



Land off Kingsway Business Park, Dig Gate Lane,
Milnrow, OL16 4NS

Flood Risk Assessment and Drainage Strategy

For Balance Power Projects Ltd

KRS.0310.081.R.001.B

January 2024

www.krsenviro.com

CONTACT DETAILS

Registered Office:
KRS Environmental Ltd
3 Princes Square
Princes Street
Montgomery
Powys
SY15 6PZ

Tel: 01686 668957
Mob: 07711 257466

Email: emma@krsenvironmental.com
Web: www.krsenviro.com
LinkedIn: uk.linkedin.com/in/emmaserjeant/

Office also at:
KRS Environmental Ltd
The Media Centre
7 Northumberland Street
Huddersfield
West Yorkshire
HD1 1RL

Tel: 01484 437420
Mob: 07711 257466

Land off Kingsway Business Par, Dig Gate Lane, Milnrow

Project	Flood Risk Assessment and Drainage Strategy
Client	Balance Power Projects Ltd
Status	Final
Prepared by	Emma Serjeant LL.B, MSc
Reviewed by	Keelan Serjeant BSc (Hons), MSc, MCIWEM
Date	January 2024

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CONTENTS

CONTENTS	ii
TABLES & FIGURES	iv
EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	2
1.1 Background	2
1.2 National Planning Policy Framework (NPPF)	2
1.3 Report Structure	3
2.0 LOCATION & DEVELOPMENT DESCRIPTION	4
2.1 Site Location	4
2.2 Existing Development	4
2.3 Proposed Development	4
2.4 Ground Levels	4
2.5 Catchment Hydrology / Drainage	5
2.6 Ground Conditions	5
2.7 Source Protection Zone	5
3.0 FLOOD RISK	6
3.1 Sources of Flooding	6
3.2 Historic Flooding	6
3.3 Existing and Planned Flood Defence Measures	6
3.4 Environment Agency Flood Zones	6
3.5 Flood Vulnerability	8
3.6 Climate Change	8
3.7 Fluvial (River) Flooding	9
3.8 Tidal (Coastal) Flooding	9
3.9 Groundwater Flooding	9
3.10 Surface Water (Pluvial) Flooding	9
3.11 Sewer Flooding	10
3.12 Flooding from Artificial Drainage Systems/Infrastructure Failure	10
3.13 The Effect of the Development on Flood Risk	11
3.14 Summary of Site Specific Flood Risk	11
4.0 SURFACE WATER DRAINAGE	13
4.1 Surface Water Management Overview	13
4.2 Climate Change	13
4.3 Opportunities for Discharge of Surface Water	14
4.3.1 Discharge to Ground	14
4.3.2 Discharge to Surface Water Body	14
4.3.3 Discharge to Road Drain, Surface Water Sewer or Combined Sewer	14
4.4 Surface Water Runoff	15
4.5 Proposed SuDS Strategy	15
4.6 Designing for Local Drainage System Failure	17
5.0 SEQUENTIAL APPROACH	18
5.1 Sequential and Exception Tests	18
6.0 SUMMARY AND CONCLUSIONS	19
6.1 Introduction	19
6.2 Flood Risk	19
6.3 SuDS Strategy	19
6.4 Sequential Approach	20
6.5 Conclusion	20
APPENDICES	21
APPENDIX 1 – Existing and Proposed Site Layout	22



APPENDIX 2 – Topographical Survey23

APPENDIX 3 – United Utilities Correspondence.....24

APPENDIX 4 – Greenfield Runoff Calculations.....25

APPENDIX 5 – Proposed Drainage Layout26

APPENDIX 6 – MicroDrainage Calculations.....27

TABLES & FIGURES

Figure 1 - Site Location.....	4
Figure 2 - Environment Agency Flood Zones.....	7
Table 1 - Environment Agency Flood Zones and Appropriate Land Use.....	7
Table 2 - Flood Risk Vulnerability and Flood Zone 'Compatibility'.....	8
Table 3 - Peak River Flow Allowances.....	9
Figure 3 - Environment Agency Surface Water Flood Map	10
Figure 4 - Environment Agency Reservoir Flood Map	11
Table 4 - Risk Posed by Flooding Sources.....	12
Table 5 - Peak Rainfall Intensity Allowances	14
Table 6 - loH124 Method Greenfield Runoff Rates (l/s).....	15

EXECUTIVE SUMMARY

The Site would be expected to remain dry in all but the most extreme conditions. The consequences of flooding are acceptable, and the development would be in accordance with the requirements of the National Planning Policy Framework (NPPF). The Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The Proposed Development will considerably reduce the flood risk posed to the Site and to off-site locations due to the adoption of a Sustainable Drainage Systems (SuDS) Strategy.

The Proposed Development should not therefore be precluded on the grounds of flood risk or drainage.

1.0 INTRODUCTION

1.1 Background

This Flood Risk Assessment and Drainage Strategy (FRA) has been prepared by KRS Enviro at the request of Balance Power Projects Ltd to support a planning application for the development of a Battery Storage Facility (“the Proposed Development”) on land off Kingsway Business Park, Dig Gate Lane, Milnrow, OL16 4NS (“the Site”).

This FRA has been carried out in accordance with guidance contained in the National Planning Policy Framework (NPPF)¹, associated Planning Practice Guidance on flood risk and coastal change² (PPG) and the PPG ‘Site-specific flood risk assessment checklist. This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

1.2 National Planning Policy Framework (NPPF)

One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall. A risk-based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FRA is required and should include:

- whether a proposed development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- if necessary, provide the evidence to the Local Planning Authority (LPA) that the Sequential Test can be applied; and
- whether the development will be safe and pass part c) of the Exception Test if this is appropriate.

The report findings are based upon professional judgement and are summarised below with detailed recommendations provided at the end of the report. The report includes rainfall data from the Flood Estimation Handbook (FEH) and hydrogeological information from the British

¹ Ministry for Housing, Communities and Local Government (2023) National Planning Policy Framework: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

² Communities and Local Government (2022) Planning Practice Guidance - Flood Risk and Coastal Change: <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

Geological Survey (BGS). The assessment will summarise and refer to these datasets in the text.

1.3 Report Structure

This FRA has the following report structure:

- Section 2 describes the location and the existing and Proposed Development;
- Section 3 outlines the flood risk to the existing and Proposed Development;
- Section 4 details the proposed surface water drainage for the Site and assesses the potential impacts of the proposed development on surface water drainage;
- Section 5 details the Sequential and Exception Tests; and
- Section 6 presents a summary and conclusions.

2.0 LOCATION & DEVELOPMENT DESCRIPTION

2.1 Site Location

The Site is located on land off Kingsway Business Park, Dig Gate Lane, Milnrow, OL16 4NS (see Figure 1). The National Grid Reference (NGR) of the Site is 391824, 411121.

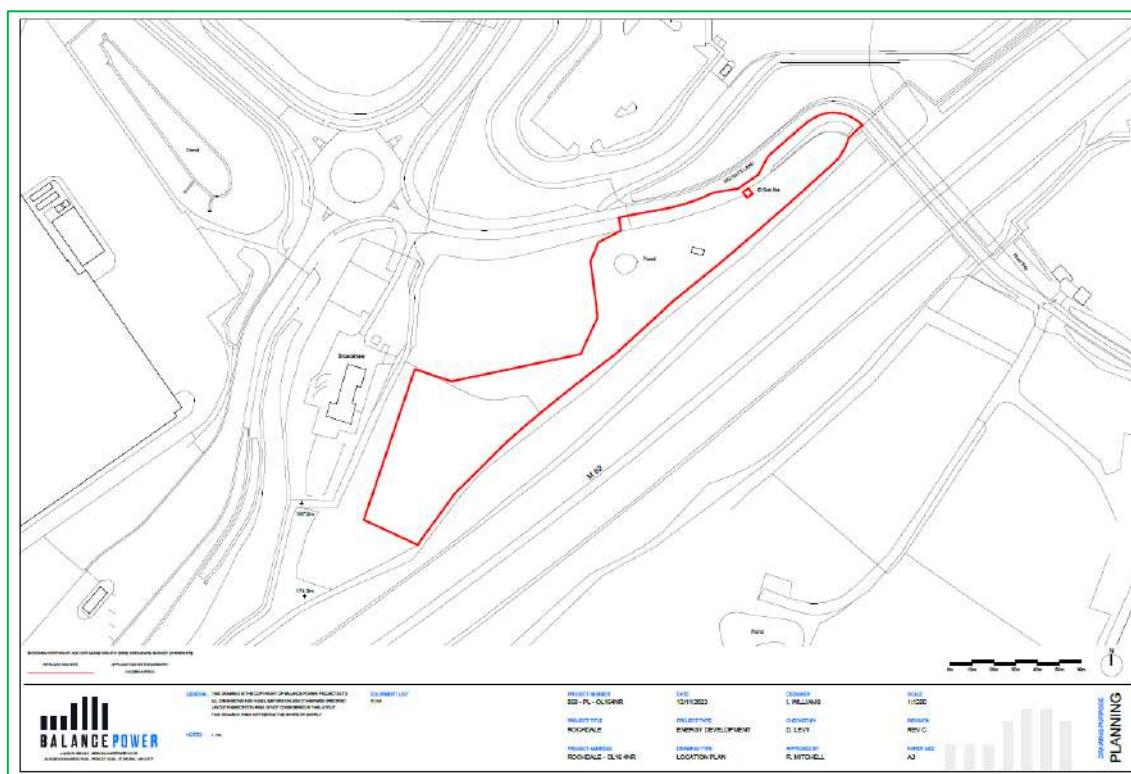


Figure 1 - Site Location

2.2 Existing Development

The existing Site is a disused parcel of land and the currently comprises grassland (see Appendix 1).

2.3 Proposed Development

The Proposed Development is for a Battery Storage Facility (BSF) and associated infrastructure (see Appendix 1). Further details with regard to the Proposed Development can be found in the accompanying information submitted with the planning application.

2.4 Ground Levels

A topographical survey of the Site has recently been completed (see Appendix 2). The Site falls from north east to south west with ground levels of between 179.21 metres Above Ordnance Datum (mAOD) and 171.57mAOD.

2.5 Catchment Hydrology / Drainage

There are no watercourses located on, or within the vicinity of the Site. There is a small pond located in the centre of the Site. The nearest watercourse is an unnamed ordinary watercourse within third-party land, located approximately 55m to the west of the Site. The Stanney Brook is located approximately 1km to the north of the Site.

There is a public surface water sewer and a separate public foul sewer located approximately 100m to the north west of the Site, as shown in Appendix 3.

2.6 Ground Conditions

The British Geological Survey (BGS) map shows that the bedrock deposits consist of the Pennine Lower Coal Measures Formation - mudstone, siltstone and sandstone. Sedimentary bedrock formed between 319 and 318 million years ago during the Carboniferous period. The superficial deposits consist of Hummocky (moundy) Glacial Deposits, Devensian - diamicton. Sedimentary superficial deposit formed between 116 and 11.80 thousand years ago during the Quaternary period.

Information from the National Soil Resources Institute details the northern area of the Site as being situated on slowly permeable seasonally wet acid loamy and clayey soils. The southern area of the Site is situated on freely draining slightly acid sandy soils. Soakaway tests undertaken by a third party on the neighbouring site encountered clayey soils/geology with low infiltration potential.

2.7 Source Protection Zone

The Site is not located within a Source Protection Zone (SPZ). SPZ's have been defined by the Environment Agency around major public water supplies with the intent to show the risk of contamination from any activities that might cause pollution in the area. Three zones are defined: SPZ 1 is the Inner Zone (highest risk); SPZ 2 is the Outer Zone (average risk); and SPZ 3 is the Total Catchment (least risk).

3.0 FLOOD RISK

3.1 Sources of Flooding

All sources of flooding have been considered, these are; fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

3.2 Historic Flooding

Environment Agency data shows that the Site has not historically flooded. There are no records of anecdotal information of flooding at the Site including within the British Hydrological Society “Chronology of British Hydrological Events”. No other historical records of flooding for the Site have been recorded. Therefore, it has been concluded that the Site has not flooded within the recent past.

3.3 Existing and Planned Flood Defence Measures

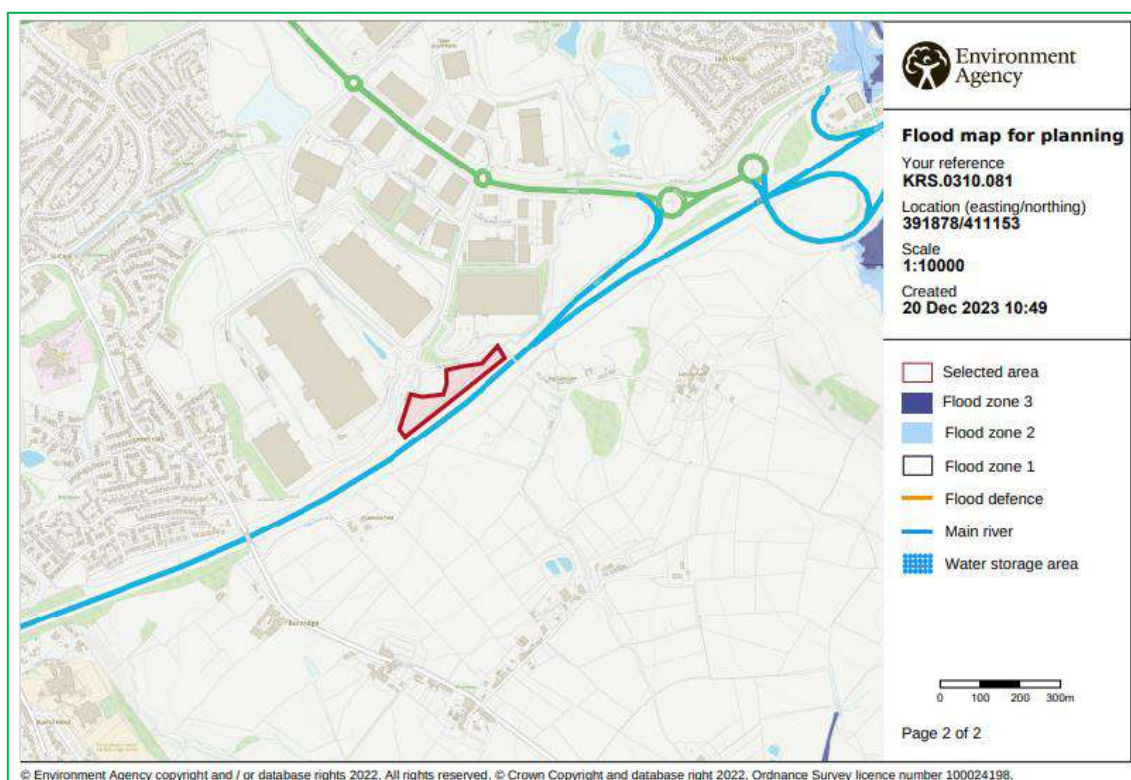
Environment Agency data confirms that the Site is not protected against flooding by existing flood defence measures.

3.4 Environment Agency Flood Zones

A review of the Environment Agency’s Flood Zones indicates that the Site is located within Flood Zone 1 and therefore has a ‘low probability’ of flooding as shown in Figure 2, with less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

The Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. They show the worst-case scenario.

The Environment Agency Flood Zones and acceptable development types are explained in Table 1. Table 1 shows that all development types are generally acceptable in Flood Zone 1.

**Figure 2 - Environment Agency Flood Zones****Table 1 - Environment Agency Flood Zones and Appropriate Land Use**

Flood Zone	Probability	Explanation	Appropriate Land Use
Zone 1	Low	Less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)	All development types generally acceptable
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year	Most development type are generally acceptable
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year	Some development types not acceptable
Zone 3b	'Functional Floodplain'	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: land having a 3.3% or greater annual probability of flooding, with any existing flood risk	Some development types not acceptable

		management infrastructure operating effectively; or land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)	
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3.5 Flood Vulnerability

In the PPG, appropriate uses have been identified for the Flood Zones. Applying the Flood Risk Vulnerability Classification in the PPG, the Proposed Development (use) is classified as 'essential infrastructure'. Table 2 of this report and the PPG states that this use is appropriate within Flood Zone 1 after the completion of a satisfactory FRA.

Table 2 - Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	✗	Exception test required	✓
Zone 3b 'Functional Floodplain'	Exception test required	✓	✗	✗	✗

Key: ✓: Development is appropriate, ✗: Development should not be permitted.

3.6 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into FRA's. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance³. Table 3 shows peak river flow allowances by river catchment.

As per Environment Agency guidance, the anticipated lifetime of the development is deemed to be 75 years however, the actual lifetime of the development will be less. The flood risk assessments: climate change allowances guidance recommends that for 'essential infrastructure' uses in Flood Zone 1 that the central allowances are used. Therefore, the design flood level for the Site is the 1 in 100 year (+35%) event.

³ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances>

Table 3 - Peak River Flow Allowances

Catchment	Allowance Category	2020s	2050s	2080s
Irwell Management Catchment	Upper	+24%	+44%	+75%
	Higher	+15%	+26%	+46%
	Central	+12%	+19%	+35%

3.7 Fluvial (River) Flooding

The Site will not be inundated with floodwater for all events up to and including the 1 in 100 year (+35%) and 1 in 1000 year events. The Site will be flood free during the 1 in 100 year (+35%) and 1 in 1000 year events. The Site is not located within the vicinity of fluvial flooding sources and the risk of fluvial flooding is considered to be **not significant**.

3.8 Tidal (Coastal) Flooding

The Site is not located within the vicinity of tidal flooding sources and the risk of tidal flooding is considered to be **not significant**.

3.9 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers). Site ground conditions suggest a low potential for groundwater flooding. The risk of flooding from groundwater flooding is considered to be **not significant**.

3.10 Surface Water (Pluvial) Flooding

The Site is not situated near to large areas of poor permeability which may result in surface water flooding there are no large catchments that would tend to generate surface water runoff towards the Site. Surface water flow flooding tends to occur sporadically in both location and time such surface water flows would tend to be confined to the areas around the development.

The Environment Agency Surface Water flood map shows that the Site has a very low risk of surface water flooding (see Figure 3) with a chance of flooding with an annual probability of less than 1 in 1000 (0.1%) years. Small areas to the south east of the Site have a low to high risk of surface water flooding with a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) years. However, these areas are located outside of the Site boundary adjacent to the motorway.

The Site will be surfaced with permeable surfaces (crushed permeable stone which will help mitigate the effect of surface water flooding. The free draining stone will allow infiltration of rainfall. Given the scale and nature of the proposed development and the size and location of the surface water flooding sources it has been concluded that surface water flooding poses a low flood risk to the Site and the risk of surface water flooding is considered to be **not significant**.



Figure 3 - Environment Agency Surface Water Flood Map

3.11 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time such flood flows would tend to be confined to the streets around the development. Flood flows could also be generated by burst water mains, but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment. There are no public sewers located within the vicinity of the Site therefore, the risk of flooding from sewer flooding is considered to be **not significant**.

3.12 Flooding from Artificial Drainage Systems/Infrastructure Failure

There are no other nearby artificial water bodies, reservoirs, water channels and artificial drainage systems that could be considered a flood risk to the Site. The Environment Agency Reservoir flood map shows that the Site is not at risk of flooding from reservoir failure (see Figure 4). The risk of flooding from artificial drainage systems/infrastructure failure is considered to be **not significant**.



The Proposed Development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed Site and surrounding area. There will be no net loss in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed. The topography of the Site will not be altered; therefore, the overland flow routes will not be altered.

A summary of the sources of flooding and a review of the risk posed by each source at the Site is shown in Table 4.

The Proposed Development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed Site and surrounding area. There will be no net loss in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed. The topography of the Site will not be altered; therefore, the overland flow routes will not be altered.

The proposed use of the Site is classed as 'essential infrastructure', 'essential infrastructure' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA. In conclusion, the flood risk to the Site can be considered to be limited; the Site is situated in Flood Zone 1, with a very low annual probability of flooding and from all sources. The Site is unlikely to flood except in very extreme conditions.

Table 4 - Risk Posed by Flooding Sources

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial Flooding	No	None Reported	None
Tidal Flooding	No	None Reported	None
Groundwater Flooding	No	None Reported	None
Surface Water Flooding	No	None Reported	None
Sewer Flooding	No	None Reported	None
Flooding from Artificial Drainage Systems/Infrastructure Failure	No	None Reported	None

4.0 SURFACE WATER DRAINAGE

4.1 Surface Water Management Overview

It is recognised that consideration of flood issues should not be confined to the floodplain. The alteration of natural surface water flow patterns through developments can lead to problems elsewhere in the catchment, particularly flooding downstream. For example, replacing vegetated areas with roofs, roads and other paved areas can increase both the total and the peak flow of surface water runoff from the Site. Changes of land use on previously developed land can also have significant downstream impacts where the existing drainage system may not have sufficient capacity for the additional drainage.

An assessment of the surface water runoff rates has been undertaken, in order to determine the surface water options and attenuation requirements for the Site. The assessment considers the impact of the proposals compared to current conditions. Therefore, the surface water attenuation requirement for the developed Site can be determined and reviewed against existing arrangements.

The requirement for managing surface water runoff from developments depends on the pre-developed nature of the Site. If it is an undeveloped greenfield site, then the impact of the proposals will need to be mitigated so that the runoff from the site replicates the natural drainage characteristics of the pre-developed site. The surface water drainage arrangements for any site should be such that the volumes and peak flow rates of surface water leaving a site are no greater than the rates prior to the proposed development unless specific off-site arrangements are made and result in the same net effect.

It should be acknowledged that the satisfactory collection, control and discharge of surface water runoff are now a principle planning and design consideration. This is reflected in recently implemented guidance and the National Sustainable Drainage Systems (SuDS) Standards. It is necessary to demonstrate that the surface water from the proposals can be discharged safely and sustainably.

4.2 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within the NPPF recommends that the effects of climate change are incorporated into FRA's. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the flood risk assessments: climate change allowances guidance⁴.

The recommended precautionary sensitivity range for peak rainfall intensity are summarised in Table 5. The proposals will take into account a 45% increase in rainfall intensity due to climate change.

⁴ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#high-allowances>

Table 5 - Peak Rainfall Intensity Allowances

River Catchment	Return Period (yrs)	Allowance Category	2050s	2070s
Irwell Management Catchment	30	Upper end	+35%	+40%
		Central	+25%	+30%
	100	Upper end	+40%	+45%
		Central	+25%	+30%

4.3 Opportunities for Discharge of Surface Water

Possible receptors for runoff generated on Site have been assessed in line with the prioritisation set out in the Defra non-statutory technical standards for SuDS. There are four possible options to discharge the surface water. The Runoff Destination is (in order of preference):

- a) To ground;
- b) To surface water body;
- c) To road drain or surface water sewer;
- d) To combined sewer

It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local runoff profile by using systems that can either attenuate runoff and reduce peak flow rates or positively impact on the existing surface water runoff.

4.3.1 Discharge to Ground

In determining the future surface runoff from the Site, the potential of using infiltration devices has been considered. An overview of the general ground conditions may be used to gauge if there is potential for their application. Due to the Site ground conditions of slowly permeable seasonally wet acid loamy and clayey soils, the potential for the use of infiltration methods has been assessed as negligible due to the low infiltration capacity. The ground conditions suggest infiltration would not provide a suitable option at the Site.

4.3.2 Discharge to Surface Water Body

Should infiltration be found to be unsuitable, the next option is discharge to a surface water body. There are no watercourses located on, or within the vicinity of the Site. There is a small pond located in the centre of the Site. The nearest watercourse is an unnamed ordinary watercourse within third-party land, located approximately 55m to the west of the Site. Therefore it will not be possible to discharge the surface water runoff from the Site to a surface water body.

4.3.3 Discharge to Road Drain, Surface Water Sewer or Combined Sewer

In the event that discharge of surface water to a watercourse is deemed unsuitable or unviable, then discharge to the public surface water sewer may be possible. There is a public surface water sewer located approximately 100m to the north west of the Site.

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 have been discounted, in this situation United Utilities have confirmed that they will consider a connection to the 900mm diameter public surface water sewer within John Milne Ave located North West at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s. A copy of United Utilities' Pre-development Enquiry response is shown in Appendix 3.

The preferred option is that the surface water runoff from the Site would be attenuated on-site before being discharged to the public surface water sewer at a rate of 2l/s. Therefore, it is proposed to discharge surface water runoff from the Site into the public surface water sewer.

4.4 Surface Water Runoff

Currently the majority of rainfall infiltrates into the soil substrate and/or runoff from the Site. It is proposed that the Site will be surfaced with grass, crushed permeable stone and compacted impermeable stone or similar.

The proposed structures such as the battery containers, transformers and ancillary equipment will be situated on small concrete sleepers which will sit on and be surrounded by permeable surfaces. Any rainfall falling on this infrastructure will runoff onto permeable surfaces and therefore, they have been treated as permeable surfaces within the calculations below. The rest of the Site, including the gravel tracks, (with the exception of the substation, switchrooms, storage container and concrete sleepers upon which the transformer will be installed) will be constructed from free draining stone or grass which will allow infiltration of rainfall.

The proposed impermeable area is associated with the substation, switchrooms, storage container and concrete sleepers upon which the transformer will be installed. All other areas will be constructed in stone surfacing which will be permeable.

An estimation of surface water runoff is required to permit effective Site surface water management and prevent any increase in flood risk to off-Site receptors. In accordance with The SuDS Manual, the Greenfield runoff from the Site has been calculated using the Institute of Hydrology (I0H124) method. Table 6 shows the I0H124 method Greenfield runoff rates calculated for the Site area of 2,410m². The mean annual maximum flow rate from a Greenfield Site (QBAR: approximately a 2.30 year return period) has been calculated to be 0.20 litres/second (l/s) (see Appendix 4).

Table 6 - I0H124 Method Greenfield Runoff Rates (l/s)

Rainfall Event	Runoff Rate
1	0.10
QBAR (rural)	0.20
30	0.30
100	0.40

The method used for calculating the runoff complies with the NPPF, as well as the Defra non-statutory technical standards for SuDS and assumes that the excess runoff associated with the proposed development (plus an allowance for future climate change) will need to be managed by the proposed SuDS scheme.

4.5 Proposed SuDS Strategy

The objective of this SuDS Strategy is to ensure that a sustainable drainage solution can be achieved which reduces the peak discharge rate to manage and reduce the flood risk posed

by the surface water runoff from the Site. The SuDS Strategy takes into account the following principles:

- No increase in the volume or runoff rate of surface water runoff from the Site.
- No increase in flooding to people or property off-site as a result of the development.
- No surface water flooding of the Site.
- The proposals take into account a 45% increase in rainfall intensity due to climate change.

In line with adopting a 'management train' it is recommended that water is managed as close to source as possible. This will reduce the size and cost of infrastructure further downstream and also shares the maintenance burden more equitably. The Outline SuDS Strategy will take the form of:

- Permeable surfaces - crushed stone.
- Attenuation storage with a restricted runoff rate of 2.00l/s before discharge to the public surface water sewer.

The proposed SuDS Strategy is shown in Appendix 5. One of the aims of the NPPF is to provide not only flood risk mitigation but also to maximise additional gains such as improvements in runoff quality and provision of amenity and biodiversity. Systems incorporating these features are often termed SuDS and it is the requirement of NPPF that these are considered as the primary means of collection, control and disposal for storm water as close to source as possible.

The principle applied in the design of storage is to limit the discharge rate of surface water runoff from the developed site for events of similar frequency of occurrence to the same peak rate of runoff as that which takes place from a Greenfield site prior to development.

The SuDS Strategy will reduce peak flows, the volume of runoff, and slow down flows and will provide a suitable SuDS solution for this Site. The adoption of a SuDS Strategy for the Site represents an enhancement from the current conditions as the current surface water runoff from the Site is uncontrolled, untreated, unmanaged and unmitigated. In adopting these principles, it has been demonstrated that a scheme can be developed that does not increase the risk of flooding to adjacent properties and development further downstream.

The QBAR Greenfield runoff rate has been calculated to be 0.20l/s. Using a control device and practical minimum pipe sizes it is not practical to control the discharge rate to below 2.00l/s. Therefore, a value of 2.00l/s has been used as the limiting discharge rate before discharge into the public sewers. The surface water runoff from the Proposed Development for all events up to and including the 1 in 100 year (+45%) event will be attenuated on Site before discharged into the nearby public surface water sewer. Additional storage would be provided within the manholes, pipes and drainage gullies which will provide betterment over and above the 1 in 100 year (+45%) event. The MicroDrainage Calculations are shown in Appendix 6.

It would not be practical to include a basin, pond, or lagoon within the Site and it would also not be sustainable to install a green roof on the buildings/structures therefore, at this stage it is proposed that the attenuation storage will be provided underground. These options will be explored further during pre-construction activities with the agreement of the Environment Agency, the Local Planning Authority, the LLFA and United Utilities where required and it is suggested that a suitably worded planning condition requiring the detailed drainage proposals to be submitted and approved is included in any permission.

4.6 Designing for Local Drainage System Failure

When considering residual risk, it is necessary to make predictions as to the impacts of a storm event that exceeds the design event, or the impact of a failure of the local drainage system. The SuDS Strategy applies a safe and sustainable approach to discharging rainfall runoff from the Site and this reduces the risk of flooding however, it is not possible to completely remove the risk.

As part of the SuDS Strategy it must be demonstrated that the flooding of property would not occur in the event of local drainage system failure and/or design exceedance. It is not economically viable or sustainable to build a drainage system that can accommodate the most extreme events. Consequently, the capacity of the drainage system may be exceeded on rare occasions, with excess water flowing above ground. However, this is considered unlikely in the immediate future.

The design of the Proposed Development provides an opportunity to manage this local drainage system failure/exceedance flow and ensure that indiscriminate flooding of property does not occur. There will not be an extensive sewerage network on the Proposed Development and therefore It is very unlikely that a catastrophic failure would occur. Exceedance flows would be contained within the permeable areas within the Site and would flow to the lower ground levels. It is not considered that there is an increased risk to the Site or properties located adjacent to the Site.

Surface water runoff would be directed to the drainage system through contouring of the hardstanding areas. When considering the impacts of a storm event that exceeds the design event, there is safety factor, even under the design event conditions. Consequently, if this event were to be exceeded there is additional capacity with the system to accommodate this (i.e. within the manholes, pipes etc.). If this freeboard was to be exceeded the consequences would be similar, if not less than for the local drainage system failure. Consequently, the impact of an exceedance event is not considered to represent any significant flood hazard.

The above manages and mitigates the flood risk from surface water runoff to the adjacent premises and Site infrastructure from surface water runoff generated by the Proposed Development.

5.0 SEQUENTIAL APPROACH

5.1 Sequential and Exception Tests

The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. The approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The flood risk to the Site can be considered to be limited; the Site is situated in Flood Zone 1, with a very low annual probability of flooding and from all sources. The Site is unlikely to flood except in very extreme conditions. Therefore, the Sequential and Exception Tests will not need to be undertaken as part of this planning application.

6.0 SUMMARY AND CONCLUSIONS

6.1 Introduction

This report presents a FRA in accordance with the NPPF for the Proposed Development on land off Kingsway Business Park, Dig Gate Lane, Milnrow ("the Site").

This FRA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

6.2 Flood Risk

The Site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The Site is located within Flood Zone 1 with less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

The Proposed Development will have no impact on flood risk and the overall direction of the movement of water will be maintained within the developed Site and surrounding area. There will be no net loss in flood storage capacity. The conveyance routes (flow paths) will not be blocked or obstructed. The topography of the Site will not be altered; therefore, the overland flow routes will not be altered.

The proposed use of the Site is classed as 'essential infrastructure', 'essential infrastructure' uses are appropriate within Flood Zone 1 after the completion of a satisfactory FRA. In conclusion, the flood risk to the Site can be considered to be limited; the Site is situated in Flood Zone 1, with a very low annual probability of flooding and from all sources. The Site is unlikely to flood except in very extreme conditions.

6.3 SuDS Strategy

The SuDS Strategy ensures that a sustainable drainage solution can be achieved which reduces the peak discharge rate to manage and reduce the flood risk posed by the surface water runoff from the Site. The SuDS Strategy takes into account the following principles:

- No increase in the volume or runoff rate of surface water runoff from the Site.
- No increase in flooding to people or property off-site as a result of the development.
- No surface water flooding of the Site.
- The proposals take into account a 45% increase in rainfall intensity due to climate change.

In line with adopting a 'management train' it is recommended that water is managed as close to source as possible. This will reduce the size and cost of infrastructure further downstream and also shares the maintenance burden more equitably. The Outline SuDS Strategy will take the form of:

- Permeable surfaces - crushed stone.
- Attenuation storage with a restricted runoff rate of 2.00l/s before discharge to the public surface water sewer.

The SuDS Strategy will reduce peak flows, the volume of runoff, and slow down flows and will provide a suitable SuDS solution for this Site. The adoption of a SuDS Strategy for the Site represents an enhancement from the current conditions as the current surface water runoff from the Site is uncontrolled, untreated, unmanaged and unmitigated. In adopting these principles, it has been demonstrated that a scheme can be developed that does not increase the risk of flooding to adjacent properties and development further downstream.

6.4 Sequential Approach

The flood risk to the Site can be considered to be limited; the Site is situated in Flood Zone 1, with a very low annual probability of flooding and from all sources. The Site is unlikely to flood except in very extreme conditions. Therefore, the Sequential and Exception Tests will not need to be undertaken as part of this planning application.

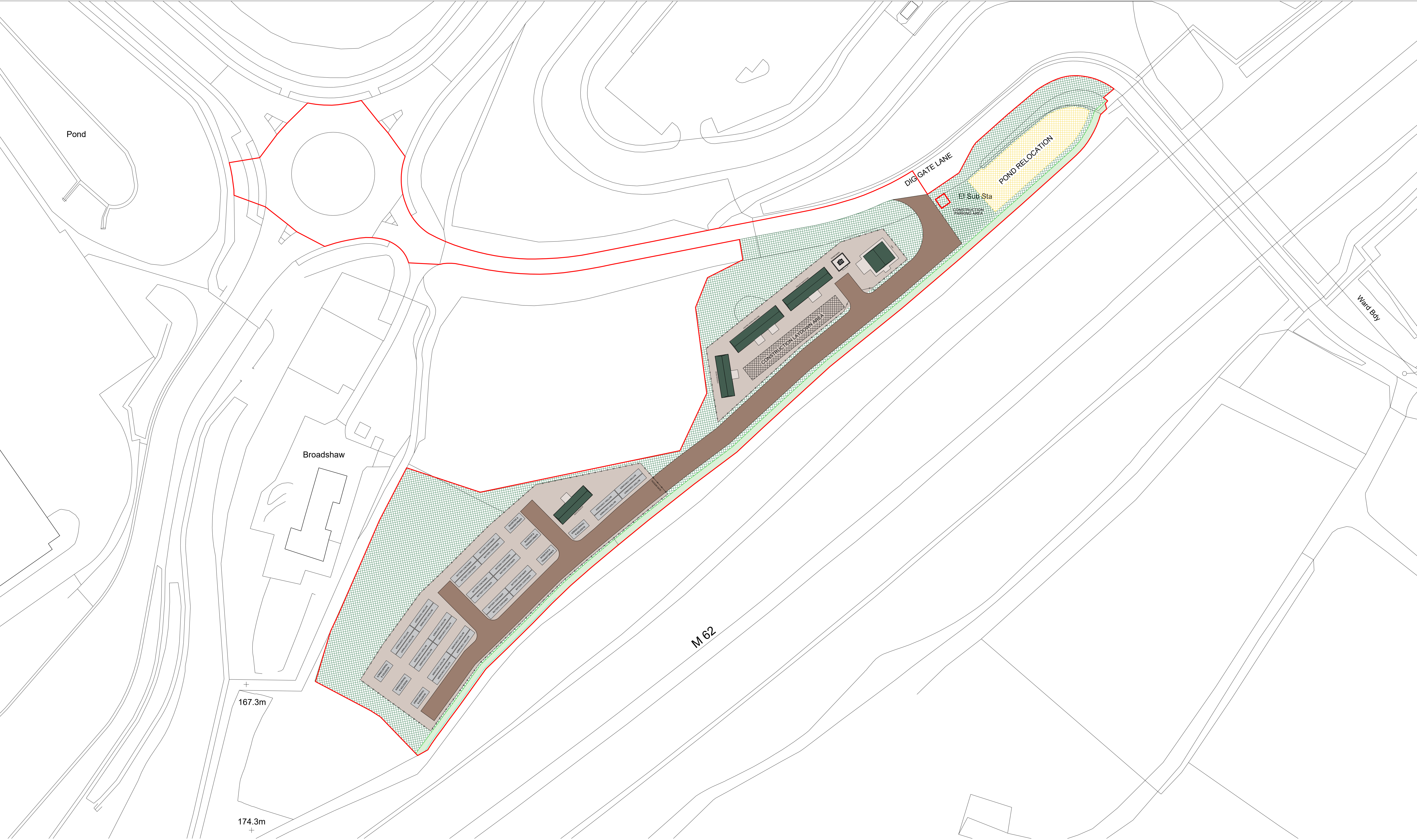
6.5 Conclusion

In conclusion, the Site would be expected to remain dry in all but the most extreme conditions. The consequences of flooding are acceptable, and the development would be in accordance with the requirements of the NPPF. The Proposed Development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of the NPPF. The Proposed Development will considerably reduce the flood risk posed to the Site and to off-Site locations due to the adoption of a SuDS Strategy.

The detailed drainage design would be subject to further investigations into third party ownership rights and it is suggested that the final configuration could be secured by a suitably worded planning condition. The Proposed Development is as appropriate use of the land and would be at low risk of flooding. With opportunities for SuDS solutions to be used. As such, planning consent should not be withheld on the grounds of flood risk or drainage.

APPENDICES

APPENDIX 1 – Existing and Proposed Site Layout



GENERAL
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ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
LAYOUT/FABRICATION AREA IS NOT CONSIDERED IN THE LAYOUT
THIS DRAWING DOES NOT DEFINE THE SCOPE OF SUPPLY

NOTES
1. NA

EQUIPMENT LIST
1. TBC

PROJECT NUMBER
058 - PL - OL164NR - 101

PROJECT TITLE
ROCHDALE

PROJECT ADDRESS
ROCHDALE - OL16 4NR

DATE
08/01/2024

PROJECT TYPE
ENERGY DEVELOPMENT

DRAWING TYPE
PROPOSED PLAN

DESIGNER
C. VICK

CHECKED BY
R. MACINDOE

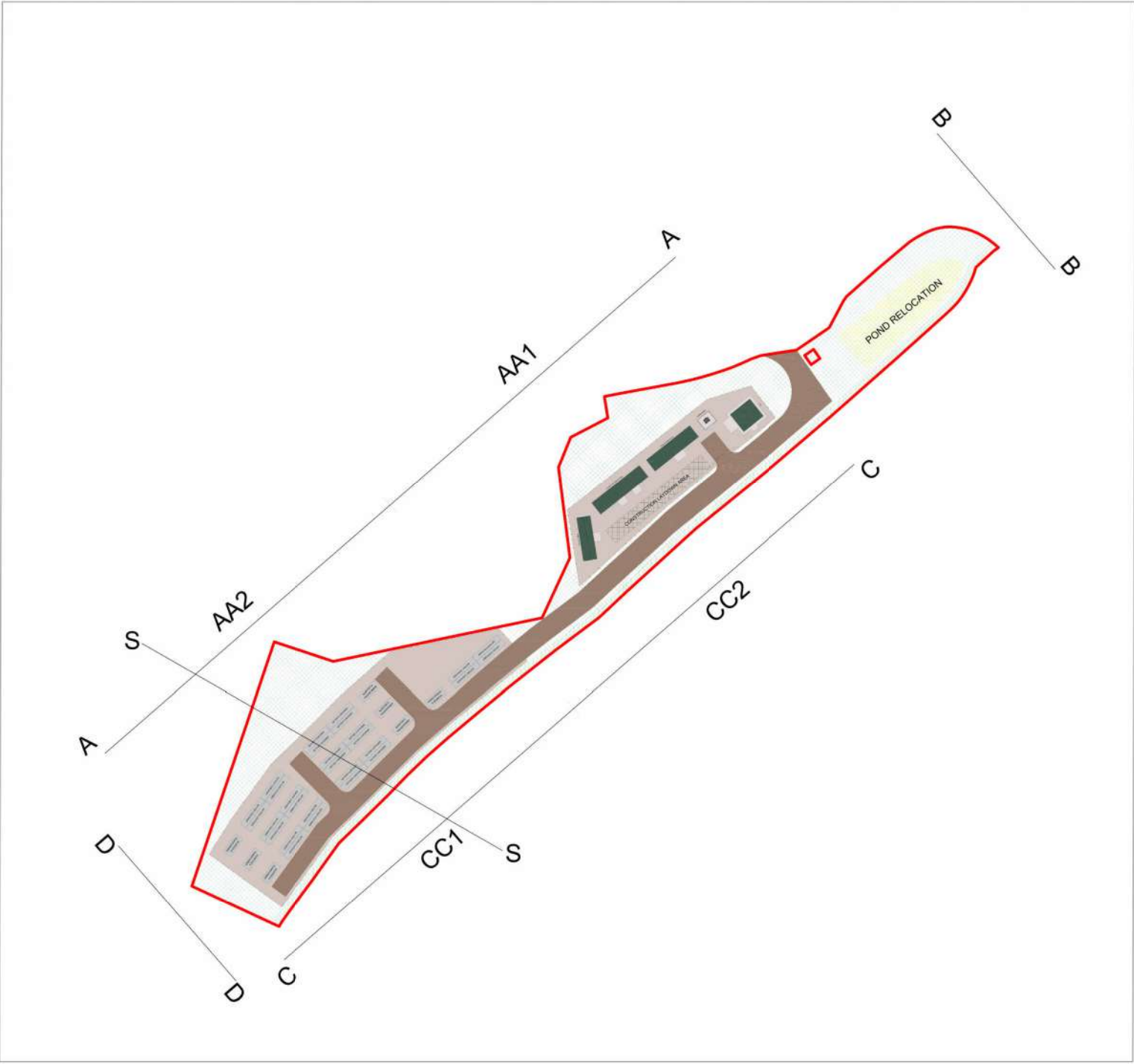
SCALE
1:500

REVISION
REV D

PAPER SIZE
A1



DRAWING PURPOSE
PLANNING



DRAWING PURPOSE
PLANNING

GENERAL

THIS DRAWING IS THE COPYRIGHT OF BALANCE POWER PROJECTS LIMITED
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DO NOT SCALE FROM THIS DRAWING

NOTES

PROJECT NUMBER

058 - PL - OL164NR - 201

PROJECT TITLE

ROCHDALE

PROJECT ADDRESS

ROCHDALE - OL164NR

PROJECT TYPE

ENERGY DEVELOPMENT

DRAWING TYPE

SECTION SS

DATE

27/1/2023

REVISION

REV C

SCALE

1:100

PAPER SIZE

A1

DESIGNER

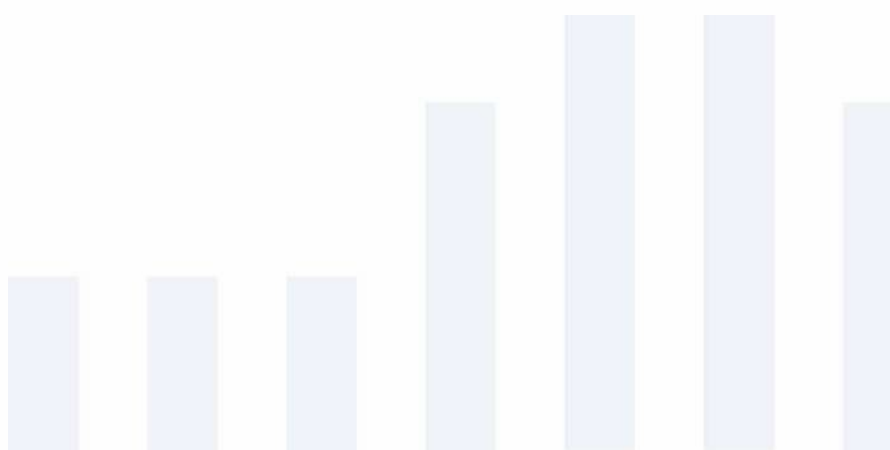
I. WILLIAMS

CHECKED BY

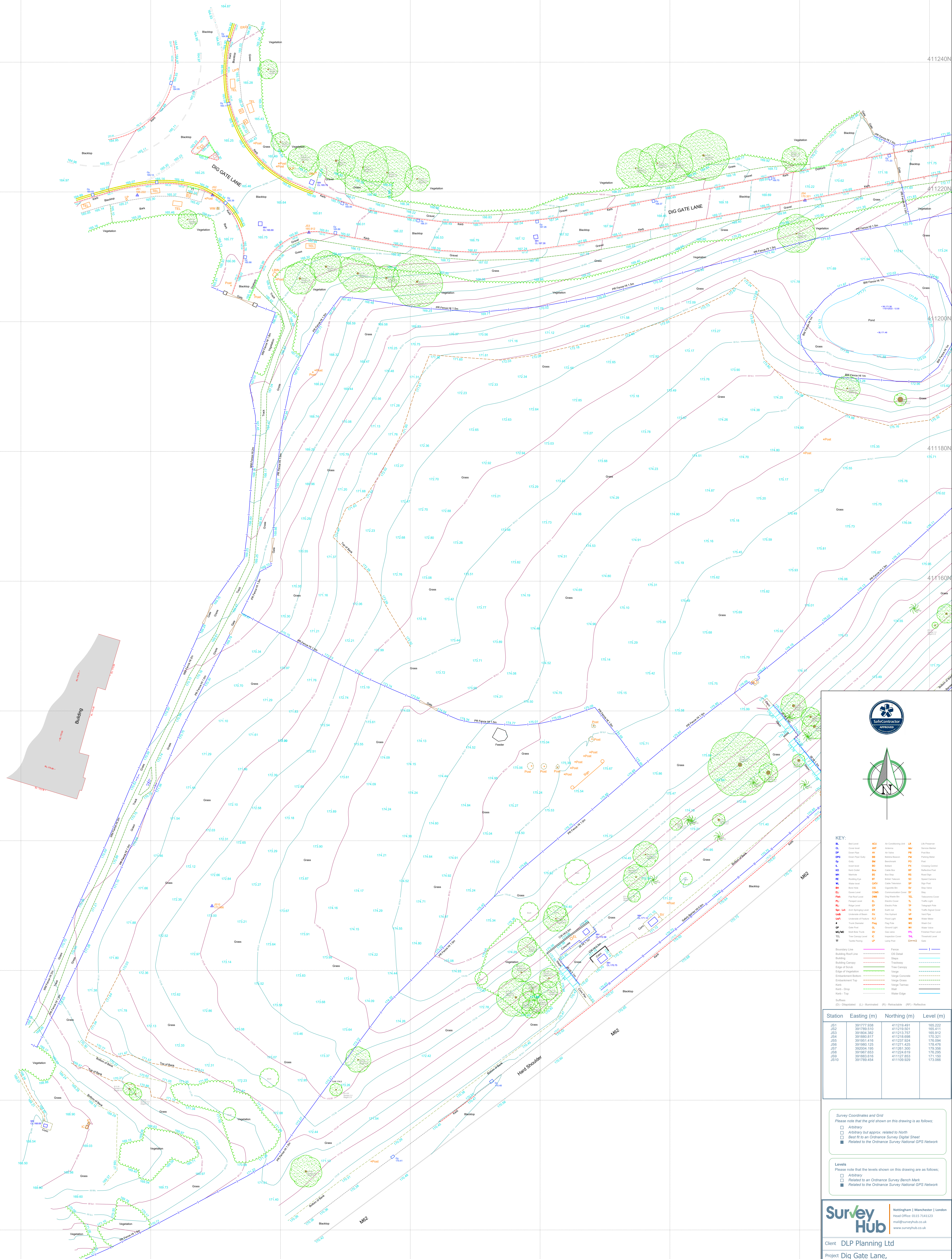
D. LEVY

APPROVED BY

R. MITCHELL



APPENDIX 2 – Topographical Survey



Station	Easting (m)	Northing (m)	Level (m)
JS1	391777.938	411219.491	165.222
JS2	391789.610	411219.951	165.411
JS3	391801.382	411219.657	165.612
JS4	391800.817	411218.698	170.321
JS5	391951.416	411237.924	176.094
JS6	391980.125	411271.425	178.476
JS7	392004.195	411261.300	179.356
JS8	391967.653	411224.619	176.295
JS9	391883.616	411127.853	171.150
JS10	391769.454	411109.929	173.066

Survey Coordinates and Grid
Please note that the grid shown on this drawing is as follows:

- ☐ Arbitrary
- ☐ Arbitrary but approx. related to North
- ☐ Best fit to an Ordnance Survey Digital Sheet
- ☒ Related to the Ordnance Survey National GPS Network

Levels
Please note that the levels shown on this drawing are as follows:

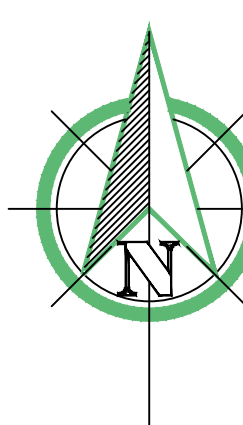
- ☐ Arbitrary
- ☐ Related to an Ordnance Survey Bench Mark
- ☒ Related to the Ordnance Survey National GPS Network

Survey Hub Nottingham | Manchester | London
Head Office: 0115 7141123
mail@surveyhub.co.uk
www.surveyhub.co.uk

Client	DLP Planning Ltd
Project	Dig Gate Lane, Rochdale, OL16 4NR
Title	Topographical Survey - 2D

Surveyed	JS	Checked	NS	Date	11/01/2022
Sheet No	1 of 2			Scale	1:200@A0

NOTES:
All critical measurements should be checked on site prior to design.
No liability will be taken for this plan if passed on to 3rd parties.
Some circumstances may be omitted in areas of marked vehicles and vegetation

[illegible]

Station	Easting (m)	Northing (m)	Level (m)
J51	391777.938	411219.491	165.222
J52	391789.510	411219.501	165.411
J53	391804.382	411213.757	165.912
J54	391890.817	411218.698	170.321
J55	391951.416	411237.924	176.094
J56	391980.125	411271.425	178.476
J57	392004.165	411261.300	178.394
J58	391967.653	411224.619	176.295
J59	391883.616	411127.853	171.150
J510	391789.454	411109.929	173.066

Survey Coordinates and Grid
Please note that the grid shown on this drawing is as follows;

- ☐ Arbitrary
- ☐ Arbitrary but approx. related to North
- ☐ Best fit to an Ordnance Survey Digital Sheet
- ☒ Related to the Ordnance Survey National GPS Network

Levels
Please note that the levels shown on this drawing are as follows:

- ☐ Arbitrary
- ☐ Related to an Ordnance Survey Bench Mark
- ☒ Related to the Ordnance Survey National GPS Network

Survey Hub Nottingham | Manchester | London
Head Office: 0115 7141123
mail@surveyhub.co.uk
www.surveyhub.co.uk

Client	DLP Planning Ltd
Project	Dig Gate Lane, Rochdale, OL16 4NR
Title	Topographical Survey - 2D

Surveyed JS	Checked NS	Date 11/01/2022
Sheet No 2 of 2		Scale 1:200@A0
Job No. 5210		Rev. -

[illegible]

APPENDIX 3 – United Utilities Correspondence

Emma

From: seweradoptions@uuplc.co.uk
Sent: 25 October 2023 10:02
To: Emma
Subject: Pre Development Enquiry for: Land off Kingsway Business Park, Dig Gate Lane, Milnrow, Rochdale, OL16 4NR UU Reference Number : 04815043

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning Emma,

Pre Development Enquiry for: Land off Kingsway Business Park, Dig Gate Lane, Milnrow, Rochdale, OL16 4NR UU Reference Number : 04815043

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 6723 723 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.

Our preferred point of discharge would be to the 150mm diameter public foul water sewer within John Milne Ave located to the North west 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.

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

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the watercourse located to the west of the proposed site.

We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

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.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 900mm diameter public surface water sewer within John Milne Ave located North West at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/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 Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/>

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,



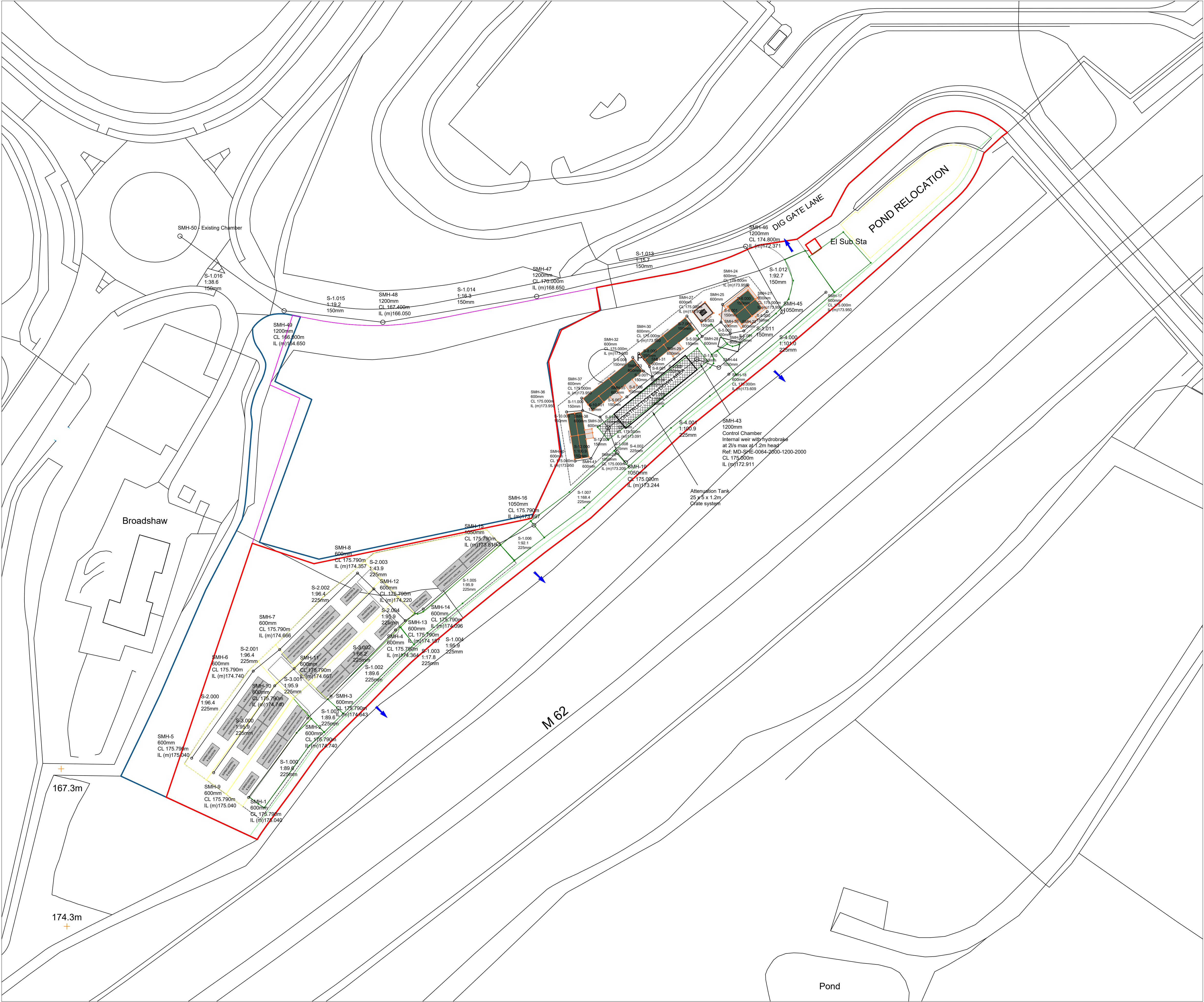
Eireann Thompson
Assistant Developer Engineer
Developer Services & Metering
Customer Services
Mobex: 07553074138
[unitedutilities.com](https://www.unitedutilities.com)

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

APPENDIX 4 – Greenfield Runoff Calculations

KRS Environmental Ltd		Page 1
3 Princes Square, Princes St... Montgomery SY15 6PZ		
Date 20/12/2023 20:44 File	Designed by Emma Checked by	
Innovyze		Source Control 2020.1.3
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.150 Area (ha) 0.241 Urban 0.000 SAAR (mm) 1131 Region Number Region 10 Results 1/s QBAR Rural 0.2 QBAR Urban 0.2 Q100 years 0.4 Q1 year 0.1 Q30 years 0.3 Q100 years 0.4		
©1982-2020 Innovyze		

APPENDIX 5 – Proposed Drainage Layout



ROCHDALE
SW DRAINAGE
(Tie into existing Sewer
option)

PLAN - Rev A

Scale 1:500 @ A1

-  DRAINAGE CATCHMENT
(100% IMPERMEABLE)
-  DRAINAGE CATCHMENT
(70% IMPERMEABLE)
-  DRAINAGE CATCHMENT
(50% IMPERMEABLE)
-  Exceedance flood flow paths

- NOTES:
- 1) All works and materials to conform to standards in latest edition of Sewers for Adoption or any relevant design guides by the overseeing Local Authorities
 - 2) All covers and gratings to be class C in Highway, B where in access or can be class A where away from access and any vehicle paths

Manhole Name	Cover Level (m)	MH Depth (m)	Manhole Connection	Manhole Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)
SMH-1	175.790	0.750	Open Manhole	600	S-1.000	175.040	225			
SMH-2	175.790	1.050	Open Manhole	600	S-1.001	174.740	225	S-1.000	174.740	225
SMH-3	175.790	1.147	Open Manhole	600	S-1.002	174.643	225	S-1.001	174.643	225
SMH-4	175.790	1.426	Open Manhole	600	S-1.003	174.364	225	S-1.002	174.364	225
SMH-5	175.790	0.750	Open Manhole	600	S-2.000	175.040	225			
SMH-6	175.790	1.050	Open Manhole	600	S-2.001	174.740	225	S-2.000	174.740	225
SMH-7	175.790	1.124	Open Manhole	600	S-2.002	174.666	225	S-2.001	174.666	225
SMH-8	175.790	1.433	Open Manhole	600	S-2.003	174.357	225	S-2.002	174.357	225
SMH-9	175.790	0.750	Open Manhole	600	S-3.000	175.040	225			
SMH-10	175.790	1.050	Open Manhole	600	S-3.001	174.740	225	S-3.000	174.740	225
SMH-11	175.790	1.123	Open Manhole	600	S-3.002	174.667	225	S-3.001	174.667	225
SMH-12	175.790	1.570	Open Manhole	600	S-2.004	174.220	225	S-2.003	174.220	225
								S-3.002	174.220	225
SMH-13	175.790	1.633	Open Manhole	600	S-1.004	174.157	225	S-1.003	174.157	225
								S-2.004	174.157	225
SMH-14	175.790	1.694	Open Manhole	600	S-1.005	174.096	225	S-1.004	174.096	225
SMH-15	175.790	1.974	Open Manhole	1050	S-1.006	173.816	225	S-1.005	173.816	225
SMH-16	175.790	2.093	Open Manhole	1050	S-1.007	173.697	225	S-1.006	173.697	225
SMH-17	175.000	1.050	Open Manhole	600	S-4.000	173.950	225			
SMH-18	175.000	1.391	Open Manhole	600	S-4.001	173.609	225	S-4.000	173.609	225
SMH-19	175.000	1.756	Open Manhole	1050	S-4.002	173.244	225	S-4.001	173.244	225
SMH-20	175.000	1.791	Open Manhole	1050	S-1.008	173.209	225	S-1.007	173.519	225
								S-4.002	173.209	225
SMH-21	175.000	1.050	Open Manhole	600	S-5.000	173.950	150			
SMH-22	175.000	1.128	Open Manhole	600	S-5.001	173.872	150	S-5.000	173.872	150
SMH-23	175.000	1.165	Open Manhole	600	S-5.002	173.835	150	S-5.001	173.835	150
SMH-24	175.000	1.050	Open Manhole	600	S-6.000	173.950	150			
SMH-25	175.000	1.136	Open Manhole	600	S-6.001	173.864	150	S-6.000	173.864	150
SMH-26	175.000	1.204	Open Manhole	600	S-5.003	173.796	150	S-5.002	173.796	150
								S-6.001	173.796	150
SMH-27	175.000	1.050	Open Manhole	600	S-7.000	173.950	150			
SMH-28	175.000	1.268	Open Manhole	600	S-5.004	173.732	150	S-5.003	173.732	150
								S-7.000	173.732	150
SMH-29	175.000	1.365	Open Manhole	600	S-5.005	173.635	150	S-5.004	173.635	150
SMH-30	175.000	1.050	Open Manhole	600	S-8.000	173.950	150			
SMH-31	175.000	1.096	Open Manhole	600	S-8.001	173.904	150	S-8.000	173.904	150
SMH-32	175.000	1.050	Open Manhole	600	S-9.000	173.950	150			
SMH-33	175.000	1.097	Open Manhole	600	S-9.001	173.903	150	S-9.000	173.903	150

[illegible]

APPENDIX 6 – MicroDrainage Calculations



Designed by ss
Checked by

Network 2020.1

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
----	---------------	-------------	----------------	----------------	----------------	--------------------	-----------	-------------	-------------	---------	------	----------------

S-2.000	29.399	0.300	98.0	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	
S-2.001	7.674	0.074	103.9	0.003	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-2.002	30.481	0.309	98.7	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-2.003	7.207	0.138	52.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-3.000	29.747	0.300	99.2	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	
S-3.001	7.813	0.073	106.6	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-3.002	30.418	0.447	68.0	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-2.004	10.455	0.063	165.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-1.004	5.786	0.060	95.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

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)
----	-----------------	----------------	--------------	------------------	----------------------	---------------	-------------------	--------------	--------------	---------------

S-2.000	50.00	5.37	175.040	0.013	0.0	0.0	0.0	1.32	52.5	1.8
S-2.001	50.00	5.47	174.740	0.016	0.0	0.0	0.0	1.28	51.0	2.1
S-2.002	50.00	5.86	174.666	0.028	0.0	0.0	0.0	1.32	52.3	3.8
S-2.003	50.00	5.92	174.357	0.028	0.0	0.0	0.0	1.81	72.1	3.8
S-3.000	50.00	5.38	175.040	0.010	0.0	0.0	0.0	1.31	52.2	1.4
S-3.001	50.00	5.48	174.740	0.012	0.0	0.0	0.0	1.27	50.3	1.6
S-3.002	50.00	5.80	174.667	0.023	0.0	0.0	0.0	1.59	63.1	3.1
S-2.004	50.00	6.10	174.220	0.051	0.0	0.0	0.0	1.01	40.3	6.9
S-1.004	50.00	6.17	174.157	0.097	0.0	0.0	0.0	1.34	53.1	13.1



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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
S-1.005	26.921	0.281	95.9	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.006	10.900	0.118	92.1	0.004	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.007	29.965	0.178	168.4	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.000	34.434	0.341	101.0	0.034	5.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.001	36.817	0.365	100.9	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.002	3.555	0.035	100.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.008	7.159	0.118	60.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-5.000	8.219	0.078	105.6	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		👉
S-5.001	3.712	0.037	100.0	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		👉
S-5.002	3.974	0.039	100.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		👉

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)
S-1.005	50.00	6.50	174.096	0.131	0.0	0.0	0.0	1.34	53.1	17.8
S-1.006	50.00	6.64	173.816	0.135	0.0	0.0	0.0	1.36	54.2	18.3
S-1.007	50.00	7.13	173.697	0.147	0.0	0.0	0.0	1.00	39.9	20.0
S-4.000	50.00	5.44	173.950	0.034	0.0	0.0	0.0	1.30	51.7	4.6
S-4.001	50.00	5.91	173.609	0.050	0.0	0.0	0.0	1.30	51.7	6.8
S-4.002	50.00	5.96	173.244	0.050	0.0	0.0	0.0	1.30	51.7	6.8
S-1.008	50.00	7.20	173.209	0.198	0.0	0.0	0.0	1.68	66.8	26.8
S-5.000	50.00	5.14	173.950	0.002	0.0	0.0	0.0	0.98	17.3	0.3
S-5.001	50.00	5.20	173.872	0.003	0.0	0.0	0.0	1.00	17.8	0.5
S-5.002	50.00	5.27	173.835	0.003	0.0	0.0	0.0	1.00	17.7	0.5



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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
S-6.000	8.661	0.086	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-6.001	4.804	0.069	70.1	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.003	6.431	0.064	100.9	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-7.000	6.893	0.218	31.6	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.004	9.758	0.097	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.005	7.609	0.075	100.9	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-8.000	4.622	0.046	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-8.001	2.860	0.028	100.9	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		

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)
S-6.000	50.00	5.14	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.3
S-6.001	50.00	5.21	173.864	0.003	0.0	0.0	0.0	1.20	21.2	0.4
S-5.003	50.00	5.38	173.796	0.009	0.0	0.0	0.0	1.00	17.7	1.3
S-7.000	50.00	5.06	173.950	0.002	0.0	0.0	0.0	1.80	31.8	0.2
S-5.004	50.00	5.54	173.732	0.013	0.0	0.0	0.0	1.00	17.7	1.8
S-5.005	50.00	5.66	173.635	0.016	0.0	0.0	0.0	1.00	17.7	2.1
S-8.000	50.00	5.08	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.2
S-8.001	50.00	5.12	173.904	0.003	0.0	0.0	0.0	1.00	17.7	0.4



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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
S-9.000	4.739	0.047	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit	
S-9.001	2.831	0.028	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-5.006	8.775	0.087	100.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-5.007	9.106	0.090	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-10.000	4.385	0.043	100.9	0.001	5.00	0.0	0.600	o	150	Pipe/Conduit	
S-11.000	3.368	0.043	77.5	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit	
S-10.001	5.020	0.050	100.9	0.001	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)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S-9.000	50.00	5.08	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.2
S-9.001	50.00	5.13	173.903	0.004	0.0	0.0	0.0	1.00	17.7	0.5
S-5.006	50.00	5.81	173.560	0.023	0.0	0.0	0.0	1.00	17.7	3.1
S-5.007	50.00	5.96	173.473	0.024	0.0	0.0	0.0	1.00	17.7	3.3
S-10.000	50.00	5.07	173.950	0.001	0.0	0.0	0.0	1.00	17.7	0.2
S-11.000	50.00	5.05	173.950	0.002	0.0	0.0	0.0	1.14	20.2	0.3
S-10.001	50.00	5.16	173.907	0.004	0.0	0.0	0.0	1.00	17.7	0.6



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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
S-5.008	3.646	0.216	16.8	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-12.000	4.346	0.043	100.9	0.001	5.00	0.0	0.600	o	150	Pipe/Conduit	
S-12.001	9.582	0.095	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.009	30.342	0.180	168.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-1.010	6.371	0.070	91.0	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.011	22.931	0.250	91.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.012	20.395	0.220	92.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.013	58.267	3.721	15.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.014	42.278	2.600	16.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.015	26.937	1.400	19.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.016	34.733	0.900	38.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

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)
S-5.008	50.00	5.99	173.383	0.030	0.0	0.0	0.0	2.47	43.6	4.0
S-12.000	50.00	5.07	173.950	0.001	0.0	0.0	0.0	1.00	17.7	0.2
S-12.001	50.00	5.23	173.907	0.003	0.0	0.0	0.0	1.00	17.7	0.4
S-1.009	48.95	7.71	173.091	0.230	0.0	0.0	0.0	1.00	39.9	30.5
S-1.010	50.00	5.10	172.911	0.000	10.0	0.0	0.0	1.05	18.6	10.0
S-1.011	50.00	5.46	172.841	0.000	10.0	0.0	0.0	1.05	18.6	10.0
S-1.012	50.00	5.79	172.591	0.000	10.0	0.0	0.0	1.04	18.5	10.0
S-1.013	50.00	6.17	172.371	0.000	10.0	0.0	0.0	2.56	45.2	10.0
S-1.014	50.00	6.45	168.650	0.000	10.0	0.0	0.0	2.51	44.4	10.0
S-1.015	50.00	6.65	166.050	0.000	10.0	0.0	0.0	2.31	40.8	10.0
S-1.016	50.00	7.00	164.650	0.000	10.0	0.0	0.0	1.63	28.7	10.0



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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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-1	175.790	0.750	Open Manhole	600	S-1.000	175.040	225				
SMH-2	175.790	1.050	Open Manhole	600	S-1.001	174.740	225	S-1.000	174.740	225	
SMH-3	175.790	1.147	Open Manhole	600	S-1.002	174.643	225	S-1.001	174.643	225	
SMH-4	175.790	1.426	Open Manhole	600	S-1.003	174.364	225	S-1.002	174.364	225	
SMH-5	175.790	0.750	Open Manhole	600	S-2.000	175.040	225				
SMH-6	175.790	1.050	Open Manhole	600	S-2.001	174.740	225	S-2.000	174.740	225	
SMH-7	175.790	1.124	Open Manhole	600	S-2.002	174.666	225	S-2.001	174.666	225	
SMH-8	175.790	1.433	Open Manhole	600	S-2.003	174.357	225	S-2.002	174.357	225	
SMH-9	175.790	0.750	Open Manhole	600	S-3.000	175.040	225				
SMH-10	175.790	1.050	Open Manhole	600	S-3.001	174.740	225	S-3.000	174.740	225	
SMH-11	175.790	1.123	Open Manhole	600	S-3.002	174.667	225	S-3.001	174.667	225	
SMH-12	175.790	1.570	Open Manhole	600	S-2.004	174.220	225	S-2.003	174.220	225	
								S-3.002	174.220	225	
SMH-13	175.790	1.633	Open Manhole	600	S-1.004	174.157	225	S-1.003	174.157	225	
								S-2.004	174.157	225	
SMH-14	175.790	1.694	Open Manhole	600	S-1.005	174.096	225	S-1.004	174.096	225	
SMH-15	175.790	1.974	Open Manhole	1050	S-1.006	173.816	225	S-1.005	173.816	225	
SMH-16	175.790	2.093	Open Manhole	1050	S-1.007	173.697	225	S-1.006	173.697	225	
SMH-17	175.000	1.050	Open Manhole	600	S-4.000	173.950	225				
SMH-18	175.000	1.391	Open Manhole	600	S-4.001	173.609	225	S-4.000	173.609	225	
SMH-19	175.000	1.756	Open Manhole	1050	S-4.002	173.244	225	S-4.001	173.244	225	
SMH-20	175.000	1.791	Open Manhole	1050	S-1.008	173.209	225	S-1.007	173.519	225	310
								S-4.002	173.209	225	



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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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-21	175.000	1.050	Open Manhole	600	S-5.000	173.950	150				
SMH-22	175.000	1.128	Open Manhole	600	S-5.001	173.872	150	S-5.000	173.872	150	
SMH-23	175.000	1.165	Open Manhole	600	S-5.002	173.835	150	S-5.001	173.835	150	
SMH-24	175.000	1.050	Open Manhole	600	S-6.000	173.950	150				
SMH-25	175.000	1.136	Open Manhole	600	S-6.001	173.864	150	S-6.000	173.864	150	
SMH-26	175.000	1.204	Open Manhole	600	S-5.003	173.796	150	S-5.002	173.796	150	
								S-6.001	173.796	150	
SMH-27	175.000	1.050	Open Manhole	600	S-7.000	173.950	150				
SMH-28	175.000	1.268	Open Manhole	600	S-5.004	173.732	150	S-5.003	173.732	150	
								S-7.000	173.732	150	
SMH-29	175.000	1.365	Open Manhole	600	S-5.005	173.635	150	S-5.004	173.635	150	
SMH-30	175.000	1.050	Open Manhole	600	S-8.000	173.950	150				
SMH-31	175.000	1.096	Open Manhole	600	S-8.001	173.904	150	S-8.000	173.904	150	
SMH-32	175.000	1.050	Open Manhole	600	S-9.000	173.950	150				
SMH-33	175.000	1.097	Open Manhole	600	S-9.001	173.903	150	S-9.000	173.903	150	
SMH-34	175.000	1.440	Open Manhole	600	S-5.006	173.560	150	S-5.005	173.560	150	
								S-8.001	173.876	150	316
								S-9.001	173.875	150	315
SMH-35	175.000	1.527	Open Manhole	600	S-5.007	173.473	150	S-5.006	173.473	150	
SMH-36	175.000	1.050	Open Manhole	600	S-10.000	173.950	150				
SMH-37	175.000	1.050	Open Manhole	600	S-11.000	173.950	150				
SMH-38	175.000	1.093	Open Manhole	600	S-10.001	173.907	150	S-10.000	173.907	150	
								S-11.000	173.907	150	

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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-39	175.000	1.617	Open Manhole	600	S-5.008	173.383	150	S-5.007	173.383	150	474
								S-10.001	173.857	150	
SMH-40	175.000	1.050	Open Manhole	600	S-12.000	173.950	150				646
SMH-41	175.000	1.093	Open Manhole	600	S-12.001	173.907	150	S-12.000	173.907	150	
SMH-42	175.000	1.909	Open Manhole	1200	S-1.009	173.091	225	S-1.008	173.091	225	
								S-5.008	173.166	150	
								S-12.001	173.812	150	
SMH-43	175.000	2.089	Open Manhole	1200	S-1.010	172.911	150	S-1.009	172.911	225	
SMH-44	175.000	2.159	Open Manhole	1050	S-1.011	172.841	150	S-1.010	172.841	150	
SMH-45	175.000	2.409	Open Manhole	1050	S-1.012	172.591	150	S-1.011	172.591	150	
SMH-46	174.800	2.429	Open Manhole	1200	S-1.013	172.371	150	S-1.012	172.371	150	
SMH-47	170.000	1.350	Open Manhole	1200	S-1.014	168.650	150	S-1.013	168.650	150	
SMH-48	167.400	1.350	Open Manhole	1200	S-1.015	166.050	150	S-1.014	166.050	150	
SMH-49	166.000	1.350	Open Manhole	1200	S-1.016	164.650	150	S-1.015	164.650	150	
SMH-50	165.100	1.350	Open Manhole	1200		OUTFALL		S-1.016	163.750	150	

MH Name

Manhole Easting (m)

Manhole Northing (m)

Intersection Easting (m)

Intersection Northing (m)

Manhole Access

Layout (North)

SMH-1

391797.133

411082.678

391797.133

411082.678

Required



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-2	391813.190	411104.220	391813.190	411104.220	Required	
SMH-3	391819.488	411110.171	391819.488	411110.171	Required	
SMH-4	391836.951	411128.093	391836.951	411128.093	Required	
SMH-5	391782.563	411093.286	391782.563	411093.286	Required	
SMH-6	391799.534	411117.293	391799.534	411117.293	Required	
SMH-7	391805.131	411122.542	391805.131	411122.542	Required	
SMH-8	391827.282	411143.480	391827.282	411143.480	Required	
SMH-9	391787.116	411088.415	391787.116	411088.415	Required	
SMH-10	391804.209	411112.761	391804.209	411112.761	Required	
SMH-11	391810.295	411117.661	391810.295	411117.661	Required	



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-12	391832.473	411138.480	391832.473	411138.480	Required	
SMH-13	391839.536	411130.772	391839.536	411130.772	Required	
SMH-14	391844.482	411133.776	391844.482	411133.776	Required	
SMH-15	391864.824	411151.410	391864.824	411151.410	Required	
SMH-16	391874.474	411156.479	391874.474	411156.479	Required	
SMH-17	391953.628	411219.660	391953.628	411219.660	Required	
SMH-18	391927.318	411197.446	391927.318	411197.446	Required	
SMH-19	391899.353	411173.499	391899.353	411173.499	Required	
SMH-20	391897.037	411176.196	391897.037	411176.196	Required	
SMH-21	391937.702	411214.389	391937.702	411214.389	Required	



Date 20/12/2023 13:25
File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-22	391931.359	411209.162	391931.359	411209.162	Required	
SMH-23	391927.712	411208.474	391927.712	411208.474	Required	
SMH-24	391932.465	411221.625	391932.465	411221.625	Required	
SMH-25	391925.610	411216.332	391925.610	411216.332	Required	
SMH-26	391925.191	411211.546	391925.191	411211.546	Required	
SMH-27	391915.950	411213.180	391915.950	411213.180	Required	
SMH-28	391920.071	411207.655	391920.071	411207.655	Required	
SMH-29	391912.467	411201.541	391912.467	411201.541	Required	
SMH-30	391902.876	411203.056	391902.876	411203.056	Required	
SMH-31	391905.826	411199.498	391905.826	411199.498	Required	



Date 20/12/2023 13:25
File Rochdale-SW-to Sewer-revA.MDX

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-32	391901.256	411201.986	391901.256	411201.986	Required	
SMH-33	391904.177	411198.255	391904.177	411198.255	Required	
SMH-34	391906.567	411196.736	391906.567	411196.736	Required	
SMH-35	391899.683	411191.294	391899.683	411191.294	Required	
SMH-36	391883.323	411187.205	391883.323	411187.205	Required	
SMH-37	391887.430	411190.937	391887.430	411190.937	Required	
SMH-38	391887.692	411187.579	391887.692	411187.579	Required	
SMH-39	391892.398	411185.830	391892.398	411185.830	Required	
SMH-40	391885.637	411173.871	391885.637	411173.871	Required	
SMH-41	391889.927	411174.569	391889.927	411174.569	Required	



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-42	391894.608	411182.930	391894.608	411182.930	Required	
SMH-43	391918.629	411201.467	391918.629	411201.467	Required	
SMH-44	391924.600	411199.245	391924.600	411199.245	Required	
SMH-45	391941.887	411214.311	391941.887	411214.311	Required	
SMH-46	391931.888	411232.086	391931.888	411232.086	Required	
SMH-47	391875.223	411218.515	391875.223	411218.515	Required	
SMH-48	391833.529	411211.512	391833.529	411211.512	Required	
SMH-49	391806.772	411214.623	391806.772	411214.623	Required	
SMH-50	391778.544	411234.861			No Entry	



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Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-1.000	o	225	SMH-1	175.790	175.040	0.525	Open Manhole		600
S-1.001	o	225	SMH-2	175.790	174.740	0.825	Open Manhole		600
S-1.002	o	225	SMH-3	175.790	174.643	0.922	Open Manhole		600
S-1.003	o	225	SMH-4	175.790	174.364	1.201	Open Manhole		600
S-2.000	o	225	SMH-5	175.790	175.040	0.525	Open Manhole		600
S-2.001	o	225	SMH-6	175.790	174.740	0.825	Open Manhole		600
S-2.002	o	225	SMH-7	175.790	174.666	0.899	Open Manhole		600
S-2.003	o	225	SMH-8	175.790	174.357	1.208	Open Manhole		600
S-3.000	o	225	SMH-9	175.790	175.040	0.525	Open Manhole		600
S-3.001	o	225	SMH-10	175.790	174.740	0.825	Open Manhole		600

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
S-1.000	26.867	89.6	SMH-2	175.790	174.740	0.825	Open Manhole		600
S-1.001	8.666	89.6	SMH-3	175.790	174.643	0.922	Open Manhole		600
S-1.002	25.023	89.6	SMH-4	175.790	174.364	1.201	Open Manhole		600
S-1.003	3.722	18.0	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-2.000	29.399	98.0	SMH-6	175.790	174.740	0.825	Open Manhole		600
S-2.001	7.674	103.9	SMH-7	175.790	174.666	0.899	Open Manhole		600
S-2.002	30.481	98.7	SMH-8	175.790	174.357	1.208	Open Manhole		600
S-2.003	7.207	52.3	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-3.000	29.747	99.2	SMH-10	175.790	174.740	0.825	Open Manhole		600
S-3.001	7.813	106.6	SMH-11	175.790	174.667	0.898	Open Manhole		600



Date 20/12/2023 13:25
File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

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., (mm)	I*W
S-3.002	o	225	SMH-11	175.790	174.667	0.898	Open Manhole		600
S-2.004	o	225	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-1.004	o	225	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-1.005	o	225	SMH-14	175.790	174.096	1.469	Open Manhole		600
S-1.006	o	225	SMH-15	175.790	173.816	1.749	Open Manhole		1050
S-1.007	o	225	SMH-16	175.790	173.697	1.868	Open Manhole		1050
S-4.000	o	225	SMH-17	175.000	173.950	0.825	Open Manhole		600
S-4.001	o	225	SMH-18	175.000	173.609	1.166	Open Manhole		600
S-4.002	o	225	SMH-19	175.000	173.244	1.531	Open Manhole		1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-3.002	30.418	68.0	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-2.004	10.455	165.8	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-1.004	5.786	95.8	SMH-14	175.790	174.096	1.469	Open Manhole		600
S-1.005	26.921	95.9	SMH-15	175.790	173.816	1.749	Open Manhole		1050
S-1.006	10.900	92.1	SMH-16	175.790	173.697	1.868	Open Manhole		1050
S-1.007	29.965	168.4	SMH-20	175.000	173.519	1.256	Open Manhole		1050
S-4.000	34.434	101.0	SMH-18	175.000	173.609	1.166	Open Manhole		600
S-4.001	36.817	100.9	SMH-19	175.000	173.244	1.531	Open Manhole		1050
S-4.002	3.555	100.9	SMH-20	175.000	173.209	1.566	Open Manhole		1050



Date 20/12/2023 13:25
File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

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., (mm)	I*W
S-1.008	o	225	SMH-20	175.000	173.209	1.566	Open Manhole		1050
S-5.000	o	150	SMH-21	175.000	173.950	0.900	Open Manhole		600
S-5.001	o	150	SMH-22	175.000	173.872	0.978	Open Manhole		600
S-5.002	o	150	SMH-23	175.000	173.835	1.015	Open Manhole		600
S-6.000	o	150	SMH-24	175.000	173.950	0.900	Open Manhole		600
S-6.001	o	150	SMH-25	175.000	173.864	0.986	Open Manhole		600
S-5.003	o	150	SMH-26	175.000	173.796	1.054	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-1.008	7.159	60.8	SMH-42	175.000	173.091	1.684	Open Manhole		1200
S-5.000	8.219	105.6	SMH-22	175.000	173.872	0.978	Open Manhole		600
S-5.001	3.712	100.0	SMH-23	175.000	173.835	1.015	Open Manhole		600
S-5.002	3.974	100.9	SMH-26	175.000	173.796	1.054	Open Manhole		600
S-6.000	8.661	100.9	SMH-25	175.000	173.864	0.986	Open Manhole		600
S-6.001	4.804	70.1	SMH-26	175.000	173.796	1.054	Open Manhole		600
S-5.003	6.431	100.9	SMH-28	175.000	173.732	1.118	Open Manhole		600



Date 20/12/2023 13:25
File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

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., (mm)	I*W
S-7.000	o	150	SMH-27	175.000	173.950	0.900	Open Manhole		600
S-5.004	o	150	SMH-28	175.000	173.732	1.118	Open Manhole		600
S-5.005	o	150	SMH-29	175.000	173.635	1.215	Open Manhole		600
S-8.000	o	150	SMH-30	175.000	173.950	0.900	Open Manhole		600
S-8.001	o	150	SMH-31	175.000	173.904	0.946	Open Manhole		600
S-9.000	o	150	SMH-32	175.000	173.950	0.900	Open Manhole		600
S-9.001	o	150	SMH-33	175.000	173.903	0.947	Open Manhole		600
S-5.006	o	150	SMH-34	175.000	173.560	1.290	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-7.000	6.893	31.6	SMH-28	175.000	173.732	1.118	Open Manhole		600
S-5.004	9.758	100.9	SMH-29	175.000	173.635	1.215	Open Manhole		600
S-5.005	7.609	100.9	SMH-34	175.000	173.560	1.290	Open Manhole		600
S-8.000	4.622	100.9	SMH-31	175.000	173.904	0.946	Open Manhole		600
S-8.001	2.860	100.9	SMH-34	175.000	173.876	0.974	Open Manhole		600
S-9.000	4.739	100.9	SMH-33	175.000	173.903	0.947	Open Manhole		600
S-9.001	2.831	100.9	SMH-34	175.000	173.875	0.975	Open Manhole		600
S-5.006	8.775	100.9	SMH-35	175.000	173.473	1.377	Open Manhole		600



Date 20/12/2023 13:25
File Rochdale-SW-to Sewer-revA.MDX

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Micro Drainage

Network 2020.1

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., (mm)	L*W
S-5.007	o	150	SMH-35	175.000	173.473	1.377	Open Manhole		600
S-10.000	o	150	SMH-36	175.000	173.950	0.900	Open Manhole		600
S-11.000	o	150	SMH-37	175.000	173.950	0.900	Open Manhole		600
S-10.001	o	150	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-5.008	o	150	SMH-39	175.000	173.383	1.467	Open Manhole		600
S-12.000	o	150	SMH-40	175.000	173.950	0.900	Open Manhole		600
S-12.001	o	150	SMH-41	175.000	173.907	0.943	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
S-5.007	9.106	100.9	SMH-39	175.000	173.383	1.467	Open Manhole		600
S-10.000	4.385	100.9	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-11.000	3.368	77.5	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-10.001	5.020	100.9	SMH-39	175.000	173.857	0.993	Open Manhole		600
S-5.008	3.646	16.8	SMH-42	175.000	173.166	1.684	Open Manhole		1200
S-12.000	4.346	100.9	SMH-41	175.000	173.907	0.943	Open Manhole		600
S-12.001	9.582	100.9	SMH-42	175.000	173.812	1.038	Open Manhole		1200



Date 20/12/2023 13:25
File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

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., (mm)	I*W
S-1.009	o	225	SMH-42	175.000	173.091	1.684	Open Manhole		1200
S-1.010	o	150	SMH-43	175.000	172.911	1.939	Open Manhole		1200
S-1.011	o	150	SMH-44	175.000	172.841	2.009	Open Manhole		1050
S-1.012	o	150	SMH-45	175.000	172.591	2.259	Open Manhole		1050
S-1.013	o	150	SMH-46	174.800	172.371	2.279	Open Manhole		1200
S-1.014	o	150	SMH-47	170.000	168.650	1.200	Open Manhole		1200
S-1.015	o	150	SMH-48	167.400	166.050	1.200	Open Manhole		1200
S-1.016	o	150	SMH-49	166.000	164.650	1.200	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., (mm)	L*W
S-1.009	30.342	168.4	SMH-43	175.000	172.911	1.864	Open Manhole		1200
S-1.010	6.371	91.0	SMH-44	175.000	172.841	2.009	Open Manhole		1050
S-1.011	22.931	91.7	SMH-45	175.000	172.591	2.259	Open Manhole		1050
S-1.012	20.395	92.7	SMH-46	174.800	172.371	2.279	Open Manhole		1200
S-1.013	58.267	15.7	SMH-47	170.000	168.650	1.200	Open Manhole		1200
S-1.014	42.278	16.3	SMH-48	167.400	166.050	1.200	Open Manhole		1200
S-1.015	26.937	19.2	SMH-49	166.000	164.650	1.200	Open Manhole		1200
S-1.016	34.733	38.6	SMH-50	165.100	163.750	1.200	Open Manhole		1200



Date 20/12/2023 13:25
File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	50	0.019	0.009	0.009
1.001	User	-	70	0.008	0.006	0.006
	User	-	70	0.013	0.009	0.015
1.002	User	-	50	0.021	0.011	0.011
	User	-	70	0.016	0.011	0.022
1.003	-	-	100	0.000	0.000	0.000
2.000	User	-	50	0.026	0.013	0.013
2.001	User	-	50	0.005	0.003	0.003
2.002	User	-	50	0.025	0.013	0.013
2.003	-	-	100	0.000	0.000	0.000
3.000	User	-	50	0.020	0.010	0.010
3.001	User	-	50	0.004	0.002	0.002
3.002	User	-	50	0.021	0.010	0.010
2.004	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
1.005	User	-	50	0.042	0.021	0.021
	User	-	70	0.019	0.014	0.034
1.006	User	-	70	0.006	0.004	0.004
1.007	User	-	70	0.017	0.012	0.012
4.000	User	-	70	0.029	0.020	0.020
	User	-	100	0.014	0.014	0.034
4.001	User	-	70	0.023	0.016	0.016
4.002	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.001	0.001	0.001
	User	-	100	0.001	0.001	0.002
5.001	User	-	100	0.001	0.001	0.001
5.002	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.001	0.001	0.001
	User	-	100	0.001	0.001	0.002
6.001	User	-	100	0.001	0.001	0.001
5.003	User	-	100	0.002	0.002	0.002
	User	-	100	0.001	0.001	0.003



Date 20/12/2023 13:25

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File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
7.000	User	-	100	0.002	0.002	0.002
5.004	User	-	70	0.003	0.002	0.002
5.005	User	-	100	0.003	0.003	0.003
8.000	User	-	100	0.002	0.002	0.002
8.001	User	-	100	0.001	0.001	0.001
9.000	User	-	100	0.002	0.002	0.002
9.001	User	-	100	0.002	0.002	0.002
5.006	-	-	100	0.000	0.000	0.000
5.007	User	-	100	0.002	0.002	0.002
10.000	User	-	100	0.001	0.001	0.001
11.000	User	-	100	0.002	0.002	0.002
10.001	User	-	100	0.001	0.001	0.001
5.008	User	-	100	0.001	0.001	0.001
12.000	User	-	100	0.001	0.001	0.001
12.001	User	-	100	0.002	0.002	0.002
1.009	-	-	100	0.000	0.000	0.000
1.010	User	-	70	0.016	0.011	0.011
1.011	-	-	100	0.000	0.000	0.000
1.012	-	-	100	0.000	0.000	0.000
1.013	-	-	100	0.000	0.000	0.000
1.014	-	-	100	0.000	0.000	0.000
1.015	-	-	100	0.000	0.000	0.000
1.016	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.378	0.241	0.241

KRS Environmental Ltd		Page 23
		
Date 20/12/2023 13:25 File Rochdale-SW-to_Sewer-revA.MDX	Designed by ss Checked by	
Micro Drainage	Network 2020.1	
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Manhole Headloss Coeff (Global) 0.500 Inlet Coeffiecient 0.800 Areal Reduction Factor 1.000 Foul Sewage per hectare (l/s) 0.000 Flow per Person per Day (l/per/day) 0.000 Hot Start (mins) 0 Additional Flow - % of Total Flow 0.000 Run Time (mins) 60 Hot Start Level (mm) 0 MADD Factor * 10m³/ha Storage 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR M5-60 (mm) 18.700 Cv (Summer) 0.750 Return Period (years) 2 Ratio R 0.324 Cv (Winter) 0.840 Region England and Wales Profile Type Summer Storm Duration (mins) 30		
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SMH-43, DS/PN: S-1.010, Volume (m³): 3.5

Unit Reference	MD-SHE-0064-2000-1200-2000	Sump Available	Yes
Design Head (m)	1.200	Diameter (mm)	64
Design Flow (l/s)	2.0	Invert Level (m)	172.911
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	100
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.0	Kick-Flo®	0.573	1.4
Flush-Flo™	0.282	1.8	Mean Flow over Head Range	-	1.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	0.600	1.5	1.600	2.3	2.600	2.8	5.000	3.9	7.500	4.7
0.200	1.7	0.800	1.7	1.800	2.4	3.000	3.0	5.500	4.0	8.000	4.8
0.300	1.8	1.000	1.8	2.000	2.5	3.500	3.3	6.000	4.2	8.500	5.0
0.400	1.7	1.200	2.0	2.200	2.6	4.000	3.5	6.500	4.4	9.000	5.1
0.500	1.6	1.400	2.1	2.400	2.7	4.500	3.7	7.000	4.5	9.500	5.2

KRS Environmental Ltd		Page 25
		
Date 20/12/2023 13:25 File Rochdale-SW-to_Sewer-revA.MDX	Designed by ss Checked by	
Micro Drainage	Network 2020.1	
<u>Offline Controls for Storm</u> <u>Weir Manhole: SMH-43, DS/PN: S-1.010, Loop to PN: S-1.011</u> Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 174.111		
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KRS Environmental Ltd		Page 26
		
Date 20/12/2023 13:25	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage	Network 2020.1	

Storage Structures for Storm

Cellular Storage Manhole: SMH-43, DS/PN: S-1.010

Invert Level (m) 172.911

Infiltration Coefficient Side (m/hr) 0.00000

Porosity 0.95

Infiltration Coefficient Base (m/hr) 0.00000

Safety Factor 2.0

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	125.0	125.0	1.200	125.0	197.0	1.300	0.0	197.0

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm)	18.700	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.324	Cv (Winter)

```
Margin for Flood Risk Warning (mm) 300.0 DTS Status   ON Inertia Status OFF
Analysis Timestep      Fine DVD Status OFF
```

Profile(s)	Summer and Winter														
Duration(s) (mins)	15,	30,	60,	120,	180,	240,	360,	480,	600,	720,	960,	1440,	2160,	2880,	4320,
												5760,	7200,	8640,	10080
n Period(s) (years)	1														
Climate Change (%)	25														

										Water	Surcharged	Flooded	Half Drain		Pipe	
PN	US/MH	Storm	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	Status
	Name		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	
S-1.000	SMH-1	15	Winter	1	+25%				175.065	-0.200	0.000	0.03			1.4	OK
S-1.001	SMH-2	15	Winter	1	+25%				174.781	-0.184	0.000	0.08			3.3	OK
S-1.002	SMH-3	15	Winter	1	+25%				174.695	-0.173	0.000	0.12			6.1	OK
S-1.003	SMH-4	15	Winter	1	+25%				174.410	-0.179	0.000	0.10			6.1	OK
S-2.000	SMH-5	15	Winter	1	+25%				175.069	-0.196	0.000	0.04			2.0	OK
S-2.001	SMH-6	15	Winter	1	+25%				174.776	-0.189	0.000	0.06			2.3	OK
S-2.002	SMH-7	15	Winter	1	+25%				174.709	-0.183	0.000	0.08			3.9	OK
S-2.003	SMH-8	15	Winter	1	+25%				174.398	-0.185	0.000	0.07			3.9	OK

KRS Environmental Ltd		Page 28																														
																																
Date 20/12/2023 13:25	Designed by ss																															
File Rochdale-SW-to_Sewer-revA.MDX	Checked by																															
Micro Drainage	Network 2020.1																															
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																																
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	US/MH	Level																														
PN	Name	Exceeded																														
S-1.000	SMH-1																															
S-1.001	SMH-2																															
S-1.002	SMH-3																															
S-1.003	SMH-4																															
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S-2.001	SMH-6																															
S-2.002	SMH-7																															
S-2.003	SMH-8																															
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

									Water	Surcharged	Flooded			Half Drain	Pipe	
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status
S-3.000	SMH-9	15	Winter	1	+25%				175.066	-0.199	0.000	0.03			1.5	OK
S-3.001	SMH-10	15	Winter	1	+25%				174.771	-0.194	0.000	0.05			1.8	OK
S-3.002	SMH-11	15	Winter	1	+25%				174.700	-0.192	0.000	0.05			3.1	OK
S-2.004	SMH-12	15	Winter	1	+25%				174.289	-0.156	0.000	0.21			7.0	OK
S-1.004	SMH-13	15	Winter	1	+25%				174.252	-0.129	0.000	0.37			13.0	OK
S-1.005	SMH-14	15	Winter	1	+25%				174.189	-0.133	0.000	0.35			17.1	OK
S-1.006	SMH-15	15	Winter	1	+25%				173.913	-0.128	0.000	0.39			17.7	OK
S-1.007	SMH-16	15	Winter	1	+25%				173.811	-0.111	0.000	0.51			19.0	OK
S-4.000	SMH-17	15	Winter	1	+25%				173.999	-0.176	0.000	0.10			5.0	OK
S-4.001	SMH-18	15	Winter	1	+25%				173.666	-0.168	0.000	0.15			7.1	OK
S-4.002	SMH-19	15	Winter	1	+25%				173.332	-0.138	0.000	0.23			7.0	OK
S-1.008	SMH-20	15	Winter	1	+25%				173.326	-0.108	0.000	0.53			25.8	OK
S-5.000	SMH-21	15	Winter	1	+25%				173.965	-0.135	0.000	0.02			0.3	OK
S-5.001	SMH-22	15	Winter	1	+25%				173.891	-0.131	0.000	0.04			0.5	OK
S-5.002	SMH-23	15	Winter	1	+25%				173.854	-0.131	0.000	0.04			0.5	OK
S-6.000	SMH-24	15	Winter	1	+25%				173.964	-0.136	0.000	0.02			0.3	OK
S-6.001	SMH-25	15	Winter	1	+25%				173.881	-0.134	0.000	0.03			0.4	OK
S-5.003	SMH-26	15	Winter	1	+25%				173.825	-0.120	0.000	0.09			1.3	OK
S-7.000	SMH-27	15	Winter	1	+25%				173.956	-0.144	0.000	0.01			0.2	OK
S-5.004	SMH-28	15	Winter	1	+25%				173.766	-0.116	0.000	0.12			1.8	OK
S-5.005	SMH-29	15	Winter	1	+25%				173.672	-0.113	0.000	0.14			2.1	OK
S-8.000	SMH-30	15	Winter	1	+25%				173.963	-0.137	0.000	0.02			0.2	OK
S-8.001	SMH-31	15	Winter	1	+25%				173.923	-0.131	0.000	0.04			0.4	OK
S-9.000	SMH-32	15	Winter	1	+25%				173.964	-0.136	0.000	0.02			0.3	OK
S-9.001	SMH-33	15	Winter	1	+25%				173.925	-0.128	0.000	0.05			0.6	OK
S-5.006	SMH-34	15	Winter	1	+25%				173.605	-0.105	0.000	0.20			3.1	OK
S-5.007	SMH-35	15	Winter	1	+25%				173.520	-0.103	0.000	0.21			3.3	OK
S-10.000	SMH-36	15	Winter	1	+25%				173.960	-0.140	0.000	0.01			0.2	OK
S-11.000	SMH-37	15	Winter	1	+25%				173.965	-0.135	0.000	0.02			0.3	OK
S-10.001	SMH-38	15	Winter	1	+25%				173.927	-0.129	0.000	0.05			0.6	OK

KRS Environmental Ltd		Page 30
		
Date 20/12/2023 13:25	Designed by ss	
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Micro Drainage	Network 2020.1	
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>		

KRS Environemntal Ltd		Page 31						
								
Date 20/12/2023 13:25 File Rochdale-SW-to_Sewer-revA.MDX	Designed by ss Checked by							
Micro Drainage	Network 2020.1							
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PN	US/MH Name	Level Exceeded						
S-10.001	SMH-38							
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KRS Environmental Ltd		Page 32
		
Date 20/12/2023 13:25	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage		Network 2020.1

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
									Level (m)	Depth (m)	Volume (m³)				
S-5.008	SMH-39	15 Winter	1	+25%					173.420	-0.113	0.000	0.14			4.0
S-12.000	SMH-40	15 Winter	1	+25%					173.960	-0.140	0.000	0.01			0.2
S-12.001	SMH-41	15 Winter	1	+25%					173.923	-0.134	0.000	0.02			0.4
S-1.009	SMH-42	15 Winter	1	+25%					173.245	-0.071	0.000	0.80			29.9
S-1.010	SMH-43	360 Winter	1	+25%	1/30 Summer			0	173.181	0.120	0.000	0.11	0.0	228	1.8
S-1.011	SMH-44	480 Winter	1	+25%					172.873	-0.118	0.000	0.10			1.8
S-1.012	SMH-45	480 Winter	1	+25%					172.623	-0.118	0.000	0.10			1.8
S-1.013	SMH-46	480 Winter	1	+25%					172.390	-0.131	0.000	0.04			1.8
S-1.014	SMH-47	240 Winter	1	+25%					168.669	-0.131	0.000	0.04			1.8
S-1.015	SMH-48	240 Winter	1	+25%					166.070	-0.130	0.000	0.05			1.8
S-1.016	SMH-49	480 Winter	1	+25%					164.674	-0.126	0.000	0.06			1.8

PN	US/MH Name	Status	Level
			Exceeded
S-5.008	SMH-39	OK	
S-12.000	SMH-40	OK	
S-12.001	SMH-41	OK	
S-1.009	SMH-42	OK	
S-1.010	SMH-43	SURCHARGED	
S-1.011	SMH-44	OK	
S-1.012	SMH-45	OK	
S-1.013	SMH-46	OK	
S-1.014	SMH-47	OK	
S-1.015	SMH-48	OK	
S-1.016	SMH-49	OK	



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Design Criteria for Storm

FSR Rainfall Model - England and Wales

FSR Rainfall Model - England and Wales					
Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	18.700	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	0.900
Ratio R	0.324	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

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
S-1.000	26.867	0.300	89.6	0.009	5.00	0.0	0.600	o	225	Pipe/Conduit		🚧
S-1.001	8.666	0.097	89.6	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit		🚧
S-1.002	25.023	0.279	89.6	0.022	0.00	0.0	0.600	o	225	Pipe/Conduit		🚧
S-1.003	3.722	0.207	18.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		🚧

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)
S-1.000	50.00	5.32	175.040	0.009	0.0	0.0	0.0	1.38	55.0	1.3
S-1.001	50.00	5.43	174.740	0.024	0.0	0.0	0.0	1.38	55.0	3.3
S-1.002	50.00	5.73	174.643	0.046	0.0	0.0	0.0	1.38	55.0	6.2
S-1.003	50.00	5.75	174.364	0.046	0.0	0.0	0.0	3.10	123.3	6.2

KRS Environmental Ltd		Page 2
		
Date 20/12/2023 13:23	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage	Network 2020.1	

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
S-2.000	29.399	0.300	98.0	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	
S-2.001	7.674	0.074	103.9	0.003	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-2.002	30.481	0.309	98.7	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-2.003	7.207	0.138	52.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-3.000	29.747	0.300	99.2	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	
S-3.001	7.813	0.073	106.6	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-3.002	30.418	0.447	68.0	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-2.004	10.455	0.063	165.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-1.004	5.786	0.060	95.8	0.000	0.00	0.0	0.600	o	225	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)
S-2.000	50.00	5.37	175.040	0.013	0.0	0.0	0.0	1.32	52.5	1.8
S-2.001	50.00	5.47	174.740	0.016	0.0	0.0	0.0	1.28	51.0	2.1
S-2.002	50.00	5.86	174.666	0.028	0.0	0.0	0.0	1.32	52.3	3.8
S-2.003	50.00	5.92	174.357	0.028	0.0	0.0	0.0	1.81	72.1	3.8
S-3.000	50.00	5.38	175.040	0.010	0.0	0.0	0.0	1.31	52.2	1.4
S-3.001	50.00	5.48	174.740	0.012	0.0	0.0	0.0	1.27	50.3	1.6
S-3.002	50.00	5.80	174.667	0.023	0.0	0.0	0.0	1.59	63.1	3.1
S-2.004	50.00	6.10	174.220	0.051	0.0	0.0	0.0	1.01	40.3	6.9
S-1.004	50.00	6.17	174.157	0.097	0.0	0.0	0.0	1.34	53.1	13.1



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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
S-1.005	26.921	0.281	95.9	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.006	10.900	0.118	92.1	0.004	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.007	29.965	0.178	168.4	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.000	34.434	0.341	101.0	0.034	5.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.001	36.817	0.365	100.9	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.002	3.555	0.035	100.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.008	7.159	0.118	60.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-5.000	8.219	0.078	105.6	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		👉
S-5.001	3.712	0.037	100.0	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		👉
S-5.002	3.974	0.039	100.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		👉

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)
S-1.005	50.00	6.50	174.096	0.131	0.0	0.0	0.0	1.34	53.1	17.8
S-1.006	50.00	6.64	173.816	0.135	0.0	0.0	0.0	1.36	54.2	18.3
S-1.007	50.00	7.13	173.697	0.147	0.0	0.0	0.0	1.00	39.9	20.0
S-4.000	50.00	5.44	173.950	0.034	0.0	0.0	0.0	1.30	51.7	4.6
S-4.001	50.00	5.91	173.609	0.050	0.0	0.0	0.0	1.30	51.7	6.8
S-4.002	50.00	5.96	173.244	0.050	0.0	0.0	0.0	1.30	51.7	6.8
S-1.008	50.00	7.20	173.209	0.198	0.0	0.0	0.0	1.68	66.8	26.8
S-5.000	50.00	5.14	173.950	0.002	0.0	0.0	0.0	0.98	17.3	0.3
S-5.001	50.00	5.20	173.872	0.003	0.0	0.0	0.0	1.00	17.8	0.5
S-5.002	50.00	5.27	173.835	0.003	0.0	0.0	0.0	1.00	17.7	0.5



Date 20/12/2023 13:23
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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
S-6.000	8.661	0.086	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-6.001	4.804	0.069	70.1	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.003	6.431	0.064	100.9	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-7.000	6.893	0.218	31.6	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.004	9.758	0.097	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.005	7.609	0.075	100.9	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-8.000	4.622	0.046	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-8.001	2.860	0.028	100.9	0.001	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)
S-6.000	50.00	5.14	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.3
S-6.001	50.00	5.21	173.864	0.003	0.0	0.0	0.0	1.20	21.2	0.4
S-5.003	50.00	5.38	173.796	0.009	0.0	0.0	0.0	1.00	17.7	1.3
S-7.000	50.00	5.06	173.950	0.002	0.0	0.0	0.0	1.80	31.8	0.2
S-5.004	50.00	5.54	173.732	0.013	0.0	0.0	0.0	1.00	17.7	1.8
S-5.005	50.00	5.66	173.635	0.016	0.0	0.0	0.0	1.00	17.7	2.1
S-8.000	50.00	5.08	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.2
S-8.001	50.00	5.12	173.904	0.003	0.0	0.0	0.0	1.00	17.7	0.4



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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
S-9.000	4.739	0.047	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-9.001	2.831	0.028	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.006	8.775	0.087	100.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.007	9.106	0.090	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-10.000	4.385	0.043	100.9	0.001	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-11.000	3.368	0.043	77.5	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-10.001	5.020	0.050	100.9	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		

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)
S-9.000	50.00	5.08	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.2
S-9.001	50.00	5.13	173.903	0.004	0.0	0.0	0.0	1.00	17.7	0.5
S-5.006	50.00	5.81	173.560	0.023	0.0	0.0	0.0	1.00	17.7	3.1
S-5.007	50.00	5.96	173.473	0.024	0.0	0.0	0.0	1.00	17.7	3.3
S-10.000	50.00	5.07	173.950	0.001	0.0	0.0	0.0	1.00	17.7	0.2
S-11.000	50.00	5.05	173.950	0.002	0.0	0.0	0.0	1.14	20.2	0.3
S-10.001	50.00	5.16	173.907	0.004	0.0	0.0	0.0	1.00	17.7	0.6



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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
S-5.008	3.646	0.216	16.8	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-12.000	4.346	0.043	100.9	0.001	5.00	0.0	0.600	o	150	Pipe/Conduit	
S-12.001	9.582	0.095	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.009	30.342	0.180	168.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S-1.010	6.371	0.070	91.0	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.011	22.931	0.250	91.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.012	20.395	0.220	92.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.013	58.267	3.721	15.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.014	42.278	2.600	16.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.015	26.937	1.400	19.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S-1.016	34.733	0.900	38.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

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)
S-5.008	50.00	5.99	173.383	0.030	0.0	0.0	0.0	2.47	43.6	4.0
S-12.000	50.00	5.07	173.950	0.001	0.0	0.0	0.0	1.00	17.7	0.2
S-12.001	50.00	5.23	173.907	0.003	0.0	0.0	0.0	1.00	17.7	0.4
S-1.009	48.95	7.71	173.091	0.230	0.0	0.0	0.0	1.00	39.9	30.5
S-1.010	50.00	5.10	172.911	0.000	10.0	0.0	0.0	1.05	18.6	10.0
S-1.011	50.00	5.46	172.841	0.000	10.0	0.0	0.0	1.05	18.6	10.0
S-1.012	50.00	5.79	172.591	0.000	10.0	0.0	0.0	1.04	18.5	10.0
S-1.013	50.00	6.17	172.371	0.000	10.0	0.0	0.0	2.56	45.2	10.0
S-1.014	50.00	6.45	168.650	0.000	10.0	0.0	0.0	2.51	44.4	10.0
S-1.015	50.00	6.65	166.050	0.000	10.0	0.0	0.0	2.31	40.8	10.0
S-1.016	50.00	7.00	164.650	0.000	10.0	0.0	0.0	1.63	28.7	10.0



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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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-1	175.790	0.750	Open Manhole	600	S-1.000	175.040	225				
SMH-2	175.790	1.050	Open Manhole	600	S-1.001	174.740	225	S-1.000	174.740	225	
SMH-3	175.790	1.147	Open Manhole	600	S-1.002	174.643	225	S-1.001	174.643	225	
SMH-4	175.790	1.426	Open Manhole	600	S-1.003	174.364	225	S-1.002	174.364	225	
SMH-5	175.790	0.750	Open Manhole	600	S-2.000	175.040	225				
SMH-6	175.790	1.050	Open Manhole	600	S-2.001	174.740	225	S-2.000	174.740	225	
SMH-7	175.790	1.124	Open Manhole	600	S-2.002	174.666	225	S-2.001	174.666	225	
SMH-8	175.790	1.433	Open Manhole	600	S-2.003	174.357	225	S-2.002	174.357	225	
SMH-9	175.790	0.750	Open Manhole	600	S-3.000	175.040	225				
SMH-10	175.790	1.050	Open Manhole	600	S-3.001	174.740	225	S-3.000	174.740	225	
SMH-11	175.790	1.123	Open Manhole	600	S-3.002	174.667	225	S-3.001	174.667	225	
SMH-12	175.790	1.570	Open Manhole	600	S-2.004	174.220	225	S-2.003	174.220	225	
								S-3.002	174.220	225	
SMH-13	175.790	1.633	Open Manhole	600	S-1.004	174.157	225	S-1.003	174.157	225	
								S-2.004	174.157	225	
SMH-14	175.790	1.694	Open Manhole	600	S-1.005	174.096	225	S-1.004	174.096	225	
SMH-15	175.790	1.974	Open Manhole	1050	S-1.006	173.816	225	S-1.005	173.816	225	
SMH-16	175.790	2.093	Open Manhole	1050	S-1.007	173.697	225	S-1.006	173.697	225	
SMH-17	175.000	1.050	Open Manhole	600	S-4.000	173.950	225				
SMH-18	175.000	1.391	Open Manhole	600	S-4.001	173.609	225	S-4.000	173.609	225	
SMH-19	175.000	1.756	Open Manhole	1050	S-4.002	173.244	225	S-4.001	173.244	225	
SMH-20	175.000	1.791	Open Manhole	1050	S-1.008	173.209	225	S-1.007	173.519	225	310
								S-4.002	173.209	225	



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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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-21	175.000	1.050	Open Manhole	600	S-5.000	173.950	150				
SMH-22	175.000	1.128	Open Manhole	600	S-5.001	173.872	150	S-5.000	173.872	150	
SMH-23	175.000	1.165	Open Manhole	600	S-5.002	173.835	150	S-5.001	173.835	150	
SMH-24	175.000	1.050	Open Manhole	600	S-6.000	173.950	150				
SMH-25	175.000	1.136	Open Manhole	600	S-6.001	173.864	150	S-6.000	173.864	150	
SMH-26	175.000	1.204	Open Manhole	600	S-5.003	173.796	150	S-5.002	173.796	150	
								S-6.001	173.796	150	
SMH-27	175.000	1.050	Open Manhole	600	S-7.000	173.950	150				
SMH-28	175.000	1.268	Open Manhole	600	S-5.004	173.732	150	S-5.003	173.732	150	
								S-7.000	173.732	150	
SMH-29	175.000	1.365	Open Manhole	600	S-5.005	173.635	150	S-5.004	173.635	150	
SMH-30	175.000	1.050	Open Manhole	600	S-8.000	173.950	150				
SMH-31	175.000	1.096	Open Manhole	600	S-8.001	173.904	150	S-8.000	173.904	150	
SMH-32	175.000	1.050	Open Manhole	600	S-9.000	173.950	150				
SMH-33	175.000	1.097	Open Manhole	600	S-9.001	173.903	150	S-9.000	173.903	150	
SMH-34	175.000	1.440	Open Manhole	600	S-5.006	173.560	150	S-5.005	173.560	150	
								S-8.001	173.876	150	316
								S-9.001	173.875	150	315
SMH-35	175.000	1.527	Open Manhole	600	S-5.007	173.473	150	S-5.006	173.473	150	
SMH-36	175.000	1.050	Open Manhole	600	S-10.000	173.950	150				
SMH-37	175.000	1.050	Open Manhole	600	S-11.000	173.950	150				
SMH-38	175.000	1.093	Open Manhole	600	S-10.001	173.907	150	S-10.000	173.907	150	
								S-11.000	173.907	150	

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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-39	175.000	1.617	Open Manhole	600	S-5.008	173.383	150	S-5.007	173.383	150	474
								S-10.001	173.857	150	
SMH-40	175.000	1.050	Open Manhole	600	S-12.000	173.950	150				646
SMH-41	175.000	1.093	Open Manhole	600	S-12.001	173.907	150	S-12.000	173.907	150	
SMH-42	175.000	1.909	Open Manhole	1200	S-1.009	173.091	225	S-1.008	173.091	225	
								S-5.008	173.166	150	
								S-12.001	173.812	150	
SMH-43	175.000	2.089	Open Manhole	1200	S-1.010	172.911	150	S-1.009	172.911	225	
SMH-44	175.000	2.159	Open Manhole	1050	S-1.011	172.841	150	S-1.010	172.841	150	
SMH-45	175.000	2.409	Open Manhole	1050	S-1.012	172.591	150	S-1.011	172.591	150	
SMH-46	174.800	2.429	Open Manhole	1200	S-1.013	172.371	150	S-1.012	172.371	150	
SMH-47	170.000	1.350	Open Manhole	1200	S-1.014	168.650	150	S-1.013	168.650	150	
SMH-48	167.400	1.350	Open Manhole	1200	S-1.015	166.050	150	S-1.014	166.050	150	
SMH-49	166.000	1.350	Open Manhole	1200	S-1.016	164.650	150	S-1.015	164.650	150	
SMH-50	165.100	1.350	Open Manhole	1200		OUTFALL		S-1.016	163.750	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-1	391797.133	411082.678	391797.133	411082.678	Required	



Date 20/12/2023 13:23
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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-2	391813.190	411104.220	391813.190	411104.220	Required	
SMH-3	391819.488	411110.171	391819.488	411110.171	Required	
SMH-4	391836.951	411128.093	391836.951	411128.093	Required	
SMH-5	391782.563	411093.286	391782.563	411093.286	Required	
SMH-6	391799.534	411117.293	391799.534	411117.293	Required	
SMH-7	391805.131	411122.542	391805.131	411122.542	Required	
SMH-8	391827.282	411143.480	391827.282	411143.480	Required	
SMH-9	391787.116	411088.415	391787.116	411088.415	Required	
SMH-10	391804.209	411112.761	391804.209	411112.761	Required	
SMH-11	391810.295	411117.661	391810.295	411117.661	Required	



Date 20/12/2023 13:23
File Rochdale-SW-to Sewer-revA.MDX

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-12	391832.473	411138.480	391832.473	411138.480	Required	
SMH-13	391839.536	411130.772	391839.536	411130.772	Required	
SMH-14	391844.482	411133.776	391844.482	411133.776	Required	
SMH-15	391864.824	411151.410	391864.824	411151.410	Required	
SMH-16	391874.474	411156.479	391874.474	411156.479	Required	
SMH-17	391953.628	411219.660	391953.628	411219.660	Required	
SMH-18	391927.318	411197.446	391927.318	411197.446	Required	
SMH-19	391899.353	411173.499	391899.353	411173.499	Required	
SMH-20	391897.037	411176.196	391897.037	411176.196	Required	
SMH-21	391937.702	411214.389	391937.702	411214.389	Required	



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Date 20/12/2023 13:23
File Rochdale-SW-to Sewer-revA.MDX
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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-22	391931.359	411209.162	391931.359	411209.162	Required	
SMH-23	391927.712	411208.474	391927.712	411208.474	Required	
SMH-24	391932.465	411221.625	391932.465	411221.625	Required	
SMH-25	391925.610	411216.332	391925.610	411216.332	Required	
SMH-26	391925.191	411211.546	391925.191	411211.546	Required	
SMH-27	391915.950	411213.180	391915.950	411213.180	Required	
SMH-28	391920.071	411207.655	391920.071	411207.655	Required	
SMH-29	391912.467	411201.541	391912.467	411201.541	Required	
SMH-30	391902.876	411203.056	391902.876	411203.056	Required	
SMH-31	391905.826	411199.498	391905.826	411199.498	Required	



Date 20/12/2023 13:23
File Rochdale-SW-to Sewer-revA.MDX

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-32	391901.256	411201.986	391901.256	411201.986	Required	
SMH-33	391904.177	411198.255	391904.177	411198.255	Required	
SMH-34	391906.567	411196.736	391906.567	411196.736	Required	
SMH-35	391899.683	411191.294	391899.683	411191.294	Required	
SMH-36	391883.323	411187.205	391883.323	411187.205	Required	
SMH-37	391887.430	411190.937	391887.430	411190.937	Required	
SMH-38	391887.692	411187.579	391887.692	411187.579	Required	
SMH-39	391892.398	411185.830	391892.398	411185.830	Required	
SMH-40	391885.637	411173.871	391885.637	411173.871	Required	
SMH-41	391889.927	411174.569	391889.927	411174.569	Required	



Date 20/12/2023 13:23
File Rochdale-SW-to Sewer-revA.MDX

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-42	391894.608	411182.930	391894.608	411182.930	Required	
SMH-43	391918.629	411201.467	391918.629	411201.467	Required	
SMH-44	391924.600	411199.245	391924.600	411199.245	Required	
SMH-45	391941.887	411214.311	391941.887	411214.311	Required	
SMH-46	391931.888	411232.086	391931.888	411232.086	Required	
SMH-47	391875.223	411218.515	391875.223	411218.515	Required	
SMH-48	391833.529	411211.512	391833.529	411211.512	Required	
SMH-49	391806.772	411214.623	391806.772	411214.623	Required	
SMH-50	391778.544	411234.861			No Entry	



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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., (mm)	L*W
S-1.000	o	225	SMH-1	175.790	175.040	0.525	Open Manhole		600
S-1.001	o	225	SMH-2	175.790	174.740	0.825	Open Manhole		600
S-1.002	o	225	SMH-3	175.790	174.643	0.922	Open Manhole		600
S-1.003	o	225	SMH-4	175.790	174.364	1.201	Open Manhole		600
S-2.000	o	225	SMH-5	175.790	175.040	0.525	Open Manhole		600
S-2.001	o	225	SMH-6	175.790	174.740	0.825	Open Manhole		600
S-2.002	o	225	SMH-7	175.790	174.666	0.899	Open Manhole		600
S-2.003	o	225	SMH-8	175.790	174.357	1.208	Open Manhole		600
S-3.000	o	225	SMH-9	175.790	175.040	0.525	Open Manhole		600
S-3.001	o	225	SMH-10	175.790	174.740	0.825	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
S-1.000	26.867	89.6	SMH-2	175.790	174.740	0.825	Open Manhole		600
S-1.001	8.666	89.6	SMH-3	175.790	174.643	0.922	Open Manhole		600
S-1.002	25.023	89.6	SMH-4	175.790	174.364	1.201	Open Manhole		600
S-1.003	3.722	18.0	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-2.000	29.399	98.0	SMH-6	175.790	174.740	0.825	Open Manhole		600
S-2.001	7.674	103.9	SMH-7	175.790	174.666	0.899	Open Manhole		600
S-2.002	30.481	98.7	SMH-8	175.790	174.357	1.208	Open Manhole		600
S-2.003	7.207	52.3	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-3.000	29.747	99.2	SMH-10	175.790	174.740	0.825	Open Manhole		600
S-3.001	7.813	106.6	SMH-11	175.790	174.667	0.898	Open Manhole		600



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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., (mm)	I*W
S-3.002	o	225	SMH-11	175.790	174.667	0.898	Open Manhole		600
S-2.004	o	225	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-1.004	o	225	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-1.005	o	225	SMH-14	175.790	174.096	1.469	Open Manhole		600
S-1.006	o	225	SMH-15	175.790	173.816	1.749	Open Manhole		1050
S-1.007	o	225	SMH-16	175.790	173.697	1.868	Open Manhole		1050
S-4.000	o	225	SMH-17	175.000	173.950	0.825	Open Manhole		600
S-4.001	o	225	SMH-18	175.000	173.609	1.166	Open Manhole		600
S-4.002	o	225	SMH-19	175.000	173.244	1.531	Open Manhole		1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-3.002	30.418	68.0	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-2.004	10.455	165.8	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-1.004	5.786	95.8	SMH-14	175.790	174.096	1.469	Open Manhole		600
S-1.005	26.921	95.9	SMH-15	175.790	173.816	1.749	Open Manhole		1050
S-1.006	10.900	92.1	SMH-16	175.790	173.697	1.868	Open Manhole		1050
S-1.007	29.965	168.4	SMH-20	175.000	173.519	1.256	Open Manhole		1050
S-4.000	34.434	101.0	SMH-18	175.000	173.609	1.166	Open Manhole		600
S-4.001	36.817	100.9	SMH-19	175.000	173.244	1.531	Open Manhole		1050
S-4.002	3.555	100.9	SMH-20	175.000	173.209	1.566	Open Manhole		1050



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Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
S-1.008	o	225	SMH-20	175.000	173.209	1.566	Open Manhole		1050
S-5.000	o	150	SMH-21	175.000	173.950	0.900	Open Manhole		600
S-5.001	o	150	SMH-22	175.000	173.872	0.978	Open Manhole		600
S-5.002	o	150	SMH-23	175.000	173.835	1.015	Open Manhole		600
S-6.000	o	150	SMH-24	175.000	173.950	0.900	Open Manhole		600
S-6.001	o	150	SMH-25	175.000	173.864	0.986	Open Manhole		600
S-5.003	o	150	SMH-26	175.000	173.796	1.054	Open Manhole		600

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., I*W (mm)
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S-1.008	7.159	60.8	SMH-42	175.000	173.091	1.684	Open	Manhole	1200
S-5.000	8.219	105.6	SMH-22	175.000	173.872	0.978	Open	Manhole	600
S-5.001	3.712	100.0	SMH-23	175.000	173.835	1.015	Open	Manhole	600
S-5.002	3.974	100.9	SMH-26	175.000	173.796	1.054	Open	Manhole	600
S-6.000	8.661	100.9	SMH-25	175.000	173.864	0.986	Open	Manhole	600
S-6.001	4.804	70.1	SMH-26	175.000	173.796	1.054	Open	Manhole	600
S-5.003	6.431	100.9	SMH-28	175.000	173.732	1.118	Open	Manhole	600



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Date 20/12/2023 13:23
File Rochdale-SW-to Sewer-revA.MDX
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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., (mm)	I*W
S-7.000	o	150	SMH-27	175.000	173.950	0.900	Open Manhole		600
S-5.004	o	150	SMH-28	175.000	173.732	1.118	Open Manhole		600
S-5.005	o	150	SMH-29	175.000	173.635	1.215	Open Manhole		600
S-8.000	o	150	SMH-30	175.000	173.950	0.900	Open Manhole		600
S-8.001	o	150	SMH-31	175.000	173.904	0.946	Open Manhole		600
S-9.000	o	150	SMH-32	175.000	173.950	0.900	Open Manhole		600
S-9.001	o	150	SMH-33	175.000	173.903	0.947	Open Manhole		600
S-5.006	o	150	SMH-34	175.000	173.560	1.290	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-7.000	6.893	31.6	SMH-28	175.000	173.732	1.118	Open Manhole		600
S-5.004	9.758	100.9	SMH-29	175.000	173.635	1.215	Open Manhole		600
S-5.005	7.609	100.9	SMH-34	175.000	173.560	1.290	Open Manhole		600
S-8.000	4.622	100.9	SMH-31	175.000	173.904	0.946	Open Manhole		600
S-8.001	2.860	100.9	SMH-34	175.000	173.876	0.974	Open Manhole		600
S-9.000	4.739	100.9	SMH-33	175.000	173.903	0.947	Open Manhole		600
S-9.001	2.831	100.9	SMH-34	175.000	173.875	0.975	Open Manhole		600
S-5.006	8.775	100.9	SMH-35	175.000	173.473	1.377	Open Manhole		600



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Date 20/12/2023 13:23
File Rochdale-SW-to Sewer-revA.MDX
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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., (mm)	I*W
S-5.007	o	150	SMH-35	175.000	173.473	1.377	Open Manhole		600
S-10.000	o	150	SMH-36	175.000	173.950	0.900	Open Manhole		600
S-11.000	o	150	SMH-37	175.000	173.950	0.900	Open Manhole		600
S-10.001	o	150	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-5.008	o	150	SMH-39	175.000	173.383	1.467	Open Manhole		600
S-12.000	o	150	SMH-40	175.000	173.950	0.900	Open Manhole		600
S-12.001	o	150	SMH-41	175.000	173.907	0.943	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-5.007	9.106	100.9	SMH-39	175.000	173.383	1.467	Open Manhole		600
S-10.000	4.385	100.9	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-11.000	3.368	77.5	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-10.001	5.020	100.9	SMH-39	175.000	173.857	0.993	Open Manhole		600
S-5.008	3.646	16.8	SMH-42	175.000	173.166	1.684	Open Manhole		1200
S-12.000	4.346	100.9	SMH-41	175.000	173.907	0.943	Open Manhole		600
S-12.001	9.582	100.9	SMH-42	175.000	173.812	1.038	Open Manhole		1200



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Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
S-1.009	o	225	SMH-42	175.000	173.091	1.684	Open Manhole		1200
S-1.010	o	150	SMH-43	175.000	172.911	1.939	Open Manhole		1200
S-1.011	o	150	SMH-44	175.000	172.841	2.009	Open Manhole		1050
S-1.012	o	150	SMH-45	175.000	172.591	2.259	Open Manhole		1050
S-1.013	o	150	SMH-46	174.800	172.371	2.279	Open Manhole		1200
S-1.014	o	150	SMH-47	170.000	168.650	1.200	Open Manhole		1200
S-1.015	o	150	SMH-48	167.400	166.050	1.200	Open Manhole		1200
S-1.016	o	150	SMH-49	166.000	164.650	1.200	Open Manhole		1200

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., I*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)

S-1.009	30.342	168.4	SMH-43	175.000	172.911	1.864	Open	Manhole	1200
S-1.010	6.371	91.0	SMH-44	175.000	172.841	2.009	Open	Manhole	1050
S-1.011	22.931	91.7	SMH-45	175.000	172.591	2.259	Open	Manhole	1050
S-1.012	20.395	92.7	SMH-46	174.800	172.371	2.279	Open	Manhole	1200
S-1.013	58.267	15.7	SMH-47	170.000	168.650	1.200	Open	Manhole	1200
S-1.014	42.278	16.3	SMH-48	167.400	166.050	1.200	Open	Manhole	1200
S-1.015	26.937	19.2	SMH-49	166.000	164.650	1.200	Open	Manhole	1200
S-1.016	34.733	38.6	SMH-50	165.100	163.750	1.200	Open	Manhole	1200



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Date 20/12/2023 13:23
File Rochdale-SW-to Sewer-revA.MDX
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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	50	0.019	0.009	0.009
1.001	User	-	70	0.008	0.006	0.006
	User	-	70	0.013	0.009	0.015
1.002	User	-	50	0.021	0.011	0.011
	User	-	70	0.016	0.011	0.022
1.003	-	-	100	0.000	0.000	0.000
2.000	User	-	50	0.026	0.013	0.013
2.001	User	-	50	0.005	0.003	0.003
2.002	User	-	50	0.025	0.013	0.013
2.003	-	-	100	0.000	0.000	0.000
3.000	User	-	50	0.020	0.010	0.010
3.001	User	-	50	0.004	0.002	0.002
3.002	User	-	50	0.021	0.010	0.010
2.004	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
1.005	User	-	50	0.042	0.021	0.021
	User	-	70	0.019	0.014	0.034
1.006	User	-	70	0.006	0.004	0.004
1.007	User	-	70	0.017	0.012	0.012
4.000	User	-	70	0.029	0.020	0.020
	User	-	100	0.014	0.014	0.034
4.001	User	-	70	0.023	0.016	0.016
4.002	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.001	0.001	0.001
	User	-	100	0.001	0.001	0.002
5.001	User	-	100	0.001	0.001	0.001
5.002	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.001	0.001	0.001
	User	-	100	0.001	0.001	0.002
6.001	User	-	100	0.001	0.001	0.001
5.003	User	-	100	0.002	0.002	0.002
	User	-	100	0.001	0.001	0.003



Date 20/12/2023 13:23

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Network 2020.1

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
7.000	User	-	100	0.002	0.002	0.002
5.004	User	-	70	0.003	0.002	0.002
5.005	User	-	100	0.003	0.003	0.003
8.000	User	-	100	0.002	0.002	0.002
8.001	User	-	100	0.001	0.001	0.001
9.000	User	-	100	0.002	0.002	0.002
9.001	User	-	100	0.002	0.002	0.002
5.006	-	-	100	0.000	0.000	0.000
5.007	User	-	100	0.002	0.002	0.002
10.000	User	-	100	0.001	0.001	0.001
11.000	User	-	100	0.002	0.002	0.002
10.001	User	-	100	0.001	0.001	0.001
5.008	User	-	100	0.001	0.001	0.001
12.000	User	-	100	0.001	0.001	0.001
12.001	User	-	100	0.002	0.002	0.002
1.009	-	-	100	0.000	0.000	0.000
1.010	User	-	70	0.016	0.011	0.011
1.011	-	-	100	0.000	0.000	0.000
1.012	-	-	100	0.000	0.000	0.000
1.013	-	-	100	0.000	0.000	0.000
1.014	-	-	100	0.000	0.000	0.000
1.015	-	-	100	0.000	0.000	0.000
1.016	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.378	0.241	0.241

KRS Environmental Ltd		Page 23
		
Date 20/12/2023 13:23 File Rochdale-SW-to_Sewer-revA.MDX	Designed by ss Checked by	
Micro Drainage	Network 2020.1	
Simulation Criteria for Storm Volumetric Runoff Coeff 0.750 Manhole Headloss Coeff (Global) 0.500 Inlet Coeffiecient 0.800 Areal Reduction Factor 1.000 Foul Sewage per hectare (l/s) 0.000 Flow per Person per Day (l/per/day) 0.000 Hot Start (mins) 0 Additional Flow - % of Total Flow 0.000 Run Time (mins) 60 Hot Start Level (mm) 0 MADD Factor * 10m³/ha Storage 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0 Synthetic Rainfall Details Rainfall Model FSR M5-60 (mm) 18.700 Cv (Summer) 0.750 Return Period (years) 2 Ratio R 0.324 Cv (Winter) 0.840 Region England and Wales Profile Type Summer Storm Duration (mins) 30		
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SMH-43, DS/PN: S-1.010, Volume (m³): 3.5

Unit Reference	MD-SHE-0064-2000-1200-2000	Sump Available	Yes
Design Head (m)	1.200	Diameter (mm)	64
Design Flow (l/s)	2.0	Invert Level (m)	172.911
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	100
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.0	Kick-Flo®	0.573	1.4
Flush-Flo™	0.282	1.8	Mean Flow over Head Range	-	1.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	0.600	1.5	1.600	2.3	2.600	2.8	5.000	3.9	7.500	4.7
0.200	1.7	0.800	1.7	1.800	2.4	3.000	3.0	5.500	4.0	8.000	4.8
0.300	1.8	1.000	1.8	2.000	2.5	3.500	3.3	6.000	4.2	8.500	5.0
0.400	1.7	1.200	2.0	2.200	2.6	4.000	3.5	6.500	4.4	9.000	5.1
0.500	1.6	1.400	2.1	2.400	2.7	4.500	3.7	7.000	4.5	9.500	5.2

KRS Environmental Ltd		Page 25
		
Date 20/12/2023 13:23	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage	Network 2020.1	
<u>Offline Controls for Storm</u> <u>Weir Manhole: SMH-43, DS/PN: S-1.010, Loop to PN: S-1.011</u> Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 174.111		
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KRS Environmental Ltd		Page 26
		
Date 20/12/2023 13:23	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage	Network 2020.1	

Storage Structures for Storm

Cellular Storage Manhole: SMH-43, DS/PN: S-1.010

Invert Level (m) 172.911

Infiltration Coefficient Side (m/hr) 0.00000

Porosity 0.95

Infiltration Coefficient Base (m/hr) 0.00000

Safety Factor 2.0

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	125.0	125.0	1.200	125.0	197.0	1.300	0.0	197.0

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm)	18.700	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.324	Cv (Winter)

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Margin for Flood Risk Warning (mm) 300.0 DTS Status   ON Inertia Status OFF
Analysis Timestep   Fine DVD Status OFF
```

Profile(s)													Summer and Winter		
Duration(s) (mins)	15,	30,	60,	120,	180,	240,	360,	480,	600,	720,	960,	1440,	2160,	2880,	4320,
												5760,	7200,	8640,	10080
n Period(s) (years)													30		
Climate Change (%)													25		

									Water	Surcharged	Flooded	Half Drain			Pipe	
PN	US/MH	Storm	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	Status
	Name		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	
S-1.000	SMH-1	15	Winter	30	+25%				175.078	-0.187	0.000	0.07			3.4	OK
S-1.001	SMH-2	15	Winter	30	+25%				174.810	-0.155	0.000	0.21			9.3	OK
S-1.002	SMH-3	15	Winter	30	+25%				174.736	-0.133	0.000	0.35			17.8	OK
S-1.003	SMH-4	15	Winter	30	+25%				174.445	-0.144	0.000	0.28			17.7	OK
S-2.000	SMH-5	15	Winter	30	+25%				175.088	-0.177	0.000	0.10			4.8	OK
S-2.001	SMH-6	15	Winter	30	+25%				174.799	-0.166	0.000	0.15			5.7	OK
S-2.002	SMH-7	15	Winter	30	+25%				174.738	-0.153	0.000	0.22			10.5	OK
S-2.003	SMH-8	15	Winter	30	+25%				174.439	-0.143	0.000	0.20			10.4	OK

KRS Environmental Ltd		Page 28																														
																																
Date 20/12/2023 13:23	Designed by ss																															
File Rochdale-SW-to_Sewer-revA.MDX	Checked by																															
Micro Drainage	Network 2020.1																															
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																																
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	US/MH	Level																														
PN	Name	Exceeded																														
S-1.000	SMH-1																															
S-1.001	SMH-2																															
S-1.002	SMH-3																															
S-1.003	SMH-4																															
S-2.000	SMH-5																															
S-2.001	SMH-6																															
S-2.002	SMH-7																															
S-2.003	SMH-8																															
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

										Water	Surcharged	Flooded	Half Drain		Pipe
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)
S-3.000	SMH-9	15 Winter	30	+25%					175.082	-0.183	0.000	0.08			3.7
S-3.001	SMH-10	15 Winter	30	+25%					174.792	-0.173	0.000	0.12			4.4
S-3.002	SMH-11	15 Winter	30	+25%					174.724	-0.168	0.000	0.14			8.4
S-2.004	SMH-12	15 Winter	30	+25%					174.429	-0.016	0.000	0.54			18.1
S-1.004	SMH-13	15 Winter	30	+25%	30/15 Summer				174.406	0.024	0.000	0.96			33.3
S-1.005	SMH-14	15 Winter	30	+25%	30/15 Summer				174.353	0.032	0.000	0.90			44.2
S-1.006	SMH-15	15 Winter	30	+25%	30/15 Summer				174.137	0.096	0.000	0.95			43.6
S-1.007	SMH-16	15 Winter	30	+25%	30/15 Summer				174.036	0.114	0.000	1.25			46.5
S-4.000	SMH-17	15 Winter	30	+25%					174.028	-0.147	0.000	0.25			12.3
S-4.001	SMH-18	15 Winter	30	+25%					173.823	-0.011	0.000	0.37			18.1
S-4.002	SMH-19	15 Winter	30	+25%	30/15 Summer				173.794	0.325	0.000	0.59			17.5
S-1.008	SMH-20	15 Winter	30	+25%	30/15 Summer				173.787	0.354	0.000	1.14			55.3
S-5.000	SMH-21	15 Winter	30	+25%					173.973	-0.127	0.000	0.06			0.8
S-5.001	SMH-22	15 Winter	30	+25%					173.905	-0.118	0.000	0.10			1.2
S-5.002	SMH-23	15 Winter	30	+25%					173.867	-0.118	0.000	0.10			1.2
S-6.000	SMH-24	15 Winter	30	+25%					173.971	-0.129	0.000	0.05			0.8
S-6.001	SMH-25	15 Winter	30	+25%					173.891	-0.123	0.000	0.07			1.2
S-5.003	SMH-26	15 Winter	30	+25%					173.845	-0.100	0.000	0.24			3.5
S-7.000	SMH-27	15 Winter	30	+25%					173.965	-0.135	0.000	0.02			0.6
S-5.004	SMH-28	15 Winter	30	+25%					173.791	-0.091	0.000	0.32			5.0
S-5.005	SMH-29	15 Winter	30	+25%					173.701	-0.084	0.000	0.39			5.9
S-8.000	SMH-30	15 Winter	30	+25%					173.970	-0.130	0.000	0.04			0.6
S-8.001	SMH-31	15 Winter	30	+25%					173.936	-0.118	0.000	0.10			1.1
S-9.000	SMH-32	15 Winter	30	+25%					173.971	-0.129	0.000	0.05			0.6
S-9.001	SMH-33	15 Winter	30	+25%					173.941	-0.112	0.000	0.14			1.5
S-5.006	SMH-34	480 Winter	30	+25%					173.683	-0.027	0.000	0.07			1.1
S-5.007	SMH-35	480 Winter	30	+25%	30/15 Summer				173.683	0.060	0.000	0.08			1.2
S-10.000	SMH-36	15 Winter	30	+25%					173.968	-0.132	0.000	0.03			0.4
S-11.000	SMH-37	15 Winter	30	+25%					173.972	-0.128	0.000	0.05			0.7
S-10.001	SMH-38	15 Winter	30	+25%					173.941	-0.115	0.000	0.12			1.1

KRS Environmental Ltd		Page 30	
			
Date 20/12/2023 13:23	Designed by ss		
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Micro Drainage	Network 2020.1		
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>			

KRS Environmental Ltd		Page 31								
										
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u> <table><thead><tr><th>PN</th><th>US/MH Name</th><th>Status</th><th>Level Exceeded</th></tr></thead><tbody><tr><td>S-10.001</td><td>SMH-38</td><td>OK</td><td></td></tr></tbody></table>			PN	US/MH Name	Status	Level Exceeded	S-10.001	SMH-38	OK	
PN	US/MH Name	Status	Level Exceeded							
S-10.001	SMH-38	OK								
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

										Water	Surcharged	Flooded			Half Drain	Pipe
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)
S-5.008	SMH-39	480	Winter	30	+25%	30/15	Summer			173.682	0.150	0.000	0.05			1.5
S-12.000	SMH-40	15	Winter	30	+25%					173.968	-0.132	0.000	0.04			0.5
S-12.001	SMH-41	15	Winter	30	+25%					173.933	-0.124	0.000	0.07			1.1
S-1.009	SMH-42	480	Winter	30	+25%	30/15	Summer			173.682	0.366	0.000	0.29			10.8
S-1.010	SMH-43	480	Winter	30	+25%	30/15	Summer		0	173.678	0.617	0.000	0.11	0.0	552	1.8
S-1.011	SMH-44	960	Winter	30	+25%					172.873	-0.118	0.000	0.10			1.8
S-1.012	SMH-45	360	Summer	30	+25%					172.623	-0.118	0.000	0.10			1.8
S-1.013	SMH-46	360	Summer	30	+25%					172.390	-0.131	0.000	0.04			1.8
S-1.014	SMH-47	480	Summer	30	+25%					168.669	-0.131	0.000	0.04			1.8
S-1.015	SMH-48	120	Winter	30	+25%					166.070	-0.130	0.000	0.05			1.8
S-1.016	SMH-49	120	Summer	30	+25%					164.674	-0.126	0.000	0.06			1.8

PN	US/MH Name	Status	Level Exceeded
S-5.008	SMH-39	SURCHARGED	
S-12.000	SMH-40	OK	
S-12.001	SMH-41	OK	
S-1.009	SMH-42	SURCHARGED	
S-1.010	SMH-43	SURCHARGED	
S-1.011	SMH-44	OK	
S-1.012	SMH-45	OK	
S-1.013	SMH-46	OK	
S-1.014	SMH-47	OK	
S-1.015	SMH-48	OK	
S-1.016	SMH-49	OK	



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Design Criteria for Storm

FSR Rainfall Model - England and Wales

FSR Rainfall Model - England and Wales						
Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500	
M5-60 (mm)	18.700	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	0.900	
Ratio R	0.324	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00	
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500	
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200			

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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
S-1.000	26.867	0.300	89.6	0.009	5.00	0.0	0.600	o	225	Pipe/Conduit		🚧
S-1.001	8.666	0.097	89.6	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit		🚧
S-1.002	25.023	0.279	89.6	0.022	0.00	0.0	0.600	o	225	Pipe/Conduit		🚧
S-1.003	3.722	0.207	18.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		🚧

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)
S-1.000	50.00	5.32	175.040	0.009	0.0	0.0	0.0	1.38	55.0	1.3
S-1.001	50.00	5.43	174.740	0.024	0.0	0.0	0.0	1.38	55.0	3.3
S-1.002	50.00	5.73	174.643	0.046	0.0	0.0	0.0	1.38	55.0	6.2
S-1.003	50.00	5.75	174.364	0.046	0.0	0.0	0.0	3.10	123.3	6.2



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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
S-2.000	29.399	0.300	98.0	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S-2.001	7.674	0.074	103.9	0.003	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S-2.002	30.481	0.309	98.7	0.013	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S-2.003	7.207	0.138	52.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S-3.000	29.747	0.300	99.2	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S-3.001	7.813	0.073	106.6	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S-3.002	30.418	0.447	68.0	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S-2.004	10.455	0.063	165.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S-1.004	5.786	0.060	95.8	0.000	0.00	0.0	0.600	o	225	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)
S-2.000	50.00	5.37	175.040	0.013	0.0	0.0	0.0	1.32	52.5	1.8
S-2.001	50.00	5.47	174.740	0.016	0.0	0.0	0.0	1.28	51.0	2.1
S-2.002	50.00	5.86	174.666	0.028	0.0	0.0	0.0	1.32	52.3	3.8
S-2.003	50.00	5.92	174.357	0.028	0.0	0.0	0.0	1.81	72.1	3.8
S-3.000	50.00	5.38	175.040	0.010	0.0	0.0	0.0	1.31	52.2	1.4
S-3.001	50.00	5.48	174.740	0.012	0.0	0.0	0.0	1.27	50.3	1.6
S-3.002	50.00	5.80	174.667	0.023	0.0	0.0	0.0	1.59	63.1	3.1
S-2.004	50.00	6.10	174.220	0.051	0.0	0.0	0.0	1.01	40.3	6.9
S-1.004	50.00	6.17	174.157	0.097	0.0	0.0	0.0	1.34	53.1	13.1



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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
S-1.005	26.921	0.281	95.9	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.006	10.900	0.118	92.1	0.004	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.007	29.965	0.178	168.4	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.000	34.434	0.341	101.0	0.034	5.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.001	36.817	0.365	100.9	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-4.002	3.555	0.035	100.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-1.008	7.159	0.118	60.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		👉
S-5.000	8.219	0.078	105.6	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		👉
S-5.001	3.712	0.037	100.0	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		👉
S-5.002	3.974	0.039	100.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		👉

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)
S-1.005	50.00	6.50	174.096	0.131	0.0	0.0	0.0	1.34	53.1	17.8
S-1.006	50.00	6.64	173.816	0.135	0.0	0.0	0.0	1.36	54.2	18.3
S-1.007	50.00	7.13	173.697	0.147	0.0	0.0	0.0	1.00	39.9	20.0
S-4.000	50.00	5.44	173.950	0.034	0.0	0.0	0.0	1.30	51.7	4.6
S-4.001	50.00	5.91	173.609	0.050	0.0	0.0	0.0	1.30	51.7	6.8
S-4.002	50.00	5.96	173.244	0.050	0.0	0.0	0.0	1.30	51.7	6.8
S-1.008	50.00	7.20	173.209	0.198	0.0	0.0	0.0	1.68	66.8	26.8
S-5.000	50.00	5.14	173.950	0.002	0.0	0.0	0.0	0.98	17.3	0.3
S-5.001	50.00	5.20	173.872	0.003	0.0	0.0	0.0	1.00	17.8	0.5
S-5.002	50.00	5.27	173.835	0.003	0.0	0.0	0.0	1.00	17.7	0.5



Date 20/12/2023 13:20
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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
S-6.000	8.661	0.086	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-6.001	4.804	0.069	70.1	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.003	6.431	0.064	100.9	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-7.000	6.893	0.218	31.6	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.004	9.758	0.097	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.005	7.609	0.075	100.9	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-8.000	4.622	0.046	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-8.001	2.860	0.028	100.9	0.001	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)
S-6.000	50.00	5.14	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.3
S-6.001	50.00	5.21	173.864	0.003	0.0	0.0	0.0	1.20	21.2	0.4
S-5.003	50.00	5.38	173.796	0.009	0.0	0.0	0.0	1.00	17.7	1.3
S-7.000	50.00	5.06	173.950	0.002	0.0	0.0	0.0	1.80	31.8	0.2
S-5.004	50.00	5.54	173.732	0.013	0.0	0.0	0.0	1.00	17.7	1.8
S-5.005	50.00	5.66	173.635	0.016	0.0	0.0	0.0	1.00	17.7	2.1
S-8.000	50.00	5.08	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.2
S-8.001	50.00	5.12	173.904	0.003	0.0	0.0	0.0	1.00	17.7	0.4



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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
S-9.000	4.739	0.047	100.9	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-9.001	2.831	0.028	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.006	8.775	0.087	100.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-5.007	9.106	0.090	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-10.000	4.385	0.043	100.9	0.001	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-11.000	3.368	0.043	77.5	0.002	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-10.001	5.020	0.050	100.9	0.001	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)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S-9.000	50.00	5.08	173.950	0.002	0.0	0.0	0.0	1.00	17.7	0.2
S-9.001	50.00	5.13	173.903	0.004	0.0	0.0	0.0	1.00	17.7	0.5
S-5.006	50.00	5.81	173.560	0.023	0.0	0.0	0.0	1.00	17.7	3.1
S-5.007	50.00	5.96	173.473	0.024	0.0	0.0	0.0	1.00	17.7	3.3
S-10.000	50.00	5.07	173.950	0.001	0.0	0.0	0.0	1.00	17.7	0.2
S-11.000	50.00	5.05	173.950	0.002	0.0	0.0	0.0	1.14	20.2	0.3
S-10.001	50.00	5.16	173.907	0.004	0.0	0.0	0.0	1.00	17.7	0.6



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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
S-5.008	3.646	0.216	16.8	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-12.000	4.346	0.043	100.9	0.001	5.00	0.0	0.600	o	150	Pipe/Conduit		
S-12.001	9.582	0.095	100.9	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-1.009	30.342	0.180	168.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		
S-1.010	6.371	0.070	91.0	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-1.011	22.931	0.250	91.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-1.012	20.395	0.220	92.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-1.013	58.267	3.721	15.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-1.014	42.278	2.600	16.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-1.015	26.937	1.400	19.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		
S-1.016	34.733	0.900	38.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit		

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)
S-5.008	50.00	5.99	173.383	0.030	0.0	0.0	0.0	2.47	43.6	4.0
S-12.000	50.00	5.07	173.950	0.001	0.0	0.0	0.0	1.00	17.7	0.2
S-12.001	50.00	5.23	173.907	0.003	0.0	0.0	0.0	1.00	17.7	0.4
S-1.009	48.95	7.71	173.091	0.230	0.0	0.0	0.0	1.00	39.9	30.5
S-1.010	50.00	5.10	172.911	0.000	10.0	0.0	0.0	1.05	18.6	10.0
S-1.011	50.00	5.46	172.841	0.000	10.0	0.0	0.0	1.05	18.6	10.0
S-1.012	50.00	5.79	172.591	0.000	10.0	0.0	0.0	1.04	18.5	10.0
S-1.013	50.00	6.17	172.371	0.000	10.0	0.0	0.0	2.56	45.2	10.0
S-1.014	50.00	6.45	168.650	0.000	10.0	0.0	0.0	2.51	44.4	10.0
S-1.015	50.00	6.65	166.050	0.000	10.0	0.0	0.0	2.31	40.8	10.0
S-1.016	50.00	7.00	164.650	0.000	10.0	0.0	0.0	1.63	28.7	10.0



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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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-1	175.790	0.750	Open Manhole	600	S-1.000	175.040	225				
SMH-2	175.790	1.050	Open Manhole	600	S-1.001	174.740	225	S-1.000	174.740	225	
SMH-3	175.790	1.147	Open Manhole	600	S-1.002	174.643	225	S-1.001	174.643	225	
SMH-4	175.790	1.426	Open Manhole	600	S-1.003	174.364	225	S-1.002	174.364	225	
SMH-5	175.790	0.750	Open Manhole	600	S-2.000	175.040	225				
SMH-6	175.790	1.050	Open Manhole	600	S-2.001	174.740	225	S-2.000	174.740	225	
SMH-7	175.790	1.124	Open Manhole	600	S-2.002	174.666	225	S-2.001	174.666	225	
SMH-8	175.790	1.433	Open Manhole	600	S-2.003	174.357	225	S-2.002	174.357	225	
SMH-9	175.790	0.750	Open Manhole	600	S-3.000	175.040	225				
SMH-10	175.790	1.050	Open Manhole	600	S-3.001	174.740	225	S-3.000	174.740	225	
SMH-11	175.790	1.123	Open Manhole	600	S-3.002	174.667	225	S-3.001	174.667	225	
SMH-12	175.790	1.570	Open Manhole	600	S-2.004	174.220	225	S-2.003	174.220	225	
								S-3.002	174.220	225	
SMH-13	175.790	1.633	Open Manhole	600	S-1.004	174.157	225	S-1.003	174.157	225	
								S-2.004	174.157	225	
SMH-14	175.790	1.694	Open Manhole	600	S-1.005	174.096	225	S-1.004	174.096	225	
SMH-15	175.790	1.974	Open Manhole	1050	S-1.006	173.816	225	S-1.005	173.816	225	
SMH-16	175.790	2.093	Open Manhole	1050	S-1.007	173.697	225	S-1.006	173.697	225	
SMH-17	175.000	1.050	Open Manhole	600	S-4.000	173.950	225				
SMH-18	175.000	1.391	Open Manhole	600	S-4.001	173.609	225	S-4.000	173.609	225	
SMH-19	175.000	1.756	Open Manhole	1050	S-4.002	173.244	225	S-4.001	173.244	225	
SMH-20	175.000	1.791	Open Manhole	1050	S-1.008	173.209	225	S-1.007	173.519	225	310
								S-4.002	173.209	225	



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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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-21	175.000	1.050	Open Manhole	600	S-5.000	173.950	150				
SMH-22	175.000	1.128	Open Manhole	600	S-5.001	173.872	150	S-5.000	173.872	150	
SMH-23	175.000	1.165	Open Manhole	600	S-5.002	173.835	150	S-5.001	173.835	150	
SMH-24	175.000	1.050	Open Manhole	600	S-6.000	173.950	150				
SMH-25	175.000	1.136	Open Manhole	600	S-6.001	173.864	150	S-6.000	173.864	150	
SMH-26	175.000	1.204	Open Manhole	600	S-5.003	173.796	150	S-5.002	173.796	150	
								S-6.001	173.796	150	
SMH-27	175.000	1.050	Open Manhole	600	S-7.000	173.950	150				
SMH-28	175.000	1.268	Open Manhole	600	S-5.004	173.732	150	S-5.003	173.732	150	
								S-7.000	173.732	150	
SMH-29	175.000	1.365	Open Manhole	600	S-5.005	173.635	150	S-5.004	173.635	150	
SMH-30	175.000	1.050	Open Manhole	600	S-8.000	173.950	150				
SMH-31	175.000	1.096	Open Manhole	600	S-8.001	173.904	150	S-8.000	173.904	150	
SMH-32	175.000	1.050	Open Manhole	600	S-9.000	173.950	150				
SMH-33	175.000	1.097	Open Manhole	600	S-9.001	173.903	150	S-9.000	173.903	150	
SMH-34	175.000	1.440	Open Manhole	600	S-5.006	173.560	150	S-5.005	173.560	150	
								S-8.001	173.876	150	316
								S-9.001	173.875	150	315
SMH-35	175.000	1.527	Open Manhole	600	S-5.007	173.473	150	S-5.006	173.473	150	
SMH-36	175.000	1.050	Open Manhole	600	S-10.000	173.950	150				
SMH-37	175.000	1.050	Open Manhole	600	S-11.000	173.950	150				
SMH-38	175.000	1.093	Open Manhole	600	S-10.001	173.907	150	S-10.000	173.907	150	
								S-11.000	173.907	150	

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)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SMH-39	175.000	1.617	Open Manhole	600	S-5.008	173.383	150	S-5.007	173.383	150	474
								S-10.001	173.857	150	
SMH-40	175.000	1.050	Open Manhole	600	S-12.000	173.950	150				646
SMH-41	175.000	1.093	Open Manhole	600	S-12.001	173.907	150	S-12.000	173.907	150	
SMH-42	175.000	1.909	Open Manhole	1200	S-1.009	173.091	225	S-1.008	173.091	225	
								S-5.008	173.166	150	
								S-12.001	173.812	150	
SMH-43	175.000	2.089	Open Manhole	1200	S-1.010	172.911	150	S-1.009	172.911	225	
SMH-44	175.000	2.159	Open Manhole	1050	S-1.011	172.841	150	S-1.010	172.841	150	
SMH-45	175.000	2.409	Open Manhole	1050	S-1.012	172.591	150	S-1.011	172.591	150	
SMH-46	174.800	2.429	Open Manhole	1200	S-1.013	172.371	150	S-1.012	172.371	150	
SMH-47	170.000	1.350	Open Manhole	1200	S-1.014	168.650	150	S-1.013	168.650	150	
SMH-48	167.400	1.350	Open Manhole	1200	S-1.015	166.050	150	S-1.014	166.050	150	
SMH-49	166.000	1.350	Open Manhole	1200	S-1.016	164.650	150	S-1.015	164.650	150	
SMH-50	165.100	1.350	Open Manhole	1200		OUTFALL		S-1.016	163.750	150	

MH Name

Manhole Easting (m)

Manhole Northing (m)

Intersection Easting (m)

Intersection Northing (m)

Manhole Access

Layout (North)

SMH-1

391797.133

411082.678

391797.133

411082.678

Required



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-2	391813.190	411104.220	391813.190	411104.220	Required	
SMH-3	391819.488	411110.171	391819.488	411110.171	Required	
SMH-4	391836.951	411128.093	391836.951	411128.093	Required	
SMH-5	391782.563	411093.286	391782.563	411093.286	Required	
SMH-6	391799.534	411117.293	391799.534	411117.293	Required	
SMH-7	391805.131	411122.542	391805.131	411122.542	Required	
SMH-8	391827.282	411143.480	391827.282	411143.480	Required	
SMH-9	391787.116	411088.415	391787.116	411088.415	Required	
SMH-10	391804.209	411112.761	391804.209	411112.761	Required	
SMH-11	391810.295	411117.661	391810.295	411117.661	Required	



Date 20/12/2023 13:20
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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-12	391832.473	411138.480	391832.473	411138.480	Required	
SMH-13	391839.536	411130.772	391839.536	411130.772	Required	
SMH-14	391844.482	411133.776	391844.482	411133.776	Required	
SMH-15	391864.824	411151.410	391864.824	411151.410	Required	
SMH-16	391874.474	411156.479	391874.474	411156.479	Required	
SMH-17	391953.628	411219.660	391953.628	411219.660	Required	
SMH-18	391927.318	411197.446	391927.318	411197.446	Required	
SMH-19	391899.353	411173.499	391899.353	411173.499	Required	
SMH-20	391897.037	411176.196	391897.037	411176.196	Required	
SMH-21	391937.702	411214.389	391937.702	411214.389	Required	



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-22	391931.359	411209.162	391931.359	411209.162	Required	
SMH-23	391927.712	411208.474	391927.712	411208.474	Required	
SMH-24	391932.465	411221.625	391932.465	411221.625	Required	
SMH-25	391925.610	411216.332	391925.610	411216.332	Required	
SMH-26	391925.191	411211.546	391925.191	411211.546	Required	
SMH-27	391915.950	411213.180	391915.950	411213.180	Required	
SMH-28	391920.071	411207.655	391920.071	411207.655	Required	
SMH-29	391912.467	411201.541	391912.467	411201.541	Required	
SMH-30	391902.876	411203.056	391902.876	411203.056	Required	
SMH-31	391905.826	411199.498	391905.826	411199.498	Required	



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-32	391901.256	411201.986	391901.256	411201.986	Required	
SMH-33	391904.177	411198.255	391904.177	411198.255	Required	
SMH-34	391906.567	411196.736	391906.567	411196.736	Required	
SMH-35	391899.683	411191.294	391899.683	411191.294	Required	
SMH-36	391883.323	411187.205	391883.323	411187.205	Required	
SMH-37	391887.430	411190.937	391887.430	411190.937	Required	
SMH-38	391887.692	411187.579	391887.692	411187.579	Required	
SMH-39	391892.398	411185.830	391892.398	411185.830	Required	
SMH-40	391885.637	411173.871	391885.637	411173.871	Required	
SMH-41	391889.927	411174.569	391889.927	411174.569	Required	



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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SMH-42	391894.608	411182.930	391894.608	411182.930	Required	
SMH-43	391918.629	411201.467	391918.629	411201.467	Required	
SMH-44	391924.600	411199.245	391924.600	411199.245	Required	
SMH-45	391941.887	411214.311	391941.887	411214.311	Required	
SMH-46	391931.888	411232.086	391931.888	411232.086	Required	
SMH-47	391875.223	411218.515	391875.223	411218.515	Required	
SMH-48	391833.529	411211.512	391833.529	411211.512	Required	
SMH-49	391806.772	411214.623	391806.772	411214.623	Required	
SMH-50	391778.544	411234.861			No Entry	



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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., (mm)	L*W
S-1.000	o	225	SMH-1	175.790	175.040	0.525	Open Manhole		600
S-1.001	o	225	SMH-2	175.790	174.740	0.825	Open Manhole		600
S-1.002	o	225	SMH-3	175.790	174.643	0.922	Open Manhole		600
S-1.003	o	225	SMH-4	175.790	174.364	1.201	Open Manhole		600
S-2.000	o	225	SMH-5	175.790	175.040	0.525	Open Manhole		600
S-2.001	o	225	SMH-6	175.790	174.740	0.825	Open Manhole		600
S-2.002	o	225	SMH-7	175.790	174.666	0.899	Open Manhole		600
S-2.003	o	225	SMH-8	175.790	174.357	1.208	Open Manhole		600
S-3.000	o	225	SMH-9	175.790	175.040	0.525	Open Manhole		600
S-3.001	o	225	SMH-10	175.790	174.740	0.825	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
S-1.000	26.867	89.6	SMH-2	175.790	174.740	0.825	Open Manhole		600
S-1.001	8.666	89.6	SMH-3	175.790	174.643	0.922	Open Manhole		600
S-1.002	25.023	89.6	SMH-4	175.790	174.364	1.201	Open Manhole		600
S-1.003	3.722	18.0	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-2.000	29.399	98.0	SMH-6	175.790	174.740	0.825	Open Manhole		600
S-2.001	7.674	103.9	SMH-7	175.790	174.666	0.899	Open Manhole		600
S-2.002	30.481	98.7	SMH-8	175.790	174.357	1.208	Open Manhole		600
S-2.003	7.207	52.3	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-3.000	29.747	99.2	SMH-10	175.790	174.740	0.825	Open Manhole		600
S-3.001	7.813	106.6	SMH-11	175.790	174.667	0.898	Open Manhole		600



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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., (mm)	I*W
S-3.002	o	225	SMH-11	175.790	174.667	0.898	Open Manhole		600
S-2.004	o	225	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-1.004	o	225	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-1.005	o	225	SMH-14	175.790	174.096	1.469	Open Manhole		600
S-1.006	o	225	SMH-15	175.790	173.816	1.749	Open Manhole		1050
S-1.007	o	225	SMH-16	175.790	173.697	1.868	Open Manhole		1050
S-4.000	o	225	SMH-17	175.000	173.950	0.825	Open Manhole		600
S-4.001	o	225	SMH-18	175.000	173.609	1.166	Open Manhole		600
S-4.002	o	225	SMH-19	175.000	173.244	1.531	Open Manhole		1050

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-3.002	30.418	68.0	SMH-12	175.790	174.220	1.345	Open Manhole		600
S-2.004	10.455	165.8	SMH-13	175.790	174.157	1.408	Open Manhole		600
S-1.004	5.786	95.8	SMH-14	175.790	174.096	1.469	Open Manhole		600
S-1.005	26.921	95.9	SMH-15	175.790	173.816	1.749	Open Manhole		1050
S-1.006	10.900	92.1	SMH-16	175.790	173.697	1.868	Open Manhole		1050
S-1.007	29.965	168.4	SMH-20	175.000	173.519	1.256	Open Manhole		1050
S-4.000	34.434	101.0	SMH-18	175.000	173.609	1.166	Open Manhole		600
S-4.001	36.817	100.9	SMH-19	175.000	173.244	1.531	Open Manhole		1050
S-4.002	3.555	100.9	SMH-20	175.000	173.209	1.566	Open Manhole		1050



Date 20/12/2023 13:20
File Rochdale-SW-to Sewer-revA.MDX

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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., (mm)	I*W
S-1.008	o	225	SMH-20	175.000	173.209	1.566	Open Manhole		1050
S-5.000	o	150	SMH-21	175.000	173.950	0.900	Open Manhole		600
S-5.001	o	150	SMH-22	175.000	173.872	0.978	Open Manhole		600
S-5.002	o	150	SMH-23	175.000	173.835	1.015	Open Manhole		600
S-6.000	o	150	SMH-24	175.000	173.950	0.900	Open Manhole		600
S-6.001	o	150	SMH-25	175.000	173.864	0.986	Open Manhole		600
S-5.003	o	150	SMH-26	175.000	173.796	1.054	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
S-1.008	7.159	60.8	SMH-42	175.000	173.091	1.684	Open Manhole		1200
S-5.000	8.219	105.6	SMH-22	175.000	173.872	0.978	Open Manhole		600
S-5.001	3.712	100.0	SMH-23	175.000	173.835	1.015	Open Manhole		600
S-5.002	3.974	100.9	SMH-26	175.000	173.796	1.054	Open Manhole		600
S-6.000	8.661	100.9	SMH-25	175.000	173.864	0.986	Open Manhole		600
S-6.001	4.804	70.1	SMH-26	175.000	173.796	1.054	Open Manhole		600
S-5.003	6.431	100.9	SMH-28	175.000	173.732	1.118	Open Manhole		600



Date 20/12/2023 13:20
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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., (mm)	I*W
S-7.000	o	150	SMH-27	175.000	173.950	0.900	Open Manhole		600
S-5.004	o	150	SMH-28	175.000	173.732	1.118	Open Manhole		600
S-5.005	o	150	SMH-29	175.000	173.635	1.215	Open Manhole		600
S-8.000	o	150	SMH-30	175.000	173.950	0.900	Open Manhole		600
S-8.001	o	150	SMH-31	175.000	173.904	0.946	Open Manhole		600
S-9.000	o	150	SMH-32	175.000	173.950	0.900	Open Manhole		600
S-9.001	o	150	SMH-33	175.000	173.903	0.947	Open Manhole		600
S-5.006	o	150	SMH-34	175.000	173.560	1.290	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
S-7.000	6.893	31.6	SMH-28	175.000	173.732	1.118	Open Manhole		600
S-5.004	9.758	100.9	SMH-29	175.000	173.635	1.215	Open Manhole		600
S-5.005	7.609	100.9	SMH-34	175.000	173.560	1.290	Open Manhole		600
S-8.000	4.622	100.9	SMH-31	175.000	173.904	0.946	Open Manhole		600
S-8.001	2.860	100.9	SMH-34	175.000	173.876	0.974	Open Manhole		600
S-9.000	4.739	100.9	SMH-33	175.000	173.903	0.947	Open Manhole		600
S-9.001	2.831	100.9	SMH-34	175.000	173.875	0.975	Open Manhole		600
S-5.006	8.775	100.9	SMH-35	175.000	173.473	1.377	Open Manhole		600



Date 20/12/2023 13:20
File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

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., (mm)	L*W
S-5.007	o	150	SMH-35	175.000	173.473	1.377	Open Manhole		600
S-10.000	o	150	SMH-36	175.000	173.950	0.900	Open Manhole		600
S-11.000	o	150	SMH-37	175.000	173.950	0.900	Open Manhole		600
S-10.001	o	150	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-5.008	o	150	SMH-39	175.000	173.383	1.467	Open Manhole		600
S-12.000	o	150	SMH-40	175.000	173.950	0.900	Open Manhole		600
S-12.001	o	150	SMH-41	175.000	173.907	0.943	Open Manhole		600

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
S-5.007	9.106	100.9	SMH-39	175.000	173.383	1.467	Open Manhole		600
S-10.000	4.385	100.9	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-11.000	3.368	77.5	SMH-38	175.000	173.907	0.943	Open Manhole		600
S-10.001	5.020	100.9	SMH-39	175.000	173.857	0.993	Open Manhole		600
S-5.008	3.646	16.8	SMH-42	175.000	173.166	1.684	Open Manhole		1200
S-12.000	4.346	100.9	SMH-41	175.000	173.907	0.943	Open Manhole		600
S-12.001	9.582	100.9	SMH-42	175.000	173.812	1.038	Open Manhole		1200



Date 20/12/2023 13:20

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File Rochdale-SW-to Sewer-revA.MDX

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Network 2020.1

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., (mm)	I*W
S-1.009	o	225	SMH-42	175.000	173.091	1.684	Open Manhole		1200
S-1.010	o	150	SMH-43	175.000	172.911	1.939	Open Manhole		1200
S-1.011	o	150	SMH-44	175.000	172.841	2.009	Open Manhole		1050
S-1.012	o	150	SMH-45	175.000	172.591	2.259	Open Manhole		1050
S-1.013	o	150	SMH-46	174.800	172.371	2.279	Open Manhole		1200
S-1.014	o	150	SMH-47	170.000	168.650	1.200	Open Manhole		1200
S-1.015	o	150	SMH-48	167.400	166.050	1.200	Open Manhole		1200
S-1.016	o	150	SMH-49	166.000	164.650	1.200	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., (mm)	L*W
S-1.009	30.342	168.4	SMH-43	175.000	172.911	1.864	Open Manhole		1200
S-1.010	6.371	91.0	SMH-44	175.000	172.841	2.009	Open Manhole		1050
S-1.011	22.931	91.7	SMH-45	175.000	172.591	2.259	Open Manhole		1050
S-1.012	20.395	92.7	SMH-46	174.800	172.371	2.279	Open Manhole		1200
S-1.013	58.267	15.7	SMH-47	170.000	168.650	1.200	Open Manhole		1200
S-1.014	42.278	16.3	SMH-48	167.400	166.050	1.200	Open Manhole		1200
S-1.015	26.937	19.2	SMH-49	166.000	164.650	1.200	Open Manhole		1200
S-1.016	34.733	38.6	SMH-50	165.100	163.750	1.200	Open Manhole		1200



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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	50	0.019	0.009	0.009
1.001	User	-	70	0.008	0.006	0.006
	User	-	70	0.013	0.009	0.015
1.002	User	-	50	0.021	0.011	0.011
	User	-	70	0.016	0.011	0.022
1.003	-	-	100	0.000	0.000	0.000
2.000	User	-	50	0.026	0.013	0.013
2.001	User	-	50	0.005	0.003	0.003
2.002	User	-	50	0.025	0.013	0.013
2.003	-	-	100	0.000	0.000	0.000
3.000	User	-	50	0.020	0.010	0.010
3.001	User	-	50	0.004	0.002	0.002
3.002	User	-	50	0.021	0.010	0.010
2.004	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
1.005	User	-	50	0.042	0.021	0.021
	User	-	70	0.019	0.014	0.034
1.006	User	-	70	0.006	0.004	0.004
1.007	User	-	70	0.017	0.012	0.012
4.000	User	-	70	0.029	0.020	0.020
	User	-	100	0.014	0.014	0.034
4.001	User	-	70	0.023	0.016	0.016
4.002	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.001	0.001	0.001
	User	-	100	0.001	0.001	0.002
5.001	User	-	100	0.001	0.001	0.001
5.002	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.001	0.001	0.001
	User	-	100	0.001	0.001	0.002
6.001	User	-	100	0.001	0.001	0.001
5.003	User	-	100	0.002	0.002	0.002
	User	-	100	0.001	0.001	0.003



Date 20/12/2023 13:20

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Network 2020.1

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
7.000	User	-	100	0.002	0.002	0.002
5.004	User	-	70	0.003	0.002	0.002
5.005	User	-	100	0.003	0.003	0.003
8.000	User	-	100	0.002	0.002	0.002
8.001	User	-	100	0.001	0.001	0.001
9.000	User	-	100	0.002	0.002	0.002
9.001	User	-	100	0.002	0.002	0.002
5.006	-	-	100	0.000	0.000	0.000
5.007	User	-	100	0.002	0.002	0.002
10.000	User	-	100	0.001	0.001	0.001
11.000	User	-	100	0.002	0.002	0.002
10.001	User	-	100	0.001	0.001	0.001
5.008	User	-	100	0.001	0.001	0.001
12.000	User	-	100	0.001	0.001	0.001
12.001	User	-	100	0.002	0.002	0.002
1.009	-	-	100	0.000	0.000	0.000
1.010	User	-	70	0.016	0.011	0.011
1.011	-	-	100	0.000	0.000	0.000
1.012	-	-	100	0.000	0.000	0.000
1.013	-	-	100	0.000	0.000	0.000
1.014	-	-	100	0.000	0.000	0.000
1.015	-	-	100	0.000	0.000	0.000
1.016	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.378	0.241	0.241

KRS Environmental Ltd		Page 23
		
Date 20/12/2023 13:20 File Rochdale-SW-to_Sewer-revA.MDX	Designed by ss Checked by	
Micro Drainage	Network 2020.1	
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Manhole Headloss Coeff (Global) 0.500 Inlet Coeffiecient 0.800 Areal Reduction Factor 1.000 Foul Sewage per hectare (l/s) 0.000 Flow per Person per Day (l/per/day) 0.000 Hot Start (mins) 0 Additional Flow - % of Total Flow 0.000 Run Time (mins) 60 Hot Start Level (mm) 0 MADD Factor * 10m³/ha Storage 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Offline Controls 1 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR M5-60 (mm) 18.700 Cv (Summer) 0.750 Return Period (years) 2 Ratio R 0.324 Cv (Winter) 0.840 Region England and Wales Profile Type Summer Storm Duration (mins) 30		
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SMH-43, DS/PN: S-1.010, Volume (m³): 3.5

Unit Reference	MD-SHE-0064-2000-1200-2000	Sump Available	Yes
Design Head (m)	1.200	Diameter (mm)	64
Design Flow (l/s)	2.0	Invert Level (m)	172.911
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	100
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.0	Kick-Flo®	0.573	1.4
Flush-Flo™	0.282	1.8	Mean Flow over Head Range	-	1.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	0.600	1.5	1.600	2.3	2.600	2.8	5.000	3.9	7.500	4.7
0.200	1.7	0.800	1.7	1.800	2.4	3.000	3.0	5.500	4.0	8.000	4.8
0.300	1.8	1.000	1.8	2.000	2.5	3.500	3.3	6.000	4.2	8.500	5.0
0.400	1.7	1.200	2.0	2.200	2.6	4.000	3.5	6.500	4.4	9.000	5.1
0.500	1.6	1.400	2.1	2.400	2.7	4.500	3.7	7.000	4.5	9.500	5.2

KRS Environmental Ltd		Page 25
		
Date 20/12/2023 13:20	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage	Network 2020.1	
Offline Controls for Storm Weir Manhole: SMH-43, DS/PN: S-1.010, Loop to PN: S-1.011 Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 174.111		
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KRS Environmental Ltd		Page 26
		
Date 20/12/2023 13:20	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage	Network 2020.1	

Storage Structures for Storm

Cellular Storage Manhole: SMH-43, DS/PN: S-1.010

Invert Level (m) 172.911 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	125.0	125.0	1.200	125.0	197.0	1.300	0.0	197.0

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm)	18.700	Cv (Summer)	0.750
Region	England and Wales	Ratio R	0.324	Cv (Winter)
				0.840

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Margin for Flood Risk Warning (mm) 300.0 DTS Status   ON Inertia Status OFF
Analysis Timestep   Fine DVD Status OFF
```

Profile(s)	Summer and Winter														
Duration(s) (mins)	15,	30,	60,	120,	180,	240,	360,	480,	600,	720,	960,	1440,	2160,	2880,	4320,
												5760,	7200,	8640,	10080
Period(s) (years)													100		
Climate Change (%)													45		

									Water	Surcharged	Flooded	Half Drain			Pipe
PN	US/MH	Storm	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow
	Name		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)
S-1.000	SMH-1	15	Winter	100	+45%				175.088	-0.177	0.000	0.10			5.1
S-1.001	SMH-2	15	Winter	100	+45%				174.886	-0.079	0.000	0.32			14.0
S-1.002	SMH-3	15	Winter	100	+45%	100/15	Winter		174.876	0.007	0.000	0.52			26.6
S-1.003	SMH-4	15	Winter	100	+45%	100/15	Summer		174.839	0.250	0.000	0.33			21.2
S-2.000	SMH-5	15	Winter	100	+45%				175.098	-0.167	0.000	0.15			7.2
S-2.001	SMH-6	15	Winter	100	+45%				174.891	-0.074	0.000	0.22			8.6
S-2.002	SMH-7	15	Winter	100	+45%				174.885	-0.006	0.000	0.32			15.8
S-2.003	SMH-8	15	Winter	100	+45%	100/15	Summer		174.861	0.278	0.000	0.25			12.8

KRS Environmental Ltd		Page 28
		
Date 20/12/2023 13:20	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage		Network 2020.1

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

US/MH		Level
PN	Name	Exceeded
S-1.000	SMH-1	OK
S-1.001	SMH-2	OK
S-1.002	SMH-3	SURCHARGED
S-1.003	SMH-4	SURCHARGED
S-2.000	SMH-5	OK
S-2.001	SMH-6	OK
S-2.002	SMH-7	OK
S-2.003	SMH-8	SURCHARGED



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

										Water	Surcharged	Flooded			Half Drain	Pipe
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge		First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)
S-3.000	SMH-9	15 Winter	100	+45%						175.091	-0.174	0.000	0.11			5.6
S-3.001	SMH-10	15 Winter	100	+45%						174.874	-0.091	0.000	0.17			6.6
S-3.002	SMH-11	15 Winter	100	+45%						174.869	-0.022	0.000	0.21			12.6
S-2.004	SMH-12	15 Winter	100	+45%	100/15	Summer				174.851	0.407	0.000	0.67			22.5
S-1.004	SMH-13	15 Winter	100	+45%	100/15	Summer				174.829	0.448	0.000	1.08			37.2
S-1.005	SMH-14	15 Winter	100	+45%	100/15	Summer				174.781	0.460	0.000	1.02			50.3
S-1.006	SMH-15	15 Winter	100	+45%	100/15	Summer				174.557	0.517	0.000	1.05			47.9
S-1.007	SMH-16	15 Winter	100	+45%	100/15	Summer				174.441	0.518	0.000	1.38			51.7
S-4.000	SMH-17	15 Winter	100	+45%	100/15	Winter				174.242	0.067	0.000	0.38			18.4
S-4.001	SMH-18	15 Winter	100	+45%	100/15	Summer				174.203	0.369	0.000	0.46			22.6
S-4.002	SMH-19	15 Winter	100	+45%	100/15	Summer				174.140	0.671	0.000	0.64			19.0
S-1.008	SMH-20	15 Winter	100	+45%	100/15	Summer				174.128	0.695	0.000	1.42			68.4
S-5.000	SMH-21	480 Winter	100	+45%	100/480	Winter				174.122	0.022	0.000	0.01			0.2
S-5.001	SMH-22	480 Winter	100	+45%	100/240	Winter				174.122	0.100	0.000	0.02			0.2
S-5.002	SMH-23	480 Winter	100	+45%	100/180	Winter				174.122	0.137	0.000	0.02			0.2
S-6.000	SMH-24	480 Winter	100	+45%	100/480	Winter				174.122	0.022	0.000	0.01			0.1
S-6.001	SMH-25	720 Winter	100	+45%	100/240	Winter				174.141	0.127	0.000	0.02			0.3
S-5.003	SMH-26	480 Winter	100	+45%	100/15	Winter				174.122	0.177	0.000	0.05			0.7
S-7.000	SMH-27	480 Winter	100	+45%	100/480	Winter				174.122	0.022	0.000	0.00			0.1
S-5.004	SMH-28	480 Winter	100	+45%	100/15	Summer				174.122	0.240	0.000	0.06			1.0
S-5.005	SMH-29	480 Winter	100	+45%	100/15	Summer				174.122	0.337	0.000	0.08			1.2
S-8.000	SMH-30	480 Winter	100	+45%	100/480	Winter				174.121	0.021	0.000	0.01			0.1
S-8.001	SMH-31	480 Winter	100	+45%	100/360	Winter				174.121	0.067	0.000	0.02			0.2
S-9.000	SMH-32	480 Winter	100	+45%	100/480	Winter				174.122	0.022	0.000	0.01			0.1
S-9.001	SMH-33	480 Winter	100	+45%	100/360	Winter				174.122	0.069	0.000	0.03			0.3
S-5.006	SMH-34	480 Winter	100	+45%	100/15	Summer				174.122	0.412	0.000	0.11			1.6
S-5.007	SMH-35	480 Winter	100	+45%	100/15	Summer	100/600	Summer		174.121	0.498	0.000	0.11			1.7
S-10.000	SMH-36	720 Winter	100	+45%	100/480	Winter				174.154	0.054	0.000	0.01			0.1
S-11.000	SMH-37	720 Winter	100	+45%	100/480	Winter				174.156	0.056	0.000	0.01			0.2
S-10.001	SMH-38	720 Winter	100	+45%	100/360	Winter				174.175	0.118	0.000	0.09			1.3

KRS Environmental Ltd		Page 30
		
Date 20/12/2023 13:20	Designed by ss	
File Rochdale-SW-to_Sewer-revA.MDX	Checked by	
Micro Drainage	Network 2020.1	
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>		

KRS Environmental Ltd		Page 31								
										
Date 20/12/2023 13:20	Designed by ss									
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Micro Drainage	Network 2020.1									
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u> <table><thead><tr><th>PN</th><th>US/MH Name</th><th>Status</th><th>Level Exceeded</th></tr></thead><tbody><tr><td>S-10.001</td><td>SMH-38</td><td>SURCHARGED</td><td></td></tr></tbody></table>			PN	US/MH Name	Status	Level Exceeded	S-10.001	SMH-38	SURCHARGED	
PN	US/MH Name	Status	Level Exceeded							
S-10.001	SMH-38	SURCHARGED								
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

										Water	Surcharged	Flooded	Half Drain			
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	
S-5.008	SMH-39	480	Winter	100	+45%	100/15	Summer	100/2880	Summer	174.120	0.588	0.000	0.07			
S-12.000	SMH-40	720	Winter	100	+45%	100/480	Winter			174.179	0.079	0.000	0.01			
S-12.001	SMH-41	720	Winter	100	+45%	100/360	Winter			174.202	0.145	0.000	0.05			
S-1.009	SMH-42	480	Winter	100	+45%	100/15	Summer			174.120	0.804	0.000	0.41			
S-1.010	SMH-43	480	Winter	100	+45%	100/15	Summer	100/480	Winter	2	174.115	1.054	0.000	0.13	0.0	816
S-1.011	SMH-44	480	Winter	100	+45%					172.875	-0.116	0.000	0.11			
S-1.012	SMH-45	480	Winter	100	+45%					172.625	-0.116	0.000	0.12			
S-1.013	SMH-46	480	Winter	100	+45%					172.391	-0.130	0.000	0.05			
S-1.014	SMH-47	480	Winter	100	+45%					168.671	-0.129	0.000	0.05			
S-1.015	SMH-48	480	Winter	100	+45%					166.072	-0.128	0.000	0.05			
S-1.016	SMH-49	480	Winter	100	+45%					164.677	-0.123	0.000	0.07			

PN	US/MH Name	Pipe Flow (1/s)	Status	Level Exceeded
S-5.008	SMH-39	1.9	SURCHARGED	
S-12.000	SMH-40	0.1	SURCHARGED	
S-12.001	SMH-41	0.8	SURCHARGED	
S-1.009	SMH-42	15.5	SURCHARGED	
S-1.010	SMH-43	2.0	SURCHARGED	
S-1.011	SMH-44	2.0	OK	
S-1.012	SMH-45	2.0	OK	
S-1.013	SMH-46	2.0	OK	
S-1.014	SMH-47	2.0	OK	
S-1.015	SMH-48	2.0	OK	
S-1.016	SMH-49	2.0	OK	

