMBER					
Construction:	Access:	Access Shaft? ☐	Reducing Slab? ☐	Landing Slab? ☐	
Chamber Dimensions	Dimension 1 (Dia.):		Shaft Dimensions(if present)	Dimension 1 (Dia.):	
	Dimension 2:			Dimension 2:	
Flow Depth (mm):		Sluice Gate? ☐	Grating? ☐	Penstock? ☐	
Silt Depth (mm):		Flap Valve? ☐	Headwall? ☐	Screens? ☐	
Surcharge Level (mm):		Orifice? ☐	Flume? ☐	Weir? ☐	

Condition	Cover	Shaft	Step Irons/Ladders	Chamber	Benching	Half Channel
Good	☐	☐	☐	☐	☐	☐
Fair	☒	☒	☐	☒	☐	☐
Poor	☐	☐	☐	☐	☐	☐
Not Present	☐	☐	☒	☐	☐	☐

INCOMING PIPES

Letter	Upstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
A		Circular	100	x		PVC - Polyvinyl Chloride	Not present	0.71
B		Circular	225	x		VC - Vitrified Clay	Not present	1.36

OUTGOING PIPES

Letter	Downstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
X		Circular	225	x		VC - Vitrified Clay	Not present	2.65

Evidence of misconnection? ☐

Manhole Images



Additional Notes and/or Recommendations

Manhole Report

MH (Node) Reference: MH5	Date: 16-06-2023
--------------------------	------------------

Location: MH5		Location Type: Road			
Function: Combined		Node Type: MH - Manhole		Status: PU - Public	
Latitude:	Longitude:		Year Installed:		Area Code:

LEVELS	Depth (m):	Cover Level (m):	Invert Level (m):
COVER	Shape: C - Circular	Hinged? ☐	Dimension 1:
	Duty: Medium	Locked? ☐	Dimension 2:

CHAMBER						
Construction: Others		Access:	Access Shaft? ☐	Reducing Slab? ☐	Landing Slab? ☐	
Chamber Dimensions	Dimension 1 (Dia.):		Shaft Dimensions(if present)	Dimension 1 (Dia.):		
	Dimension 2:			Dimension 2:		
Flow Depth (mm):		Sluice Gate? ☐		Grating? ☐		Penstock? ☐
Silt Depth (mm):		Flap Valve? ☐		Headwall? ☐		Screens? ☐
Surcharge Level (mm):		Orifice? ☐		Flume? ☐		Weir? ☐

Condition	Cover	Shaft	Step Irons/Ladders	Chamber	Benching	Half Channel
Good	☒	☒	☒	☒	☐	☐
Fair	☐	☐	☐	☐	☐	☐
Poor	☐	☐	☐	☐	☐	☐
Not Present	☐	☐	☐	☐	☐	☐

INCOMING PIPES

Letter	Upstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
A		Circular	300	x		VC - Vitrified Clay	Not present	

OUTGOING PIPES

Letter	Downstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
X		Circular	300	x		VC - Vitrified Clay	Not present	1.81

Evidence of misconnection? ☐

Manhole Images



Additional Notes and/or Recommendations

Manhole
Report

MH (Node) Reference: MH4	Date: 16-06-2023
--------------------------	------------------

Location: MH4		Location Type: Road			
Function: Combined		Node Type: MH - Manhole		Status: PU - Public	
Latitude:	Longitude:		Year Installed:		Area Code:

LEVELS	Depth (m):	Cover Level (m):	Invert Level (m):
COVER	Shape: C - Circular	Hinged? ☐	Dimension 1:
	Duty:	Locked? ☐	Dimension 2:

CHAMBER				
Construction:	Access:	Access Shaft? ☐	Reducing Slab? ☐	Landing Slab? ☐
Chamber Dimensions	Dimension 1 (Dia.):		Shaft Dimensions(if present)	Dimension 1 (Dia.):
	Dimension 2:			Dimension 2:
Flow Depth (mm):		Sluice Gate? ☐	Grating? ☐	Penstock? ☐
Silt Depth (mm):		Flap Valve? ☐	Headwall? ☐	Screens? ☐
Surcharge Level (mm):		Orifice? ☐	Flume? ☐	Weir? ☐

Condition	Cover	Shaft	Step Irons/Ladders	Chamber	Benching	Half Channel
Good	☐	☐	☐	☐	☐	☐
Fair	☐	☐	☐	☐	☐	☐
Poor	☐	☐	☐	☐	☐	☐
Not Present	☐	☐	☐	☐	☐	☐

INCOMING PIPES

Letter	Upstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
		Circular		x		VC - Vitrified Clay	Not present	

OUTGOING PIPES

Letter	Downstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
		Circular		x		VC - Vitrified Clay	Not present	

Evidence of misconnection? ☐

Manhole Images



Additional Notes and/or Recommendations

Manhole
Report

MH (Node) Reference: MH6	Date: 16-06-2023
--------------------------	------------------

Location: MH6		Location Type: Footway			
Function: Combined		Node Type: MH - Manhole		Status: PU - Public	
Latitude:	Longitude:		Year Installed:		Area Code:

LEVELS	Depth (m):	Cover Level (m):	Invert Level (m):
COVER	Shape: C - Circular	Hinged? ☐	Dimension 1:
	Duty: Heavy	Locked? ☐	Dimension 2:

CHAMBER					
Construction: Plastic		Access:	Access Shaft? ☐	Reducing Slab? ☐	Landing Slab? ☐
Chamber Dimensions	Dimension 1 (Dia.):		Shaft Dimensions(if present)	Dimension 1 (Dia.):	
	Dimension 2:			Dimension 2:	
Flow Depth (mm):		Sluice Gate? ☐		Grating? ☐	Penstock? ☐
Silt Depth (mm):		Flap Valve? ☐		Headwall? ☐	Screens? ☐
Surcharge Level (mm):		Orifice? ☐		Flume? ☐	Weir? ☐

Condition	Cover	Shaft	Step Irons/Ladders	Chamber	Benching	Half Channel
Good	☐	☐	☐	☐	☐	☐
Fair	☒	☒	☐	☒	☐	☐
Poor	☐	☐	☐	☐	☐	☐
Not Present	☐	☐	☒	☐	☐	☐

INCOMING PIPES

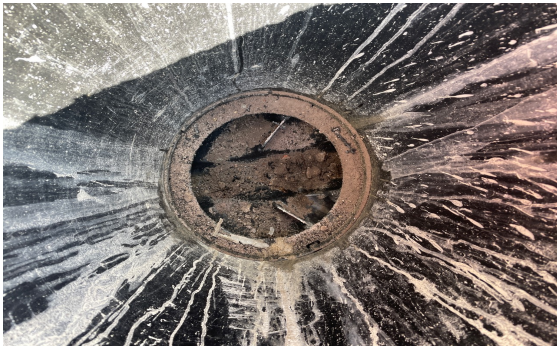
Letter	Upstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
A		Circular	100	x		VC - Vitrified Clay	Not present	
B		Circular	150	x		VC - Vitrified Clay	Not present	
C		Circular	100	x		VC - Vitrified Clay	Not present	

OUTGOING PIPES

Letter	Downstream Ref.	Pipe Shape	Height (Dia.)		Width	Pipe Material	Lining Material	Depth (m)
X		Circular	150	x		VC - Vitrified Clay	Not present	1.31

Evidence of misconnection? ☐

Manhole Images

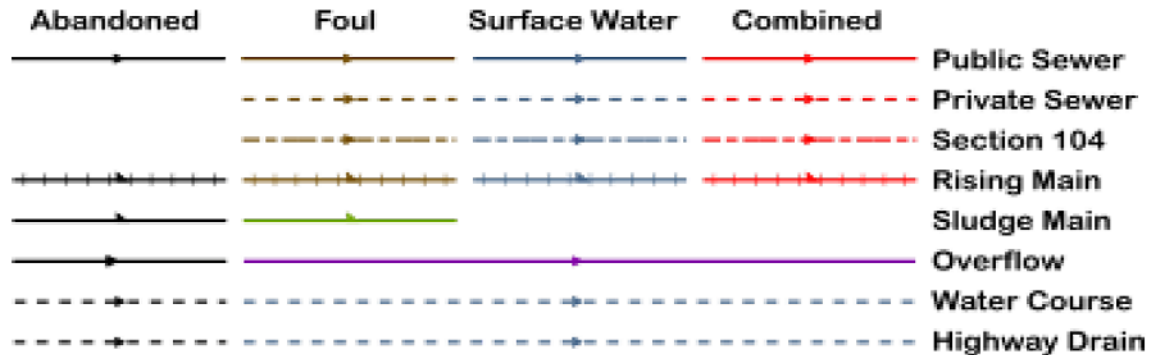


Additional Notes and/or Recommendations

Appendix C

United Utilities Sewer Records

Wastewater Symbolology



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

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



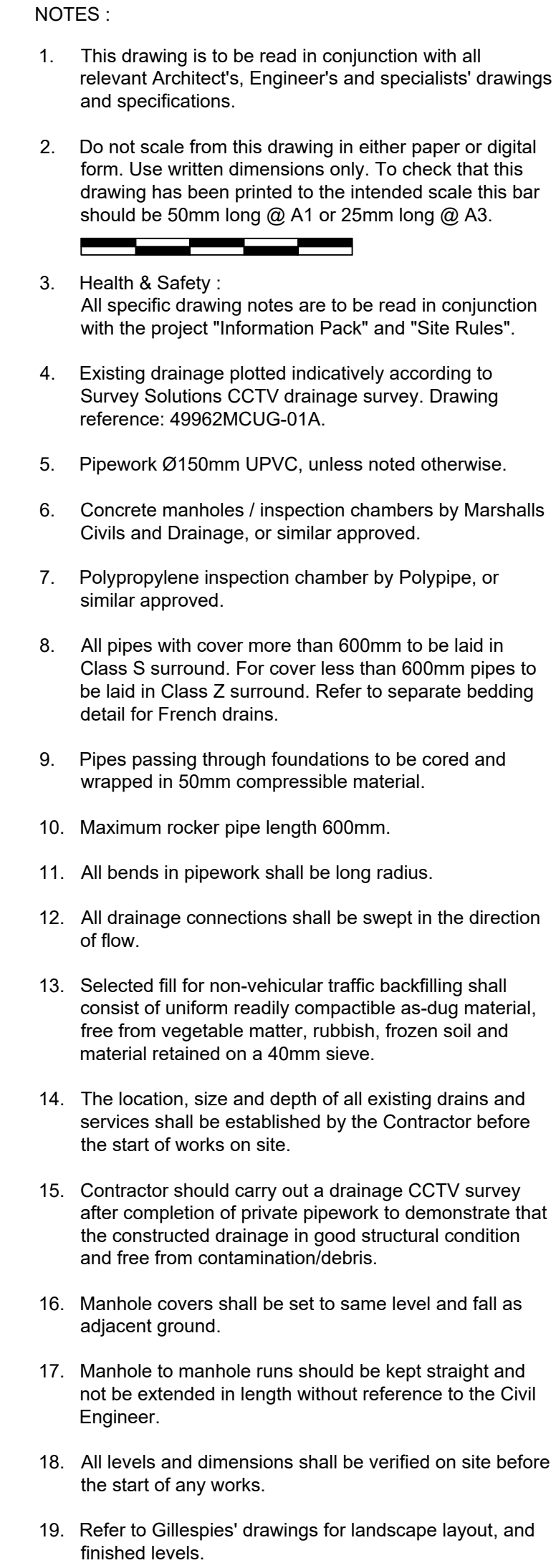
Rochdale Town Hall,

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Appendix D

Below Ground Drainage Layouts



P12	28.11.24	AC	SRe	Drain depths rationalised
P11	31.10.24	AC	SRe	Issued for Stage 4
P10	18.10.24	AC	SRe	Issued for Stage 4
P09	27.09.24	SRe	SRe	Issued for Draft Stage 4
P08	13.12.23	SRe	SRe	Issued for Planning
P07	25.10.23	SRe	SRe	CCTV drainage survey information added & FW drainage updated. L/A layout updated
P06	19.09.23	AC	SRe	VE updates and fountain drainage update
P05	23.06.23	DLA	SRe	Issued for Stage 2
P04	13.03.23	AC	SRe	Below Ground Drainage Updates
Rev	Date	Drawn	Eng	Amendment

BROADFIELD SLOPES
ROCHDALE

PHASE 2
SOUTH SLOPES
INFRASTRUCTURE

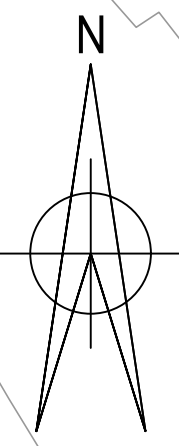
Status	STAGE 4 NOT FOR CONSTRUCTION
--------	--

Drawn	AC	Eng	SRe
Scales	1:200 at A1	1:400 at A3	
Drawing No	Rev		
30217 / 6002	P12		
Doc Ref.			
-			

Appendix E

Buro Happold Rochdale Town Hall Proposed Surface Water Drainage Layout

- LEGEND**
- BD-BACKDROP SITE BOUNDARY
 - BD-BACKDROP SURFACE WATER SEWER
 - BD-BACKDROP COMBINED SEWER
 - BD-BACKDROP EXISTING COMBINED UI SEWER
 - EXISTING PIPE TO BE RETAINED
 - EXISTING PIPE TO BE ABANDONED
 - ARROWING ACCESS CHANNEL OUTLET CHANNEL DRAIN
 - PERFORATED PIPE
 - GULLY
 - ROODING EYE
 - ATTENUATION TANK



ALL PIPES 1500 UNLESS OTHERWISE STATED

HEALTH AND SAFETY INFORMATION

DO NOT SCALE THIS DRAWING

CONSTRUCTION

- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
- WORKS IN PROXIMITY TO FLOOD ZONE
- WORKS INTERFACING WITH THE PUBLIC ON THE ESPLANADE, NEWGATE, SOUTH PARADE AND LONDON STREET

MAINTENANCE/OPERATION

- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
- WORKS IN PROXIMITY TO FLOOD ZONE

DECOMMISSIONING/DEMOLITION

- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
- WORKS IN PROXIMITY TO FLOOD ZONE

- Notes**
- GENERAL NOTES:**
- THE DESIGN OF THIS SCHEME HAS BEEN BASED ON THE FOLLOWING DRAWINGS AND INFORMATION:
 - 2D GPR SURVEY: DRAWING NO. 0445 REV 01-01 RECEIVED OCTOBER 2019, BY GEOTECHNICAL ENGINEERING LTD
 - GILLESPIES LANDSCAPE DRAWING: LANDSCAPE GENERAL ARRANGEMENT DRAWING NO. P11511-00-01-GL-0100 REV 01 RECEIVED 31/03/2020
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS, DETAILS AND SPECIFICATIONS.
 - ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
 - ALL EXISTING PRIVATE GULLIES AND ASSOCIATED PIPES TO BE REMOVED UNLESS OTHERWISE STATED.
 - THE CONTRACTOR SHALL TAKE ALL NECESSARY SAFETY PRECAUTIONS IN LINE WITH CURRENT LEGISLATION WHEN WORKING IN NEAR CONFINED SPACES, DEEP EXCAVATIONS AND UTILITIES.
 - PRIOR TO THE COMMENCEMENT OF WORK THE LOCATION, SIZE AND DEPTH OF ALL EXISTING DRAINAGE SEWERS AND SERVICES SHALL BE ESTABLISHED BY THE CONTRACTOR. ANY DISCREPANCIES FROM THE INFORMATION INDICATED ON THESE DRAWINGS SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ARCHITECT OR ENGINEER.
 - ALL DRAINAGE SHALL BE CONSTRUCTED IN ACCORDANCE WITH BS EN 752 DRAINAGE AND SEWERS OUTSIDE BUILDINGS. THE CURRENT BUILDING REGULATIONS AND TO THE SATISFACTION OF THE WATER AUTHORITY BUILDING CONTROL. OR SPECIFIC REQUIREMENTS OF THE CLIENT IF APPLICABLE.
 - ANY DRAINAGE TO BE PUT FORWARD FOR ADOPTION SHALL BE CONSTRUCTED TO "SEWERS FOR ADOPTION" AND ANY SPECIFIC REQUIREMENTS OF THE ADOPTING AUTHORITY.
 - THE CONTRACTOR SHALL ALLOW FOR ALL RELEVANT APPROVALS FROM THE RELEVANT AUTHORITIES WHEN WORKING WITHIN THE PUBLIC HIGHWAY AND ON ADOPTED SEWER SYSTEMS.
 - THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND DIVERSION WORKS AS NECESSARY, TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE PUBLIC UTILITIES.
 - THE CONTRACTOR SHALL ALLOW FOR DEALING WITH SURFACE WATER RUNOFF INTO EXCAVATIONS AND FROM GROUNDWATER BY MEANS OF PUMPS, PIPING AND DE-WATERING AS APPROPRIATE IN ORDER TO KEEP THE EXCAVATION AS DRY AS REASONABLY PRACTICABLE DURING THE CONSTRUCTION OF THE WORKS. DEWATERING SHALL BE UNDERTAKEN IN STRICT ACCORDANCE WITH THE SPECIFICATION.
 - THE CONTRACTOR SHALL TAKE ALL NECESSARY SAFETY PRECAUTIONS IN LINE WITH CURRENT LEGISLATION WHEN WORKING IN NEAR CONFINED SPACES, DEEP EXCAVATIONS AND UTILITIES.
 - UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAINAGE BY JETTING, REMOVING ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE PUBLIC DRAINAGE SYSTEM, WATERCOURSE OR OFFSITE DISCHARGE NETWORK. ALL DRAINS SHALL BE CCTV SURVEYED WITH THE RECORD INFORMATION INCLUDING VIDEO FOOTAGE BEING PASSED TO THE ENGINEER FOR REVIEW.
 - ALL PROPRIETARY PRODUCTS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS' SPECIFIC REQUIREMENTS AND SPECIFICATIONS.
 - ALL EXISTING DRAINAGE INFRASTRUCTURE NOT REQUIRED AS PART OF THE FINAL DRAINAGE SYSTEMS TO BE GRUBBED UP AND REMOVED FROM SITE OR GRouted UP AS DIRECTED BY THE ENGINEER.
 - ABOVE GROUND ROODING POINTS MUST BE PROVIDED TO FOUL STACKS AND RAINWATER DOWNPIPES WHICH DO NOT CONNECT DIRECTLY TO A MANHOLE. ALL ROODING POINTS MUST BE PROVIDED WITH ACCESS PANELS.
 - WHERE INFILL MANHOLE COVERS ARE SPECIFIED THE LOCATION OF MANHOLES AND ORIENTATION OF THE COVERS SHALL BE COORDINATED ON SITE TO SUIT THE SURFACING MATERIAL AND PAVING ARRANGEMENT WHEREVER POSSIBLE.
 - DUCTILE IRON SHALL BE USED FOR PIPE WORK WHICH IS TO BE CAST THROUGH PILE CAPS / PAD FOUNDATIONS.

P02 STAGE 3 UPDATE	04/05/2020	PB	CB
P01 ISSUED FOR STAGE 3	23/04/2020	PB	CB
Rev	Description	Date	Drawn

STAGE 3

BUROHAPPOLD ENGINEERING

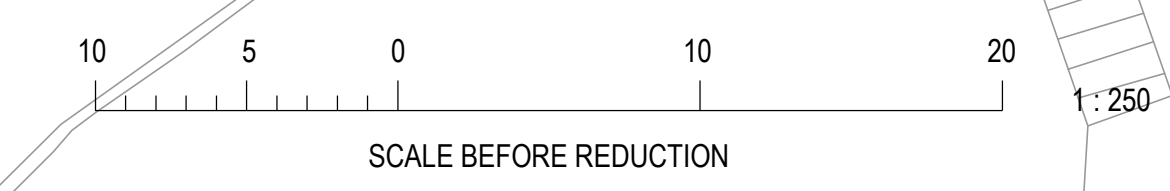
17 Newman Street
London
W1T 3ED
UK

Tel: +44 (0)20 7527 0700
Fax: +44 (0)20 757 4145
Web: www.burohappold.com

Architect: GILLESPIES
Project: ROCHDALE TOWN HALL SQUARE
Original Title: PROPOSED SURFACE WATER DRAINAGE PLAN

Issue No: 0042509
Drawn by: PB
Checked by: CB
Date: APRIL 2020
Rev: P02

Drawing No: 0042509-BHE-DR-C-3100



Appendix F

Greenfield Runoff Estimate

Calculated by:	Toby Lloyd
Site name:	30217 Broadfield Slopes
Site location:	Rochdale

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

Site Details

Latitude:	53.61512° N
Longitude:	2.15837° W
Reference:	1665979799
Date:	Feb 05 2025 17:43

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha):	0.54
-----------------------	------

Methodology

Q _{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.83
Q _{MED} (l/s):	
Q _{BAR} / Q _{MED} factor:	1.08

Hydrological characteristics

	Default	Edited
SAAR (mm):	1147	1147
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

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

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

(2) Are flow rates $< 5.0 \text{ l/s}$?

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

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

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

Q_{BAR} (l/s):		1.25
1 in 1 year (l/s):		1.09
1 in 30 years (l/s):		2.13
1 in 100 year (l/s):		2.6
1 in 200 years (l/s):		2.97

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