

TECHNICAL NOTE

210472 – Land at Halifax Road

Liversedge

AMO/210472/FRS-01 - 02 February 2023

1.0 CONTENTS

2.0	INTRODUCTION	1
3.0	OBJECTIVE OF STRATEGY	2
4.0	POLICY & GUIDENCE.....	4
5.0	EXISTING SITE	4
6.0	PROPOSED DEVELOPMENT	5
7.0	SOURCES OF FLOOD RISK.....	5
8.0	DRAINAGE STRATEGY	8
9.0	MANAGEMENT MEASURES, OFF SITE IMPACTS AND RESIDUAL RISK.....	11
10.0	SUMMARY	12

APPENDICIES

APPENDIX A – Environment Agency Flood Maps

APPENDIX B – UK SuDS Greenfield Rate Print out

APPENDIX C - Proposed Drainage & Design Calculations

2.0 INTRODUCTION

SCP has been commissioned by Studio 91 Architecture to provide a Flood Risk Statement and Drainage Strategy Report to support the discharging of Condition 16 for the proposed development, (Application Number: 2019/62/93380/E) Approved Planning Application.

16. A scheme detailing the proposed drainage of the site which adheres to the hierarchy of sustainable drainage shall be submitted to and approved in writing by the Local Planning Authority before works to erect the superstructure of the dwelling commence. The dwelling shall not be first occupied until such approved drainage scheme has been provided on the site to serve the development and thereafter be retained.

Reason: To ensure the provision of adequate and sustainable systems of drainage in the interests of amenity and environmental well-being and to accord with Policy LP28 of the Kirklees Local Plan and Chapter 14 of the National Planning Policy Framework

3.0 OBJECTIVE OF STRATEGY

The objective of the strategy is to undertake a Flood Risk Statement in accordance with the National Planning Policy Framework 2021 (NPPF). The detail and complexity of a Flood Risk Statement should reflect the level of risk to the site. The NPPF 2021 is the official document that regulates the assessment of flood risks and their appropriate mitigations to the planning process.

A site-specific flood risk statement should:

- Consider whether a proposed development is likely to be affected by current or future flooding from any source;
- Establish whether it will increase flood risk elsewhere;
- Identify whether the measures proposed to deal with these effects and risks are appropriate;
- Review the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;
- Assess whether the development will be safe and pass the Exception Test, if applicable.
- Proportionate to the risk and appropriate to the scale, nature and location of the site;
- Take the impacts of climate change into account;
- Consider both the potential adverse and beneficial effects of flood risk management infrastructure including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure;
- Consider the vulnerability of those that could occupy and use the site, taking account of the Sequential and Exception Tests and the vulnerability classification including arrangements for safe access/ egress;
- Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
- Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
- include the assessment of the remaining (known as ‘residual’) risks after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development or land use;
- Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems;
- Be supported by appropriate data and information, including historical information on previous events.

This report therefore assesses flood risk to the site and any impact on flood risk to other land because of the development proposals.

Limitations

This report has been prepared for exclusive use by the Client for the purpose of assisting them in discharging the planning conditions associated with the granted planning permission for this development.

SCP accepts no liability for any use of this document other than by its Client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the Client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of SCP. Any advice, opinions or recommendations within this document should be read and relied upon only in the context of the document as a whole.

SCP has assessed all information provided to them during this assessment and therefore this report has been compiled from a number of external sources.

This report has been undertaken with the assumption that the site will be developed in accordance with the above proposals without significant change. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

4.0 POLICY & GUIDANCE

In carrying out our assessment and preparing this report, regard has been taken of the provisions of the development plan and a range of other material considerations. The following documentation has been reviewed and considered with regards to Flood Risk and Drainage at the proposed development site.

- National Planning Policy Framework (NPPF) 2021
- Flood and Water Management Act 2010
- Environment Agency Flood Map for Planning and interactive online maps
- The SUDS Manual 2015
- Calder Catchment Strategic Flood Risk Assessment – Volumes 1 & 2 - 2016
- Kirklees Local Flood Risk Management Strategy 2012
- Kirklees Surface Water Management Plan 2011
- Kirklees Local Plan 2019

5.0 EXISTING SITE

A topographical survey of the site has been completed. The general topography of the existing site appears to be generally flat, with levels ranging between 154.460m AOD and 154.710m AOD.

The site is currently a commercial site with associated access, parking and service yard. The land consists of tarmac hard standing, grassed verges and building roofs.

There is an existing Yorkshire Water combined sewer located outside the site in Halifax Road.

The Oldfield Beck is located to the north, approximately 540m from the site. There is an unnamed watercourse / drainage ditch to the northeast which is approximately 320m from the site.

There are no reservoirs in the area of the development site.

There are no flood defences recorded on any maps within close proximity to the application site.

The site is circa 0.047ha.

The Greenfield Rate for the site is 0.55 l/s (Qbar), this has been calculated using the UK SUDS online tool, the printout is included in Appendix B. This rate is not practical for maintenance purposes; therefore, the proposed discharge rate is to be restricted to 2.5 l/s.

6.0 PROPOSED DEVELOPMENT

The proposal is to construct a detached residential dwelling within a development boundary. This development boundary is within the overall site boundary. The dwelling is to be located partially in areas described as; existing grass / shrubs and generally overgrown and partially in an area designated as vehicle access / parking. This area is in the centre of the site. Private off-road parking is to be provided within the site boundary.

The remaining area of the site is to be retained for commercial use, with new designated off-road parking. The flood risk and drainage for this element of the site are not included in this report.

7.0 SOURCES OF FLOOD RISK

Source	Definition	Likelihood
Fluvial	River Flood	Low
Pluvial	Surface Water Flooding	Low
Coastal - Sea	Tidal Surge	Not Applicable
Coastal - Estuarine	Tidal Surge	Not Applicable
SWS, FWS, CS, CSO	Sewer Flooding	Low
Groundwater	Emergence from ground	Very Low
Reservoir	Breach in containment structure	Not Applicable

The Environment Agency identifies the site being located within Flood Zone 1.

The Environment Agency Flood Mapping shows the site has a **low risk of Fluvial flooding** from these sources. The surface water flood maps can be found in Appendix A.

The Environment Agency Flood Mapping shows the site has a **low risk of Pluvial flooding** from these sources. The area identified as low risk on the Environment Agencies map appears to be within the site boundary in an area currently occupied by landscaping and car park. The surface water flood maps can be found in Appendix A.

Information taken from Kirklees Borough Councils website; a document has been prepared by JBA Consulting to indicate the Risk clusters for the Critical Drainage Areas. From this, the site is

located within an area of low risk. This shows the site has a **low risk of Surface Water flooding** from these sources, this information is included in Appendix A.

Information taken from Calder Catchment Strategic Flood Risk Assessment indicates that the site is **at low risk of ground water susceptibility / flooding.** The map showing the areas susceptible to groundwater flooding can be found in Appendix A.

The risk of reservoir flooding is not applicable to the proposed development due to no reservoirs being within the area of the site.

No other potential sources of flood risk have been identified immediately affecting the site.

There is no evidence available of any flooding at the existing site which has been made available to SCP.

A review of anecdotal information available through various news sources has not provided any evidence of flooding at the site.

In accordance with NPPF Technical Guidance, a sequential would not be required for this development as there are no forms of flooding identified at the site using the available flood map information.

Appropriateness for the development is assessed by using Table 3: *Flood Risk Vulnerability and flood zone 'compatibility'* from NPPF. To use this table, Table 1: *Flood Zones* and Table 2: *Flood Risk Vulnerability Classification* are to be referred to.

It has previously been noted that the proposal building is in Flood Zone 1, using Table 2: *Flood Risk Vulnerability Classification* the building would be identified as being '*More Vulnerable*'.

More vulnerable

- Hospitals
- Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Using Table 3: *Flood Risk Vulnerability and flood zone ‘compatibility’* as shown below, the unit is identified as appropriate.

	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Y	Y	Y	Y	Y
Zone 2	Y	Y	Exception Test Req'd	Y	Y
Zone 3a	Exception Test Req'd	Y	N	Exception Test Req'd	Y
Zone 3b (functional flood plain)	Exception Test Req'd	Y	N	N	N

Key:

Y = Development is appropriate

N = Development should not be permitted

8.0 DRAINAGE STRATEGY

Surface Water Drainage

The National Planning Policy Framework 2019 (NPPF)¹ and accompanying Planning Practice Guidance² indicate surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.

Consideration should therefore firstly be given to using sustainable urban drainage (SUDS) techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements. Approved document Part H of the Building Regulations (2010)³ sets out a hierarchy for the disposal of surface water which encourages a SUDS approach, as detailed above.

As noted within Section 4.0: Development Proposals, it is proposed to construct a detached dwelling within the site on areas of existing grass / shrubs and partially in hardstanding access / parking areas.

A topographical survey has been completed and there appears to be no existing private drainage within the site boundary or any system currently serving the adjacent commercial site.

Infiltration testing has been completed at the development site. The results from the testing highlighted that the ground is unsuitable for infiltration as the 25% effective depth was not achieved. However, as there is no existing drainage network on the existing site, the current conditions are assumed to accommodate some infiltration. The testing results are included within this Technical Note in Appendix C.

Due to the distance to the nearest watercourse, it is not practical for this type of discharge method for the site.

The Yorkshire Water asset records show that there is an existing combined sewer located outside the site in Halifax Road.

¹ Department for Communities and Local Government 2019 – National Planning Policy Framework

² Department for Communities and Local Government 2016 – Planning Practice Guidance

³ HM Government Building Regulations 2010 – Approved Document part H

For the purpose of this report, it is proposed to deal with surface water via discharge to the combined water system in Halifax Road. This will be via a S106 connection with Yorkshire Water.

A pre-development enquiry will be submitted to Yorkshire Water to determine the discharge requirement rate for the site. However, for the purpose of this report, the discharge rate is to be restricted to 2.5 l/s.

The proposed impermeable area for the site is 0.032ha.

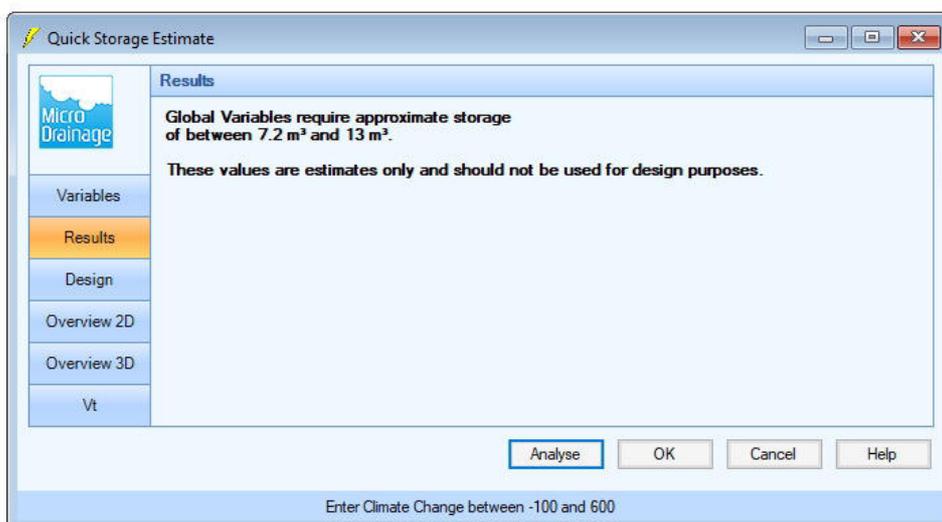
The development is proposing to incorporate permeable tarmac for the private driveway and parking. As storage will be required, it is proposed that there will be a lined stoned system below the surfacing.

The proposed site peak run-off rates are provided in the table below.

Proposed Peak Run-off Rates

Return Period (Yr.)	Proposed Runoff Rate (l/s)
2 Year	4.3 l/s
100 Year	4.3 l/s
100 Year (+45%)	6.3 l/s

Using the Microdrainage Quick Storage Estimate facility, the volume of storage required is expected to be between 7.2m³ and 13m³.



The permeable surfacing is expected to cover an area of circa 2700m², with a possible subbase depth of 225mm will be expected to have a volume capacity of circa 182m³, this is suitable for the volume of storage required.

A design for the drainage has been prepared in Microdrainage and is included with the Proposed Drainage Strategy Drawing in Appendix C.

Foul Water Drainage

The proposed foul drainage is proposed to discharge into the existing Yorkshire Water sewer located in Halifax Road. It is proposed that there will be a new connection made under a S106 agreement for the discharge of the foul water from the development.

As the existing sewer is a combined sewer, the demarcation manhole will be a combined manhole. The proposed drainage for the development will be separate up to this demarcation chamber. The out falling surface water into this manhole will have the invert level set higher than the incoming foul and outgoing combined pipes.

An outline drainage design has been completed; the drawing is presented in Appendix C.

Upon confirmation for the design and details of the permeable surfacing, the drainage system will be able to be designed in detail.

9.0 MANAGEMENT MEASURES, OFF SITE IMPACTS AND RESIDUAL RISK

As the development proposal is for the construction of a detached dwelling in an area with no identified risk of flooding, it is considered that access and egress will not be at an increased risk and that no additional flood risk management measures will be required.

As with any drainage system, blockages within the surface water system have potential to cause flooding or disruption. It is important that any private drainage systems located at the development site continue to be maintained.

The invert level for the surface water outfall into the combined water demarcation manhole will be set at a higher level than the incoming foul pipe and outgoing combined pipe.

10.0 SUMMARY

The site is in an area identified as having a 'low' probability of flooding on the EA Flood Map for Fluvial, Pluvial and Surface flooding and is located in Flood Zone 1. These are shown in Appendix A.

The Flood Risk Statement (FRS) has reviewed all sources of flood risk to both the proposed development and the existing building, including fluvial, tidal, pluvial, groundwater, sewers and flooding from artificial sources.

The proposals for the surface water drainage will incorporate a SUDS in the form of permeable surfacing incorporating attenuation.

The surface water discharge rate is to be restricted as practicable to greenfield rate, for this development the discharge rate will be 2.5 l/s.

The connection to the existing sewers will require consultation and approval under a S106 agreement with Yorkshire Water.

The Flood Risk Statement is considered to be commensurate with the development proposals and in summary, the planning application can be considered appropriate for Flood Zone 1 in accordance with the NPPF 2021.

APPENDIX A – Environment Agency Flood Maps

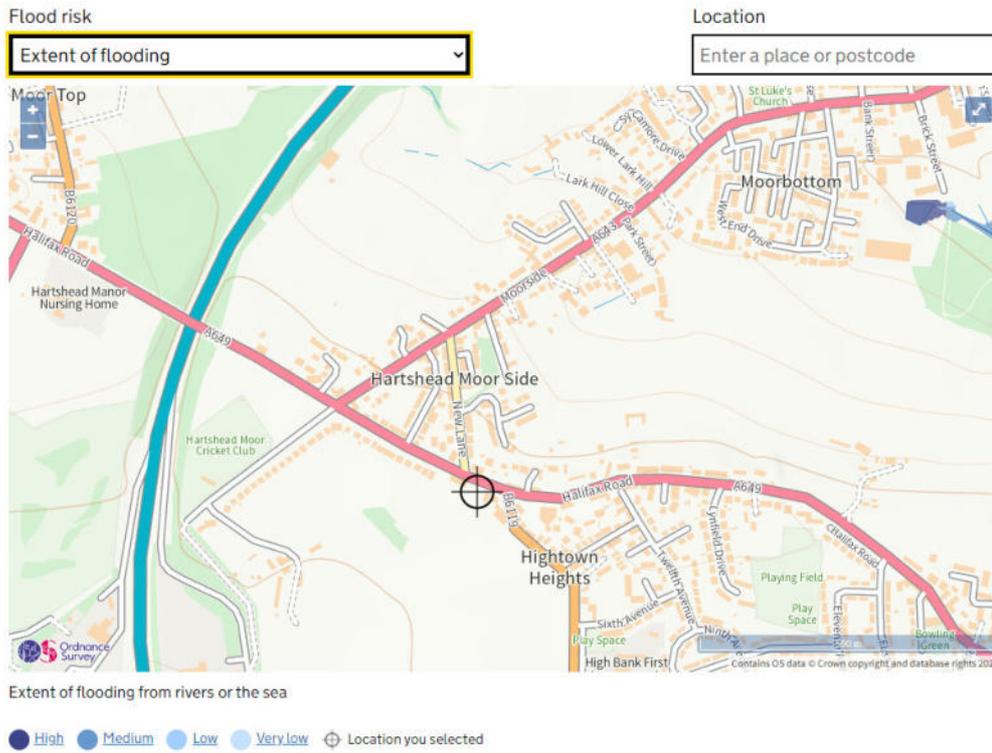


Figure 1 - EA Pluvial Flood Map - Online Mapping Tool 2022

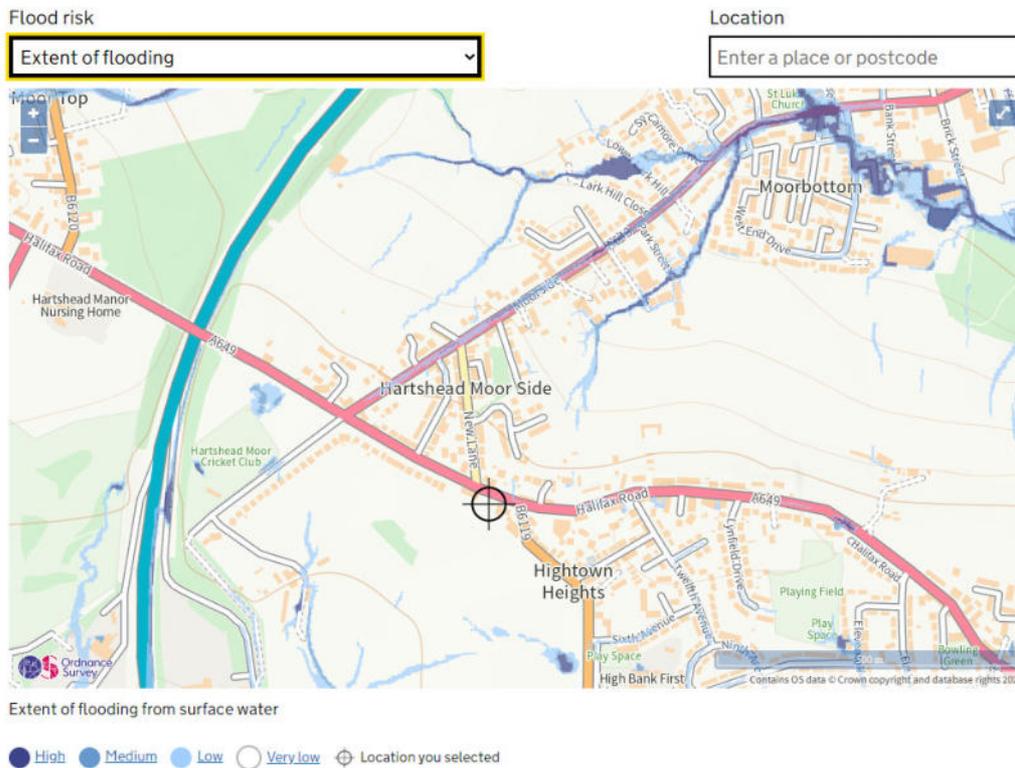


Figure 2 - EA Fluvial Flood Map - Online Mapping Tool 2022

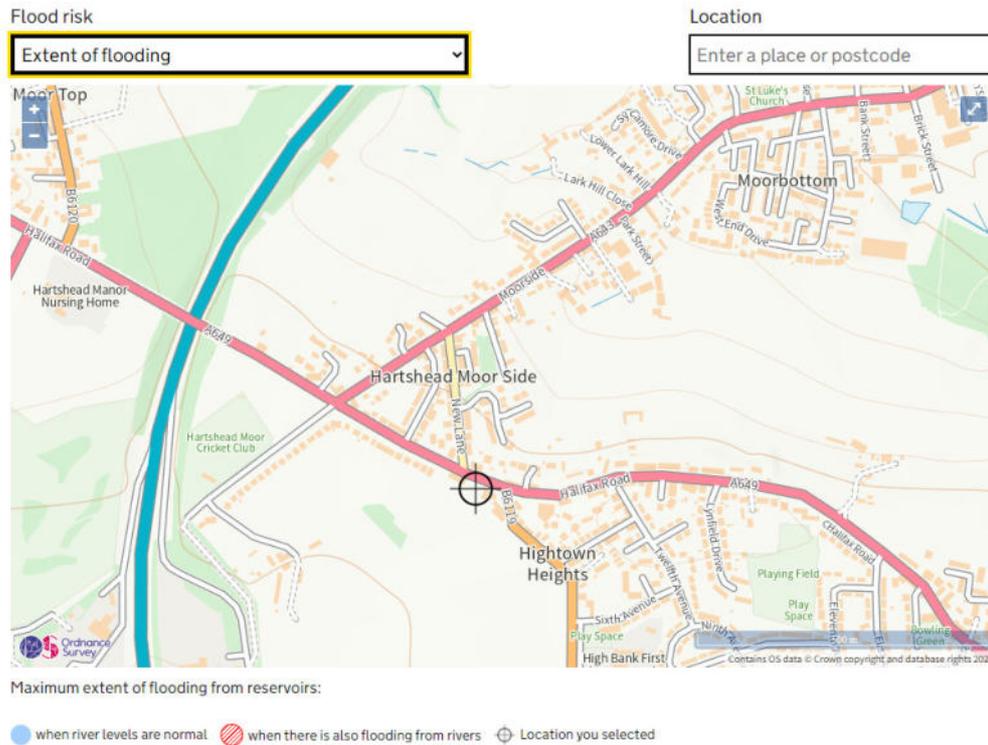


Figure 3 - EA Fluvial Flood Depth Map - Online Mapping Tool – 2022

APPENDIX B – UK SuDS Greenfield Rate Print-out

Calculated by: Allison O'Neill

Site name: Halifax Road

Site location: Liversedge

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: 53.71620° N

Longitude: 1.73688° W

Reference: 2166852138

Date: Mar 04 2022 14:58

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 0.1

Methodology

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

SPR estimation method: Calculate from SOIL type

Soil characteristics: Default Edited

SOIL type: 4 4

HOST class: N/A N/A

SPR/SPRHOST: 0.47 0.47

Hydrological characteristics: Default Edited

SAAR (mm): 779 779

Hydrological region: 3 3

Growth curve factor 1 year: 0.86 0.86

Growth curve factor 30 years: 1.75 1.75

Growth curve factor 100 years: 2.08 2.08

Growth curve factor 200 years: 2.37 2.37

Notes

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

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

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

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

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

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

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.55	0.55
1 in 1 year (l/s):	0.47	0.47
1 in 30 years (l/s):	0.96	0.96
1 in 100 year (l/s):	1.14	1.14
1 in 200 years (l/s):	1.3	1.3

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

APPENDIX C – Proposed Drainage & Design Calculations



Trial Pit Log

Trialpit No
TP01
Sheet 1 of 1

Project Name: Land at Halifax Road, Liversedge Project No. C2764/22/E/4214 Co-ords: - Date 10/10/2022
Level: Level:

Location: Land at Halifax Road, Liversedge, West Yorkshire, WF15 8HE Dimensions (m): 1.8
Client: Studio91 Architecture Depth 0.35 Logged TM
Level 1.50

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.05 - 0.35	B		0.05		[Cross-hatch pattern]	Asphalt MADE GROUND (Dense, dark brown, slightly silty, sandy fine to coarse and angular to sub-angular GRAVEL of sandstone and siltstone. Sand is fine to coarse).
	0.35 - 0.70	B		0.35		[Cross-hatch pattern]	MADE GROUND (Dense, dark brown, slightly silty, sandy fine to coarse and angular to sub-angular GRAVEL of sandstone and brick, with low cobble content).
	0.70 - 1.00	B		0.70		[X-pattern]	Firm, orangish brown mottled grey, silty CLAY. PENNINE LOWER COAL MEASURES FORMATION
				1.50		[Dashed line]	End of pit at 1.50 m

Remarks:

Stability: Stable





Trial Pit Log

Trialpit No
TP02
Sheet 1 of 1

Project Name: Land at Halifax Road, Liversedge Project No. C2764/22/E/4214 Co-ords: - Date 10/10/2022
Level: -

Location: Land at Halifax Road, Liversedge, West Yorkshire, WF15 8HE Dimensions (m): 2.1
Client: Studio91 Architecture Depth 1.85 0.4 Scale 1:25
Logged TM

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.00 - 0.50	B					TOPSOIL (Dense, dark brown, slightly clayey, very silty, gravelly fine to coarse SAND. Gravel is fine to medium and angular to sub-rounded of sandstone, siltstone and glass).
	0.50 - 1.00	B		0.50			Stiff, grey mottled orangish brown, silty CLAY. PENNINE LOWER COAL MEASURES FORMATION
	1.70 - 1.80	B		1.70 1.80			Weak, thinly laminated, brownish grey, SHALE. PENNINE LOWER COAL MEASURES FORMATION End of pit at 1.85 m

Remarks:

Stability: Stable

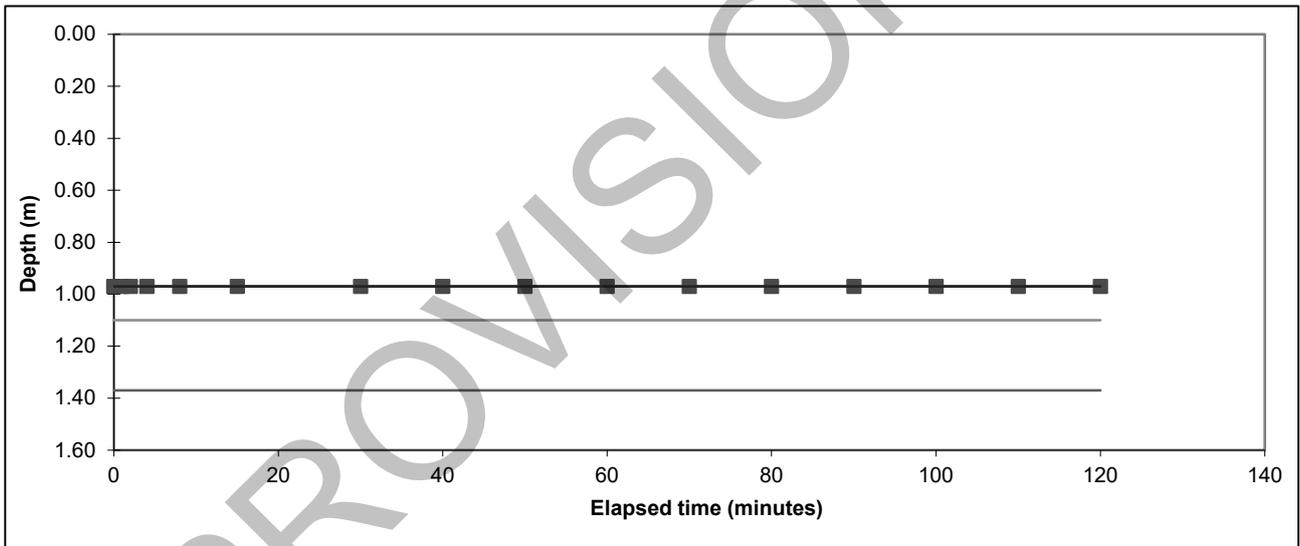


Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP01	Test No:	1	Date:	10/10/2022
Length (m):	1.800	Datum Height:			0.00 m agl
Width (m):	0.35	Granular infill:	None		
Depth (m):	1.50	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.970	110	0.970
1	0.970	120	0.970
2	0.970		
4	0.970		
8	0.970		
15	0.970		
30	0.970		
40	0.970		
50	0.970		
60	0.970		
70	0.970		
80	0.970		
90	0.970		
100	0.970		



Start water depth for analysis (mbgl):	0.97	Elapsed time (mins):	#N/A
75% effective depth (mbgl):	1.10	Elapsed time (mins):	#N/A
50% effective depth (mbgl):	1.24	Elapsed time (mins):	#N/A
25% effective depth (mbgl):	1.37	Elapsed time (mins):	#N/A
Base of soakage zone (mbgl):	1.50		
Volume outflow between 75% and 25% effective depth (m ³):			
Mean surface area of outflow (m ²):			1.75
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):			

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
--------------------------------------	--

Remarks	Results processed following BRE 365 (2007). Pit depth due to intended use of site - Shallow permeable asphalt.
----------------	---

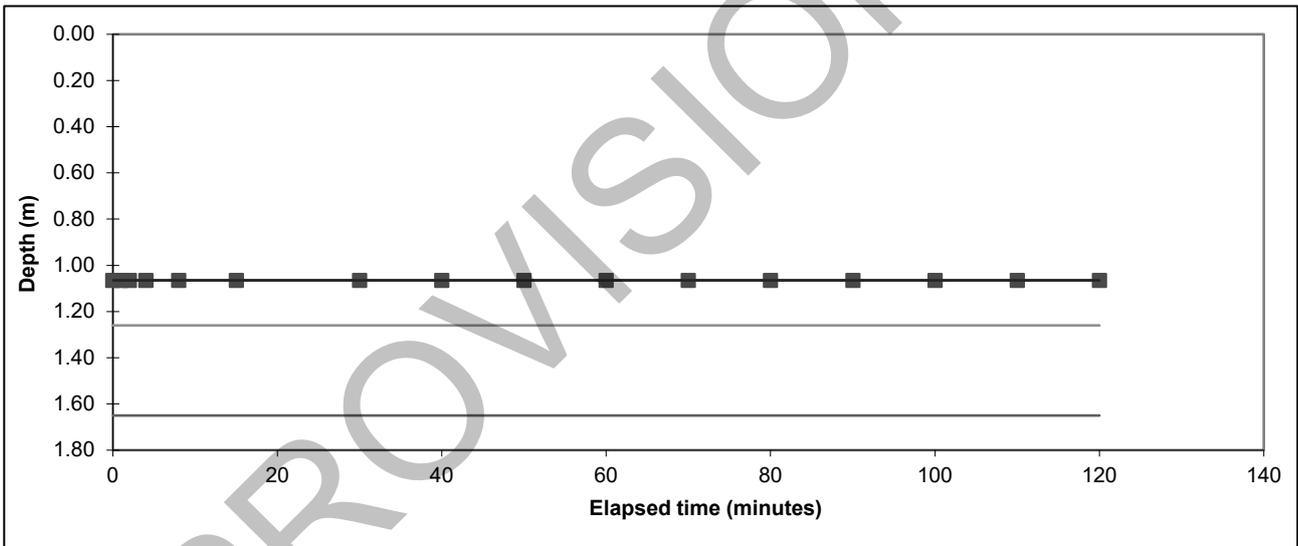
Client:	Studio91 Architecture	Job No:	C2764/22/E/4214
Site:	Land at Halifax Road, Liversedge		

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP02	Test No:	1	Date:	10/10/2022
Length (m):	2.100	Datum Height:			0.00 m agl
Width (m):	0.40	Granular infill:	None		
Depth (m):	1.85	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.065	110	1.065
1	1.065	120	1.065
2	1.065		
4	1.065		
8	1.065		
15	1.065		
30	1.065		
40	1.065		
50	1.065		
60	1.065		
70	1.065		
80	1.065		
90	1.065		
100	1.065		

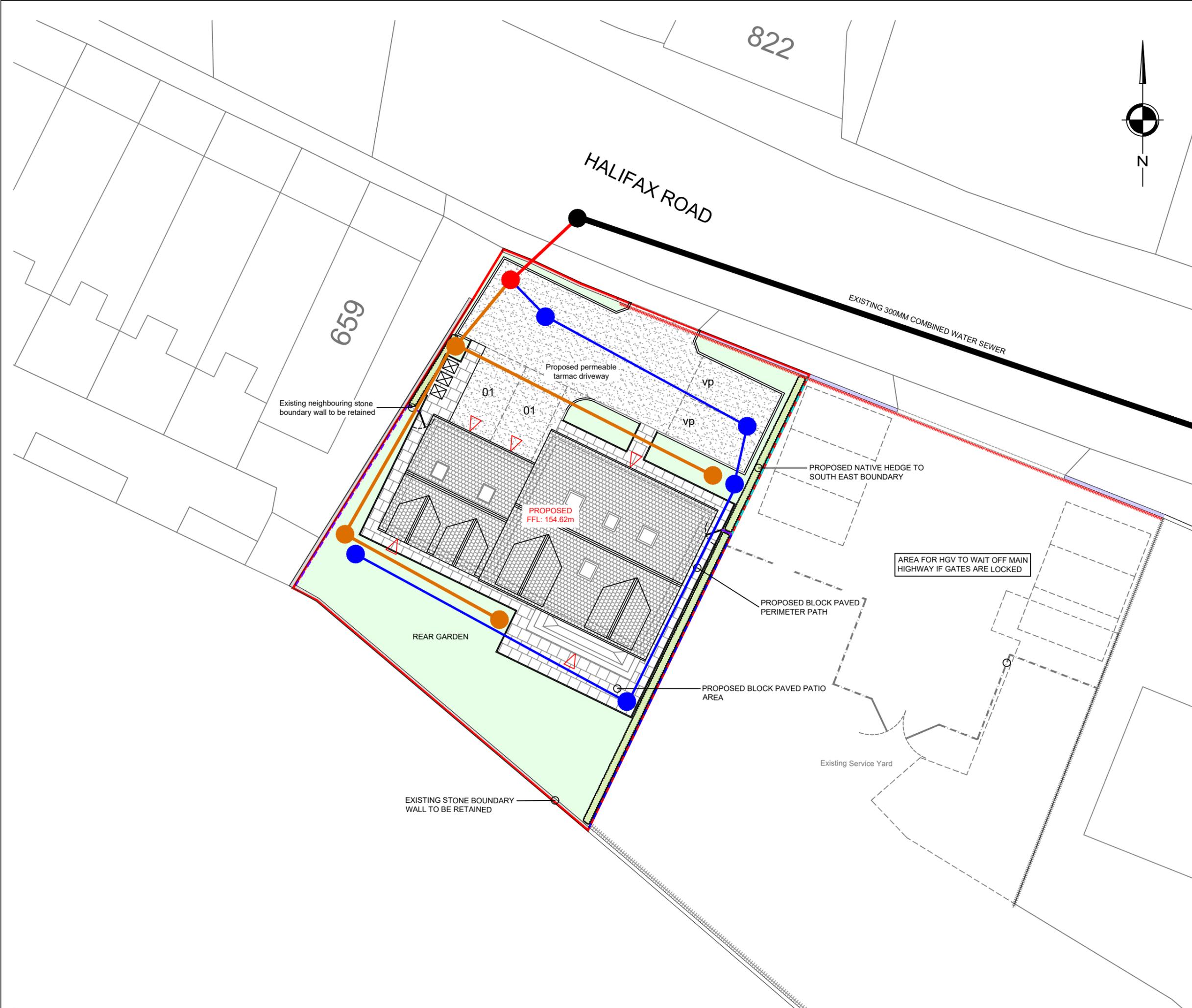


Start water depth for analysis (mbgl):	1.07		
75% effective depth (mbgl):	1.26	Elapsed time (mins):	#N/A
50% effective depth (mbgl):	1.46		
25% effective depth (mbgl):	1.65	Elapsed time (mins):	#N/A
Base of soakage zone (mbgl):	1.85		
Volume outflow between 75% and 25% effective depth (m ³):			
Mean surface area of outflow (m ²):			2.79
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):			

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
--------------------------------------	--

Remarks	Results processed following BRE 365 (2007).
----------------	---

Client:	Studio91 Architecture	Job No:	C2764/22/E/4214
Site:	Land at Halifax Road, Liversedge		

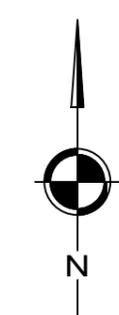


822

659

HALIFAX ROAD

EXISTING 300MM COMBINED WATER SEWER



- NOTES**
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED
 2. DO NOT SCALE FROM THIS DRAWING.
 3. ANY DISCREPANCIES FOUND ON THIS DRAWING OR OTHERS IN RELATION, ARE TO BE BROUGHT TO THE ATTENTION OF SCP.
 4. THE EXISTING TOPOGRAPHICAL SURVEY IS FROM THE MIDLANDS SURVEYS LTD TOPOGRAPHICAL SURVEY DATA DATED SEPTEMBER 2020
 5. THE EXISTING YORKSHIRE WATER SEWERS ARE FROM THE YORKSHIRE WATER EXISTING SEWER RECORDS PLAN

- KEY**
- PRIVATE SURFACE WATER MANHOLE AND PIPE
 - PRIVATE FOUL WATER MANHOLE AND PIPE
 - PRIVATE COMBINED WATER MANHOLE AND PIPE
 - EXISTING YORKSHIRE COMBINED WATER PIPE AND SEWER

REVISIONS

REV	DESCRIPTION	DATE	BY
A	FIRST ISSUE	07.03.22	LR

SCP
 Transportation Planning : Infrastructure Design
 Colwyn Chambers, 19 York Street, Manchester, M2 3BA, Tel 0161 832 4400,
 www.scptransport.co.uk, Email info@scptransport.co.uk

Client Name:
 STUDIO 91 ARCHITECTURE

Project Title:
 HALIFAX ROAD, LIVERSEEDGE

Drawing Title:
 DRAINAGE STRATEGY

Date:	07.03.2022	Drawn By:	LR
Scale:	1:200 @ A3	Checked:	AMO
Status:	DRAFT	Approved:	AMO

Drawing No.	SCP-210472-0500-001	Rev.	A
-------------	---------------------	------	---

SCP		Page 1
Colwyn Chambers 19 York St Manchester M2 3BA		
Date 23/01/2023 13:40 File SURFACE WATER NETWORK.MDX	Designed by micro.drainage Checked by	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	45
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	100

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.019	4-8	0.013

Total Area Contributing (ha) = 0.032

Total Pipe Volume (m³) = 0.951

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	17.000	0.113	150.0	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	13.300	0.089	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	3.200	0.021	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	12.600	0.084	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.004	2.700	0.018	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.005	5.000	0.033	151.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.35	153.770	0.032	0.0	0.0	1.9	0.82	14.5	6.3
S1.001	50.00	5.62	153.657	0.032	0.0	0.0	1.9	0.82	14.5	6.3
S1.002	50.00	5.68	153.568	0.032	0.0	0.0	1.9	0.82	14.5	6.3
S1.003	50.00	5.94	153.547	0.032	0.0	0.0	1.9	0.82	14.5	6.3
S1.004	50.00	5.99	153.463	0.032	0.0	0.0	1.9	0.82	14.5	6.3
S1.005	50.00	6.10	153.445	0.032	0.0	0.0	1.9	0.81	14.4	6.3

Colwyn Chambers
 19 York St
 Manchester M2 3BA



Date 23/01/2023 13:40

Designed by micro.drainage

File SURFACE WATER NETWORK.MDX

Checked by

XP Solutions

Network 2020.1.3

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	154.620	0.850	Open Manhole	1200	S1.000	153.770	150				
S2	154.610	0.953	Open Manhole	1200	S1.001	153.657	150	S1.000	153.657	150	
S3	154.620	1.052	Open Manhole	1200	S1.002	153.568	150	S1.001	153.568	150	
S4	154.555	1.008	Open Manhole	1200	S1.003	153.547	150	S1.002	153.547	150	
S5	154.520	1.057	Open Manhole	1200	S1.004	153.463	150	S1.003	153.463	150	
S6	154.450	1.005	Open Manhole	1200	S1.005	153.445	150	S1.004	153.445	150	
S	0.000		Open Manhole	0		OUTFALL		S1.005	153.412	150	

No coordinates have been specified, layout information cannot be produced.

Colwyn Chambers
 19 York St
 Manchester M2 3BA



Date 23/01/2023 13:40

Designed by micro.drainage

File SURFACE WATER NETWORK.MDX

Checked by

XP Solutions

Network 2020.1.3

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	150	S1	154.620	153.770	0.700	Open Manhole	1200
S1.001	o	150	S2	154.610	153.657	0.803	Open Manhole	1200
S1.002	o	150	S3	154.620	153.568	0.902	Open Manhole	1200
S1.003	o	150	S4	154.555	153.547	0.858	Open Manhole	1200
S1.004	o	150	S5	154.520	153.463	0.907	Open Manhole	1200
S1.005	o	150	S6	154.450	153.445	0.855	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	17.000	150.0	S2	154.610	153.657	0.803	Open Manhole	1200
S1.001	13.300	150.0	S3	154.620	153.568	0.902	Open Manhole	1200
S1.002	3.200	150.0	S4	154.555	153.547	0.858	Open Manhole	1200
S1.003	12.600	150.0	S5	154.520	153.463	0.907	Open Manhole	1200
S1.004	2.700	150.0	S6	154.450	153.445	0.855	Open Manhole	1200
S1.005	5.000	151.5	S	0.000	153.412		Open Manhole	0

SCP		Page 4
Colwyn Chambers 19 York St Manchester M2 3BA		
Date 23/01/2023 13:40	Designed by micro.drainage	
File SURFACE WATER NETWORK.MDX	Checked by	
XP Solutions	Network 2020.1.3	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.032	0.032	0.032
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.032	0.032	0.032

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		