



Project Title

Drainage Strategy Report

At

**Three Development Sites,
Whitworth Road,
Syke,
Rochdale,
OL12**

For

Cornerstone Place Ltd

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Executive Summary

Figure 1: Flood Risk and Drainage Strategy Summary

Item	Brief Description
Development Proposed	The proposed construction of three adjacent sites encompassing a number of residential units, with associated gardens and landscaping.
Flood Zone Classification	Flood Zone 1 – Low Risk
Geology	A site-specific intrusive Phase 2 Site Investigation has been carried out at the 3 development areas. This has identified the underlying ground to encompass deep made ground (mottled grey sandy gravelly clay) over natural cohesive strata. Based on these findings infiltration-based options would not be suitable.
Infiltration Rate	Based on the findings from the intrusive site investigation, infiltration is not deemed feasible.
Nearest Watercourses	Hey Brook is located approximately 400m to the east.
Nearest Adopted Sewers and Culverts	A number of 225mm diameter combined public sewers adjoining the three sites within the adopted highways. Larger 450mm diameter combined sewer in Whitworth Road to the east.
Surface Water Drainage Outfall and SuDS Hierarchal Approach	Based on the cohesive ground conditions, the strategy is to connect each site to the combined water sewer at a peak restricted rate of 2l/s. This has been agreed with United Utilities.
Existing Discharge Rate	All three sites are currently unmade. As such they can be classed as greenfield for drainage purposes.
Proposed Discharge Rate	Although 2l/s for each site has been agreed with UU, consultation with Rochdale LLFA has informed that a minimum flow rate of 5l/s should be applied to reduce the risk of blockage.
Allowance for Climate Change	40% - based on a residential > 50-year design life to 'the 2080's'.
Proposed Attenuation Method & Outline Volume	Geocellular Crates for Block A only – 5m ³ (100yr + 40% CC)
SuDS features	Water butts to rear rainwater pipes. Flow control with Geocellular Attenuation.
Maintenance Responsibility	Management company
Foul Drainage Outfall	Free discharge to public combined sewer bounding the sites.

1. Introduction

- 1.1 Paul Graveney Consulting Ltd (PGC) has been appointed by Cornerstone Place Ltd to prepare this Drainage & SuDS (Sustainable Drainage Systems) Strategy to support a full planning submission for a proposed development encompassing three residential housing schemes on three separate unmade sites with associated landscaping on land off Whitworth Road, Syke, Rochdale, OL12. The assessment has been undertaken in line with Section 10 of the 2021 'National Planning Policy Framework', plus the accompanying Technical Guidance on Flood Risk and any local policies.
- 1.2 This report has been commissioned by Cornerstone Place Ltd and is specific to their interests in the development proposals as described by the Architectural plan in Appendix A.
- 1.3 The report has been commissioned to identify any drainage related issues associated with the proposed development and any likely constraints that could be imposed. The following issues have been addressed within this report;
- Determine the current surface water drainage regime and assess any potential increase in surface water runoff as a result of the proposed development.
 - Discuss Sustainable Drainage Systems (SUDS) as an option for reducing surface water flood risk and devise an outline Drainage layout.
 - Devise an appropriate outline surface water drainage strategy (including calculation where appropriate) to deal with any potential increase in surface water runoff and include for climate change.
 - Devise an appropriate outline foul water drainage strategy.

2. Development Description and Location

2.1 Site Location

The site is referenced in Figure 2, and a site location map is provided in Appendix A.

Item	Brief Description
Project name	Whitworth Road
Site address and location	Whitworth Road, Syke, Rochdale, Manchester, OL12.
Council Area	Rochdale Borough Council
Approximate Grid Reference	OS: 389790, 414327
General Locality	The three adjacent sites are located some 1km to the north of Rochdale Town Centre.

Figure 2: Site Referencing Information

2.2 Existing Site Description and Walk Over

- 2.2.1 The three development sites (Red Line Boundaries) are irregular in plan shapes and are situated within a largely residential area. A site visit was undertaken on Tuesday 8th February 2022. A summary of the three sites is identified below:

Block A – Currently encompasses a tarmac former children’s play area on the western side with surrounding metal hand railings. Site bounds the rear yards of terraced properties to the south and west. Eastern area is grassed with a nominal fall down to Whitworth Road to the east. A medium sized tree was identified along the southern edge. A footpath passes between the two areas.

Block B – Currently encompasses a number of derelict garages. Identified to be in a poor condition and evidence of asbestos sheeting identified. Some fly tipping to the sides of the garages. A medium sized tree in poor condition is located in the NE corner.

Block C – Currently tarmac surfaced, with peripheral grassed areas. Used as car parking and evidence of fly tipping. Site immediately adjacent a sub-station.

- 2.2.2 Figure 2 identifies the overall site location details. Further details of the existing layout can be seen on the Red Line Plans in Appendix A.

Access to Block A will be from Derwent Street, whilst access to Blocks B & C will be off Grasmere Street.

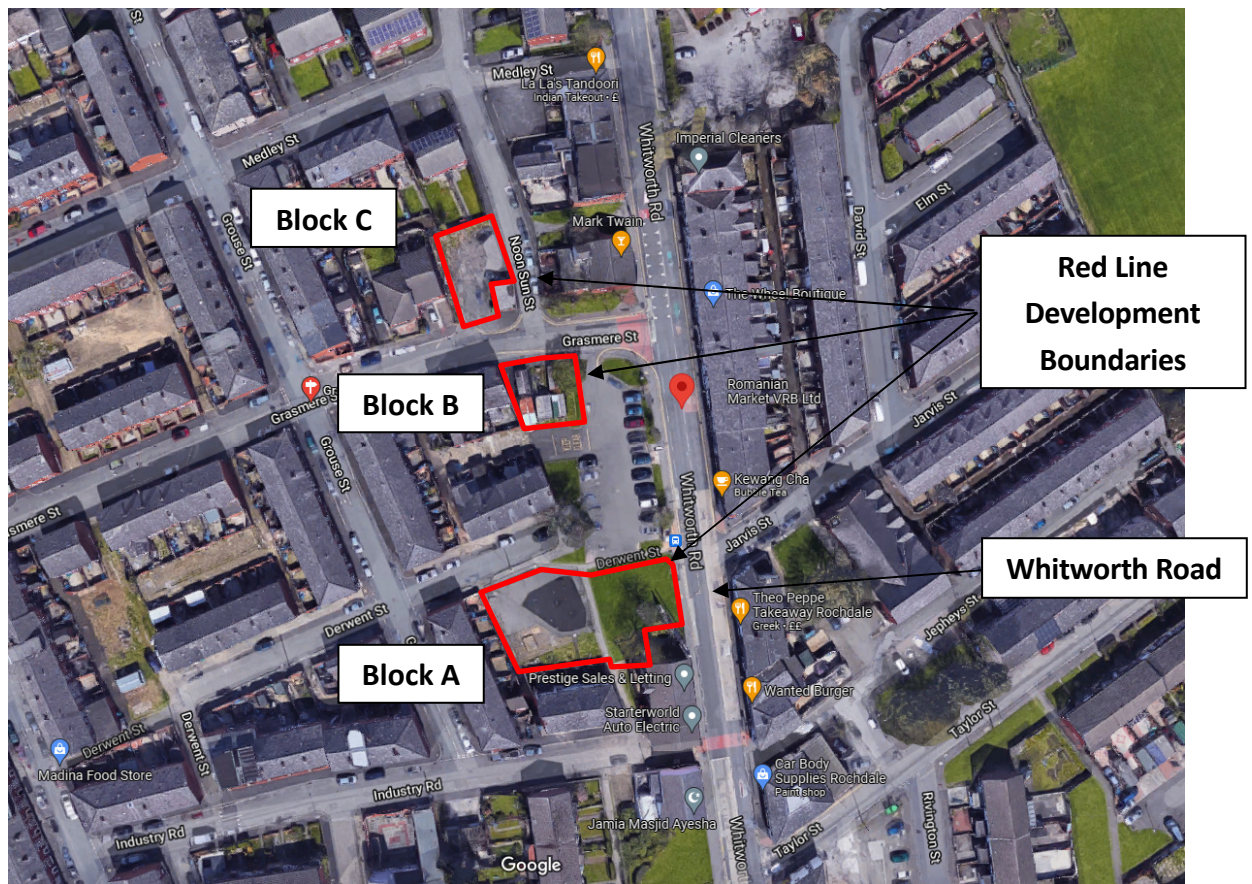


Figure 3: Site Location

2.3 Site Photographs



Block A – Former Play Ground to West



Block A – Open Grassed Area to the East



Block B – Existing Garages from the South



Block B – Existing Garages from the North



Block C – Un-made Land from the South



Block C – Sub Station with Site Beyond

2.4 Topography

- 2.4.1 All three sites are relatively flat and range in level from 155m AOD at Block A to the south up to 157m AOD at Block C at the north.

2.5 Hydrology

- 2.5.1 A review of local maps the closest identified watercourse is the Hey Brook, situated some 400m to the east, outfalling to the larger River Roch.

2.6 Development Proposals

- 2.6.1 As discussed in the earlier sections, this report has been prepared to support a planning application for the construction of three residential blocks of flats, totaling 14 units, with associated gardens and landscaping.
- 2.5.2 The outline Site Master Plan as indicated in Appendix A provides details of the proposed development intent.

3. Fluvial Flood Risk Review

- 3.1 Figure 4 below locates the site on the Environment Agency's indicative flood plain map. It is clear from this that the red line boundary sits outside of a fluvial generator of flood water from any identified water body or river. It is considered therefore that the site lays outside of the active 100-year and extreme event floodplains, thus lying within 'Flood Zone 1 Classification' in accordance with the 2021 National Planning Policy Framework (NPPF) Flood Risk Guidance Notes, i.e. probability of annual fluvial flooding significantly less than 1 in 1000 in any one year (<0.1%). The risk from fluvial flood water is diminished to acceptable levels, removing the requirement for further investigation and assessment of the fluvial flood regime.

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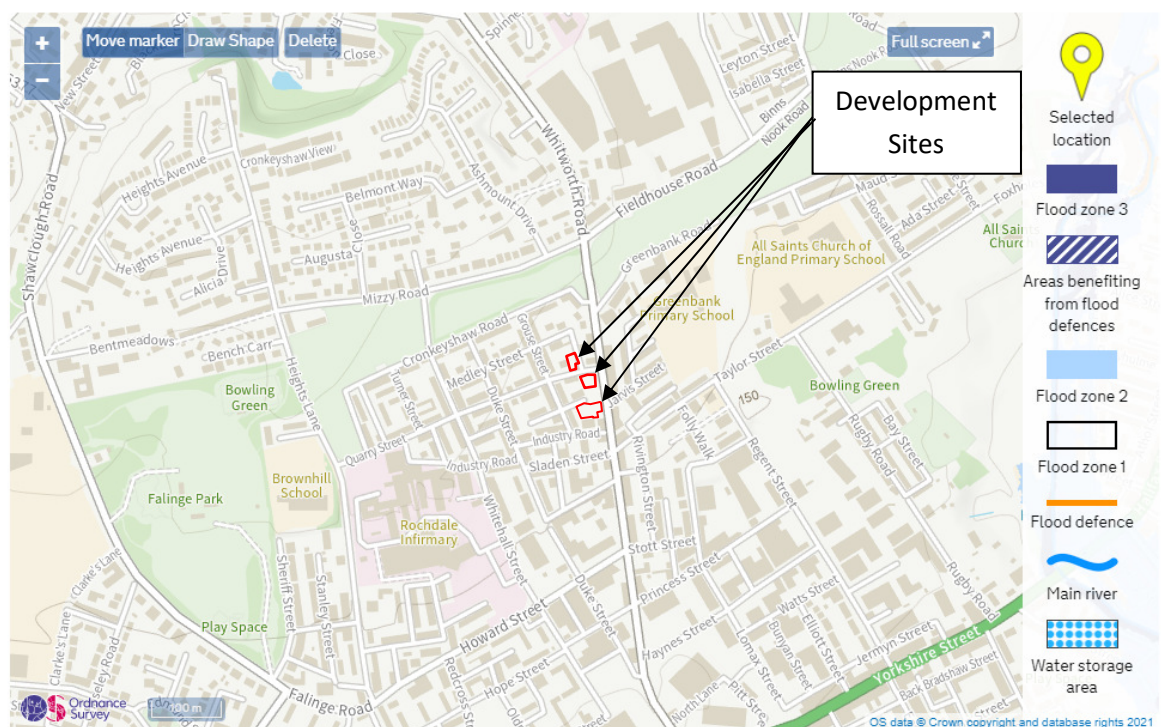


Figure 4: EA Indicative Flood Maps

- 3.2 In addition, the development application boundary is less than 1ha in plan area. In line with criteria set within the NPPF a Flood Risk Assessment is not required to support a planning application if the development is less than 1ha and in Flood Zone 1.

4. Outline Drainage Strategy

4.1 Correspondence

- 4.1.1 A Pre-development enquiry was submitted to United Utilities. Their response was received on the 7th February 2022 and can be found in Appendix D. In summary the foul water generated by the new development can discharge unrestricted to the combined sewer adjacent each of the sites. Surface water should follow the SuDS hierarchal approach. If infiltration is found not to be feasible, and it can be proved that connection to a watercourse is not feasible then UU will accept connection to the combined public sewers at a pass forward flow rate not exceeding 2l/s from each site.

4.2 Existing Drainage

- 4.2.1 The United Utilities sewer records have been reviewed (Figure 5 below) and confirm a number of 225mm diameter combined public sewers adjoining the sites in the adopted highways. A larger 450mm diameter combined sewer flows south in Whitworth Road to the east.
- 4.2.1 Following a site visit, it was determined that a 225mm diameter combined sewer is also located along both the southern and western boundaries of Block A, flowing generally in a southerly direction to Industry Road. No private drainage was identified on the other two blocks.

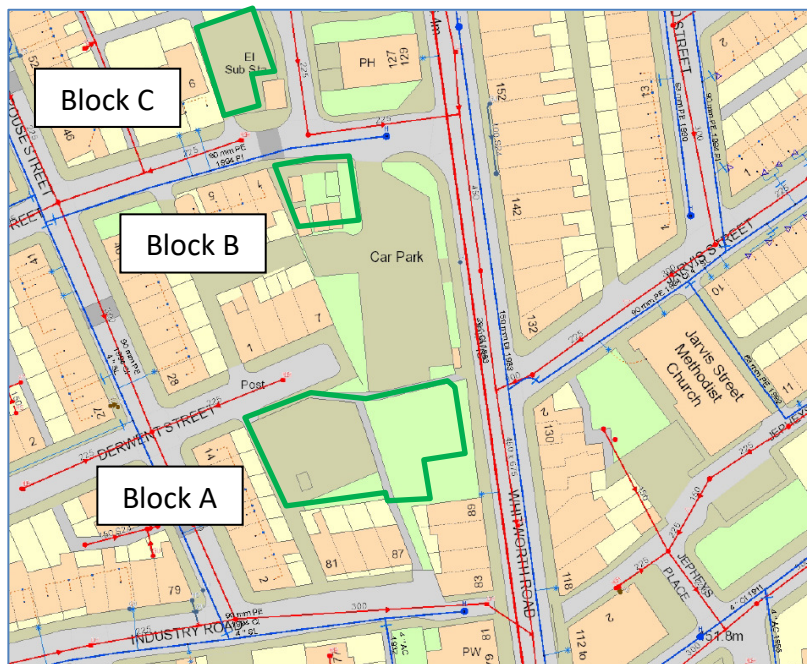


Figure 5: United Utilities Sewer Records

4.3 Existing Runoff

4.3.1 Based on the current use of the three sites, they can all be classed as 'Greenfield' with the greenfield runoff rates shown in Figure 6 below:

	Area (ha)	1 year	30 year	100 year
Block A	0.072	0.5 l/s	1.0 l/s	1.2 l/s
Block B	0.020	0.1 l/s	0.3 l/s	0.4 l/s
Block C	0.021	0.1 l/s	0.3 l/s	0.4 l/s

Figure 6: Existing Greenfield Discharge Rates

4.4 Geology

4.4.1 A site-specific intrusive Phase 2 Site Investigation has been carried out at the 3 development areas. This has identified the underlying ground to encompass deep made ground (mottled grey sandy gravelly clay) over natural cohesive strata. Based on these findings infiltration-based options would not be suitable.

4.5 Hydrological Assessment

4.5.1 As discussed in previous sections, a review of the topographical survey, OS Maps and Environment Agency maps would indicate the closest surface water feature to be Hey Brook, located some 400m to the east beyond a residential and commercial area.

4.6 Sustainable Drainage Systems (SuDS) Assessment

4.6.1 SuDS Objectives

4.6.1.1 Sustainable drainage developed in line with the ideals of sustainable development is collectively referred to as Sustainable Drainage Systems (SuDS). At a particular site, these systems are designed both to manage the environmental risks resulting from the urban runoff and to contribute wherever possible to environmental enhancement. SuDS objectives are therefore to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).

4.6.2 SuDS Design Themes

4.6.2.1 The 'Management Train Approach' should be central to the surface water drainage strategy of the proposed site. The main objective is treatment and control of runoff as near to the source as possible protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:

- i. **Prevention** – The use of good site design and housekeeping measures to prevent runoff and pollution and includes the use of rainwater reuse / harvesting.

- ii. **Source Controls** – Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).
- iii. **Site Control** – Management of water in a local area and can include below ground storage / attenuation, detention basins, large infiltration devices.
- iv. **Regional Control** – Management of water from a site or various sites and can include wetlands and balancing ponds.

4.6.3 SuDS Site Constraints

4.6.3.1 SuDS techniques are suitable for all sites; therefore an assessment of the existing site is required so that SuDS limitations can be determined.

- *Land Use Characteristics:* The type of development enables the opportunities on the use of prevention and site control SuDS devices to be considered.
- *Site Characteristics:* A Phase 2 intrusive site investigation has confirmed that the cohesive ground is unsuitable for infiltration techniques.
- *Catchment Characteristics:* The site is currently classed for drainage purposes as 'Greenfield'.
- *Environmental and Amenity Performance:* The inclusion of SuDS within the overall development is a key driver in providing both amenity and habitat creation. Some types of SuDS will be considered and blended into the project where feasible. Maintenance plans will be prepared for all SuDS devices that are included.

4.6.4 SuDS Methods

4.6.4.1 Figure 7 and 8 on the following pages provide an assessment of various above and below ground SuDS methods that can provide water quality treatment and management of flows to reduce runoff rates and volumes and whether they can be suitably incorporated at this development site. The purpose of this assessment is to set out options to be considered at the planning stage with consideration to time constraints, viability and lifetime maintenance of the residential development.

Method	Comment	Suitability for Development
Green Roofs	Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	<u>Not suitable:</u> Not suitable due to the pitched roof of the residential dwellings.
Water Butts	Plastic tanks placed at the base of rainwater down pipes to collect rainwater runoff from the roof areas.	<u>Suitable:</u> To be placed at the base of the rear rainwater pipes.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site and reduces treated water consumption.	<u>Not Suitable:</u> - Additional costs of installation would have severe effect on viability of the development. - Running and maintenance costs would not be acceptable to our client and future occupiers. - The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs.
Infiltration Options	Reduces total run off volume from the development.	<u>Not Suitable:</u> Initial investigation would indicate that the underlying ground is unsuitable for infiltration.
Permeable Surfacing (Infiltration)	- Reduces total run off volume from the development. - Can be used to enhance water quality.	<u>Not Suitable:</u> - Initial investigation would indicate that the underlying ground is unsuitable for infiltration. - Limited areas of hard paving.
Permeable Surfacing (Standard)	- Can be used to enhance quality of runoff water. - Sub-base provides 'source' storage and reduces the volume of storage downstream. - The storage can be created with selection of the stone fill or plastic box stems. - Impermeable membrane at base of construction to prevent impact on pavement stability.	<u>Not Suitable:</u> No parking is proposed for the development and so permeable surfacing would not be feasible.

Swales, basins and ponds	• Provide areas for above ground surface runoff storage. • Swales also allow filtering of particulate matter, improving water quality	<u>Not suitable:</u> • No space available in the site for any of these features to be incorporated.
Bio-Retention	• Collect and retain run-off to help improve water quality, prior to discharge in piped system on infiltration.	<u>Not suitable:</u> • No space available in the site for any of these features to be incorporated.

Figure 7: Surface SuDS Methods

Method	Comment	Suitability for Development
Geocellular Storage	• Suitable for sites with insufficient space for basins etc. • Suitable for sites where topography prevents the use of open basins etc.	<u>Suitable:</u> • Small Tanks to act as attenuation measures behind a flow control device, where required.
Large Diameter Pipes, Culverts or Tanks	• Suitable for sites with insufficient space for basins etc. • Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. • Generally be suitable for adoption by the statutory water company (e.g. United Utilities).	<u>Not suitable:</u> • More suited to larger residential schemes with adopted sewers.

Figure 8: Sub-Surface SuDS Methods

4.6.5 SuDS Hierarchal Approach

4.6.5.1 Based on the SuDS assessment in Figure 7 and 8, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	Intrusive site investigation would indicate that the underlying ground would not be suitable for infiltration-based options.
Connection to Watercourse	No	Watercourse too far from the development boundary.
Connection to Surface Water Sewer	No	No surface water sewers in close proximity to the site boundary.
Connection to a Combined Sewer	Yes	New connections to be made to the adjoining combined water sewers at restricted rates.

Figure 9: SuDS Hierarchal Approach

4.6.6 SuDS Design Philosophy

4.6.6.1 SuDS assessment and hierarchal approach discussed in Figure 7, 8 and 9 above has defined the overall SuDS strategy. Thus, the SuDS philosophy for the development site is the promotion of prevention and site control measures with discharge to the combined public sewer.

4.6.6.2 The following design philosophy is proposed:

- Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to conveyance to the existing drainage infrastructure.
- Water butts placed at base of rear rainwater pipes.
- Site control in the form of geocellular crates behind the flow control devices.
- Aim to reduce the impermeable footprint.

4.7 Outline Surface Water Drainage Strategy

- 4.7.1 The general principal of the surface water drainage strategy is to collect the runoff from the roof area of the each of the three residential units via the rainwater pipes. The networks then outfall to the combined water public sewer via a new connection from each site. Although United Utilities have suggested a peak flow rate of 2l/s from each site, consultation with Rochdale LLFA has advised that this low flow rate poses a high risk of blockage. As such the larger block A should be restricted to 5l/s and the smaller units be unrestricted discharge as the 100yr + 40% CC peak flow rates will still be below 5l/s and reduce for the less intense storms. Due to the flow restriction in Block A, attenuation will take the form of a geocellular crated tank. The pathways adjoining the units will fall into the soft landscaping areas and thus not connect to the drainage network.
- 4.7.2 The proposed private drainage layout for the new development building will be designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance. This is to indicate no surcharge for the 2-year storm event and no flooding for up to the 30-year storm event.
- 4.7.3 A full hydraulic drainage model has been simulated for each Block based on the restricted discharge rate. Taking into account the reduced discharge rate for Block A and the unrestricted discharge rate for Blocks A and B, the worst-case attenuation volumes are defined in the figures below. Note that as the areas for Blocks B & C are small, no additional attenuation measures are required. Further details on the drainage strategy plan can be found in Appendix B with the hydraulic calculations in Appendix C.

Block	New Impermeable Area	Peak Post Development Peak Discharge Rate	Attenuation Volume for 30-year Event	Attenuation Volume for 100 year + 40% CC Event)
A	0.034 ha	5 l/s	2m ³	5m ³

Figure 10: Outline Attenuation Volumes

4.8 Maintenance

- 4.8.1 The long-term maintenance of the new drainage and SuDS infrastructure will be with the owners or a management company in line with best practice guidance. Annual inspections will need to be carried out and clearing of gullies and manholes.

Typically the maintenance regime will be in line with Figure 11 below.

Future Maintenance of the Drainage System			
Responsibility	Feature	Maintenance	Frequency
Management Company	Rainwater gutters, downpipes and above ground drainage.	Regular maintenance and inspections.	Ad-hoc sweeping and emptying of silt and debris required. Annual visual inspections to check for damage/leaks.
	Flow control chambers.	Regular maintenance / removal of blockages and debris.	Annual inspection and following significant rainfall events.
	Geocellular Attenuation / Attenuation Tanks	Regular maintenance / removal of blockages and debris.	Annual inspection and following significant rainfall events.
	Pipes, sewers, manholes	Regular maintenance / removal of blockages and debris.	Annual inspection and removal of silts if required.

Figure 11: Outline Management and Maintenance Strategy

4.9 Foul Water Drainage

- 4.9.1 Foul drainage generated from the new development will discharge to the existing combined water public sewers bounding each of the sites.
- 4.9.2 The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2017 and Building Regulations Part H guidance.

Appendix A – Architects Drawings



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Site Plan Legend

- Soft landscaping (details TBC by landscaping proposal)
- Hard landscaping (details TBC by landscaping proposal)
- Screening planting (details TBC by landscaping proposal)
- SP = \ Lampost / telegraph pole / signpost
- LP/TP Existing tree replaced / removed
- New tree planting
- Existing tree retained

Tree Schedule

- T1 Existing tree removed
- T2 Existing tree retained
- T3 Existing tree replaced by new tree
- T4 Existing tree replaced by new tree
- T5 Existing tree removed
- T6 New tree
- T7 New tree
- T8 New tree

Total trees removed: 2no.
Total trees replaced: 2no.
Total trees planted: 5no.

P03	22.03.22	JS	Issued for planning with updated redline boundary.
P02	02.03.22	JS	Updated as engineer comments.
P01	20.01.22	JS	Issued for client comment.
Rev	Date	By	Remarks

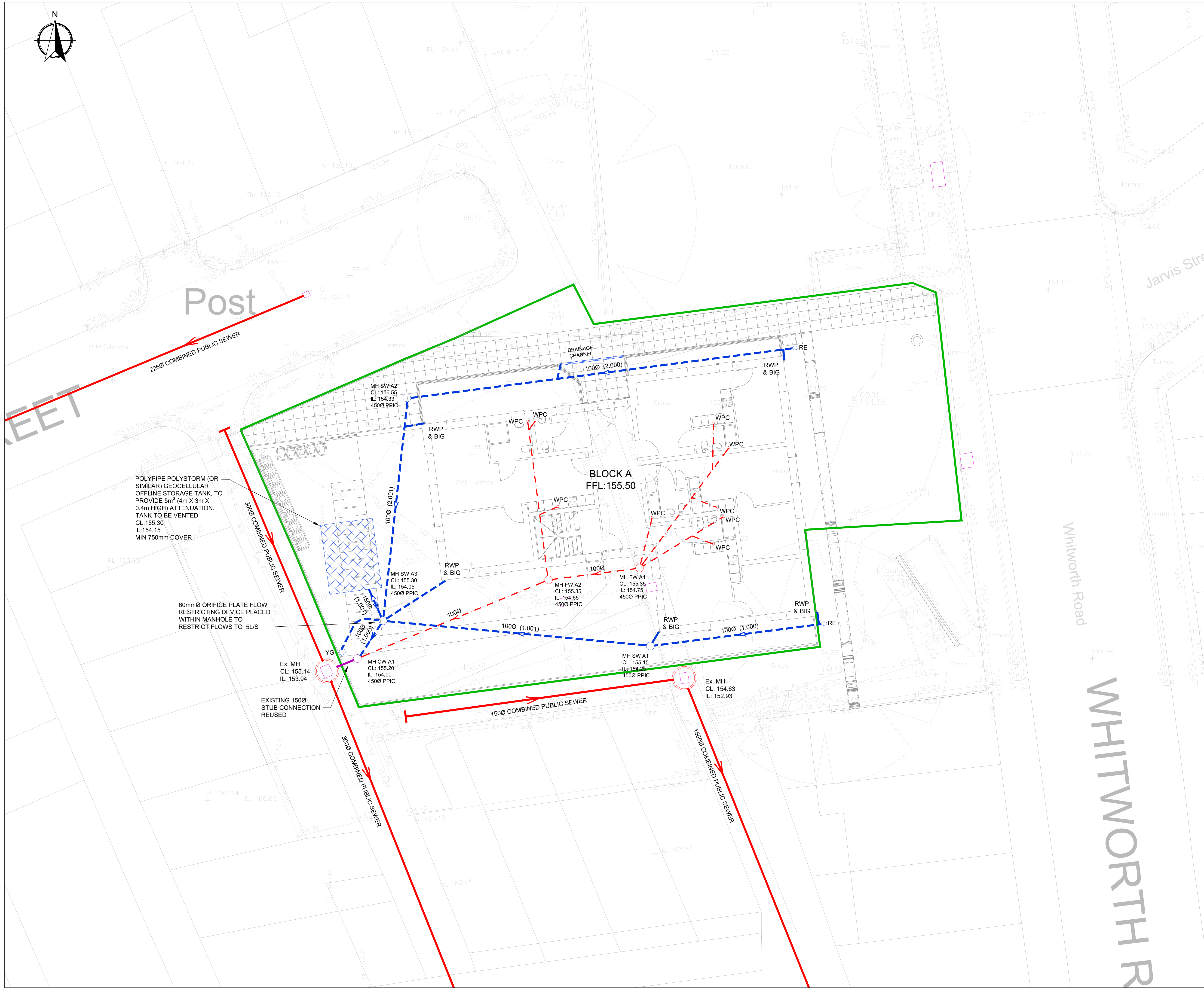
Client:		Cornerstone Place	
Project No. / Project Name:		21-032 / Whitworth Road, Rochdale	
Drawing Name:		Proposed Site Plan	
Drawing Purpose:		PLANNING	
Project:	Origin:	Vol/Sys:	Level:
WHI - TRI - ZZ - ZZ - DR - A - 3010			
Status:	Scale @ A1	Drawn:	Check:
As indicated	JS	AJD	March 2022



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Appendix B – PGC Drawings



GENERAL NOTES

1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
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KEY

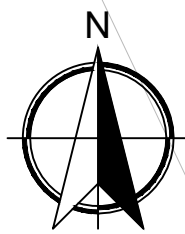
- EXISTING COMBINED WATER SEWER
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- SITE BOUNDARY
- RWP RAINWATER PIPE
- WPC WASTE POINT CONNECTION
- YG YARD GULLY
- RE RODDING EYE
- SG SUMP GULLY FOR DRAINAGE CHANNEL

ALL FINISHED LEVELS TO BE
CONFIRMED TO SET COVER
AND INVERT LEVELS

NOTE ALL RWP AND SVP
LOCATIONS TO BE
CONFIRMED BY OTHERS

ALL PIPEWORK TO BE 100Ø
UNLESS NOTED
OTHERWISE

P2	16.08.22	PG	PG	FLOW CONTROL AMENDED
P1	02.03.22	PG	PG	PRELIMINARY ISSUE
REV	DATE	DRAWN	REV'D	NOTES
CLIENT CORNERSTONE PLACE				
PROJECT WHITWORTH ROAD, ROCHDALE				
DRAWING TITLE DRAINAGE STRATEGY PLAN (BLOCK A)				
DRAWING STATUS PRELIMINARY				
SCALE	1:100	DRAWN BY PG	ENGINEER PG	SHEET A1
DRAWING No PGC388-C-100				REVISION P2
PGConsulting Civil & Infrastructure Engineers		108 Ack Lane West, Cheadle Hulme, Cheshire, SK8 7ES Tel: 07710 758971 Email: paul@pgcd.co.uk		



156.4m

BLOCK C
FFL:156.85

NEW JUNCTION CONNECTION TO
EXISTING COMBINED SEWER SUBJECT
TO S106 AGREEMENT WITH UU

NEW BACKDROP CONNECTION
TO EXISTING COMBINED
SEWER SUBJECT TO S106
AGREEMENT WITH UU

Ex. UU
MH 7307
CL: 156.17
IL: 153.61

BD IN @
154.87

BLOCK B
FFL:156.200

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KEY

- EXISTING COMBINED WATER SEWER
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED COMBINED WATER DRAINAGE
- SITE BOUNDARY
- RWP RAINWATER PIPE
- WPC WASTE POINT CONNECTION
- YG YARD GULLY
- RE RODDING EYE
- SG SUMP GULLY FOR DRAINAGE CHANNEL

ALL FINISHED LEVELS TO BE
CONFIRMED TO SET COVER
AND INVERT LEVELS

NOTE ALL RWP AND SVP
LOCATIONS TO BE
CONFIRMED BY OTHERS

ALL PIPEWORK TO BE 100Ø
UNLESS NOTED
OTHERWISE

CLIENT			
CORNERSTONE PLACE			
PROJECT			
WHITWORTH ROAD, ROCHDALE			
DRAWING TITLE			
DRAINAGE STRATEGY PLAN (BLOCKS B & C)			
DRAWING STATUS			
PRELIMINARY			
SCALE	DRAWN BY	ENGINEER	SHEET
1:100	PG	PG	A1
DRAWING No			REVISION
PGC388-C-101			P2
PGConsulting		108 Ack Lane West, Cheshire Hulme, Cheshire, SK9 7ES Tel: 07710 758971 Email: paul@pgcd.co.uk	
Civil & Infrastructure Engineers			

Appendix C – Outline Hydraulic Calculations

		Page 1
	Whitworth Road Block A - GR Rates	
Date 24/02/2022 File	Designed by paulg Checked by	
Innovyze Source Control 2017.1.2		
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 1 Soil 0.450 Area (ha) 0.072 Urban 0.000 SAAR (mm) 1169 Region Number Region 10 Results 1/s QBAR Rural 0.6 QBAR Urban 0.6 Q1 year 0.5 Q1 year 0.5 Q30 years 1.0 Q100 years 1.2		
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		Page 1
	Whitworth Road Blocks B & C - GF Rates	
Date 24/02/2022 File	Designed by paulg Checked by	
Innovyze Source Control 2017.1.2		
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 1 Soil 0.450 Area (ha) 0.021 Urban 0.000 SAAR (mm) 1169 Region Number Region 10 Results l/s QBAR Rural 0.2 QBAR Urban 0.2 Q1 year 0.1 Q1 year 0.1 Q30 years 0.3 Q100 years 0.3		
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Block A - Whitworth Road
SW Network
V2 16.08.22
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Date 16/08/2022

Designed by paulg

File Whitworth Raod Block A ...

Checked by

Innovyze

Network 2017.1.2

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
1.002	4.000	0.040	100.0	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.002	50.00	4.75	154.050	0.034	0.0	0.0	0.0	1.00	17.8	4.6

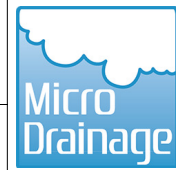
		Page 3																																																																																																																																																																							
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PIPELINE SCHEDULES for Storm Upstream Manhole <table><thead><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>1.000</td><td>o</td><td>100</td><td>RE</td><td>154.850</td><td>154.350</td><td>0.400</td><td>Open Manhole</td><td>100</td></tr><tr><td>1.001</td><td>o</td><td>100</td><td>SW A1</td><td>155.150</td><td>154.250</td><td>0.800</td><td>Open Manhole</td><td>450</td></tr><tr><td>2.000</td><td>o</td><td>100</td><td>RE</td><td>155.150</td><td>154.550</td><td>0.500</td><td>Open Manhole</td><td>100</td></tr><tr><td>2.001</td><td>o</td><td>100</td><td>SW A2</td><td>155.550</td><td>154.330</td><td>1.120</td><td>Open Manhole</td><td>450</td></tr><tr><td>3.000</td><td>o</td><td>150</td><td>TANK</td><td>155.300</td><td>154.150</td><td>1.000</td><td>Open Manhole</td><td>1200</td></tr><tr><td>1.002</td><td>o</td><td>150</td><td>SW A3</td><td>155.300</td><td>154.050</td><td>1.100</td><td>Open Manhole</td><td>450</td></tr></tbody></table> Downstream Manhole <table><thead><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>1.000</td><td>10.000</td><td>100.0</td><td>SW A1</td><td>155.150</td><td>154.250</td><td>0.800</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.001</td><td>15.000</td><td>100.0</td><td>SW A3</td><td>155.300</td><td>154.100</td><td>1.100</td><td>Open Manhole</td><td>450</td></tr><tr><td>2.000</td><td>22.000</td><td>100.0</td><td>SW A2</td><td>155.550</td><td>154.330</td><td>1.120</td><td>Open Manhole</td><td>450</td></tr><tr><td>2.001</td><td>13.000</td><td>56.5</td><td>SW A3</td><td>155.300</td><td>154.100</td><td>1.100</td><td>Open Manhole</td><td>450</td></tr><tr><td>3.000</td><td>3.000</td><td>60.0</td><td>SW A3</td><td>155.300</td><td>154.100</td><td>1.050</td><td>Open Manhole</td><td>450</td></tr><tr><td>1.002</td><td>4.000</td><td>100.0</td><td>sewer</td><td>155.140</td><td>154.010</td><td>0.980</td><td>Open Manhole</td><td>0</td></tr></tbody></table> Free Flowing Outfall Details for Storm <table><thead><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. Level (m)</th><th>D, L (mm)</th><th>W (mm)</th></tr></thead><tbody><tr><td>1.002</td><td>sewer</td><td>155.140</td><td>154.010</td><td>153.940</td><td>0</td><td>0</td></tr></tbody></table> Simulation Criteria for Storm <table><tbody><tr><td>Volumetric Runoff Coeff</td><td>0.750</td><td>Additional Flow - % of Total Flow</td><td>0.000</td></tr><tr><td>Areal Reduction Factor</td><td>1.000</td><td>MADD Factor * 10m³/ha Storage</td><td>2.000</td></tr><tr><td>Hot Start (mins)</td><td>0</td><td>Inlet Coeffiecient</td><td>0.800</td></tr><tr><td>Hot Start Level (mm)</td><td>0</td><td>Flow per Person per Day (l/per/day)</td><td>0.000</td></tr><tr><td>Manhole Headloss Coeff (Global)</td><td>0.500</td><td>Run Time (mins)</td><td>60</td></tr><tr><td>Foul Sewage per hectare (l/s)</td><td>0.000</td><td>Output Interval (mins)</td><td>1</td></tr></tbody></table> Number of Input Hydrographs 0 Number of Storage Structures 1 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 Synthetic Rainfall Details				PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	1.000	o	100	RE	154.850	154.350	0.400	Open Manhole	100	1.001	o	100	SW A1	155.150	154.250	0.800	Open Manhole	450	2.000	o	100	RE	155.150	154.550	0.500	Open Manhole	100	2.001	o	100	SW A2	155.550	154.330	1.120	Open Manhole	450	3.000	o	150	TANK	155.300	154.150	1.000	Open Manhole	1200	1.002	o	150	SW A3	155.300	154.050	1.100	Open Manhole	450	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	1.000	10.000	100.0	SW A1	155.150	154.250	0.800	Open Manhole	450	1.001	15.000	100.0	SW A3	155.300	154.100	1.100	Open Manhole	450	2.000	22.000	100.0	SW A2	155.550	154.330	1.120	Open Manhole	450	2.001	13.000	56.5	SW A3	155.300	154.100	1.100	Open Manhole	450	3.000	3.000	60.0	SW A3	155.300	154.100	1.050	Open Manhole	450	1.002	4.000	100.0	sewer	155.140	154.010	0.980	Open Manhole	0	Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)	1.002	sewer	155.140	154.010	153.940	0	0	Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000	Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000	Hot Start (mins)	0	Inlet Coeffiecient	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	©1982-2017 XP Solutions	
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		Page 4																				
	Block A - Whitworth Road SW Network V2 16.08.22																					
Date 16/08/2022 File Whitworth Raod Block A ...	Designed by paulg Checked by																					
Innovyze	Network 2017.1.2																					
<u>Simulation Criteria for Storm</u> <table><tr><td>Rainfall Model</td><td>FSR</td><td>Profile Type</td><td>Summer</td></tr><tr><td>Return Period (years)</td><td>2</td><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Region</td><td>England and Wales</td><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>M5-60 (mm)</td><td>19.000</td><td>Storm Duration (mins)</td><td>30</td></tr><tr><td>Ratio R</td><td>0.256</td><td></td><td></td></tr></table>			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	0.256		
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		Page 5
	Block A - Whitworth Road SW Network V2 16.08.22	
Date 16/08/2022 File Whitworth Raod Block A ...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	
<u>Online Controls for Storm</u> <u>Orifice Manhole: SW A3, DS/PN: 1.002, Volume (m³): 0.5</u> Diameter (m) 0.060 Discharge Coefficient 0.600 Invert Level (m) 154.100		
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		Page 6																																																																																				
	Block A - Whitworth Road SW Network V2 16.08.22																																																																																					
Date 16/08/2022 File Whitworth Raod Block A ...	Designed by paulg Checked by																																																																																					
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Storage Structures for Storm Cellular Storage Manhole: TANK, DS/PN: 3.000 Invert Level (m) 154.150 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>12.0</td><td>12.0</td><td>2.600</td><td>0.0</td><td>17.5</td></tr><tr><td>0.200</td><td>12.0</td><td>14.8</td><td>2.800</td><td>0.0</td><td>17.5</td></tr><tr><td>0.400</td><td>12.0</td><td>17.5</td><td>3.000</td><td>0.0</td><td>17.5</td></tr><tr><td>0.401</td><td>0.0</td><td>17.5</td><td>3.200</td><td>0.0</td><td>17.5</td></tr><tr><td>0.800</td><td>0.0</td><td>17.5</td><td>3.400</td><td>0.0</td><td>17.5</td></tr><tr><td>1.000</td><td>0.0</td><td>17.5</td><td>3.600</td><td>0.0</td><td>17.5</td></tr><tr><td>1.200</td><td>0.0</td><td>17.5</td><td>3.800</td><td>0.0</td><td>17.5</td></tr><tr><td>1.400</td><td>0.0</td><td>17.5</td><td>4.000</td><td>0.0</td><td>17.5</td></tr><tr><td>1.600</td><td>0.0</td><td>17.5</td><td>4.200</td><td>0.0</td><td>17.5</td></tr><tr><td>1.800</td><td>0.0</td><td>17.5</td><td>4.400</td><td>0.0</td><td>17.5</td></tr><tr><td>2.000</td><td>0.0</td><td>17.5</td><td>4.600</td><td>0.0</td><td>17.5</td></tr><tr><td>2.200</td><td>0.0</td><td>17.5</td><td>4.800</td><td>0.0</td><td>17.5</td></tr><tr><td>2.400</td><td>0.0</td><td>17.5</td><td>5.000</td><td>0.0</td><td>17.5</td></tr></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	12.0	12.0	2.600	0.0	17.5	0.200	12.0	14.8	2.800	0.0	17.5	0.400	12.0	17.5	3.000	0.0	17.5	0.401	0.0	17.5	3.200	0.0	17.5	0.800	0.0	17.5	3.400	0.0	17.5	1.000	0.0	17.5	3.600	0.0	17.5	1.200	0.0	17.5	3.800	0.0	17.5	1.400	0.0	17.5	4.000	0.0	17.5	1.600	0.0	17.5	4.200	0.0	17.5	1.800	0.0	17.5	4.400	0.0	17.5	2.000	0.0	17.5	4.600	0.0	17.5	2.200	0.0	17.5	4.800	0.0	17.5	2.400	0.0	17.5	5.000	0.0	17.5
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Block A - Whitworth Road
SW Network
V2 16.08.22
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Date	16/08/2022
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Designed by paulg

File Whitworth Raod Block A ...

Checked by

Innovyze

Network 2017.1.2

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.256
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

									Water
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
1.000	RE	15	Winter	1	+0%	100/15	Summer		154.380
1.001	SW A1	15	Summer	1	+0%	30/15	Summer		154.280
2.000	RE	15	Winter	1	+0%	100/15	Summer		154.579
2.001	SW A2	15	Winter	1	+0%	100/15	Summer		154.364
3.000	TANK	15	Winter	1	+0%	30/15	Winter		154.176
1.002	SW A3	15	Winter	1	+0%	1/15	Summer		154.237

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)			Flow		
1.000	RE	-0.070	0.000	0.20		1.1	OK	
1.001	SW A1	-0.070	0.000	0.19		1.1	OK	
2.000	RE	-0.071	0.000	0.19		1.1	OK	
2.001	SW A2	-0.066	0.000	0.24		1.9	OK	
3.000	TANK	-0.124	0.000	0.04		0.5	OK	
1.002	SW A3	0.037	0.000	0.20		2.5	SURCHARGED	

		Block A - Whitworth Road SW Network V2 16.08.22		Page 8				
Date 16/08/2022		Designed by paulg						
File Whitworth Raod Block A ...		Checked by						
Innovyze		Network 2017.1.2						
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm								
Simulation Criteria								
Areal Reduction Factor		1.000	Additional Flow - % of Total Flow		0.000			
Hot Start (mins)		0	MADD Factor * 10m³/ha Storage		2.000			
Hot Start Level (mm)		0	Inlet Coeffiecient		0.800			
Manhole Headloss Coeff (Global)		0.500	Flow per Person per Day (l/per/day)		0.000			
Foul Sewage per hectare (l/s)		0.000						
Number of Input Hydrographs		0	Number of Storage Structures		1			
Number of Online Controls		1	Number of Time/Area Diagrams		0			
Number of Offline Controls		0	Number of Real Time Controls		0			
Synthetic Rainfall Details								
Rainfall Model		FSR	Ratio R		0.256			
Region England and Wales Cv (Summer)		0.750						
M5-60 (mm)		19.000	Cv (Winter)		0.840			
Margin for Flood Risk Warning (mm)		300.0						
Analysis Timestep		2.5 Second Increment (Extended)						
DTS Status		OFF						
DVD Status		ON						
Inertia Status		ON						
Profile(s)		Summer and Winter						
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440						
Return Period(s) (years)		1, 30, 100						
Climate Change (%)		0, 0, 40						
Water								
US/MH	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Level
							Act.	(m)
1.000	RE 15	Winter	30	+0%	100/15	Summer		154.399
1.001	SW A1 15	Summer	30	+0%	30/15	Summer		154.354
2.000	RE 15	Winter	30	+0%	100/15	Summer		154.597
2.001	SW A2 15	Summer	30	+0%	100/15	Summer		154.424
3.000	TANK 30	Winter	30	+0%	30/15	Winter		154.316
1.002	SW A3 15	Summer	30	+0%	1/15	Summer		154.322
Surcharged Flooded						Pipe		
US/MH	Depth	Volume	Flow /	Overflow	Pipe	Level		
PN	Name	(m)	Cap.	(l/s)	Flow	Status	Exceeded	
1.000	RE	-0.051	0.000	0.48	2.7	OK		
1.001	SW A1	0.004	0.000	0.46	2.6	SURCHARGED		
2.000	RE	-0.053	0.000	0.46	2.7	OK		
2.001	SW A2	-0.006	0.000	0.64	4.9	OK		
3.000	TANK	0.016	0.000	0.15	2.1	SURCHARGED		
1.002	SW A3	0.122	0.000	0.26	3.3	SURCHARGED		
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				Block A - Whitworth Road SW Network V2 16.08.22				Page 9	
Date 16/08/2022 File Whitworth Raod Block A ...				Designed by paulg Checked by					
Innovyze				Network 2017.1.2					
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
Simulation Criteria									
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow		0.000			
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage		2.000			
Hot Start Level (mm)		0		Inlet Coeffiecient		0.800			
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day)		0.000			
Foul Sewage per hectare (l/s)		0.000							
Number of Input Hydrographs		0		Number of Storage Structures		1			
Number of Online Controls		1		Number of Time/Area Diagrams		0			
Number of Offline Controls		0		Number of Real Time Controls		0			
Synthetic Rainfall Details									
Rainfall Model		FSR		Ratio R		0.256			
Region England and Wales Cv (Summer)		0.750							
M5-60 (mm)		19.000		Cv (Winter)		0.840			
Margin for Flood Risk Warning (mm)						300.0			
Analysis Timestep		2.5 Second Increment (Extended)							
DTS Status						OFF			
DVD Status						ON			
Inertia Status						ON			
Profile(s)						Summer and Winter			
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440							
Return Period(s) (years)		1, 30, 100							
Climate Change (%)		0, 0, 40							
Water									
US/MH	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level		
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
1.000	RE 30	Winter	100	+40%	100/15 Summer				154.582
1.001	SW A1 30	Winter	100	+40%	30/15 Summer				154.571
2.000	RE 15	Winter	100	+40%	100/15 Summer				154.791
2.001	SW A2 15	Winter	100	+40%	100/15 Summer				154.684
3.000	TANK 60	Winter	100	+40%	30/15 Winter				154.549
1.002	SW A3 30	Winter	100	+40%	1/15 Summer				154.552
Surcharged Flooded									
US/MH	Depth	Volume	Flow /	Overflow	Pipe				
PN	Name	(m)	(m³)	Cap.	(l/s)	Flow	Status	Level	
						(l/s)		Exceeded	
1.000	RE	0.132	0.000	0.63		3.6	FLOOD RISK		
1.001	SW A1	0.221	0.000	0.59		3.4	SURCHARGED		
2.000	RE	0.141	0.000	0.74		4.3	SURCHARGED		
2.001	SW A2	0.254	0.000	1.04		7.9	SURCHARGED		
3.000	TANK	0.249	0.000	0.21		3.0	SURCHARGED		
1.002	SW A3	0.352	0.000	0.39		4.9	SURCHARGED		
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		Page 1
	Block B - Whitworth Road SW Network V2 16.08.22	
Date 16/08/2022 File Whitworth Raod Block B ...	Designed by paulg Checked by	
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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)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.258	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)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.008	4-8	0.001

Total Area Contributing (ha) = 0.009

Total Pipe Volume (m³) = 0.259

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		Page 2
Block B - Whitworth Road SW Network V2 16.08.22		
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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)
10.000	o	100	RE	156.100	155.450	0.550	Open Manhole	100
10.001	o	100	SW B1	156.100	155.288	0.713	Open Manhole	450
10.002	o	100	SW B2	156.450	155.163	1.187	Open Manhole	450
10.003	o	100	SW B3	156.200	155.100	1.000	Open Manhole	450

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)
10.000	13.000	80.0	SW B1	156.100	155.288	0.713	Open Manhole	450
10.001	10.000	80.0	SW B2	156.450	155.163	1.187	Open Manhole	450
10.002	5.000	80.0	SW B3	156.200	155.100	1.000	Open Manhole	450
10.003	5.000	62.5	EX SEWER	156.170	155.020	1.050	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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10.003	EX SEWER	156.170	155.020	153.600	0	0
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Simulation Criteria for Storm

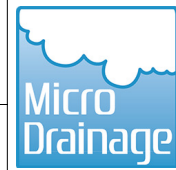
Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	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	0.258		

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Block B - Whitworth Road
SW Network
V2 16.08.22
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Date	16/08/2022
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.258
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

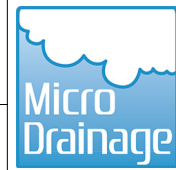
Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water
	Name	Storm							Level (m)
10.000	RE	15 Winter	1	+0%					155.472
10.001	SW B1	15 Winter	1	+0%					155.314
10.002	SW B2	15 Winter	1	+0%					155.190
10.003	SW B3	15 Winter	1	+0%					155.126

PN	US/MH Name	Surcharged		Flooded	Pipe		
		Depth	Volume	Flow /	Overflow	Flow	Level
		(m)	(m³)	Cap.	(l/s)	(l/s)	Exceeded
10.000	RE	-0.078	0.000	0.11		0.7	OK
10.001	SW B1	-0.073	0.000	0.16		1.0	OK
10.002	SW B2	-0.072	0.000	0.17		1.0	OK
10.003	SW B3	-0.074	0.000	0.15		1.0	OK

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Block B - Whitworth Road
SW Network
V2 16.08.22
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Date 16/08/2022

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Network 2017.1.2

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.258
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

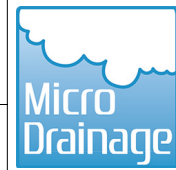
Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

									Water	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.		(m)
10.000	RE 15	Winter	30	+0%						155.486
10.001	SW B1 15	Summer	30	+0%						155.333
10.002	SW B2 15	Summer	30	+0%						155.210
10.003	SW B3 15	Summer	30	+0%						155.144

PN	US/MH Name	Surcharged	Flooded	Pipe			Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	
10.000	RE	-0.064	0.000	0.28		1.8	OK
10.001	SW B1	-0.054	0.000	0.43		2.7	OK
10.002	SW B2	-0.052	0.000	0.46		2.7	OK
10.003	SW B3	-0.056	0.000	0.40		2.7	OK

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Block B - Whitworth Road
SW Network
V2 16.08.22
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Date	16/08/2022
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100 year Return Period Summary of Critical Results by Maximum Level (Rank
1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.258
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

									Water	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.		(m)
10.000	RE 15	Winter	100	+40%						155.500
10.001	SW B1 15	Summer	100	+40%						155.354
10.002	SW B2 15	Summer	100	+40%						155.233
10.003	SW B3 15	Summer	100	+40%						155.164

PN	US/MH Name	Surcharged		Flooded	Pipe		
		Depth	Volume	Flow /	Overflow	Flow	Level
		(m)	(m³)	Cap.	(l/s)	(l/s)	Status Exceeded
10.000	RE	-0.050	0.000	0.51		3.2	OK
10.001	SW B1	-0.034	0.000	0.77		4.9	OK
10.002	SW B2	-0.030	0.000	0.82		4.9	OK
10.003	SW B3	-0.036	0.000	0.72		4.9	OK

		Page 1
	Block C - Whitworth Road SW Network V2 16.08.22	
Date 16/08/2022 File Whitworth Raod Block C ...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

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)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.257	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)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.009	4-8	0.001

Total Area Contributing (ha) = 0.010

Total Pipe Volume (m³) = 0.212

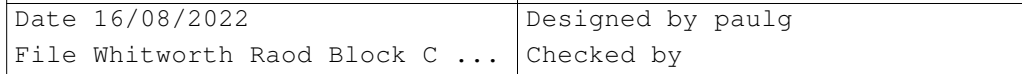
Network Design Table for Storm

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
20.000	8.000	0.100	80.0	0.005	4.00	0.0	0.600	o	100	Pipe/Conduit	
20.001	2.000	0.025	80.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
20.002	4.000	0.080	50.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
21.000	9.000	0.205	43.9	0.005	4.00	0.0	0.600	o	100	Pipe/Conduit	
20.003	4.000	1.000	4.0	0.000	0.00	0.0	0.600	o	100	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)
20.000	50.00	4.15	156.000	0.005	0.0	0.0	0.0	0.86	6.8	0.7
20.001	50.00	4.19	155.900	0.005	0.0	0.0	0.0	0.86	6.8	0.7
20.002	50.00	4.25	155.875	0.005	0.0	0.0	0.0	1.09	8.6	0.7
21.000	50.00	4.13	156.000	0.005	0.0	0.0	0.0	1.17	9.2	0.7
20.003	50.00	4.27	155.795	0.010	0.0	0.0	0.0	3.89	30.6	1.4

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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
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20.003	SEWER	156.800	154.795	155.000	0	0
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Simulation Criteria for Storm

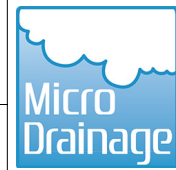
Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60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

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	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	0.257		

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Block C - Whitworth Road
SW Network
V2 16.08.22
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Date	16/08/2022
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File Whitworth Raod Block C ...

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Network 2017.1.2

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.257
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH		Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water
	Name									Level (m)
20.000	RE	15	Winter	1	+0%					156.021
20.001	SW	C1	15 Summer	1	+0%					155.925
20.002	SW	C2	15 Summer	1	+0%					155.895
21.000	RE	15	Winter	1	+0%					156.018
20.003	CW	C3	15 Winter	1	+0%					155.809

PN	US/MH Name	Surcharged Flooded			Pipe		Level Exceeded
		Depth	Volume	Flow / Overflow	Flow	Status	
		(m)	(m³)	Cap.	(l/s)	(l/s)	
20.000	RE	-0.079	0.000	0.10	0.6	OK	
20.001	SW C1	-0.075	0.000	0.14	0.6	OK	
20.002	SW C2	-0.080	0.000	0.08	0.6	OK	
21.000	RE	-0.082	0.000	0.07	0.6	OK	
20.003	CW C3	-0.086	0.000	0.05	1.2	OK	

		Block C - Whitworth Road SW Network V2 16.08.22		Page 4	
Date 16/08/2022		Designed by paulg			
File Whitworth Raod Block C ...		Checked by			
Innovyze		Network 2017.1.2			
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm					
Simulation Criteria					
Areal Reduction Factor		1.000	Additional Flow - % of Total Flow		0.000
Hot Start (mins)		0	MADD Factor * 10m³/ha Storage		2.000
Hot Start Level (mm)		0	Inlet Coeffiecient		0.800
Manhole Headloss Coeff (Global)		0.500	Flow per Person per Day (l/per/day)		0.000
Foul Sewage per hectare (l/s)		0.000			
Number of Input Hydrographs		0	Number of Storage Structures		0
Number of Online Controls		0	Number of Time/Area Diagrams		0
Number of Offline Controls		0	Number of Real Time Controls		0
Synthetic Rainfall Details					
Rainfall Model		FSR	Ratio R		0.257
Region England and Wales Cv (Summer)		M5-60 (mm)		19.000 Cv (Winter) 0.840	
Margin for Flood Risk Warning (mm)		300.0			
Analysis Timestep		2.5 Second Increment (Extended)			
DTS Status		OFF			
DVD Status		ON			
Inertia Status		ON			
Profile(s)		Summer and Winter			
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440			
Return Period(s) (years)		1, 30, 100			
Climate Change (%)		0, 0, 40			
Water					
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) First (Y) First (Z) Overflow Level Surcharge Flood Overflow Act. (m)
20.000	RE 15	Winter	30	+0%	156.033
20.001	SW C1 15	Summer	30	+0%	155.940
20.002	SW C2 15	Summer	30	+0%	155.906
21.000	RE 15	Winter	30	+0%	156.028
20.003	CW C3 15	Summer	30	+0%	155.818
Surcharged Flooded					
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Pipe Overflow Flow Level (l/s) Status Exceeded
20.000	RE	-0.067	0.000	0.24	1.5 OK
20.001	SW C1	-0.060	0.000	0.34	1.5 OK
20.002	SW C2	-0.069	0.000	0.21	1.5 OK
21.000	RE	-0.072	0.000	0.18	1.5 OK
20.003	CW C3	-0.077	0.000	0.11	3.0 OK
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Appendix D – UU Sewer Records and Pre-Development Response

Paul Graveney

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 08 February 2022 13:44
To: Paul Graveney
Cc: Wastewater Developer Services
Subject: Pre Development Enquiry for: Whitworth Road, Rochdale UU Reference Number : 4200046841

Good afternoon Paul ,

Pre Development Enquiry for: Whitworth Road, Rochdale UU Reference Number : 4200046841

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 3723223 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Site 1: Our preferred point of discharge would be to the 225mm diameter public combined sewer within Derwent Street located to the North of your proposed development at an unrestricted rate.

Site 2: Our preferred point of discharge would be to the 225mm diameter public combined sewer within Noon Sun Street located to the North of your proposed development at an unrestricted rate.

Site 3: Our preferred point of discharge would be to the 225mm diameter public combined sewer within Noon Sun Street located to the South of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

- 1. into the ground (infiltration);**
- 2. to a surface waterbody;**
- 3. to a surface water sewer or highway drain;**
- 4. to a combined sewer.**

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

United Utilities acknowledge that the nearest watercourse is a significant distance off-site.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Site 1: Once evidence is provided as outlined above, United Utilities will consider a connection to the 225mm diameter public combined sewer within Derwent Street located North of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 2l/s.

Site 2: Once evidence is provided as outlined above, United Utilities will consider a connection to the 225mm diameter public combined sewer within Noon Sun Street located North of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 2l/s.

Site 3: Once evidence is provided as outlined above, United Utilities will consider a connection to the 225mm diameter public combined sewer within Noon Sun Street located South of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 2l/s.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address:

DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,



United Utilities
Water for the North West

Mohammed Aljafarawi
Developer Engineer
Developer Services & Metering
Customer Services
Email: Mohammed.Aljafarawi@uuplc.co.uk
unitedutilities.com

If you have received a great service today why not tell us?

Visit: [unitedutilities.com/wow](https://www.unitedutilities.com/wow)

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry <https://www.unitedutilities.com/builders-developers/> or you can email us at developerserviceswater@uuplc.co.uk

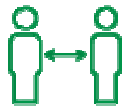
Coronavirus | Prevent the spread



Wash your
hands



Disinfect
common surfaces



Practise social
distancing



FEVER +
COUGH

Stay home if you
have symptoms

[Click for our message to customers](#)

From: Paul Graveney [mailto:paul@pgcl.co.uk]

Sent: 28 January 2022 11:36

To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: RE: Pre Development Enquiry - Whitworth Road, Rochdale

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good Morning,

Please find attached my pre development enquiry for a proposed residential scheme on land off Whitworth Road, Rochdale.

Regards

Paul

Paul Graveney

BEng(Hons) CEng MICE
Director



Tel: 07710 758971

E-mail: paul@pgcl.co.uk

Address: 108 Ack Lane West, Cheadle Hulme, Cheshire, SK8 7ES

Registered in England & Wales. No. 11238546

(Paul Graveney Consulting Ltd: Trading as PG Consulting)

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