Cown Top Lane, Rochdale

Report on Drainage Strategy to Accompany Planning Application

by

Barratt Manchester

Revision	Date	Prepared By	Revision Notes
-	June 23	LB	PRELIMINARY ONLY – WATER TREATMENT PROPOSAL.

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Drawings

1. **Topographical Survey Drg No BH.TS.08_D**
2. **Engineering Layout Drg No 496/ED/02-03 & Masterplan No 496/ED/13**
3. **Proposed Impermeable Areas Plan Drg No 496/ED/11-12 & 496/ED/22**
4. **Proposed SUDs Details Drg No 496/ED/20-21**

Appendices

A. **FRA, Ciria SuDS Manual C753 and United Utilities S104 SuDS Guidance Doc**
B. **Site Investigation inc Soakaway Test Results**
C. **Infodrainage Simulations**
    a. **1 in 1 Year**
    b. **1 in 30 Year**
    c. **1 in 100 Year**
    d. **1in 100 Year + Climate Change**

Introduction

A Full planning Application (ref 22/01190/FUL) was submitted for the development of the land south of Cown Top Lane, Castleton, Rochdale for up to 495 dwellings. The overall site is a Residential developer site which also includes associated access, car parking, landscaping and infrastructure.

The following document has been prepared to assist the designer's preparation and the readers understanding of the drainage theory and calculations in one reference document.

Site Details

Development Name	Cown Top Lane Rochdale
Site Address	Cown Top Lane, Rochdale, OL11 2PU
Longitude, Latitude (or OS Grid Ref)	389181; 410312
Site Description	The site currently consists of open fields separated by stock fencing. The fields are in use for grazing.
Topographical Survey Drg No	BH.TS.08_D
Site Area (Ha)	Approx. 20 Ha
Site Area for Calculation of Greenfield Run Off Rate (Ha)	19.65ha
Existing Permeable Area (Ha)	19.625ha
Existing Impermeable Area (Ha)	0.025ha
FRA Report Reference	881680 R1(07) FRA
Is the Site Steeply Sloping (Y/N), If "Yes" Typical Gradient.	Yes average gradient of 1 in 6.

Table 1

Pre-development Greenfield Run-off Rates and Volumes

Refer to the site specific FRA produced by 881680 R1(07) FRA dated August 2022

Return Period	**Greenfield Rate (L/s)**
Qbar Total Site Area (l/s)	144.60
1 in 1 Year (l/s)	125.80
1 in 30 Year (l/s)	245.20
1 in 100 Year (l/s)	300.80

Table 2

Where compliance to 100 year volumetric criterion is not provided, the limiting discharge for any return period up to the 100 year 6 hour event, shall be not greater than Qbar or 2L/s/Ha, whichever is greater.

Soakaway Testing

A site specific site investigation was carried out by Smith Grant dated September 2017. A copy of the site investigation is presented in Appendix B

Ground conditions are typically 0.4m of topsoil overlaying Hummocky Glacial Deposits recorded to 20.45m bgl – not bottomed out. Soils comprised sand and silt but with local variation of clay and gravel.

8No soakaway tests were carried out as part of the site investigation.

Infiltration rates in the order of $1x10^{-6}$ were experienced; therefore the soakaway test results indicate that infiltration drainage is NOT a feasible option.

Post-Development Surface Water Allowable Discharge Rates

Discharge rates have been limited to existing greenfield runoff rates of Qbar for all storm return periods. Refer to the Phase specific FRA, and Table 2 above for details of the greenfield runoff rates.

	Qbar	**1 in 1 Year**	**1 in 30 Year**	**1 in 100 Year**
Developable Area (Ha)	**Allowable Discharge Rate L/s**	**Allowable Discharge Rate L/s**	**Allowable Discharge Rate L/s**	**Allowable Discharge Rate L/s**
13.55 (increases to 13.98 when allowing for access roads)	102.89	89.47	174.47	214.03
Western Parcel 6.44ha	47.39	41.21	80.37	98.59
Eastern Parcel 7.56ha	55.64	48.38	94.34	115.74

Table 3

Design Parameters

Engineering Layout Drg No & Revision	496/ED/02
Proposed Impermeable Areas Drg No	496/ED/11
Urban Creep included in Design	10%
Lowest FFL	159.45
Maximum TWL for Design	156.70 – lowest gully on Road 1
M5-60	19
Ratio R	0.287
MADD Factor	2.0
Climate Change Allowance	40%
Discharge location minimum level	143.47
Surcharged Outfall Level	
Point of Connection	Existing fishing lodges south of site
Point of Connection Approved By UU (Y/N)	Yes

Table 4

Engineering Layout Drg No & Revision	496/ED/03
Proposed Impermeable Areas Drg No	496/ED/12
Urban Creep included in Design	10%
Lowest FFL	155.475
Maximum TWL for Design (Lowest FFL – 0.6m)	154.875
M5-60	19
Ratio R	0.287
MADD Factor	2.0
Climate Change Allowance	40%
Discharge location minimum level	148.925
Surcharged Outfall Level	
Point of Connection	Existing fishing lodges south of site
Point of Connection Approved By UU (Y/N)	Yes

Table 5

Summary of Drainage Design

The drainage has been designed in accordance with the site specific FRA produced by RSK dated August 2022.

The drainage has also been designed to comply with DEFRA's Non-statutory technical standards for sustainable drainage systems dated March 2015. Compliance to such is demonstrated in Section 15.

Surface water is to drain to the adjacent fishery ponds named Trub Brook. Discharge rates have been limited to existing Greenfield run off rates/Qbar.

A full assessment to monitor the onsite flows was undertaken, two valley features orientated to the north-east and to the south-west are found within the eastern and western half of the site. The flow data collected from these locations are considered very low and it is anticipated that the flows from these springs are negligible (RSK 881680 R1 FRA Appendix A).

To match the on-site flow routes the proposed surface water drainage will be split via two outfalls limited to the pre-development Greenfield runoff rates from the developable area (RSK 881680 R1 FRA Appendix A).

The Western parcel will be via a new surface water outfall adjacent to an existing drainage pipe into a watercourse at 47.39l/s.

The eastern parcel will be via a new surface water outfall into the existing onsite watercourse in the south eastern area of the site discharging to a fishing lodge at 55.64l/s.

Attenuation storage for the western outfall is provided in the form of SuDS in public open spaces. The attenuation storage is sized to provide attenuation for all flows up to an including the 1 in 100 year storm event plus a 40% allowance for climate change. The 0.142ha of access road to the south of the site will be stored in oversized pipes.

Attenuation storage for the eastern outfall is provided in the form of SuDS in public open spaces. The attenuation storage is sized to provide attenuation for all flows up to an including the 1 in 100 year storm event plus a 40% allowance for climate change.

To improve water quality management, guidance has been followed by using a point scoring system based on pollution hazard indices for different land use classifications from CIRIA SuDs manual C753 (See Water Quality Treatment Assessment table 26.2) in Appendix D.

The site falls into the low pollution hazard level; in order to provide adequate treatment, the selected detention basin SuDs component will have a total mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index from the CIRA SuDs manual C753 (See Water Quality Treatment Assessment table 26.3).

Additional pre-treatment will be provided in the form of catch-pit manholes upstream of the detention basin which is an additional design requirement presented in the S104 SuDs guidance document by the adopting water and wastewater undertaker (United Utilities).

The use of petrol inceptors as a type of pre-treatment was discussed via email with the adopting water and wastewater undertaker (United Utilities). Their response is attached in appendix D, and it states that they will not adopt petrol interceptors into their network.

For storm events exceeding 1in 30 year events, long term storage is provided in above ground storage areas to ensure no flooding to properties occurs for all storm events up to and including 1 in 100 year 6 hour storm event plus a 40% allowance for climate change.

Some minor flooding to highways is accepted for the 1 in 100 year 6 hour event. Volumes of flooding are shown on the attached infodrainage simulations in Appendix C. Flooding is only permitted where it can be demonstrated that minor flooded is contained wholly within the adopted highway and will Not flood properties. The location and flood extent are shown on the Flood Routing and Overland Flow drawing.

Infodrainage simulations are available in Appendix C

Return Period	**Western Parcel Proposed Discharge Rate**	**Western Parcel Actual Discharge Rate**
1 in 1 Year (l/s)	41.21	22.3
1 in 30 Year (l/s)	47.39	32.1
1 in 100 Year (l/s)	47.39	37.6
1 in 100+40cc Year (l/s)	47.39	47.2

Table 6

Return Period	**Eastern Parcel Proposed Discharge Rate**	**Eastern Parcel Actual Discharge Rate**
1 in 1 Year (l/s)	48.38	27.6
1 in 30 Year (l/s)	55.64	41.1
1 in 100 Year (l/s)	55.64	46.5
1 in 100+40cc Year (l/s)	55.64	55.0

Table 7

Foul Drainage Strategy

The drainage strategy and detailed design for the foul drainage on site is via two pumped systems northwards to the existing foul water manhole in Cown Top Lane.

Design for Exceedance

All surface water drainage models have been modelled for storm events greater than the 1 in 100 Year event to determine the impact of flooding. The Flood locations are shown on the attached Flood Routing and over land flow drawing. Any exceedance flooding has been demonstrated to be managed within the site where reasonably practicable.

This demonstrates that properties are unlikely to flood during extreme flood events.

Water Quality Treatment Assessment

1. Background

The following is based upon CIRIA SuDS C753 Manual Chapter 26.

Land use is the primary influencing factor in the quality of urban surface water run-off. Determining the hazard posed by the different land use activities, and the extent to which underlying soils and/or proposed treatment components reduce the associated risk, can be done using a variety of methods.

Table 4.3 sets out which of these methods are required, for different generic land use types and receiving waters.

TABLE 4.3 Minimum water quality management requirements for discharges to receiving surface waters and groundwater

Land use	Pollution hazard level	Requirements for discharge to surface waters, including coasts and estuaries[2]	Requirements for discharge to groundwater
Residential roofs	Very low	Removal of gross solids and sediments only	
Individual property driveways, roofs (excluding residential), residential car parks, low traffic roads (eg cul de sacs, home zones, general access roads), non-residential car parking with infrequent change (eg schools, offices)	Low	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]*	
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]*	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]* In England and Wales, Risk Screening[4] must be undertaken first to determine whether consultation with the environmental regulator is required. In Northern Ireland, the need for risk screening should be agreed with the environmental regulator.
Trunk roads and motorways	High	Follow the guidance and risk assessment process set out in HA (2009)	
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured, industrial sites	High	Discharges may require an environmental licence or permit[5]. Obtain pre-permitting advice from the environmental regulator. Risk assessment is likely to be required[5].	

For residential sites from Table 4.3, the pollution hazard level is Low, and the preferred design method is the **Simple Index Approach.**

2. Simple Index Approach

The Simple Index Approach is summarised in CIRA SuDs manual C753 Box 26.2, and is applied to this development.

BOX 26.2 Steps of the simple index approach

Step 1 – Allocate suitable pollution hazard indices for the proposed land use

Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index

Step 3 – Where the discharge is to protected[†] surface waters or groundwater, consider the need for a more precautionary approach

Note:

† Designated as those protected for the supply of drinking water (Table 4.3)

3. Step 1 – Allocate Suitable Pollution Hazard Indices for the Proposed Land Use

We can allocate the pollution hazard indices using CIRA SuDs manual C753 Table 26.2

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[*]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured, industrial sites, trunk roads and motorways[†]	High	0.8[‡]	0.8[‡]	0.9[‡]

On this development we have:

- Residential Roofs
- Individual Property Driveways
- Low Traffic Roads

The Pollution Hazard Indices are as follows:

Pollution Hazard Indices – Residential Roofs	
Pollution Hazard Level	Very Low
Total Suspended Solids	0.2
Metals	0.2
Hydrocarbons	0.05

Pollution Hazard Indices – Driveways & Low Traffic Roads	
Pollution Hazard Level	Low
Total Suspended Solids	0.5
Metals	0.4
Hydrocarbons	0.4

4. Step 2 – Select SuDS

We must select SuDS with total pollution mitigation indices which equal or exceed the maximum pollution hazard index identified in Step 1 (driveways and low traffic roads). As this site discharges to a watercourse we use CIRA SuDs manual C753 Table 26.3.

Total SuDS Mitigation Index >= Pollution Hazard Index [for each contaminant type]

Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required, known as a SuDS Management Train.

Total SuDS Mitigation Index >= Mitigation Index$_1$ + 0.5 x Mitigation Index$_2$ + 0.5 x Mitigation Index$_3$

A factor of 0.5 is used to account for the reduced performance of the secondary or tertiary components associated with already reduced inflow concentrations.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: http://tinyurl.com/qt7yuj7

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

The FRA suggest that one level of treatment is required for residential roof, driveways and low traffic roads. The drainage strategy has all water drainage draining via adopted sewers to an adopted detention basin. The following simple index approach will demonstrate whether the detention basin alone is considered suitable for water quality treatment.

Residential Roofs		
Pollution Hazard Indices		**SuDS Mitigation Indices from Table 26.3**
		Detention Basin
Total Suspended Solids	0.2	0.5
Metals	0.2	0.5
Hydrocarbons	0.05	0.6

Driveways & Low Traffic Roads		
Pollution Hazard Indices		**SuDS Mitigation Indices from Table 26.3**
		Detention Basin
Total Suspended Solids	0.5	0.5
Metals	0.4	0.5
Hydrocarbons	0.4	0.6

The Total SuDS Mitigation Index [shown in Green] are >= Pollution Hazard Index [for each contaminant type] and therefore deemed to comply with the requirements of the simple index approach of the SuDS manual.

To further improve water quality management, two mitigation components will be added in the form of a sediment forebay set at the 1 in 30 yr level; greater than 10 m2 will be formed by building a rock-filled gabion after the inlet (see chapter 23.8.1. CIRIA C753) and a small permanent pool at a shallow depth of 0.8m at the outlet (see chapter 23.1. CIRIA C753). Keeping the permanent water shallow allows oxygen to reach the bottom of the pond, enabling the biodegradation of oils by natural organisms (see chapter 23.2 of CIRIA C753). This is subject to approval by United Utilities.

Residential Roofs, Driveways & Low Traffic Roads					
Pollution Hazard Indices		**SuDS Mitigation Indices from Table 26.3**			**Total SuDS Mitigation Index**
		Detention Basin	**Wetland (x0.5)**	**Pre-treatment system/sediment control (x0.25)**	
Total Suspended Solids	0.5	0.5	0.8 (0.4)	0.5 (0.125)[1]	1.025
Metals	0.5	0.5	0.8 (0.4)	0.5 (0.125)[1]	1.025
Hydrocarbons	0.5	0.6	0.8 (0.4)	0.6 (0.15)[1]	1.150

Notes

1. There is no level of betterment in the SuDs mitigation indices for pre-treatment systems or sediment control. A sediment forebay is the only suitable management option at the site to provide effective pre-treatment (that removes coarse sediments and floating oils). The sediment deposition area may be designed to be intermittently dry, which will aid the biodegradation of organic pollutants. Planting will be used to screen and/or enhance sediment deposition areas (see chapter 23.1 of CIRIA C753). So an approximate point score has been indicated as a level of treatment.

Water Quality Treatment Assessment Summary

Table 26.2 of the CIRIA SuDs manual C753 shows that one type of SuD provides enough mitigation to fulfil the LOW pollution hazard index for different land use classifications.

Multiple SuD components have been introduced after the initial SuD, in a series known as a Management Train, before the outfall to the fisheries. This will minimise pollution hazards by more than twice the required values stated in table 26.2 from the CIRIA SuDs manual C753.

Therefore, the SuDs management train specified above provides more than enough treatment to remove pollution hazards and contaminants upstream of the fisheries.

Maintenance

All Surface Water (coloured Blue) on the attached plan 496/ED/02-03, will be put forward for adoption under a S104 agreement with United Utilities. Prior to issue of the Vesting Declaration by United Utilities, the drainage shown on the included plan will be maintainable by Barratt Manchester and at the expense of Barratt Manchester.

All areas of public open space will be transferred to the management company for adoption and maintenance. This includes the Overflow areas/Ponds on the attached plan 496/ED/02-03. The management and maintenance will be funded by the purchasers/owners of the development by way of an annual fee levied on the owner. In order to ensure the long term operation of the swales, the maintenance contract will stipulate regular maintenance of the SUDS network, in accordance with this management plan.

All highway gullies and highway drains on the attached plan will be put forward for adoption under a 38 agreement with Rochdale Borough Council. After issue of the highway final certificate, the highway and Highway Drains, Gullies, and gully pipes on the attached plan 496/ED/02-03, will be maintainable by the Local Highway Authority at public expense. Prior to issue of the final Certificate by Rochdale Borough Council, the highway drains shown on the included plan will be maintainable by Barratt Manchester and at the expense of Barratt Manchester.

All Foul drainage (coloured Brown) on the attached plan 496/ED/02-03 will be put forward for adoption under a S104 agreement with United Utilities. Prior to issue of the Vesting Declaration by United Utilities, the drainage shown on the included plan will be maintainable by Barratt Manchester and at the expense of Barratt Manchester.

A draft inspection & maintenance schedule for elements of the SUDS/Drainage infrastructure is shown in Table 8 & 9.

Drainage Element	Maintenance Requirement	Frequency
Surface Water Pipes and Manholes (prior to adoption)	Inspect. Remove excess silt & debris, Clear Blockage	Inspect Annually. CCTV if required. Silt & debris removed as necessary.
Catchpits	Inspect. Remove excess silt & debris, Clear Blockage	Inspected every 3 months. Silt & debris removed as necessary.
Ditches/Swales	Inspect. Remove excess vegetation. Clear blockages, silt & debris.	Inspected every 1 Month. Blockages, silt & debris removed as necessary.
Flow Controls	Inspect. Remove excess silt & debris, clear blockage. Test functionality of Bypass doors.	Inspect Annually Silt & debris removed as necessary. Flow control repaired, maintained as necessary.
Overflow Ponds (and POS)	Inspect. Remove excess vegetation. Clear blockages, silt & debris.	Inspected monthly, or after significant storm events. Blockages, silt & debris removed as necessary.

Table 8

Maintenance of the Adoptable Detention Basin:

Responsible Organisation	Basin	Frequency
Private Management Company	Remove litter and debris	Monthly or as required
	Cut the grass	
	Inspect the bankside vegetation and remove nuisance plants	
United Utilities (after adoption)	Inspect and clear blockages	Monthly or as required
	Inspection water for signs of reduced water quality	
United Utilities (after adoption)	Inspect silt accumulation rates. Undertake contamination testing	Half yearly
	Check flow controls	
Private Management Company	Remove excess vegetation	Annually
	Tidy all dead growth prior to growing season	
United Utilities (after adoption)	Remove sediment from one quadrant of the main body of basin	Every 1-5 years or as required

Table 9

5. DEFECT REPORTING

Prior to adoption of the highway drains, foul drains, Surface water drains or SUDS, defects may be reported to Barratt Manchester by the local authority, local residents or members of the public.

All defects are can be reported to Barratt Manchester Customer Care Line using the following details:

Email: manchester@newhomecare.co.uk

Phone number during office hours: 0161 872 0161 option 3

Phone number out-of-hours: 0345 6016084

The customer care line normal working hours are Monday to Friday 9am to 5.30pm, excluding bank holidays. For reports of defects outside normal working hours, a 24 hours out of hours call centre is in operation.

After adoption, the following numbers may be useful.

Management Company: TBC

Rochdale Borough Council
Highway Issues should be reported online at:
https://www.rochdale.gov.uk/roadworks-repairs-restrictions
Tel: 0300 303 8879 - Monday to Friday 8.30am to 5.30pm (excluding bank holidays)
Email: highways@rochdale.go.uk

United Utilities
Tel: 0345 672 3723

Environment Agency
Tel: 0800 80 70 60 (24 Hours)

6. RESPONSE TIMES

All non-urgent defects will be repaired within 10 weeks of being reported.

All urgent defects will be made safe within 48 hours, or sooner if practicable. Any works to “Make Safe” may be of a temporary nature in order to protect the public, and allow sufficient time to procure the permanent remedial works. This may include temporary “fencing off” of the hazard until permanent remedials can be completed.

United Utilities, LA, EA and The Management Company may operate to alternative response times.

Compliance with DEFRA's Non-statutory Technical Standards for Sustainable Drainage Systems dated March 2015

Flood risk outside the development

Criteria	Designers Comments
S1 Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (**S2** and **S3** below) and volume control technical standards (**S4** and **S6** below) need not apply.	The surface water discharges to existing watercourse/sewer, therefore this criteria does not apply.

Peak flow control

Criteria	Designers Comments
S2 For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.	All proposed discharge rates are less than or equal to Qbar. All proposed discharge rates are less than or equal to the equivalent greenfield discharge rate. Therefore this criteria is deemed to comply.
S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.	The site is greenfield therefore not applicable. Therefore, this criteria is deemed to comply.

Volume control

Criteria	Designers Comments
S4 Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.	As the infiltration test results do not allow infiltration drainage, it is not possible to reduce the run-off volume to the greenfield volume, therefore Criteria S6 will apply.
S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.	The site is Greenfield therefore not applicable.
S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with **S4** or **S5** above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.	As the infiltration test results do not allow infiltration drainage, it is not possible to reduce the run-off volume to the greenfield volume, therefore the discharge rate has been reduced to the equivalent greenfield discharge rate for all rainfall events up to and including 1 in 100 year 6 hour event.

Flood risk within the development

Criteria	Designers Comments
S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.	The drainage system has been designed to ensure no flooding occurs for any part of the site for a 1 in 30 year event. Info drainage simulation for a 1 in 30 year event are attached in Appendix C
S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.	The drainage system has been designed to ensure no flooding to properties occurs for any part of the site for a 1 in 100 year 6 Hour event. For flows in excess of the 1 in 30 year event, flows are allowed to overflow into Long Term Storage areas located in public open spaces. Some minor flooding to highways is accepted for the 1 in 100 year 6 hour event. Flooding is only permitted where it can be demonstrated that minor flooded is contained wholly within the adopted highway and will not flood properties. The location and flood extent are shown on the Flood Routing and Overland Flow drawing. Info drainage simulation for a 1 in 100 year event are attached in Appendix C
S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed	All surface water drainage models have been modelled for storm events greater than the 1 in 100 Year event to determine the impact of flooding. Any exceedance flooding has been demonstrated to be managed within the site where reasonably practicable.

Structural Integrity

Criteria	Designers Comments
S10 Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.	All Sewers are to be covered under a S104 agreement with United Utilities for future adoption. All sewers to be built to UU adoptable standards. A 12 month maintenance period is standard with all S104 sewers
S11 The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.	All main sewers to be constructed to adoptable standards. All SUDS to be constructed in accordance with the Typical details as provided.

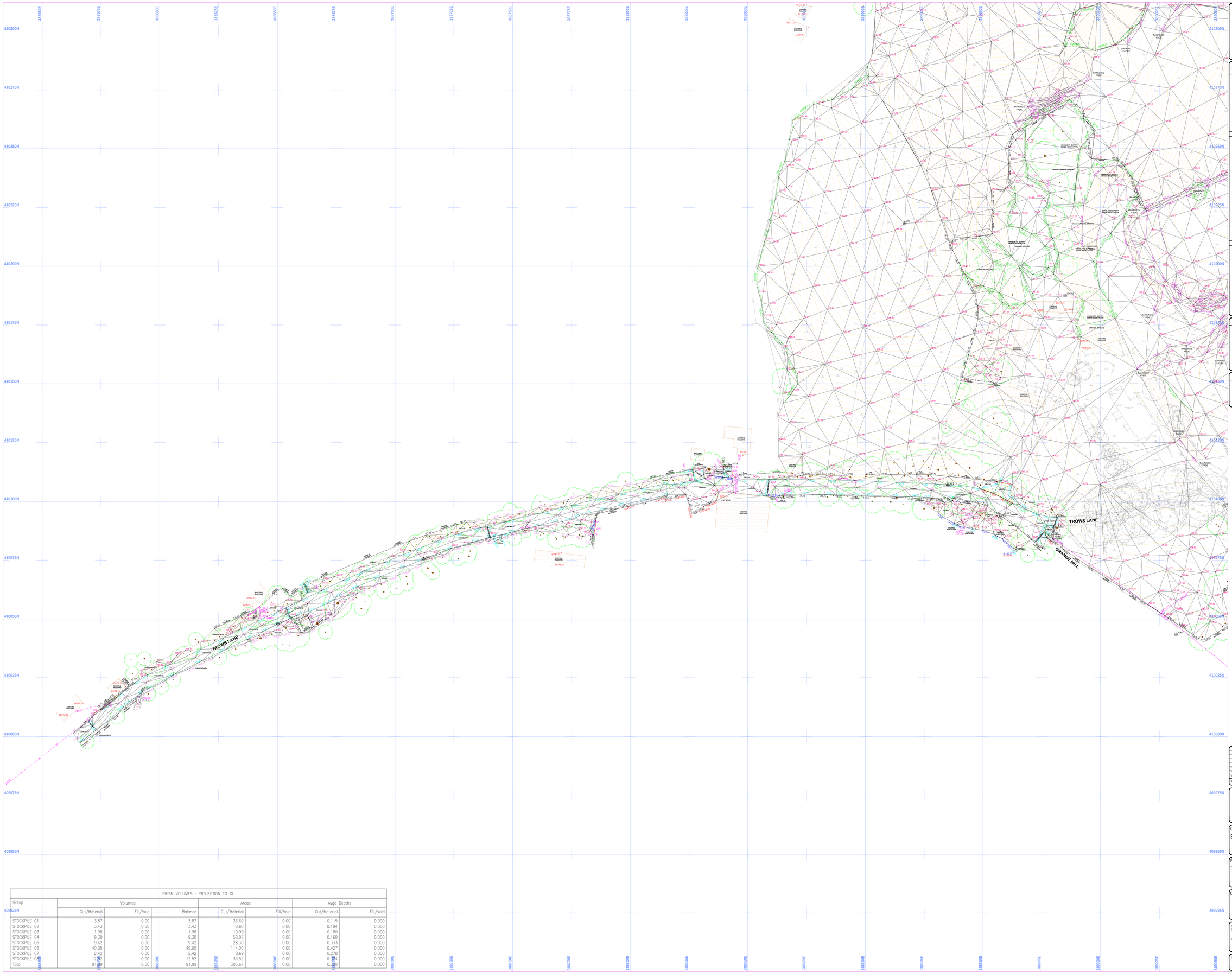
Designing for maintenance considerations

Criteria	Designers Comments
S12 Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.	A Foul ONLY Pump Stations is provided only where it is not possible to drain foul by gravity.

Construction

Criteria	Designers Comments
S13 The mode of construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.	All Sewers are to be covered under a S104 agreement with United Utilities for future adoption. All sewers to be built to UU adoptable standards. The connection to the existing sewer will be in accordance with United Utilities Requirements and a Part 2 Application. Connection to the ordinary watercourse will require LLFA land drainage consent. Details of the works will be submitted to the LLFA for subsequent approval. No works to within 8m of an ordinary watercourse will be permitted without LLFA approval.
S14 Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.	All Sewers are to be covered under a S104 agreement with United Utilities for future adoption. All sewers to be built to UU adoptable standards. A 12 month maintenance period is standard with all S104 sewers. Connection to the ordinary watercourse will require LLFA land drainage consent. Details of the works will be submitted to the LLFA for subsequent approval. No works to within 8m of an ordinary watercourse will be permitted without LLFA consent. LLFA consent will be formally requested post planning approval.

Drawings
Topographical Survey



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W E

S

SURVEY ORIENTATED TO OS GRID (OSGB36-15)

SURVEY LEGEND

FEATURES

TOP OF BANK

BOTTOM OF BANK

SURVEY STATION

TREE

HEDGE

TREE CANOPY

BUSHES

VEGETATION

BOUNDARY ANNOTATIONS

BARB WIRE FENCE	BW.F
CHAIN LINK FENCE	CL.F
CONC POST AND PANEL	CP&P.F
CONC POST TIMB PANEL	CP&TP.F
ELECTRIC FENCE	EL.F
HERAS FENCE	HER.F
IRON RAIL FENCE	IR.F
KNEE RAIL FENCE	KR.F
MISCELLANEOUS FENCE	MISC.F
POST AND WIRE FENCE	P&W.F
RANCH STYLE FENCE	RS.F
SECURITY FENCE	SEC.F
TIMBER FENCE	T.F
BRICK WALL	B.W
BLOCK WALL	BL.W
CONCRETE WALL	C.W
GABION WALL	G.W
MISCELLANEOUS WALL	MISC.W
RETAINING WALL	R.W
RETAINING LOG WALL	RL.W
STONE WALL	S.W

LEVEL PREFIX ANNOTATIONS

ASL	ARCH SPRING LEVEL
BL	BED LEVEL
BD	BACK DROP
CL	COVER LEVEL
DH	TOP OF DOOR
DTC	DEPTH TO CROWN
GL	GROUND SURFACE LEVEL
IL	INVERT LEVEL
PL	PARAPET LEVEL
RL	ROOF/RIDGE LEVEL
SL	SOFFIT LEVEL
TOF	TOP OF FENCE
TOP	TOP OF PIPE
TOW	TOP OF WALL
TRH	TREE HEIGHT
THR	THRESHOLD LEVEL
WL	WATER LEVEL
WS	WINDOW SILL
WSF	WINDOW SOFFIT

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AV	AIR VALVE
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CP	CATCH PIT
DR	DRAIN
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EL	ELECTRICAL IC
ELP	ELECTRIC POLE
ER	EARTH ROD
FH	FIRE HYDRANT
FP	FLAG POLE
G	GULLY
GH	GREENHOUSE
GP	GATE POST
GV	GAS VALVE
IC	INSPECTION COVER
JB	JUNCTION BOX
JKW	JAPANESE KNOT WEED
KO	KERB OUTLET
LH	LAMP HOLE
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MH	MANHOLE
MP	MONITOR POINT
NP	NAME PLATE
OHC	OVERHEAD CABLES
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PS	POST
PYL	ELECTRICITY PYLON
RE	RODDING EYE
RS	ROAD SIGN
RWP	RAIN WATER PIPE
ST	STOP TAP
SM	SERVICE MARKER
SP	SIGN POST
SV	STOP VALVE / SLUICE VALVE
SVP	SOIL VENT PIPE
TB	TELEPHONE BOX
TL	TRAFFIC LIGHTS
TM	TELEPHONE MAST
TP	TELEGRAPH POLE
TPS	TACTILE PAVING SLABS
VP	VENT PIPE
WM	WATER METER
WO	WASH OUT
UTL	UNABLE TO LIFT
UTS	UNABLE TO SURVEY

GEOTECHNICAL INFORMATION

TRIAL HOLE / PIT	TH
BORE HOLE	BH
WINDOW SAMPLE	WS
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ESTABLISHED AT SE1 USING THE LEICA SMARTNET GPS NETWORK

SURVEY STATIONS

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227	389252.634	410362.417	140.485
A21	389516.726	410218.298	164.871
A22	389417.886	410222.825	161.144
A23	389240.885	410332.925	163.144
A24	389326.758	410401.524	177.189
A25	389477.773	410401.524	177.189
A26	389400.573	410342.765	172.018
A27	389533.380	410157.875	163.277
A28	389552.760	410157.875	163.277
CT3	389592.782	410013.954	134.868
JLP1	389959.228	410094.118	146.141
JLP2	389959.228	410094.118	146.141
JLP3	389570.092	410136.784	145.825
JLP6	389712.150	410075.528	139.466
JLP7	389653.214	410074.673	139.871
L1	389985.973	410475.827	169.385
L2	389985.973	410475.827	169.385
NEW1	389533.562	410398.055	151.501
NEW2	389512.373	410374.557	154.914
NEW4	389185.501	410196.278	155.551
NEW5	389221.386	410060.496	153.899

PRISM VOLUMES : PROJECTION TO GL

Group	Volumes			Areas		Avge Depths	
	Cut/Material	Fill/Void	Balance	Cut/Material	Fill/Void	Cut/Material	Fill/Void
STOCKPILE 01	3.87	0.00	3.87	33.60	0.00	0.115	0.000
STOCKPILE 02	3.43	0.00	3.43	18.60	0.00	0.184	0.000
STOCKPILE 03	1.98	0.00	1.98	10.99	0.00	0.180	0.000
STOCKPILE 04	9.30	0.00	9.30	58.07	0.00	0.160	0.000
STOCKPILE 05	9.42	0.00	9.42	28.30	0.00	0.333	0.000
STOCKPILE 06	49.05	0.00	49.05	114.90	0.00	0.427	0.000
STOCKPILE 07	2.42	0.00	2.42	8.69	0.00	0.278	0.000
STOCKPILE 08	12.52	0.00	12.52	33.52	0.00	0.374	0.000
Total	91.99	0.00	91.99	306.67	0.00	0.300	0.000

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DESCRIPTION	REV	DATE	DRWN	APPR
TOPO UPDATED, 3D MESH / MODEL COMBINED	C	18.05.22	BM	
TOPO UPDATED	B	30.01.19	BM	
SITE INVESTIGATIONS ANNOTATED	A	11.01.19	SH	

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BARRATT HOMES

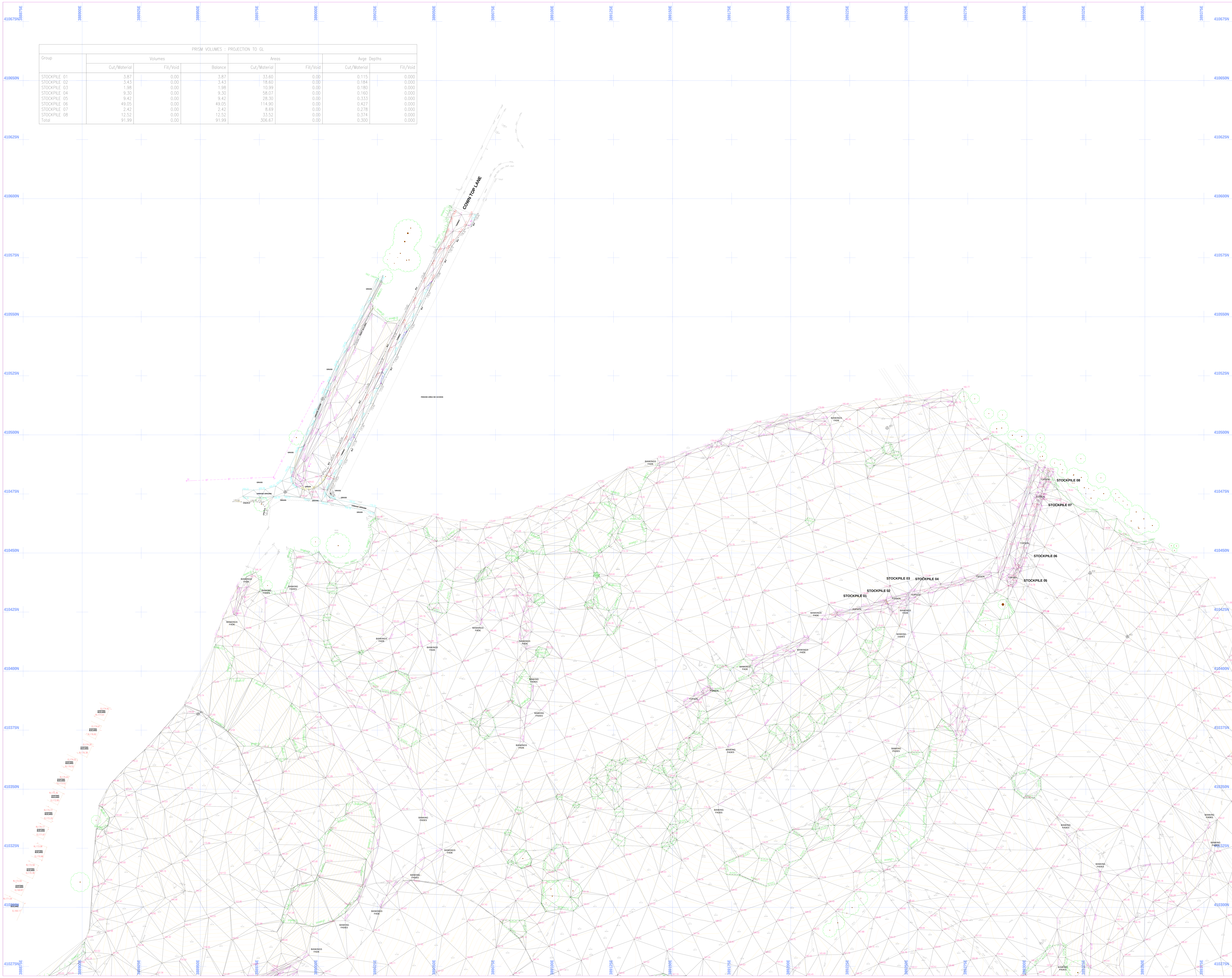
PROJECT TITLE
TROWS LANE, ROCHDALE

DRAWING DETAIL
TOPOGRAPHICAL LAND SURVEY
SHEET 1 OF 4

PROJECT ENGINEER	DATE
JLP	01.10.2018
DRAWN	SCALE
BM	1:500@A0

DRAWING NUMBER	REVISION
BH.TS.08	C

PRISM VOLUMES : PROJECTION TO GL							
Group	Volumes			Areas		Avge Depths	
	Cut/Material	Fill/Void	Balance	Cut/Material	Fill/Void	Cut/Material	Fill/Void
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STOCKPILE 02	3.43	0.00	3.43	18.60	0.00	0.184	0.000
STOCKPILE 03	1.98	0.00	1.98	10.99	0.00	0.180	0.000
STOCKPILE 04	9.30	0.00	9.30	58.07	0.00	0.160	0.000
STOCKPILE 05	9.42	0.00	9.42	28.30	0.00	0.333	0.000
STOCKPILE 06	49.05	0.00	49.05	114.90	0.00	0.427	0.000
STOCKPILE 07	2.42	0.00	2.42	8.69	0.00	0.278	0.000
STOCKPILE 08	12.52	0.00	12.52	33.52	0.00	0.374	0.000
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SURVEY ORIENTATED TO OS GRID (OSGB36-15)

SURVEY LEGEND

FEATURES

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BOTTOM OF BANK
SURVEY STATION
TREE
HEDGE
TREE CANOPY
BUSHES
VEGETATION

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TRIAL HOLE / PIT	TH
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AS1	388916.736	410218.298	164.911
AS2	388949.114	410381.868	174.326
AS3	389240.885	410502.925	183.144
AS4	389326.756	410441.524	177.189
AS5	389342.618	410414.591	173.842
AS6	389400.171	410342.785	172.018
AS7	389523.380	410157.875	163.277
AS8	389499.538	410167.868	163.288
CT1	388592.782	410019.894	134.869
JLP1	388959.229	410094.118	146.141
JLP2	388935.092	410106.784	145.935
JLP3	388935.092	410106.784	145.935
JLP6	388712.150	410075.528	139.466
JLP7	388650.214	410047.973	136.857
L1	388985.973	410475.827	169.365
L2	389001.808	410515.233	169.589
NEW1	389032.068	410043.416	146.227
NEW2	389052.562	410098.055	151.501
NEW3	389107.373	410074.557	154.814
NEW4	389165.551	410106.278	155.551
NEW5	389223.388	410080.498	153.899

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DESCRIPTION	REV	DATE	DRWN	APPR
TOPO UPDATED, 3D MESH / MODEL COMBINED	C	16.05.22	BM	-
TOPO UPDATED	B	30.01.19	BM	-
SITE INVESTIGATIONS ANNOTATED	A	11.01.19	SH	-

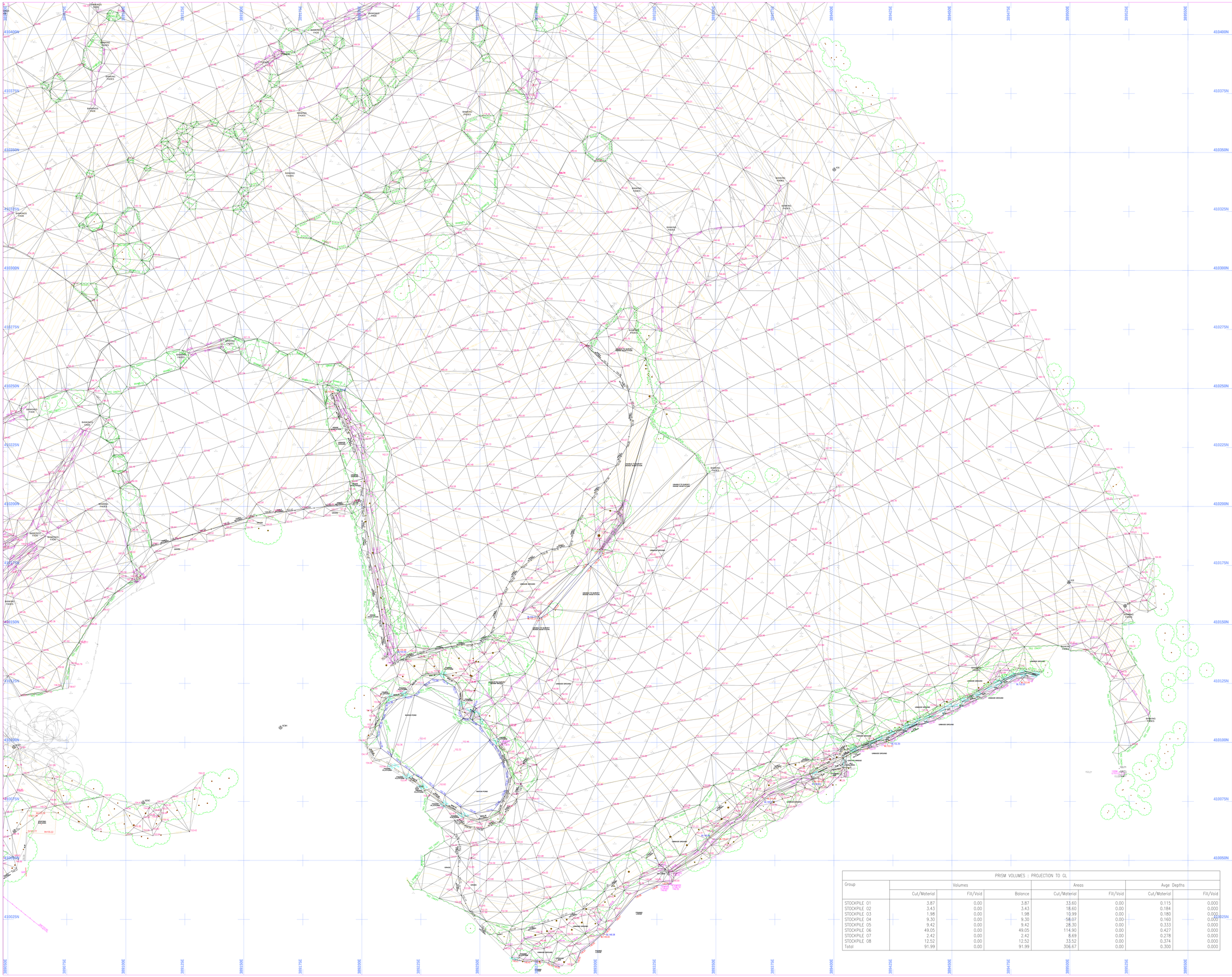
SurveyEng Ltd
Land Surveyors & Engineers
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BL5 3GE
TEL/FAX: 0800 772 3040
MOB: 07850069993
info@surveyeng.co.uk

CLIENT
BARRATT HOMES

PROJECT TITLE
TROWS LANE, ROCHDALE
SHEET 2 OF 4

DRAWING DETAIL
TOPOGRAPHICAL LAND SURVEY

PROJECT ENGINEER	JLP	DATE	01.10.2018
DRAWN	BM	SCALE	1:500@A0
DRAWING NUMBER	BH.TS.08	REVISION	C



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S

SURVEY ORIENTATED TO OS GRID (OSGB36-15)

SURVEY LEGEND

FEATURES

TOP OF BANK
BOTTOM OF BANK
SURVEY STATION
TREE
HEDGE
TREE CANOPY
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VEGETATION

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STONE WALL	S-W

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A28	385552.662	410153.864	163.277
C23	385052.782	410013.954	139.668
JUP1	385959.239	410094.118	146.140
JUP2	385970.092	410106.784	145.835
JUP3	385910.092	410126.784	145.835
JUP4	385852.274	410041.673	139.807
L1	385985.973	410475.827	169.585
L2	385852.274	410041.673	139.807
NEW1	385232.568	410043.418	146.227
NEW2	385052.562	410098.055	151.501
NEW3	385052.562	410098.055	151.501
NEW4	385165.551	410136.278	155.530
NEW5	385223.398	410080.488	153.899

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TOPO UPDATED	B	30.01.19	BM	-
SITE INVESTIGATIONS ANNOTATED	A	11.01.18	SH	-

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CLIENT
BARRATT HOMES

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DRAWING DETAIL
TOPOGRAPHICAL LAND SURVEY
SHEET 3 OF 4

PROJECT ENGINEER	JLP	DATE	01.10.2018
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DRAWING NUMBER	REVISION
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Total	91.99	0.00	91.99	306.67	0.00	0.300	0.000



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SURVEY ORIENTATED TO OS GRID (OSGB36-15)

SURVEY LEGEND

FEATURES

TOP OF BANK
BOTTOM OF BANK
SURVEY STATION
TREE
HEDGE
TREE CANOPY
BUSHES
VEGETATION

BOUNDARY ANNOTATIONS

BARB WIRE FENCE	BW.F
CHAIN LINK FENCE	C/L.F
CONC POST AND PANEL	CP&P.F
CONC POST TIMB PANEL	CP&TP.F
ELECTRIC FENCE	EL.F
HERAS FENCE	HER.F
IRON RAIL FENCE	IR.F
KNEE RAIL FENCE	KR.F
MISCELLANEOUS FENCE	MISC.F
POST AND WIRE FENCE	P&W.F
RANCH STYLE FENCE	RS.F
SECURITY FENCE	SEC.F
TIMBER FENCE	T.F
BRICK WALL	B.W
BLOCK WALL	BL.W
CONCRETE WALL	C.W
GABIEN WALL	G.W
MISCELLANEOUS WALL	MISC.W
RETAINING WALL	R.W
RETAINING LOG WALL	RL.W
STONE WALL	S.W

LEVEL PREFIX ANNOTATIONS

ASL	ARCH SPRING LEVEL
BL	BED LEVEL
BD	BACK DROP
CL	COVER LEVEL
DH	TOP OF DOOR
DTC	DEPTH TO CROWN
FFL	FINISHED FLOOR LEVEL
IL	INVERT LEVEL
PL	PARAPET LEVEL
RL	ROOF/RIDGE LEVEL
SL	SOFFIT LEVEL
TOF	TOP OF FENCE
TOP	TOP OF PIPE
TOW	TOP OF WALL
TRH	TREE HEIGHT
THR	THRESHOLD LEVEL
WL	WATER LEVEL
WS	WINDOW SILL
WSF	WINDOW SOFFIT

SURVEY ANNOTATIONS

AV	AIR VALVE
B	BOLLARD
BS	BUS STOP
BT	BRITISH TELECOM IC
CPS	CONCRETE PAVING SLABS
CP	CATCH PIT
DR	DRAIN
EB	ELECTRIC CONTROL BOX
EL	ELECTRICAL IC
EP	ELECTRICITY POLE
ER	EARTH ROD
FH	FIRE HYDRANT
FP	FLAG POLE
G	GULLY
GH	GREENHOUSE
GP	GATE POST
GV	GAS VALVE
IC	INSPECTION COVER
JB	JUNCTION BOX
JKW	JAPANESE KNOT WEED
KO	KERB OUTLET
LH	LAMP HOLE
LP	LAMP POST/LIGHT COLUMN
MH	MANHOLE
MP	MONITOR POINT
NP	NAME PLATE
OHC	OVERHEAD CABLES
PB	POST BOX
PM	PARKING METER
PS	POST
PYL	ELECTRICITY PYLON
RE	RODDING EYE
RS	ROAD SIGN
RWP	RAIN WATER PIPE
ST	STOP TAP
SM	SERVICE MARKER
SP	SIGN POST
SV	STOP VALVE / SLUICE VALVE
SVP	SOIL VENT PIPE
TB	TELEPHONE BOX
TL	TRAFFIC LIGHTS
TM	TELEPHONE MAST
TP	TELEGRAPH POLE
TPS	TACTILE PAVING SLABS
VP	VENT PIPE
WM	WATER METER
WO	WASH OUT
UTL	UNABLE TO LIFT
UTS	UNABLE TO SURVEY

GEOTECHNICAL INFORMATION

TRIAL HOLE / PIT	TH
BORE HOLE	BH
WINDOW SAMPLE	WS
MONITORING POINT	MP
PROBE HOLE	PH

DISCLAIMER:

ONLY MANHOLES AND SERVICES SHOWN WERE VISIBLE AT THE TIME OF SURVEY.

MAN ENTRY TO SEWERS HAS NOT BEEN UNDERTAKEN, DEPTHS, PIPESIZES ETC ARE MEASURED FROM GROUND LEVEL.

DRAINAGE INFORMATION MUST BE CHECKED AND VERIFIED PRIOR TO ANY WORK COMMENCING.

BOUNDARIES SHOWN ARE PHYSICAL AND MAY NOT REPRESENT LEGALLY CONVEYED OWNERSHIP.

TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE AVERAGE SPREAD, THE TREE CANOPY LAYER DENOTES THE TREES EXTREMITY.

SURVEY NOTES

ALL LEVELS ARE RELATED TO O.S DATUM (OSGB36-15)
ESTABLISHED AT SE1 USING THE LEICA SMARTNET GPS NETWORK

SURVEY STATIONS

Name	Easting	Northing	Height
227	389052.834	410062.417	148.485
AS1	388916.736	410218.298	164.911
AS2	388949.114	410381.868	174.326
AS3	389240.885	410502.925	183.144
AS4	389326.756	410441.524	177.189
AS5	389342.618	410414.591	173.842
AS6	389400.171	410342.785	172.018
AS7	389523.380	410157.875	163.277
AS8	389499.538	410167.868	163.288
CT1	388592.782	410019.894	134.869
JLP1	388959.229	410094.118	146.141
JLP2	388935.092	410106.784	145.935
JLP3	388935.092	410106.784	145.935
JLP6	388712.150	410075.528	139.466
JLP7	388650.214	410047.973	136.857
L1	388985.973	410475.827	169.365
L2	389001.808	410515.233	169.589
NEW1	389032.068	410043.416	146.227
NEW2	389052.562	410098.055	151.501
NEW3	389107.373	410074.557	154.814
NEW4	389165.551	410106.278	155.551
NEW5	389223.388	410080.498	153.899

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DESCRIPTION	REV	DATE	DRWN	APPR
TOPO UPDATED, 3D MESH / MODEL COMBINED	C	16.05.22	BM	-
TOPO UPDATED	B	30.01.19	BM	-
SITE INVESTIGATIONS ANNOTATED	A	11.01.19	SH	-

SurveyEng Ltd
Land Surveyors & Engineers
14 GREEN MILL
WESTHOUGHTON
BOLTON
LANCS
BL5 3GE
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CLIENT
BARRATT HOMES

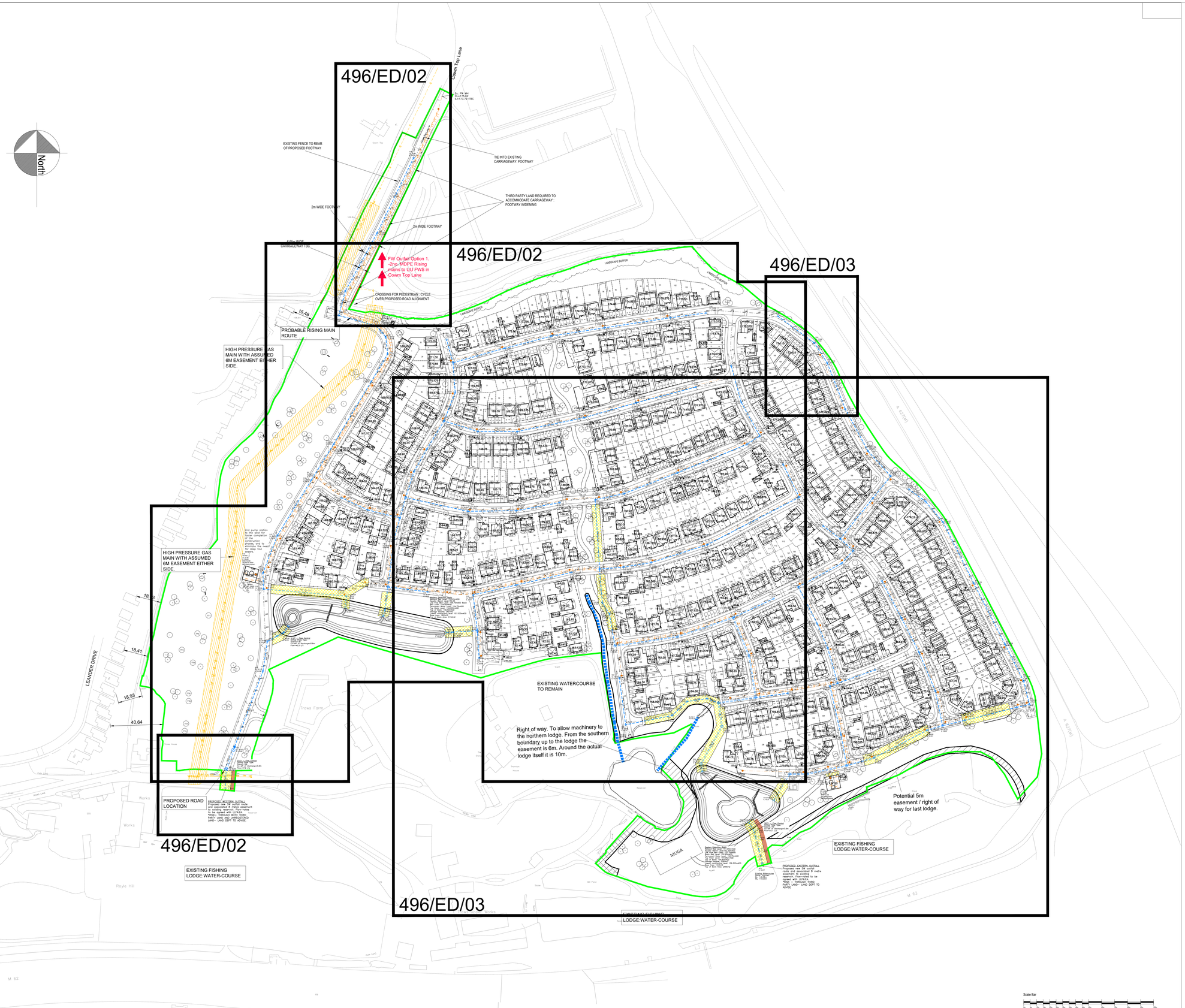
PROJECT TITLE
TROWS LANE, ROCHDALE

DRAWING DETAIL
TOPOGRAPHICAL LAND SURVEY
SHEET 4 OF 4

PROJECT ENGINEER	JLP	DATE	01.10.2018
DRAWN	BM	SCALE	1:1000@A0

DRAWING NUMBER	REVISION
BH.TS.08	C

Drawings
Engineering Layout



WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

Buyers are warned that this is a working drawing and is not intended to be treated as descriptive material describing, in relation to any particular property or development, any of the Specified matters prescribed by any Order made under the above Act. The contents of this drawing may be subject to change at any time and alterations and variations can occur during the progress of the works without revision of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially from those shown. Nor do the contents of this drawing constitute a contract, part of any contract or warranty.

ENGINEERING LAYOUT NOTES

1. All adoptable drainage works have been designed and are to be constructed in accordance with 'Sewers for Adoption, 6th Edition', and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidelines shall take presidence.

United Utilities Standard details to be used are:

STND/19/701A	Manhole Type 1
STND/19/702A	Manhole Type 2 and Invert Access Detail
STND/19/703A	Shallow Manhole Detail for Small Diameter Pipes (Type 4)
STND/19/704A	Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450Dia and Above
STND/19/705A	Flow Control Manhole Detail
STND/19/707A	External Backdrop Detail
STND/19/708A	Pipe Bedding Detail
STND/19/710A	Variable Manhole – Guidance Notes
STND/19/711A	Headwall Type 1 and Typical Outlet Grille Detail
STND/19/712A	Typical Outfall Details Type 2 & Type 3

Barratt SUDs Details to be used are:

496/ED/20	Western Attenuation Details
496/ED/21	Eastern Attenuation Details

2. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (DØ pipes only).

3. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BS kitemark.

4. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.

5. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufactured to BS EN 1917 and BS 5911/Part 3.

6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244-2. Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 13244-2.

7. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

8. This drawing is to be read in accordance with all other relevant drawings.

9. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.

10. All proposed connections to the sewer shall be 150Ø unless stated otherwise.

11. All private house drainage shall be 100Ø and all drag-out connections shall be 150Ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.

12. Runoff from private surfaces shall not discharge across the highway. Gullies or channels shall be provided as appropriate to prevent this.

13. Pram crossings shall be provided at the inner tangent points of all junctions.

14. Pipes shall be protected from concentrated loading by construction traffic during the construction period when insufficient cover to the pipe may make them vulnerable to damage.

15. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.

16. Groundworker to ensure that plot drainage be within the curtilage of the plot they serve where possible and inspection covers kept within hardstandings where possible.

17. Contractor to provide United Utilities with sufficient notice prior to commencement of Sewer works on their inspections telephone number. Tel 0845 602 0406.

18. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

ENGINEERING KEY

S1 ——○S1——	S104 Adoptable S.W. Sewer & Manhole
F1 ——●F1——	S104 Adoptable F.W. Sewer & Manhole
S: Water Drag-Out and Invert (10.25)	Foul Drag-Out and Invert 10.25
S38 Adoptable Road Gully	
Street Name Plate	
Proposed Adoptable Foul Water Pumpstation	Proposed Adoptable Foul Water Rising Main(s)
Proposed foul water outfall route – subject to UU approval	

PLEASE NOTE THAT THE DRAINAGE DESIGN IS SUBJECT TO APPROVAL BY UNITED UTILITIES AND THE LLFA.

REV	DESCRIPTION	DATE	DRAWN

BARRATT HOMES

MANCHESTER

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(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job	Cown Top Farm Castleton Rochdale
Title	Engineering Masterplan

Design By: LB	Date: 04.04.23	Drawing Number: 496/ED/13	Rev: -
C.A.D By: LB	Scale @ A0: 1:1000		

PLEASE NOTE THAT THE DRAINAGE DESIGN IS SUBJECT TO APPROVAL BY UNITED UTILITIES AND THE LLFA.

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CARRIAGEWAY TBC

FW Outfall Option 1. -2no. MDPE Rising mains to UU FWS in Cowm Top Lane

CROSSING FOR PEDESTRIAN : CYCLE OVER PROPOSED ROAD ALIGNMENT

LANDSCAPE BUFFER

LANDSCAPE BUFFER

LANDSCAPE BUFFER

15.48

PROBABLE RISING MAIN ROUTE

Cowm Top Lane

2m WIDE FOOTWAY

FW Outfall Option 1. -2no. MDPE Rising mains to UU FWS in Cowm Top Lane

CROSSING FOR PEDESTRIAN : CYCLE OVER PROPOSED ROAD ALIGNMENT

2nd pump station to the west for faster completion of the construction phases, and to eliminate the need for deep foul sewers.

HIGH PRESSURE GAS MAIN WITH ASSUMED 6M EASEMENT EITHER SIDE.

Western Detention Basin
Wetland Bed Level: 153.5mAOD
Aquatic Bench Level:154.35
Low Flow Bed Level: 154.75mAOD Basin
Bed Level: 155.000mAOD
Permanent Water Level: 154.75mAOD
Top Water Level: 156.000mAOD
Top of Bank: 156.50mAOD
Storage Volume: 2407m3
Lowest contributing level: 157.030mAOD
Base Area: 1820m2
Top of Bank Area: 3152m2

S147 — Flow Control
Orifice Plate Type
Size=0.136
Co-eff of discharge=0.6m
Flow=40.3 l/s

S151 — Flow Control
Orifice Plate Type
Size=0.129
Co-eff of discharge=0.6m
Flow=47.2 l/s

PROPOSED ROAD LOCATION

PROPOSED WESTERN OUTFALL
Proposed new SW outfall route and associated 8 metre easement to existing reservoir. Flow-rates to be agreed with LLFA:EA. *RISK— THROUGH BOTH THIRD PARTY LAND AND UNREGISTERED LAND— LAND DEPT TO ADVISE.

EXISTING WATERCOURSE TO REMAIN

Right of way. To allow machinery to the northern lodge. From the southern boundary up to the lodge the easement is 6m. Around the actual lodge itself it is 10m.

Trows House

Trows Farm

Thornton House

Track

Reservoir

ENGINEERING LAYOUT NOTES

1. All adoptable drainage works have been designed and are to be constructed in accordance with 'Sewerage Sector Guidance Appendix C — Design and Construction Guide (C.D.T. and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidelines shall take precedence.

United Utilities Standard details to be used are:

STND/19/7001A Manhole Type 1
STND/19/7002A Manhole Type 2 and Invert Access Detail
STND/19/7003A Shallow Manhole Detail for Small Diameter Pipes (Type 4)
STND/19/7004A Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450Dia and Above
STND/19/7005A Flow Control Manhole Detail
STND/19/7007A External Backdrop Detail
STND/19/7009A Pipe Bedding Detail
STND/19/7010A Variable Manhole – Guidance Notes
STND/19/7011A Headwall Type 1 and Typical Outlet Grille Detail
STND/19/7012A Typical Outfall Details Type 2 & Type 3

Barratt SUDs Details to be used are:

496/ED/20 Western Attenuation Details
496/ED/21 Eastern Attenuation Details

2. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (SW pipes only).

3. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BSI kitemark.

4. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.

5. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufactured to BS EN 1917 and BS 5911/Part 3.

6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244-2. Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 1594-2.

7. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

8. This drawing is to be read in accordance with all other relevant drawings.

9. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.

10. All proposed connections to the sewer shall be 150ø unless stated otherwise.

11. All private house drainage shall be 100ø and all drag-out connections shall be 150ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.

12. Runoff from private surfaces shall not discharge across the highway. Gullies or channels shall be provided as appropriate to prevent this.

13. Frame crossings shall be provided at the inner tangent points of all junctions.

14. Pipes shall be protected from concentrated loading by construction traffic during the construction period when insufficient cover to the pipe may make them vulnerable to damage.

15. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.

16. Groundworker to ensure that plot drainage be within the curtilage of the plot they serve where possible and inspection covers kept within hardstandings where possible.

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18. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

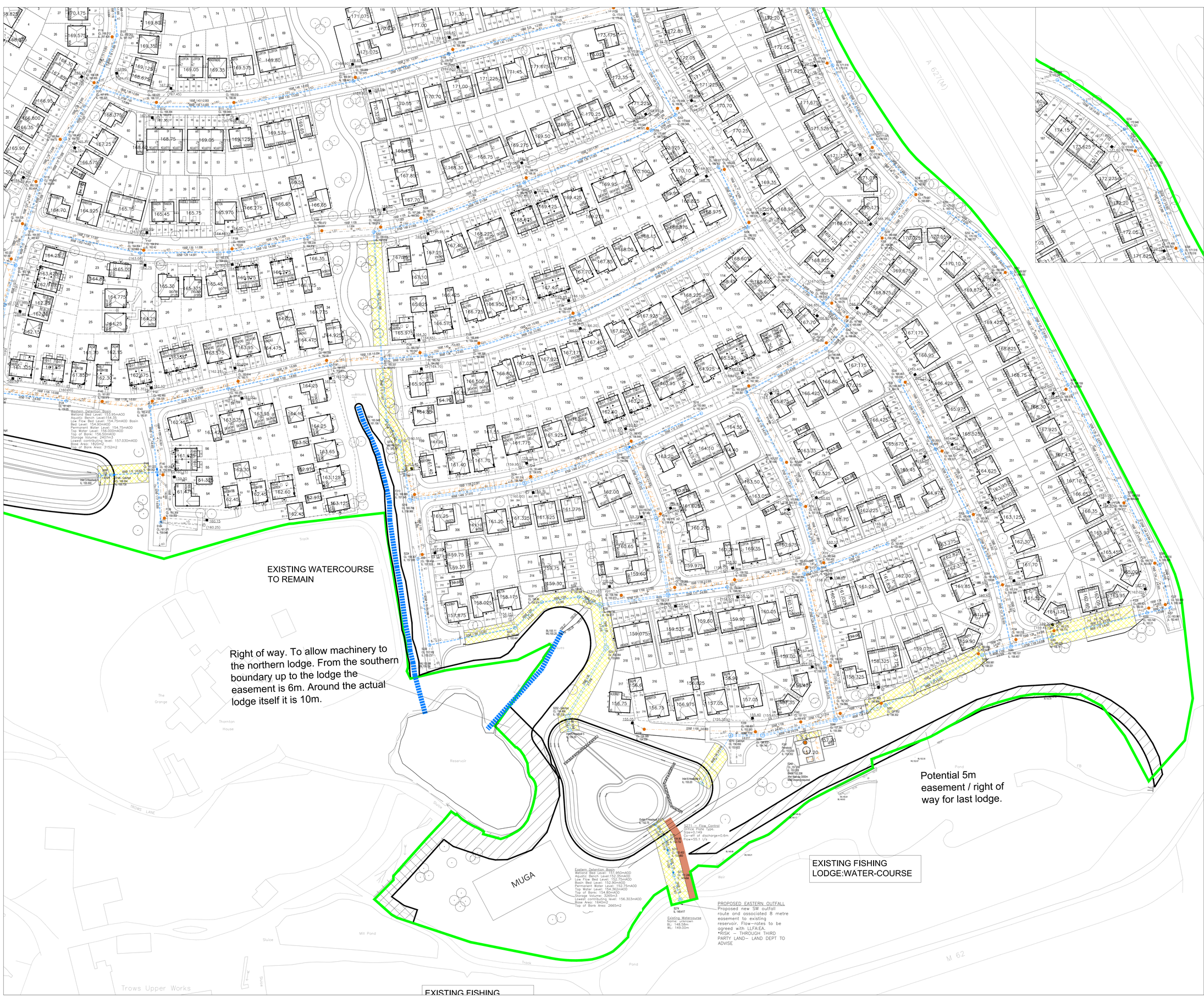
ENGINEERING KEY

- S104 Adoptable S.W. Sewer & Manhole
- S104 Adoptable F.W. Sewer & Manhole
- S. Water Drag-Out and Invert (10.25)
- Foul Drag-Out and Invert 10.25
- S38 Adoptable Road Gully
- Street Name Plate
- Proposed S104 Sewer Easement
- Proposed Adoptable Foul Water Pumpstation
- Proposed Adoptable Foul Water Rising Main(s)
- Proposed foul water outfall route — subject to UU approval
- Land required temporarily by the developer and developers contractor in order to complete outfall works

REV	DESCRIPTION	DATE	DRAWN
A	Amendments to drainage runs, FFLs, plot drainage and drag-outs. In order to ensure that the pipes and SuDs are sized correctly, the storm simulations were modelled in info drainage.	04.04.23	RB

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Job: Cowm Top, Castleton Rochdale			
Title: Preliminary Engineering Layout Sheet 1			
Design By: LB	Date: August 2022	Drawing Number: 496/ED/02	Rev: A
C.A.D By: LB	Scale @ A0: 1:500		



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United Utilities Standard details to be used are:

STND/19/0014 Manhole Type 1
STND/19/0024 Manhole Type 2 and Invert Access Detail
STND/19/0034 Shallow Manhole Detail for Small Diameter Pipes (Type 4)
STND/19/0044 Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450Dia and Above.
STND/19/0054 Flow Control Manhole Detail
STND/19/0074 External Blockring Detail
STND/19/0084 Pipe Bedding Detail
STND/19/0104 Variable Manhole – Guidance Notes
STND/19/0114 Headwall Type 1 and Typical Outlet Grille Detail
STND/19/0124 Typical Outfall Details Type 2 & Type 3

Barratt SUDs Details to be used are:

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496/ED/21 Eastern Attenuation Details

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6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 12244-2, Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 13244-2.

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ENGINEERING KEY

- S104 Adoptable S.W. Sewer & Manhole
- S104 Adoptable F.W. Sewer & Manhole
- S. Water Drag-Out and Invert
- Foul Drag-Out and Invert
- S38 Adoptable Road Gully
- Street Name Plate
- Proposed S104 Sewer Easement
- Proposed Adoptable Foul Water Pumpstation
- Proposed Adoptable Foul Water Rising Main(s)
- Proposed foul water outfall route – subject to UU approval
- Land required temporarily by the developer and developers contractor in order to complete outfall works

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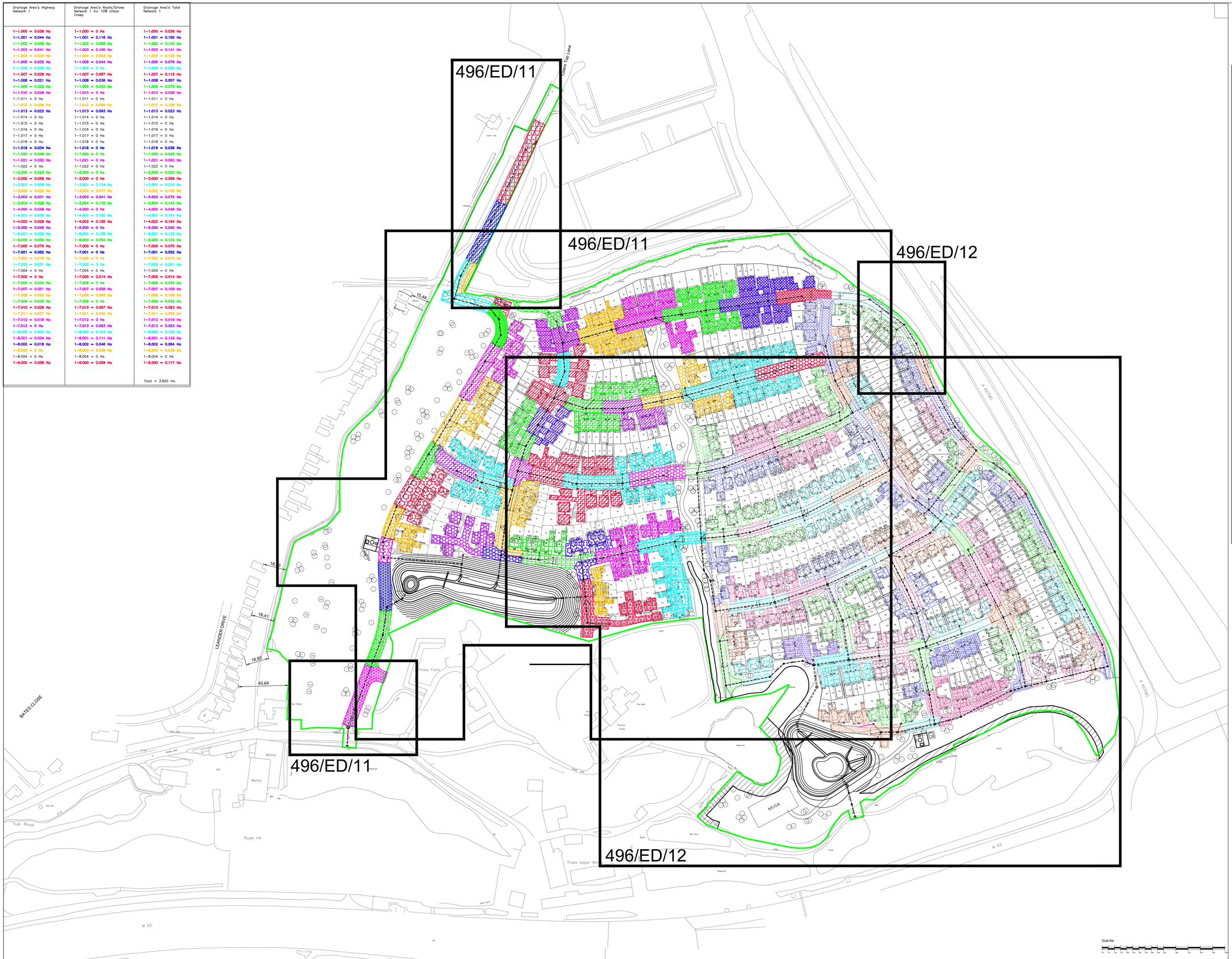
REV	DESCRIPTION	DATE	DRAWN
B	Amendments to drainage runs, FFLs, plot drainage and drag-outs. In order to ensure that the pipes and SuDs are sized correctly, the storm simulations were modelled in info drainage.	04.04.23	RB
A	Added extra viewport to show missing drainage runs S28–S31 and F32–F35.	Oct 22	LB

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Job: Cowm Top, Castleton, Rochdale			
Title: Preliminary Engineering Layout Sheet 2			
Design By: LB	Date: June 2022	Drawing Number: 496/ED/03	Rev: B
C.A.D By: LB	Scale @ A0: 1:500		

Drawings
Impermeable Area’s Plan

Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urban Creep	Drainage Area's Total Network 1
1-1.000 = 0.039 Ha	1-1.000 = 0 Ha	1-1.000 = 0.039 Ha
1-1.001 = 0.044 Ha	1-1.001 = 0.116 Ha	1-1.001 = 0.160 Ha
1-1.002 = 0.045 Ha	1-1.002 = 0.095 Ha	1-1.002 = 0.140 Ha
1-1.003 = 0.041 Ha	1-1.003 = 0.100 Ha	1-1.003 = 0.141 Ha
1-1.004 = 0.033 Ha	1-1.004 = 0.093 Ha	1-1.004 = 0.126 Ha
1-1.005 = 0.032 Ha	1-1.005 = 0.044 Ha	1-1.005 = 0.076 Ha
1-1.006 = 0.028 Ha	1-1.006 = 0 Ha	1-1.006 = 0.028 Ha
1-1.007 = 0.028 Ha	1-1.007 = 0.087 Ha	1-1.007 = 0.115 Ha
1-1.008 = 0.021 Ha	1-1.008 = 0.036 Ha	1-1.008 = 0.057 Ha
1-1.009 = 0.022 Ha	1-1.009 = 0.053 Ha	1-1.009 = 0.075 Ha
1-1.010 = 0.028 Ha	1-1.010 = 0 Ha	1-1.010 = 0.028 Ha
1-1.011 = 0 Ha	1-1.011 = 0 Ha	1-1.011 = 0 Ha
1-1.012 = 0.059 Ha	1-1.012 = 0.049 Ha	1-1.012 = 0.108 Ha
1-1.013 = 0.023 Ha	1-1.013 = 0.093 Ha	1-1.013 = 0.023 Ha
1-1.014 = 0 Ha	1-1.014 = 0 Ha	1-1.014 = 0 Ha
1-1.015 = 0 Ha	1-1.015 = 0 Ha	1-1.015 = 0 Ha
1-1.016 = 0 Ha	1-1.016 = 0 Ha	1-1.016 = 0 Ha
1-1.017 = 0 Ha	1-1.017 = 0 Ha	1-1.017 = 0 Ha
1-1.018 = 0 Ha	1-1.018 = 0 Ha	1-1.018 = 0 Ha
1-1.019 = 0.034 Ha	1-1.019 = 0 Ha	1-1.019 = 0.039 Ha
1-1.020 = 0.046 Ha	1-1.020 = 0 Ha	1-1.020 = 0.046 Ha
1-1.021 = 0.082 Ha	1-1.021 = 0 Ha	1-1.021 = 0.082 Ha
1-1.022 = 0 Ha	1-1.022 = 0 Ha	1-1.022 = 0 Ha
1-2.000 = 0.023 Ha	1-2.000 = 0 Ha	1-2.000 = 0.023 Ha
1-3.000 = 0.056 Ha	1-3.000 = 0 Ha	1-3.000 = 0.056 Ha
1-3.001 = 0.058 Ha	1-3.001 = 0.154 Ha	1-3.001 = 0.212 Ha
1-3.002 = 0.032 Ha	1-3.002 = 0.077 Ha	1-3.002 = 0.109 Ha
1-3.003 = 0.031 Ha	1-3.003 = 0.041 Ha	1-3.003 = 0.072 Ha
1-3.004 = 0.028 Ha	1-3.004 = 0.115 Ha	1-3.004 = 0.143 Ha
1-4.000 = 0.049 Ha	1-4.000 = 0 Ha	1-4.000 = 0.049 Ha
1-4.001 = 0.056 Ha	1-4.001 = 0.105 Ha	1-4.001 = 0.161 Ha
1-4.002 = 0.029 Ha	1-4.002 = 0.165 Ha	1-4.002 = 0.194 Ha
1-5.000 = 0.040 Ha	1-5.000 = 0 Ha	1-5.000 = 0.040 Ha
1-5.001 = 0.030 Ha	1-5.001 = 0.105 Ha	1-5.001 = 0.135 Ha
1-6.000 = 0.050 Ha	1-6.000 = 0.052 Ha	1-6.000 = 0.102 Ha
1-7.000 = 0.070 Ha	1-7.000 = 0 Ha	1-7.000 = 0.070 Ha
1-7.001 = 0.052 Ha	1-7.001 = 0 Ha	1-7.001 = 0.052 Ha
1-7.002 = 0.015 Ha	1-7.002 = 0 Ha	1-7.002 = 0.015 Ha
1-7.003 = 0.051 Ha	1-7.003 = 0 Ha	1-7.003 = 0.051 Ha
1-7.004 = 0 Ha	1-7.004 = 0 Ha	1-7.004 = 0 Ha
1-7.005 = 0 Ha	1-7.005 = 0.014 Ha	1-7.005 = 0.014 Ha
1-7.006 = 0.034 Ha	1-7.006 = 0 Ha	1-7.005 = 0.034 Ha
1-7.007 = 0.051 Ha	1-7.007 = 0.058 Ha	1-7.007 = 0.109 Ha
1-7.008 = 0.043 Ha	1-7.008 = 0.063 Ha	1-7.008 = 0.106 Ha
1-7.009 = 0.032 Ha	1-7.009 = 0 Ha	1-7.009 = 0.032 Ha
1-7.010 = 0.026 Ha	1-7.010 = 0.067 Ha	1-7.010 = 0.093 Ha
1-7.011 = 0.027 Ha	1-7.011 = 0.032 Ha	1-7.011 = 0.059 Ha
1-7.012 = 0.019 Ha	1-7.012 = 0 Ha	1-7.012 = 0.019 Ha
1-7.013 = 0 Ha	1-7.013 = 0.093 Ha	1-7.013 = 0.093 Ha
1-8.000 = 0.053 Ha	1-8.000 = 0.103 Ha	1-8.000 = 0.156 Ha
1-8.001 = 0.034 Ha	1-8.001 = 0.111 Ha	1-8.001 = 0.145 Ha
1-8.002 = 0.018 Ha	1-8.002 = 0.046 Ha	1-8.002 = 0.064 Ha
1-8.003 = 0 Ha	1-8.003 = 0.039 Ha	1-8.003 = 0.039 Ha
1-8.004 = 0 Ha	1-8.004 = 0 Ha	1-8.004 = 0 Ha
1-9.000 = 0.058 Ha	1-9.000 = 0.059 Ha	1-9.000 = 0.117 Ha
		Total = 3.825 Ha



WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

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Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urban Creep	Drainage Area's Total Network 1
2-1.000 = 0.059 Ha	2-1.000 = 0.045 Ha	2-1.000 = 0.104 Ha
2-1.001 = 0.026 Ha	2-1.001 = 0.050 Ha	-1.001 = 0.076 Ha
2-1.000 = 0 Ha	2-1.002 = 0.039 Ha	2-1.002 = 0.039 Ha
2-1.003 = 0.067 Ha	2-1.003 = 0.039 Ha	2-1.003 = 0.106 Ha
2-1.004 = 0.033 Ha	2-1.004 = 0.157 Ha	2-1.004 = 0.190 Ha
2-1.005 = 0.033 Ha	2-1.005 = 0.081 Ha	2-1.005 = 0.114 Ha
2-1.006 = 0.010 Ha	2-1.006 = 0.062 Ha	2-1.006 = 0.072 Ha
2-1.007 = 0 Ha	2-1.007 = 0 Ha	2-1.007 = 0 Ha
2-1.008 = 0 Ha	2-1.008 = 0 Ha	2-1.008 = 0 Ha
2-1.009 = 0.006 Ha	2-1.009 = 0.044 Ha	2-1.009 = 0.050 Ha
2-1.010 = 0.047 Ha	2-1.010 = 0 Ha	2-1.010 = 0.047 Ha
2-1.011 = 0.033 Ha	2-1.011 = 0.133 Ha	2-1.011 = 0.166 Ha
2-1.012 = 0.025 Ha	2-1.012 = 0.071 Ha	2-1.012 = 0.096 Ha
2-1.013 = 0.040 Ha	2-1.013 = 0.090 Ha	2-1.013 = 0.130 Ha
2-1.014 = 0.032 Ha	2-1.014 = 0.057 Ha	2-1.014 = 0.089 Ha
2-1.015 = 0 Ha	2-1.015 = 0.050 Ha	2-1.015 = 0.050 Ha
2-1.016 = 0 Ha	2-1.016 = 0 Ha	2-1.016 = 0 Ha
2-1.017 = 0 Ha	2-1.017 = 0 Ha	2-1.017 = 0 Ha
2-1.018 = 0 Ha	2-1.018 = 0 Ha	2-1.018 = 0 Ha
2-1.019 = 0 Ha	2-1.019 = 0 Ha	2-1.019 = 0 Ha
2-1.020 = 0 Ha	2-1.020 = 0 Ha	2-1.020 = 0 Ha
2-1.021 = 0 Ha	2-1.021 = 0 Ha	2-1.021 = 0 Ha
2-2.000 = 0.050 Ha	2-2.000 = 0.025 Ha	2-2.000 = 0.075 Ha
2-2.001 = 0.054 Ha	2-2.001 = 0.075 Ha	2-2.001 = 0.0129 Ha
2-2.002 = 0.065 Ha	2-2.002 = 0.171 Ha	2-2.002 = 0.236 Ha
2-2.003 = 0.026 Ha	2-2.003 = 0 Ha	2-2.003 = 0.026 Ha
2-2.004 = 0.026 Ha	2-2.004 = 0.139 Ha	2-2.004 = 0.165 Ha
2-3.000 = 0.039 Ha	2-3.000 = 0 Ha	2-3.000 = 0.039 Ha
2-4.000 = 0.044 Ha	2-4.000 = 0.092 Ha	2-4.000 = 0.136 Ha
2-5.000 = 0.026 Ha	2-5.000 = 0.028 Ha	2-5.000 = 0.054 Ha
2-5.001 = 0.053 Ha	2-5.001 = 0 Ha	2-5.001 = 0.053 Ha
2-5.002 = 0 Ha	2-5.002 = 0.043 Ha	2-5.002 = 0.043 Ha
2-5.003 = 0 Ha	2-5.003 = 0 Ha	2-5.003 = 0 Ha
2-5.004 = 0 Ha	2-5.004 = 0 Ha	2-5.004 = 0 Ha
2-6.000 = 0 Ha	2-6.000 = 0.092 Ha	2-6.000 = 0.092 Ha
2-6.001 = 0.027 Ha	2-6.001 = 0.062 Ha	2-6.001 = 0.089 Ha
2-6.002 = 0.026 Ha	2-6.002 = 0 Ha	2-6.002 = 0.026 Ha
2-6.003 = 0.039 Ha	2-6.003 = 0.064 Ha	2-6.003 = 0.103 Ha
2-6.004 = 0.040 Ha	2-6.004 = 0.008 Ha	2-6.004 = 0.048 Ha
2-6.005 = 0.021 Ha	2-6.005 = 0 Ha	2-6.005 = 0.021 Ha
2-6.006 = 0.028 Ha	2-6.006 = 0.019 Ha	2-6.006 = 0.047 Ha
2-6.007 = 0.027 Ha	2-6.007 = 0.061 Ha	2-6.007 = 0.088 Ha
2-6.008 = 0.053 Ha	2-6.008 = 0.045 Ha	2-6.008 = 0.098 Ha
2-6.009 = 0.030 Ha	2-6.009 = 0 Ha	2-6.009 = 0.030 Ha
2-6.010 = 0.028 Ha	2-6.010 = 0.107 Ha	2-6.010 = 0.135 Ha
2-6.011 = 0.024 Ha	2-6.011 = 0 Ha	2-6.011 = 0.024 Ha
2-6.012 = 0.025 Ha	2-6.012 = 0.081 Ha	2-6.012 = 0.106 Ha
2-6.013 = 0 Ha	2-6.013 = 0.050 Ha	2-6.013 = 0.050 Ha
2-6.014 = 0.055 Ha	2-6.014 = 0 Ha	2-6.014 = 0.055 Ha
2-6.015 = 0 Ha	2-6.015 = 0.018 Ha	2-6.015 = 0.018 Ha
2-6.016 = 0.027 Ha	2-6.016 = 0 Ha	2-6.016 = 0.027 Ha
2-6.017 = 0 Ha	2-6.017 = 0.049 Ha	2-6.017 = 0.049 Ha
2-6.018 = 0.035 Ha	2-6.018 = 0.059 Ha	2-6.018 = 0.094 Ha
2-7.000 = 0.034 Ha	2-7.000 = 0 Ha	2-7.000 = 0.034 Ha
2-8.000 = 0.044 Ha	2-8.000 = 0.045 Ha	2-8.000 = 0.089 Ha
2-9.000 = 0.030 Ha	2-9.000 = 0 Ha	2-9.000 = 0.030 Ha
2-9.001 = 0.015 Ha	2-9.001 = 0 Ha	2-9.001 = 0.015 Ha
2-9.002 = 0.040 Ha	2-9.002 = 0.042 Ha	2-9.002 = 0.082 Ha
2-9.003 = 0.040 Ha	2-9.003 = 0.070 Ha	2-9.003 = 0.110 Ha
2-9.004 = 0.027 Ha	2-9.004 = 0.059 Ha	2-9.004 = 0.086 Ha
2-9.005 = 0.014 Ha	2-9.005 = 0 Ha	2-9.005 = 0.014 Ha
2-9.006 = 0.018 Ha	2-9.006 = 0 Ha	2-9.006 = 0.018 Ha
2-9.007 = 0.011 Ha	2-9.007 = 0.039 Ha	2-9.007 = 0.050 Ha
2-9.008 = 0.019 Ha	2-9.008 = 0.051 Ha	2-9.008 = 0.070 Ha
2-9.009 = 0.020 Ha	2-9.009 = 0 Ha	2-9.009 = 0.020 Ha
2-9010 = 0 Ha	2-9.010 = 0 Ha	2-9.010 = 0 Ha
2-9011 = 0.028 Ha	2-9.011 = 0.111 Ha	2-9.011 = 0.139 Ha
2-10000 = 0.026 Ha	2-10.000 = 0 Ha	2-10.000 = 0.026 Ha
2-10001 = 0.044 Ha	2-10.001 = 0.131 Ha	2-10.001 = 0.175 Ha
2-10002 = 0.030 Ha	2-10.002 = 0.027 Ha	2-10.002 = 0.057 Ha
2-10003 = 0.025 Ha	2-10.003 = 0.075 Ha	2-10.003 = 0.100 Ha
		Total = 4.522 Ha

REV	DESCRIPTION	DATE	DRAWN

BARRATT HOMES

MANCHESTER

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Fax: 0161 855 2020

Job: Cown Top Farm, Castleton, Rochdale			
Title: Impermeable Areas Masterplan			
Design By: LB	Date: June 2023	Drawing Number: 496/ED/22	Rev: -
C.A.D By: LB	Scale @ A0: 1:1000		

WARNING TO HOUSE-PURCHASERS
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LANDSCAPE BUFFER

LANDSCAPE BUFFER

LANDSCAPE BUFFER

Cown Top

Trows Farm

Trows House

The Nest

Thornton House

Track

Track

Track

Issues

Issues

Sales

Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urbon Creep	Drainage Area's Total Network 1
1=1.000 = 0.039 Ha	1=1.000 = 0 Ha	1=1.000 = 0.039 Ha
1=1.001 = 0.044 Ha	1=1.001 = 0.116 Ha	1=1.001 = 0.160 Ha
1=1.002 = 0.045 Ha	1=1.002 = 0.095 Ha	1=1.002 = 0.140 Ha
1=1.003 = 0.041 Ha	1=1.003 = 0.100 Ha	1=1.003 = 0.141 Ha
1=1.004 = 0.033 Ha	1=1.004 = 0.093 Ha	1=1.004 = 0.126 Ha
1=1.005 = 0.032 Ha	1=1.005 = 0.044 Ha	1=1.005 = 0.076 Ha
1=1.006 = 0.028 Ha	1=1.006 = 0 Ha	1=1.006 = 0.028 Ha
1=1.007 = 0.028 Ha	1=1.007 = 0.087 Ha	1=1.007 = 0.115 Ha
1=1.008 = 0.021 Ha	1=1.008 = 0.036 Ha	1=1.008 = 0.057 Ha
1=1.009 = 0.022 Ha	1=1.009 = 0.053 Ha	1=1.009 = 0.075 Ha
1=1.010 = 0.028 Ha	1=1.010 = 0 Ha	1=1.010 = 0.028 Ha
1=1.011 = 0 Ha	1=1.011 = 0 Ha	1=1.011 = 0 Ha
1=1.012 = 0.039 Ha	1=1.012 = 0.069 Ha	1=1.012 = 0.108 Ha
1=1.013 = 0.023 Ha	1=1.013 = 0.093 Ha	1=1.013 = 0.023 Ha
1=1.014 = 0 Ha	1=1.014 = 0 Ha	1=1.014 = 0 Ha
1=1.015 = 0 Ha	1=1.015 = 0 Ha	1=1.015 = 0 Ha
1=1.016 = 0 Ha	1=1.016 = 0 Ha	1=1.016 = 0 Ha
1=1.017 = 0 Ha	1=1.017 = 0 Ha	1=1.017 = 0 Ha
1=1.018 = 0 Ha	1=1.018 = 0 Ha	1=1.018 = 0 Ha
1=1.019 = 0.034 Ha	1=1.019 = 0 Ha	1=1.019 = 0.039 Ha
1=1.020 = 0.046 Ha	1=1.020 = 0 Ha	1=1.020 = 0.046 Ha
1=1.021 = 0.062 Ha	1=1.021 = 0 Ha	1=1.021 = 0.062 Ha
1=1.022 = 0 Ha	1=1.022 = 0 Ha	1=1.022 = 0 Ha
1=2.000 = 0.023 Ha	1=2.000 = 0 Ha	1=2.000 = 0.023 Ha
1=3.000 = 0.056 Ha	1=3.000 = 0 Ha	1=3.000 = 0.056 Ha
1=3.001 = 0.058 Ha	1=3.001 = 0.154 Ha	1=3.001 = 0.212 Ha
1=3.002 = 0.032 Ha	1=3.002 = 0.077 Ha	1=3.002 = 0.109 Ha
1=3.003 = 0.031 Ha	1=3.003 = 0.041 Ha	1=3.003 = 0.072 Ha
1=3.004 = 0.028 Ha	1=3.004 = 0.115 Ha	1=3.004 = 0.143 Ha
1=4.000 = 0.049 Ha	1=4.000 = 0 Ha	1=4.000 = 0.049 Ha
1=4.001 = 0.056 Ha	1=4.001 = 0.105 Ha	1=4.001 = 0.161 Ha
1=4.002 = 0.029 Ha	1=4.002 = 0.165 Ha	1=4.002 = 0.194 Ha
1=5.000 = 0.040 Ha	1=5.000 = 0 Ha	1=5.000 = 0.040 Ha
1=5.001 = 0.030 Ha	1=5.001 = 0.105 Ha	1=5.001 = 0.135 Ha
1=6.000 = 0.050 Ha	1=6.000 = 0.052 Ha	1=6.000 = 0.102 Ha
1=7.000 = 0.070 Ha	1=7.000 = 0 Ha	1=7.000 = 0.070 Ha
1=7.001 = 0.052 Ha	1=7.001 = 0 Ha	1=7.001 = 0.052 Ha
1=7.002 = 0.015 Ha	1=7.002 = 0 Ha	1=7.002 = 0.015 Ha
1=7.003 = 0.051 Ha	1=7.003 = 0 Ha	1=7.003 = 0.051 Ha
1=7.004 = 0 Ha	1=7.004 = 0 Ha	1=7.004 = 0 Ha
1=7.005 = 0 Ha	1=7.005 = 0.014 Ha	1=7.005 = 0.014 Ha
1=7.006 = 0.034 Ha	1=7.006 = 0 Ha	1=7.006 = 0.034 Ha
1=7.007 = 0.051 Ha	1=7.007 = 0.058 Ha	1=7.007 = 0.109 Ha
1=7.008 = 0.043 Ha	1=7.008 = 0.063 Ha	1=7.008 = 0.106 Ha
1=7.009 = 0.032 Ha	1=7.009 = 0 Ha	1=7.009 = 0.032 Ha
1=7.010 = 0.026 Ha	1=7.010 = 0.067 Ha	1=7.010 = 0.093 Ha
1=7.011 = 0.027 Ha	1=7.011 = 0.032 Ha	1=7.011 = 0.059 Ha
1=7.012 = 0.019 Ha	1=7.012 = 0 Ha	1=7.012 = 0.019 Ha
1=7.013 = 0 Ha	1=7.013 = 0.093 Ha	1=7.013 = 0.093 Ha
1=8.000 = 0.053 Ha	1=8.000 = 0.103 Ha	1=8.000 = 0.156 Ha
1=8.001 = 0.034 Ha	1=8.001 = 0.111 Ha	1=8.001 = 0.145 Ha
1=8.002 = 0.018 Ha	1=8.002 = 0.046 Ha	1=8.002 = 0.064 Ha
1=8.003 = 0 Ha	1=8.003 = 0.039 Ha	1=8.003 = 0.039 Ha
1=8.004 = 0 Ha	1=8.004 = 0 Ha	1=8.004 = 0 Ha
1=9.000 = 0.058 Ha	1=9.000 = 0.059 Ha	1=9.000 = 0.117 Ha
		Total = 3.825 Ha

Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urbon Creep	Drainage Area's Total Network 1
2=1000 = 0.059 Ha	2=1.000 = 0.045 Ha	2=1.000 = 0.104 Ha
2=1001 = 0.026 Ha	2=1001 = 0.050 Ha	2=1001 = 0.076 Ha
2=1002 = 0 Ha	2=1002 = 0.039 Ha	2=1002 = 0.039 Ha
2=1003 = 0.067 Ha	2=1003 = 0.039 Ha	2=1003 = 0.106 Ha
2=1004 = 0.033 Ha	2=1004 = 0.157 Ha	2=1004 = 0.190 Ha
2=1005 = 0.033 Ha	2=1005 = 0.081 Ha	2=1005 = 0.114 Ha
2=1006 = 0.019 Ha	2=1006 = 0.052 Ha	2=1006 = 0.071 Ha
2=1007 = 0 Ha	2=1007 = 0 Ha	2=1007 = 0 Ha
2=1008 = 0 Ha	2=1008 = 0 Ha	2=1008 = 0 Ha
2=1009 = 0.006 Ha	2=1009 = 0.044 Ha	2=1009 = 0.050 Ha
2=1010 = 0.047 Ha	2=1010 = 0 Ha	2=1010 = 0.047 Ha
2=1011 = 0.033 Ha	2=1011 = 0.133 Ha	2=1011 = 0.166 Ha
2=1012 = 0.025 Ha	2=1012 = 0.071 Ha	2=1012 = 0.096 Ha
2=1013 = 0.040 Ha	2=1013 = 0.090 Ha	2=1013 = 0.130 Ha
2=1014 = 0 Ha	2=1014 = 0.052 Ha	2=1014 = 0.052 Ha
2=1015 = 0 Ha	2=1015 = 0.050 Ha	2=1015 = 0.050 Ha
2=1016 = 0 Ha	2=1016 = 0 Ha	2=1016 = 0 Ha
2=1017 = 0 Ha	2=1017 = 0 Ha	2=1017 = 0 Ha
2=1018 = 0 Ha	2=1018 = 0 Ha	2=1018 = 0 Ha
2=1019 = 0 Ha	2=1019 = 0 Ha	2=1019 = 0 Ha
2=1020 = 0 Ha	2=1020 = 0 Ha	2=1020 = 0 Ha
2=1021 = 0 Ha	2=1021 = 0 Ha	2=1021 = 0 Ha
2=2000 = 0.050 Ha	2=2.000 = 0.025 Ha	2=2.000 = 0.075 Ha
2=2001 = 0.054 Ha	2=2001 = 0.075 Ha	2=2001 = 0.0129 Ha
2=2002 = 0.052 Ha	2=2002 = 0.171 Ha	2=2002 = 0.223 Ha
2=2003 = 0.028 Ha	2=2.003 = 0 Ha	2=2.003 = 0.028 Ha
2=2004 = 0.026 Ha	2=2004 = 0.139 Ha	2=2.004 = 0.165 Ha
2=2005 = 0.039 Ha	2=2005 = 0.039 Ha	2=2.005 = 0.078 Ha
2=4000 = 0.044 Ha	2=4.000 = 0.092 Ha	2=4.000 = 0.136 Ha
2=5000 = 0.026 Ha	2=5.000 = 0.028 Ha	2=5.000 = 0.054 Ha
2=5001 = 0.053 Ha	2=5.001 = 0 Ha	2=5.001 = 0.053 Ha
2=5002 = 0 Ha	2=5.002 = 0.043 Ha	2=5.002 = 0.043 Ha
2=5003 = 0 Ha	2=5.003 = 0 Ha	2=5.003 = 0 Ha
2=5004 = 0 Ha	2=5.004 = 0 Ha	2=5.004 = 0 Ha
2=6000 = 0.060 Ha	2=6.000 = 0.062 Ha	2=6.000 = 0.060 Ha
2=6001 = 0.027 Ha	2=6.001 = 0.092 Ha	2=6.001 = 0.119 Ha
2=6002 = 0.026 Ha	2=6.002 = 0 Ha	2=6.002 = 0.026 Ha
2=6003 = 0.039 Ha	2=6.003 = 0.064 Ha	2=6.003 = 0.103 Ha
2=6004 = 0.008 Ha	2=6.004 = 0.048 Ha	2=6.004 = 0.056 Ha
2=6005 = 0.021 Ha	2=6.005 = 0 Ha	2=6.005 = 0.021 Ha
2=6006 = 0.028 Ha	2=6.006 = 0.019 Ha	2=6.006 = 0.047 Ha
2=6007 = 0.027 Ha	2=6.007 = 0.061 Ha	2=6.007 = 0.088 Ha
2=6008 = 0.023 Ha	2=6.008 = 0.045 Ha	2=6.008 = 0.068 Ha
2=6009 = 0.030 Ha	2=6.009 = 0 Ha	2=6.009 = 0.030 Ha
2=6010 = 0.028 Ha	2=6.010 = 0.107 Ha	2=6.010 = 0.135 Ha
2=6011 = 0.024 Ha	2=6.011 = 0 Ha	2=6.011 = 0.024 Ha
2=6012 = 0.025 Ha	2=6.012 = 0.081 Ha	2=6.012 = 0.106 Ha
2=6013 = 0 Ha	2=6.013 = 0.050 Ha	2=6.013 = 0.050 Ha
2=6014 = 0.055 Ha	2=6.014 = 0 Ha	2=6.014 = 0.055 Ha
2=6015 = 0 Ha	2=6.015 = 0.018 Ha	2=6.015 = 0.018 Ha
2=6016 = 0.027 Ha	2=6.016 = 0 Ha	2=6.016 = 0.027 Ha
2=6017 = 0 Ha	2=6.017 = 0.049 Ha	2=6.017 = 0.049 Ha
2=6018 = 0.035 Ha	2=6.018 = 0.059 Ha	2=6.018 = 0.094 Ha
2=7000 = 0.034 Ha	2=7.000 = 0 Ha	2=7.000 = 0.034 Ha
2=8000 = 0.044 Ha	2=8.000 = 0.045 Ha	2=8.000 = 0.089 Ha
2=9000 = 0.030 Ha	2=9.000 = 0 Ha	2=9.000 = 0.030 Ha
2=9001 = 0.015 Ha	2=9.001 = 0 Ha	2=9.001 = 0.015 Ha
2=9002 = 0.040 Ha	2=9.002 = 0.042 Ha	2=9.002 = 0.082 Ha
2=9003 = 0.040 Ha	2=9.003 = 0.070 Ha	2=9.003 = 0.110 Ha
2=9004 = 0.027 Ha	2=9.004 = 0.059 Ha	2=9.004 = 0.086 Ha
2=9005 = 0.014 Ha	2=9.005 = 0 Ha	2=9.005 = 0.014 Ha
2=9006 = 0.018 Ha	2=9.006 = 0 Ha	2=9.006 = 0.018 Ha
2=9007 = 0.011 Ha	2=9.007 = 0.039 Ha	2=9.007 = 0.050 Ha
2=9008 = 0.019 Ha	2=9.008 = 0.051 Ha	2=9.008 = 0.070 Ha
2=9009 = 0.020 Ha	2=9.009 = 0 Ha	2=9.009 = 0.020 Ha
2=9010 = 0 Ha	2=9.010 = 0 Ha	2=9.010 = 0 Ha
2=9011 = 0.028 Ha	2=9.011 = 0.131 Ha	2=9.011 = 0.159 Ha
2=10000 = 0.026 Ha	2=10.000 = 0 Ha	2=10.000 = 0.026 Ha
2=10001 = 0.044 Ha	2=10.001 = 0.131 Ha	2=10.001 = 0.175 Ha
2=10002 = 0.030 Ha	2=10.002 = 0.027 Ha	2=10.002 = 0.057 Ha
2=10003 = 0.025 Ha	2=10.003 = 0.075 Ha	2=10.003 = 0.100 Ha
		Total = 4.522 Ha

REV	DESCRIPTION	DATE	DRAWN

BARRATT HOMES

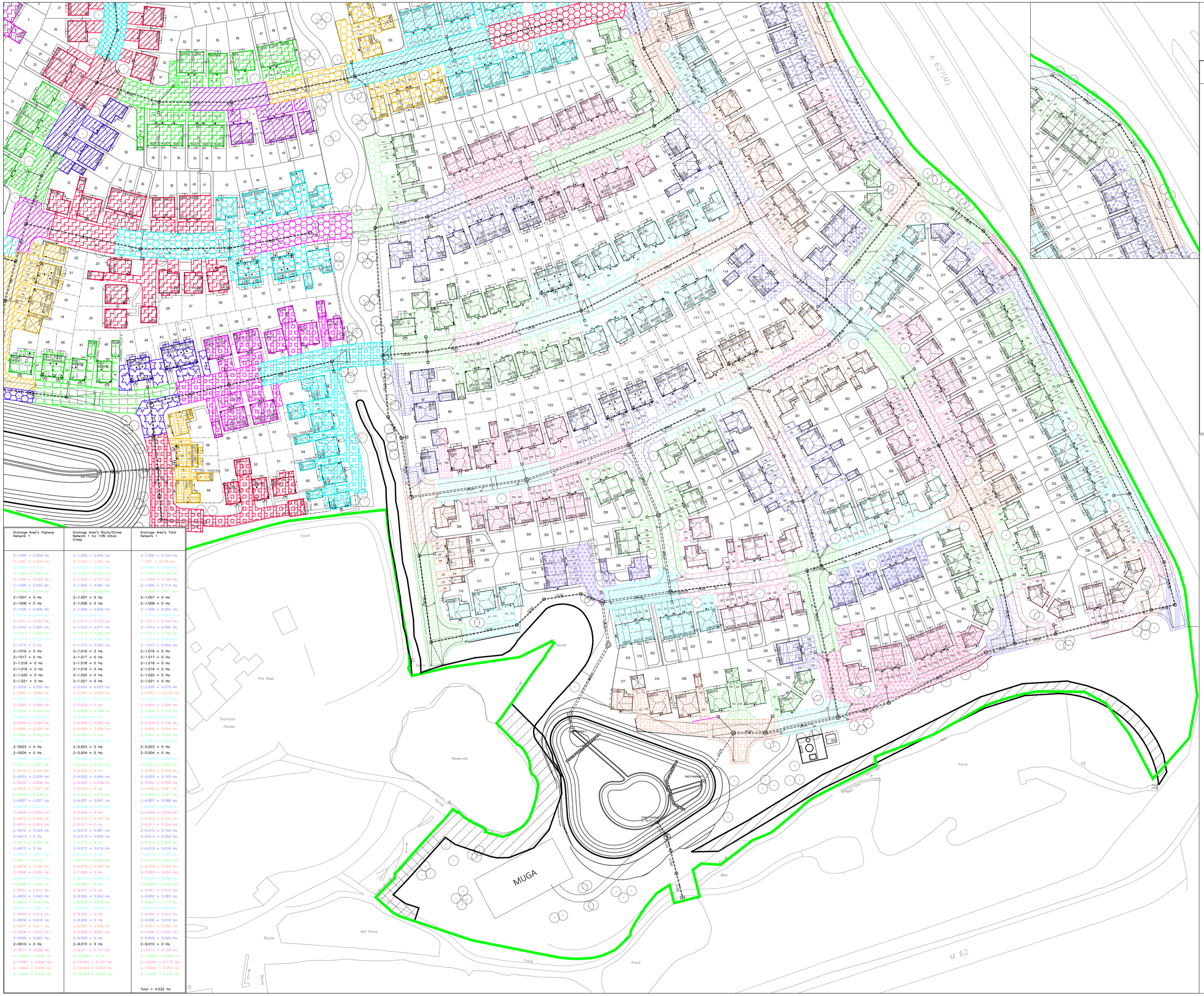
MANCHESTER

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4 Brindley Road
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Tel: 0161 872 0161
Fax: 0161 855 2828

Job
Cown Top,
Castleton
Rochdale

Title
Impermeable Area's Plan
Sheet 1 of 2

Design By	Date	Drawing Number	Rev
LB	Jun 2023	496/ED/11	-
C.A.D By	Scale @ A0		
LB	1:500		



Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urban Creep	Drainage Area's Total Network 1
2-1000 = 0.059 Ha	2-1.000 = 0.045 Ha	2-1.000 = 0.104 Ha
2-1001 = 0.026 Ha	2-1.001 = 0.050 Ha	-1.001 = 0.076 Ha
2-1002 = 0 Ha	2-1.002 = 0.039 Ha	2-1.002 = 0.039 Ha
2-1003 = 0.067 Ha	2-1.003 = 0.039 Ha	2-1.003 = 0.106 Ha
2-1004 = 0.033 Ha	2-1.004 = 0.157 Ha	2-1.004 = 0.190 Ha
2-1005 = 0.033 Ha	2-1.005 = 0.081 Ha	2-1.005 = 0.114 Ha
2-1006 = 0.019 Ha	2-1.006 = 0.052 Ha	2-1.006 = 0.071 Ha
2-1007 = 0 Ha	2-1.007 = 0 Ha	2-1.007 = 0 Ha
2-1008 = 0 Ha	2-1.008 = 0 Ha	2-1.008 = 0 Ha
2-1009 = 0.006 Ha	2-1.009 = 0.044 Ha	2-1.009 = 0.050 Ha
2-1010 = 0.047 Ha	2-1.010 = 0 Ha	2-1.010 = 0.047 Ha
2-1011 = 0.033 Ha	2-1.011 = 0.133 Ha	2-1.011 = 0.166 Ha
2-1012 = 0.025 Ha	2-1.012 = 0.071 Ha	2-1.012 = 0.096 Ha
2-1013 = 0.040 Ha	2-1.013 = 0.090 Ha	2-1.013 = 0.130 Ha
2-1014 = 0.032 Ha	2-1.014 = 0.057 Ha	2-1.014 = 0.089 Ha
2-1015 = 0 Ha	2-1.015 = 0.050 Ha	2-1.015 = 0.050 Ha
2-1016 = 0 Ha	2-1.016 = 0 Ha	2-1.016 = 0 Ha
2-1017 = 0 Ha	2-1.017 = 0 Ha	2-1.017 = 0 Ha
2-1.018 = 0 Ha	2-1.018 = 0 Ha	2-1.018 = 0 Ha
2-1.019 = 0 Ha	2-1.019 = 0 Ha	2-1.019 = 0 Ha
2-1.020 = 0 Ha	2-1.020 = 0 Ha	2-1.020 = 0 Ha
2-1.021 = 0 Ha	2-1.021 = 0 Ha	2-1.021 = 0 Ha
2-2000 = 0.050 Ha	2-2.000 = 0.025 Ha	2-2.000 = 0.075 Ha
2-2001 = 0.054 Ha	2-2.001 = 0.075 Ha	2-2.001 = 0.0129 Ha
2-2002 = 0.052 Ha	2-2.002 = 0.171 Ha	2-2.002 = 0.223 Ha
2-2003 = 0.026 Ha	2-2.003 = 0 Ha	2-2.003 = 0.026 Ha
2-2004 = 0.026 Ha	2-2.004 = 0.139 Ha	2-2.004 = 0.165 Ha
2-3000 = 0.039 Ha	2-3.000 = 0 Ha	2-3.000 = 0.039 Ha
2-4000 = 0.044 Ha	2-4.000 = 0.092 Ha	2-4.000 = 0.136 Ha
2-5000 = 0.026 Ha	2-5.000 = 0.028 Ha	2-5.000 = 0.054 Ha
2-5001 = 0.053 Ha	2-5.001 = 0 Ha	2-5.001 = 0.053 Ha
2-5002 = 0 Ha	2-5.002 = 0.043 Ha	2-5.002 = 0.043 Ha
2-5003 = 0 Ha	2-5.003 = 0 Ha	2-5.003 = 0 Ha
2-5004 = 0 Ha	2-5.004 = 0 Ha	2-5.004 = 0 Ha
2-6000 = 0.059 Ha	2-6.000 = 0 Ha	2-6.000 = 0.059 Ha
2-6001 = 0.027 Ha	2-6.001 = 0.062 Ha	2-6.001 = 0.089 Ha
2-6002 = 0.026 Ha	2-6.002 = 0 Ha	2-6.002 = 0.026 Ha
2-6003 = 0.039 Ha	2-6.003 = 0.064 Ha	2-6.003 = 0.103 Ha
2-6004 = 0.008 Ha	2-6.004 = 0.048 Ha	2-6.004 = 0.056 Ha
2-6005 = 0.021 Ha	2-6.005 = 0 Ha	2-6.005 = 0.021 Ha
2-6006 = 0.028 Ha	2-6.006 = 0.019 Ha	2-6.006 = 0.047 Ha
2-6007 = 0.027 Ha	2-6.007 = 0.061 Ha	2-6.007 = 0.088 Ha
2-6008 = 0.023 Ha	2-6.008 = 0.045 Ha	2-6.008 = 0.068 Ha
2-6009 = 0.030 Ha	2-6.009 = 0 Ha	2-6.009 = 0.030 Ha
2-6010 = 0.028 Ha	2-6.010 = 0.107 Ha	2-6.010 = 0.135 Ha
2-6011 = 0.024 Ha	2-6.011 = 0 Ha	2-6.011 = 0.024 Ha
2-6012 = 0.025 Ha	2-6.012 = 0.081 Ha	2-6.012 = 0.106 Ha
2-6013 = 0 Ha	2-6.013 = 0.050 Ha	2-6.013 = 0.050 Ha
2-6014 = 0.055 Ha	2-6.014 = 0 Ha	2-6.014 = 0.055 Ha
2-6015 = 0 Ha	2-6.015 = 0.018 Ha	2-6.015 = 0.018 Ha
2-6016 = 0.027 Ha	2-6.016 = 0 Ha	2-6.016 = 0.027 Ha
2-6017 = 0 Ha	2-6.017 = 0.049 Ha	2-6.017 = 0.049 Ha
2-6018 = 0.035 Ha	2-6.018 = 0.059 Ha	2-6.018 = 0.094 Ha
2-7000 = 0.034 Ha	2-7.000 = 0 Ha	2-7.000 = 0.034 Ha
2-8000 = 0.044 Ha	2-8.000 = 0.045 Ha	2-8.000 = 0.089 Ha
2-9000 = 0.030 Ha	2-9.000 = 0 Ha	2-9.000 = 0.030 Ha
2-9001 = 0.015 Ha	2-9.001 = 0 Ha	2-9.001 = 0.015 Ha
2-9002 = 0.040 Ha	2-9.002 = 0.042 Ha	2-9.002 = 0.082 Ha
2-9003 = 0.040 Ha	2-9.003 = 0.070 Ha	2-9.003 = 0.110 Ha
2-9004 = 0.027 Ha	2-9.004 = 0.059 Ha	2-9.004 = 0.086 Ha
2-9005 = 0.014 Ha	2-9.005 = 0 Ha	2-9.005 = 0.014 Ha
2-9006 = 0.018 Ha	2-9.006 = 0 Ha	2-9.006 = 0.018 Ha
2-9007 = 0.011 Ha	2-9.007 = 0.039 Ha	2-9.007 = 0.050 Ha
2-9008 = 0.019 Ha	2-9.008 = 0.051 Ha	2-9.008 = 0.070 Ha
2-9009 = 0.020 Ha	2-9.009 = 0 Ha	2-9.009 = 0.020 Ha
2-9010 = 0 Ha	2-9.010 = 0 Ha	2-9.010 = 0 Ha
2-9011 = 0.028 Ha	2-9.011 = 0.111 Ha	2-9.011 = 0.139 Ha
2-10000 = 0.026 Ha	2-10.000 = 0 Ha	2-10.000 = 0.026 Ha
2-10001 = 0.044 Ha	2-10.001 = 0.131 Ha	2-10.001 = 0.175 Ha
2-10002 = 0.030 Ha	2-10.002 = 0.027 Ha	2-10.002 = 0.057 Ha
2-10003 = 0.025 Ha	2-10.003 = 0.075 Ha	2-10.003 = 0.100 Ha
		Total = 4.522 Ha

WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

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Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urban Creep	Drainage Area's Total Network 1
1-1.000 = 0.039 Ha	1-1.000 = 0 Ha	1-1.000 = 0.039 Ha
1-1.001 = 0.044 Ha	1-1.001 = 0.118 Ha	1-1.001 = 0.160 Ha
1-1.002 = 0.045 Ha	1-1.002 = 0.095 Ha	1-1.002 = 0.140 Ha
1-1.003 = 0.041 Ha	1-1.003 = 0.100 Ha	1-1.003 = 0.141 Ha
1-1.004 = 0.033 Ha	1-1.004 = 0.093 Ha	1-1.004 = 0.126 Ha
1-1.005 = 0.032 Ha	1-1.005 = 0.044 Ha	1-1.005 = 0.076 Ha
1-1.006 = 0.028 Ha	1-1.006 = 0 Ha	1-1.006 = 0.028 Ha
1-1.007 = 0.028 Ha	1-1.007 = 0.087 Ha	1-1.007 = 0.115 Ha
1-1.008 = 0.021 Ha	1-1.008 = 0.036 Ha	1-1.008 = 0.057 Ha
1-1.009 = 0.022 Ha	1-1.009 = 0.053 Ha	1-1.009 = 0.075 Ha
1-1.010 = 0.028 Ha	1-1.010 = 0 Ha	1-1.010 = 0.028 Ha
1-1.011 = 0 Ha	1-1.011 = 0 Ha	1-1.011 = 0 Ha
1-1.012 = 0.059 Ha	1-1.012 = 0.049 Ha	1-1.012 = 0.108 Ha
1-1.013 = 0.023 Ha	1-1.013 = 0.093 Ha	1-1.013 = 0.023 Ha
1-1.014 = 0 Ha	1-1.014 = 0 Ha	1-1.014 = 0 Ha
1-1.015 = 0 Ha	1-1.015 = 0 Ha	1-1.015 = 0 Ha
1-1.016 = 0 Ha	1-1.016 = 0 Ha	1-1.016 = 0 Ha
1-1.017 = 0 Ha	1-1.017 = 0 Ha	1-1.017 = 0 Ha
1-1.018 = 0 Ha	1-1.018 = 0 Ha	1-1.018 = 0 Ha
1-1.019 = 0.034 Ha	1-1.019 = 0 Ha	1-1.019 = 0.039 Ha
1-1.020 = 0.046 Ha	1-1.020 = 0 Ha	1-1.020 = 0.046 Ha
1-1.021 = 0.062 Ha	1-1.021 = 0 Ha	1-1.021 = 0.062 Ha
1-1.022 = 0 Ha	1-1.022 = 0 Ha	1-1.022 = 0 Ha
1-2.000 = 0.023 Ha	1-2.000 = 0 Ha	1-2.000 = 0.023 Ha
1-3.000 = 0.056 Ha	1-3.000 = 0 Ha	1-3.000 = 0.056 Ha
1-3.001 = 0.058 Ha	1-3.001 = 0.154 Ha	1-3.001 = 0.212 Ha
1-3.002 = 0.032 Ha	1-3.002 = 0.077 Ha	1-3.002 = 0.109 Ha
1-3.003 = 0.031 Ha	1-3.003 = 0.041 Ha	1-3.003 = 0.072 Ha
1-3.004 = 0.028 Ha	1-3.004 = 0.115 Ha	1-3.004 = 0.143 Ha
1-4.000 = 0.049 Ha	1-4.000 = 0 Ha	1-4.000 = 0.049 Ha
1-4.001 = 0.056 Ha	1-4.001 = 0.105 Ha	1-4.001 = 0.161 Ha
1-4.002 = 0.029 Ha	1-4.002 = 0.165 Ha	1-4.002 = 0.194 Ha
1-5.000 = 0.040 Ha	1-5.000 = 0 Ha	1-5.000 = 0.040 Ha
1-5.001 = 0.030 Ha	1-5.001 = 0.105 Ha	1-5.001 = 0.135 Ha
1-6.000 = 0.050 Ha	1-6.000 = 0.052 Ha	1-6.000 = 0.102 Ha
1-7.000 = 0.070 Ha	1-7.000 = 0 Ha	1-7.000 = 0.070 Ha
1-7.001 = 0.052 Ha	1-7.001 = 0 Ha	1-7.001 = 0.052 Ha
1-7.002 = 0.015 Ha	1-7.002 = 0 Ha	1-7.002 = 0.015 Ha
1-7.003 = 0.051 Ha	1-7.003 = 0 Ha	1-7.003 = 0.051 Ha
1-7.004 = 0 Ha	1-7.004 = 0 Ha	1-7.004 = 0 Ha
1-7.005 = 0 Ha	1-7.005 = 0.014 Ha	1-7.005 = 0.014 Ha
1-7.006 = 0.034 Ha	1-7.006 = 0 Ha	1-7.006 = 0.034 Ha
1-7.007 = 0.051 Ha	1-7.007 = 0.058 Ha	1-7.007 = 0.109 Ha
1-7.008 = 0.043 Ha	1-7.008 = 0.063 Ha	1-7.008 = 0.106 Ha
1-7.009 = 0.032 Ha	1-7.009 = 0 Ha	1-7.009 = 0.032 Ha
1-7.010 = 0.028 Ha	1-7.010 = 0.067 Ha	1-7.010 = 0.093 Ha
1-7.011 = 0.027 Ha	1-7.011 = 0.032 Ha	1-7.011 = 0.059 Ha
1-7.012 = 0.019 Ha	1-7.012 = 0 Ha	1-7.012 = 0.019 Ha
1-7.013 = 0 Ha	1-7.013 = 0.093 Ha	1-7.013 = 0.093 Ha
1-8.000 = 0.053 Ha	1-8.000 = 0.103 Ha	1-8.000 = 0.156 Ha
1-8.001 = 0.034 Ha	1-8.001 = 0.111 Ha	1-8.001 = 0.145 Ha
1-8.002 = 0.018 Ha	1-8.002 = 0.046 Ha	1-8.002 = 0.064 Ha
1-8.003 = 0 Ha	1-8.003 = 0.039 Ha	1-8.003 = 0.039 Ha
1-8.004 = 0 Ha	1-8.004 = 0 Ha	1-8.004 = 0 Ha
1-9.000 = 0.058 Ha	1-9.000 = 0.059 Ha	1-9.000 = 0.117 Ha
		Total = 3.825 Ha

REV	DESCRIPTION	DATE	DRAWN

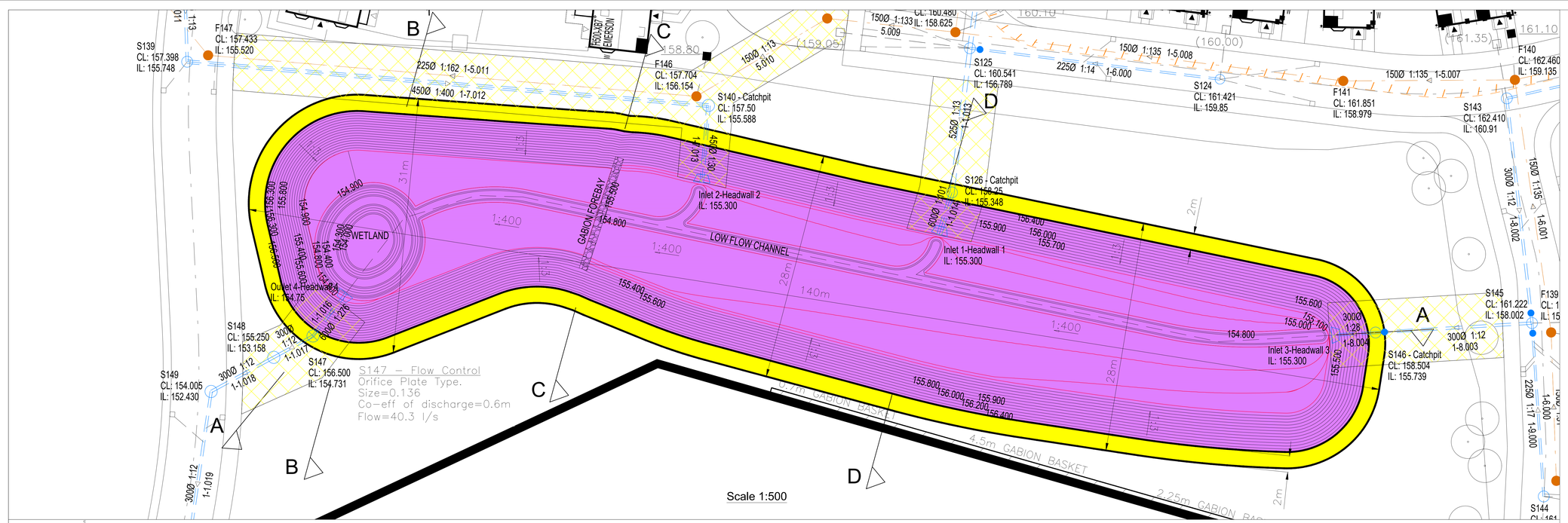
BARRATT HOMES

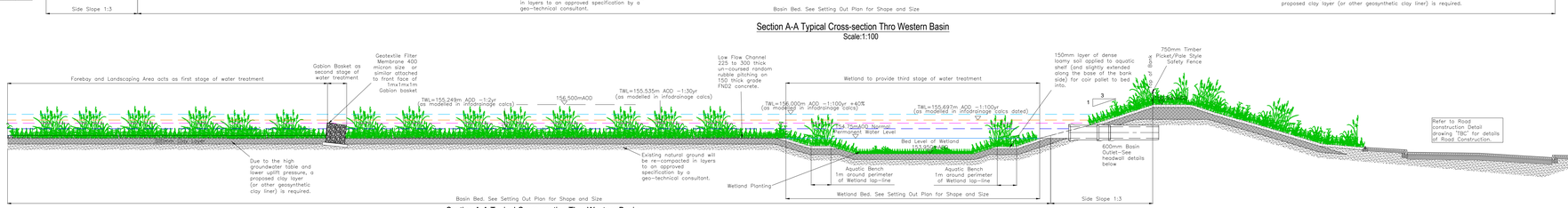
MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job: Cowm Top, Castleton Rochdale			
Title: Impermeable Area's Sheet 2 of 2			
Design By: LB	Date: June 2023	Drawing Number: 496/ED/12	Rev: -
C.A.D By: LB	Scale @ A0: 1:500		

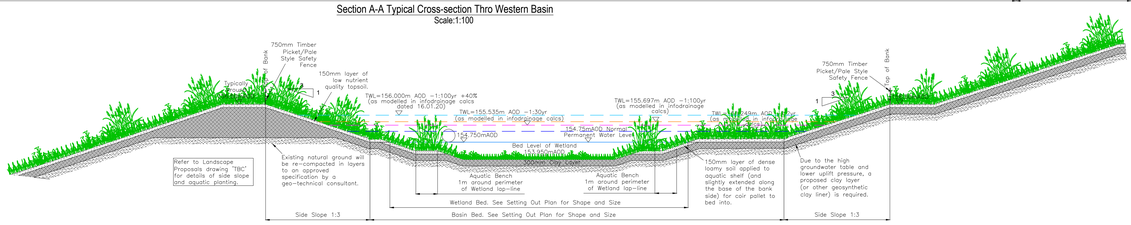
Drawings
Proposed SUDS Details Plan



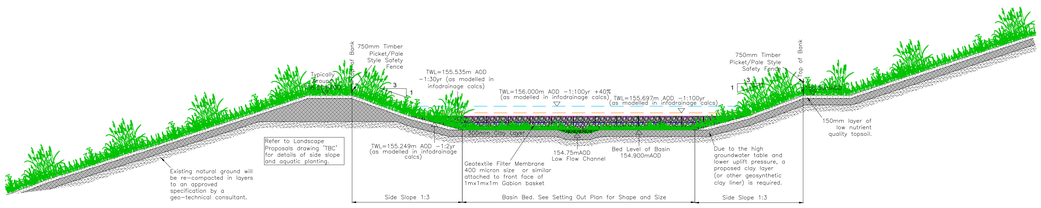


Section A-A Typical Cross-section Thro Western Basin
Scale:1:100

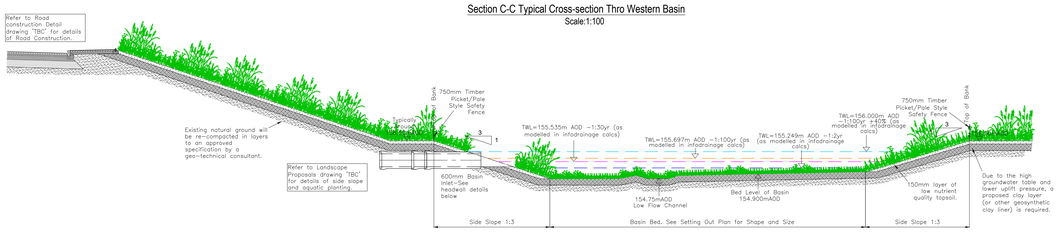
Section A-A Typical Cross-section Thro Western Basin
Scale:1:100



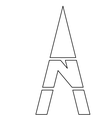
Section B-B Typical Cross-section Thro Western Basin
Scale:1:100



Section C-C Typical Cross-section Thro Western Basin
Scale:1:100



Section D-D Typical Cross-section Thro Western Basin
Scale:1:100



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ENGINEERING LAYOUT NOTES

1. This drawing is to be read in conjunction with Barratt drainage layout drawings:

   471/ED/50 Drainage Overview
   471/ED/51 Drainage Layout, Sheet 1 of 4
   471/ED/52 Drainage Layout, Sheet 2 of 4
   471/ED/53 Drainage Layout, Sheet 3 of 4
   471/ED/54 Drainage Layout, Sheet 4 of 4.

   and Barratt SUDs construction details drawings:

   471/ED/100 Pond A Construction Details
   471/ED/101 Pond B Construction Details
   471/ED/102 Pond C Construction Details
   471/ED/103 Pond D Construction Details
   471/ED/104 Pond E Construction Details
   471/ED/105 Primary Swales '1' and '2' Construction Details
   471/ED/106 Secondary Swale 'A1' Construction Details
   471/ED/107 Secondary Swale 'B1' Construction Details
   471/ED/108 Primary Swale 'C1' Construction Details
   471/ED/109 Primary Swale '3' Construction Details
   471/ED/110 Primary Swale '4' Construction Details
   471/ED/111 Under-drained Swale 'UD1' Plan and Construction Details
   471/ED/112 Under-drained Swale 'UD2' Plan

2. All adoptable drainage works have been designed and are to be constructed in accordance with 'Sewers for Adoption, 6th Edition', and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidelines shall take presidence.

3. United Utilities Standard details to be used are:

   STND/19/001A Manhole Type 1
   STND/19/002A Manhole Type 2 and Invert Access Detail
   STND/19/003A Shallow Manhole Detail for Small Diameter Pipes (Type 4)
   STND/19/004A Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450Dia and Above
   STND/19/005A Flow Control Manhole Detail
   STND/19/007A External Backdrop Detail
   STND/19/008A Pipe Bedding Detail
   STND/19/010A Variable Manhole – Guidance Notes
   STND/19/011A Headwall Type 1 and Typical Outlet Grille Detail
   STND/19/012A Typical Outfall Details Type 2 & Type 3

4. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (S.W. pipes only).

5. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BS kitemark.

6. All adoptable drainage to be bedded in Class 'S' granular surround unless otherwise stated.

7. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufatured to BS EN 1917 and BS 5911/Part 3.

8. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244–2. Polyethylene fittings, including fusion joints, and electro–fusion fittings shall comply with BS EN 13244–2.

9. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

10. This drawing is to be read in accordance with all other relevant drawings.

11. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.

12. All proposed connections to the sewer shall be 150ø unless stated otherwise.

13. All private house drainage shall be 100ø and all drag–out connections shall be 150ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.

14. Runoff from private surfaces shall not discharge across the highway. Gullies or channels shall be provided as appropriate to prevent this.

15. Pram crossings shall be provided at the inner tangent points of all junctions.

16. Pipes shall be protected from concentrated loading by construction traffic during the construction period when insufficient cover to the pipe may make them vulnerable to damage.

17. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.

18. Groundworker to ensure that plot drainage be within the curtilage of the plot they serve where possible and inspection covers kept within hardstandings where possible.

19. Contractor to provide United Utilities with sufficient notice prior to commencement of Sewer works on their Inspections telephone number. Tel 0845 602 0406.

20. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

ENGINEERING KEY

- S1 — S104 Adoptable S.W. Sewer & Manhole
- F1 — S104 Adoptable F.W. Sewer & Manhole
- S. Water Drag–Out and Invert (10.25)
- Foul Drag–Out and Invert 10.25
- S38 Adoptable Road Gully
- Street Name Plate
- Proposed S104 Sewer Easement
- Proposed Adoptable Foul Water Pumpstation
- Proposed Adoptable Foul Water Rising Main(s)
- Bed of SUDs Feature
- Top Edge of SUDs Feature
- Normal permanent Water Level within SUDs
- Land Dedication for S104 SUDs Feature

WATER LEVELS KEY:

- 1 in 2yr Modelled Top Water Level
- 1 in 30yr Modelled Top Water Level
- 1 in 100yr Modelled Top Water Level
- 1 in 100yr+40% Climate Change Modelled Top Water Level

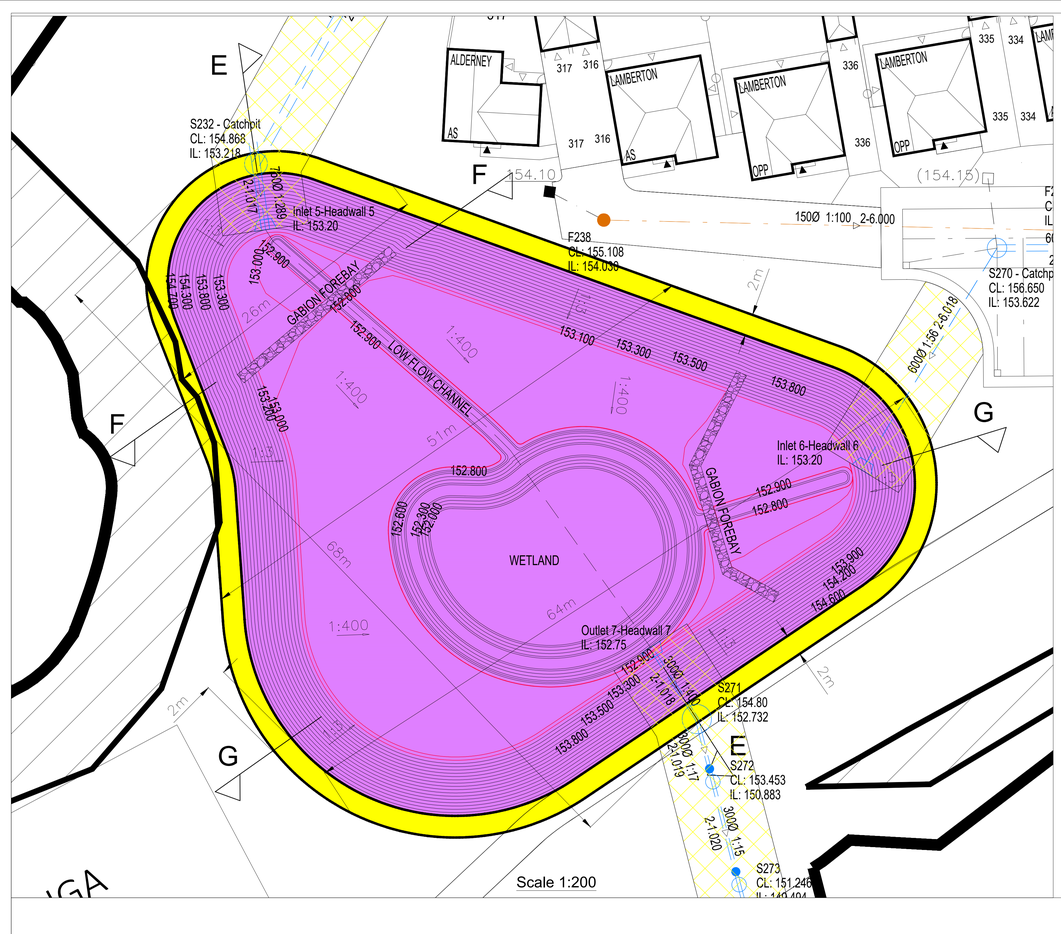
PLEASE NOTE THAT THE DRAINAGE DESIGN IS SUBJECT TO APPROVAL BY UNITED UTILITIES AND THE LLFA.

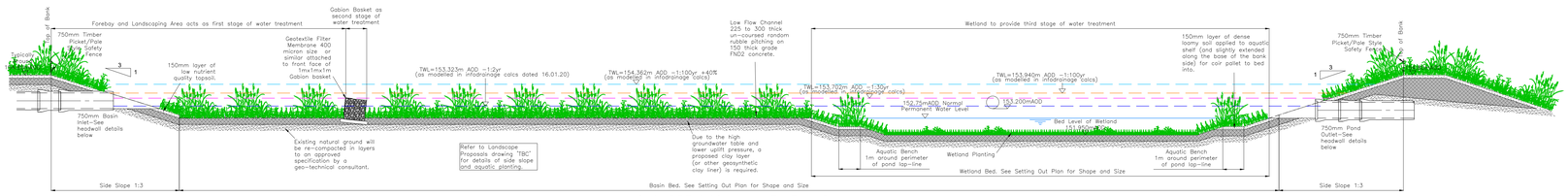
REV	DESCRIPTION	DATE	DRAWN

BARRATT HOMES
MANCHESTER
Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2020

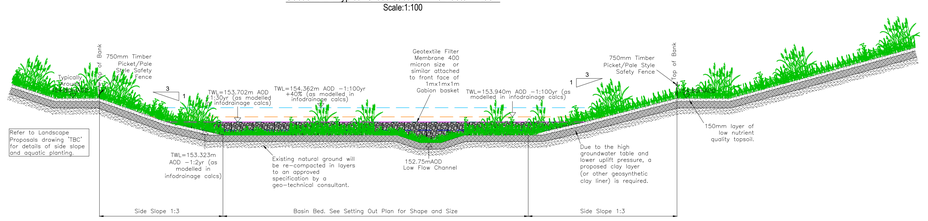
Job	Cown Top Castleton Rochdale
Title	Proposed SUDs Details 'Western Basin'

Design By LB	Date June 2023	Drawing Number 496/ED/20	Rev -
C.A.D By LB	Scale @ A0 As Shown		

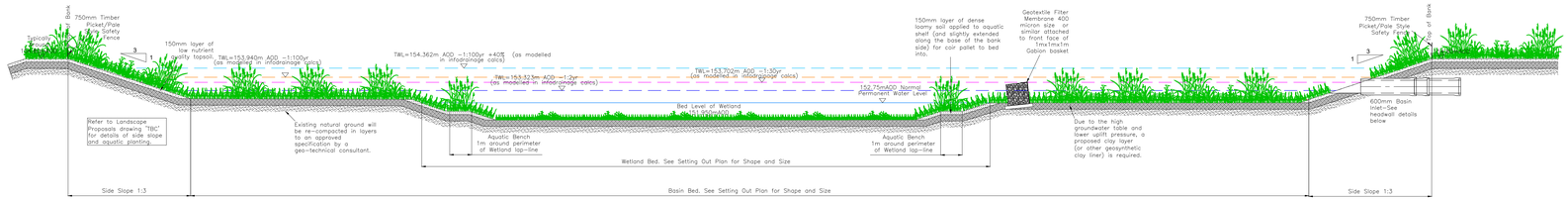




Section E-E Typical Cross-section Thro Eastern Basin
Scale:1:100



Section F-F Typical Cross-section Thro Eastern Basin
Scale:1:100



Section G-G Typical Cross-section Thro Eastern Basin
Scale:1:100

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ENGINEERING LAYOUT NOTES

1. This drawing is to be read in conjunction with JBarratt drainage layout drawings:

471/ED/50	Drainage Overview
471/ED/51	Drainage Layout, Sheet 1 of 4
471/ED/52	Drainage Layout, Sheet 2 of 4
471/ED/53	Drainage Layout, Sheet 3 of 4
471/ED/54	Drainage Layout, Sheet 4 of 4.

and Barratt SUDs construction details drawings:

471/ED/100	Pond A Construction Details
471/ED/101	Pond B Construction Details
471/ED/102	Pond C Construction Details
471/ED/103	Pond D Construction Details
471/ED/104	Pond E Construction Details
471/ED/105	Primary Swales '1' and '2' Construction Details
471/ED/106	Secondary Swale 'A1' Construction Details
471/ED/107	Secondary Swale 'B1' Construction Details
471/ED/108	Primary Swale 'C1' Construction Details
471/ED/109	Primary Swale '3' Construction Details
471/ED/110	Primary Swale '4' Construction Details
471/ED/111	Under-drained Swale 'UD1' Plan and Construction Details
471/ED/112	Under-drained Swale 'UD2' Plan

2. All adoptable drainage works have been designed and are to be constructed in accordance with 'Sewers for Adoption, 6th Edition', and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidelines shall take precidence.
3. United Utilities Standard details to be used are:

STND/19/001A	Manhole Type 1
STND/19/002A	Manhole Type 2 and Invert Access Detail
STND/19/003A	Shallow Manhole Detail for Small Diameter Pipes (Type 4)
STND/19/004A	Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450dia and Above
STND/19/005A	Flow Control Manhole Detail
STND/19/007A	External Backdrop Detail
STND/19/008A	Pipe Bedding Detail
STND/19/010A	Variable Manhole – Guidance Notes
STND/19/011A	Headwall Type 1 and Typical Outlet Grille Detail
STND/19/012A	Typical Outfall Details Type 2 & Type 3

4. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (SW pipes only).
5. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BS kitemark.
6. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.
7. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufactured to BS EN 1917 and BS 5911:Part 3.
8. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244-2. Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 13244-2.
9. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.
10. This drawing is to be read in accordance with all other relevant drawings.
11. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.
12. All proposed connections to the sewer shall be 150ø unless stated otherwise.
13. All private house drainage shall be 100ø and all drag-out connections shall be 150ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.
14. Runoff from private surfaces shall not discharge across the highway. Gullies or channels shall be provided as appropriate to prevent this.
15. Pram crossings shall be provided at the inner tangent points of all junctions.
16. Pipes shall be protected from concentrated loading by construction traffic during the construction period when insufficient cover to the pipe may make them vulnerable to damage.
17. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.
18. Groundworker to ensure that plot drainage be within the curtilage of the plot they serve where possible and inspection covers kept within hardstandings where possible.
19. Contractor to provide United Utilities with sufficient notice prior to commencement of Sewer works on their Inspections telephone number, Tel 0845 602 0406.
20. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

ENGINEERING KEY

S1 — S104 Adoptable S.W. Sewer & Manhole	F1 — S104 Adoptable F.W. Sewer & Manhole
S. Water Drag-Out and Invert (10.25)	Foul Drag-Out and Invert 10.25
S38 Adoptable Road Gully	
Street Name Plate	Proposed S104 Sewer Easement
Proposed Adoptable Foul Water Pumpstation	Proposed Adoptable Foul Water Rising Main(s)
Bed of SUDs Feature	Top Edge of SUDs Feature
Normal permanent Water Level within SUDs	Land Dedication for S104 SUDs Feature

WATER LEVELS KEY:

- 1 in 2yr Modelled Top Water Level
- 1 in 30yr Modelled Top Water Level
- 1 in 100yr Modelled Top Water Level
- 1 in 100yr+40% Climate Change Modelled Top Water Level

REV	DESCRIPTION	DATE	DRAWN

BARRATT HOMES
MANCHESTER
Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job: Cown Top, Castleton, Rochdale			
Title: Proposed SUDs Details 'Eastern Basin'			
Design By: LB	Date: June 2023	Drawing Number: 496/ED/21	Rev: -
C.A.D By: LB	Scale @ A0: As Shown		

Appendix A
Flood Risk Assessment, Ciria SuDS Manual C753, United Utilities SuDS Guidance Doc

Chapter 22

Detention basins

This chapter provides guidance on the design of detention basins – landscaped depressions that are normally dry except during and following rainfall events, designed to attenuate runoff and, where vegetated, provide treatment.

► *Appendix C, Section C.5.3 demonstrates how to design a detention basin for a supermarket.*

22.1 GENERAL DESCRIPTION

Detention basins are landscaped depressions that are normally dry except during and immediately following storm events. They can be on-line components where surface runoff from regular events is routed through the basin and when the flows rise, because the outlet is restricted, the basin fills and provides storage of runoff and flow attenuation. They can also be off-line components into which runoff is diverted once flows reach a specified threshold.

Detention basins can be vegetated depressions (that can provide treatment when designed to manage regular flows) or hard landscaped storage areas (that will tend not to provide any treatment and are normally designed as off-line components).

Where the basin is vegetated, the soil surface can absorb some runoff, so can be used to support the prevention of runoff from the site for small rainfall events (Interception), provided that small amounts of infiltration would not pose a risk to groundwater. The principal water quality benefits of vegetated detention basins are associated with the removal of sediment and buoyant materials, but levels of nutrients, heavy metals, toxic materials and oxygen-demanding materials may also be significantly reduced. The water quality benefits of a vegetated detention basin increase as the detention time for an event becomes longer. Where designed appropriately, some or all of the basin area can also be used as a recreational or other amenity facility (**Figure 22.1**).



Figure 22.1 Detention basin with landscape design providing attractive amenity space, Hamilton, Leicester

Off-line detention basins will normally have an alternative principal use: either as an amenity or recreational facility, or as part of urban hard landscaping.

Where there is no upstream pre-treatment, on-line detention basins should include a forebay to try to contain accumulating sediments, although this can result in unusable and unattractive areas, which may not be acceptable for public open space.

For maximum pollutant removal effectiveness in vegetated basins, flows should be distributed across the full width of the basin. However, where there are concerns about keeping a proportion of the base of the basin dry, a discrete area of the basin can be lowered to constrain frequent events within a specified area. Constraining low flows to specific routes can provide multi-functionality benefits and reduce the risks of the base of the basin becoming wet and boggy.

Vegetated detention basins can be designed with a small permanent pool at the outlet to help prevent resuspension of sediment particles by high intensity storms and to provide enhanced water quality treatment for frequent events. Any open water element would require effective integration into the landscape, and consideration would be required of the risk of the pond drying out during the summer, potentially causing plant die off. An ephemeral pool could be valuable from a biodiversity perspective, but it may look unattractive, and this requires careful consideration by the designer (eg evaluation of appropriate minimum depths or appropriate marginal planting).

Detention basins are frequently used for temporary sediment control during construction. It is essential that they are reinstated or reconstructed at the end of construction and before adoption by the maintaining authority.

Figure 22.2 provides a typical plan view and profile for the design of a detention basin.

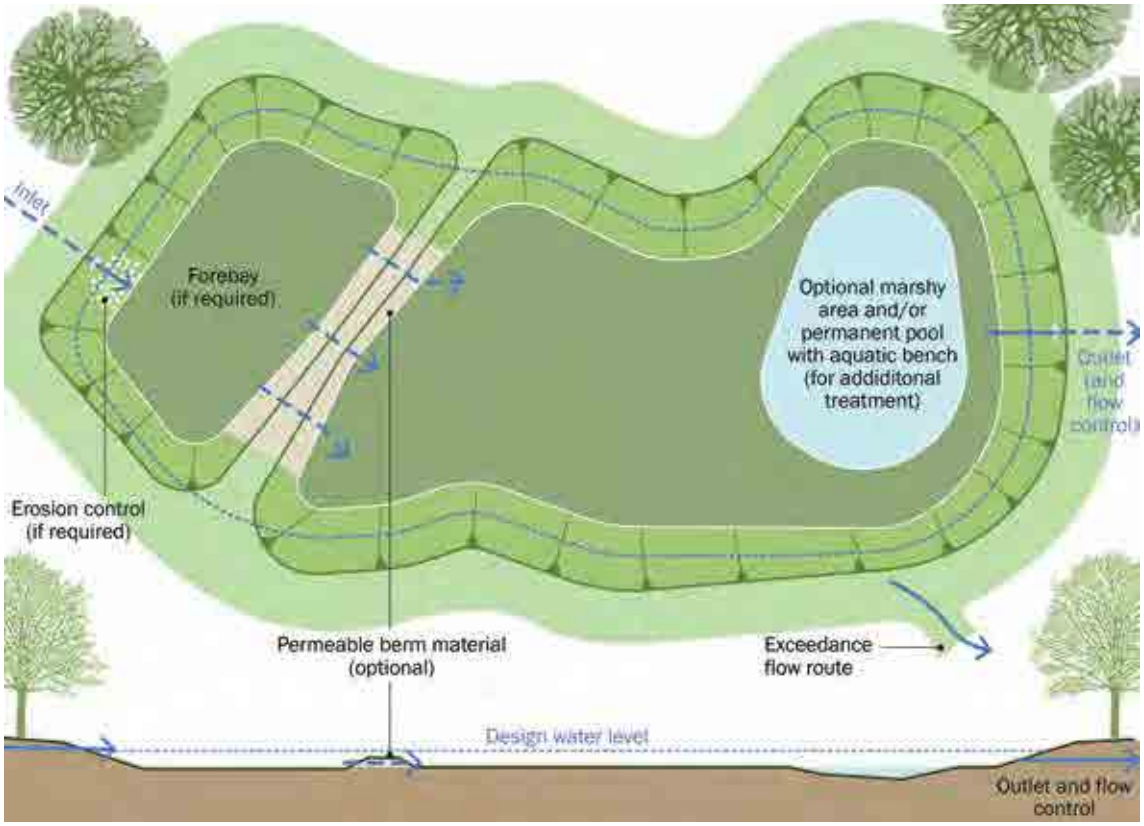


Figure 22.2 Plan and elevation of vegetated detention basin

22.2 GENERAL DESIGN CONSIDERATIONS

The form and aesthetic appearance of the component will depend on specific site characteristics,

Chapter 23

Ponds and wetlands

This chapter provides guidance on the design of ponds – depressions designed to temporarily store surface water above permanently wet pools that permit settlement of suspended solids and biological removal of pollutants. This includes wetlands, which are ponds with a higher proportion of shallow zones that promote the growth of bottom-rooted plants.

- *Appendix C, Section C.5.4 demonstrates how to design a wetland area for an industrial site.*
- *Appendix C, Section C.5.5 demonstrates how to design a strategic amenity pond.*

23.1 GENERAL DESCRIPTION

Ponds and wetlands are features with a permanent pool of water that provide both attenuation and treatment of surface water runoff. They can support emergent and submerged aquatic vegetation along their shoreline and in shallow, marshy (wetland) zones, which helps enhance treatment processes and has amenity and biodiversity benefits. Dense stands of vegetation facilitate the adhesion of contaminants to vegetation, aerobic decomposition of pollutants and can also help stabilise settled sediment and prevent resuspension. The term “wetland” is used to describe bodies of water with larger proportions of the surface area covered by aquatic planting. They also tend to have greater depth variations and may include shallow islands. However, for the purposes of this document, ponds and wetlands are considered together.

Attenuation storage is provided above the permanent pool and wetland areas. A flow control system at the outfall controls the rates of discharge for a range of water levels, causing the pond volume to fill during storm events. Runoff from each rainfall event is detained and treated in the pool. The volume of the pool influences the effectiveness of the feature in settling out particulate pollutants, with larger volumes providing longer periods of time for sedimentation to occur, and greater opportunities for biodegradation and biological uptake mechanisms.

Ponds and wetlands should always be designed with suitable upstream pre-treatment systems (or separate sediment forebays) in place. This prevents open water features from becoming unsightly and odorous and reduces the risk of rapid silt accumulation, which is generally expensive and difficult to extract and dispose of. Ponds and wetlands perform a valuable function in settling out residual fine silts and in final “polishing” of surface water runoff before discharge.

Well-designed and maintained permanent water bodies can offer important aesthetic, amenity and wildlife benefits to development sites. Ponds can be designed as natural features with shallow, grassed side slopes (**Figure 23.1**) or can be hard landscaped features that complement the character of dense urban environments. Well-managed ponds and wetlands can add significant economic value to a development, increasing property values and attracting business and tourism. Public acceptability of ponds is strongly dependent on their aesthetic quality, on their effective integration within the landscape and on their performance as a community resource, so their form, layout and planting should usually be designed and specified by landscape architects. They should not be designed by engineers without landscape architecture expertise.



Figure 23.1 Soft landscaped pond, Elvetham Heath, Hampshire



Figure 23.2 Hard landscaped planted pond, Springhill, Gloucestershire (courtesy Robert Bray Associates)

Ponds and wetlands can be created by using an existing natural depression, by excavating a new depression, or by constructing embankments. Existing natural water bodies should not be used as a means by which to dispose of surface water runoff where this would create a risk that pollution events, poorer water quality or alternative flow regimes might disturb/damage the natural morphology and/or ecology of the system. There may, however, be scenarios where existing water bodies would benefit from further inputs of cleaned surface water runoff. Locating SuDS ponds and wetlands close to existing ones can also benefit biodiversity.

The design of ponds/wetlands should consider the inclusion of a number of zones:

1 **Sediment forebay (optional) –** Effective pre-treatment (that removes coarse sediments and floating oils) should ideally be implemented via appropriate source control and upstream SuDS Management Train components. Where there are residual sediment risks, or where a sediment forebay is the only suitable management option at the site, then the pond can be split to allow coarse sediments to settle in the forebay before the runoff enters the permanent pool. The forebay allows sediment build-up to be easily monitored, and concentrates any required sediment removal activities within a small area, thereby minimising potential damage to the rest of the pond.

2 **Permanent pool** – This is the permanent volume of water that will remain in the pond/wetland throughout the year (less any evaporation and infiltration during extended periods of dry weather). The pool acts as the main treatment zone and helps to protect fine deposited sediments from resuspension. The top water level for this volume should be at the invert level of the outlet structure, unless an “infiltration depth” is included (ie a depth between outlet invert level and top elevation of liner over which infiltration is encouraged to take place). In larger wetlands, this pool volume may be distributed into a number of “micropools”.

3 **Attenuation storage volume** – This is the temporary storage volume above the permanent pool that fills as water levels rise during rainfall events, providing the required flow attenuation.

4 **Aquatic bench** – This is the zone of shallow water along the edge of the permanent pool that supports wetland planting, acting as a biological filter and providing ecology, amenity and safety benefits. Where the proportion of planting is increased (ie to create wetland features), there may be other “islands” (zones of shallow, vegetated areas) within the permanent pool.

Where there is a high proportion of shallow water, the extent of water loss by evapotranspiration should be taken into account to ensure that there is likely to be sufficient water supply to sustain good wetland plant growth through the year.

Design features should also include a safe exceedance route, maintenance access to all areas of the pond, a flat safety bench around the perimeter of the pond (to provide a suitable distance before open water (this discourages direct access and facilitates surveillance of the pond and rescue if

required) and also usually acts as a maintenance route). Access for maintenance to smaller features may often just be an easement with sufficient space and gradients to allow access by mini excavators.



Figure 23.3 Wetland, Banner Country Park, Upton, Northamptonshire

Larger ponds should, preferably, be divided into zones – providing the water quality and quantity volume storage in a number of independent cells. These can create increased attenuation, longer pollutant removal pathways (and therefore enhanced pollution removal), an easier maintenance regime and more varied ecology. They also allow:

- enhanced biodiversity – with lower zones tending to comprise cleaner water
- a more environmentally effective maintenance programme – through staggered programmes for each of the zones.

Figure 23.4 provides a typical design of a pond in plan view and profile. **Figure 23.5** shows typical planted pond edge details and **Figure 23.6** shows equivalent details for a typical non-planted pond.

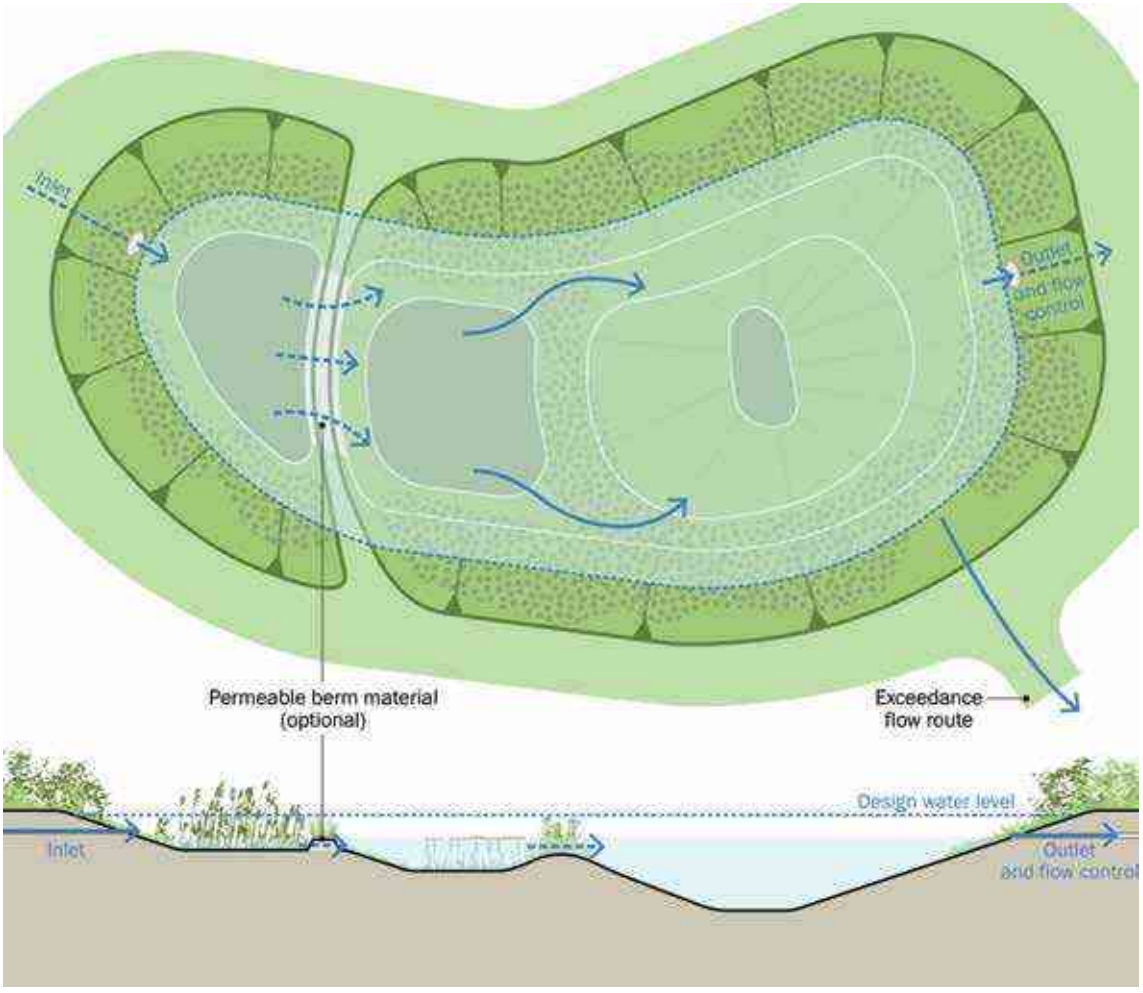


Figure 23.4 Plan view and profile of pond details

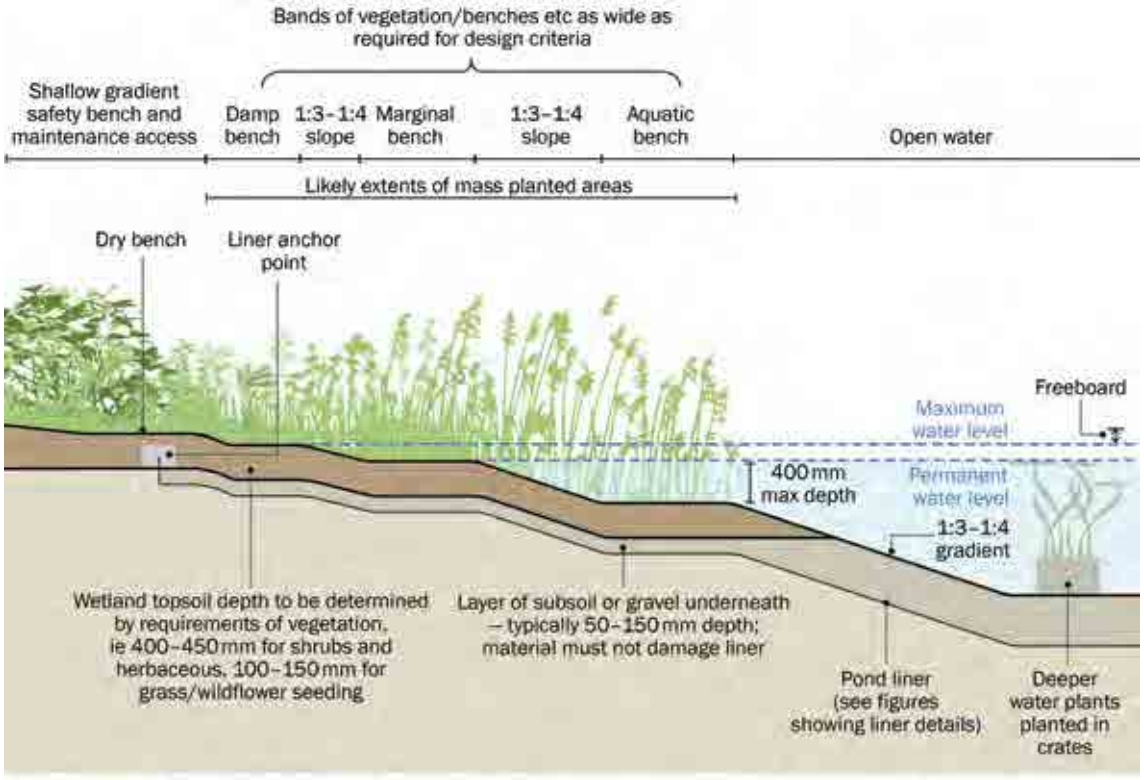


Figure 23.5 Typical planted pond edge details

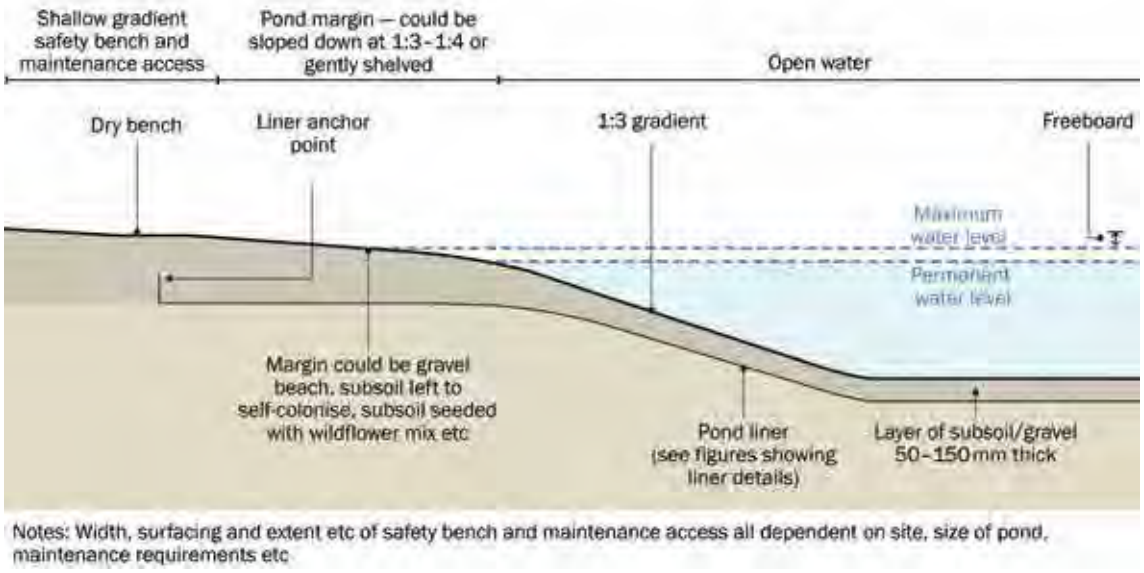


Figure 23.6 Typical non-planted pond edge details

23.2 GENERAL DESIGN CONSIDERATIONS

Ponds should be designed so that flow enters the pond and gradually spreads out, avoiding the creation of dead zones caused by corners, and optimising the sedimentation process through maximising the flow paths. Baffles, pond shaping and islands can be added within the permanent pool to increase the flow path length and maximise water quality treatment effectiveness (**Chapter 28**) (**Figure 23.7**).



Figure 23.7 Pond with baffles and islands, Augustenborg, Sweden

Inlets and outlets should be placed to maximise the flow path through the facility. The ratio of flow path length to width should be at least 3:1 to avoid hydraulic short-circuiting and ideally 4:1 or 5:1. If there are multiple inlets, they should all follow this principle ideally, but as a minimum the length-to-width ratio should be based on the flow-weighted, average flow path length for all inlets.

A balance is required between deep and shallow zones in a pond or wetland. The maximum depth of the permanent pool should not exceed 2 m to avoid stratification and anoxic conditions (and should normally be a maximum of 1.2 m, unless all safety considerations indicate that a greater depth is acceptable). Keeping the permanent water shallow allows oxygen to reach the bottom of the pond, enabling the biodegradation of oils by natural organisms; however, very shallow ponds may be at risk of algal blooms and high biological activity during summer months, and may be at risk of drying out when rainfall is low, therefore some depths of 0.6–1.0 m should usually be included. Greater depths near the outlet will reduce the risk of sediment re-entrainment, and will tend to yield cooler bottom water discharges that may mitigate downstream thermal effects. Deep water supports a relatively few number of plant species compared to shallow zones, so the overall extent of deep water zones should be considered and limited.

The maximum depth of temporary storage above the permanent pool should be limited: 0.5 m is usually appropriate for small to medium-sized ponds, but increased depths may be suitable for larger systems or where the risks can be demonstrated to have been managed appropriately. Surface water wetlands are generally chosen to improve runoff quality, rather than for controlling large volumes of surface water. Where wetlands are used for flow attenuation, the depth of temporary storage above the permanent water level should be such that the risk of plant damage is low.

An aquatic bench should be provided that extends inwards from the normal pond edge and has a maximum depth of 0.4 m below the normal pool water surface elevation. The width can be varied depending on the size of the pond and the extent of vegetation required for safety and aesthetic purposes. On most pond sites, it is important to amend the soil before planting, since ponds are typically placed well below the native soil horizon. In very poor soils nutrient additions should be minimised owing to the risk of algal blooms and eutrophication.

Any pond embankment should be designed in accordance with best practice, as described in Kennard *et al* (1996). Designs should meet all requirements of the Reservoir Act 1975 as amended by the Flood and Water Management Act 2010. Even if the impounded pond does not come within the thresholds of the Reservoirs Act, owners still have statutory duties for the safety of others under legislation such as the Health and Safety at Work (etc) Act 1974 and the Building Act 1984. Consideration should be given to the safe routing of floodwater when the design event is exceeded, and to mitigating the risks of potential embankment failure.

Ponds and wetlands should be designed to prevent/discourage the introduction of species such as fish and wildfowl, where an objective of the system is to support amphibians, particularly great crested newts. If the pond discharges to a nutrient sensitive receptor, dense planting can be considered on the side slopes to discourage wildfowl use. Conversely, where wildfowl use is to be encouraged, “bays” suitable for breeding birds can be integrated into the shape of larger ponds and breeding “islands” should be no closer than 3 m from the edge of the pond to prevent access by foxes.

Pond designs can be improved for ecology by developing the pond system in two phases: Phase 1 establishes the basic shape and structure of the pond with a follow-up Phase 2 (1–2 years later) to undertake fine-tuning of the scheme. Examples of small-scale refinement that can be incorporated in Phase 2 and that add considerably to the habitat value of sites include:

- addition of small-scale topographic features (eg reprofiling of pond margins to increase the extent of seasonal water level variations
- maximising the potential of unplanned habitats that occur on most sites, such as runoff from grassed slopes and natural seepages.

Ecological value can be further enhanced by creating small pools around the margins of larger ponds, which are fed by clean surface runoff from non-intensively managed grassland, scrub or woodland on the basin sides. These pools should be located above the level of the main SuDS pond. If some ponds, or parts of basins, are not exposed to the main pollutant burden, this may allow a wider range of animals and plants to exploit some parts of the site. As well as enhancing biodiversity, such a design approach should ensure rapid re-colonisation following any potential spill event. This type of benefit may also be achieved through the use of multiple ponds in series, where water quality improves through the train.

In contaminated systems, shallow water and wetland areas can support a range of wildlife that is less vulnerable to the effects of pollutants than submerged aquatic plants and those animals that live permanently under the water (such as mayfly larvae, dragonfly larvae and fish). Further information on maximising the ecological benefits of SuDS is given in Biggs (2003) and Graham *et al* (2013).

23.8 PHYSICAL SPECIFICATIONS

23.8.1 Pre-treatment and inlets

The number of inlets to the feature should be limited, preferably to one. The flowpath length should be maximised from inlet to outlet for all inlets.

Effective pre-treatment for all inlets should ideally be implemented via appropriate source control and upstream SuDS Management Train components (**Chapter 4**). As many contaminants adhere to sediment, its removal will ensure that the water in the main pool is relatively clean and can deliver on amenity and biodiversity objectives. Where there are residual sediment risks, or where a sediment forebay is the only suitable management option at the site, then the pond/wetland area can be split to allow heavier sediments to drop out of suspension before the runoff enters the main body of the system. The sediment forebay allows sediment build-up to be easily monitored, and concentrates any required sediment removal activities within a small area, thereby minimising potential damage to the rest of the pond or wetland. The plan area of the sedimentation bay should be at least 10% of the total basin area and could consist of a separate basin or be formed by building an earth berm, stone- or rock-filled gabion or rip-rap across the upstream portion of the basin. For systems with multiple inlets, pre-treatment should be provided for each inlet that is likely to contribute a significant sediment load. Each forebay should be accessible and easily maintained.

Consideration should be given to installing a fixed sediment depth marker in forebays where high sediment loads are expected, to measure sediment deposition with time. This will assist with the development of appropriate future maintenance schedules. The base of the forebay can be reinforced to facilitate sediment removal. If a membrane liner is used without protection, great care should be taken during sediment removal operations.

The energy of the incoming flows should be dissipated to minimise the risk of scouring and erosion, and to prevent disturbance to the permanent pool volume. This can be achieved by stabilising inflow channels using rip-rap or other erosion control systems, or by partially or fully submerging the inlet pipe. The scale of the erosion mitigation system should be physically and aesthetically proportionate to the size of the pond.



Figure 23.12 Energy dissipating inlet channels for ponds, Augustenborg, Sweden (courtesy Graham Fairhurst and Illman Young)

Safety grilles may be required if inlet pipe diameters allow public entry, but they tend to increase the risks of blockage and can present a hazard in themselves so, wherever possible, inlet infrastructure should be designed so that they are not required.

If the pond or wetland is to be constructed off-line, as a treatment facility only, then an upstream bypass structure can be used to divert events that require treatment into the pond/wetland. Flows exceeding this will then bypass the system, reducing the potential for turbulence and mixing, and allowing optimum contaminant removal processes to occur.

▶ Guidance on inlet design is set out in **Chapter 28**.

23.8.2 Outlets

At the outlet, there will normally be a requirement for some form of flow control system. A manhole-type outlet structure can accommodate a variety of outlet control mechanisms. Ponds and wetlands will generally require a non-clogging, variable flow rate control structure at the outlet, together with an emergency overflow. Low flow controls are generally provided via protected orifices, which can then be combined with overflow channels and overflow weir sections and/or culverts for larger events. Multiple orifices or pipe outlets can be used to achieve the same objectives. Trash screens are not recommended, but where they are considered necessary to prevent access into pipework, they should be designed so that debris does not unduly obstruct or reduce design flow rates.

▶ The design of exceedance flow management components is discussed in **Section 23.4.5**.

The outlet area should be the deepest point to provide final settling and to prevent resuspension of sediments. Energy dissipation may be required downstream of the outlet to prevent scouring and erosion – but this will depend on the outflow discharge rates, the outfall design and the vulnerability of the receiving watercourse or lake to erosion.

The method is guided by the land use and SuDS performance evidence (**Section 26.6**). However, the variations in the approaches and data collected between studies, the wide ranges in pollution concentrations involved (pre and post treatment) and the paucity of UK data all mean that the evidence has had to be supplemented with theoretical understanding regarding the processes likely to deliver higher levels of removal of specific contaminants. The method has then been applied to a range of development scenarios to check that they deliver appropriate outputs.

If the indices are not considered to be appropriate – either for the land use or for the proposed mitigation, then the designer can either use alternative measures of hazard and risk mitigation, using a bespoke risk assessment process (**Section 26.7.3**), or justify alternative indices using similar evidence and/or process understanding to that discussed in this chapter and presented in **Annexes 1–5**.

BOX 26.2 Steps of the simple index approach

Step 1 – Allocate suitable pollution hazard indices for the proposed land use

Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index

Step 3 – Where the discharge is to protected[1] surface waters or groundwater, consider the need for a more precautionary approach

Note:

1 Designated as those protected for the supply of drinking water (**Table 4.3**).

Step 1 Define pollution hazard indices

Pollution hazard indices are presented in **Table 26.2** for the same range of land use categories used in **Table 4.3** (water quality standard 2, **Chapter 4**).

The indices range from 0 (no pollution hazard for this contaminant type) to 1 (high pollution hazard for this contaminant type).

Step 2 Determine SuDS pollution mitigation indices

To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type):

Total SuDS mitigation index ≥ pollution hazard index
(for each contaminant type) (for each contaminant type)

Where the only destination of the runoff is to a surface water – that is there is no infiltration from the SuDS to groundwater – the surface water indices should be used, as suggested in **Table 26.3**.

In England and Wales, where the principal destination of the runoff is to a surface water, but small amounts of infiltration may occur from unlined components (Interception), then the groundwater indices should be used for the discharge to groundwater (as suggested in **Table 26.4**), and the surface water indices should be used for the main surface water discharge (as suggested in **Table 26.3**). In Scotland and Northern Ireland, groundwater risk management is not a requirement for this scenario.

Where the principal destination of the runoff is to groundwater, but discharges to surface waters may occur once the infiltration capacity is exceeded, the groundwater indices should be used, as suggested in **Table 26.4**. The risk to surface waters will be low, as dilution will be high for large events, so treatment is not required.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Notes

1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Where a site land use falls outside the defined categories, the indices should be adapted (and agreed with the drainage approving body) or else the more detailed risk assessment method should be adopted.

Where nutrient or bacteria and pathogen removal is important for a particular receiving water, equivalent indices should be developed for these pollutants (if acceptable to the drainage approving body) or the risk assessment method adopted.

Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required, where:

$$\textbf{Total SuDS mitigation index} = \textbf{mitigation index}_1 + 0.5\ (\textbf{mitigation index}_2)$$

Where:

$\text{mitigation Index}_n$ = mitigation index for component n

A factor of 0.5 is used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See **Chapter 14** for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: **http://tinyurl.com/qf7yuj7**

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

S104 SuDS Guidance Document

Basin

Version 3 (October 22)

(This document should be read in conjunction with S104 SuDS Technical appraisal form for Basins)

Comment no.	Technical Guidance
Types of basins	
1	It's essential that it is made clear what type of basin is being utilised within the design at an early stage to enable an effective assessment to be completed and this must be referenced correctly on the S104 Agreement Plan. The different types of basins are noted below; **Infiltration basin** **Dry detention/attenuation basin** **Vegetated detention/attenuation basin** See CIRIA C753 Chapter 23 (figure 23.5) for further guidance on permanent pool/aquatic bench design specifications
High level considerations, location & layout	
2	**Topography:** The surface should be level to allow distribution of flows across it. **Shape, location & maintenance considerations:** Length / width ratio for online detention basins should be between 3:1 and 5:1. However, the location and shape of the component should be agreed with the local planning authority but where the component is not located in a verge, other public open space or the boundary between the highway and a private garden, provision should be made for access including any specific features that are likely to pose maintenance difficulties and any associated mitigation measures that have been put in place – see chapter 32 of CIRIA C753 for guidance. Consideration should be given to planting of trees etc. which may hinder access for the maintenance particularly around ancillaries and access points
3	**Flood risk to existing features**: No surrounding properties or features should be at risk – see chapter 36 of CIRIA C753 for guidance.
Design requirements	
4	**Flow path requirements**: Flow paths should be maximised through the length of the component. If a low-flow channel is required through the basin, a swale shall be the preferred option. Where a swale is used its design shall follow CIRIA C753: SuDS Manual Chapter 17. Any engineered channels should be between 100-150mm deep. The minimum width size should mimic the incoming pipe size(s) and/or maximum width size should be no wider than the width of the headwall. Infiltration basins do not require low flow channels.
5	**Hydraulic assessment information criteria;** **Representing feature for hydraulic calculations**: For conveyance it must be represented as part of the online piped network. If labelled as a storage component then it must be explained how this is linked in the model as part of the online network. Volumetric allowances for vegetation of up to 25% should be provided to ensure flood control criteria are met. **Longitudinal fall** needs to be represented in the model between 1 in 100 and 1 in 400 **(this will not be applicable for infiltration basins)** **Inflow velocities** must be acceptable and any erosion protection must show suitable flow spreading and energy dissipation ensuring that they are physically and aesthetically proportionate to the size of the basin. Any erosion protection must be reflected in the hydraulic model by applying a **headloss** of 0.5 at the point of outfall. The same headloss value of 0.5 needs to be applied for catch pits where applicable. **Water depths** should not exceed 1m in the 100 year event and the maximum water depth in any event should not exceed 2m. This can be achieved by having a robust SuDS management train. The maximum water level must be at least 500mm below the lowest FFL of any adjacent properties. Most Local Authorities will require a much lower maximum depth, for safety reasons. Any depth must be justified in checklist B.5 (Health and Safety) – see CIRIA C753 chapters 22.2 & 24.2.3 for further guidance. For basins, the maximum design storage depth should provide a **freeboard** of between 400-600mm below the top of the banks, depending on the scale of the component – see section C7.7.6 of Design & Construction Guidance.

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	Requirements to be discussed with LLFA (from 100yr + cc level to top of banks), taking into consideration periodic sediment accumulation. **Flow control diameter should** usually be a minimum of 100mm, however if the flow control has robust upstream protection which prevents debris this could be reduced to a minimum of 50mm **Component drain down time** must be within 24hrs and will need to be supported with calculation. For infiltration systems, this is 48hrs (or half drain down within 24hrs) **Designing for exceedance & considering overland flow** Overland flows from surrounding land must be considered particularly if adoptable components are designed to accept surface inflow. Flow routes for significant offsite flow paths must be provided as part of the overall site design and should be separated from any new adoptable network design See chapter 36 (table 36.1) of CIRIA C753 for guidance on acceptable velocities for exceedance. **Very large basins:** If the storage volume exceeds 10,000m^3 then the design may have to comply with the Reservoirs Act 1975.
6	**Side slopes** need to be within a gradient of 1:3 and 1:5 for the perimeter of the component, 1:5 is preferred around any access to ancillaries (i.e. inlets & outlets). **UU will not adopt a feature with the minimum slope around the entire perimeter of the surface SuDS feature.**
7	**Pre-treatment / Sediment control** must be provided on any open SuDS component. For systems with multiple inlets distanced apart, pre-treatment should be provided at or upstream of each inlet. Adoptable pre-treatment can be provided in the form of forebays and catch-pit details, or in the case of infiltration systems proprietary treatment systems such as vortex separators. If a forebay is chosen see chapters 22 & 28.4.8 of CIRIA C753 for further guidance. The forebay area must be at least 10% of the total component. If the area is <10m2 then the depth of the forebay should be 200mm deep, if the area is >10m2 it should be 300mm deep – see CIRIA C753 chapter 18.8.1 (EQ.18.2). The top of the permeable berm for the forebay must be set at the 30yr level as shown on our inlet headwall & forebay details drawing located on our website. Each forebay should be accessible and easily maintained. A fixed sediment depth marker is recommended to monitor silt levels over time. Consideration can be given to a concrete lined forebay as this would also protect from erosion and can facilitate desilting (without damage to a liner for example). If using catch pit manholes, they must be sufficiently sized and representative of the upstream catchment with sump depths between 300-500mm. Suitable access should be provided for maintenance and the management and maintenance document must consider potential increase for maintenance activities. For an infiltration basin, pre-treatment can be in the form of an additional upstream SuD component (i.e. attenuation basin/swale) or an adequate sediment management system.
8	**Erosion protection** will be required for any outfall to a SuDS component and should extend to the base of the component. It can be in the form of a gabion mattress, rip rap, large stone spillway or can be incorporated into a forebay design if applicable.
9	**Water quality** For the 1yr, 30 minute event; Average residence time in basin > 9 minutes for effective treatment Flow height to be < 100mm Velocity < 0.3m/s for effective treatment This is to ensure good pollutant removal performance – see CIRIA C753 section 22.5 for further guidance. The residence time in component can be calculated by the following; length of low flow channel or component (m) / velocity (m/s)* = residence time (seconds) / 60 = residence time in component (mins) *Velocity through the component must be less than 0.3m/s during a 1yr 30min event

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10	**Inlet and outlet connections** There are various point inlet details within the DCG and CIRIA SuDS manual which can differ based on pipe size, component type and application, if discharging via piped network inlets up to 350mm diameter, are to be constructed as per the standards set out in the Design & Construction Guidance (DCG) or our inlet headwall details drawing located within our SuDS technical library on our website Inlets greater than 350mm diameter, are to be constructed as per our inlet headwall details drawing or our standard detail drawings which can be found within our S104 technical library on our website. Outlet construction details can be based on the inlet details above. For dry features the outlet invert level should be set to the base of the headwall detail.
11	**Lining considerations:** Below is a list of information/considerations required when lining is proposed; Unlined components should not be used on brownfield sites unless it has been demonstrated that the risks posed by leaching of contaminants is managed to acceptable levels. Specification of chosen liner will be required. Geosynthetic barriers should be designed in accordance with BS EN 13361 or BS EN 13362 (see section E2.45 of Design & Construction Guidance), this includes tensile load, tear resistance and puncture resistance. These should have welded joints, taping would not be acceptable.
12	The **full design detail** should show all individual components which may include; inlet, forebay, permeable berm, low flow channel, vegetation/planting, (aquatic pool – vegetated basins), outlet etc. as applicable. **Materials** should be shown on the **sectional drawing** i.e. subsoil, topsoil, geotextile membrane, geosynthetic barrier, permeable berm, low flow channel etc. as applicable. See CIRIA C753 chapters 22 (Basins), 30 (Materials including specification for liners – see 30.5.4) and 31 (Construction) along with chapters 21 (Soils) & 22 (Materials), of CIRIA C768 for further guidance.
Additional requirements for infiltration basins only	
A	Infiltration Basins will require good quality backfill/bedding/surround 300mm of Engineering soil is required to ensure reduce top soil saturation. See Chapter 13 and 21 of the CIRIA guidance, in particular section 21.10
B	The bottom of the system must be flat the guidance states that the tolerance should be 10mm in 3m. See chapter 13 of CIRIA C753 for guidance in particular page 261

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Construction

Construction of Detention Basins should be in accordance with the guidance provided in the appropriate chapters of CIRIA C753 (22.11) and CIRIA C768 chapter 35 along with CIRIA C753 Appendix B: Construction assessment checklist.

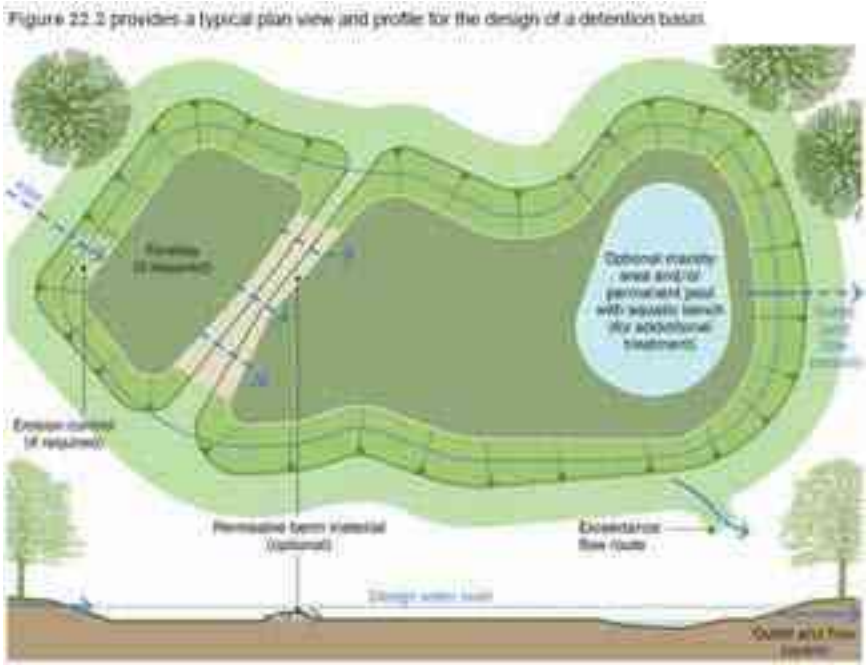




PHOTO OF STONE EMBANKMENT SEDIMENT FOREBAY



PHOTO OF STONE EMBANKMENT SEDIMENT FOREBAY

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S104 SuDS Guidance Document

Ponds & Wetlands

Version 3 (October 22)

(This document should be read in conjunction with S104 SuDS Technical appraisal form for Ponds & Wetlands)

Comment no.	Technical Guidance
High level considerations, location & layout	
1	**Wetlands** can be considered for adoption where they form part of a wider SuD system. We will not adopt wetlands that are only designed to deliver a water quality benefit Wetlands are bodies of water with larger proportions of the surface area covered by aquatic planting. They also tend to have greater depth variations and may include shallow islands.
2	**Topography:** The surface should be level to allow distribution of flows across it. **Shape, location & maintenance considerations:** Length / width ratio for online detention basins should be between 3:1 and 5:1. However, the location and shape of the component should be agreed with the local planning authority but where the component is not located in a verge, other public open space or the boundary between the highway and a private garden, provision should be made for access including any specific features that are likely to pose maintenance difficulties and any associated mitigation measures that have been put in place – see chapter 32 of CIRIA C753 for guidance. Consideration should be given to planting of trees etc. which may hinder access for the maintenance particularly around ancillaries and access points
3	**Flood risk to existing features**: No surrounding properties or features should be at risk – see chapter 36 of CIRIA C753 for guidance
Design requirements	
4	**Hydraulic assessment information criteria;** **Representing component for hydraulic calculations**: For conveyance it must be represented as part of the online piped network. If labelled as a storage component then it must be explained how this is linked in the model as part of the online network. **Inflow velocities** must be acceptable and the designer should provide suitable flow spreading and energy dissipation to prevent disturbance to the permanent pool volume – see CIRIA C753 23.8.1 for guidance. For ponds, it would need to be proven that the depth of permanent water level manages any incoming velocities and removes any risk of erosion to the base of the component, if this is a risk then further considerations need to be made. Where incoming inverts are above permanent water levels, erosion protection may be required. Any erosion protection must be reflected in the hydraulic model by applying a **headloss** of 0.5 at the point of outfall. The same headloss value of 0.5 needs to be applied for catch pits where applicable. **Permanent water depth:** The top water level for the permanent pool is not related to a particular storm event and should be at the invert level of the outfall structure. For planted ponds the depth can vary as long as there's areas of deeper water between 0.6-1.0m and no deeper than 1.2m to avoid stratification and anoxic conditions. For non-planted ponds the max depth of water must not exceed 1.2m. Shallow non-planted ponds will be more susceptible to naturally occurring vegetation, therefore the requirement for increased frequencies for certain maintenance activities need to be taken into consideration. **Temporary storage depth:** Where wetlands are used for flow attenuation, the maximum depth of temporary storage above the permanent pool should be limited; 0.5m is usually acceptable for small/medium sized ponds so that the risk to plant damage is low. The critical duration is the length of rainfall event that results in the greatest flow rate, flood volume or flood level. Return periods from 1 in 1yr to 1 in 100yr and durations from 15 minutes to 48hrs are often required to be assessed – see CIRIA C753 chapter 24.2.3 for further guidance. The maximum water level must be at least 500mm below the lowest FFL of any adjacent properties. Ponds should have a **freeboard** of 300mm to the top of the bank – see CIRIA C753 section 23.4.5 for further guidance

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Ponds & wetlands

	Flow control diameter should usually be a minimum of 100mm, however if the flow control has robust upstream protection which prevents debris this could be reduced to a minimum of 50mm **Designing for exceedance & considering overland flow** Overland flows from surrounding land must be considered particularly if adoptable components are designed to accept surface inflow. Flow routes for significant offsite flow paths must be provided as part of the overall site design and should be separated from any new adoptable network design See chapter 36 (table 36.1) of CIRIA C753 for guidance on acceptable velocities for exceedance.
5	The **side slopes** confirmed to be no greater than 1 in 3 between the aquatic bench and safety bench and no greater than 1 in 4 where mowing access is required. A 3.5m safety bench must also be provided with a slope of less than 1:15 although this will depend on land availability, designated access and the type of maintenance equipment required for the pond.
6	**Pre-treatment / Sediment control** must be provided on any open SuDS component. For systems with multiple inlets distanced apart, pre-treatment should be provided at or upstream of each inlet. Adoptable pre-treatment can be provided in the form of forebays and catch-pit details, or in the case of infiltration systems proprietary treatment systems such as vortex separators. If a forebay is chosen see chapters 23 & 28.4.8 of CIRIA C753 for further guidance. The forebay area must be at least 10% of the total component. If the area is <10m2 then the depth of the forebay should be 200mm deep, if the area is >10m2 it should be 300mm deep – see CIRIA C753 chapter 18.8.1 (EQ.18.2). The top of the permeable berm for the forebay must be set at the 30yr level. Each forebay should be accessible and easily maintained. A fixed sediment depth marker is recommended to monitor silt levels over time. For planted ponds, further considerations will be required regarding maintenance access (i.e. sediment removal) to avoid damage to any planting. Consideration can be given to a concrete lined forebay as this would also protect from erosion and can facilitate desilting (without damage to a liner for example). If using catch pit manholes, they must be sufficiently sized and representative of the upstream catchment with sump depths between 300-500mm. Suitable access should be provided for maintenance and the management and maintenance document must consider potential increase for maintenance activities.
7	**Erosion protection** will be required for any outfall to a SuDS component and should extend to the permanent water level of the component. It can be in the form of a gabion mattress, rip rap, large stone spillway or can be incorporated into a forebay design if applicable.
8	**Inlet and outlet connections** There are various point inlet details within the DCG and CIRIA SuDS manual which can differ based on pipe size, component type and application, if discharging via piped network inlets up to 350mm diameter, are to be constructed as per the standards set out in the Design & Construction Guidance (DCG) or our inlet headwall details drawing located within our SuDS technical library on our website Inlets greater than 350mm diameter, are to be constructed as per our inlet headwall details drawing or our standard detail drawings which can be found within our S104 technical library on our website. Outlet construction details can be based on the inlet details above. For dry features the outlet invert level should be set to the base of the headwall detail.
9	**Lining considerations:** Below is a list of information/considerations required when lining is proposed; Unlined components should not be used on brownfield sites unless it has been demonstrated that the risks posed by leaching of contaminants is managed to acceptable levels. Specification of chosen liner will be required. Geosynthetic barriers should be designed in accordance with BS EN 13361 or BS EN 13362 (see section E2.45 of Design & Construction Guidance), this includes tensile load, tear resistance and puncture resistance. These should have welded joints, taping would not be acceptable.
10	The **full design detail** should show all individual components which may include; inlet, forebay, permeable berm, vegetation/planting, aquatic pool, outlet etc. as applicable. **Materials** should be shown on the **sectional drawing** i.e. subsoil, topsoil, geotextile membrane, geosynthetic barrier, permeable berm etc. as applicable. See CIRIA C753 chapters 23 (Ponds & Wetlands), 30 (Materials including specification for liners – see 30.5.4) and 31 (Construction) along with chapters 21 (Soils) & 22 (Materials), of CIRIA C768 for further guidance.

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Ponds & wetlands

Construction

Construction of Ponds & Wetlands should be in accordance with the guidance provided in the appropriate chapters of CIRIA C753 (23.11) and CIRIA C768 chapter 36 along with CIRIA C753 Appendix B: Construction assessment checklist.

Figure 23.4 provides a typical design of a pond in plan view and profile. Figure 23.5 shows typical planted pond edge details and Figure 23.6 shows equivalent details for a typical non-planted pond.

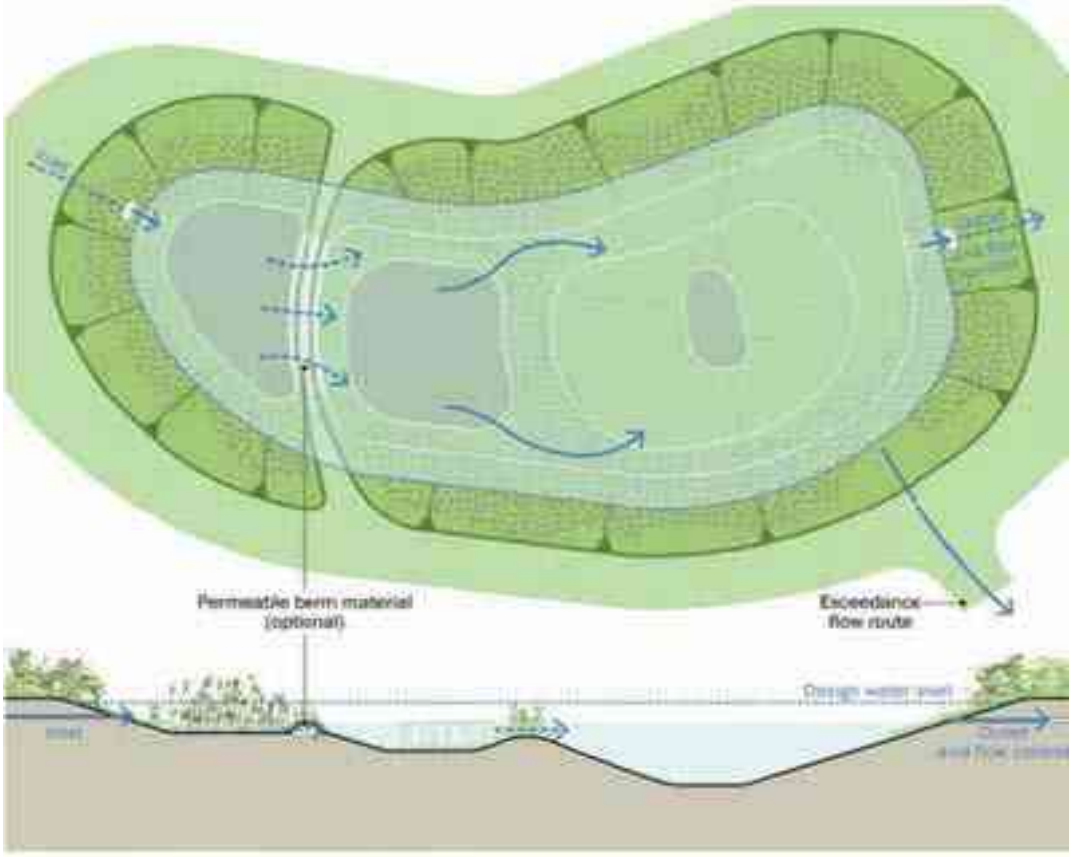
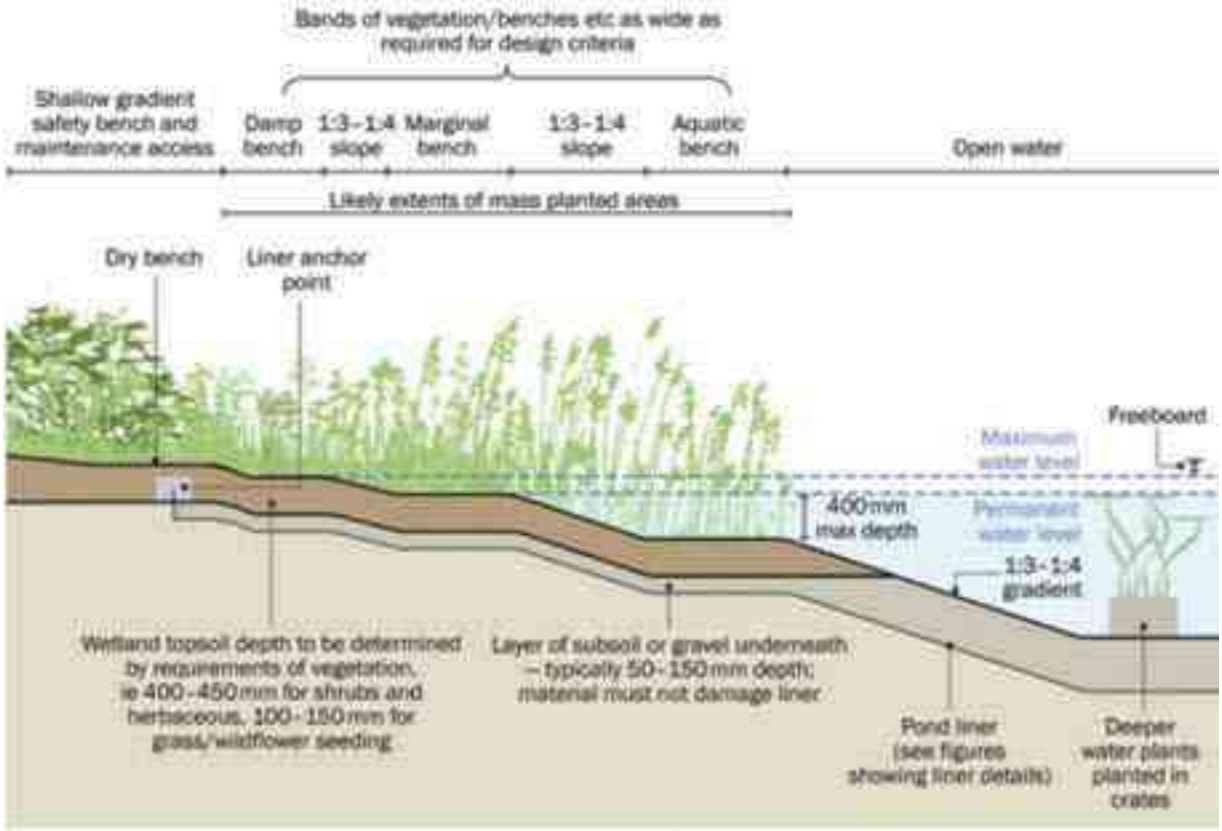


Figure 23.4 Plan view and profile of pond details

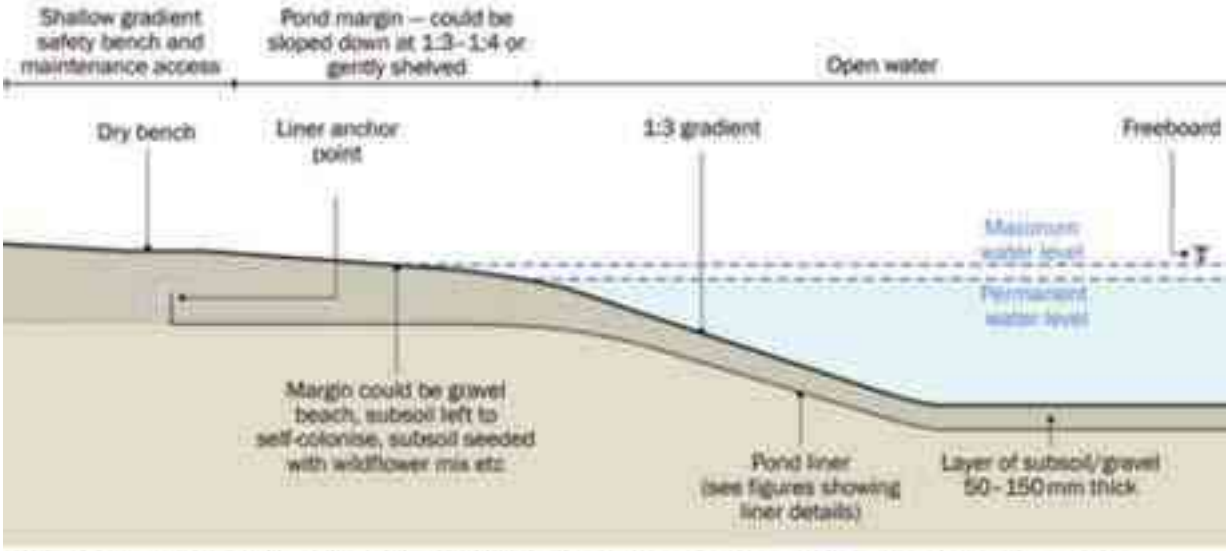
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Ponds & wetlands



Notes: Width, surfacing and extent etc of safety bench and maintenance access all dependent on site, size of pond, maintenance requirements etc

Figure 23.5 Typical planted pond edge details



Notes: Width, surfacing and extent etc of safety bench and maintenance access all dependent on site, size of pond, maintenance requirements etc

Figure 23.6 Typical non-planted pond edge details

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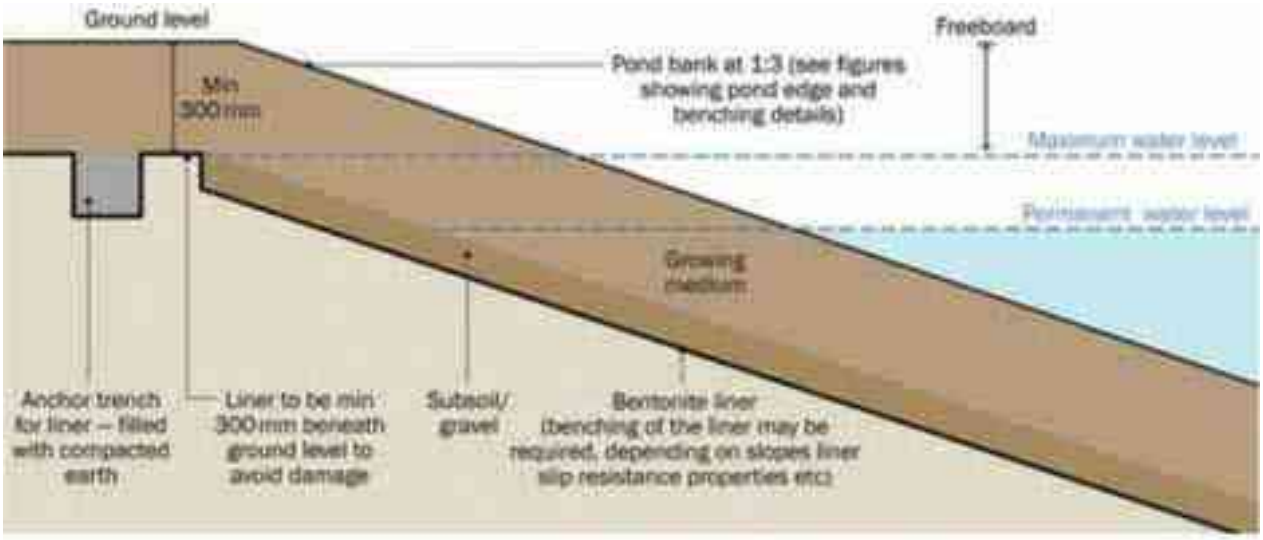


Figure 23.13 Details for a typical geosynthetic liner

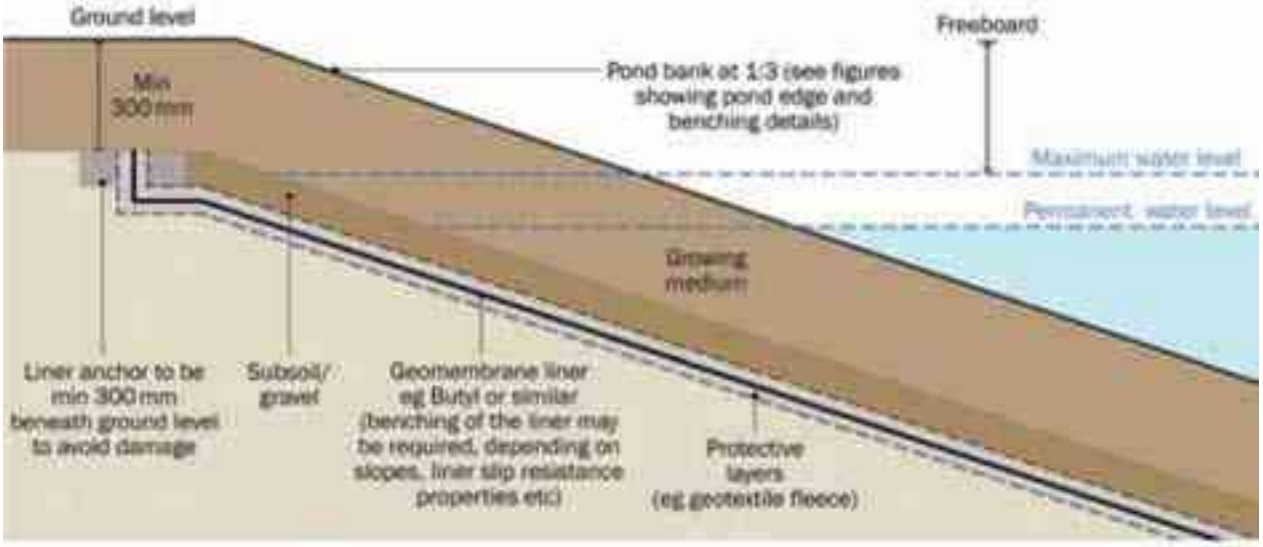


Figure 23.14 Details for a typical geomembrane liner

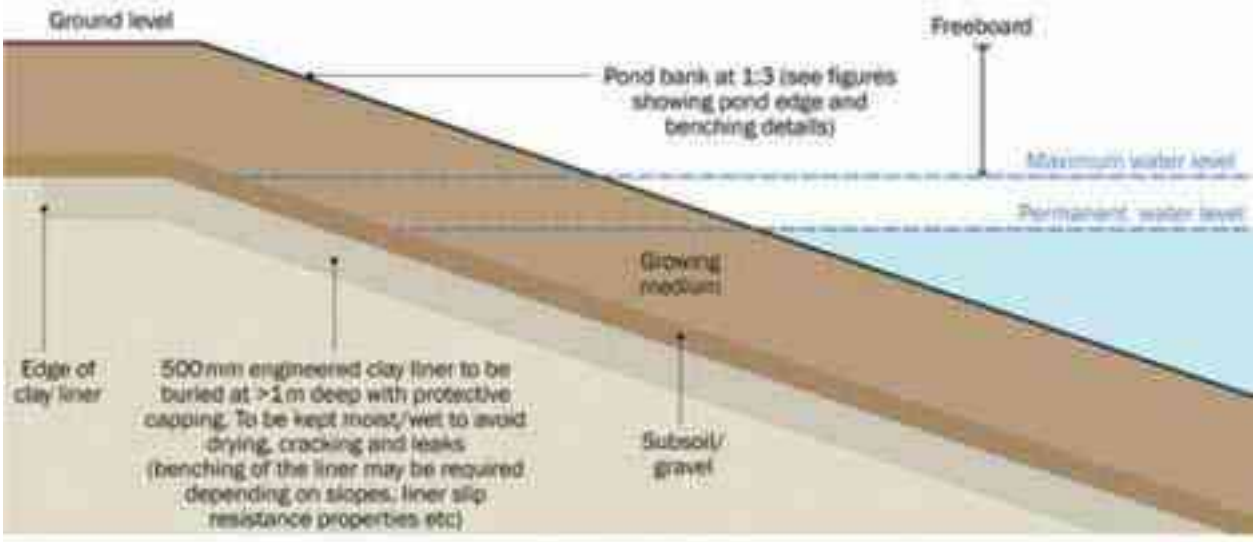
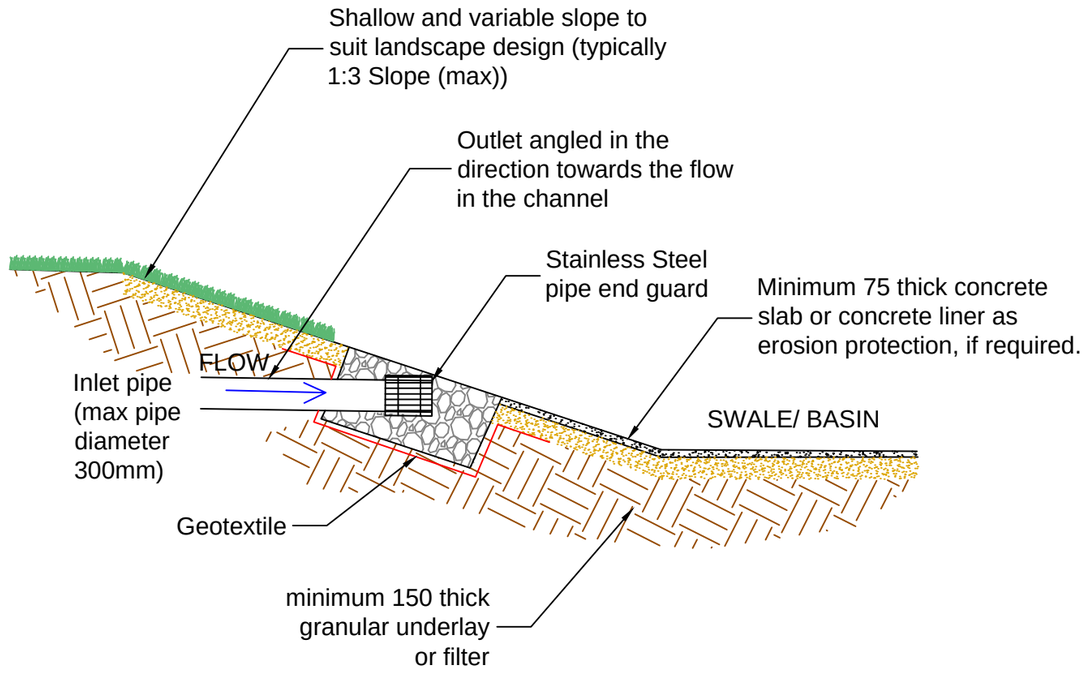


Figure 23.15 Details for a typical clay liner

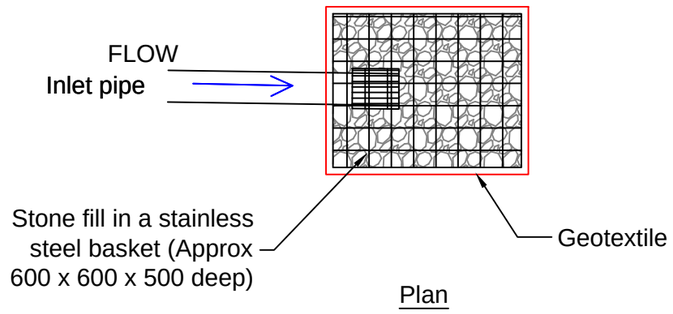
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Section



Plan

Notes:

1. All dimensions in millimetres. This drawing is not to scale.
2. Design to be developed using design guidance as set out in CIRIA C753 SuDS Manual.
3. Suitable bedding to achieve a stable footing specific to site requirements. Engineer to specify.
4. Geotextile and granular underlay can be permeable if required. Ground investigation to confirm ground conditions. If the ground is unstable or unsuitable, replace with suitable engineered soil.

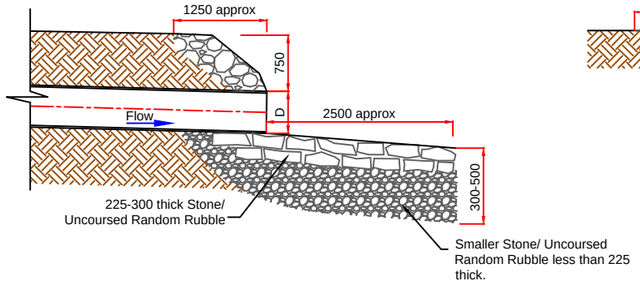
TYPICAL DETAIL GABION BASKET INLET



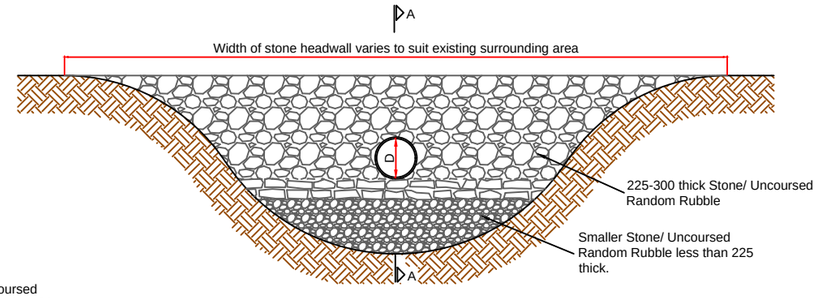




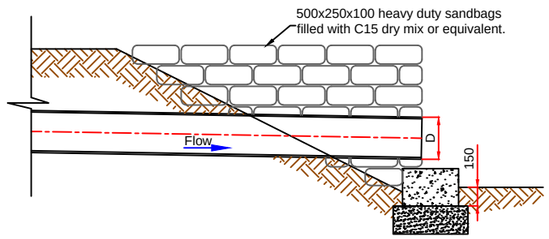




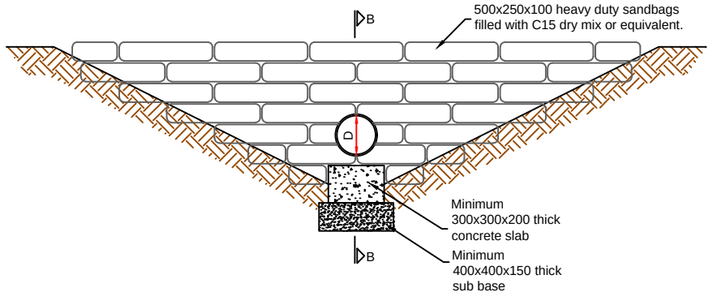
SECTION A-A
TYPE 1 - STONE STACKED HEADWALL



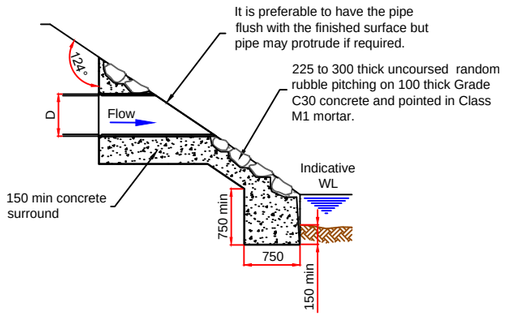
TYPE 1 - STONE STACKED HEADWALL
FRONT ELEVATION



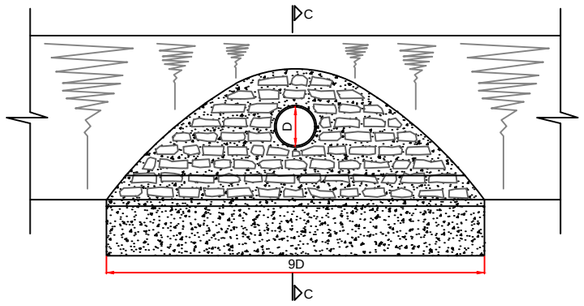
SECTION B-B
TYPE 2 - SANDBAG HEADWALL



TYPE 2 - SANDBAG HEADWALL
FRONT ELEVATION



SECTION C-C
TYPE 3 - STONE PITCHED HEADWALL



TYPE 3 - STONE PITCHED HEADWALL
FRONT ELEVATION

Notes:

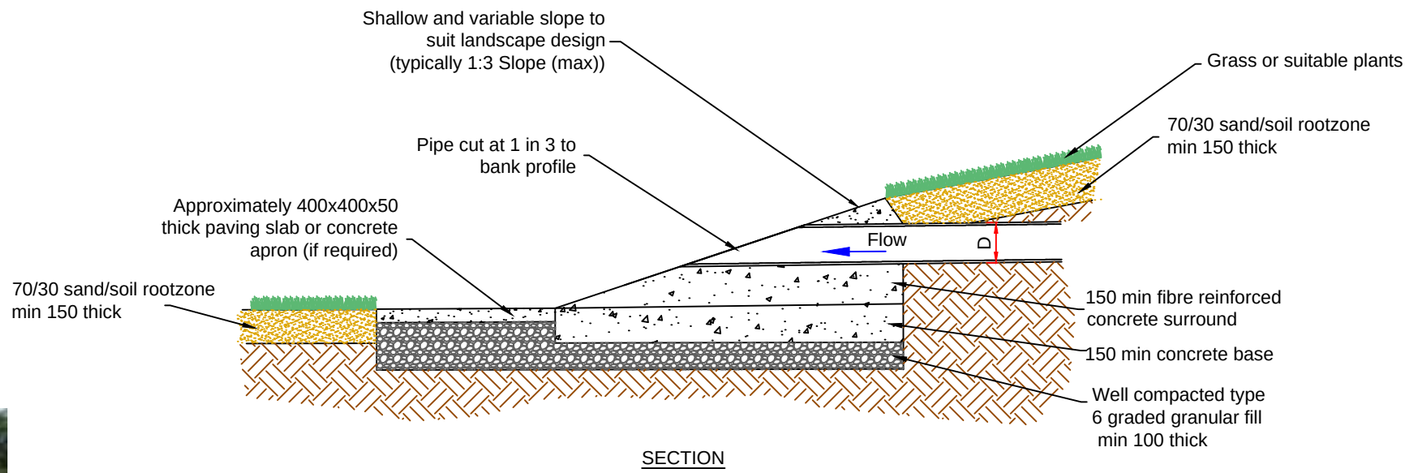
1. All dimensions in millimetres. This drawing is not to scale.
2. Design to be developed using design guidance as set out in CIRIA C753 SuDS Manual.
3. Suitable bedding to achieve a stable footing specific to site requirements. Engineer to specify
4. The bed and opposite bank of the watercourse may in certain circumstances, need to be protected by 225mm to 300mm thick uncoursed rubble pitching laid on 100mm thick bed of C30 concrete and pointed in Class M1 mortar. The stone for pitching shall consist of large smooth faced stones roughly dressed square and shall be of a hard durable and inert material. Bunter sandstones, Keuper waterstones and carboniferous shales and mudstones are not to be used.
5. Diameter 'D':
   Type 1 - Max pipe diameter is 300mm,
   Type 2 - Max pipe diameter is 300mm,
   Type 3 - Pipe diameter is greater than 300mm.
6. Dimensions of sandbags are taken from:
   - S.G. Baker - www.sgbaker.co.uk
4. Headwalls for larger pipe diameters, refer to UU Standard Details STND-00-006 and Design and Construction Guidance (DCG).
5. For safety grille and trash screen, UU Standard Details STND-00-007 and Design and Construction Guidance (DCG).
6. Large outfalls may require the provision of a security screen to prevent others from gaining access to the pipe. Note that there must be a screen at the inlet of the pipe if there is one at the outfall. UU standards specify 375-450mm pipes have safety bars and >450mm dia have safety grille.
7. Where the velocity of flow exiting the outfall is likely to be high, some means of energy dissipation is necessary to reduce the risk of erosion in the vicinity of the outfall. This may take the form of baffle blocks on the apron, or an impact type stilling outfall can be adopted.
8. Outfalls do not have to be large and visually intrusive provided careful thought is given to the purpose of the outfall and the hydraulics (velocity, direction) of the flow.

TYPICAL DETAIL HEADWALLS

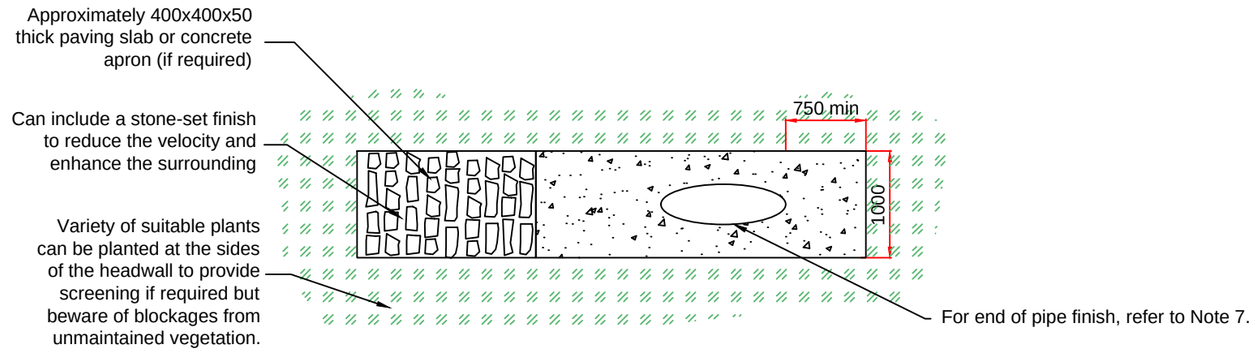








SECTION



PLAN

Notes

1. All dimensions in millimetres. This drawing is not to scale.
2. Design to be developed using design guidance as set out in CIRIA C753 SuDS Manual.
3. Suitable bedding to achieve a stable footing specific to site requirements. Engineer to specify
4. Recommended maximum slope is 1 in 3.
5. Headwall arrangement is only suitable for small pipe diameters ('D') of up to and including 300mm.
6. Pipe cover depth to achieve 0.9m as soon as it is possible to do so for non-trafficked areas, open space areas. Refer to the 'Design and Construction Guidance'.
7. Pipe end can be moved closer to or further from the concrete slab base if required but must maintain the minimum concrete surround.
8. Paving slab, concrete apron or stone-set finish can be angled at maximum of 1 in 3 slope if required.
9. Concrete, stone or other surrounds to pipe must be flush to bank profile. The cut ends of the plastic pipe should not be left exposed. Plastic pipe end may need to be cut prior to being exposed externally and and reinforce the cut end with a concrete collar, smooth out the concrete surround.
10. Precast concrete mitred inlet/outlet is also available: https://www.althon.co.uk/products /swale-inlet-headwall/ or https://www.aco.co.uk /products/suds-swale-inlet however, mesh grating to be used with care and assess location for suitability. Possible blinding/ blockage risk.
11. Designed water level to be below the outlet/ inlet of the SuDS feature.
12. For larger pipe diameters, refer to the 'Design and Construction Guidance', United Utilities Developer Services Construction Details both of which comply with the Environment Agency's standard details.

TYPICAL DETAIL MITRED CONCRETE HEADWALL



PHOTO OF CONCRETE
SEDIMENT FOREBAY

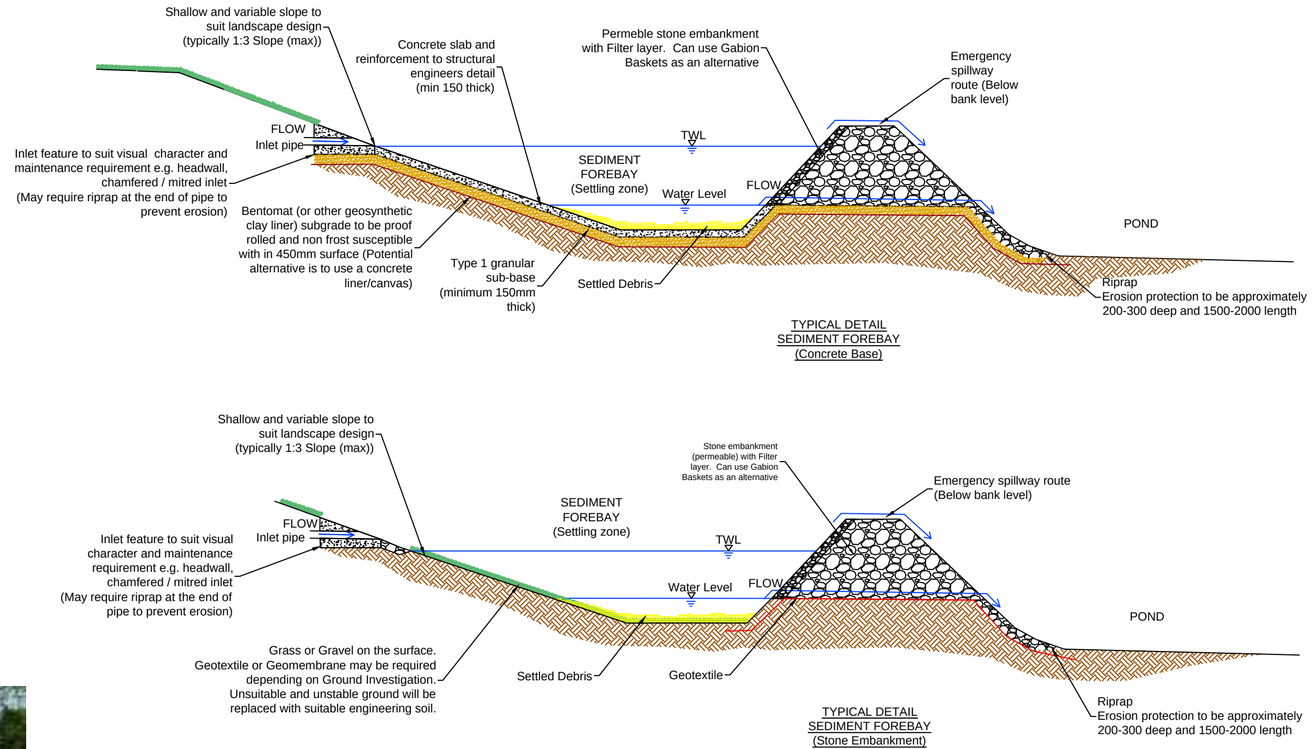
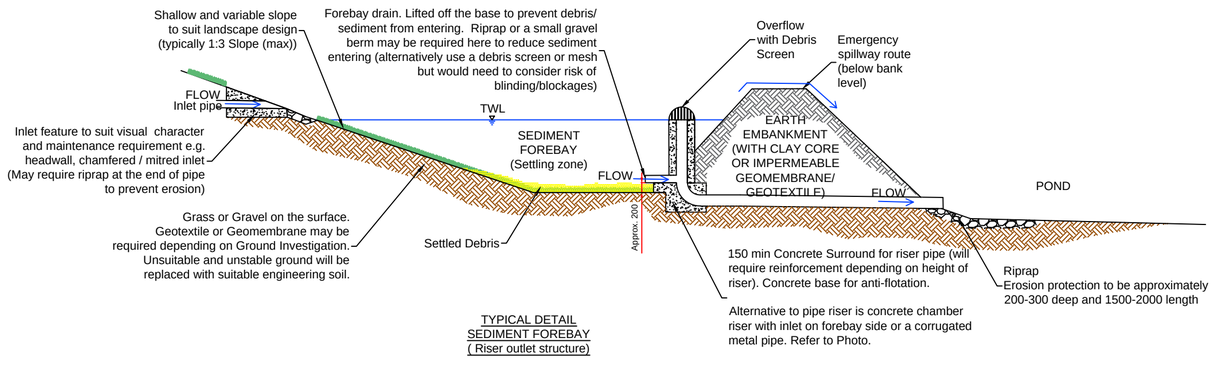




PHOTO OF STONE
EMBANKMENT
SEDIMENT FOREBAY

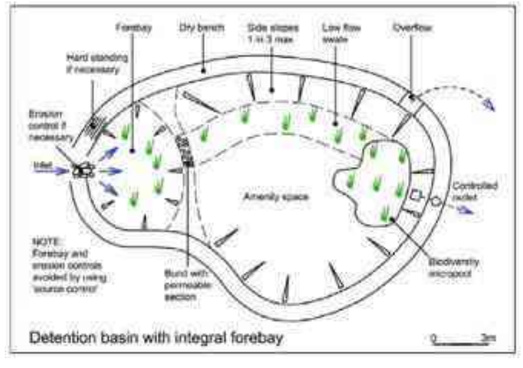


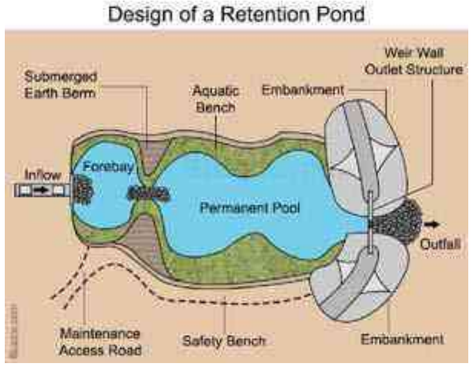
TYPICAL DETAIL
SEDIMENT FOREBAY
(Riser outlet structure)





PHOTO OF SEDIMENT
FOREBAY WITH RISER OUTLET
(Alternative options corrugated pipe and concrete chamber)





TYPICAL PLAN OF
SEDIMENT FOREBAY

Notes

1. All dimensions in millimetres. This drawing is not to scale.
2. Design to be developed using design guidance as set out in CIRIA C753 SuDS Manual.
3. Maximum slope is 1 in 2 for riprap stability but recommended maximum slope for bank is 1 in 3 for undertaking maintenance.
4. Headwall arrangement shown on this drawing is only suitable for small pipe diameters. Refer to typical detail for mitred headwall and typical headwalls.
5. Suitable bedding to achieve a stable footing specific to site requirements. Engineer to specify.

RipRap:

Riprap needs a well engineered underlayer to work effectively...

This underlayer must act as:
- a drain parallel to the slope to prevent a build-up of water pressure under the cover layer;
- a filter to prevent the underlying soil from washing out.

The underlayer normally consists of a granular material laid on a geotextile filter cloth that separates it from the bare earth bank. To reduce the risk of voids, the underlayer must be finished to provide an even formation for the cover layer.

Riprap to be light grading 60-300kg as per EN 13383 standard grading requirements, reproduced in CIRIA C683 'The Rock Manual', Table 3.5. Grading requirements for Riprap.

Appropriate characteristics of riprap are given in Table 8.2 Appropriate characteristics of riprap (Escarameia, 1998). Many formulae have been developed to determine the size of rocks in a revetment, but that of Escarameia (1998) is one of the easiest to use. It can be used for bank slopes not steeper than 1V:2H to determine the 50% passing size of the revetment.

Minimum Thickness of placed Riprap to be 2 x DN50 or 1 to 1.5 × maximum dimension of individual stones.

Gabion Mattress:
Reference made to:

River and Channel Revetments: A Design Manual By Manuela Escarameia

A T Pepper, C E Rickard
FDG2 – Chapter 8 – Final, FDG2-Ch8-Final4b.doc 8–18 13Dec09
http://evidence.environment-agency.gov.uk/FCERM/Libraries
/Fluvial_Documents/Fluvial_Design_Guide_-_Chapter_8.sflb.ashx

With a well-constructed gabion mattress smaller stones can be used. The minimum thickness of the mattress is then1.5 times the nominal stone size.

Loose or interlocking concrete block revetment may also be designed, DN50 is taken as the block thickness.

Where material has to be placed underwater (underlayer or cover layer), the ability of the contractor to control the quality of the finished product is reduced –particularly for riprap – and so the specification should be upgraded to compensate.

TYPICAL DETAIL
SEDIMENT FOREBAYS

Bletcher, Lee

From: seweradoptions@uuplc.co.uk
Sent: 25 January 2023 15:14
To: Browne, Rick
Subject: *EXTERNAL:RE: FW: Cowm Top, Rochdale.

This Message Is From an External Sender
This message came from outside your organization.

Hi Rick,

Thank you for your email.

Unfortunately, we would not adopt a petrol interceptor due to the potential ramifications of it malfunctioning.

If you need anything else please do let me know.

Kind regards,

United Utilities
Water for the North West

Jordan Houghton
Assistant Developer Engineer
Developer Services & Metering
Customer Services
T: 07500671544
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

---------- Original Message ----------
From: Browne, Rick [rick.browne@barratthomes.co.uk]
Sent: 25/01/2023 10:04
To: jill.ellis@uuplc.co.uk
Cc: seweradoptions@uuplc.co.uk
Subject: FW: Cowm Top, Rochdale.

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

Hi Jill. As discussed. This is quite urgent, as we have an objection to our planning application from the downstream land-owner who is asking us to provide a petrol interceptor on what we are putting forward as a UU adoptable network.

Regards

Rick Browne

Engineering Design Manager

Rick.browne@barratthomes.co.uk

Barratt Homes Manchester

(a trading name of BDW Trading Limited)

4 Brindley Road, City Park, Manchester, M16 9HQ

☎ 0161 855 2864

☎ 07909 644836

From: Browne, Rick
Sent: 11 January 2023 09:19
To: seweradoptions@uuplc.co.uk
Subject: Cowm Top, Rochdale.

Hi.

I wonder if you could please assist me?

We are looking at a site in Rochdale where we are proposing adoptable surface water systems that discharge to a watercourse, that has been dammed to create a fishing lodge. The owner of the fishery are therefore asking for us to ensure that the water exiting the system and entering the watercourse is as clean as possible and minimise the chance of oil spills on residents drives etc passing through to their lodge. So we are currently optioneering how we may be able to provide some level of treatment.

We would naturally want our system to be adopted by United Utilities, though our understanding is that yourselves do not accept petrol interceptors on a United Utilities adoptable network. Please can you confirm that this is still strictly the case or whether yourselves would consider one, as any such feature would have to be installed towards the end of the network, thus would have to be on the UU adoptable system?

Regards

Rick Browne

Engineering Design Manager

Rick.browne@barratthomes.co.uk

Barratt Homes Manchester

(a trading name of BDW Trading Limited)

4 Brindley Road, City Park, Manchester, M16 9HQ

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Appendix B
Site Investigation

5.1.24. The results of the Super Heavy Dynamic Probing indicated that the Hummocky Glacial Deposits varied with depth from very loose/very soft to very dense/very stiff.

California Bearing (CBR) Tests

5.1.25. Laboratory CBR tests were undertaken in the Hummocky Glacial Deposits encountered at the site. Results of the testing ranged between 0.1% and 4.7%. The results are resumed in the table below.

Table 5.1: Summary of CBR tests for different soils of the Hummocky Glacial Deposits

Soil	CBR (%)
very silty SAND	0.5
slightly sandy SILT	1.7
sandy SILT	0.2
sandy SILT	0.8
sandy SILT	0.1
sandy SILT	0.1
CLAY	1.0-1.2
silty SAND	4.2-4.7

Dry density/Moisture Proctor Tests

5.1.26. 2.5kg rammer tests – Proctor Tests were undertaken in the Hummocky Glacial Deposits in areas assumed to form part of the 'cut' (and which will therefore require placement and compaction in other areas) to determine the maximum dry density versus optimum moisture content relationship. The results are resumed in the table below.

Table 5.2: Summary of 2.5kg rammer tests (Proctor method) for different soils of the Hummocky Glacial Deposits

Soil	Maximum density (Mg/m3)	Optimum moisture (%)
silty SAND	1.76	14
sandy SILT	1.99	10
sandy SILT	1.99	12
slightly sandy SILT	1.91	11
sandy SILT	1.73	15
CLAY	1.67	19
silty SAND	1.68	15
slightly gravelly slightly sandy CLAY	1.71	19

5.2. Groundwater Conditions

5.2.1. Groundwater was encountered as seepages or inflows in 5 of the 21 trial pits undertaken in June 2016, groundwater was observed typically in low-lying areas, during the fieldwork, mainly as seepages and inflows within the sandy layers of Hummocky Glacial Deposits and in alluvium layer in TP05. The groundwater levels (trial pits June 2016 and surface water features) are summarised below:

Table 5.3: Summary of groundwater levels, June 2016, Report R2228.

Exploratory hole	GW level (m bgl)	Type	Material	Total depth (m)	Approximate hole ground elevation (m)
TP03	1.8	Inflow	Sand (Hummocky)	3.0	~155
TP05	0.6 1.3 2.4	Inflow Inflow Standing level after 10min	Made Ground Alluvium Sand (Hummocky)	2.6	~158
TP09	2.7	Seepage	Sand (Hummocky)	2.7	~152
TP10	2.0	Seepage	Sand (Hummocky)	2.0	~167
TP16	0.8 1.3 1.8	Seepage Seepage Seepage	Sand (Hummocky) Sand (Hummocky) Sand (Hummocky)	3.0	~166
Spring 1	-	spring	Sand (Hummocky)	-	~155
Spring 2	-	spring	Sand (Hummocky)	-	~164
Farm Water supply	-	Supply draining groundwater from Sand (Hummocky)	Sand (Hummocky)	-	~155

5.2.2. On completion of the cable percussion boreholes BHD, BHG, BHH, BHI, BHK, BHL, BHM and BHN were utilised for the installation of a 50mm diameter PVC standpipes for groundwater monitoring programme. Details of groundwater monitoring are summarised below:

Table 5.4: Summary of groundwater monitoring (m).

Exploratory hole	09/06/17	Total depth
BHD	9.65	10.45
BHG	not measured	20.45
BHH	6.78	20.45
BHI	20.24	20.45
BHK	dry	15.45
BHL	not measured	20.45
BHM	0.99	10.45
BHN	4.32	15.45

5.2.3. Falling head permeability testing was undertaken in BHD, BHG, BHH, BHI, BHK, BHL, BHM and BHN. Results are provided in the table below:

Table 5.5: Summary of permeability results

Exploratory hole	permeability k (m/s)
BHD	$1.4x10^{-7}$
BHG	$4.9x10^{-7}$
BHH	$1.9x10^{-6}$

Exploratory hole	permeability k (m/s)
BHI	$2.8x10^{-7}$
BHK	$5.8x10^{-7}$
BHL	$1.4x10^{-6}$
BHM	$1.1x10^{-6}$
BHN	$1x10^{-6}$

5.3. Results of Soil and Groundwater Chemical Analysis

5.3.1. The complete soil analytical data are presented in report R2228 Preliminary Phase I & II Contamination and Geotechnical Assessment (2016). With respect to BRE Special Digest SD1 (2009) chemical tests on selected soil samples have recorded soluble sulphate concentrations ranging from 1.5*mg/l to 168mg/l. The pH values ranged from 4.9 to 8.2.

Appendix C
InfoDrainage Simulations

CONTENTS

Drainage Layout

Drainage Network Layout

SW Impermeable Areas Layout

Network 1 Storm Water Design

Storm Drainage Design (1 in 2 yr) and Online Controls

SW Manhole Schedules

Rainfall Simulation – 1 in 1 year

Rainfall Simulation – 1 in 2 year

Rainfall Simulation – 1 in 30 year

Rainfall Simulation – 1 in 100 year

Rainfall Simulation – 1 in 100 year + 40% Climate Change

Network 2 Storm Water Design

Storm Drainage Design (1 in 2 yr) and Online Controls

SW Manhole Schedules

Rainfall Simulation – 1 in 1 year

Rainfall Simulation – 1 in 2 year

Rainfall Simulation – 1 in 30 year

Rainfall Simulation – 1 in 100 year

Rainfall Simulation – 1 in 100 year + 40% Climate Change

DRAINAGE LAYOUT

Drainage Network Layout

PLEASE NOTE THAT THE DRAINAGE DESIGN IS SUBJECT TO APPROVAL BY UNITED UTILITIES AND THE LLFA.

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CARRIAGEWAY TBC

FW Outfall Option 1. -2no. MDPE Rising mains to UU FWS in Cowm Top Lane

CROSSING FOR PEDESTRIAN : CYCLE OVER PROPOSED ROAD ALIGNMENT

LANDSCAPE BUFFER

LANDSCAPE BUFFER

LANDSCAPE BUFFER

15.48

PROBABLE RISING MAIN ROUTE

Cowm Top Lane

2m WIDE FOOTWAY

FW Outfall Option 1. -2no. MDPE Rising mains to UU FWS in Cowm Top Lane

CROSSING FOR PEDESTRIAN : CYCLE OVER PROPOSED ROAD ALIGNMENT

2nd pump station to the west for faster completion of the construction phases, and to eliminate the need for deep foul sewers.

HIGH PRESSURE GAS MAIN WITH ASSUMED 6M EASEMENT EITHER SIDE.

Western Detention Basin
Wetland Bed Level: 153.5mAOD
Aquatic Bench Level:154.35
Low Flow Bed Level: 154.75mAOD Basin
Bed Level: 155.000mAOD
Permanent Water Level: 154.75mAOD
Top Water Level: 156.000mAOD
Top of Bank: 156.50mAOD
Storage Volume: 2407m3
Lowest contributing level: 157.030mAOD
Base Area: 1820m2
Top of Bank Area: 3152m2

S147 — Flow Control
Orifice Plate Type
Size=0.136
Co-eff of discharge=0.6m
Flow=40.3 l/s

S151 — Flow Control
Orifice Plate Type
Size=0.129
Co-eff of discharge=0.6m
Flow=47.2 l/s

PROPOSED ROAD LOCATION

PROPOSED WESTERN OUTFALL
Proposed new SW outfall route and associated 8 metre easement to existing reservoir. Flow-rates to be agreed with LLFA:EA. *RISK— THROUGH BOTH THIRD PARTY LAND AND UNREGISTERED LAND— LAND DEPT TO ADVISE.

EXISTING WATERCOURSE TO REMAIN

Right of way. To allow machinery to the northern lodge. From the southern boundary up to the lodge the easement is 6m. Around the actual lodge itself it is 10m.

Trows House

Trows Farm

Thornton House

Track

Reservoir

ENGINEERING LAYOUT NOTES

1. All adoptable drainage works have been designed and are to be constructed in accordance with 'Sewerage Sector Guidance Appendix C — Design and Construction Guide (C.D.T. and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidelines shall take precedence.

United Utilities Standard details to be used are:

STND/19/7001A Manhole Type 1
STND/19/7002A Manhole Type 2 and Invert Access Detail
STND/19/7003A Shallow Manhole Detail for Small Diameter Pipes (Type 4)
STND/19/7004A Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450Dia and Above
STND/19/7005A Flow Control Manhole Detail
STND/19/7007A External Backdrop Detail
STND/19/7009A Pipe Bedding Detail
STND/19/7010A Variable Manhole – Guidance Notes
STND/19/7011A Headwall Type 1 and Typical Outlet Grille Detail
STND/19/7012A Typical Outfall Details Type 2 & Type 3

Barratt SUDs Details to be used are:

496/ED/20 Western Attenuation Details
496/ED/21 Eastern Attenuation Details

2. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (SW pipes only).

3. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BSI kitemark.

4. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.

5. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufactured to BS EN 1917 and BS 5911/Part 3.

6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244-2. Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 1594-2.

7. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

8. This drawing is to be read in accordance with all other relevant drawings.

9. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.

10. All proposed connections to the sewer shall be 150ø unless stated otherwise.

11. All private house drainage shall be 100ø and all drag-out connections shall be 150ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.

12. Runoff from private surfaces shall not discharge across the highway. Gullies or channels shall be provided as appropriate to prevent this.

13. Frame crossings shall be provided at the inner tangent points of all junctions.

14. Pipes shall be protected from concentrated loading by construction traffic during the construction period when insufficient cover to the pipe may make them vulnerable to damage.

15. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.

16. Groundworker to ensure that plot drainage be within the curtilage of the plot they serve where possible and inspection covers kept within hardstandings where possible.

17. Contractor to provide United Utilities with sufficient notice prior to commencement of Sewer works on their Inspections telephone number. Tel 0845 602 0406.

18. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

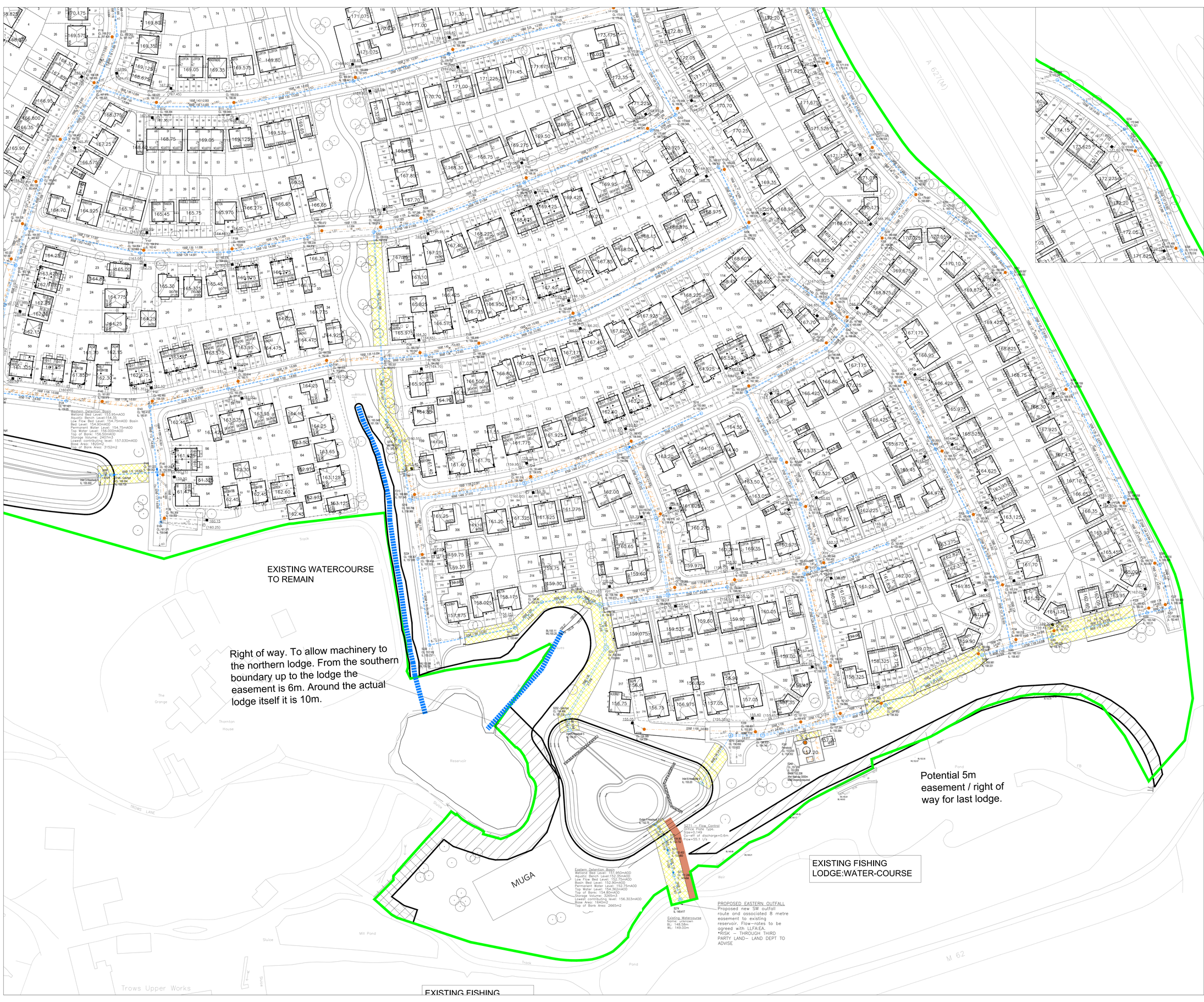
ENGINEERING KEY

- S104 Adoptable S.W. Sewer & Manhole
- S104 Adoptable F.W. Sewer & Manhole
- S. Water Drag-Out and Invert (10.25)
- Foul Drag-Out and Invert 10.25
- S38 Adoptable Road Gully
- Street Name Plate
- Proposed S104 Sewer Easement
- Proposed Adoptable Foul Water Pumpstation
- Proposed Adoptable Foul Water Rising Main(s)
- Proposed foul water outfall route — subject to UU approval
- Land required temporarily by the developer and developers contractor in order to complete outfall works

REV	DESCRIPTION	DATE	DRAWN
A	Amendments to drainage runs, FFLs, plot drainage and drag-outs. In order to ensure that the pipes and SuDs are sized correctly, the storm simulations were modelled in info drainage.	04.04.23	RB

BARRATT HOMES
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Barratt Homes Manchester
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4 Brindley Road
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M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2620

Job: Cowm Top, Castleton Rochdale			
Title: Preliminary Engineering Layout Sheet 1			
Design By: LB	Date: August 2022	Drawing Number: 496/ED/02	Rev: A
C.A.D By: LB	Scale @ A0: 1:500		



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ENGINEERING LAYOUT NOTES

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United Utilities Standard details to be used are:

STND/19/0014 Manhole Type 1
STND/19/0024 Manhole Type 2 and Invert Access Detail
STND/19/0034 Shallow Manhole Detail for Small Diameter Pipes (Type 4)
STND/19/0044 Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450Dia and Above.
STND/19/0054 Flow Control Manhole Detail
STND/19/0074 External Blockring Detail
STND/19/0084 Pipe Bedding Detail
STND/19/0104 Variable Manhole – Guidance Notes
STND/19/0114 Headwall Type 1 and Typical Outlet Grille Detail
STND/19/0124 Typical Outfall Details Type 2 & Type 3

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496/ED/21 Eastern Attenuation Details

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3. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BS kitemark.

4. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.

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6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 12244-2, Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 13244-2.

7. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

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- Land required temporarily by the developer and developers contractor in order to complete outfall works

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REV	DESCRIPTION	DATE	DRAWN
B	Amendments to drainage runs, FFLs, plot drainage and drag-outs. In order to ensure that the pipes and SuDs are sized correctly, the storm simulations were modelled in info drainage.	04.04.23	RB
A	Added extra viewport to show missing drainage runs S28–S31 and F32–F35.	Oct 22	LB

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Job: Cowm Top, Castleton, Rochdale			
Title: Preliminary Engineering Layout Sheet 2			
Design By: LB	Date: June 2022	Drawing Number: 496/ED/03	Rev: B
C.A.D By: LB	Scale @ A0: 1:500		

DRAINAGE LAYOUT

SW Impermeable Areas Layout

WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

Buyers are warned that this is a working drawing and is not intended to be treated as descriptive material describing, in relation to any particular property or development, any of the Specified matters prescribed by any Order made under the above Act. The contents of this drawing may be subject to change at any time and alterations and variations can occur during the progress of the works without revision of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially from those shown. Nor do the contents of this drawing constitute a contract, part of any contract or warranty.

LANDSCAPE BUFFER

LANDSCAPE BUFFER

LANDSCAPE BUFFER

Cown Top

Trows Farm

Trows House

The Nest

Thornton House

Track

Track

Track

Issues

Issues

Sales

Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urbon Creep	Drainage Area's Total Network 1
1=1.000 = 0.039 Ha	1=1.000 = 0 Ha	1=1.000 = 0.039 Ha
1=1.001 = 0.044 Ha	1=1.001 = 0.116 Ha	1=1.001 = 0.160 Ha
1=1.002 = 0.045 Ha	1=1.002 = 0.095 Ha	1=1.002 = 0.140 Ha
1=1.003 = 0.041 Ha	1=1.003 = 0.100 Ha	1=1.003 = 0.141 Ha
1=1.004 = 0.033 Ha	1=1.004 = 0.093 Ha	1=1.004 = 0.126 Ha
1=1.005 = 0.032 Ha	1=1.005 = 0.044 Ha	1=1.005 = 0.076 Ha
1=1.006 = 0.028 Ha	1=1.006 = 0 Ha	1=1.006 = 0.028 Ha
1=1.007 = 0.028 Ha	1=1.007 = 0.087 Ha	1=1.007 = 0.115 Ha
1=1.008 = 0.021 Ha	1=1.008 = 0.036 Ha	1=1.008 = 0.057 Ha
1=1.009 = 0.022 Ha	1=1.009 = 0.053 Ha	1=1.009 = 0.075 Ha
1=1.010 = 0.028 Ha	1=1.010 = 0 Ha	1=1.010 = 0.028 Ha
1=1.011 = 0 Ha	1=1.011 = 0 Ha	1=1.011 = 0 Ha
1=1.012 = 0.039 Ha	1=1.012 = 0.069 Ha	1=1.012 = 0.108 Ha
1=1.013 = 0.023 Ha	1=1.013 = 0.093 Ha	1=1.013 = 0.023 Ha
1=1.014 = 0 Ha	1=1.014 = 0 Ha	1=1.014 = 0 Ha
1=1.015 = 0 Ha	1=1.015 = 0 Ha	1=1.015 = 0 Ha
1=1.016 = 0 Ha	1=1.016 = 0 Ha	1=1.016 = 0 Ha
1=1.017 = 0 Ha	1=1.017 = 0 Ha	1=1.017 = 0 Ha
1=1.018 = 0 Ha	1=1.018 = 0 Ha	1=1.018 = 0 Ha
1=1.019 = 0.034 Ha	1=1.019 = 0 Ha	1=1.019 = 0.039 Ha
1=1.020 = 0.046 Ha	1=1.020 = 0 Ha	1=1.020 = 0.046 Ha
1=1.021 = 0.062 Ha	1=1.021 = 0 Ha	1=1.021 = 0.062 Ha
1=1.022 = 0 Ha	1=1.022 = 0 Ha	1=1.022 = 0 Ha
1=2.000 = 0.023 Ha	1=2.000 = 0 Ha	1=2.000 = 0.023 Ha
1=3.000 = 0.056 Ha	1=3.000 = 0 Ha	1=3.000 = 0.056 Ha
1=3.001 = 0.058 Ha	1=3.001 = 0.154 Ha	1=3.001 = 0.212 Ha
1=3.002 = 0.032 Ha	1=3.002 = 0.077 Ha	1=3.002 = 0.109 Ha
1=3.003 = 0.031 Ha	1=3.003 = 0.041 Ha	1=3.003 = 0.072 Ha
1=3.004 = 0.028 Ha	1=3.004 = 0.115 Ha	1=3.004 = 0.143 Ha
1=4.000 = 0.049 Ha	1=4.000 = 0 Ha	1=4.000 = 0.049 Ha
1=4.001 = 0.056 Ha	1=4.001 = 0.105 Ha	1=4.001 = 0.161 Ha
1=4.002 = 0.029 Ha	1=4.002 = 0.165 Ha	1=4.002 = 0.194 Ha
1=5.000 = 0.040 Ha	1=5.000 = 0 Ha	1=5.000 = 0.040 Ha
1=5.001 = 0.030 Ha	1=5.001 = 0.105 Ha	1=5.001 = 0.135 Ha
1=6.000 = 0.050 Ha	1=6.000 = 0.052 Ha	1=6.000 = 0.102 Ha
1=7.000 = 0.070 Ha	1=7.000 = 0 Ha	1=7.000 = 0.070 Ha
1=7.001 = 0.052 Ha	1=7.001 = 0 Ha	1=7.001 = 0.052 Ha
1=7.002 = 0.015 Ha	1=7.002 = 0 Ha	1=7.002 = 0.015 Ha
1=7.003 = 0.051 Ha	1=7.003 = 0 Ha	1=7.003 = 0.051 Ha
1=7.004 = 0 Ha	1=7.004 = 0 Ha	1=7.004 = 0 Ha
1=7.005 = 0 Ha	1=7.005 = 0.014 Ha	1=7.005 = 0.014 Ha
1=7.006 = 0.034 Ha	1=7.006 = 0 Ha	1=7.006 = 0.034 Ha
1=7.007 = 0.051 Ha	1=7.007 = 0.058 Ha	1=7.007 = 0.109 Ha
1=7.008 = 0.043 Ha	1=7.008 = 0.063 Ha	1=7.008 = 0.106 Ha
1=7.009 = 0.032 Ha	1=7.009 = 0 Ha	1=7.009 = 0.032 Ha
1=7.010 = 0.026 Ha	1=7.010 = 0.067 Ha	1=7.010 = 0.093 Ha
1=7.011 = 0.027 Ha	1=7.011 = 0.032 Ha	1=7.011 = 0.059 Ha
1=7.012 = 0.019 Ha	1=7.012 = 0 Ha	1=7.012 = 0.019 Ha
1=7.013 = 0 Ha	1=7.013 = 0.093 Ha	1=7.013 = 0.093 Ha
1=8.000 = 0.053 Ha	1=8.000 = 0.103 Ha	1=8.000 = 0.156 Ha
1=8.001 = 0.034 Ha	1=8.001 = 0.111 Ha	1=8.001 = 0.145 Ha
1=8.002 = 0.018 Ha	1=8.002 = 0.046 Ha	1=8.002 = 0.064 Ha
1=8.003 = 0 Ha	1=8.003 = 0.039 Ha	1=8.003 = 0.039 Ha
1=8.004 = 0 Ha	1=8.004 = 0 Ha	1=8.004 = 0 Ha
1=9.000 = 0.058 Ha	1=9.000 = 0.059 Ha	1=9.000 = 0.117 Ha
		Total = 3.825 Ha

Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urbon Creep	Drainage Area's Total Network 1
2=1000 = 0.059 Ha	2=1.000 = 0.045 Ha	2=1.000 = 0.104 Ha
2=1001 = 0.026 Ha	2=1001 = 0.050 Ha	2=1001 = 0.076 Ha
2=1002 = 0 Ha	2=1002 = 0.039 Ha	2=1002 = 0.039 Ha
2=1003 = 0.067 Ha	2=1003 = 0.039 Ha	2=1003 = 0.106 Ha
2=1004 = 0.033 Ha	2=1004 = 0.157 Ha	2=1004 = 0.190 Ha
2=1005 = 0.033 Ha	2=1005 = 0.081 Ha	2=1005 = 0.114 Ha
2=1006 = 0.019 Ha	2=1006 = 0.052 Ha	2=1006 = 0.071 Ha
2=1007 = 0 Ha	2=1007 = 0 Ha	2=1007 = 0 Ha
2=1008 = 0 Ha	2=1008 = 0 Ha	2=1008 = 0 Ha
2=1009 = 0.006 Ha	2=1009 = 0.044 Ha	2=1009 = 0.050 Ha
2=1010 = 0.047 Ha	2=1010 = 0 Ha	2=1010 = 0.047 Ha
2=1011 = 0.033 Ha	2=1011 = 0.133 Ha	2=1011 = 0.166 Ha
2=1012 = 0.025 Ha	2=1012 = 0.071 Ha	2=1012 = 0.096 Ha
2=1013 = 0.040 Ha	2=1013 = 0.090 Ha	2=1013 = 0.130 Ha
2=1014 = 0 Ha	2=1014 = 0.052 Ha	2=1014 = 0.052 Ha
2=1015 = 0 Ha	2=1015 = 0.050 Ha	2=1015 = 0.050 Ha
2=1016 = 0 Ha	2=1016 = 0 Ha	2=1016 = 0 Ha
2=1017 = 0 Ha	2=1017 = 0 Ha	2=1017 = 0 Ha
2=1018 = 0 Ha	2=1018 = 0 Ha	2=1018 = 0 Ha
2=1019 = 0 Ha	2=1019 = 0 Ha	2=1019 = 0 Ha
2=1020 = 0 Ha	2=1020 = 0 Ha	2=1020 = 0 Ha
2=1021 = 0 Ha	2=1021 = 0 Ha	2=1021 = 0 Ha
2=2000 = 0.050 Ha	2=2.000 = 0.025 Ha	2=2.000 = 0.075 Ha
2=2001 = 0.054 Ha	2=2001 = 0.075 Ha	2=2001 = 0.0129 Ha
2=2002 = 0.052 Ha	2=2002 = 0.171 Ha	2=2002 = 0.223 Ha
2=2003 = 0.028 Ha	2=2.003 = 0 Ha	2=2.003 = 0.028 Ha
2=2004 = 0.026 Ha	2=2004 = 0.139 Ha	2=2.004 = 0.165 Ha
2=2005 = 0.039 Ha	2=2005 = 0.039 Ha	2=2.005 = 0.078 Ha
2=4000 = 0.044 Ha	2=4.000 = 0.092 Ha	2=4.000 = 0.136 Ha
2=5000 = 0.026 Ha	2=5.000 = 0.028 Ha	2=5.000 = 0.054 Ha
2=5001 = 0.053 Ha	2=5.001 = 0 Ha	2=5.001 = 0.053 Ha
2=5002 = 0 Ha	2=5.002 = 0.043 Ha	2=5.002 = 0.043 Ha
2=5003 = 0 Ha	2=5.003 = 0 Ha	2=5.003 = 0 Ha
2=5004 = 0 Ha	2=5.004 = 0 Ha	2=5.004 = 0 Ha
2=6000 = 0.060 Ha	2=6.000 = 0.062 Ha	2=6.000 = 0.060 Ha
2=6001 = 0.027 Ha	2=6.001 = 0.092 Ha	2=6.001 = 0.119 Ha
2=6002 = 0.026 Ha	2=6.002 = 0 Ha	2=6.002 = 0.026 Ha
2=6003 = 0.039 Ha	2=6.003 = 0.064 Ha	2=6.003 = 0.103 Ha
2=6004 = 0.008 Ha	2=6.004 = 0.048 Ha	2=6.004 = 0.056 Ha
2=6005 = 0.021 Ha	2=6.005 = 0 Ha	2=6.005 = 0.021 Ha
2=6006 = 0.028 Ha	2=6.006 = 0.019 Ha	2=6.006 = 0.047 Ha
2=6007 = 0.027 Ha	2=6.007 = 0.061 Ha	2=6.007 = 0.088 Ha
2=6008 = 0.023 Ha	2=6.008 = 0.045 Ha	2=6.008 = 0.068 Ha
2=6009 = 0.030 Ha	2=6.009 = 0 Ha	2=6.009 = 0.030 Ha
2=6010 = 0.028 Ha	2=6.010 = 0.107 Ha	2=6.010 = 0.135 Ha
2=6011 = 0.024 Ha	2=6.011 = 0 Ha	2=6.011 = 0.024 Ha
2=6012 = 0.025 Ha	2=6.012 = 0.081 Ha	2=6.012 = 0.106 Ha
2=6013 = 0 Ha	2=6.013 = 0.050 Ha	2=6.013 = 0.050 Ha
2=6014 = 0.055 Ha	2=6.014 = 0 Ha	2=6.014 = 0.055 Ha
2=6015 = 0 Ha	2=6.015 = 0.018 Ha	2=6.015 = 0.018 Ha
2=6016 = 0.027 Ha	2=6.016 = 0 Ha	2=6.016 = 0.027 Ha
2=6017 = 0 Ha	2=6.017 = 0.049 Ha	2=6.017 = 0.049 Ha
2=6018 = 0.035 Ha	2=6.018 = 0.059 Ha	2=6.018 = 0.094 Ha
2=7000 = 0.034 Ha	2=7.000 = 0 Ha	2=7.000 = 0.034 Ha
2=8000 = 0.044 Ha	2=8.000 = 0.045 Ha	2=8.000 = 0.089 Ha
2=9000 = 0.030 Ha	2=9.000 = 0 Ha	2=9.000 = 0.030 Ha
2=9001 = 0.015 Ha	2=9.001 = 0 Ha	2=9.001 = 0.015 Ha
2=9002 = 0.040 Ha	2=9.002 = 0.042 Ha	2=9.002 = 0.082 Ha
2=9003 = 0.040 Ha	2=9.003 = 0.070 Ha	2=9.003 = 0.110 Ha
2=9004 = 0.027 Ha	2=9.004 = 0.059 Ha	2=9.004 = 0.086 Ha
2=9005 = 0.014 Ha	2=9.005 = 0 Ha	2=9.005 = 0.014 Ha
2=9006 = 0.018 Ha	2=9.006 = 0 Ha	2=9.006 = 0.018 Ha
2=9007 = 0.011 Ha	2=9.007 = 0.039 Ha	2=9.007 = 0.050 Ha
2=9008 = 0.019 Ha	2=9.008 = 0.051 Ha	2=9.008 = 0.070 Ha
2=9009 = 0.020 Ha	2=9.009 = 0 Ha	2=9.009 = 0.020 Ha
2=9010 = 0 Ha	2=9.010 = 0 Ha	2=9.010 = 0 Ha
2=9011 = 0.028 Ha	2=9.011 = 0.131 Ha	2=9.011 = 0.159 Ha
2=10000 = 0.026 Ha	2=10.000 = 0 Ha	2=10.000 = 0.026 Ha
2=10001 = 0.044 Ha	2=10.001 = 0.131 Ha	2=10.001 = 0.175 Ha
2=10002 = 0.030 Ha	2=10.002 = 0.027 Ha	2=10.002 = 0.057 Ha
2=10003 = 0.025 Ha	2=10.003 = 0.075 Ha	2=10.003 = 0.100 Ha
		Total = 4.522 Ha

REV	DESCRIPTION	DATE	DRAWN

BARRATT HOMES

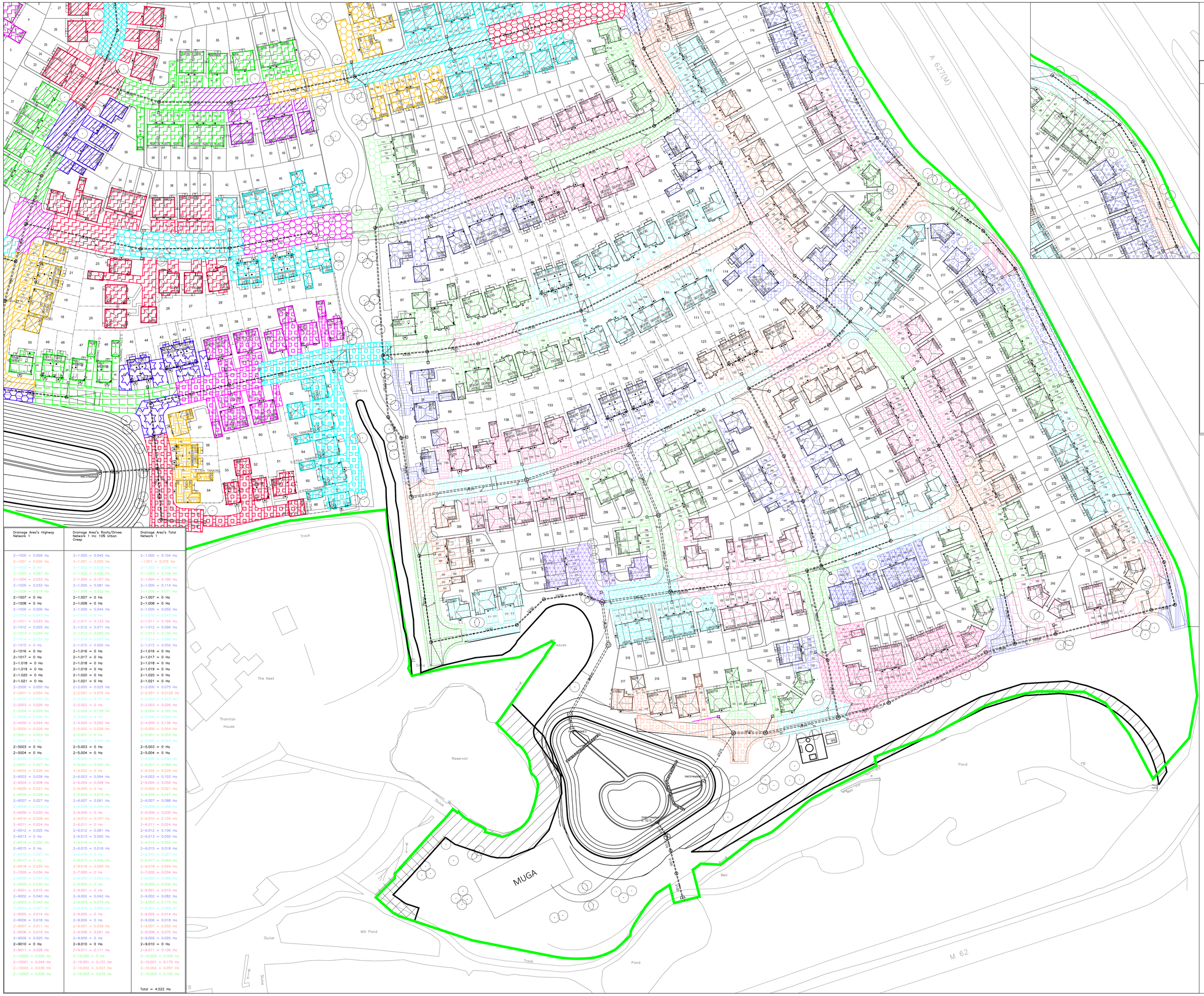
MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job
Cown Top,
Castleton
Rochdale

Title
Impermeable Area's Plan
Sheet 1 of 2

Design By	Date	Drawing Number	Rev
LB	Jun 2023	496/ED/11	-
C.A.D By	Scale @ A0		
LB	1:500		



Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urban Creep	Drainage Area's Total Network 1
2-1000 = 0.059 Ha	2-1.000 = 0.045 Ha	2-1.000 = 0.104 Ha
2-1001 = 0.026 Ha	2-1.001 = 0.050 Ha	-1.001 = 0.076 Ha
2-1002 = 0 Ha	2-1.002 = 0.039 Ha	2-1.002 = 0.039 Ha
2-1003 = 0.067 Ha	2-1.003 = 0.039 Ha	2-1.003 = 0.106 Ha
2-1004 = 0.033 Ha	2-1.004 = 0.157 Ha	2-1.004 = 0.190 Ha
2-1005 = 0.033 Ha	2-1.005 = 0.081 Ha	2-1.005 = 0.114 Ha
2-1006 = 0.019 Ha	2-1.006 = 0.052 Ha	2-1.006 = 0.071 Ha
2-1007 = 0 Ha	2-1.007 = 0 Ha	2-1.007 = 0 Ha
2-1008 = 0 Ha	2-1.008 = 0 Ha	2-1.008 = 0 Ha
2-1009 = 0.006 Ha	2-1.009 = 0.044 Ha	2-1.009 = 0.050 Ha
2-1010 = 0.047 Ha	2-1.010 = 0 Ha	2-1.010 = 0.047 Ha
2-1011 = 0.033 Ha	2-1.011 = 0.133 Ha	2-1.011 = 0.166 Ha
2-1012 = 0.025 Ha	2-1.012 = 0.071 Ha	2-1.012 = 0.096 Ha
2-1013 = 0.040 Ha	2-1.013 = 0.090 Ha	2-1.013 = 0.130 Ha
2-1014 = 0.032 Ha	2-1.014 = 0.057 Ha	2-1.014 = 0.089 Ha
2-1015 = 0 Ha	2-1.015 = 0.050 Ha	2-1.015 = 0.050 Ha
2-1016 = 0 Ha	2-1.016 = 0 Ha	2-1.016 = 0 Ha
2-1017 = 0 Ha	2-1.017 = 0 Ha	2-1.017 = 0 Ha
2-1.018 = 0 Ha	2-1.018 = 0 Ha	2-1.018 = 0 Ha
2-1.019 = 0 Ha	2-1.019 = 0 Ha	2-1.019 = 0 Ha
2-1.020 = 0 Ha	2-1.020 = 0 Ha	2-1.020 = 0 Ha
2-1.021 = 0 Ha	2-1.021 = 0 Ha	2-1.021 = 0 Ha
2-2000 = 0.050 Ha	2-2.000 = 0.025 Ha	2-2.000 = 0.075 Ha
2-2001 = 0.054 Ha	2-2.001 = 0.075 Ha	2-2.001 = 0.0129 Ha
2-2002 = 0.052 Ha	2-2.002 = 0.171 Ha	2-2.002 = 0.223 Ha
2-2003 = 0.026 Ha	2-2.003 = 0 Ha	2-2.003 = 0.026 Ha
2-2004 = 0.026 Ha	2-2.004 = 0.139 Ha	2-2.004 = 0.165 Ha
2-3000 = 0.039 Ha	2-3.000 = 0 Ha	2-3.000 = 0.039 Ha
2-4000 = 0.044 Ha	2-4.000 = 0.092 Ha	2-4.000 = 0.136 Ha
2-5000 = 0.026 Ha	2-5.000 = 0.028 Ha	2-5.000 = 0.054 Ha
2-5001 = 0.053 Ha	2-5.001 = 0 Ha	2-5.001 = 0.053 Ha
2-5002 = 0 Ha	2-5.002 = 0.043 Ha	2-5.002 = 0.043 Ha
2-5003 = 0 Ha	2-5.003 = 0 Ha	2-5.003 = 0 Ha
2-5004 = 0 Ha	2-5.004 = 0 Ha	2-5.004 = 0 Ha
2-6000 = 0.059 Ha	2-6.000 = 0 Ha	2-6.000 = 0.059 Ha
2-6001 = 0.027 Ha	2-6.001 = 0.062 Ha	2-6.001 = 0.089 Ha
2-6002 = 0.026 Ha	2-6.002 = 0 Ha	2-6.002 = 0.026 Ha
2-6003 = 0.039 Ha	2-6.003 = 0.064 Ha	2-6.003 = 0.103 Ha
2-6004 = 0.008 Ha	2-6.004 = 0.048 Ha	2-6.004 = 0.056 Ha
2-6005 = 0.021 Ha	2-6.005 = 0 Ha	2-6.005 = 0.021 Ha
2-6006 = 0.028 Ha	2-6.006 = 0.019 Ha	2-6.006 = 0.047 Ha
2-6007 = 0.027 Ha	2-6.007 = 0.061 Ha	2-6.007 = 0.088 Ha
2-6008 = 0.023 Ha	2-6.008 = 0.045 Ha	2-6.008 = 0.068 Ha
2-6009 = 0.030 Ha	2-6.009 = 0 Ha	2-6.009 = 0.030 Ha
2-6010 = 0.028 Ha	2-6.010 = 0.107 Ha	2-6.010 = 0.135 Ha
2-6011 = 0.024 Ha	2-6.011 = 0 Ha	2-6.011 = 0.024 Ha
2-6012 = 0.025 Ha	2-6.012 = 0.081 Ha	2-6.012 = 0.106 Ha
2-6013 = 0 Ha	2-6.013 = 0.050 Ha	2-6.013 = 0.050 Ha
2-6014 = 0.055 Ha	2-6.014 = 0 Ha	2-6.014 = 0.055 Ha
2-6015 = 0 Ha	2-6.015 = 0.018 Ha	2-6.015 = 0.018 Ha
2-6016 = 0.027 Ha	2-6.016 = 0 Ha	2-6.016 = 0.027 Ha
2-6017 = 0 Ha	2-6.017 = 0.049 Ha	2-6.017 = 0.049 Ha
2-6018 = 0.035 Ha	2-6.018 = 0.059 Ha	2-6.018 = 0.094 Ha
2-7000 = 0.034 Ha	2-7.000 = 0 Ha	2-7.000 = 0.034 Ha
2-8000 = 0.044 Ha	2-8.000 = 0.045 Ha	2-8.000 = 0.089 Ha
2-9000 = 0.030 Ha	2-9.000 = 0 Ha	2-9.000 = 0.030 Ha
2-9001 = 0.015 Ha	2-9.001 = 0 Ha	2-9.001 = 0.015 Ha
2-9002 = 0.040 Ha	2-9.002 = 0.042 Ha	2-9.002 = 0.082 Ha
2-9003 = 0.040 Ha	2-9.003 = 0.070 Ha	2-9.003 = 0.110 Ha
2-9004 = 0.027 Ha	2-9.004 = 0.059 Ha	2-9.004 = 0.086 Ha
2-9005 = 0.014 Ha	2-9.005 = 0 Ha	2-9.005 = 0.014 Ha
2-9006 = 0.018 Ha	2-9.006 = 0 Ha	2-9.006 = 0.018 Ha
2-9007 = 0.011 Ha	2-9.007 = 0.039 Ha	2-9.007 = 0.050 Ha
2-9008 = 0.019 Ha	2-9.008 = 0.051 Ha	2-9.008 = 0.070 Ha
2-9009 = 0.020 Ha	2-9.009 = 0 Ha	2-9.009 = 0.020 Ha
2-9010 = 0 Ha	2-9.010 = 0 Ha	2-9.010 = 0 Ha
2-9011 = 0.028 Ha	2-9.011 = 0.111 Ha	2-9.011 = 0.139 Ha
2-10000 = 0.026 Ha	2-10.000 = 0 Ha	2-10.000 = 0.026 Ha
2-10001 = 0.044 Ha	2-10.001 = 0.131 Ha	2-10.001 = 0.175 Ha
2-10002 = 0.030 Ha	2-10.002 = 0.027 Ha	2-10.002 = 0.057 Ha
2-10003 = 0.025 Ha	2-10.003 = 0.075 Ha	2-10.003 = 0.100 Ha
		Total = 4.522 Ha

WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

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Drainage Area's Highway Network 1	Drainage Area's Roofs/Drives Network 1 Inc 10% Urban Creep	Drainage Area's Total Network 1
1-1.000 = 0.039 Ha	1-1.000 = 0 Ha	1-1.000 = 0.039 Ha
1-1.001 = 0.044 Ha	1-1.001 = 0.118 Ha	1-1.001 = 0.160 Ha
1-1.002 = 0.045 Ha	1-1.002 = 0.095 Ha	1-1.002 = 0.140 Ha
1-1.003 = 0.041 Ha	1-1.003 = 0.100 Ha	1-1.003 = 0.141 Ha
1-1.004 = 0.033 Ha	1-1.004 = 0.093 Ha	1-1.004 = 0.126 Ha
1-1.005 = 0.032 Ha	1-1.005 = 0.044 Ha	1-1.005 = 0.076 Ha
1-1.006 = 0.028 Ha	1-1.006 = 0 Ha	1-1.006 = 0.028 Ha
1-1.007 = 0.028 Ha	1-1.007 = 0.087 Ha	1-1.007 = 0.115 Ha
1-1.008 = 0.021 Ha	1-1.008 = 0.036 Ha	1-1.008 = 0.057 Ha
1-1.009 = 0.022 Ha	1-1.009 = 0.053 Ha	1-1.009 = 0.075 Ha
1-1.010 = 0.028 Ha	1-1.010 = 0 Ha	1-1.010 = 0.028 Ha
1-1.011 = 0 Ha	1-1.011 = 0 Ha	1-1.011 = 0 Ha
1-1.012 = 0.059 Ha	1-1.012 = 0.049 Ha	1-1.012 = 0.108 Ha
1-1.013 = 0.023 Ha	1-1.013 = 0.093 Ha	1-1.013 = 0.023 Ha
1-1.014 = 0 Ha	1-1.014 = 0 Ha	1-1.014 = 0 Ha
1-1.015 = 0 Ha	1-1.015 = 0 Ha	1-1.015 = 0 Ha
1-1.016 = 0 Ha	1-1.016 = 0 Ha	1-1.016 = 0 Ha
1-1.017 = 0 Ha	1-1.017 = 0 Ha	1-1.017 = 0 Ha
1-1.018 = 0 Ha	1-1.018 = 0 Ha	1-1.018 = 0 Ha
1-1.019 = 0.034 Ha	1-1.019 = 0 Ha	1-1.019 = 0.039 Ha
1-1.020 = 0.046 Ha	1-1.020 = 0 Ha	1-1.020 = 0.046 Ha
1-1.021 = 0.062 Ha	1-1.021 = 0 Ha	1-1.021 = 0.062 Ha
1-1.022 = 0 Ha	1-1.022 = 0 Ha	1-1.022 = 0 Ha
1-2.000 = 0.023 Ha	1-2.000 = 0 Ha	1-2.000 = 0.023 Ha
1-3.000 = 0.056 Ha	1-3.000 = 0 Ha	1-3.000 = 0.056 Ha
1-3.001 = 0.058 Ha	1-3.001 = 0.154 Ha	1-3.001 = 0.212 Ha
1-3.002 = 0.032 Ha	1-3.002 = 0.077 Ha	1-3.002 = 0.109 Ha
1-3.003 = 0.031 Ha	1-3.003 = 0.041 Ha	1-3.003 = 0.072 Ha
1-3.004 = 0.028 Ha	1-3.004 = 0.115 Ha	1-3.004 = 0.143 Ha
1-4.000 = 0.049 Ha	1-4.000 = 0 Ha	1-4.000 = 0.049 Ha
1-4.001 = 0.056 Ha	1-4.001 = 0.105 Ha	1-4.001 = 0.161 Ha
1-4.002 = 0.029 Ha	1-4.002 = 0.165 Ha	1-4.002 = 0.194 Ha
1-5.000 = 0.040 Ha	1-5.000 = 0 Ha	1-5.000 = 0.040 Ha
1-5.001 = 0.030 Ha	1-5.001 = 0.105 Ha	1-5.001 = 0.135 Ha
1-6.000 = 0.050 Ha	1-6.000 = 0.052 Ha	1-6.000 = 0.102 Ha
1-7.000 = 0.070 Ha	1-7.000 = 0 Ha	1-7.000 = 0.070 Ha
1-7.001 = 0.052 Ha	1-7.001 = 0 Ha	1-7.001 = 0.052 Ha
1-7.002 = 0.015 Ha	1-7.002 = 0 Ha	1-7.002 = 0.015 Ha
1-7.003 = 0.051 Ha	1-7.003 = 0 Ha	1-7.003 = 0.051 Ha
1-7.004 = 0 Ha	1-7.004 = 0 Ha	1-7.004 = 0 Ha
1-7.005 = 0 Ha	1-7.005 = 0.014 Ha	1-7.005 = 0.014 Ha
1-7.006 = 0.034 Ha	1-7.006 = 0 Ha	1-7.006 = 0.034 Ha
1-7.007 = 0.051 Ha	1-7.007 = 0.058 Ha	1-7.007 = 0.109 Ha
1-7.008 = 0.043 Ha	1-7.008 = 0.063 Ha	1-7.008 = 0.106 Ha
1-7.009 = 0.032 Ha	1-7.009 = 0 Ha	1-7.009 = 0.032 Ha
1-7.010 = 0.028 Ha	1-7.010 = 0.067 Ha	1-7.010 = 0.093 Ha
1-7.011 = 0.027 Ha	1-7.011 = 0.032 Ha	1-7.011 = 0.059 Ha
1-7.012 = 0.019 Ha	1-7.012 = 0 Ha	1-7.012 = 0.019 Ha
1-7.013 = 0 Ha	1-7.013 = 0.093 Ha	1-7.013 = 0.093 Ha
1-8.000 = 0.053 Ha	1-8.000 = 0.103 Ha	1-8.000 = 0.156 Ha
1-8.001 = 0.034 Ha	1-8.001 = 0.111 Ha	1-8.001 = 0.145 Ha
1-8.002 = 0.018 Ha	1-8.002 = 0.046 Ha	1-8.002 = 0.064 Ha
1-8.003 = 0 Ha	1-8.003 = 0.039 Ha	1-8.003 = 0.039 Ha
1-8.004 = 0 Ha	1-8.004 = 0 Ha	1-8.004 = 0 Ha
1-9.000 = 0.058 Ha	1-9.000 = 0.059 Ha	1-9.000 = 0.117 Ha
		Total = 3.825 Ha

REV	DESCRIPTION	DATE	DRAWN

BARRATT HOMES

MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job: Cowm Top, Castleton Rochdale			
Title: Impermeable Area's Sheet 2 of 2			
Design By: LB	Date: June 2023	Drawing Number: 496/ED/12	Rev: -
C.A.D By: LB	Scale @ A0: 1:500		

Storm Water Network 1

STORM SEWER DESIGN

Network Design Details (1 in 2 yr) & Online Controls

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Surface Network 1	Company Address:		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

1in2 year

Type: FSR

Return Period (years)	2.0
Region	England and Wales
M5-60 (mm)	19.0
Ratio R	0.287

Lock Slope Options	None
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:x)	400.00
Max. Slope (1:x)	12.00
Min. Backdrop (m)	0.600
Max. Backdrop (m)	1.500
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Pipe sizes

Add. Increment (mm)	75

Diameter (mm)	Min. Slope (1:x)	Max. Slope (1:x)
150	0.00	0.00
225	0.00	0.00

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Network Design Report Storm Phase: Surface Network 1 Flow Path: 1-1.000-1-1.022	Company Address:		

Name	From	To	Length (m)	Connection Type	Slope (1:x)	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)
1-1.000	S100	S101	27.727	Pipe	71.646	0.6	225	175.274
1-1.001	S101	S102	51.171	Pipe	69.810	0.6	225	174.887
1-1.002	S102	S103	41.542	Pipe	40.411	0.6	300	174.154
1-1.003	S103	S104	36.870	Pipe	39.946	0.6	300	173.612
1-1.004	S104	S106	41.484	Pipe	25.560	0.6	300	172.204
Branch: 1-2.000								
1-2.000	S105	S106	18.412	Pipe	16.892	0.6	225	171.670
1-1.005	S106	S107	23.104	Pipe	17.414	0.6	300	170.580
1-1.006	S107	S113	23.529	Pipe	18.406	0.6	300	169.253
Branch: 1-3.000								
1-3.000	S108	S109	47.686	Pipe	42.387	0.6	225	171.851
1-3.001	S109	S110	41.659	Pipe	53.069	0.6	225	170.725
1-3.002	S110	S111	52.616	Pipe	52.987	0.6	300	169.941
1-3.003	S111	S112	30.283	Pipe	54.663	0.6	300	168.949
1-3.004	S112	S113	27.253	Pipe	65.043	0.6	375	168.394
1-1.007	S113	S114	25.295	Pipe	16.081	0.6	450	167.975
1-1.008	S114	S115	19.966	Pipe	17.182	0.6	450	166.402
1-1.009	S115	S119	21.156	Pipe	17.883	0.6	450	165.240
Branch: 1-4.000								
1-4.000	S116	S117	34.149	Pipe	51.662	0.6	225	166.239
1-4.001	S117	S118	37.268	Pipe	29.161	0.6	225	165.578
1-4.002	S118	S119	49.107	Pipe	202.086	0.6	300	164.854
1-1.010	S119	S122	16.299	Pipe	13.085	0.6	450	164.057
Branch: 1-5.000								
1-5.000	S120	S121	22.125	Pipe	16.902	0.6	225	164.392
1-5.001	S121	S122	25.823	Pipe	74.632	0.6	225	163.700
1-1.011	S122	S123	17.017	Pipe	13.050	0.6	450	163.108
1-1.012	S123	S125	36.939	Pipe	12.341	0.6	525	162.206
Branch: 1-6.000								
1-6.000	S124	S125	30.845	Pipe	13.794	0.6	225	161.421
1-1.013	S125	S126	17.798	Pipe	13.030	0.6	525	160.541
1-1.014	S126	Basin 1	4.872	Pipe	101.494	0.6	600	158.250
Branch: 1-8.000								
1-8.000	S141	S142	44.099	Pipe	100.000	0.6	225	164.635
1-8.001	S142	S143	33.705	Pipe	75.738	0.6	225	163.375
1-8.002	S143	S145	27.693	Pipe	12.000	0.6	300	162.410
Branch: 1-9.000								
1-9.000	S144	S145	21.286	Pipe	16.761	0.6	225	161.371
1-8.003	S145	S146	19.182	Pipe	12.000	0.6	300	161.222
1-8.004	S146	Basin 1	5.138	Pipe	49.886	0.6	300	158.504
1-1.015	Basin 1	Basin 2	1.772	No Delay				
Branch: 1-7.000								
1-7.000	S127	S128	64.344	Pipe	22.349	0.6	225	175.767
1-7.001	S128	S129	50.999	Pipe	16.088	0.6	225	172.888
1-7.002	S129	S130	19.461	Pipe	45.049	0.6	225	169.717
1-7.003	S130	S131	29.975	Pipe	165.000	0.6	225	169.286
1-7.004	S131	S132	11.412	Pipe	165.000	0.6	225	169.782
1-7.005	S132	S133	13.118	Pipe	165.000	0.6	225	169.587
1-7.006	S133	S134	24.807	Pipe	38.461	0.6	225	169.140
1-7.007	S134	S135	55.976	Pipe	30.046	0.6	225	168.309
1-7.008	S135	S136	32.860	Pipe	22.819	0.6	225	166.446
1-7.009	S136	S137	49.933	Pipe	12.227	0.6	225	165.006
1-7.010	S137	S138	30.884	Pipe	12.045	0.6	225	160.922
1-7.011	S138	S139	12.397	Pipe	12.913	0.6	300	158.358
1-7.012	S139	S140	64.015	Pipe	400.000	0.6	450	157.398
1-7.013	S140	Basin 1	8.740	Pipe	30.349	0.6	450	157.500

1-7.014	Basin 1	Basin 2	1.735	No Delay				
1-1.016	Basin 2	S147	5.347	Pipe	275.905	0.6	300	156.500
1-1.017	S147	S148	5.463	Pipe	12.000	0.6	375	156.500
1-1.018	S148	S149	8.738	Pipe	12.000	0.6	375	155.250
1-1.019	S149	S150	23.005	Pipe	12.269	0.6	300	154.005
1-1.020	S150	S151	64.779	Pipe	12.732	0.6	300	152.113
1-1.021	S151	S152	15.859	Pipe	48.902	0.6	1200	149.367
1-1.022	S152	S153	15.246	Pipe	88.281	0.6	300	145.998

Name	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Total Area (ha)	Total Impermeable Area (ha)	Total Contributing Area (ha)	Volumetric Runoff Coefficient	Local Time of Concentration (mins)
1-1.000	173.849	174.887	173.462	0.039	0.039	0.033	0.840	5
1-1.001	173.462	174.154	172.729	0.199	0.199	0.167	0.840	5
1-1.002	172.654	173.612	171.626	0.339	0.339	0.285	0.840	5
1-1.003	171.626	172.204	170.703	0.480	0.480	0.403	0.840	5
1-1.004	170.703	170.580	169.080	0.606	0.606	0.509	0.840	5
Branch: 1-2.000								
1-2.000	170.245	170.580	169.155	0.023	0.023	0.019	0.840	5
1-1.005	169.080	169.253	167.753	0.705	0.705	0.592	0.840	5
1-1.006	167.753	167.975	166.475	0.731	0.731	0.614	0.840	5
Branch: 1-3.000								
1-3.000	170.425	170.725	169.300	0.056	0.056	0.047	0.840	5
1-3.001	169.300	169.941	168.515	0.268	0.268	0.225	0.840	5
1-3.002	168.441	168.949	167.448	0.377	0.377	0.317	0.840	5
1-3.003	167.448	168.394	166.894	0.449	0.449	0.377	0.840	5
1-3.004	166.819	167.975	166.400	0.592	0.592	0.497	0.840	5
1-1.007	166.325	166.402	164.752	1.438	1.438	1.208	0.840	5
1-1.008	164.752	165.240	163.590	1.495	1.495	1.256	0.840	5
1-1.009	163.590	164.057	162.407	1.570	1.570	1.319	0.840	5
Branch: 1-4.000								
1-4.000	164.814	165.578	164.153	0.049	0.049	0.041	0.840	5
1-4.001	164.153	164.854	162.875	0.210	0.210	0.176	0.840	5
1-4.002	162.800	164.057	162.557	0.404	0.404	0.339	0.840	5
1-1.010	162.407	163.108	161.161	2.002	2.002	1.682	0.840	5
Branch: 1-5.000								
1-5.000	162.966	163.700	161.657	0.040	0.040	0.034	0.840	5
1-5.001	161.657	163.108	161.311	0.175	0.175	0.147	0.840	5
1-1.011	161.161	162.206	159.857	2.177	2.177	1.829		0
1-1.012	159.782	160.541	156.789	2.285	2.285	1.919	0.840	5
Branch: 1-6.000								
1-6.000	159.850	160.541	157.614	0.102	0.102	0.086	0.840	5
1-1.013	156.789	158.250	155.423	2.387	2.387	2.005		0
1-1.014	155.348	156.500	155.300	2.387	2.387	2.005		0
Branch: 1-8.000								
1-8.000	161.871	163.375	161.430	0.156	0.156	0.131	0.840	5
1-8.001	161.430	162.410	160.985	0.301	0.301	0.253	0.840	5
1-8.002	160.910	161.222	158.602	0.365	0.365	0.307	0.840	5
Branch: 1-9.000								
1-9.000	159.946	161.222	158.676	0.117	0.117	0.098	0.840	5
1-8.003	158.002	158.504	156.403	0.521	0.521	0.438	0.840	5
1-8.004	155.403	156.500	155.300	0.521	0.521	0.438		0
1-1.015				2.387	2.387	2.005		0
Branch: 1-7.000								
1-7.000	174.341	172.888	171.462	0.070	0.070	0.059	0.840	5
1-7.001	171.462	169.717	168.292	0.122	0.122	0.102	0.840	5
1-7.002	168.292	169.286	167.860	0.137	0.137	0.115	0.840	5
1-7.003	167.860	169.782	167.678	0.188	0.188	0.158	0.840	5
1-7.004	167.678	169.587	167.609	0.188	0.188	0.158		0

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Network Design Report Storm Phase: Surface Network 1 Flow Path: 1-1.000-1-1.022	Company Address:		

1-7.005	167.609	169.140	167.529	0.202	0.202	0.170	0.840	5
1-7.006	167.529	168.309	166.884	0.234	0.234	0.197	0.840	5
1-7.007	166.884	166.446	165.021	0.343	0.343	0.288	0.840	5
1-7.008	165.021	165.006	163.581	0.449	0.449	0.377	0.840	5
1-7.009	163.581	160.922	159.497	0.481	0.481	0.404	0.840	5
1-7.010	159.497	158.358	156.933	0.574	0.574	0.482	0.840	5
1-7.011	156.858	157.398	155.898	0.633	0.633	0.532	0.840	5
1-7.012	155.748	157.500	155.588	0.657	0.657	0.552	0.840	5
1-7.013	155.588	156.500	155.300	0.657	0.657	0.552		0
1-7.014				1.178	1.178	0.990		0
1-1.016	154.750	156.500	154.731	3.565	3.565	2.995		0
1-1.017	154.731	155.250	154.276	3.565	3.565	2.995		0
1-1.018	153.158	154.005	152.430	3.565	3.565	2.995		0
1-1.019	152.430	152.113	150.555	3.599	3.599	3.023	0.840	5
1-1.020	150.555	149.367	145.467	3.645	3.645	3.062	0.840	5
1-1.021	143.967	145.998	143.643	3.707	3.707	3.114	0.840	5
1-1.022	143.643	144.566	143.470	3.707	3.707	3.114		0

Name	Time Of Travel (mins)	Rainfall Intensity (mm/hr)	Total Base Flow (L/s)	Proportional Velocity (m/s)	Capacity Limited to 75% (L/s)	Full Bore Velocity (m/s)	Capacity (L/s)	Flow (L/s)
1-1.000	5.30	55.029		1.012	61.5065	1.547	61.5065	6.5100
1-1.001	5.84	52.962		1.577	62.3167	1.567	62.3167	31.9694
1-1.002	6.12	51.974		2.187	175.3461	2.481	175.3461	53.4444
1-1.003	6.37	51.139		2.393	176.3691	2.495	176.3691	74.4582
1-1.004	6.59	50.416		2.991	220.7130	3.122	220.7130	92.6751
Branch: 1-2.000								
1-2.000	5.10	55.853		1.455	127.2140	3.199	127.2140	3.8967
1-1.005	6.69	50.093		3.583	267.5898	3.786	267.5898	107.1232
1-1.006	6.80	49.759		3.535	260.2568	3.682	260.2568	110.3348
Branch: 1-3.000								
1-3.000	5.39	54.651		1.355	80.1171	2.015	80.1171	9.2834
1-3.001	5.78	53.190		1.882	71.5477	1.799	71.5477	43.2397
1-3.002	6.19	51.756		2.031	153.0137	2.165	153.0137	59.1859
1-3.003	6.42	50.960		2.089	150.6360	2.131	150.6360	69.4065
1-3.004	6.62	50.306		2.078	248.4757	2.250	248.4757	90.3365
1-1.007	6.88	49.504		4.337	809.4387	5.089	809.4387	215.9330
1-1.008	6.95	49.298		4.271	782.9966	4.923	782.9966	223.5579
1-1.009	7.02	49.078		4.258	767.4502	4.825	767.4502	233.7237
Branch: 1-4.000								
1-4.000	5.31	54.977		1.217	72.5220	1.824	72.5220	8.1713
1-4.001	5.57	53.984		2.231	96.6972	2.432	96.6972	34.3877
1-4.002	6.31	51.334		1.222	77.9175	1.102	77.9175	62.9077
1-1.010	7.07	48.934		5.090	897.5492	5.643	897.5492	297.1615
Branch: 1-5.000								
1-5.000	5.12	55.773		1.715	127.1735	3.198	127.1735	6.7671
1-5.001	5.40	54.632		1.501	60.2533	1.515	60.2533	29.0006
1-1.011	7.12	48.785		5.202	898.7562	5.651	898.7562	322.1541
1-1.012	7.22	48.503		5.320	1385.5490	6.400	1385.5490	336.1803
Branch: 1-6.000								
1-6.000	5.15	55.650		2.421	140.8276	3.542	140.8276	17.2182
1-1.013	7.26	48.365		5.272	1348.3643	6.229	1348.3643	350.1863
1-1.014	7.30	48.268		2.431	683.4727	2.417	683.4727	350.1863
Branch: 1-8.000								
1-8.000	5.56	54.004		1.302	51.9848	1.307	51.9848	25.5546
1-8.001	5.94	52.628		1.667	59.8082	1.504	59.8082	48.0514
1-8.002	6.04	52.271		3.484	322.5448	4.563	322.5448	57.8721
Branch: 1-9.000								
1-9.000	5.11	55.793		2.349	127.7114	3.212	127.7114	19.8009
1-8.003	6.11	52.026		3.836	322.5448	4.563	322.5448	82.2204

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Network Design Report Storm Phase: Surface Network 1 Flow Path: 1-1.000-1-1.022	Company Address:		

1-8.004	6.15	51.894		2.254	157.7252	2.231	157.7252	82.2204
1-1.015	7.30							
Branch: 1-7.000								
1-7.000	5.39	54.685		1.818	110.5275	2.780	110.5275	11.6115
1-7.001	5.65	53.691		2.386	130.3646	3.279	130.3646	19.8692
1-7.002	5.81	53.077		1.688	77.6988	1.954	77.6988	22.0572
1-7.003	6.30	51.356		1.104	40.3609	1.015	40.3609	29.2868
1-7.004	6.49	50.737		1.104	40.3609	1.015	40.3609	29.2868
1-7.005	6.71	50.047		1.114	40.3609	1.015	40.3609	30.6655
1-7.006	6.90	49.441		2.023	84.1324	2.116	84.1324	35.0933
1-7.007	7.29	48.286		2.427	95.2545	2.396	95.2545	50.2384
1-7.008	7.49	47.721		2.865	109.3790	2.751	109.3790	64.9944
1-7.009	7.71	47.112		3.685	149.6174	3.763	149.6174	68.7382
1-7.010	7.85	46.748		3.862	150.7429	3.791	150.7429	81.3942
1-7.011	7.89	46.623		3.820	310.8969	4.398	310.8969	89.5216
1-7.012	8.95	44.027		1.037	160.6860	1.010	160.6860	89.5216
1-7.013	8.99	43.938		2.705	588.6355	3.701	588.6355	89.5216
1-7.014	8.99							
1-1.016	9.08	43.723		0.942	66.5596	0.942	66.5596	472.8160
1-1.017	9.10	43.684		5.827	580.3963	5.255	580.3963	472.8160
1-1.018	9.13	43.622		5.827	580.3963	5.255	580.3963	472.8160
1-1.019	9.21	43.433		4.513	318.9818	4.513	318.9818	474.1574
1-1.020	9.46	42.902		4.430	313.1122	4.430	313.1122	474.3427
1-1.021	9.51	42.796		3.286	6057.6634	5.356	6057.6634	481.2234
1-1.022	9.66	42.475		1.674	118.3416	1.674	118.3416	481.2234

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Surface Network 1 Flow Path: 1-1.000-1-1.022	Company Address:		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
S100	Outlet	1-1.000	Free Discharge
S101	Outlet	1-1.001	Free Discharge
S102	Outlet	1-1.002	Free Discharge
S103	Outlet	1-1.003	Free Discharge
S104	Outlet	1-1.004	Free Discharge
S106	Outlet	1-1.005	Free Discharge
S107	Outlet	1-1.006	Free Discharge
S113	Outlet	1-1.007	Free Discharge
S114	Outlet	1-1.008	Free Discharge
S115	Outlet	1-1.009	Free Discharge
S119	Outlet	1-1.010	Free Discharge
S122	Outlet	1-1.011	Free Discharge
S123	Outlet	1-1.012	Free Discharge
S125	Outlet	1-1.013	Free Discharge
S126	Outlet	1-1.014	Free Discharge
S147	Outlet	1-1.017	Free Discharge
S148	Outlet	1-1.018	Free Discharge
S149	Outlet	1-1.019	Free Discharge
S150	Outlet	1-1.020	Free Discharge
S151	Outlet	1-1.021	Free Discharge
S152	Outlet	1-1.022	Orifice
	Diameter (m)	0.129	
	Coefficient of Discharge	0.600	
	Invert Level (m)	143.643	

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1 Flow Path: 1-1.000-1-1.022	Company Address:		



Basin 1

Type : Pond

Dimensions

Exceedence Level (m)	156.500
Depth (m)	1.750
Base Level (m)	154.750
Freeboard (mm)	400
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:x)	11.926
Total Volume (m³)	1765.728

Depth (m)	Area (m²)	Volume (m³)
0.000	101.4823	0.000
0.050	131.4753	5.808
0.150	191.0580	21.842
0.250	827.3775	69.043
0.350	1197.1247	169.700
0.450	1334.6276	296.226
0.550	1399.8842	432.938
0.650	1465.5341	576.197
0.750	1531.5938	726.041
0.850	1598.0625	882.512
0.950	1664.9494	1045.651
1.050	1732.2594	1215.500
1.150	1799.9926	1392.102
1.250	1868.1081	1575.497
1.350	1936.7285	1765.728
1.450	2005.7313	1962.841
1.550	2075.1572	2166.876
1.650	2145.0063	2377.874
1.750	2215.2786	2595.879

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1-7.013
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	1-1.014
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	1-8.004
Bypass Destination	(None)
Capacity Type	No Restriction

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1 Flow Path: 1-1.000-1-1.022	Company Address:		

Outlets

Outlet

Outgoing Connection	1-1.015
Outlet Type	Weir
Width (m)	15.510
Coefficient of Discharge	0.460
Crest Level (m)	155.540

Outlet (1)

Outgoing Connection	1-7.014
Outlet Type	Orifice
Diameter (m)	0.300
Coefficient of Discharge	0.600
Invert Level (m)	154.750

Advanced

Perimeter	Circular
Length (m)	96.884
Friction Scheme	Manning's n
n	0.03



Basin 2 Type : Pond

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1 Flow Path: 1-1.000-1-1.022	Company Address:		

Dimensions

Exceedence Level (m)	156.500
Depth (m)	2.550
Base Level (m)	153.950
Freeboard (mm)	400
Initial Depth (m)	0.800
Porosity (%)	100
Average Slope (1:x)	5.653
Total Volume (m³)	911.909

Depth (m)	Area (m²)	Volume (m³)
0.000	30.2122	0.000
0.050	33.2391	1.586
0.100	39.7163	3.407
0.200	46.7579	7.726
0.300	54.3639	12.777
0.350	58.3785	15.595
0.351	88.7617	15.668
0.400	93.8731	20.142
0.500	104.5261	30.058
0.600	115.7528	41.067
0.700	127.5531	53.227
0.750	156.3208	60.312
0.800	169.2097	68.448
0.900	485.7472	99.836
1.000	505.0976	149.376
1.100	531.6274	201.206
1.200	558.4343	255.704
1.300	585.5230	312.896
1.400	612.8423	372.809
1.500	640.5411	435.473
1.600	668.6852	500.930
1.700	696.8878	569.203
1.800	725.3661	640.311
1.900	754.1202	714.281
2.000	783.1500	791.140
2.100	812.4809	870.917
2.200	842.0616	953.640
2.300	871.9180	1039.334
2.400	902.0488	1128.028
2.500	933.0218	1219.778

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1-1.015
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	1-7.014
Bypass Destination	(None)
Capacity Type	No Restriction

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Outfall Details Storm Phase: Surface Network 1	Company Address:		

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
S153	Free Discharge		

Project:	Date: 27/04/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S100	1in2 year: 2 years: +0 %: 15 mins: Winter	175.274	173.849	173.896	0.047	6.4	0.068	0.000	6.3	2.792	OK
S101	1in2 year: 2 years: +0 %: 15 mins: Winter	174.887	173.462	173.578	0.116	32.5	0.166	0.000	30.9	14.225	OK
S102	1in2 year: 2 years: +0 %: 15 mins: Winter	174.154	172.654	172.768	0.114	53.9	0.162	0.000	53.2	24.233	OK
S103	1in2 year: 2 years: +0 %: 15 mins: Winter	173.612	171.627	171.770	0.143	76.3	0.205	0.000	74.8	34.307	OK
S104	1in2 year: 2 years: +0 %: 15 mins: Winter	172.204	170.703	170.846	0.143	95.4	0.204	0.000	93.8	43.305	OK
S105	1in2 year: 2 years: +0 %: 15 mins: Winter	171.670	170.245	170.271	0.026	3.8	0.038	0.000	3.7	1.641	OK
S106	1in2 year: 2 years: +0 %: 15 mins: Winter	170.580	169.080	169.222	0.142	110.0	0.203	0.000	108.4	50.378	OK
S107	1in2 year: 2 years: +0 %: 15 mins: Winter	169.253	167.753	167.902	0.148	112.7	0.168	0.000	111.1	52.216	OK
S108	1in2 year: 2 years: +0 %: 15 mins: Winter	171.851	170.425	170.475	0.050	9.2	0.071	0.000	9.0	4.008	OK
S109	1in2 year: 2 years: +0 %: 15 mins: Winter	170.725	169.300	169.430	0.130	43.7	0.186	0.000	41.9	19.161	OK
S110	1in2 year: 2 years: +0 %: 15 mins: Winter	169.941	168.441	168.572	0.131	59.8	0.187	0.000	58.8	26.963	OK
S111	1in2 year: 2 years: +0 %: 15 mins: Winter	168.949	167.448	167.599	0.151	70.6	0.217	0.000	68.1	32.076	OK
S112	1in2 year: 2 years: +0 %: 15 mins: Winter	168.394	166.819	166.987	0.168	91.6	0.241	0.000	89.8	42.290	OK

S113	1in2 year: 2 years: +0 %: 15 mins: Winter	167.975	166.325	166.496	0.171	219.8	0.245	0.000	218.7	102.720	OK
S114	1in2 year: 2 years: +0 %: 15 mins: Winter	166.402	164.752	164.935	0.183	228.1	0.261	0.000	226.2	106.771	OK
S115	1in2 year: 2 years: +0 %: 15 mins: Winter	165.240	163.590	163.778	0.188	238.5	0.269	0.000	236.6	112.113	OK
S116	1in2 year: 2 years: +0 %: 15 mins: Winter	166.239	164.814	164.864	0.050	8.0	0.072	0.000	7.9	3.505	OK
S117	1in2 year: 2 years: +0 %: 15 mins: Winter	165.578	164.153	164.245	0.092	34.2	0.131	0.000	33.7	14.954	OK
S118	1in2 year: 2 years: +0 %: 15 mins: Winter	164.854	162.800	163.016	0.216	65.4	0.309	0.000	61.6	28.800	OK
S119	1in2 year: 2 years: +0 %: 15 mins: Winter	164.057	162.407	162.611	0.204	302.8	0.361	0.000	300.7	142.886	OK
S120	1in2 year: 2 years: +0 %: 15 mins: Winter	164.392	162.966	163.000	0.034	6.6	0.048	0.000	6.5	2.862	OK
S121	1in2 year: 2 years: +0 %: 15 mins: Winter	163.700	161.657	161.770	0.113	28.6	0.162	0.000	27.8	12.514	OK
S122	1in2 year: 2 years: +0 %: 15 mins: Winter	163.108	161.161	161.378	0.217	328.5	0.310	0.000	325.6	155.367	OK
S123	1in2 year: 2 years: +0 %: 15 mins: Winter	162.206	159.782	159.968	0.186	343.3	0.329	0.000	341.4	163.067	OK
S124	1in2 year: 2 years: +0 %: 15 mins: Winter	161.421	159.850	159.903	0.053	16.7	0.060	0.000	16.5	7.298	OK
S125	1in2 year: 2 years: +0 %: 15 mins: Winter	160.541	156.789	156.991	0.202	357.9	0.357	0.000	354.5	170.296	OK
S126	1in2 year: 2 years: +0 %: 15 mins: Winter	158.250	155.348	155.725	0.377	354.5	0.539	0.000	351.8	170.257	OK
S127	1in2 year: 2 years: +0 %: 15 mins: Winter	175.767	174.341	174.389	0.048	11.5	0.069	0.000	11.2	5.012	OK
S128	1in2 year: 2 years: +0 %: 15 mins: Winter	172.888	171.462	171.520	0.058	19.8	0.083	0.000	19.3	8.733	OK

S129	1in2 year: 2 years: +0 %: 15 mins: Winter	169.717	168.292	168.372	0.080	21.7	0.115	0.000	21.2	9.791	OK
S130	1in2 year: 2 years: +0 %: 15 mins: Winter	169.286	167.860	168.009	0.149	29.5	0.169	0.000	28.5	13.432	OK
S131	1in2 year: 2 years: +0 %: 15 mins: Winter	169.782	167.678	167.831	0.153	28.5	0.219	0.000	27.3	13.400	OK
S132	1in2 year: 2 years: +0 %: 15 mins: Winter	169.587	167.609	167.753	0.144	29.6	0.207	0.000	28.9	14.378	OK
S133	1in2 year: 2 years: +0 %: 15 mins: Winter	169.140	167.529	167.631	0.102	34.1	0.146	0.000	33.3	16.647	OK
S134	1in2 year: 2 years: +0 %: 15 mins: Winter	168.309	166.884	167.000	0.116	51.2	0.166	0.000	49.6	24.416	OK
S135	1in2 year: 2 years: +0 %: 15 mins: Winter	166.446	165.021	165.156	0.135	67.0	0.194	0.000	64.7	31.976	OK
S136	1in2 year: 2 years: +0 %: 15 mins: Winter	165.006	163.581	163.688	0.107	70.0	0.153	0.000	68.4	34.229	OK
S137	1in2 year: 2 years: +0 %: 15 mins: Winter	160.922	159.497	159.622	0.125	83.7	0.178	0.000	81.1	40.849	OK
S138	1in2 year: 2 years: +0 %: 15 mins: Winter	158.358	156.858	156.981	0.123	90.8	0.176	0.000	89.9	45.053	OK
S139	1in2 year: 2 years: +0 %: 15 mins: Winter	157.398	155.748	155.987	0.239	93.9	0.342	0.000	90.4	46.702	OK
S140	1in2 year: 2 years: +0 %: 15 mins: Winter	157.500	155.588	155.727	0.139	90.4	0.198	0.000	93.1	46.584	OK
S141	1in2 year: 2 years: +0 %: 15 mins: Winter	164.635	161.871	161.981	0.110	25.5	0.158	0.000	25.0	11.168	OK
S142	1in2 year: 2 years: +0 %: 15 mins: Winter	163.375	161.430	161.590	0.160	48.8	0.229	0.000	46.6	21.519	OK
S143	1in2 year: 2 years: +0 %: 15 mins: Winter	162.410	160.910	160.998	0.088	57.1	0.126	0.000	56.5	26.093	OK
S144	1in2 year: 2 years: +0 %: 15 mins: Winter	161.371	159.946	160.006	0.060	19.2	0.086	0.000	18.9	8.372	OK

S145	1in2 year: 2 years: +0 %: 15 mins: Winter	161.222	158.002	158.112	0.110	81.9	0.157	0.000	81.3	37.249	OK
S146	1in2 year: 2 years: +0 %: 15 mins: Winter	158.504	155.403	155.591	0.188	81.3	0.268	0.000	80.8	37.239	OK
S147	1in2 year: 2 years: +0 %: 480 mins: Winter	156.500	154.731	154.787	0.056	22.7	0.193	0.000	23.2	918.035	OK
S148	1in2 year: 2 years: +0 %: 480 mins: Winter	155.250	153.158	153.211	0.053	23.2	0.076	0.000	23.2	917.972	OK
S149	1in2 year: 2 years: +0 %: 480 mins: Winter	154.005	152.430	152.486	0.056	23.4	0.080	0.000	23.4	927.184	OK
S150	1in2 year: 2 years: +0 %: 480 mins: Winter	152.113	150.555	150.611	0.056	23.7	0.063	0.000	23.7	939.466	OK
S151	1in2 year: 2 years: +0 %: 480 mins: Winter	149.367	143.967	144.228	0.261	24.3	0.904	0.000	24.3	956.294	OK
S152	1in2 year: 2 years: +0 %: 480 mins: Winter	145.998	143.643	144.227	0.585	24.3	2.026	0.000	24.2	955.442	Surcharged
S153	1in2 year: 2 years: +0 %: 480 mins: Winter	144.566	143.470	143.562	0.092	24.2	0.000	0.000	24.2	955.212	OK

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1-1.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S100	S101	175.3	173.896	0.082	2.792	0.5	0.1	6.3	OK
1-1.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S101	S102	174.9	173.578	0.114	14.225	1.5	0.5	30.9	OK
1-1.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S102	S103	174.2	172.768	0.128	24.233	1.8	0.3	53.2	OK
1-1.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S103	S104	173.6	171.770	0.143	34.307	2.3	0.42	74.8	OK
1-1.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S104	S106	172.2	170.846	0.142	43.305	2.8	0.43	93.8	OK
1-2.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S105	S106	171.7	170.271	0.047	1.641	1.1	0.03	3.7	OK
1-1.005	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S106	S107	170.6	169.222	0.145	50.378	3.2	0.41	108.4	OK
1-1.006	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S107	S113	169.3	167.902	0.143	52.216	3.4	0.43	111.1	OK
1-3.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S108	S109	171.9	170.475	0.090	4.008	0.6	0.11	9.0	OK
1-3.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S109	S110	170.7	169.430	0.127	19.161	1.8	0.59	41.9	OK
1-3.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S110	S111	169.9	168.572	0.141	26.963	1.8	0.38	58.8	OK
1-3.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S111	S112	168.9	167.599	0.146	32.076	2.0	0.45	68.1	OK
1-3.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S112	S113	168.4	166.987	0.162	42.290	2.0	0.36	89.8	OK
1-1.007	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S113	S114	168.0	166.496	0.177	102.720	3.8	0.27	218.7	OK

1-1.008	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S114	S115	166.4	164.935	0.185	106.771	3.7	0.29	226.2	OK
1-1.009	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S115	S119	165.2	163.778	0.196	112.113	3.6	0.31	236.6	OK
1-4.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S116	S117	166.2	164.864	0.071	3.505	0.7	0.11	7.9	OK
1-4.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S117	S118	165.6	164.245	0.116	14.954	1.9	0.35	33.7	OK
1-4.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S118	S119	164.9	163.016	0.204	28.800	1.2	0.79	61.6	OK
1-1.010	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S119	S122	164.1	162.611	0.211	142.886	4.1	0.34	300.7	OK
1-5.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S120	S121	164.4	163.000	0.074	2.862	0.6	0.05	6.5	OK
1-5.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S121	S122	163.7	161.770	0.110	12.514	1.4	0.46	27.8	OK
1-1.011	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S122	S123	163.1	161.378	0.202	155.367	4.7	0.36	325.6	OK
1-1.012	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S123	S125	162.2	159.968	0.194	163.067	4.7	0.25	341.4	OK
1-6.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S124	S125	161.4	159.903	0.052	7.298	2.3	0.12	16.5	OK
1-1.013	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S125	S126	160.5	156.991	0.252	170.296	3.5	0.26	354.5	OK
1-1.014	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S126	Basin 1	158.3	155.725	0.340	170.257	2.1	0.51	351.8	OK
1-7.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S127	S128	175.8	174.389	0.053	5.012	1.6	0.1	11.2	OK
1-7.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S128	S129	172.9	171.520	0.069	8.733	1.9	0.15	19.3	OK
1-7.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S129	S130	169.7	168.372	0.115	9.791	1.0	0.27	21.2	OK
1-7.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S130	S131	169.3	168.009	0.151	13.432	1.0	0.71	28.5	OK
1-7.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S131	S132	169.8	167.831	0.149	13.400	1.0	0.68	27.3	OK

1-7.005	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S132	S133	169.6	167.753	0.123	14.378	1.3	0.71	28.9	OK
1-7.006	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S133	S134	169.1	167.631	0.109	16.647	1.8	0.4	33.3	OK
1-7.007	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S134	S135	168.3	167.000	0.126	24.416	2.2	0.52	49.6	OK
1-7.008	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S135	S136	166.4	165.156	0.121	31.976	3.0	0.59	64.7	OK
1-7.009	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S136	S137	165.0	163.688	0.116	34.229	3.3	0.46	68.4	OK
1-7.010	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S137	S138	160.9	159.622	0.121	40.849	3.7	0.54	81.1	OK
1-7.011	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S138	S139	158.4	156.981	0.117	45.053	3.5	0.29	89.9	OK
1-7.012	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S139	S140	157.4	155.987	0.186	46.702	1.5	0.56	90.4	OK
1-7.013	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S140	Basin 1	157.5	155.727	0.130	46.584	2.5	0.16	93.1	OK
1-8.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S141	S142	164.6	161.981	0.135	11.168	1.0	0.48	25.0	OK
1-8.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S142	S143	163.4	161.590	0.154	21.519	1.6	0.78	46.6	OK
1-8.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S143	S145	162.4	160.998	0.086	26.093	3.4	0.18	56.5	OK
1-9.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S144	S145	161.4	160.006	0.059	8.372	2.3	0.15	18.9	OK
1-8.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S145	S146	161.2	158.112	0.106	37.249	3.6	0.25	81.3	OK
1-8.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S146	Basin 1	158.5	155.591	0.170	37.239	2.0	0.51	80.8	OK
1-1.015	1in2 year: 2 years: +0 %: 15 mins: Summer	No Delay	Basin 1	Basin 2		155.107	0.000	0.000	0.0		0.0	
1-7.014	1in2 year: 2 years: +0 %: 30 mins: Winter	No Delay	Basin 1	Basin 2		155.161	0.234	182.698	0.0		95.2	
1-1.016	1in2 year: 2 years: +0 %: 600 mins: Winter	Pipe	Basin 2	S147	156.5	155.232	0.088	1033.946	1.4	0.36	23.7	Surcharged

1-1.017	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S147	S148	156.5	154.787	0.053	918.035	2.4	0.04	23.2	OK
1-1.018	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S148	S149	155.3	153.211	0.054	917.972	2.3	0.04	23.2	OK
1-1.019	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S149	S150	154.0	152.486	0.056	927.184	2.6	0.07	23.4	OK
1-1.020	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S150	S151	152.1	150.611	0.056	939.466	2.6	0.08	23.7	OK
1-1.021	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S151	S152	149.4	144.228	0.423	956.294	0.3	0	24.3	OK
1-1.022	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S152	S153	146.0	144.227	0.095	955.212	1.3	0.2	24.2	Surcharged

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Company Address:		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin 2	1in2 year: 2 years: +0 %: 480 mins: Winter	155.232	155.232	1.282	1.282	38.6	302.659	0.000	0.000	23.2	918.413	67	OK
Basin 1	1in2 year: 2 years: +0 %: 480 mins: Winter	155.249	155.249	0.499	0.499	85.8	362.268	0.000	0.000	38.6	960.716	79	OK

STORM SEWER DESIGN

SW Manhole Schedules

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Surface Network 1	Company Address:		

Name	Cover Level (m) Invert Level (m)		Connection Details				Type
Coordinates (m)	Depth (m)	Manhole Size (m)	Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
S100	175.274 173.849	Diameter / Length: 1.350					Manhole - Access Required
E:389281.227 N:410464.405	1.425						
			{a} 1-1.000	Pipe	173.849	Diam/Width:225	Not Applicable
S101	174.887 173.462	Diameter / Length: 1.350	{1} 1-1.000	Pipe	173.462	Diam/Width:225	Manhole - Access Required
E:389253.747 N:410460.710	1.425						
			{a} 1-1.001	Pipe	173.462	Diam/Width:225	Not Applicable
S102	174.154 172.654	Diameter / Length: 1.350	{1} 1-1.001	Pipe	172.729	Diam/Width:225	Manhole - Access Required
E:389203.166 N:410452.964	1.500						
			{a} 1-1.002	Pipe	172.654	Diam/Width:300	Not Applicable
S103	173.612 171.627	Diameter / Length: 1.350	{1} 1-1.002	Pipe	171.626	Diam/Width:300	Manhole - Access Required
E:389162.120 N:410446.562	1.985						
			{a} 1-1.003	Pipe	171.626	Diam/Width:300	Not Applicable
S104	172.204 170.703	Diameter / Length: 1.350	{1} 1-1.003	Pipe	170.703	Diam/Width:300	Manhole - Access Required
E:389126.456 N:410437.213	1.501						
			{a} 1-1.004	Pipe	170.703	Diam/Width:300	Not Applicable
S105	171.670 170.245	Diameter / Length: 1.350					Manhole - Access Required
E:389081.502 N:410443.862	1.425						
			{a} 1-2.000	Pipe	170.245	Diam/Width:225	Not Applicable
N:410188.587 S106	170.580	Diameter / Length: 1.350	{1} 1-2.000{2} 1-1.004	PipePipe	169.155 169.08	Diam/Width:225Diam/Width:300	Manhole - Access Required
	169.080						
E:389086.478 N:410426.135	1.500						
S107	169.253	Diameter / Length: 1.200	{a} 1-1.005 {1} 1-1.005	Pipe Pipe	169.080 167.753	Diam/Width:300 Diam/Width:300	Not Applicable Manhole - Access Required
	167.753						
E:389088.157 N:410403.092	1.500						
S108	171.851	Diameter / Length: 1.350	{a} 1-1.006	Pipe	167.753	Diam/Width:300	Not Applicable Manhole - Access Required
	170.425						
E:389273.519 N:410407.346	1.426						
S109	170.725	Diameter / Length: 1.350	{a} 1-3.000 {1} 1-3.000	Pipe Pipe	170.425 169.300	Diam/Width:225 Diam/Width:225	Not Applicable Manhole - Access Required
	169.300						
E:389227.411 N:410395.183	1.425						
S110	169.941	Diameter / Length: 1.350	{a} 1-3.001 {1} 1-3.001	Pipe Pipe	169.300 168.515	Diam/Width:225 Diam/Width:225	Not Applicable Manhole - Access Required
	168.441						
E:389187.358 N:410383.726	1.500						
S111	168.949	Diameter / Length: 1.350	{a} 1-3.002 {1} 1-3.002	Pipe Pipe	168.441 167.448	Diam/Width:300 Diam/Width:300	Not Applicable Manhole - Access Required
	167.448						
E:389135.837	1.501						

N:410373.045							
S112	168.394	Diameter / Length: 1.350	{a} 1-3.003 {1} 1-3.003	Pipe Pipe	167.448 166.894	Diam/Width:300 Diam/Width:300	Not Applicable Manhole - Access Required
E:389105.554	166.819 1.575						
N:410373.102							
S113	167.975	Diameter / Length: 1.350	{a} 1-3.004 {1} 1-3.004{2} 1-1.006	Pipe PipePipe	166.819 166.400 166.475	Diam/Width:375 Diam/Width:375Diam/Width:300	Not Applicable Manhole - Access Required
E:389079.533	166.325 1.650						
N:410381.202							
S114	166.402	Diameter / Length: 1.350	{a} 1-1.007 {1} 1-1.007	Pipe Pipe	166.325 164.752	Diam/Width:450 Diam/Width:450	Not Applicable Manhole - Access Required
E:389066.380	164.752 1.650						
N:410359.595							
S115	165.240	Diameter / Length: 1.350	{a} 1-1.008 {1} 1-1.008	Pipe Pipe	164.752 163.590	Diam/Width:450 Diam/Width:450	Not Applicable Manhole - Access Required
E:389056.467	163.590 1.650						
N:410342.264							
S116	166.239	Diameter / Length: 1.350	{a} 1-1.009	Pipe	163.590	Diam/Width:450	Not Applicable Manhole - Access Required
E:389168.683	164.814 1.425						
N:410318.382							
S117	165.578	Diameter / Length: 1.350	{a} 1-4.000 {1} 1-4.000	Pipe Pipe	164.814 164.153	Diam/Width:225 Diam/Width:225	Not Applicable Manhole - Access Required
E:389135.125	164.153 1.425						
N:410312.059							
S118	164.854	Diameter / Length: 1.350	{a} 1-4.001 {1} 1-4.001	Pipe Pipe	164.153 162.875	Diam/Width:225 Diam/Width:225	Not Applicable Manhole - Access Required
E:389097.859	162.800 2.054						
N:410311.648							
S119	164.057	Diameter / Length: 1.500	{a} 1-4.002 {1} 1-4.002{2} 1-1.009	Pipe PipePipe	162.800 162.557	Diam/Width:300 Diam/Width:300Diam/Width:450	Not Applicable Manhole - Access Required
E:389049.890	162.407 1.650						
N:410322.156							
S120	164.392	Diameter / Length: 1.350	{a} 1-1.010	Pipe	162.407	Diam/Width:450	Not Applicable Manhole - Access Required
E:389000.526	162.966 1.426						
N:410322.091							
S121	163.700	Diameter / Length: 1.350	{a} 1-5.000 {1} 1-5.000	Pipe Pipe	162.966 161.657	Diam/Width:225 Diam/Width:225	Not Applicable Manhole - Access Required
E:389020.579	161.657 2.043						
N:410312.742							
S122	163.108	Diameter / Length: 1.350	{a} 1-5.001 {1} 1-5.001{2} 1-1.010	Pipe PipePipe	161.657 161.311	Diam/Width:225 Diam/Width:225Diam/Width:450	Not Applicable Manhole - Access Required
E:389045.618	161.161 1.947						
N:410306.427							
S123	162.206	Diameter / Length: 1.500	{a} 1-1.011 {1} 1-1.011	Pipe Pipe	161.161 159.857	Diam/Width:450 Diam/Width:450	Not Applicable Manhole - Access Required
E:389041.115	159.782 2.424						
N:410290.016							
S124	161.421	Diameter / Length: 1.200	{a} 1-1.012	Pipe	159.782	Diam/Width:525	Not Applicable Manhole - Access Required

	159.850						
E:389066.901	1.571						
N:410249.600							
			{a} 1-6.000	Pipe	159.850	Diam/Width:225	Not Applicable
S125	160.541	Diameter / Length: 1.500	{1} 1-1.012{2} 1-6.000	PipePipe	156.789 157.614	Diam/Width:525Diam/Width:225	Manhole - Access Required
	156.789						
E:389036.291	3.752						
N:410253.394							
			{a} 1-1.013	Pipe	156.789	Diam/Width:525	Not Applicable
S126	158.250	Diameter / Length: 1.350	{1} 1-1.013	Pipe	155.423	Diam/Width:525	Manhole - Access Required
	155.348						
E:389034.102	2.902						
N:410235.730							
			{a} 1-1.014	Pipe	155.348	Diam/Width:600	Not Applicable
S127	175.767	Diameter / Length: 1.350					Manhole - Access Required
	174.341						
E:389056.093	1.426						
N:410583.843							
			{a} 1-7.000	Pipe	174.341	Diam/Width:225	Not Applicable
S128	172.888	Diameter / Length: 1.350	{1} 1-7.000	Pipe	171.462	Diam/Width:225	Manhole - Access Required
	171.462						
E:389028.000	1.426						
N:410525.956							
			{a} 1-7.001	Pipe	171.462	Diam/Width:225	Not Applicable
S129	169.717	Diameter / Length: 1.350	{1} 1-7.001	Pipe	168.292	Diam/Width:225	Manhole - Access Required
	168.292						
E:389003.528	1.425						
N:410481.212							
			{a} 1-7.002	Pipe	168.292	Diam/Width:225	Not Applicable
S130	169.286	Diameter / Length: 1.200	{1} 1-7.002	Pipe	167.860	Diam/Width:225	Manhole - Access Required
	167.860						
E:388998.389	1.426						
N:410462.441							
			{a} 1-7.003	Pipe	167.860	Diam/Width:225	Not Applicable
S131	169.782	Diameter / Length: 1.350	{1} 1-7.003	Pipe	167.678	Diam/Width:225	Manhole - Access Required
	167.678						
E:389027.300	2.104						
N:410454.526							
			{a} 1-7.004	Pipe	167.678	Diam/Width:225	Not Applicable
S132	169.587	Diameter / Length: 1.350	{1} 1-7.004	Pipe	167.609	Diam/Width:225	Manhole - Access Required
	167.609						
E:389034.633	1.978						
N:410445.783							
			{a} 1-7.005	Pipe	167.609	Diam/Width:225	Not Applicable
S133	169.140	Diameter / Length: 1.350	{1} 1-7.005	Pipe	167.529	Diam/Width:225	Manhole - Access Required
	167.529						
E:389036.124	1.611						
N:410432.750							
			{a} 1-7.006	Pipe	167.529	Diam/Width:225	Not Applicable
S134	168.309	Diameter / Length: 1.350	{1} 1-7.006	Pipe	166.884	Diam/Width:225	Manhole - Access Required
	166.884						
E:389023.392	1.425						
N:410411.458							
			{a} 1-7.007	Pipe	166.884	Diam/Width:225	Not Applicable
S135	166.446	Diameter / Length: 1.350	{1} 1-7.007	Pipe	165.021	Diam/Width:225	Manhole - Access Required
	165.021						
E:388994.551	1.425						
N:410363.484							
			{a} 1-7.008	Pipe	165.021	Diam/Width:225	Not Applicable
S136	165.006	Diameter / Length: 1.350	{1} 1-7.008	Pipe	163.581	Diam/Width:225	Manhole - Access Required
	163.581						
E:388977.246	1.425						
N:410335.551							
			{a} 1-7.009	Pipe	163.581	Diam/Width:225	Not Applicable
S137	160.922	Diameter / Length: 1.350	{1} 1-7.009	Pipe	159.497	Diam/Width:225	Manhole - Access Required
	159.497						

E:388951.196 N:410292.951	1.425						
S138 E:388940.094 N:410264.131	158.358 156.858 1.500	Diameter / Length: 1.350	{a} 1-7.010 {1} 1-7.010	Pipe Pipe	159.497 156.933	Diam/Width:225 Diam/Width:225	Not Applicable Manhole - Access Required
S139 E:388940.505 N:410251.741	157.398 155.748 1.650	Diameter / Length: 1.350	{a} 1-7.011 {1} 1-7.011	Pipe Pipe	156.858 155.898	Diam/Width:300 Diam/Width:300	Not Applicable Manhole - Access Required
S140 E:389004.295 N:410246.378	157.500 155.588 1.912	Diameter / Length: 1.350	{a} 1-7.012 {1} 1-7.012	Pipe Pipe	155.748 155.588	Diam/Width:450 Diam/Width:450	Not Applicable Manhole - Access Required
S141 E:389177.838 N:410264.618	164.635 161.871 2.764	Diameter / Length: 1.350	{a} 1-7.013	Pipe	155.588	Diam/Width:450	Not Applicable Manhole - Access Required
S142 E:389134.848 N:410254.794	163.375 161.430 1.945	Diameter / Length: 1.350	{a} 1-8.000 {1} 1-8.000	Pipe Pipe	161.871 161.430	Diam/Width:225 Diam/Width:225	Not Applicable Manhole - Access Required
S143 E:389101.999 N:410247.249	162.410 160.910 1.500	Diameter / Length: 1.350	{a} 1-8.001 {1} 1-8.001	Pipe Pipe	161.430 160.985	Diam/Width:225 Diam/Width:225	Not Applicable Manhole - Access Required
S144 E:389106.524 N:410198.491	161.371 159.946 1.425	Diameter / Length: 1.350	{a} 1-8.002	Pipe	160.910	Diam/Width:300	Not Applicable Manhole - Access Required
S145 E:389105.088 N:410219.729	161.222 158.002 3.219	Diameter / Length: 1.350	{a} 1-9.000 {1} 1-9.000{2} 1-8.002	Pipe PipePipe	159.946 158.676 158.602	Diam/Width:225 Diam/Width:225Diam/Width:300	Not Applicable Manhole - Access Required
S146 E:389085.941 N:410218.567	158.504 155.403 3.101	Diameter / Length: 1.350	{a} 1-8.003 {1} 1-8.003	Pipe Pipe	158.002 156.403	Diam/Width:300 Diam/Width:300	Not Applicable Manhole - Access Required
S147 E:388955.903 N:410218.147	156.500 154.731 1.769	Diameter / Length: 2.100	{a} 1-8.004 {1} 1-1.016	Pipe Pipe	155.403 154.731	Diam/Width:300 Diam/Width:300	Not Applicable Manhole - Access Required
S148 E:388951.107 N:410215.532	155.250 153.158 2.092	Diameter / Length: 1.350	{a} 1-1.017 {1} 1-1.017	Pipe Pipe	154.731 154.276	Diam/Width:375 Diam/Width:375	Not Applicable Manhole - Access Required
S149 E:388943.435 N:410211.349	154.005 152.430 1.575	Diameter / Length: 1.350	{a} 1-1.018 {1} 1-1.018	Pipe Pipe	153.158 152.430	Diam/Width:375 Diam/Width:375	Not Applicable Manhole - Access Required
S150 E:388940.102	152.113 150.555 1.558	Diameter / Length: 1.200	{a} 1-1.019 {1} 1-1.019	Pipe Pipe	152.430 150.555	Diam/Width:300 Diam/Width:300	Not Applicable Manhole - Access Required

			{a} 1-1.020	Pipe	150.555	Diam/Width:300	Not Applicable
S151	149.367 143.967	Diameter / Length: 2.100	{1} 1-1.020	Pipe	145.467	Diam/Width:300	Manhole - Access Required
E:388917.390 N:410127.920	5.400						
			{a} 1-1.021	Pipe	143.967	Diam/Width:1200	Not Applicable
S152	145.998 143.643	Diameter / Length: 2.100	{1} 1-1.021	Pipe	143.643	Diam/Width:1200	Manhole - Access Required
E:388911.819 N:410113.072	2.356						
			{a} 1-1.022	Pipe	143.643	Diam/Width:300	Not Applicable
S153	144.566 143.470	Diameter / Length: 2.700	{1} 1-1.022	Pipe	143.470	Diam/Width:300	Manhole - Access Required
E:388911.077 N:410097.844	1.096						
							Not Applicable

STORM SEWER DESIGN

Rainfall Simulation

1:1 year event

Project:	Date: 27/04/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S100	1in1 year: 1 years: +0 %: 15 mins: Winter	175.274	173.849	173.891	0.042	4.9	0.060	0.000	4.8	2.156	OK
S101	1in1 year: 1 years: +0 %: 15 mins: Winter	174.887	173.462	173.561	0.099	25.1	0.142	0.000	23.8	10.983	OK
S102	1in1 year: 1 years: +0 %: 15 mins: Winter	174.154	172.654	172.752	0.098	41.5	0.141	0.000	41.0	18.716	OK
S103	1in1 year: 1 years: +0 %: 15 mins: Winter	173.612	171.627	171.749	0.123	58.8	0.175	0.000	57.6	26.497	OK
S104	1in1 year: 1 years: +0 %: 15 mins: Winter	172.204	170.703	170.825	0.122	73.5	0.175	0.000	72.2	33.446	OK
S105	1in1 year: 1 years: +0 %: 15 mins: Winter	171.670	170.245	170.268	0.023	2.9	0.033	0.000	2.9	1.266	OK
S106	1in1 year: 1 years: +0 %: 15 mins: Winter	170.580	169.080	169.201	0.121	84.7	0.173	0.000	83.4	38.902	OK
S107	1in1 year: 1 years: +0 %: 15 mins: Winter	169.253	167.753	167.880	0.126	86.7	0.143	0.000	85.4	40.320	OK
S108	1in1 year: 1 years: +0 %: 15 mins: Winter	171.851	170.425	170.469	0.044	7.1	0.063	0.000	6.9	3.097	OK
S109	1in1 year: 1 years: +0 %: 15 mins: Winter	170.725	169.300	169.410	0.110	33.7	0.158	0.000	32.3	14.803	OK
S110	1in1 year: 1 years: +0 %: 15 mins: Winter	169.941	168.441	168.554	0.113	46.1	0.161	0.000	45.4	20.832	OK
S111	1in1 year: 1 years: +0 %: 15 mins: Winter	168.949	167.448	167.577	0.129	54.5	0.185	0.000	52.4	24.774	OK
S112	1in1 year: 1 years: +0 %: 15 mins: Winter	168.394	166.819	166.963	0.144	70.5	0.207	0.000	69.1	32.660	OK

S113	1in1 year: 1 years: +0 %: 15 mins: Winter	167.975	166.325	166.472	0.147	169.0	0.211	0.000	168.1	79.325	OK
S114	1in1 year: 1 years: +0 %: 15 mins: Winter	166.402	164.752	164.908	0.156	175.4	0.223	0.000	173.8	82.450	OK
S115	1in1 year: 1 years: +0 %: 15 mins: Winter	165.240	163.590	163.751	0.161	183.3	0.230	0.000	181.7	86.571	OK
S116	1in1 year: 1 years: +0 %: 15 mins: Winter	166.239	164.814	164.858	0.044	6.2	0.063	0.000	6.1	2.710	OK
S117	1in1 year: 1 years: +0 %: 15 mins: Winter	165.578	164.153	164.233	0.080	26.5	0.114	0.000	26.0	11.551	OK
S118	1in1 year: 1 years: +0 %: 15 mins: Winter	164.854	162.800	162.979	0.179	50.5	0.255	0.000	47.4	22.273	OK
S119	1in1 year: 1 years: +0 %: 15 mins: Winter	164.057	162.407	162.580	0.173	232.6	0.306	0.000	230.9	110.364	OK
S120	1in1 year: 1 years: +0 %: 15 mins: Winter	164.392	162.966	162.996	0.030	5.1	0.043	0.000	5.0	2.212	OK
S121	1in1 year: 1 years: +0 %: 15 mins: Winter	163.700	161.657	161.754	0.097	22.1	0.139	0.000	21.4	9.668	OK
S122	1in1 year: 1 years: +0 %: 15 mins: Winter	163.108	161.161	161.345	0.184	252.3	0.263	0.000	250.0	120.001	OK
S123	1in1 year: 1 years: +0 %: 15 mins: Winter	162.206	159.782	159.943	0.161	263.7	0.284	0.000	262.1	125.947	OK
S124	1in1 year: 1 years: +0 %: 15 mins: Winter	161.421	159.850	159.896	0.046	12.9	0.052	0.000	12.7	5.637	OK
S125	1in1 year: 1 years: +0 %: 15 mins: Winter	160.541	156.789	156.961	0.172	274.8	0.304	0.000	272.1	131.519	OK
S126	1in1 year: 1 years: +0 %: 15 mins: Winter	158.250	155.348	155.669	0.321	272.1	0.459	0.000	269.7	131.484	OK
S127	1in1 year: 1 years: +0 %: 15 mins: Winter	175.767	174.341	174.383	0.042	8.9	0.061	0.000	8.7	3.874	OK
S128	1in1 year: 1 years: +0 %: 15 mins: Winter	172.888	171.462	171.513	0.051	15.3	0.073	0.000	14.8	6.749	OK

S129	1in1 year: 1 years: +0 %: 15 mins: Winter	169.717	168.292	168.362	0.070	16.7	0.100	0.000	16.3	7.563	OK
S130	1in1 year: 1 years: +0 %: 15 mins: Winter	169.286	167.860	167.985	0.125	22.7	0.141	0.000	21.9	10.375	OK
S131	1in1 year: 1 years: +0 %: 15 mins: Winter	169.782	167.678	167.806	0.128	21.9	0.183	0.000	20.9	10.343	OK
S132	1in1 year: 1 years: +0 %: 15 mins: Winter	169.587	167.609	167.732	0.123	22.7	0.175	0.000	22.4	11.091	OK
S133	1in1 year: 1 years: +0 %: 15 mins: Winter	169.140	167.529	167.616	0.087	26.1	0.124	0.000	25.5	12.837	OK
S134	1in1 year: 1 years: +0 %: 15 mins: Winter	168.309	166.884	166.983	0.099	39.2	0.141	0.000	37.8	18.836	OK
S135	1in1 year: 1 years: +0 %: 15 mins: Winter	166.446	165.021	165.135	0.114	51.2	0.163	0.000	49.4	24.668	OK
S136	1in1 year: 1 years: +0 %: 15 mins: Winter	165.006	163.581	163.673	0.092	53.4	0.131	0.000	52.1	26.403	OK
S137	1in1 year: 1 years: +0 %: 15 mins: Winter	160.922	159.497	159.602	0.105	63.9	0.150	0.000	61.8	31.507	OK
S138	1in1 year: 1 years: +0 %: 15 mins: Winter	158.358	156.858	156.963	0.105	69.2	0.150	0.000	68.5	34.750	OK
S139	1in1 year: 1 years: +0 %: 15 mins: Winter	157.398	155.748	155.954	0.206	71.6	0.295	0.000	69.9	36.007	OK
S140	1in1 year: 1 years: +0 %: 15 mins: Winter	157.500	155.588	155.708	0.120	69.9	0.171	0.000	71.8	35.897	OK
S141	1in1 year: 1 years: +0 %: 15 mins: Winter	164.635	161.871	161.966	0.095	19.7	0.136	0.000	19.3	8.629	OK
S142	1in1 year: 1 years: +0 %: 15 mins: Winter	163.375	161.430	161.563	0.133	37.7	0.191	0.000	36.0	16.621	OK
S143	1in1 year: 1 years: +0 %: 15 mins: Winter	162.410	160.910	160.987	0.077	44.1	0.110	0.000	43.6	20.154	OK
S144	1in1 year: 1 years: +0 %: 15 mins: Winter	161.371	159.946	159.999	0.053	14.8	0.075	0.000	14.6	6.467	OK

S145	1in1 year: 1 years: +0 %: 15 mins: Winter	161.222	158.002	158.097	0.095	63.2	0.136	0.000	62.7	28.771	OK
S146	1in1 year: 1 years: +0 %: 15 mins: Winter	158.504	155.403	155.561	0.158	62.7	0.227	0.000	62.3	28.761	OK
S147	1in1 year: 1 years: +0 %: 480 mins: Winter	156.500	154.731	154.784	0.053	21.8	0.184	0.000	21.4	782.603	OK
S148	1in1 year: 1 years: +0 %: 480 mins: Winter	155.250	153.158	153.209	0.051	21.4	0.073	0.000	21.4	782.562	OK
S149	1in1 year: 1 years: +0 %: 480 mins: Winter	154.005	152.430	152.484	0.054	21.5	0.077	0.000	21.5	790.251	OK
S150	1in1 year: 1 years: +0 %: 480 mins: Winter	152.113	150.555	150.609	0.054	21.8	0.061	0.000	21.8	800.534	OK
S151	1in1 year: 1 years: +0 %: 480 mins: Winter	149.367	143.967	144.148	0.181	22.3	0.627	0.000	22.3	814.589	OK
S152	1in1 year: 1 years: +0 %: 480 mins: Winter	145.998	143.643	144.147	0.505	22.3	1.748	0.000	22.3	814.123	Surcharged
S153	1in1 year: 1 years: +0 %: 480 mins: Winter	144.566	143.470	143.558	0.088	22.3	0.000	0.000	22.3	813.971	OK

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1-1.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S100	S101	175.3	173.891	0.071	2.156	0.5	0.08	4.8	OK
1-1.001	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S101	S102	174.9	173.561	0.098	10.983	1.4	0.38	23.8	OK
1-1.002	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S102	S103	174.2	172.752	0.111	18.716	1.7	0.23	41.0	OK
1-1.003	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S103	S104	173.6	171.749	0.123	26.497	2.1	0.33	57.6	OK
1-1.004	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S104	S106	172.2	170.825	0.122	33.446	2.7	0.33	72.2	OK
1-2.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S105	S106	171.7	170.268	0.035	1.266	1.1	0.02	2.9	OK
1-1.005	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S106	S107	170.6	169.201	0.124	38.902	3.0	0.31	83.4	OK
1-1.006	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S107	S113	169.3	167.880	0.122	40.320	3.2	0.33	85.4	OK
1-3.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S108	S109	171.9	170.469	0.077	3.097	0.6	0.09	6.9	OK
1-3.001	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S109	S110	170.7	169.410	0.108	14.803	1.7	0.45	32.3	OK
1-3.002	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S110	S111	169.9	168.554	0.121	20.832	1.7	0.3	45.4	OK
1-3.003	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S111	S112	168.9	167.577	0.125	24.774	1.9	0.35	52.4	OK
1-3.004	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S112	S113	168.4	166.963	0.140	32.660	1.8	0.28	69.1	OK
1-1.007	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S113	S114	168.0	166.472	0.152	79.325	3.6	0.21	168.1	OK
1-1.008	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S114	S115	166.4	164.908	0.158	82.450	3.5	0.22	173.8	OK

1-1.009	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S115	S119	165.2	163.751	0.167	86.571	3.4	0.24	181.7	OK
1-4.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S116	S117	166.2	164.858	0.062	2.710	0.7	0.08	6.1	OK
1-4.001	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S117	S118	165.6	164.233	0.092	11.551	1.9	0.27	26.0	OK
1-4.002	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S118	S119	164.9	162.979	0.173	22.273	1.1	0.61	47.4	OK
1-1.010	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S119	S122	164.1	162.580	0.178	110.364	3.9	0.26	230.9	OK
1-5.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S120	S121	164.4	162.996	0.063	2.212	0.5	0.04	5.0	OK
1-5.001	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S121	S122	163.7	161.754	0.095	9.668	1.3	0.36	21.4	OK
1-1.011	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S122	S123	163.1	161.345	0.173	120.001	4.4	0.28	250.0	OK
1-1.012	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S123	S125	162.2	159.943	0.166	125.947	4.4	0.19	262.1	OK
1-6.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S124	S125	161.4	159.896	0.046	5.637	2.2	0.09	12.7	OK
1-1.013	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S125	S126	160.5	156.961	0.209	131.519	3.4	0.2	272.1	OK
1-1.014	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S126	Basin 1	158.3	155.669	0.291	131.484	2.0	0.39	269.7	OK
1-7.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S127	S128	175.8	174.383	0.047	3.874	1.5	0.08	8.7	OK
1-7.001	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S128	S129	172.9	171.513	0.060	6.749	1.7	0.11	14.8	OK
1-7.002	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S129	S130	169.7	168.362	0.097	7.563	1.0	0.21	16.3	OK
1-7.003	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S130	S131	169.3	167.985	0.126	10.375	1.0	0.54	21.9	OK
1-7.004	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S131	S132	169.8	167.806	0.125	10.343	0.9	0.52	20.9	OK
1-7.005	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S132	S133	169.6	167.732	0.105	11.091	1.2	0.55	22.4	OK

1-7.006	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S133	S134	169.1	167.616	0.093	12.837	1.7	0.3	25.5	OK
1-7.007	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S134	S135	168.3	166.983	0.106	18.836	2.0	0.4	37.8	OK
1-7.008	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S135	S136	166.4	165.135	0.103	24.668	2.8	0.45	49.4	OK
1-7.009	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S136	S137	165.0	163.673	0.098	26.403	3.1	0.35	52.1	OK
1-7.010	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S137	S138	160.9	159.602	0.103	31.507	3.5	0.41	61.8	OK
1-7.011	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S138	S139	158.4	156.963	0.100	34.750	3.3	0.22	68.5	OK
1-7.012	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S139	S140	157.4	155.954	0.162	36.007	1.4	0.43	69.9	OK
1-7.013	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S140	Basin 1	157.5	155.708	0.113	35.897	2.3	0.12	71.8	OK
1-8.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S141	S142	164.6	161.966	0.114	8.629	1.0	0.37	19.3	OK
1-8.001	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S142	S143	163.4	161.563	0.129	16.621	1.5	0.6	36.0	OK
1-8.002	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S143	S145	162.4	160.987	0.075	20.154	3.1	0.14	43.6	OK
1-9.000	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S144	S145	161.4	159.999	0.052	6.467	2.1	0.11	14.6	OK
1-8.003	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S145	S146	161.2	158.097	0.092	28.771	3.4	0.19	62.7	OK
1-8.004	1in1 year: 1 years: +0 %: 15 mins: Winter	Pipe	S146	Basin 1	158.5	155.561	0.145	28.761	1.8	0.39	62.3	OK
1-1.015	1in1 year: 1 years: +0 %: 15 mins: Summer	No Delay	Basin 1	Basin 2		155.069	0.000	0.000	0.0		0.0	
1-7.014	1in1 year: 1 years: +0 %: 30 mins: Winter	No Delay	Basin 1	Basin 2		155.111	0.222	158.648	0.0		85.8	
1-1.016	1in1 year: 1 years: +0 %: 480 mins: Winter	Pipe	Basin 2	S147	156.5	155.171	0.084	782.384	1.3	0.33	21.8	Surcharged
1-1.017	1in1 year: 1 years: +0 %: 480 mins: Winter	Pipe	S147	S148	156.5	154.784	0.051	782.603	2.4	0.04	21.4	OK

1-1.018	1in1 year: 1 years: +0 %: 480 mins: Winter	Pipe	S148	S149	155.3	153.209	0.052	782.562	2.3	0.04	21.4	OK
1-1.019	1in1 year: 1 years: +0 %: 480 mins: Winter	Pipe	S149	S150	154.0	152.484	0.054	790.251	2.5	0.07	21.5	OK
1-1.020	1in1 year: 1 years: +0 %: 480 mins: Winter	Pipe	S150	S151	152.1	150.609	0.054	800.534	2.6	0.07	21.8	OK
1-1.021	1in1 year: 1 years: +0 %: 480 mins: Winter	Pipe	S151	S152	149.4	144.148	0.343	814.589	0.3	0	22.3	OK
1-1.022	1in1 year: 1 years: +0 %: 480 mins: Winter	Pipe	S152	S153	146.0	144.147	0.091	813.971	1.2	0.19	22.3	Surcharged

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Company Address:		



Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin 2	1in1 year: 1 years: +0 %: 480 mins: Winter	155.171	155.171	1.221	1.221	34.5	267.518	0.000	0.000	21.4	782.847	71	OK
Basin 1	1in1 year: 1 years: +0 %: 480 mins: Winter	155.185	155.185	0.435	0.435	71.3	276.164	0.000	0.000	34.5	803.548	84	OK

STORM SEWER DESIGN

Rainfall Simulation

1:30 year event

Project:	Date: 27/04/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S100	1in30yr: 30 years: +0 %: 15 mins: Winter	175.274	173.849	173.914	0.065	12.1	0.093	0.000	11.9	5.273	OK
S101	1in30yr: 30 years: +0 %: 15 mins: Winter	174.887	173.462	173.647	0.185	61.4	0.265	0.000	58.1	26.876	OK
S102	1in30yr: 30 years: +0 %: 15 mins: Winter	174.154	172.654	172.821	0.167	101.4	0.239	0.000	100.4	45.784	OK
S103	1in30yr: 30 years: +0 %: 15 mins: Winter	173.612	171.627	171.848	0.222	144.0	0.317	0.000	141.1	64.827	OK
S104	1in30yr: 30 years: +0 %: 15 mins: Winter	172.204	170.703	170.923	0.220	180.1	0.315	0.000	177.2	81.833	OK
S105	1in30yr: 30 years: +0 %: 15 mins: Summer	171.670	170.245	170.279	0.034	7.1	0.049	0.000	7.1	2.772	OK
S106	1in30yr: 30 years: +0 %: 15 mins: Winter	170.580	169.080	169.301	0.221	207.8	0.316	0.000	204.7	95.201	OK
S107	1in30yr: 30 years: +0 %: 15 mins: Winter	169.253	167.753	167.989	0.236	212.8	0.267	0.000	209.7	98.691	OK
S108	1in30yr: 30 years: +0 %: 15 mins: Winter	171.851	170.425	170.493	0.068	17.3	0.097	0.000	17.1	7.566	OK
S109	1in30yr: 30 years: +0 %: 15 mins: Winter	170.725	169.300	169.571	0.271	82.7	0.388	0.000	70.9	36.204	Surcharged
S110	1in30yr: 30 years: +0 %: 15 mins: Winter	169.941	168.441	168.628	0.187	104.5	0.268	0.000	103.9	50.934	OK
S111	1in30yr: 30 years: +0 %: 15 mins: Winter	168.949	167.448	167.679	0.231	126.2	0.331	0.000	124.4	60.621	OK
S112	1in30yr: 30 years: +0 %: 15 mins: Winter	168.394	166.819	167.071	0.252	168.6	0.361	0.000	167.2	79.926	OK

S113	1in30yr: 30 years: +0 %: 15 mins: Winter	167.975	166.325	166.579	0.254	412.4	0.364	0.000	411.0	194.144	OK
S114	1in30yr: 30 years: +0 %: 15 mins: Winter	166.402	164.752	165.029	0.277	428.6	0.396	0.000	425.8	201.817	OK
S115	1in30yr: 30 years: +0 %: 15 mins: Winter	165.240	163.590	163.878	0.288	449.0	0.412	0.000	446.1	211.923	OK
S116	1in30yr: 30 years: +0 %: 15 mins: Winter	166.239	164.814	164.883	0.069	15.2	0.099	0.000	14.9	6.622	OK
S117	1in30yr: 30 years: +0 %: 15 mins: Winter	165.578	164.153	164.289	0.136	64.8	0.194	0.000	63.9	28.276	OK
S118	1in30yr: 30 years: +0 %: 15 mins: Winter	164.854	162.800	163.487	0.687	124.0	0.983	0.000	120.5	54.633	Surcharged
S119	1in30yr: 30 years: +0 %: 15 mins: Winter	164.057	162.407	162.731	0.324	575.2	0.573	0.000	571.6	270.305	OK
S120	1in30yr: 30 years: +0 %: 15 mins: Winter	164.392	162.966	163.011	0.045	12.4	0.065	0.000	12.3	5.408	OK
S121	1in30yr: 30 years: +0 %: 15 mins: Winter	163.700	161.657	161.838	0.181	54.1	0.260	0.000	52.6	23.469	OK
S122	1in30yr: 30 years: +0 %: 15 mins: Winter	163.108	161.161	161.507	0.346	624.2	0.496	0.000	618.1	293.835	OK
S123	1in30yr: 30 years: +0 %: 15 mins: Winter	162.206	159.782	160.055	0.273	651.6	0.482	0.000	648.9	308.404	OK
S124	1in30yr: 30 years: +0 %: 15 mins: Winter	161.421	159.850	159.924	0.074	31.6	0.084	0.000	31.2	13.786	OK
S125	1in30yr: 30 years: +0 %: 15 mins: Winter	160.541	156.789	157.111	0.322	680.1	0.569	0.000	672.7	322.095	OK
S126	1in30yr: 30 years: +0 %: 15 mins: Winter	158.250	155.348	155.995	0.647	672.7	0.926	0.000	662.2	322.067	Surcharged
S127	1in30yr: 30 years: +0 %: 15 mins: Winter	175.767	174.341	174.408	0.067	21.7	0.096	0.000	21.3	9.466	OK
S128	1in30yr: 30 years: +0 %: 15 mins: Winter	172.888	171.462	171.543	0.081	37.4	0.117	0.000	36.6	16.492	OK

S129	1in30yr: 30 years: +0 %: 15 mins: Winter	169.717	168.292	168.415	0.123	41.3	0.176	0.000	38.0	18.483	OK
S130	1in30yr: 30 years: +0 %: 15 mins: Winter	169.286	167.860	168.329	0.469	51.4	0.531	0.000	50.9	25.351	Surcharged
S131	1in30yr: 30 years: +0 %: 15 mins: Winter	169.782	167.678	168.013	0.335	50.9	0.479	0.000	49.9	25.353	Surcharged
S132	1in30yr: 30 years: +0 %: 15 mins: Winter	169.587	167.609	167.876	0.267	53.7	0.382	0.000	53.4	27.220	Surcharged
S133	1in30yr: 30 years: +0 %: 15 mins: Winter	169.140	167.529	167.680	0.151	61.7	0.216	0.000	60.5	31.511	OK
S134	1in30yr: 30 years: +0 %: 15 mins: Winter	168.309	166.884	167.183	0.299	94.0	0.428	0.000	88.9	46.167	Surcharged
S135	1in30yr: 30 years: +0 %: 15 mins: Winter	166.446	165.021	165.560	0.539	121.7	0.771	0.000	110.9	60.536	Surcharged
S136	1in30yr: 30 years: +0 %: 15 mins: Winter	165.006	163.581	163.732	0.151	118.1	0.216	0.000	117.5	64.813	OK
S137	1in30yr: 30 years: +0 %: 15 mins: Winter	160.922	159.497	159.695	0.198	145.2	0.283	0.000	142.3	77.347	OK
S138	1in30yr: 30 years: +0 %: 15 mins: Winter	158.358	156.858	157.033	0.175	160.5	0.251	0.000	160.2	85.261	OK
S139	1in30yr: 30 years: +0 %: 15 mins: Winter	157.398	155.748	156.091	0.343	167.7	0.490	0.000	164.7	88.458	OK
S140	1in30yr: 30 years: +0 %: 15 mins: Winter	157.500	155.588	155.782	0.194	164.7	0.278	0.000	162.7	88.318	OK
S141	1in30yr: 30 years: +0 %: 15 mins: Winter	164.635	161.871	162.444	0.573	48.3	0.820	0.000	41.7	21.039	Surcharged
S142	1in30yr: 30 years: +0 %: 15 mins: Winter	163.375	161.430	162.134	0.704	86.6	1.008	0.000	81.3	40.676	Surcharged
S143	1in30yr: 30 years: +0 %: 15 mins: Winter	162.410	160.910	161.031	0.121	101.2	0.173	0.000	99.9	49.320	OK
S144	1in30yr: 30 years: +0 %: 15 mins: Winter	161.371	159.946	160.031	0.085	36.2	0.122	0.000	35.8	15.813	OK

S145	1in30yr: 30 years: +0 %: 15 mins: Winter	161.222	158.002	158.159	0.157	147.8	0.225	0.000	146.5	70.397	OK
S146	1in30yr: 30 years: +0 %: 15 mins: Winter	158.504	155.403	155.722	0.319	146.5	0.457	0.000	144.9	70.386	Surcharged
S147	1in30yr: 30 years: +0 %: 600 mins: Winter	156.500	154.731	154.795	0.064	31.1	0.222	0.000	30.3	1586.610	OK
S148	1in30yr: 30 years: +0 %: 600 mins: Winter	155.250	153.158	153.219	0.061	30.3	0.087	0.000	30.3	1586.505	OK
S149	1in30yr: 30 years: +0 %: 600 mins: Winter	154.005	152.430	152.494	0.064	30.6	0.092	0.000	30.6	1603.899	OK
S150	1in30yr: 30 years: +0 %: 600 mins: Winter	152.113	150.555	150.619	0.064	31.0	0.072	0.000	31.0	1627.058	OK
S151	1in30yr: 30 years: +0 %: 600 mins: Winter	149.367	143.967	144.589	0.622	31.8	2.155	0.000	31.7	1658.831	OK
S152	1in30yr: 30 years: +0 %: 600 mins: Winter	145.998	143.643	144.589	0.946	31.7	3.277	0.000	31.7	1655.851	Surcharged
S153	1in30yr: 30 years: +0 %: 600 mins: Winter	144.566	143.470	143.576	0.106	31.7	0.000	0.000	31.7	1655.571	OK

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1-1.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S100	S101	175.3	173.914	0.125	5.273	0.5	0.19	11.9	OK
1-1.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S101	S102	174.9	173.647	0.178	26.876	1.7	0.93	58.1	OK
1-1.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S102	S103	174.2	172.821	0.194	45.784	2.1	0.57	100.4	OK
1-1.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S103	S104	173.6	171.848	0.221	64.827	2.5	0.8	141.1	OK
1-1.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S104	S106	172.2	170.923	0.221	81.833	3.2	0.8	177.2	OK
1-2.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S105	S106	171.7	170.279	0.090	3.103	1.0	0.06	7.1	OK
1-1.005	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S106	S107	170.6	169.301	0.228	95.201	3.5	0.77	204.7	OK
1-1.006	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S107	S113	169.3	167.989	0.220	98.691	3.8	0.81	209.7	OK
1-3.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S108	S109	171.9	170.493	0.170	7.566	0.7	0.21	17.1	OK
1-3.001	1in30yr: 30 years: +0 %: 15 mins: Summer	Pipe	S109	S110	170.7	169.553	0.218	32.318	2.0	1	71.4	Surcharged
1-3.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S110	S111	169.9	168.628	0.209	50.934	2.0	0.68	103.9	OK
1-3.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S111	S112	168.9	167.679	0.219	60.621	2.2	0.83	124.4	OK
1-3.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S112	S113	168.4	167.071	0.238	79.926	2.3	0.67	167.2	OK
1-1.007	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S113	S114	168.0	166.579	0.266	194.144	4.2	0.51	411.0	OK

1-1.008	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S114	S115	166.4	165.029	0.282	201.817	4.1	0.54	425.8	OK
1-1.009	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S115	S119	165.2	163.878	0.306	211.923	3.9	0.58	446.1	OK
1-4.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S116	S117	166.2	164.883	0.102	6.622	0.8	0.21	14.9	OK
1-4.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S117	S118	165.6	164.289	0.225	28.276	1.9	0.66	63.9	OK
1-4.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S118	S119	164.9	163.487	0.300	54.633	1.7	1.55	120.5	Surcharged
1-1.010	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S119	S122	164.1	162.731	0.335	270.305	4.5	0.64	571.6	OK
1-5.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S120	S121	164.4	163.011	0.113	5.408	0.6	0.1	12.3	OK
1-5.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S121	S122	163.7	161.838	0.189	23.469	1.5	0.87	52.6	OK
1-1.011	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S122	S123	163.1	161.507	0.310	293.835	5.3	0.69	618.1	OK
1-1.012	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S123	S125	162.2	160.055	0.297	308.404	5.1	0.47	648.9	OK
1-6.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S124	S125	161.4	159.924	0.073	13.786	2.8	0.22	31.2	OK
1-1.013	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S125	S126	160.5	157.111	0.447	322.095	3.5	0.5	672.7	OK
1-1.014	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S126	Basin 1	158.3	155.995	0.560	322.067	2.5	0.97	662.2	Surcharged
1-7.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S127	S128	175.8	174.408	0.074	9.466	1.9	0.19	21.3	OK
1-7.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S128	S129	172.9	171.543	0.102	16.492	2.1	0.28	36.6	OK
1-7.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S129	S130	169.7	168.415	0.225	18.483	1.1	0.49	38.0	OK
1-7.003	1in30yr: 30 years: +0 %: 15 mins: Summer	Pipe	S130	S131	169.3	168.323	0.225	22.624	1.3	1.28	51.5	Surcharged
1-7.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S131	S132	169.8	168.013	0.225	25.353	1.3	1.24	49.9	Surcharged

1-7.005	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S132	S133	169.6	167.876	0.207	27.220	1.4	1.32	53.4	Surcharged
1-7.006	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S133	S134	169.1	167.680	0.221	31.511	2.0	0.72	60.5	OK
1-7.007	1in30yr: 30 years: +0 %: 15 mins: Summer	Pipe	S134	S135	168.3	167.062	0.225	41.197	2.2	0.93	88.9	OK
1-7.008	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S135	S136	166.4	165.560	0.225	60.536	3.1	1.01	110.9	Surcharged
1-7.009	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S136	S137	165.0	163.732	0.174	64.813	3.7	0.79	117.5	OK
1-7.010	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S137	S138	160.9	159.695	0.185	77.347	4.1	0.94	142.3	OK
1-7.011	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S138	S139	158.4	157.033	0.184	85.261	3.7	0.52	160.2	OK
1-7.012	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S139	S140	157.4	156.091	0.268	88.458	1.7	1.03	164.7	OK
1-7.013	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S140	Basin 1	157.5	155.782	0.178	88.318	2.8	0.28	162.7	OK
1-8.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S141	S142	164.6	162.444	0.225	21.039	1.1	0.8	41.7	Surcharged
1-8.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S142	S143	163.4	162.134	0.225	40.676	2.0	1.36	81.3	Surcharged
1-8.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S143	S145	162.4	161.031	0.118	49.320	3.9	0.31	99.9	OK
1-9.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S144	S145	161.4	160.031	0.083	15.813	2.7	0.28	35.8	OK
1-8.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S145	S146	161.2	158.159	0.149	70.397	4.2	0.45	146.5	OK
1-8.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S146	Basin 1	158.5	155.722	0.272	70.386	2.2	0.92	144.9	Surcharged
1-1.015	1in30yr: 30 years: +0 %: 15 mins: Summer	No Delay	Basin 1	Basin 2		155.246	0.000	0.000	0.0		0.0	
1-7.014	1in30yr: 30 years: +0 %: 30 mins: Winter	No Delay	Basin 1	Basin 2		155.360	0.258	261.431	0.0		119.4	
1-1.016	1in30yr: 30 years: +0 %: 600 mins: Winter	Pipe	Basin 2	S147	156.5	155.507	0.102	1586.104	1.5	0.47	31.1	Surcharged

1-1.017	1in30yr: 30 years: +0 %: 600 mins: Winter	Pipe	S147	S148	156.5	154.795	0.061	1586.610	2.6	0.05	30.3	OK
1-1.018	1in30yr: 30 years: +0 %: 600 mins: Winter	Pipe	S148	S149	155.3	153.219	0.063	1586.505	2.5	0.05	30.3	OK
1-1.019	1in30yr: 30 years: +0 %: 600 mins: Winter	Pipe	S149	S150	154.0	152.494	0.064	1603.899	2.8	0.1	30.6	OK
1-1.020	1in30yr: 30 years: +0 %: 600 mins: Winter	Pipe	S150	S151	152.1	150.619	0.064	1627.058	2.8	0.1	31.0	OK
1-1.021	1in30yr: 30 years: +0 %: 30 mins: Summer	Pipe	S151	S152	149.4	144.193	0.388	63.656	0.6	0.01	36.7	OK
1-1.022	1in30yr: 30 years: +0 %: 600 mins: Winter	Pipe	S152	S153	146.0	144.589	0.110	1655.571	1.4	0.27	31.7	Surcharged

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Company Address:		



Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin 2	1in30yr: 30 years: +0 %: 600 mins: Winter	155.507	155.507	1.557	1.557	53.2	472.149	0.000	0.000	30.3	1587.130	48	OK
Basin 1	1in30yr: 30 years: +0 %: 600 mins: Winter	155.535	155.535	0.785	0.785	129.4	779.939	0.000	0.000	53.2	1721.150	56	OK

STORM SEWER DESIGN

Rainfall Simulation

1:100 year event

Project:	Date: 27/04/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S100	1in100yr: 100 years: +0 %: 15 mins: Winter	175.274	173.849	173.925	0.076	15.6	0.109	0.000	15.0	6.792	OK
S101	1in100yr: 100 years: +0 %: 15 mins: Winter	174.887	173.462	173.903	0.441	78.9	0.631	0.000	69.0	34.701	Surcharged
S102	1in100yr: 100 years: +0 %: 15 mins: Winter	174.154	172.654	172.846	0.192	124.8	0.275	0.000	123.1	59.073	OK
S103	1in100yr: 100 years: +0 %: 15 mins: Winter	173.612	171.627	171.912	0.285	179.4	0.408	0.000	171.3	83.634	OK
S104	1in100yr: 100 years: +0 %: 15 mins: Winter	172.204	170.703	171.006	0.303	221.6	0.434	0.000	208.5	105.505	Surcharged
S105	1in100yr: 100 years: +0 %: 15 mins: Summer	171.670	170.245	170.283	0.038	9.2	0.055	0.000	9.1	3.576	OK
S106	1in100yr: 100 years: +0 %: 15 mins: Winter	170.580	169.080	169.504	0.424	247.9	0.607	0.000	235.0	122.793	Surcharged
S107	1in100yr: 100 years: +0 %: 15 mins: Winter	169.253	167.753	168.256	0.502	243.9	0.568	0.000	242.7	127.451	Surcharged
S108	1in100yr: 100 years: +0 %: 15 mins: Winter	171.851	170.425	170.505	0.080	22.4	0.114	0.000	22.1	9.733	OK
S109	1in100yr: 100 years: +0 %: 15 mins: Winter	170.725	169.300	170.336	1.036	106.8	1.482	0.000	98.8	46.727	Surcharged
S110	1in100yr: 100 years: +0 %: 15 mins: Winter	169.941	168.441	168.681	0.240	142.3	0.343	0.000	142.8	65.615	OK
S111	1in100yr: 100 years: +0 %: 15 mins: Winter	168.949	167.448	167.807	0.359	171.5	0.514	0.000	148.3	78.251	Surcharged
S112	1in100yr: 100 years: +0 %: 15 mins: Winter	168.394	166.819	167.112	0.293	205.4	0.419	0.000	201.6	103.162	OK

S113	1in100yr: 100 years: +0 %: 15 mins: Winter	167.975	166.325	166.611	0.286	485.4	0.410	0.000	479.9	250.650	OK
S114	1in100yr: 100 years: +0 %: 15 mins: Summer	166.402	164.752	165.070	0.318	505.7	0.456	0.000	510.6	232.623	OK
S115	1in100yr: 100 years: +0 %: 15 mins: Summer	165.240	163.590	163.926	0.336	540.6	0.480	0.000	533.7	244.270	OK
S116	1in100yr: 100 years: +0 %: 15 mins: Winter	166.239	164.814	164.892	0.078	19.6	0.112	0.000	19.1	8.531	OK
S117	1in100yr: 100 years: +0 %: 15 mins: Winter	165.578	164.153	164.563	0.410	83.4	0.586	0.000	71.8	36.509	Surcharged
S118	1in100yr: 100 years: +0 %: 15 mins: Winter	164.854	162.800	163.788	0.988	149.3	1.413	0.000	144.9	70.460	Surcharged
S119	1in100yr: 100 years: +0 %: 15 mins: Winter	164.057	162.407	162.893	0.486	691.6	0.859	0.000	690.3	348.804	Surcharged
S120	1in100yr: 100 years: +0 %: 15 mins: Winter	164.392	162.966	163.017	0.051	16.0	0.074	0.000	15.7	6.962	OK
S121	1in100yr: 100 years: +0 %: 15 mins: Winter	163.700	161.657	162.197	0.540	69.6	0.772	0.000	63.9	30.314	Surcharged
S122	1in100yr: 100 years: +0 %: 15 mins: Winter	163.108	161.161	161.925	0.764	754.2	1.094	0.000	726.0	379.395	Surcharged
S123	1in100yr: 100 years: +0 %: 15 mins: Summer	162.206	159.782	160.094	0.312	778.9	0.551	0.000	766.2	355.466	OK
S124	1in100yr: 100 years: +0 %: 15 mins: Winter	161.421	159.850	159.935	0.085	40.7	0.096	0.000	40.3	17.787	OK
S125	1in100yr: 100 years: +0 %: 15 mins: Winter	160.541	156.789	157.150	0.361	822.4	0.638	0.000	947.3	414.982	OK
S126	1in100yr: 100 years: +0 %: 15 mins: Winter	158.250	155.348	156.322	0.974	947.3	1.394	0.000	928.7	416.009	Surcharged
S127	1in100yr: 100 years: +0 %: 15 mins: Winter	175.767	174.341	174.417	0.076	27.9	0.109	0.000	27.5	12.212	OK
S128	1in100yr: 100 years: +0 %: 15 mins: Summer	172.888	171.462	171.555	0.093	48.2	0.134	0.000	47.8	18.916	OK

S129	1in100yr: 100 years: +0 %: 15 mins: Winter	169.717	168.292	169.017	0.725	53.4	1.037	0.000	41.0	23.854	Surcharged
S130	1in100yr: 100 years: +0 %: 15 mins: Winter	169.286	167.860	168.890	1.030	61.4	1.165	0.000	54.5	32.712	Surcharged
S131	1in100yr: 100 years: +0 %: 15 mins: Winter	169.782	167.678	168.559	0.881	54.5	1.260	0.000	53.4	32.739	Surcharged
S132	1in100yr: 100 years: +0 %: 15 mins: Winter	169.587	167.609	168.403	0.794	56.9	1.136	0.000	59.5	35.165	Surcharged
S133	1in100yr: 100 years: +0 %: 15 mins: Winter	169.140	167.529	168.204	0.675	64.7	0.966	0.000	70.5	40.734	Surcharged
S134	1in100yr: 100 years: +0 %: 15 mins: Winter	168.309	166.884	167.769	0.885	95.9	1.267	0.000	94.3	59.669	Surcharged
S135	1in100yr: 100 years: +0 %: 15 mins: Winter	166.446	165.021	166.007	0.986	130.5	1.411	0.000	124.8	78.180	Surcharged
S136	1in100yr: 100 years: +0 %: 15 mins: Winter	165.006	163.581	163.902	0.321	137.6	0.459	0.000	136.5	83.688	Surcharged
S137	1in100yr: 100 years: +0 %: 15 mins: Winter	160.922	159.497	160.411	0.914	173.6	1.307	0.000	162.1	99.897	Surcharged
S138	1in100yr: 100 years: +0 %: 15 mins: Winter	158.358	156.858	157.051	0.193	181.8	0.276	0.000	179.8	110.154	OK
S139	1in100yr: 100 years: +0 %: 15 mins: Winter	157.398	155.748	156.118	0.370	189.4	0.530	0.000	186.9	114.271	OK
S140	1in100yr: 100 years: +0 %: 15 mins: Winter	157.500	155.588	155.801	0.213	186.9	0.305	0.000	189.0	114.059	OK
S141	1in100yr: 100 years: +0 %: 15 mins: Winter	164.635	161.871	163.140	1.269	62.3	1.815	0.000	53.6	27.155	Surcharged
S142	1in100yr: 100 years: +0 %: 15 mins: Winter	163.375	161.430	162.666	1.236	111.5	1.769	0.000	104.5	52.487	Surcharged
S143	1in100yr: 100 years: +0 %: 15 mins: Winter	162.410	160.910	161.051	0.141	130.0	0.202	0.000	128.6	63.640	OK
S144	1in100yr: 100 years: +0 %: 15 mins: Winter	161.371	159.946	160.045	0.099	46.7	0.142	0.000	46.3	20.401	OK

S145	1in100yr: 100 years: +0 %: 15 mins: Winter	161.222	158.002	158.189	0.187	190.5	0.267	0.000	189.0	90.834	OK
S146	1in100yr: 100 years: +0 %: 15 mins: Winter	158.504	155.403	155.911	0.508	189.0	0.727	0.000	187.5	90.789	Surcharged
S147	1in100yr: 100 years: +0 %: 480 mins: Winter	156.500	154.731	154.800	0.069	34.9	0.239	0.000	34.5	1510.293	OK
S148	1in100yr: 100 years: +0 %: 600 mins: Winter	155.250	153.158	153.223	0.065	34.5	0.094	0.000	34.5	1842.866	OK
S149	1in100yr: 100 years: +0 %: 600 mins: Winter	154.005	152.430	152.499	0.069	34.9	0.098	0.000	34.9	1865.052	OK
S150	1in100yr: 100 years: +0 %: 480 mins: Winter	152.113	150.555	150.624	0.069	35.7	0.078	0.000	35.7	1558.714	OK
S151	1in100yr: 100 years: +0 %: 360 mins: Winter	149.367	143.967	144.912	0.945	38.3	3.272	0.000	37.2	1221.699	OK
S152	1in100yr: 100 years: +0 %: 360 mins: Winter	145.998	143.643	144.911	1.269	37.2	4.394	0.000	37.2	1213.621	Surcharged
S153	1in100yr: 100 years: +0 %: 360 mins: Winter	144.566	143.470	143.585	0.115	37.2	0.000	0.000	37.2	1213.289	OK

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1-1.000	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S100	S101	175.3	173.924	0.225	6.063	0.6	0.25	15.1	OK
1-1.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S101	S102	174.9	173.903	0.225	34.701	1.7	1.11	69.0	Surcharged
1-1.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S102	S103	174.2	172.846	0.239	59.073	2.1	0.7	123.1	OK
1-1.003	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S103	S104	173.6	171.912	0.292	83.634	2.5	0.97	171.3	OK
1-1.004	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S104	S106	172.2	170.982	0.300	94.198	3.1	0.96	212.9	OK
1-2.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S105	S106	171.7	170.283	0.190	4.002	1.1	0.07	9.1	OK
1-1.005	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S106	S107	170.6	169.413	0.300	109.632	3.5	0.88	236.4	Surcharged
1-1.006	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S107	S113	169.3	168.256	0.300	127.451	3.7	0.93	242.7	Surcharged
1-3.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S108	S109	171.9	170.505	0.225	9.733	0.6	0.28	22.1	OK
1-3.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S109	S110	170.7	170.336	0.225	46.727	2.5	1.38	98.8	Surcharged
1-3.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S110	S111	169.9	168.681	0.298	65.615	2.0	0.93	142.8	OK
1-3.003	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S111	S112	168.9	167.807	0.299	78.251	2.2	0.98	148.3	Surcharged
1-3.004	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S112	S113	168.4	167.112	0.274	103.162	2.3	0.81	201.6	OK
1-1.007	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S113	S114	168.0	166.606	0.299	223.780	4.3	0.6	482.9	OK

1-1.008	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S114	S115	166.4	165.070	0.327	232.623	4.1	0.65	510.6	OK
1-1.009	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S115	S119	165.2	163.922	0.400	273.527	3.9	0.7	535.6	OK
1-4.000	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S116	S117	166.2	164.891	0.212	7.613	0.9	0.26	19.2	OK
1-4.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S117	S118	165.6	164.563	0.225	36.509	1.8	0.74	71.8	Surcharged
1-4.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S118	S119	164.9	163.788	0.300	70.460	2.0	1.86	144.9	Surcharged
1-1.010	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S119	S122	164.1	162.893	0.450	348.804	4.4	0.77	690.3	Surcharged
1-5.000	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S120	S121	164.4	163.017	0.212	6.225	0.7	0.12	15.8	OK
1-5.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S121	S122	163.7	162.197	0.225	30.314	1.6	1.06	63.9	Surcharged
1-1.011	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S122	S123	163.1	161.594	0.371	338.697	5.4	0.82	735.8	OK
1-1.012	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S123	S125	162.2	160.088	0.327	398.163	5.5	0.56	782.1	OK
1-6.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S124	S125	161.4	159.935	0.084	17.787	3.0	0.29	40.3	OK
1-1.013	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S125	S126	160.5	157.150	0.525	414.982	4.4	0.7	947.3	OK
1-1.014	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S126	Basin 1	158.3	156.322	0.600	416.009	3.3	1.36	928.7	Surcharged
1-7.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S127	S128	175.8	174.417	0.085	12.212	2.0	0.25	27.5	OK
1-7.001	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S128	S129	172.9	171.555	0.225	18.916	2.2	0.37	47.8	OK
1-7.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S129	S130	169.7	169.017	0.225	23.854	1.0	0.53	41.0	Surcharged
1-7.003	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S130	S131	169.3	168.890	0.225	32.712	1.4	1.35	54.5	Surcharged
1-7.004	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S131	S132	169.8	168.559	0.225	32.739	1.3	1.32	53.4	Surcharged

1-7.005	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S132	S133	169.6	168.403	0.225	35.165	1.5	1.47	59.5	Surcharged
1-7.006	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S133	S134	169.1	168.204	0.225	40.734	2.1	0.84	70.5	Surcharged
1-7.007	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S134	S135	168.3	167.769	0.225	59.669	2.4	0.99	94.3	Surcharged
1-7.008	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S135	S136	166.4	166.007	0.225	78.180	3.1	1.14	124.8	Surcharged
1-7.009	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S136	S137	165.0	163.902	0.225	83.688	3.6	0.91	136.5	Surcharged
1-7.010	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S137	S138	160.9	160.411	0.225	99.897	4.1	1.08	162.1	Surcharged
1-7.011	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S138	S139	158.4	157.051	0.204	110.154	3.7	0.58	179.8	OK
1-7.012	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S139	S140	157.4	156.118	0.292	114.271	1.7	1.16	186.9	OK
1-7.013	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S140	Basin 1	157.5	155.801	0.194	114.059	2.9	0.32	189.0	OK
1-8.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S141	S142	164.6	163.140	0.225	27.155	1.3	1.03	53.6	Surcharged
1-8.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S142	S143	163.4	162.666	0.225	52.487	2.6	1.75	104.5	Surcharged
1-8.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S143	S145	162.4	161.051	0.136	63.640	4.1	0.4	128.6	OK
1-9.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S144	S145	161.4	160.045	0.096	20.401	2.8	0.36	46.3	OK
1-8.003	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S145	S146	161.2	158.189	0.176	90.834	4.4	0.59	189.0	OK
1-8.004	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S146	Basin 1	158.5	155.911	0.300	90.789	2.7	1.19	187.5	Surcharged
1-1.015	1in100yr: 100 years: +0 %: 180 mins: Winter	No Delay	Basin 1	Basin 2		155.644	0.297	442.148	0.0		156.1	
1-7.014	1in100yr: 100 years: +0 %: 30 mins: Winter	No Delay	Basin 1	Basin 2		155.482	0.267	302.967	0.0		131.5	
1-1.016	1in100yr: 100 years: +0 %: 360 mins: Winter	Pipe	Basin 2	S147	156.5	155.692	0.108	1145.821	1.6	0.53	35.1	Surcharged

1-1.017	1in100yr: 100 years: +0 %: 480 mins: Winter	Pipe	S147	S148	156.5	154.800	0.065	1510.293	2.7	0.06	34.5	OK
1-1.018	1in100yr: 100 years: +0 %: 600 mins: Winter	Pipe	S148	S149	155.3	153.223	0.067	1842.866	2.6	0.06	34.5	OK
1-1.019	1in100yr: 100 years: +0 %: 600 mins: Winter	Pipe	S149	S150	154.0	152.499	0.069	1865.052	2.9	0.11	34.9	OK
1-1.020	1in100yr: 100 years: +0 %: 480 mins: Winter	Pipe	S150	S151	152.1	150.624	0.068	1558.714	2.9	0.11	35.7	OK
1-1.021	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S151	S152	149.4	144.319	0.514	36.394	0.7	0.01	43.8	OK
1-1.022	1in100yr: 100 years: +0 %: 360 mins: Winter	Pipe	S152	S153	146.0	144.911	0.120	1213.289	1.4	0.31	37.2	Surcharged

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Company Address:		



Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin 2	1in100yr: 100 years: +0 %: 600 mins: Winter	155.697	155.697	1.747	1.747	121.6	602.335	0.000	0.000	34.5	1843.566	34	OK
Basin 1	1in100yr: 100 years: +0 %: 600 mins: Winter	155.697	155.697	0.947	0.947	165.0	1040.797	0.000	0.000	121.6	2054.601	41	OK

STORM SEWER DESIGN

Rainfall Simulation

1:100 year event +40% Climate Change

Project:	Date: 27/04/2023	
	Designed by: bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S100	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	175.274	173.849	174.996	1.147	21.8	1.641	0.000	17.5	9.650	Surcharged
S101	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	174.887	173.462	174.890	1.428	101.9	5.403	3.364	85.7	48.694	Flood
S102	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	174.154	172.654	174.106	1.452	145.9	2.078	0.000	132.1	82.714	Surcharged
S103	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	173.612	171.627	173.479	1.853	210.9	2.651	0.000	199.7	117.220	Surcharged
S104	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	172.204	170.703	172.209	1.506	270.1	7.018	4.870	244.9	147.902	Flood
S105	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	171.670	170.245	170.447	0.202	12.9	0.289	0.000	12.2	5.593	OK
S106	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	170.580	169.080	170.432	1.352	274.8	1.935	0.000	270.3	172.082	Surcharged
S107	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.253	167.753	168.873	1.120	284.8	1.267	0.000	279.8	178.572	Surcharged
S108	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	171.851	170.425	170.910	0.485	31.3	0.693	0.000	42.4	12.169	Surcharged
S109	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	170.725	169.300	170.732	1.432	149.4	8.826	6.787	112.2	65.415	Flood
S110	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.941	168.441	169.387	0.946	154.9	1.354	0.000	149.8	91.904	Surcharged
S111	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	168.949	167.448	168.407	0.959	190.0	1.373	0.000	181.1	109.569	Surcharged
S112	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	168.394	166.819	167.548	0.729	261.0	1.043	0.000	232.5	143.940	Surcharged

S113	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	167.975	166.325	167.083	0.758	571.4	1.085	0.000	560.9	350.649	Surcharged
S114	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	166.402	164.752	166.053	1.301	592.7	1.862	0.000	583.8	364.596	Surcharged
S115	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	165.240	163.590	165.117	1.527	615.3	2.185	0.000	612.9	382.959	Surcharged
S116	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	166.239	164.814	165.748	0.934	27.4	1.336	0.000	36.5	10.679	Surcharged
S117	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	165.578	164.153	165.582	1.429	122.1	5.819	3.780	77.6	51.152	Flood
S118	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	164.854	162.800	164.857	2.057	182.7	6.048	3.108	165.8	98.714	Flood
S119	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	164.057	162.407	164.058	1.651	767.2	3.720	0.804	777.2	488.503	Flood
S120	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	164.392	162.966	163.202	0.236	22.4	0.338	0.000	21.1	9.741	Surcharged
S121	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.700	161.657	163.179	1.522	85.5	2.179	0.000	77.3	42.373	Surcharged
S122	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.108	161.161	162.605	1.444	850.9	2.067	0.000	851.6	531.433	Surcharged
S123	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	162.206	159.782	160.134	0.352	902.2	0.622	0.000	902.6	557.747	OK
S124	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	161.421	159.850	159.953	0.103	57.0	0.117	0.000	56.4	24.903	OK
S125	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	160.541	156.789	157.166	0.377	940.8	0.666	0.000	940.3	723.116	OK
S126	1in100yr+40 CC: 100 years: +40 %: 30 mins: Winter	158.250	155.348	156.306	0.958	938.2	1.370	0.000	895.0	809.694	Surcharged
S127	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	175.767	174.341	174.433	0.092	39.1	0.131	0.000	38.6	17.096	OK
S128	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	172.888	171.462	171.576	0.114	67.7	0.164	0.000	66.6	29.606	OK

S129	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.717	168.292	169.704	1.412	75.0	2.020	0.000	72.5	33.427	Surcharged
S130	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.286	167.860	169.293	1.433	101.0	8.302	6.689	54.9	45.821	Flood
S131	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.782	167.678	169.028	1.350	54.9	1.931	0.000	58.3	45.859	Surcharged
S132	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.587	167.609	168.903	1.294	59.4	1.852	0.000	69.8	49.267	Surcharged
S133	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.140	167.529	168.732	1.203	70.3	1.721	0.000	82.3	57.133	Surcharged
S134	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	168.309	166.884	168.312	1.428	123.0	4.783	2.744	97.8	83.759	Flood
S135	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	166.446	165.021	166.449	1.428	157.0	5.505	3.466	136.6	109.545	Flood
S136	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	165.006	163.581	164.478	0.897	144.6	1.284	0.000	142.7	117.283	Surcharged
S137	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	160.922	159.497	160.923	1.426	192.4	3.199	1.160	176.9	140.025	Flood
S138	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	158.358	156.858	157.075	0.217	209.9	0.310	0.000	209.6	154.377	OK
S139	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	157.398	155.748	156.221	0.473	223.0	0.676	0.000	210.1	160.166	Surcharged
S140	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	157.500	155.588	155.997	0.409	37.3	0.585	0.000	37.3	638.669	OK
S141	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	164.635	161.871	164.347	2.476	87.2	3.543	0.000	81.0	38.054	Surcharged
S142	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.375	161.430	163.377	1.947	162.1	5.132	2.348	130.9	73.516	Flood
S143	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	162.410	160.910	161.075	0.165	166.6	0.237	0.000	166.4	89.136	OK
S144	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	161.371	159.946	160.068	0.122	65.4	0.175	0.000	64.8	28.568	OK

S145	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	161.222	158.002	158.237	0.235	252.9	0.337	0.000	252.1	127.220	OK
S146	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	158.504	155.403	156.168	0.765	252.1	1.095	0.000	251.1	126.937	Surcharged
S147	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	156.500	154.731	154.807	0.076	43.3	0.262	0.000	40.8	2649.541	OK
S148	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	155.250	153.158	153.230	0.072	40.8	0.102	0.000	40.8	2649.386	OK
S149	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	154.005	152.430	152.505	0.075	41.2	0.107	0.000	41.2	2682.108	OK
S150	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	152.113	150.555	150.633	0.078	45.4	0.088	0.000	45.0	79.819	OK
S151	1in100yr+40 CC: 100 years: +40 %: 180 mins: Winter	149.367	143.967	145.656	1.689	51.8	5.852	0.000	48.4	739.152	Surcharged
S152	1in100yr+40 CC: 100 years: +40 %: 180 mins: Winter	145.998	143.643	145.656	2.013	48.4	6.974	0.000	47.5	725.890	Surcharged
S153	1in100yr+40 CC: 100 years: +40 %: 180 mins: Winter	144.566	143.470	143.602	0.132	47.5	0.000	0.000	47.5	725.513	OK

Project:	Date: 27/04/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1-1.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S100	S101	175.3	174.892	0.225	8.538	0.8	0.53	32.4	Surcharged
1-1.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S101	S102	174.9	174.890	0.225	48.599	2.2	1.37	85.7	Flood
1-1.002	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S102	S103	174.2	173.987	0.300	102.764	2.0	0.79	138.3	Surcharged
1-1.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S103	S104	173.6	173.479	0.300	117.220	2.8	1.13	199.7	Surcharged
1-1.004	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S104	S106	172.2	172.209	0.300	147.902	3.5	1.11	244.9	Flood
1-2.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S105	S106	171.7	170.363	0.225	4.991	1.2	0.11	13.5	OK
1-1.005	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S106	S107	170.6	170.345	0.300	153.630	3.9	1.03	274.5	Surcharged
1-1.006	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S107	S113	169.3	168.748	0.300	159.452	4.0	1.09	284.6	Surcharged
1-3.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S108	S109	171.9	170.910	0.225	12.169	1.1	0.53	42.4	Surcharged
1-3.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S109	S110	170.7	170.732	0.225	65.415	2.8	1.57	112.2	Flood
1-3.002	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S110	S111	169.9	169.349	0.300	82.075	2.1	0.98	150.0	Surcharged
1-3.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S111	S112	168.9	168.329	0.300	97.884	2.6	1.22	183.6	Surcharged
1-3.004	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S112	S113	168.4	167.357	0.375	128.507	2.3	1.04	259.0	Surcharged
1-1.007	1in100yr+40 CC: 100 years: +40 %: 30 mins: Winter	Pipe	S113	S114	168.0	166.744	0.450	488.132	4.3	0.69	561.9	OK
1-1.008	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S114	S115	166.4	166.053	0.450	364.596	4.1	0.75	583.8	Surcharged

1-1.009	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S115	S119	165.2	165.117	0.450	382.959	4.0	0.8	612.9	Surcharged
1-4.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S116	S117	166.2	165.748	0.225	10.670	0.9	0.5	36.5	Surcharged
1-4.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S117	S118	165.6	165.580	0.225	45.695	2.0	0.84	80.8	Flood
1-4.002	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S118	S119	164.9	164.857	0.300	98.714	2.3	2.13	165.8	Flood
1-1.010	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S119	S122	164.1	164.058	0.450	488.503	4.9	0.87	777.2	Flood
1-5.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S120	S121	164.4	163.122	0.225	8.692	0.6	0.19	24.2	OK
1-5.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S121	S122	163.7	163.179	0.225	42.373	1.9	1.28	77.3	Surcharged
1-1.011	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S122	S123	163.1	162.605	0.450	531.433	5.4	0.95	851.6	Surcharged
1-1.012	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S123	S125	162.2	160.134	0.342	557.747	6.1	0.65	902.6	OK
1-6.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S124	S125	161.4	159.953	0.101	24.903	3.3	0.4	56.4	OK
1-1.013	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S125	S126	160.5	157.139	0.525	581.941	4.4	0.71	956.2	OK
1-1.014	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S126	Basin 1	158.3	156.273	0.600	581.979	3.4	1.41	962.3	Surcharged
1-7.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S127	S128	175.8	174.433	0.103	17.096	2.2	0.35	38.6	OK
1-7.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S128	S129	172.9	171.576	0.225	29.606	2.0	0.51	66.6	OK
1-7.002	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S129	S130	169.7	169.704	0.225	33.427	1.8	0.93	72.5	Surcharged
1-7.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S130	S131	169.3	169.291	0.225	40.922	1.6	1.57	63.5	Flood
1-7.004	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S131	S132	169.8	169.014	0.225	57.020	1.6	1.59	64.3	Surcharged
1-7.005	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S132	S133	169.6	168.885	0.225	44.003	1.8	1.79	72.1	Surcharged

1-7.006	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S133	S134	169.1	168.732	0.225	57.133	2.1	0.98	82.3	Surcharged
1-7.007	1in100yr+40 CC: 100 years: +40 %: 60 mins: Summer	Pipe	S134	S135	168.3	168.175	0.225	138.372	2.5	1.03	98.4	Surcharged
1-7.008	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S135	S136	166.4	166.449	0.225	109.545	3.4	1.25	136.6	Flood
1-7.009	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S136	S137	165.0	164.478	0.225	117.283	3.7	0.95	142.7	Surcharged
1-7.010	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S137	S138	160.9	160.923	0.225	140.025	4.4	1.17	176.9	Flood
1-7.011	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S138	S139	158.4	157.074	0.258	137.858	3.7	0.67	209.7	OK
1-7.012	1in100yr+40 CC: 100 years: +40 %: 30 mins: Winter	Pipe	S139	S140	157.4	156.169	0.324	223.121	1.7	1.31	210.4	OK
1-7.013	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S140	Basin 1	157.5	155.817	0.208	159.755	3.0	0.36	211.9	OK
1-8.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S141	S142	164.6	164.347	0.225	38.054	2.0	1.56	81.0	Surcharged
1-8.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S142	S143	163.4	163.377	0.225	73.516	3.3	2.19	130.9	Flood
1-8.002	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S143	S145	162.4	161.075	0.159	89.136	4.4	0.52	166.4	OK
1-9.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S144	S145	161.4	160.068	0.118	28.568	3.1	0.51	64.8	OK
1-8.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S145	S146	161.2	158.237	0.217	127.220	4.6	0.78	252.1	OK
1-8.004	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S146	Basin 1	158.5	156.168	0.300	126.937	3.6	1.59	251.1	Surcharged
1-1.015	1in100yr+40 CC: 100 years: +40 %: 60 mins: Winter	No Delay	Basin 1	Basin 2		155.680	0.521	463.551	0.0		578.5	
1-7.014	1in100yr+40 CC: 100 years: +40 %: 30 mins: Winter	No Delay	Basin 2	Basin 2		155.605	0.279	240.497	0.0		145.2	
1-1.016	1in100yr+40 CC: 100 years: +40 %: 600 mins: Winter	Pipe	Basin 2	S147	156.5	155.995	0.119	2250.686	1.7	0.65	43.5	Surcharged
1-1.017	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	Pipe	S147	S148	156.5	154.807	0.071	2649.541	2.8	0.07	40.8	OK

1-1.018	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	Pipe	S148	S149	155.3	153.230	0.073	2649.386	2.7	0.07	40.8	OK
1-1.019	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	Pipe	S149	S150	154.0	152.505	0.075	2682.108	3.0	0.13	41.2	OK
1-1.020	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S150	S151	152.1	150.633	0.077	79.819	3.1	0.14	45.0	OK
1-1.021	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S151	S152	149.4	144.587	0.782	46.053	0.8	0.01	52.6	OK
1-1.022	1in100yr+40 CC: 100 years: +40 %: 180 mins: Winter	Pipe	S152	S153	146.0	145.656	0.138	725.513	1.5	0.4	47.5	Surcharged

Project:	Date: 27/04/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Company Address:		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Basin 2	1in100yr+40CC: 100 years: +40 %: 720 mins: Winter	156.000	155.999	2.050	2.049	414.2	830.162	0.000	0.000	40.3	2624.176	9	OK
Basin 1	1in100yr+40CC: 100 years: +40 %: 720 mins: Winter	155.999	155.999	1.249	1.249	202.2	1573.339	0.000	0.000	353.5	2941.922	11	OK

Storm Water Network 2

STORM SEWER DESIGN

Network Design Details (1 in 2 yr) & Online Controls

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Surface Network 2	Company Address:		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

1in2 year

Type: FSR

Return Period (years)	2.0
Region	England and Wales
M5-60 (mm)	19.0
Ratio R	0.287

Lock Slope Options	None
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:x)	400.00
Max. Slope (1:x)	12.00
Min. Backdrop (m)	0.600
Max. Backdrop (m)	1.500
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Pipe sizes

Add. Increment (mm)	75

Diameter (mm)	Min. Slope (1:x)	Max. Slope (1:x)
150	0.00	0.00
225	0.00	0.00

Project:	Date: 09/05/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Network Design Report Storm Phase: Surface Network 2 Flow Path: 2-1.000-2-1.020	Company Address:		

Name	From	To	Length (m)	Connection Type	Slope (1:x)	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)
2-1.000	S201	S202	29.234	Pipe	21.062	0.6	225	173.638
2-1.001	S202	S203	29.616	Pipe	20.049	0.6	225	172.251
2-1.002	S203	S204	11.993	Pipe	21.122	0.6	225	170.848
2-1.003	S204	S205	57.752	Pipe	29.692	0.6	300	170.497
2-1.004	S205	S206	44.298	Pipe	40.455	0.6	300	168.637
2-1.005	S206	S207	22.444	Pipe	67.806	0.6	375	167.244
2-1.006	S207	S213	53.463	Pipe	27.459	0.6	375	166.834
Branch: 2-2.000								
2-2.000	S208	S209	28.181	Pipe	28.097	0.6	225	169.527
2-2.001	S209	S210	79.902	Pipe	62.477	0.6	300	168.532
2-2.002	S210	S211	45.130	Pipe	53.283	0.6	300	167.245
2-2.003	S211	S212	21.609	Pipe	35.658	0.6	300	166.398
2-2.004	S212	S213	18.522	Pipe	20.466	0.6	300	165.792
2-1.007	S213	S214	25.878	Pipe	12.003	0.6	375	165.337
2-1.008	S214	S215	10.315	Pipe	12.008	0.6	375	163.348
2-1.009	S215	S216	25.076	Pipe	22.673	0.6	375	162.525
2-1.010	S216	S217	48.725	Pipe	400.000	0.6	600	160.766
2-1.011	S217	S219	45.265	Pipe	400.000	0.6	675	161.314
Branch: 2-3.000								
2-3.000	S218	S219	34.571	Pipe	12.000	0.6	225	163.966
2-1.012	S219	S220	31.912	Pipe	45.983	0.6	675	162.237
2-1.013	S220	S223	32.523	Pipe	20.002	0.6	675	160.743
Branch: 2-4.000								
2-4.000	S221	S223	25.041	Pipe	17.270	0.6	225	159.661
2-1.014	S223	S230	28.894	Pipe	20.010	0.6	675	159.217
Branch: 2-5.000								
2-5.000	S224	S226	36.471	Pipe	18.627	0.6	225	159.307
2-5.001	S226	S227	36.532	Pipe	165.000	0.6	225	157.162
2-5.002	S227	S228	15.643	Pipe	235.000	0.6	300	157.947
2-5.003	S228	S229	15.614	Pipe	235.000	0.6	300	158.800
2-5.004	S229	S230	9.534	Pipe	235.000	0.6	300	158.800
2-1.015	S230	S231	18.107	Pipe	19.520	0.6	750	158.736
2-1.016	S231	S232	33.244	Pipe	49.519	0.6	750	158.364
2-1.017	S232	Pond	5.201	Pipe	288.932	0.6	750	154.868
Branch: 2-9.000								
2-9.000	S251	S252	15.910	Pipe	41.325	0.6	225	170.537
2-9.001	S252	S253	20.762	Pipe	36.942	0.6	225	170.152
2-9.002	S253	S254	52.614	Pipe	36.767	0.6	225	169.597
2-9.003	S254	S255	52.877	Pipe	25.168	0.6	225	168.159
2-9.004	S255	S256	32.073	Pipe	24.151	0.6	225	166.058
2-9.005	S256	S257	18.412	Pipe	23.943	0.6	225	164.730
2-9.006	S257	S259	10.102	Pipe	40.246	0.6	300	163.961
2-9.007	S259	S260	41.228	Pipe	12.002	0.6	300	163.748
2-9.008	S260	S265	17.608	Pipe	104.807	0.6	375	160.275
Branch: 2-10.000								
2-10.000	S261	S262	32.410	Pipe	27.463	0.6	225	166.463
2-10.001	S262	S263	29.756	Pipe	16.290	0.6	225	165.283
2-10.002	S263	S264	32.113	Pipe	15.655	0.6	225	163.456
2-10.003	S264	S265	27.334	Pipe	21.058	0.6	225	161.405
2-9.009	S265	S266	12.551	Pipe	99.613	0.6	450	160.107
2-9.010	S266	S267	45.797	Pipe	22.571	0.6	450	159.981
2-9.011	S267	S268	21.990	Pipe	28.633	0.6	450	157.952
Branch: 2-7.000								
2-7.000	S240	S241	16.524	Pipe	92.830	0.6	225	168.192
Branch: 2-6.000								
2-6.000	S233	S234	34.865	Pipe	20.282	0.6	225	174.665

2-6.001	S234	S235	18.262	Pipe	23.904	0.6	225	172.946
2-6.002	S235	S236	38.217	Pipe	57.383	0.6	225	172.182
2-6.003	S236	S237	36.780	Pipe	74.909	0.6	300	171.516
2-6.004	S237	S238	25.989	Pipe	96.975	0.6	300	171.025
2-6.005	S238	S239	21.977	Pipe	20.501	0.6	300	170.757
2-6.006	S239	S241	40.031	Pipe	23.956	0.6	300	169.685
2-6.007	S241	S242	13.572	Pipe	32.010	0.6	300	168.014
2-6.008	S242	S243	13.209	Pipe	19.033	0.6	300	167.591
2-6.009	S243	S244	38.098	Pipe	19.498	0.6	300	166.896
2-6.010	S244	S245	31.844	Pipe	18.898	0.6	375	165.005
2-6.011	S245	S246	20.464	Pipe	14.970	0.6	375	163.257
2-6.012	S246	S248	28.183	Pipe	14.818	0.6	375	161.890
Branch: 2-8.000								
2-8.000	S247	S248	30.799	Pipe	21.613	0.6	225	161.924
2-6.013	S248	S249	6.284	Pipe	310.000	0.6	375	160.487
2-6.014	S249	S250	38.591	Pipe	24.180	0.6	375	160.264
2-6.015	S250	S268	24.238	Pipe	20.403	0.6	375	158.372
2-6.016	S268	S269	31.111	Pipe	48.286	0.6	600	157.265
2-6.017	S269	S270	13.427	Pipe	12.009	0.6	600	156.832
2-6.018	S270	Pond	23.728	Pipe	56.228	0.6	600	156.650
2-1.018	Pond	S271	7.398	Pipe	400.000	0.6	300	154.800
2-1.019	S271	S272	5.984	Pipe	17.187	0.6	300	154.800
2-1.020	S272	S273	9.802	Pipe	15.340	0.6	300	153.453
2-1.021	S273	S274	10.779	Pipe	18.943	0.6	300	151.246

Name	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Total Area (ha)	Total Impermeable Area (ha)	Total Contributing Area (ha)	Volumetric Runoff Coefficient	Local Time of Concentration (mins)
2-1.000	172.213	172.251	170.825	0.104	0.104	0.087	0.840	5
2-1.001	170.825	170.848	169.348	0.180	0.180	0.151	0.840	5
2-1.002	169.348	170.497	168.780	0.219	0.219	0.184	0.840	5
2-1.003	168.705	168.637	166.760	0.325	0.325	0.273	0.840	5
2-1.004	166.760	167.244	165.665	0.515	0.515	0.433	0.840	5
2-1.005	165.590	166.834	165.259	0.629	0.629	0.528	0.840	5
2-1.006	165.259	165.337	163.312	0.700	0.700	0.588	0.840	5
Branch: 2-2.000								
2-2.000	168.102	168.532	167.099	0.075	0.075	0.063	0.840	5
2-2.001	167.024	167.245	165.745	0.204	0.204	0.171	0.840	5
2-2.002	165.745	166.398	164.898	0.427	0.427	0.359	0.840	5
2-2.003	164.898	165.792	164.292	0.453	0.453	0.381	0.840	5
2-2.004	164.292	165.337	163.387	0.618	0.618	0.519	0.840	5
2-1.007	163.312	163.348	161.156	1.318	1.318	1.107		0
2-1.008	161.156	162.525	160.297	1.318	1.318	1.107		0
2-1.009	160.297	160.766	159.191	1.368	1.368	1.149	0.840	5
2-1.010	158.966	161.314	158.844	1.415	1.415	1.189	0.840	5
2-1.011	158.769	162.237	158.656	1.581	1.581	1.328	0.840	5
Branch: 2-3.000								
2-3.000	162.541	162.237	159.660	0.039	0.039	0.033	0.840	5
2-1.012	158.656	160.743	157.962	1.716	1.716	1.441	0.840	5
2-1.013	157.962	159.217	156.336	1.846	1.846	1.551	0.840	5
Branch: 2-4.000								
2-4.000	158.236	159.217	156.786	0.136	0.136	0.114	0.840	5
2-1.014	156.336	158.736	154.892	2.071	2.071	1.740	0.840	5
Branch: 2-5.000								
2-5.000	157.695	157.162	155.737	0.054	0.054	0.045	0.840	5
2-5.001	155.737	157.947	155.516	0.107	0.107	0.090	0.840	5
2-5.002	155.441	158.800	155.374	0.150	0.150	0.126	0.840	5
2-5.003	155.374	158.800	155.308	0.150	0.150	0.126		0
2-5.004	155.308	158.736	155.267	0.150	0.150	0.126		0

Project:	Date: 09/05/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Network Design Report Storm Phase: Surface Network 2 Flow Path: 2-1.000-2-1.020	Company Address:		

2-1.015	154.817	158.364	153.889	2.271	2.271	1.908	0.840	5
2-1.016	153.889	154.868	153.218	2.271	2.271	1.908		0
2-1.017	153.218	154.800	153.200	2.271	2.271	1.908		0
Branch: 2-9.000								
2-9.000	169.112	170.152	168.727	0.030	0.030	0.025	0.840	5
2-9.001	168.727	169.597	168.165	0.045	0.045	0.038	0.840	5
2-9.002	168.165	168.159	166.734	0.127	0.127	0.107	0.840	5
2-9.003	166.734	166.058	164.633	0.237	0.237	0.199	0.840	5
2-9.004	164.633	164.730	163.305	0.323	0.323	0.271	0.840	5
2-9.005	163.305	163.961	162.536	0.337	0.337	0.283	0.840	5
2-9.006	162.461	163.748	162.210	0.355	0.355	0.298	0.840	5
2-9.007	162.210	160.275	158.775	0.405	0.405	0.340	0.840	5
2-9.008	158.700	160.107	158.532	0.475	0.475	0.399	0.840	5
Branch: 2-10.000								
2-10.000	165.038	165.283	163.858	0.026	0.026	0.022	0.840	5
2-10.001	163.858	163.456	162.031	0.201	0.201	0.169	0.840	5
2-10.002	162.031	161.405	159.980	0.258	0.258	0.217	0.840	5
2-10.003	159.980	160.107	158.682	0.358	0.358	0.301	0.840	5
2-9.009	158.457	159.981	158.331	0.853	0.853	0.717	0.840	5
2-9.010	158.331	157.952	156.302	0.853	0.853	0.717		0
2-9.011	156.302	157.265	155.534	0.992	0.992	0.833	0.840	5
Branch: 2-7.000								
2-7.000	166.767	168.014	166.589	0.034	0.034	0.029	0.840	5
Branch: 2-6.000								
2-6.000	173.240	172.946	171.521	0.050	0.050	0.042	0.840	5
2-6.001	171.521	172.182	170.757	0.139	0.139	0.117	0.840	5
2-6.002	170.757	171.516	170.091	0.165	0.165	0.139	0.840	5
2-6.003	170.016	171.025	169.525	0.268	0.268	0.225	0.840	5
2-6.004	169.525	170.757	169.257	0.324	0.324	0.272	0.840	5
2-6.005	169.257	169.685	168.185	0.345	0.345	0.290	0.840	5
2-6.006	168.185	168.014	166.514	0.392	0.392	0.329	0.840	5
2-6.007	166.514	167.591	166.090	0.514	0.514	0.432	0.840	5
2-6.008	166.090	166.896	165.396	0.582	0.582	0.489	0.840	5
2-6.009	165.396	165.005	163.442	0.612	0.612	0.514	0.840	5
2-6.010	163.367	163.257	161.682	0.747	0.747	0.627	0.840	5
2-6.011	161.682	161.890	160.315	0.771	0.771	0.648	0.840	5
2-6.012	160.315	160.487	158.413	0.877	0.877	0.737	0.840	5
Branch: 2-8.000								
2-8.000	159.988	160.487	158.563	0.089	0.089	0.075	0.840	5
2-6.013	158.413	160.264	158.393	1.016	1.016	0.853	0.840	5
2-6.014	158.393	158.372	156.797	1.071	1.071	0.900	0.840	5
2-6.015	156.797	157.265	155.609	1.089	1.089	0.915	0.840	5
2-6.016	155.384	156.832	154.740	2.108	2.108	1.771	0.840	5
2-6.017	154.740	156.650	153.622	2.157	2.157	1.812	0.840	5
2-6.018	153.622	154.800	153.200	2.251	2.251	1.891	0.840	5
2-1.018	152.750	154.800	152.732	4.522	4.522	3.798		0
2-1.019	152.732	153.453	152.383	4.522	4.522	3.798		0
2-1.020	150.883	151.246	150.244	4.522	4.522	3.798		0
2-1.021	149.494	149.417	148.925	4.522	4.522	3.798		0

Name	Time Of Travel (mins)	Rainfall Intensity (mm/hr)	Total Base Flow (L/s)	Proportional Velocity (m/s)	Capacity Limited to 75% (L/s)	Full Bore Velocity (m/s)	Capacity (L/s)	Flow (L/s)
2-1.000	5.17	127.258		2.622	113.8717	2.864	113.8717	40.1455
2-1.001	5.34	125.908		3.051	116.7265	2.936	116.7265	68.7458
2-1.002	5.41	125.359		3.115	113.7094	2.860	113.7094	83.2758
2-1.003	5.74	122.834		3.012	204.7124	2.896	204.7124	121.0935
2-1.004	6.04	120.687		2.479	175.2490	2.479	175.2490	188.5330
2-1.005	6.21	119.508		2.489	243.3312	2.203	243.3312	228.0181
2-1.006	6.46	117.785		3.687	383.1928	3.469	383.1928	250.0967

Project:	Date: 09/05/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Network Design Report Storm Phase: Surface Network 2 Flow Path: 2-1.000-2-1.020	Company Address:		

Branch: 2-2.000								
2-2.000	5.19	127.100		2.161	98.5218	2.478	98.5218	28.9152
2-2.001	5.86	121.975		2.026	140.8426	1.993	140.8426	75.4780
2-2.002	6.21	119.520		2.159	152.5866	2.159	152.5866	154.8067
2-2.003	6.34	118.597		2.962	186.7255	2.642	186.7255	162.9635
2-2.004	6.43	118.008		3.928	246.7658	3.491	246.7658	221.2176
2-1.007	6.55	117.249		5.819	580.3344	5.254	580.3344	468.7517
2-1.008	6.58	117.037		5.818	580.2101	5.253	580.2101	468.7517
2-1.009	6.69	116.335		3.819	421.8488	3.819	421.8488	482.7449
2-1.010	7.36	112.280		1.211	342.5126	1.211	342.5126	482.7449
2-1.011	7.94	109.080		1.304	466.7179	1.304	466.7179	523.1159
Branch: 2-3.000								
2-3.000	5.15	127.408		2.449	151.0283	3.798	151.0283	15.0724
2-1.012	8.08	108.357		3.682	1385.4123	3.872	1385.4123	564.0192
2-1.013	8.17	107.879		5.112	2103.0025	5.877	2103.0025	604.0702
Branch: 2-4.000								
2-4.000	5.13	127.570		3.027	125.8078	3.164	125.8078	52.6269
2-1.014	8.25	107.459		5.262	2102.6060	5.876	2102.6060	675.0589
Branch: 2-5.000								
2-5.000	5.20	127.019		2.293	121.1190	3.046	121.1190	20.8056
2-5.001	5.80	122.401		1.152	40.3609	1.015	40.3609	39.7273
2-5.002	6.05	120.572		1.120	72.1922	1.021	72.1922	54.8603
2-5.003	6.31	118.820		1.120	72.1922	1.021	72.1922	54.8603
2-5.004	6.47	117.784		1.120	72.1922	1.021	72.1922	54.8603
2-1.015	8.30	107.217		5.401	2805.8526	6.351	2805.8526	738.5873
2-1.016	8.44	106.519		3.817	1759.4726	3.983	1759.4726	738.5873
2-1.017	8.49	106.257		1.641	725.0784	1.641	725.0784	738.5873
Branch: 2-9.000								
2-9.000	5.13	127.586		1.458	81.1471	2.041	81.1471	11.6103
2-9.001	5.29	126.290		1.697	85.8550	2.159	85.8550	17.2386
2-9.002	5.70	123.169		2.216	86.0602	2.164	86.0602	47.4487
2-9.003	6.03	120.732		2.919	104.1260	2.619	104.1260	86.7945
2-9.004	6.23	119.347		2.674	106.3052	2.674	106.3052	116.9318
2-9.005	6.35	118.574		2.685	106.7689	2.685	106.7689	121.2103
2-9.006	6.41	118.123		2.700	175.7064	2.486	175.7064	127.1983
2-9.007	6.56	117.136		4.437	322.5119	4.563	322.5119	143.9012
2-9.008	6.73	116.075		1.978	195.4452	1.770	195.4452	167.2448
Branch: 2-10.000								
2-10.000	5.22	126.889		1.618	99.6570	2.506	99.6570	10.0073
2-10.001	5.37	125.676		3.390	129.5530	3.258	129.5530	76.6245
2-10.002	5.53	124.426		3.624	132.1609	3.324	132.1609	97.3759
2-10.003	5.69	123.225		2.864	113.8810	2.864	113.8810	133.8139
2-9.009	6.83	115.431		2.297	323.9875	2.037	323.9875	298.6712
2-9.010	7.01	114.340		4.156	682.8915	4.294	682.8915	298.6712
2-9.011	7.11	113.762		3.921	606.0832	3.811	606.0832	342.3170
Branch: 2-7.000								
2-7.000	5.20	126.992		1.123	53.9740	1.357	53.9740	13.0971
Branch: 2-6.000								
2-6.000	5.20	127.022		2.176	116.0489	2.919	116.0489	19.2650
2-6.001	5.31	126.114		2.684	106.8572	2.688	106.8572	53.1737
2-6.002	5.68	123.279		1.949	68.7861	1.730	68.7861	61.7011
2-6.003	6.02	120.833		1.996	128.5473	1.819	128.5473	98.2289
2-6.004	6.29	118.959		1.597	112.8713	1.597	112.8713	116.9127
2-6.005	6.39	118.255		3.491	246.5548	3.488	246.5548	123.7535
2-6.006	6.60	116.901		3.378	228.0107	3.226	228.0107	139.0031
2-6.007	6.68	116.382		3.147	197.1289	2.789	197.1289	181.4547
2-6.008	6.74	115.997		4.005	255.9184	3.621	255.9184	204.7805
2-6.009	6.92	114.892		3.991	252.8411	3.577	252.8411	213.2861
2-6.010	7.05	114.121		4.297	462.1968	4.185	462.1968	258.5868

2-6.011	7.12	113.686		4.730	519.4961	4.704	519.4961	265.8785
2-6.012	7.22	113.098		4.887	522.1589	4.728	522.1589	300.8680
Branch: 2-8.000								
2-8.000	5.18	127.164		2.492	112.4032	2.827	112.4032	34.3302
2-6.013	7.32	112.502		1.024	113.0660	1.024	113.0660	346.7146
2-6.014	7.50	111.507		4.153	408.4457	3.698	408.4457	362.2519
2-6.015	7.60	110.944		4.474	444.7777	4.027	444.7777	366.4812
2-6.016	7.74	110.130		3.793	992.5510	3.510	992.5510	704.1976
2-6.017	7.77	109.957		6.506	1993.9512	7.052	1993.9512	719.4359
2-6.018	7.90	109.301		3.601	919.5131	3.252	919.5131	746.3138
2-1.018	8.65	105.484		0.780	55.1348	0.780	55.1348	1446.8995
2-1.019	8.67	105.358		3.811	269.3635	3.811	269.3635	1446.8995
2-1.020	8.71	105.163		4.034	285.1684	4.034	285.1684	1446.8995
2-1.021	8.76	104.926		3.629	256.5272	3.629	256.5272	1446.8995

Project:	Date: 09/05/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 2 Flow Path: 2-1.000-2-1.020	Company Address:		



Pond

Type : Pond

Dimensions

Exceedence Level (m)	154.800
Depth (m)	2.850
Base Level (m)	151.950
Freeboard (mm)	400
Initial Depth (m)	0.800
Porosity (%)	100
Average Slope (1:x)	6.933
Total Volume (m³)	3265.590

Depth (m)	Area (m²)	Volume (m³)
0.000	257.6353	0.000
0.050	266.7181	13.108
0.150	285.3062	40.704
0.250	304.4578	70.187
0.350	324.1729	101.614
0.400	334.2417	118.073
0.401	404.9917	118.442
0.450	416.1474	138.560
0.550	438.8966	181.307
0.650	462.2293	226.358
0.750	486.1456	273.772
0.800	520.2425	298.927
0.850	562.7825	325.995
0.950	651.0407	386.633
1.050	1565.2495	494.158
1.150	1663.5394	655.573
1.250	1713.9998	824.444
1.350	1765.1031	998.393
1.450	1816.8654	1177.485
1.550	1869.2977	1361.787
1.650	1922.3599	1551.363
1.750	1976.0792	1746.279
1.850	2030.4561	1946.600
1.950	2085.4891	2152.391
2.050	2141.1409	2363.716
2.150	2197.4000	2580.637
2.250	2254.2865	2803.216
2.350	2311.7820	3031.513
2.450	2369.8890	3265.590
2.550	2428.6116	3505.509
2.650	2487.9485	3751.332
2.750	2547.8934	4003.118
2.850	2608.2871	4260.921

Project:	Date: 09/05/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 2 Flow Path: 2-1.000-2-1.020	Company Address:		

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	2-6.018
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	2-1.017
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	2-1.018
Outlet Type	Orifice

Diameter (m)	0.149
Coefficient of Discharge	0.600
Invert Level (m)	152.750

Advanced

Perimeter	Circular
Length (m)	72.506
Friction Scheme	Manning's n
n	0.03

Project:	Date: 09/05/2023		
	Designed by: bletchl	Checked by:	Approved By:
Report Details: Type: Outfall Details Storm Phase: Surface Network 2	Company Address:		

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
S274	Free Discharge		

Project:	Date: 09/05/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 2	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S201	1in2 year: 2 years: +0 %: 15 mins: Winter	173.638	172.213	172.271	0.058	17.0	0.083	0.000	16.9	7.444	OK
S202	1in2 year: 2 years: +0 %: 15 mins: Winter	172.251	170.825	170.901	0.076	29.3	0.109	0.000	28.9	12.880	OK
S203	1in2 year: 2 years: +0 %: 15 mins: Winter	170.848	169.348	169.441	0.093	35.3	0.133	0.000	34.8	15.667	OK
S204	1in2 year: 2 years: +0 %: 15 mins: Winter	170.497	168.705	168.807	0.102	52.2	0.146	0.000	51.5	23.257	OK
S205	1in2 year: 2 years: +0 %: 15 mins: Winter	168.637	166.760	166.909	0.149	82.6	0.214	0.000	79.8	36.818	OK
S206	1in2 year: 2 years: +0 %: 15 mins: Winter	167.244	165.590	165.771	0.181	98.4	0.260	0.000	97.6	44.967	OK
S207	1in2 year: 2 years: +0 %: 15 mins: Winter	166.834	165.259	165.396	0.137	109.2	0.196	0.000	107.6	50.019	OK
S208	1in2 year: 2 years: +0 %: 15 mins: Winter	169.527	168.102	168.156	0.054	12.3	0.077	0.000	12.0	5.367	OK
S209	1in2 year: 2 years: +0 %: 15 mins: Winter	168.532	167.024	167.122	0.098	33.2	0.140	0.000	32.3	14.596	OK
S210	1in2 year: 2 years: +0 %: 15 mins: Winter	167.245	165.745	165.891	0.146	68.8	0.209	0.000	66.5	30.538	OK
S211	1in2 year: 2 years: +0 %: 15 mins: Winter	166.398	164.898	165.033	0.135	70.8	0.194	0.000	69.5	32.362	OK
S212	1in2 year: 2 years: +0 %: 15 mins: Winter	165.792	164.292	164.434	0.142	96.5	0.203	0.000	95.3	44.158	OK

S213	1in2 year: 2 years: +0 %: 15 mins: Winter	165.337	163.312	163.473	0.161	202.9	0.231	0.000	200.7	94.157	OK
S214	1in2 year: 2 years: +0 %: 15 mins: Winter	163.348	161.156	161.334	0.178	200.7	0.254	0.000	199.2	94.133	OK
S215	1in2 year: 2 years: +0 %: 15 mins: Winter	162.525	160.297	160.502	0.205	207.4	0.293	0.000	204.7	97.680	OK
S216	1in2 year: 2 years: +0 %: 15 mins: Winter	160.766	158.966	159.313	0.347	212.4	0.882	0.000	207.9	100.872	OK
S217	1in2 year: 2 years: +0 %: 15 mins: Winter	161.314	158.769	159.085	0.316	225.7	0.803	0.000	231.9	112.608	OK
S218	1in2 year: 2 years: +0 %: 15 mins: Winter	163.966	162.541	162.572	0.031	6.4	0.035	0.000	6.3	2.791	OK
S219	1in2 year: 2 years: +0 %: 15 mins: Winter	162.237	158.656	158.867	0.211	246.2	0.537	0.000	251.6	122.112	OK
S220	1in2 year: 2 years: +0 %: 15 mins: Winter	160.743	157.962	158.131	0.169	264.9	0.431	0.000	267.9	131.325	OK
S221	1in2 year: 2 years: +0 %: 15 mins: Winter	159.661	158.236	158.301	0.065	22.3	0.094	0.000	22.0	9.730	OK
S223	1in2 year: 2 years: +0 %: 15 mins: Winter	159.217	156.336	156.519	0.183	291.8	0.467	0.000	296.0	147.312	OK
S224	1in2 year: 2 years: +0 %: 15 mins: Winter	159.307	157.695	157.736	0.041	8.8	0.058	0.000	8.7	3.872	OK
S226	1in2 year: 2 years: +0 %: 15 mins: Winter	157.162	155.737	155.840	0.103	17.4	0.147	0.000	16.1	7.638	OK
S227	1in2 year: 2 years: +0 %: 15 mins: Winter	157.947	155.441	155.566	0.125	23.2	0.179	0.000	22.7	10.708	OK
S228	1in2 year: 2 years: +0 %: 15 mins: Winter	158.800	155.374	155.497	0.123	22.7	0.176	0.000	21.9	10.689	OK
S229	1in2 year: 2 years: +0 %: 15 mins: Winter	158.800	155.308	155.428	0.120	21.9	0.172	0.000	21.4	10.657	OK

S230	1in2 year: 2 years: +0 %: 15 mins: Winter	158.736	154.817	155.005	0.188	322.5	0.650	0.000	323.9	161.481	OK
S231	1in2 year: 2 years: +0 %: 15 mins: Winter	158.364	153.889	154.126	0.237	323.9	0.822	0.000	327.7	161.362	OK
S232	1in2 year: 2 years: +0 %: 15 mins: Winter	154.868	153.218	153.622	0.404	327.7	1.399	0.000	330.6	161.050	OK
S233	1in2 year: 2 years: +0 %: 15 mins: Winter	174.665	173.240	173.280	0.040	8.2	0.057	0.000	8.1	3.578	OK
S234	1in2 year: 2 years: +0 %: 15 mins: Winter	172.946	171.521	171.591	0.070	22.6	0.100	0.000	22.3	9.946	OK
S235	1in2 year: 2 years: +0 %: 15 mins: Winter	172.182	170.757	170.856	0.099	26.6	0.141	0.000	25.7	11.792	OK
S236	1in2 year: 2 years: +0 %: 15 mins: Winter	171.516	170.016	170.136	0.120	42.6	0.172	0.000	41.9	19.158	OK
S237	1in2 year: 2 years: +0 %: 15 mins: Winter	171.025	169.525	169.676	0.151	51.1	0.215	0.000	49.8	23.142	OK
S238	1in2 year: 2 years: +0 %: 15 mins: Winter	170.757	169.257	169.355	0.098	53.2	0.140	0.000	52.6	24.626	OK
S239	1in2 year: 2 years: +0 %: 15 mins: Winter	169.685	168.185	168.289	0.104	60.3	0.149	0.000	59.4	27.970	OK
S240	1in2 year: 2 years: +0 %: 15 mins: Winter	168.192	166.767	166.815	0.048	5.6	0.069	0.000	5.5	2.413	OK
S241	1in2 year: 2 years: +0 %: 15 mins: Winter	168.014	166.514	166.661	0.147	79.3	0.210	0.000	77.7	36.679	OK
S242	1in2 year: 2 years: +0 %: 15 mins: Winter	167.591	166.090	166.225	0.135	88.9	0.193	0.000	88.1	41.533	OK
S243	1in2 year: 2 years: +0 %: 15 mins: Winter	166.896	165.396	165.527	0.131	93.1	0.187	0.000	91.1	43.648	OK
S244	1in2 year: 2 years: +0 %: 15 mins: Winter	165.005	163.367	163.499	0.132	113.2	0.189	0.000	112.3	53.295	OK

S245	1in2 year: 2 years: +0 %: 15 mins: Winter	163.257	161.682	161.810	0.128	116.2	0.183	0.000	114.8	54.983	OK
S246	1in2 year: 2 years: +0 %: 15 mins: Winter	161.890	160.315	160.443	0.128	132.2	0.183	0.000	130.9	62.549	OK
S247	1in2 year: 2 years: +0 %: 15 mins: Summer	161.924	159.988	160.042	0.054	14.6	0.077	0.000	14.4	5.647	OK
S248	1in2 year: 2 years: +0 %: 15 mins: Winter	160.487	158.413	158.720	0.307	153.6	0.439	0.000	165.4	72.309	OK
S249	1in2 year: 2 years: +0 %: 15 mins: Winter	160.264	158.393	158.563	0.170	174.4	0.244	0.000	155.5	76.383	OK
S250	1in2 year: 2 years: +0 %: 15 mins: Winter	158.372	156.797	156.965	0.168	158.4	0.241	0.000	157.5	77.608	OK
S251	1in2 year: 2 years: +0 %: 15 mins: Winter	170.537	169.112	169.149	0.037	4.9	0.053	0.000	4.9	2.145	OK
S252	1in2 year: 2 years: +0 %: 15 mins: Winter	170.152	168.727	168.771	0.044	7.3	0.063	0.000	7.2	3.216	OK
S253	1in2 year: 2 years: +0 %: 15 mins: Winter	169.597	168.165	168.239	0.074	20.6	0.106	0.000	20.2	9.083	OK
S254	1in2 year: 2 years: +0 %: 15 mins: Winter	168.159	166.734	166.827	0.093	38.2	0.133	0.000	37.3	16.943	OK
S255	1in2 year: 2 years: +0 %: 15 mins: Winter	166.058	164.633	164.746	0.113	51.4	0.161	0.000	50.4	23.084	OK
S256	1in2 year: 2 years: +0 %: 15 mins: Winter	164.730	163.305	163.424	0.119	52.7	0.171	0.000	51.7	24.067	OK
S257	1in2 year: 2 years: +0 %: 15 mins: Winter	163.961	162.461	162.590	0.129	54.6	0.185	0.000	54.3	25.346	OK
S259	1in2 year: 2 years: +0 %: 15 mins: Winter	163.748	162.210	162.300	0.090	62.5	0.128	0.000	62.0	28.897	OK
S260	1in2 year: 2 years: +0 %: 15 mins: Winter	160.275	158.700	158.873	0.173	73.5	0.247	0.000	71.4	33.888	OK

S261	1in2 year: 2 years: +0 %: 15 mins: Winter	166.463	165.038	165.069	0.031	4.3	0.035	0.000	4.2	1.857	OK
S262	1in2 year: 2 years: +0 %: 15 mins: Winter	165.283	163.858	163.935	0.077	32.8	0.088	0.000	32.4	14.381	OK
S263	1in2 year: 2 years: +0 %: 15 mins: Winter	163.456	162.031	162.118	0.086	41.8	0.098	0.000	41.3	18.458	OK
S264	1in2 year: 2 years: +0 %: 15 mins: Winter	161.405	159.980	160.099	0.119	57.7	0.134	0.000	56.7	25.606	OK
S265	1in2 year: 2 years: +0 %: 15 mins: Winter	160.107	158.457	158.672	0.215	131.3	0.379	0.000	130.5	60.909	OK
S266	1in2 year: 2 years: +0 %: 15 mins: Winter	159.981	158.331	158.463	0.132	130.5	0.234	0.000	129.0	60.861	OK
S267	1in2 year: 2 years: +0 %: 15 mins: Winter	157.952	156.302	156.468	0.166	151.7	0.293	0.000	148.3	70.780	OK
S268	1in2 year: 2 years: +0 %: 15 mins: Winter	157.265	155.384	155.641	0.257	310.2	0.654	0.000	306.9	150.257	OK
S269	1in2 year: 2 years: +0 %: 15 mins: Winter	156.832	154.740	154.919	0.179	314.9	0.455	0.000	311.3	153.698	OK
S270	1in2 year: 2 years: +0 %: 15 mins: Winter	156.650	153.622	153.900	0.278	326.7	0.708	0.000	318.3	160.321	OK
S271	1in2 year: 2 years: +0 %: 480 mins: Winter	154.800	152.732	152.809	0.077	33.0	0.087	0.000	30.7	1164.899	OK
S272	1in2 year: 2 years: +0 %: 480 mins: Winter	153.453	150.883	150.954	0.071	30.7	0.101	0.000	30.4	1164.752	OK
S273	1in2 year: 2 years: +0 %: 480 mins: Winter	151.246	149.494	149.569	0.075	30.4	0.084	0.000	30.4	1164.682	OK
S274	1in2 year: 2 years: +0 %: 480 mins: Winter	149.417	148.925	148.995	0.070	30.4	0.000	0.000	30.4	1164.682	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 2	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
2-1.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S201	S202	173.6	172.271	0.067	7.444	1.7	0.15	16.9	OK
2-1.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S202	S203	172.3	170.901	0.084	12.880	2.1	0.25	28.9	OK
2-1.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S203	S204	170.8	169.441	0.089	15.667	2.4	0.31	34.8	OK
2-1.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S204	S205	170.5	168.807	0.126	23.257	1.8	0.25	51.5	OK
2-1.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S205	S206	168.6	166.909	0.145	36.818	2.3	0.46	79.8	OK
2-1.005	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S206	S207	167.2	165.771	0.159	44.967	2.2	0.4	97.6	OK
2-1.006	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S207	S213	166.8	165.396	0.149	50.019	2.6	0.28	107.6	OK
2-2.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S208	S209	169.5	168.156	0.054	5.367	1.7	0.12	12.0	OK
2-2.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S209	S210	168.5	167.122	0.122	14.596	1.2	0.23	32.3	OK
2-2.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S210	S211	167.2	165.891	0.141	30.538	2.0	0.44	66.5	OK
2-2.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S211	S212	166.4	165.033	0.139	32.362	2.2	0.37	69.5	OK
2-2.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S212	S213	165.8	164.434	0.135	44.158	3.1	0.39	95.3	OK
2-1.007	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S213	S214	165.3	163.473	0.170	94.157	4.1	0.35	200.7	OK
2-1.008	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S214	S215	163.3	161.334	0.191	94.133	3.5	0.34	199.2	OK

2-1.009	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S215	S216	162.5	160.502	0.194	97.680	3.5	0.49	204.7	OK
2-1.010	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S216	S217	160.8	159.313	0.320	100.872	1.4	0.61	207.9	OK
2-1.011	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S217	S219	161.3	159.085	0.263	112.608	1.8	0.5	231.9	OK
2-3.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S218	S219	164.0	162.572	0.031	2.791	1.9	0.04	6.3	OK
2-1.012	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S219	S220	162.2	158.867	0.190	122.112	3.0	0.18	251.6	OK
2-1.013	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S220	S223	160.7	158.131	0.176	131.325	3.6	0.13	267.9	OK
2-4.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S221	S223	159.7	158.301	0.064	9.730	2.3	0.17	22.0	OK
2-1.014	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S223	S230	159.2	156.519	0.177	147.312	3.9	0.14	296.0	OK
2-5.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S224	S226	159.3	157.736	0.072	3.872	0.8	0.07	8.7	OK
2-5.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S226	S227	157.2	155.840	0.101	7.638	0.9	0.4	16.1	OK
2-5.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S227	S228	157.9	155.566	0.124	10.708	0.8	0.31	22.7	OK
2-5.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S228	S229	158.8	155.497	0.122	10.689	0.8	0.3	21.9	OK
2-5.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S229	S230	158.8	155.428	0.115	10.657	0.9	0.3	21.4	OK
2-1.015	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S230	S231	158.7	155.005	0.212	161.481	3.1	0.12	323.9	OK
2-1.016	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S231	S232	158.4	154.126	0.321	161.362	1.8	0.19	327.7	OK
2-1.017	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S232	Pond	154.9	153.622	0.377	161.050	1.5	0.46	330.6	OK
2-6.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S233	S234	174.7	173.280	0.055	3.578	1.1	0.07	8.1	OK

2-6.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S234	S235	172.9	171.591	0.084	9.946	1.6	0.21	22.3	OK
2-6.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S235	S236	172.2	170.856	0.097	11.792	1.6	0.37	25.7	OK
2-6.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S236	S237	171.5	170.136	0.135	19.158	1.4	0.33	41.9	OK
2-6.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S237	S238	171.0	169.676	0.124	23.142	1.8	0.44	49.8	OK
2-6.005	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S238	S239	170.8	169.355	0.101	24.626	2.5	0.21	52.6	OK
2-6.006	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S239	S241	169.7	168.289	0.126	27.970	2.1	0.26	59.4	OK
2-7.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S240	S241	168.2	166.815	0.060	2.413	0.8	0.1	5.5	OK
2-6.007	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S241	S242	168.0	166.661	0.141	36.679	2.4	0.39	77.7	OK
2-6.008	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S242	S243	167.6	166.225	0.133	41.533	2.9	0.34	88.1	OK
2-6.009	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S243	S244	166.9	165.527	0.127	43.648	3.2	0.36	91.1	OK
2-6.010	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S244	S245	165.0	163.499	0.130	53.295	3.3	0.24	112.3	OK
2-6.011	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S245	S246	163.3	161.810	0.128	54.983	3.5	0.22	114.8	OK
2-6.012	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S246	S248	161.9	160.443	0.217	62.549	2.0	0.25	130.9	OK
2-8.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S247	S248	161.9	160.042	0.105	6.333	1.5	0.13	14.5	OK
2-6.013	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S248	S249	160.5	158.720	0.238	72.309	2.2	1.46	165.4	OK
2-6.014	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S249	S250	160.3	158.563	0.169	76.383	3.2	0.38	155.5	OK
2-6.015	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S250	S268	158.4	156.965	0.161	77.608	3.5	0.35	157.5	OK

2-9.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S251	S252	170.5	169.149	0.041	2.145	1.0	0.06	4.9	OK
2-9.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S252	S253	170.2	168.771	0.059	3.216	0.9	0.08	7.2	OK
2-9.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S253	S254	169.6	168.239	0.083	9.083	1.5	0.23	20.2	OK
2-9.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S254	S255	168.2	166.827	0.103	16.943	2.1	0.36	37.3	OK
2-9.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S255	S256	166.1	164.746	0.116	23.084	2.4	0.47	50.4	OK
2-9.005	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S256	S257	164.7	163.424	0.115	24.067	2.5	0.48	51.7	OK
2-9.006	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S257	S259	164.0	162.590	0.110	25.346	2.3	0.31	54.3	OK
2-9.007	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S259	S260	163.7	162.300	0.094	28.897	3.3	0.19	62.0	OK
2-9.008	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S260	S265	160.3	158.873	0.164	33.888	1.5	0.37	71.4	OK
2-10.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S261	S262	166.5	165.069	0.054	1.857	0.6	0.04	4.2	OK
2-10.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S262	S263	165.3	163.935	0.082	14.381	2.5	0.25	32.4	OK
2-10.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S263	S264	163.5	162.118	0.103	18.458	2.3	0.31	41.3	OK
2-10.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S264	S265	161.4	160.099	0.115	25.606	2.8	0.5	56.7	OK
2-9.009	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S265	S266	160.1	158.672	0.173	60.909	2.3	0.4	130.5	OK
2-9.010	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S266	S267	160.0	158.463	0.149	60.861	2.8	0.19	129.0	OK
2-9.011	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S267	S268	158.0	156.468	0.159	70.780	3.0	0.24	148.3	OK
2-6.016	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S268	S269	157.3	155.641	0.218	150.257	3.3	0.31	306.9	OK

2-6.017	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S269	S270	156.8	154.919	0.228	153.698	3.1	0.16	311.3	OK
2-6.018	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S270	Pond	156.7	153.900	0.261	160.321	2.7	0.35	318.3	OK
2-1.018	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	Pond	S271	154.8	153.323	0.110	1159.677	1.4	0.6	33.0	Surcharged
2-1.019	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S271	S272	154.8	152.809	0.073	1164.899	2.4	0.11	30.7	OK
2-1.020	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S272	S273	153.5	150.954	0.068	1164.752	2.5	0.11	30.4	OK
2-1.021	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S273	S274	151.2	149.569	0.072	1164.682	2.3	0.12	30.4	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 2	Company Address:		



Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	1in2 year: 2 years: +0 %: 480 mins: Winter	153.323	153.323	1.373	1.373	108.8	1039.604	0.000	0.000	30.5	1165.281	68	OK

STORM SEWER DESIGN

SW Manhole Schedules

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Surface Network 2	Company Address:		

Name	Cover Level (m) Invert Level (m)		Connection Details				Type
Coordinates (m)	Depth (m)	Manhole Size (m)	Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
S226	157.162 155.737	Diameter / Length: 1.350	{1} 2-5.000	Pipe	155.737	Diam/Width:225	Manhole - Access Required
E:389219.361 N:410147.182	1.425						
			{a} 2-5.001	Pipe	155.737	Diam/Width:225	Not Applicable
S216	160.766 158.966	Diameter / Length: 1.800	{1} 2-1.009	Pipe	159.191	Diam/Width:375	Manhole - Access Required
E:389211.071 N:410207.887	1.800						
			{a} 2-1.010	Pipe	158.966	Diam/Width:600	Not Applicable
S217	161.314 158.769	Diameter / Length: 1.800	{1} 2-1.010	Pipe	158.844	Diam/Width:600	Manhole - Access Required
E:389259.262 N:410215.079	2.545						
			{a} 2-1.011	Pipe	158.769	Diam/Width:675	Not Applicable
S219	162.237 158.656	Diameter / Length: 1.800	{1} 2-1.011{2} 2-3.000	PipePipe	158.656 159.66	Diam/Width:675Diam/Width:225	Manhole - Access Required
E:389302.090 N:410229.733	3.581						
			{a} 2-1.012	Pipe	158.656	Diam/Width:675	Not Applicable
S220	160.743 157.962	Diameter / Length: 1.800	{1} 2-1.012	Pipe	157.962	Diam/Width:675	Manhole - Access Required
E:389314.457 N:410200.315	2.781						
			{a} 2-1.013	Pipe	157.962	Diam/Width:675	Not Applicable
S223	159.217 156.336	Diameter / Length: 1.800	{1} 2-1.013{2} 2-4.000	PipePipe	156.336 156.786	Diam/Width:675Diam/Width:225	Manhole - Access Required
E:389319.471 N:410168.181	2.881						
			{a} 2-1.014	Pipe	156.336	Diam/Width:675	Not Applicable
S230	158.736 154.817	Diameter / Length: 2.100	{1} 2-1.014{2} 2-5.004	PipePipe	154.892 155.267	Diam/Width:675Diam/Width:300	Manhole - Access Required
E:389290.884 N:410163.983	3.919						
			{a} 2-1.015	Pipe	154.817	Diam/Width:750	Not Applicable
S232	154.868 153.218	Diameter / Length: 2.100	{1} 2-1.016	Pipe	153.218	Diam/Width:750	Manhole - Access Required
E:389277.363 N:410117.011	1.650						
			{a} 2-1.017	Pipe	153.218	Diam/Width:750	Not Applicable
S213	165.337 163.312	Diameter / Length: 1.350	{1} 2-1.006{2} 2-2.004	PipePipe	163.312 163.387	Diam/Width:375Diam/Width:300	Manhole - Access Required
E:389199.272 N:410267.146	2.025						
			{a} 2-1.007	Pipe	163.312	Diam/Width:375	Not Applicable
S211	166.398 164.898	Diameter / Length: 1.350	{1} 2-2.002	Pipe	164.898	Diam/Width:300	Manhole - Access Required
E:389239.061 N:410272.135	1.500						
			{a} 2-2.003	Pipe	164.898	Diam/Width:300	Not Applicable
S210	167.245 165.745	Diameter / Length: 1.350	{1} 2-2.001	Pipe	165.745	Diam/Width:300	Manhole - Access Required
E:389282.068 N:410285.815	1.500						
			{a} 2-2.002	Pipe	165.745	Diam/Width:300	Not Applicable
S209	168.532 167.024	Diameter / Length: 1.350	{1} 2-2.000	Pipe	167.099	Diam/Width:225	Manhole - Access Required

E:389353.079 N:410322.445	1.508						
			{a} 2-2.001	Pipe	167.024	Diam/Width:300	Not Applicable
S244	165.005 163.367	Diameter / Length: 1.350	{1} 2-6.009	Pipe	163.442	Diam/Width:300	Manhole - Access Required
E:389352.249 N:410253.334	1.638						
			{a} 2-6.010	Pipe	163.367	Diam/Width:375	Not Applicable
S243	166.896 165.396	Diameter / Length: 1.350	{1} 2-6.008	Pipe	165.396	Diam/Width:300	Manhole - Access Required
E:389385.719 N:410271.534	1.500						
			{a} 2-6.009	Pipe	165.396	Diam/Width:300	Not Applicable
S242	167.591 166.090	Diameter / Length: 1.350	{1} 2-6.007	Pipe	166.090	Diam/Width:300	Manhole - Access Required
E:389394.656 N:410281.260	1.500						
			{a} 2-6.008	Pipe	166.090	Diam/Width:300	Not Applicable
S268	157.265 155.384	Diameter / Length: 1.800	{1} 2-9.011{2} 2-6.015	PipePipe	155.534 155.609	Diam/Width:450Diam/Width:375	Manhole - Access Required
E:389389.610 N:410115.740	1.881						
			{a} 2-6.016	Pipe	155.384	Diam/Width:600	Not Applicable
S249	160.264 158.393	Diameter / Length: 1.350	{1} 2-6.013	Pipe	158.393	Diam/Width:375	Manhole - Access Required
E:389376.577 N:410177.190	1.871						
			{a} 2-6.014	Pipe	158.393	Diam/Width:375	Not Applicable
S245	163.257 161.682	Diameter / Length: 1.350	{1} 2-6.010	Pipe	161.682	Diam/Width:375	Manhole - Access Required
E:389366.868 N:410225.045	1.575						
			{a} 2-6.011	Pipe	161.682	Diam/Width:375	Not Applicable
S247	161.924 159.988	Diameter / Length: 1.350					Manhole - Access Required
E:389411.534 N:410189.557	1.936						
			{a} 2-8.000	Pipe	159.988	Diam/Width:225	Not Applicable
S221	159.661 158.236	Diameter / Length: 1.350					Manhole - Access Required
E:389344.295 N:410171.470	1.425						
			{a} 2-4.000	Pipe	158.236	Diam/Width:225	Not Applicable
S241	168.014 166.514	Diameter / Length: 1.350	{1} 2-6.006{2} 2-7.000	PipePipe	166.514 166.589	Diam/Width:300Diam/Width:225	Manhole - Access Required
E:389384.616 N:410290.392	1.500						
			{a} 2-6.007	Pipe	166.514	Diam/Width:300	Not Applicable
S239	169.685 168.185	Diameter / Length: 1.350	{1} 2-6.005	Pipe	168.185	Diam/Width:300	Manhole - Access Required
E:389409.661 N:410321.621	1.500						
			{a} 2-6.006	Pipe	168.185	Diam/Width:300	Not Applicable
S240	168.192 166.767	Diameter / Length: 1.350					Manhole - Access Required
E:389371.458 N:410300.387	1.425						
			{a} 2-7.000	Pipe	166.767	Diam/Width:225	Not Applicable
S233	174.665 173.240	Diameter / Length: 1.350					Manhole - Access Required
E:389336.493 N:410461.911	1.425						
			{a} 2-6.000	Pipe	173.240	Diam/Width:225	Not Applicable
S234	172.946 171.521	Diameter / Length: 1.350	{1} 2-6.000	Pipe	171.521	Diam/Width:225	Manhole - Access Required
E:389364.633	1.425						

N:410441.326							
			{a} 2-6.001	Pipe	171.521	Diam/Width:225	Not Applicable
S235	172.182 170.757	Diameter / Length: 1.350	{1} 2-6.001	Pipe	170.757	Diam/Width:225	Manhole - Access Required
E:389374.529 N:410425.977	1.425						
			{a} 2-6.002	Pipe	170.757	Diam/Width:225	Not Applicable
S236	171.516 170.016	Diameter / Length: 1.350	{1} 2-6.002	Pipe	170.091	Diam/Width:225	Manhole - Access Required
E:389388.488 N:410390.401	1.500						
			{a} 2-6.003	Pipe	170.016	Diam/Width:300	Not Applicable
S237	171.025 169.525	Diameter / Length: 1.350	{1} 2-6.003	Pipe	169.525	Diam/Width:300	Manhole - Access Required
E:389405.989 N:410358.051	1.500						
			{a} 2-6.004	Pipe	169.525	Diam/Width:300	Not Applicable
S238	170.757 169.257	Diameter / Length: 1.350	{1} 2-6.004	Pipe	169.257	Diam/Width:300	Manhole - Access Required
E:389423.410 N:410338.765	1.500						
			{a} 2-6.005	Pipe	169.257	Diam/Width:300	Not Applicable
S253	169.597 168.165	Diameter / Length: 1.350	{1} 2-9.001	Pipe	168.165	Diam/Width:225	Manhole - Access Required
E:389463.682 N:410303.398	1.432						
			{a} 2-9.002	Pipe	168.165	Diam/Width:225	Not Applicable
S254	168.159 166.734	Diameter / Length: 1.350	{1} 2-9.002	Pipe	166.734	Diam/Width:225	Manhole - Access Required
E:389487.345 N:410256.406	1.425						
			{a} 2-9.003	Pipe	166.734	Diam/Width:225	Not Applicable
S255	166.058 164.633	Diameter / Length: 1.350	{1} 2-9.003	Pipe	164.633	Diam/Width:225	Manhole - Access Required
E:389511.441 N:410209.338	1.425						
			{a} 2-9.004	Pipe	164.633	Diam/Width:225	Not Applicable
S256	164.730 163.305	Diameter / Length: 1.350	{1} 2-9.004	Pipe	163.305	Diam/Width:225	Manhole - Access Required
E:389525.855 N:410180.687	1.425						
			{a} 2-9.005	Pipe	163.305	Diam/Width:225	Not Applicable
S257	163.961 162.461	Diameter / Length: 1.350	{1} 2-9.005	Pipe	162.536	Diam/Width:225	Manhole - Access Required
E:389530.382 N:410162.840	1.500						
			{a} 2-9.006	Pipe	162.461	Diam/Width:300	Not Applicable
S259	163.748 162.210	Diameter / Length: 1.350	{1} 2-9.006	Pipe	162.210	Diam/Width:300	Manhole - Access Required
E:389520.515 N:410160.674	1.538						
			{a} 2-9.007	Pipe	162.210	Diam/Width:300	Not Applicable
S265	160.107 158.457	Diameter / Length: 1.500	{1} 2-10.003{2} 2-9.008	PipePipe	158.682 158.532	Diam/Width:225Diam/Width:375	Manhole - Access Required
E:389463.401 N:410146.551	1.650						
			{a} 2-9.009	Pipe	158.457	Diam/Width:450	Not Applicable
S267	157.952 156.302	Diameter / Length: 1.500	{1} 2-9.010	Pipe	156.302	Diam/Width:450	Manhole - Access Required
E:389410.736 N:410121.841	1.650						
			{a} 2-9.011	Pipe	156.302	Diam/Width:450	Not Applicable
S269	156.832 154.740	Diameter / Length: 1.800	{1} 2-6.016	Pipe	154.740	Diam/Width:600	Manhole - Access Required
E:389359.176 N:410109.283	2.092						

			{a} 2-6.017	Pipe	154.740	Diam/Width:600	Not Applicable
S270	156.650 153.622	Diameter / Length: 1.800	{1} 2-6.017	Pipe	153.622	Diam/Width:600	Manhole - Access Required
E:389345.750 N:410109.232	3.028						
			{a} 2-6.018	Pipe	153.622	Diam/Width:600	Not Applicable
S264	161.405 159.980	Diameter / Length: 1.200	{1} 2-10.002	Pipe	159.980	Diam/Width:225	Manhole - Access not Required
E:389457.754 N:410173.295	1.425						
			{a} 2-10.003	Pipe	159.980	Diam/Width:225	Not Applicable
S263	163.456 162.031	Diameter / Length: 1.200	{1} 2-10.001	Pipe	162.031	Diam/Width:225	Manhole - Access not Required
E:389445.270 N:410202.881	1.425						
			{a} 2-10.002	Pipe	162.031	Diam/Width:225	Not Applicable
S262	165.283 163.858	Diameter / Length: 1.200	{1} 2-10.000	Pipe	163.858	Diam/Width:225	Manhole - Access not Required
E:389431.703 N:410229.365	1.425						
			{a} 2-10.001	Pipe	163.858	Diam/Width:225	Not Applicable
S261	166.463 165.038	Diameter / Length: 1.200					Manhole - Access not Required
E:389416.549 N:410258.013	1.425						
			{a} 2-10.000	Pipe	165.038	Diam/Width:225	Not Applicable
S207	166.834 165.259	Diameter / Length: 1.350	{1} 2-1.005	Pipe	165.259	Diam/Width:375	Manhole - Access Required
E:389195.932 N:410320.504	1.575						
			{a} 2-1.006	Pipe	165.259	Diam/Width:375	Not Applicable
S206	167.244 165.590	Diameter / Length: 1.350	{1} 2-1.004	Pipe	165.665	Diam/Width:300	Manhole - Access Required
E:389217.889 N:410325.154	1.654						
			{a} 2-1.005	Pipe	165.590	Diam/Width:375	Not Applicable
S204	170.497 168.705	Diameter / Length: 1.350	{1} 2-1.002	Pipe	168.780	Diam/Width:225	Manhole - Access Required
E:389312.614 N:410363.109	1.792						
			{a} 2-1.003	Pipe	168.705	Diam/Width:300	Not Applicable
S203	170.848 169.348	Diameter / Length: 1.350	{1} 2-1.001	Pipe	169.348	Diam/Width:225	Manhole - Access Required
E:389322.670 N:410369.644	1.500						
			{a} 2-1.002	Pipe	169.348	Diam/Width:225	Not Applicable
S202	172.251 170.825	Diameter / Length: 1.350	{1} 2-1.000	Pipe	170.825	Diam/Width:225	Manhole - Access Required
E:389308.354 N:410395.569	1.426						
			{a} 2-1.001	Pipe	170.825	Diam/Width:225	Not Applicable
S208	169.527 168.102	Diameter / Length: 1.350					Manhole - Access Required
E:389340.597 N:410347.711	1.425						
			{a} 2-2.000	Pipe	168.102	Diam/Width:225	Not Applicable
S201	173.638 172.213	Diameter / Length: 1.350					Manhole - Access Required
E:389300.603 N:410423.757	1.425						
			{a} 2-1.000	Pipe	172.213	Diam/Width:225	Not Applicable
S246	161.890 160.315	Diameter / Length: 1.350	{1} 2-6.011	Pipe	160.315	Diam/Width:375	Manhole - Access Required
E:389374.940 N:410206.240	1.575						
			{a} 2-6.012	Pipe	160.315	Diam/Width:375	Not Applicable
S250	158.372 156.797	Diameter / Length: 1.350	{1} 2-6.014	Pipe	156.797	Diam/Width:375	Manhole - Access Required

E:389385.166 N:410139.567	1.575						
			{a} 2-6.015	Pipe	156.797	Diam/Width:375	Not Applicable
S248	160.487 158.413	Diameter / Length: 1.350	{1} 2-8.000{2} 2-6.012	PipePipe	158.563 158.413	Diam/Width:225Diam/Width:375	Manhole - Access Required
E:389382.562 N:410179.107	2.074						
			{a} 2-6.013	Pipe	158.413	Diam/Width:375	Not Applicable
S266	159.981 158.331	Diameter / Length: 1.500	{1} 2-9.009	Pipe	158.331	Diam/Width:450	Manhole - Access Required
E:389451.377 N:410142.952	1.650						
			{a} 2-9.010	Pipe	158.331	Diam/Width:450	Not Applicable
S205	168.637 166.760	Diameter / Length: 1.350	{1} 2-1.003	Pipe	166.760	Diam/Width:300	Manhole - Access Required
E:389259.172 N:410341.218	1.877						
			{a} 2-1.004	Pipe	166.760	Diam/Width:300	Not Applicable
S224	159.307 157.695	Diameter / Length: 1.350					Manhole - Access Required
E:389214.426 N:410183.318	1.612						
			{a} 2-5.000	Pipe	157.695	Diam/Width:225	Not Applicable
S215	162.525 160.297	Diameter / Length: 1.350	{1} 2-1.008	Pipe	160.297	Diam/Width:375	Manhole - Access Required
E:389206.890 N:410232.612	2.228						
			{a} 2-1.009	Pipe	160.297	Diam/Width:375	Not Applicable
S260	160.275 158.700	Diameter / Length: 1.350	{1} 2-9.007	Pipe	158.775	Diam/Width:300	Manhole - Access Required
E:389480.535 N:410150.607	1.575						
			{a} 2-9.008	Pipe	158.700	Diam/Width:375	Not Applicable
S214	163.348 161.156	Diameter / Length: 1.350	{1} 2-1.007	Pipe	161.156	Diam/Width:375	Manhole - Access not Required
E:389201.421 N:410241.358	2.192						
			{a} 2-1.008	Pipe	161.156	Diam/Width:375	Not Applicable
S212	165.792 164.292	Diameter / Length: 1.350	{1} 2-2.003	Pipe	164.292	Diam/Width:300	Manhole - Access Required
E:389217.730 N:410268.684	1.500						
			{a} 2-2.004	Pipe	164.292	Diam/Width:300	Not Applicable
S251	170.537 169.112	Diameter / Length: 1.350					Manhole - Access Required
E:389437.382 N:410328.589	1.425						
			{a} 2-9.000	Pipe	169.112	Diam/Width:225	Not Applicable
S252	170.152 168.727	Diameter / Length: 1.350	{1} 2-9.000	Pipe	168.727	Diam/Width:225	Manhole - Access Required
E:389450.243 N:410319.223	1.425						
			{a} 2-9.001	Pipe	168.727	Diam/Width:225	Not Applicable
S218	163.966 162.541	Diameter / Length: 1.200					Manhole - Access Required
E:389333.404 N:410244.381	1.424						
			{a} 2-3.000	Pipe	162.541	Diam/Width:225	Not Applicable
S231	158.364 153.889	Diameter / Length: 2.100	{1} 2-1.015	Pipe	153.889	Diam/Width:750	Manhole - Access Required
E:389293.514 N:410146.068	4.475						
			{a} 2-1.016	Pipe	153.889	Diam/Width:750	Not Applicable
S273	151.246 149.494	Diameter / Length: 1.200	{1} 2-1.020	Pipe	150.244	Diam/Width:300	Manhole - Access not Required
E:389321.951 N:410050.461	1.752						

			{a} 2-1.021	Pipe	149.494	Diam/Width:300	Not Applicable
S274	149.417 148.925	Diameter / Length: 1.200	{1} 2-1.021	Pipe	148.925	Diam/Width:300	Manhole - Access not Required
E:389324.618 N:410040.018	0.492						
							Not Applicable
S271	154.800 152.732	Diameter / Length: 1.200	{1} 2-1.018	Pipe	152.732	Diam/Width:300	Manhole - Access Required
E:389318.045 N:410065.757	2.068						
			{a} 2-1.019	Pipe	152.732	Diam/Width:300	Not Applicable
S272	153.453 150.883	Diameter / Length: 1.350	{1} 2-1.019	Pipe	152.383	Diam/Width:300	Manhole - Access Required
E:389319.526 N:410059.959	2.570						
			{a} 2-1.020	Pipe	150.883	Diam/Width:300	Not Applicable
S227	157.947 155.441	Diameter / Length: 1.350	{1} 2-5.001	Pipe	155.516	Diam/Width:225	Manhole - Access Required
E:389255.179 N:410154.372	2.506						
			{a} 2-5.002	Pipe	155.441	Diam/Width:300	Not Applicable
S228	158.800 155.374	Diameter / Length: 1.350	{1} 2-5.002	Pipe	155.374	Diam/Width:300	Manhole - Access not Required
E:389266.525 N:410165.141	3.426						
			{a} 2-5.003	Pipe	155.374	Diam/Width:300	Not Applicable
S229	158.800 155.308	Diameter / Length: 1.350	{1} 2-5.003	Pipe	155.308	Diam/Width:300	Manhole - Access Required
E:389281.977 N:410167.384	3.492						
			{a} 2-5.004	Pipe	155.308	Diam/Width:300	Not Applicable

STORM SEWER DESIGN

Rainfall Simulation

1:1 year event

Project:	Date: 09/05/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 2	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S201	1in1 year: 1 years: +0 %: 15 mins: Winter	173.638	172.213	172.264	0.051	13.2	0.073	0.000	13.0	5.750	OK
S202	1in1 year: 1 years: +0 %: 15 mins: Winter	172.251	170.825	170.891	0.066	22.6	0.095	0.000	22.3	9.949	OK
S203	1in1 year: 1 years: +0 %: 15 mins: Winter	170.848	169.348	169.428	0.080	27.3	0.114	0.000	26.8	12.100	OK
S204	1in1 year: 1 years: +0 %: 15 mins: Winter	170.497	168.705	168.794	0.089	40.3	0.128	0.000	39.7	17.964	OK
S205	1in1 year: 1 years: +0 %: 15 mins: Winter	168.637	166.760	166.888	0.128	63.7	0.183	0.000	61.4	28.432	OK
S206	1in1 year: 1 years: +0 %: 15 mins: Winter	167.244	165.590	165.746	0.156	75.8	0.223	0.000	75.2	34.726	OK
S207	1in1 year: 1 years: +0 %: 15 mins: Winter	166.834	165.259	165.377	0.118	84.1	0.169	0.000	82.8	38.623	OK
S208	1in1 year: 1 years: +0 %: 15 mins: Winter	169.527	168.102	168.149	0.047	9.5	0.068	0.000	9.3	4.145	OK
S209	1in1 year: 1 years: +0 %: 15 mins: Winter	168.532	167.024	167.109	0.085	25.6	0.122	0.000	24.9	11.275	OK
S210	1in1 year: 1 years: +0 %: 15 mins: Winter	167.245	165.745	165.870	0.125	53.1	0.179	0.000	51.2	23.588	OK
S211	1in1 year: 1 years: +0 %: 15 mins: Winter	166.398	164.898	165.014	0.116	54.5	0.166	0.000	53.4	24.993	OK
S212	1in1 year: 1 years: +0 %: 15 mins: Winter	165.792	164.292	164.413	0.121	74.3	0.173	0.000	73.3	34.101	OK
S213	1in1 year: 1 years: +0 %: 15 mins: Winter	165.337	163.312	163.451	0.139	156.1	0.198	0.000	154.2	72.704	OK

S214	1in1 year: 1 years: +0 %: 15 mins: Winter	163.348	161.156	161.306	0.150	154.2	0.214	0.000	153.0	72.680	OK
S215	1in1 year: 1 years: +0 %: 15 mins: Winter	162.525	160.297	160.470	0.173	159.3	0.248	0.000	157.1	75.412	OK
S216	1in1 year: 1 years: +0 %: 15 mins: Winter	160.766	158.966	159.263	0.297	163.1	0.757	0.000	161.4	77.839	OK
S217	1in1 year: 1 years: +0 %: 15 mins: Winter	161.314	158.769	159.045	0.276	174.5	0.703	0.000	179.7	86.876	OK
S218	1in1 year: 1 years: +0 %: 15 mins: Winter	163.966	162.541	162.569	0.028	4.9	0.031	0.000	4.8	2.156	OK
S219	1in1 year: 1 years: +0 %: 15 mins: Winter	162.237	158.656	158.840	0.184	190.7	0.467	0.000	194.4	94.189	OK
S220	1in1 year: 1 years: +0 %: 15 mins: Winter	160.743	157.962	158.109	0.147	204.7	0.375	0.000	206.8	101.290	OK
S221	1in1 year: 1 years: +0 %: 15 mins: Winter	159.661	158.236	158.293	0.057	17.2	0.082	0.000	17.0	7.517	OK
S223	1in1 year: 1 years: +0 %: 15 mins: Winter	159.217	156.336	156.495	0.159	225.3	0.405	0.000	228.2	113.621	OK
S224	1in1 year: 1 years: +0 %: 15 mins: Winter	159.307	157.695	157.731	0.036	6.8	0.051	0.000	6.7	2.992	OK
S226	1in1 year: 1 years: +0 %: 15 mins: Winter	157.162	155.737	155.825	0.088	13.4	0.127	0.000	12.4	5.895	OK
S227	1in1 year: 1 years: +0 %: 15 mins: Winter	157.947	155.441	155.549	0.108	17.8	0.154	0.000	17.4	8.266	OK
S228	1in1 year: 1 years: +0 %: 15 mins: Winter	158.800	155.374	155.480	0.106	17.4	0.151	0.000	16.7	8.248	OK
S229	1in1 year: 1 years: +0 %: 15 mins: Winter	158.800	155.308	155.412	0.104	16.7	0.149	0.000	16.6	8.217	OK
S230	1in1 year: 1 years: +0 %: 15 mins: Winter	158.736	154.817	154.979	0.162	248.7	0.560	0.000	249.7	124.535	OK
S231	1in1 year: 1 years: +0 %: 15 mins: Winter	158.364	153.889	154.090	0.201	249.7	0.696	0.000	252.3	124.416	OK

S232	1in1 year: 1 years: +0 %: 15 mins: Winter	154.868	153.218	153.567	0.349	252.3	1.208	0.000	254.0	124.119	OK
S233	1in1 year: 1 years: +0 %: 15 mins: Winter	174.665	173.240	173.275	0.035	6.3	0.051	0.000	6.2	2.762	OK
S234	1in1 year: 1 years: +0 %: 15 mins: Winter	172.946	171.521	171.582	0.061	17.5	0.087	0.000	17.2	7.684	OK
S235	1in1 year: 1 years: +0 %: 15 mins: Winter	172.182	170.757	170.842	0.085	20.5	0.122	0.000	19.8	9.109	OK
S236	1in1 year: 1 years: +0 %: 15 mins: Winter	171.516	170.016	170.120	0.104	32.8	0.148	0.000	32.3	14.799	OK
S237	1in1 year: 1 years: +0 %: 15 mins: Winter	171.025	169.525	169.655	0.130	39.4	0.186	0.000	38.3	17.872	OK
S238	1in1 year: 1 years: +0 %: 15 mins: Winter	170.757	169.257	169.341	0.084	40.9	0.121	0.000	40.4	19.017	OK
S239	1in1 year: 1 years: +0 %: 15 mins: Winter	169.685	168.185	168.276	0.091	46.3	0.130	0.000	45.6	21.594	OK
S240	1in1 year: 1 years: +0 %: 15 mins: Summer	168.192	166.767	166.810	0.043	4.3	0.062	0.000	4.2	1.664	OK
S241	1in1 year: 1 years: +0 %: 15 mins: Winter	168.014	166.514	166.639	0.125	61.0	0.179	0.000	59.8	28.315	OK
S242	1in1 year: 1 years: +0 %: 15 mins: Winter	167.591	166.090	166.205	0.115	68.4	0.165	0.000	67.8	32.062	OK
S243	1in1 year: 1 years: +0 %: 15 mins: Winter	166.896	165.396	165.508	0.112	71.5	0.160	0.000	69.8	33.690	OK
S244	1in1 year: 1 years: +0 %: 15 mins: Winter	165.005	163.367	163.481	0.114	86.9	0.164	0.000	86.1	41.140	OK
S245	1in1 year: 1 years: +0 %: 15 mins: Winter	163.257	161.682	161.792	0.110	89.1	0.157	0.000	87.9	42.438	OK
S246	1in1 year: 1 years: +0 %: 15 mins: Winter	161.890	160.315	160.426	0.111	101.3	0.159	0.000	100.2	48.279	OK
S247	1in1 year: 1 years: +0 %: 15 mins: Winter	161.924	159.988	160.036	0.048	11.3	0.068	0.000	11.1	4.887	OK

S248	1in1 year: 1 years: +0 %: 15 mins: Winter	160.487	158.413	158.680	0.267	117.6	0.382	0.000	123.3	55.875	OK
S249	1in1 year: 1 years: +0 %: 15 mins: Winter	160.264	158.393	158.538	0.145	130.2	0.208	0.000	119.0	58.946	OK
S250	1in1 year: 1 years: +0 %: 15 mins: Winter	158.372	156.797	156.939	0.142	121.3	0.204	0.000	118.8	59.881	OK
S251	1in1 year: 1 years: +0 %: 15 mins: Winter	170.537	169.112	169.145	0.033	3.8	0.047	0.000	3.7	1.658	OK
S252	1in1 year: 1 years: +0 %: 15 mins: Winter	170.152	168.727	168.766	0.039	5.6	0.055	0.000	5.5	2.483	OK
S253	1in1 year: 1 years: +0 %: 15 mins: Winter	169.597	168.165	168.230	0.065	15.9	0.092	0.000	15.5	7.016	OK
S254	1in1 year: 1 years: +0 %: 15 mins: Winter	168.159	166.734	166.815	0.081	29.4	0.115	0.000	28.7	13.087	OK
S255	1in1 year: 1 years: +0 %: 15 mins: Winter	166.058	164.633	164.729	0.096	39.6	0.138	0.000	38.7	17.829	OK
S256	1in1 year: 1 years: +0 %: 15 mins: Winter	164.730	163.305	163.406	0.101	40.5	0.145	0.000	39.7	18.582	OK
S257	1in1 year: 1 years: +0 %: 15 mins: Winter	163.961	162.461	162.572	0.111	42.0	0.159	0.000	41.7	19.569	OK
S259	1in1 year: 1 years: +0 %: 15 mins: Winter	163.748	162.210	162.289	0.079	48.0	0.113	0.000	47.1	22.314	OK
S260	1in1 year: 1 years: +0 %: 15 mins: Winter	160.275	158.700	158.848	0.148	56.0	0.212	0.000	54.9	26.164	OK
S261	1in1 year: 1 years: +0 %: 15 mins: Winter	166.463	165.038	165.066	0.028	3.3	0.031	0.000	3.2	1.436	OK
S262	1in1 year: 1 years: +0 %: 15 mins: Winter	165.283	163.858	163.925	0.067	25.4	0.076	0.000	25.0	11.111	OK
S263	1in1 year: 1 years: +0 %: 15 mins: Winter	163.456	162.031	162.106	0.075	32.2	0.085	0.000	31.9	14.260	OK
S264	1in1 year: 1 years: +0 %: 15 mins: Winter	161.405	159.980	160.081	0.101	44.5	0.115	0.000	43.7	19.783	OK

S265	1in1 year: 1 years: +0 %: 15 mins: Winter	160.107	158.457	158.642	0.185	101.1	0.328	0.000	100.5	47.036	OK
S266	1in1 year: 1 years: +0 %: 15 mins: Winter	159.981	158.331	158.446	0.115	100.5	0.203	0.000	99.2	46.995	OK
S267	1in1 year: 1 years: +0 %: 15 mins: Winter	157.952	156.302	156.445	0.143	116.8	0.252	0.000	114.0	54.647	OK
S268	1in1 year: 1 years: +0 %: 15 mins: Winter	157.265	155.384	155.604	0.220	236.2	0.560	0.000	233.4	115.959	OK
S269	1in1 year: 1 years: +0 %: 15 mins: Winter	156.832	154.740	154.891	0.151	239.6	0.384	0.000	236.4	118.608	OK
S270	1in1 year: 1 years: +0 %: 15 mins: Winter	156.650	153.622	153.857	0.235	248.3	0.599	0.000	246.7	123.704	OK
S271	1in1 year: 1 years: +0 %: 480 mins: Winter	154.800	152.732	152.805	0.073	29.8	0.082	0.000	27.8	987.578	OK
S272	1in1 year: 1 years: +0 %: 480 mins: Winter	153.453	150.883	150.950	0.067	27.8	0.096	0.000	27.6	987.481	OK
S273	1in1 year: 1 years: +0 %: 480 mins: Winter	151.246	149.494	149.565	0.071	27.6	0.080	0.000	27.6	987.437	OK
S274	1in1 year: 1 years: +0 %: 480 mins: Winter	149.417	148.925	148.991	0.066	27.6	0.000	0.000	27.6	987.437	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 2	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
2-1.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S201	S202	173.6	172.271	0.067	7.444	1.7	0.15	16.9	OK
2-1.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S202	S203	172.3	170.901	0.084	12.880	2.1	0.25	28.9	OK
2-1.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S203	S204	170.8	169.441	0.089	15.667	2.4	0.31	34.8	OK
2-1.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S204	S205	170.5	168.807	0.126	23.257	1.8	0.25	51.5	OK
2-1.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S205	S206	168.6	166.909	0.145	36.818	2.3	0.46	79.8	OK
2-1.005	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S206	S207	167.2	165.771	0.159	44.967	2.2	0.4	97.6	OK
2-1.006	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S207	S213	166.8	165.396	0.149	50.019	2.6	0.28	107.6	OK
2-2.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S208	S209	169.5	168.156	0.054	5.367	1.7	0.12	12.0	OK
2-2.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S209	S210	168.5	167.122	0.122	14.596	1.2	0.23	32.3	OK
2-2.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S210	S211	167.2	165.891	0.141	30.538	2.0	0.44	66.5	OK
2-2.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S211	S212	166.4	165.033	0.139	32.362	2.2	0.37	69.5	OK
2-2.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S212	S213	165.8	164.434	0.135	44.158	3.1	0.39	95.3	OK
2-1.007	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S213	S214	165.3	163.473	0.170	94.157	4.1	0.35	200.7	OK
2-1.008	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S214	S215	163.3	161.334	0.191	94.133	3.5	0.34	199.2	OK

2-1.009	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S215	S216	162.5	160.502	0.194	97.680	3.5	0.49	204.7	OK
2-1.010	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S216	S217	160.8	159.313	0.320	100.872	1.4	0.61	207.9	OK
2-1.011	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S217	S219	161.3	159.085	0.263	112.608	1.8	0.5	231.9	OK
2-3.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S218	S219	164.0	162.572	0.031	2.791	1.9	0.04	6.3	OK
2-1.012	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S219	S220	162.2	158.867	0.190	122.112	3.0	0.18	251.6	OK
2-1.013	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S220	S223	160.7	158.131	0.176	131.325	3.6	0.13	267.9	OK
2-4.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S221	S223	159.7	158.301	0.064	9.730	2.3	0.17	22.0	OK
2-1.014	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S223	S230	159.2	156.519	0.177	147.312	3.9	0.14	296.0	OK
2-5.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S224	S226	159.3	157.736	0.072	3.872	0.8	0.07	8.7	OK
2-5.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S226	S227	157.2	155.840	0.101	7.638	0.9	0.4	16.1	OK
2-5.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S227	S228	157.9	155.566	0.124	10.708	0.8	0.31	22.7	OK
2-5.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S228	S229	158.8	155.497	0.122	10.689	0.8	0.3	21.9	OK
2-5.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S229	S230	158.8	155.428	0.115	10.657	0.9	0.3	21.4	OK
2-1.015	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S230	S231	158.7	155.005	0.212	161.481	3.1	0.12	323.9	OK
2-1.016	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S231	S232	158.4	154.126	0.321	161.362	1.8	0.19	327.7	OK
2-1.017	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S232	Pond	154.9	153.622	0.377	161.050	1.5	0.46	330.6	OK
2-6.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S233	S234	174.7	173.280	0.055	3.578	1.1	0.07	8.1	OK

2-6.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S234	S235	172.9	171.591	0.084	9.946	1.6	0.21	22.3	OK
2-6.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S235	S236	172.2	170.856	0.097	11.792	1.6	0.37	25.7	OK
2-6.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S236	S237	171.5	170.136	0.135	19.158	1.4	0.33	41.9	OK
2-6.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S237	S238	171.0	169.676	0.124	23.142	1.8	0.44	49.8	OK
2-6.005	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S238	S239	170.8	169.355	0.101	24.626	2.5	0.21	52.6	OK
2-6.006	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S239	S241	169.7	168.289	0.126	27.970	2.1	0.26	59.4	OK
2-7.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S240	S241	168.2	166.815	0.060	2.413	0.8	0.1	5.5	OK
2-6.007	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S241	S242	168.0	166.661	0.141	36.679	2.4	0.39	77.7	OK
2-6.008	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S242	S243	167.6	166.225	0.133	41.533	2.9	0.34	88.1	OK
2-6.009	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S243	S244	166.9	165.527	0.127	43.648	3.2	0.36	91.1	OK
2-6.010	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S244	S245	165.0	163.499	0.130	53.295	3.3	0.24	112.3	OK
2-6.011	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S245	S246	163.3	161.810	0.128	54.983	3.5	0.22	114.8	OK
2-6.012	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S246	S248	161.9	160.443	0.217	62.549	2.0	0.25	130.9	OK
2-8.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S247	S248	161.9	160.042	0.105	6.333	1.5	0.13	14.5	OK
2-6.013	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S248	S249	160.5	158.720	0.238	72.309	2.2	1.46	165.4	OK
2-6.014	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S249	S250	160.3	158.563	0.169	76.383	3.2	0.38	155.5	OK
2-6.015	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S250	S268	158.4	156.965	0.161	77.608	3.5	0.35	157.5	OK

2-9.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S251	S252	170.5	169.149	0.041	2.145	1.0	0.06	4.9	OK
2-9.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S252	S253	170.2	168.771	0.059	3.216	0.9	0.08	7.2	OK
2-9.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S253	S254	169.6	168.239	0.083	9.083	1.5	0.23	20.2	OK
2-9.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S254	S255	168.2	166.827	0.103	16.943	2.1	0.36	37.3	OK
2-9.004	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S255	S256	166.1	164.746	0.116	23.084	2.4	0.47	50.4	OK
2-9.005	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S256	S257	164.7	163.424	0.115	24.067	2.5	0.48	51.7	OK
2-9.006	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S257	S259	164.0	162.590	0.110	25.346	2.3	0.31	54.3	OK
2-9.007	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S259	S260	163.7	162.300	0.094	28.897	3.3	0.19	62.0	OK
2-9.008	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S260	S265	160.3	158.873	0.164	33.888	1.5	0.37	71.4	OK
2-10.000	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S261	S262	166.5	165.069	0.054	1.857	0.6	0.04	4.2	OK
2-10.001	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S262	S263	165.3	163.935	0.082	14.381	2.5	0.25	32.4	OK
2-10.002	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S263	S264	163.5	162.118	0.103	18.458	2.3	0.31	41.3	OK
2-10.003	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S264	S265	161.4	160.099	0.115	25.606	2.8	0.5	56.7	OK
2-9.009	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S265	S266	160.1	158.672	0.173	60.909	2.3	0.4	130.5	OK
2-9.010	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S266	S267	160.0	158.463	0.149	60.861	2.8	0.19	129.0	OK
2-9.011	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S267	S268	158.0	156.468	0.159	70.780	3.0	0.24	148.3	OK
2-6.016	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S268	S269	157.3	155.641	0.218	150.257	3.3	0.31	306.9	OK

2-6.017	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S269	S270	156.8	154.919	0.228	153.698	3.1	0.16	311.3	OK
2-6.018	1in2 year: 2 years: +0 %: 15 mins: Winter	Pipe	S270	Pond	156.7	153.900	0.261	160.321	2.7	0.35	318.3	OK
2-1.018	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	Pond	S271	154.8	153.323	0.110	1159.677	1.4	0.6	33.0	Surcharged
2-1.019	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S271	S272	154.8	152.809	0.073	1164.899	2.4	0.11	30.7	OK
2-1.020	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S272	S273	153.5	150.954	0.068	1164.752	2.5	0.11	30.4	OK
2-1.021	1in2 year: 2 years: +0 %: 480 mins: Winter	Pipe	S273	S274	151.2	149.569	0.072	1164.682	2.3	0.12	30.4	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 2	Company Address:		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	1in1 year: 1 years: +0 %: 480 mins: Winter	153.239	153.239	1.289	1.289	90.4	891.865	0.000	0.000	27.7	987.820	73	OK

STORM SEWER DESIGN

Rainfall Simulation

1:30 year event

Project:	Date: 09/05/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 2	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S201	1in30yr: 30 years: +0 %: 15 mins: Winter	173.638	172.213	172.294	0.081	32.2	0.116	0.000	31.9	14.059	OK
S202	1in30yr: 30 years: +0 %: 15 mins: Winter	172.251	170.825	170.934	0.109	55.4	0.156	0.000	54.8	24.326	OK
S203	1in30yr: 30 years: +0 %: 15 mins: Winter	170.848	169.348	169.487	0.140	66.9	0.200	0.000	65.9	29.596	OK
S204	1in30yr: 30 years: +0 %: 15 mins: Winter	170.497	168.705	168.851	0.146	98.7	0.209	0.000	97.7	43.932	OK
S205	1in30yr: 30 years: +0 %: 15 mins: Winter	168.637	166.760	166.995	0.235	156.5	0.337	0.000	150.7	69.575	OK
S206	1in30yr: 30 years: +0 %: 15 mins: Winter	167.244	165.590	165.866	0.276	186.0	0.395	0.000	184.5	84.977	OK
S207	1in30yr: 30 years: +0 %: 15 mins: Winter	166.834	165.259	165.459	0.200	206.5	0.286	0.000	204.0	94.536	OK
S208	1in30yr: 30 years: +0 %: 15 mins: Winter	169.527	168.102	168.178	0.076	23.2	0.109	0.000	22.8	10.135	OK
S209	1in30yr: 30 years: +0 %: 15 mins: Winter	168.532	167.024	167.163	0.139	62.7	0.199	0.000	61.4	27.572	OK
S210	1in30yr: 30 years: +0 %: 15 mins: Winter	167.245	165.745	165.971	0.226	130.4	0.323	0.000	125.8	57.697	OK
S211	1in30yr: 30 years: +0 %: 15 mins: Winter	166.398	164.898	165.107	0.209	133.9	0.299	0.000	131.5	61.174	OK
S212	1in30yr: 30 years: +0 %: 15 mins: Winter	165.792	164.292	164.513	0.221	182.6	0.317	0.000	180.3	83.465	OK
S213	1in30yr: 30 years: +0 %: 15 mins: Winter	165.337	163.312	163.557	0.245	384.2	0.351	0.000	380.5	177.981	OK

S214	1in30yr: 30 years: +0 %: 15 mins: Winter	163.348	161.156	161.451	0.295	380.5	0.422	0.000	376.7	177.921	OK
S215	1in30yr: 30 years: +0 %: 15 mins: Winter	162.525	160.297	160.669	0.372	392.1	0.532	0.000	380.2	184.297	OK
S216	1in30yr: 30 years: +0 %: 15 mins: Winter	160.766	158.966	159.508	0.542	394.8	1.378	0.000	392.5	190.645	OK
S217	1in30yr: 30 years: +0 %: 15 mins: Winter	161.314	158.769	159.225	0.456	431.2	1.161	0.000	432.5	212.929	OK
S218	1in30yr: 30 years: +0 %: 15 mins: Winter	163.966	162.541	162.584	0.043	12.1	0.049	0.000	11.9	5.272	OK
S219	1in30yr: 30 years: +0 %: 15 mins: Winter	162.237	158.656	158.958	0.302	464.3	0.767	0.000	469.6	231.002	OK
S220	1in30yr: 30 years: +0 %: 15 mins: Winter	160.743	157.962	158.203	0.241	494.8	0.614	0.000	502.7	248.473	OK
S221	1in30yr: 30 years: +0 %: 15 mins: Winter	159.661	158.236	158.329	0.093	42.1	0.133	0.000	41.6	18.382	OK
S223	1in30yr: 30 years: +0 %: 15 mins: Winter	159.217	156.336	156.601	0.265	554.8	0.673	0.000	558.7	278.766	OK
S224	1in30yr: 30 years: +0 %: 15 mins: Winter	159.307	157.695	157.751	0.056	16.7	0.080	0.000	16.5	7.308	OK
S226	1in30yr: 30 years: +0 %: 15 mins: Winter	157.162	155.737	155.893	0.156	32.9	0.224	0.000	30.7	14.440	OK
S227	1in30yr: 30 years: +0 %: 15 mins: Winter	157.947	155.441	155.630	0.189	44.0	0.271	0.000	43.3	20.245	OK
S228	1in30yr: 30 years: +0 %: 15 mins: Winter	158.800	155.374	155.559	0.185	43.3	0.264	0.000	42.0	20.225	OK
S229	1in30yr: 30 years: +0 %: 15 mins: Winter	158.800	155.308	155.484	0.176	42.0	0.252	0.000	40.7	20.191	OK
S230	1in30yr: 30 years: +0 %: 15 mins: Winter	158.736	154.817	155.094	0.277	608.2	0.961	0.000	612.0	305.646	OK
S231	1in30yr: 30 years: +0 %: 15 mins: Winter	158.364	153.889	154.259	0.370	612.0	1.282	0.000	620.3	305.519	OK

S232	1in30yr: 30 years: +0 %: 15 mins: Winter	154.868	153.218	153.800	0.582	620.3	2.018	0.000	623.1	305.176	OK
S233	1in30yr: 30 years: +0 %: 15 mins: Winter	174.665	173.240	173.295	0.055	15.5	0.079	0.000	15.3	6.758	OK
S234	1in30yr: 30 years: +0 %: 15 mins: Winter	172.946	171.521	171.621	0.100	42.8	0.143	0.000	42.3	18.788	OK
S235	1in30yr: 30 years: +0 %: 15 mins: Winter	172.182	170.757	170.905	0.148	50.3	0.212	0.000	48.7	22.290	OK
S236	1in30yr: 30 years: +0 %: 15 mins: Winter	171.516	170.016	170.198	0.182	80.6	0.260	0.000	79.5	36.208	OK
S237	1in30yr: 30 years: +0 %: 15 mins: Winter	171.025	169.525	169.753	0.228	96.8	0.327	0.000	94.6	43.753	OK
S238	1in30yr: 30 years: +0 %: 15 mins: Winter	170.757	169.257	169.399	0.142	101.1	0.204	0.000	100.1	46.573	OK
S239	1in30yr: 30 years: +0 %: 15 mins: Winter	169.685	168.185	168.335	0.150	114.6	0.214	0.000	113.4	52.904	OK
S240	1in30yr: 30 years: +0 %: 15 mins: Winter	168.192	166.767	166.832	0.065	10.5	0.094	0.000	10.4	4.578	OK
S241	1in30yr: 30 years: +0 %: 15 mins: Winter	168.014	166.514	166.748	0.234	151.0	0.334	0.000	147.9	69.380	OK
S242	1in30yr: 30 years: +0 %: 15 mins: Winter	167.591	166.090	166.300	0.210	168.9	0.301	0.000	167.7	78.561	OK
S243	1in30yr: 30 years: +0 %: 15 mins: Winter	166.896	165.396	165.594	0.198	177.0	0.284	0.000	173.8	82.582	OK
S244	1in30yr: 30 years: +0 %: 15 mins: Winter	165.005	163.367	163.561	0.194	215.5	0.278	0.000	214.2	100.818	OK
S245	1in30yr: 30 years: +0 %: 15 mins: Winter	163.257	161.682	161.871	0.189	221.6	0.271	0.000	219.4	104.027	OK
S246	1in30yr: 30 years: +0 %: 15 mins: Winter	161.890	160.315	160.498	0.183	252.2	0.262	0.000	250.7	118.302	OK
S247	1in30yr: 30 years: +0 %: 15 mins: Winter	161.924	159.988	160.062	0.074	27.5	0.106	0.000	27.4	11.963	OK

S248	1in30yr: 30 years: +0 %: 15 mins: Winter	160.487	158.413	159.113	0.700	293.6	1.002	0.000	290.2	137.032	Surcharged
S249	1in30yr: 30 years: +0 %: 15 mins: Summer	160.264	158.393	158.666	0.273	306.6	0.391	0.000	301.0	129.019	OK
S250	1in30yr: 30 years: +0 %: 15 mins: Winter	158.372	156.797	157.063	0.266	314.9	0.381	0.000	304.3	146.886	OK
S251	1in30yr: 30 years: +0 %: 15 mins: Winter	170.537	169.112	169.163	0.051	9.3	0.074	0.000	9.2	4.054	OK
S252	1in30yr: 30 years: +0 %: 15 mins: Winter	170.152	168.727	168.788	0.061	13.8	0.087	0.000	13.6	6.078	OK
S253	1in30yr: 30 years: +0 %: 15 mins: Winter	169.597	168.165	168.270	0.105	39.0	0.151	0.000	38.3	17.158	OK
S254	1in30yr: 30 years: +0 %: 15 mins: Winter	168.159	166.734	166.871	0.137	72.3	0.195	0.000	70.8	32.013	OK
S255	1in30yr: 30 years: +0 %: 15 mins: Winter	166.058	164.633	164.812	0.179	97.4	0.256	0.000	95.3	43.622	OK
S256	1in30yr: 30 years: +0 %: 15 mins: Winter	164.730	163.305	163.504	0.199	99.6	0.285	0.000	97.2	45.496	OK
S257	1in30yr: 30 years: +0 %: 15 mins: Winter	163.961	162.461	162.653	0.192	102.7	0.275	0.000	102.3	47.918	OK
S259	1in30yr: 30 years: +0 %: 15 mins: Winter	163.748	162.210	162.335	0.125	117.8	0.178	0.000	117.0	54.647	OK
S260	1in30yr: 30 years: +0 %: 15 mins: Winter	160.275	158.700	158.966	0.266	138.6	0.380	0.000	136.5	64.268	OK
S261	1in30yr: 30 years: +0 %: 15 mins: Winter	166.463	165.038	165.081	0.043	8.0	0.048	0.000	7.9	3.512	OK
S262	1in30yr: 30 years: +0 %: 15 mins: Winter	165.283	163.858	163.970	0.112	62.1	0.127	0.000	61.4	27.167	OK
S263	1in30yr: 30 years: +0 %: 15 mins: Winter	163.456	162.031	162.156	0.125	79.0	0.141	0.000	78.3	34.871	OK
S264	1in30yr: 30 years: +0 %: 15 mins: Winter	161.405	159.980	160.177	0.197	109.2	0.223	0.000	106.4	48.379	OK

S265	1in30yr: 30 years: +0 %: 15 mins: Winter	160.107	158.457	158.772	0.315	249.1	0.557	0.000	247.3	115.189	OK
S266	1in30yr: 30 years: +0 %: 15 mins: Winter	159.981	158.331	158.521	0.190	247.3	0.335	0.000	245.1	115.130	OK
S267	1in30yr: 30 years: +0 %: 15 mins: Winter	157.952	156.302	156.550	0.248	288.1	0.438	0.000	284.7	133.812	OK
S268	1in30yr: 30 years: +0 %: 15 mins: Winter	157.265	155.384	155.769	0.385	597.4	0.979	0.000	574.3	284.321	OK
S269	1in30yr: 30 years: +0 %: 15 mins: Winter	156.832	154.740	155.010	0.270	589.4	0.688	0.000	576.1	290.870	OK
S270	1in30yr: 30 years: +0 %: 15 mins: Winter	156.650	153.622	154.043	0.421	605.2	1.071	0.000	597.3	303.435	OK
S271	1in30yr: 30 years: +0 %: 600 mins: Winter	154.800	152.732	152.823	0.091	45.6	0.103	0.000	41.6	2062.191	OK
S272	1in30yr: 30 years: +0 %: 600 mins: Winter	153.453	150.883	150.967	0.084	41.6	0.120	0.000	41.0	2061.920	OK
S273	1in30yr: 30 years: +0 %: 480 mins: Winter	151.246	149.494	149.582	0.088	41.0	0.099	0.000	41.0	1723.909	OK
S274	1in30yr: 30 years: +0 %: 480 mins: Winter	149.417	148.925	149.006	0.081	41.0	0.000	0.000	41.0	1723.909	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 2	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
2-1.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S201	S202	173.6	172.294	0.095	14.059	2.0	0.28	31.9	OK
2-1.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S202	S203	172.3	170.934	0.124	24.326	2.4	0.47	54.8	OK
2-1.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S203	S204	170.8	169.487	0.131	29.596	2.7	0.58	65.9	OK
2-1.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S204	S205	170.5	168.851	0.191	43.932	2.1	0.48	97.7	OK
2-1.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S205	S206	168.6	166.995	0.225	69.575	2.7	0.86	150.7	OK
2-1.005	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S206	S207	167.2	165.866	0.238	84.977	2.5	0.76	184.5	OK
2-1.006	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S207	S213	166.8	165.459	0.222	94.536	3.0	0.53	204.0	OK
2-2.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S208	S209	169.5	168.178	0.075	10.135	2.0	0.23	22.8	OK
2-2.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S209	S210	168.5	167.163	0.182	27.572	1.4	0.44	61.4	OK
2-2.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S210	S211	167.2	165.971	0.217	57.697	2.3	0.82	125.8	OK
2-2.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S211	S212	166.4	165.107	0.215	61.174	2.4	0.7	131.5	OK
2-2.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S212	S213	165.8	164.513	0.206	83.465	3.5	0.73	180.3	OK
2-1.007	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S213	S214	165.3	163.557	0.270	177.981	4.5	0.66	380.5	OK
2-1.008	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S214	S215	163.3	161.451	0.333	177.921	3.8	0.65	376.7	OK

2-1.009	1in30yr: 30 years: +0 %: 15 mins: Summer	Pipe	S215	S216	162.5	160.650	0.328	164.440	3.7	0.9	380.3	OK
2-1.010	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S216	S217	160.8	159.508	0.476	190.645	1.6	1.15	392.5	OK
2-1.011	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S217	S219	161.3	159.225	0.378	212.929	2.1	0.93	432.5	OK
2-3.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S218	S219	164.0	162.584	0.043	5.272	2.3	0.08	11.9	OK
2-1.012	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S219	S220	162.2	158.958	0.271	231.002	3.5	0.34	469.6	OK
2-1.013	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S220	S223	160.7	158.203	0.253	248.473	4.1	0.24	502.7	OK
2-4.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S221	S223	159.7	158.329	0.091	18.382	2.8	0.33	41.6	OK
2-1.014	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S223	S230	159.2	156.601	0.251	278.766	4.6	0.27	558.7	OK
2-5.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S224	S226	159.3	157.751	0.106	7.308	0.9	0.14	16.5	OK
2-5.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S226	S227	157.2	155.893	0.151	14.440	1.1	0.76	30.7	OK
2-5.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S227	S228	157.9	155.630	0.187	20.245	0.9	0.6	43.3	OK
2-5.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S228	S229	158.8	155.559	0.181	20.225	0.9	0.58	42.0	OK
2-5.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S229	S230	158.8	155.484	0.166	20.191	1.0	0.56	40.7	OK
2-1.015	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S230	S231	158.7	155.094	0.324	305.646	3.4	0.22	612.0	OK
2-1.016	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S231	S232	158.4	154.259	0.476	305.519	2.1	0.35	620.3	OK
2-1.017	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S232	Pond	154.9	153.800	0.535	305.176	1.8	0.86	623.1	OK
2-6.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S233	S234	174.7	173.295	0.077	6.758	1.3	0.13	15.3	OK
2-6.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S234	S235	172.9	171.621	0.124	18.788	1.9	0.4	42.3	OK

2-6.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S235	S236	172.2	170.905	0.144	22.290	1.8	0.71	48.7	OK
2-6.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S236	S237	171.5	170.198	0.205	36.208	1.5	0.62	79.5	OK
2-6.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S237	S238	171.0	169.753	0.185	43.753	2.1	0.84	94.6	OK
2-6.005	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S238	S239	170.8	169.399	0.146	46.573	2.9	0.41	100.1	OK
2-6.006	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S239	S241	169.7	168.335	0.192	52.904	2.4	0.5	113.4	OK
2-7.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S240	S241	168.2	166.832	0.112	4.578	0.8	0.19	10.4	OK
2-6.007	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S241	S242	168.0	166.748	0.222	69.380	2.6	0.75	147.9	OK
2-6.008	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S242	S243	167.6	166.300	0.204	78.561	3.3	0.66	167.7	OK
2-6.009	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S243	S244	166.9	165.594	0.190	82.582	3.7	0.69	173.8	OK
2-6.010	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S244	S245	165.0	163.561	0.192	100.818	3.8	0.46	214.2	OK
2-6.011	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S245	S246	163.3	161.871	0.186	104.027	4.0	0.42	219.4	OK
2-6.012	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S246	S248	161.9	160.498	0.375	118.302	2.3	0.48	250.7	OK
2-8.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S247	S248	161.9	160.062	0.225	11.963	1.4	0.24	27.4	OK
2-6.013	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S248	S249	160.5	159.113	0.375	137.032	2.6	2.57	290.2	Surcharged
2-6.014	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S249	S250	160.3	158.661	0.267	144.519	3.7	0.76	309.3	OK
2-6.015	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S250	S268	158.4	157.063	0.247	146.886	3.9	0.68	304.3	OK
2-9.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S251	S252	170.5	169.163	0.056	4.054	1.2	0.11	9.2	OK
2-9.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S252	S253	170.2	168.788	0.083	6.078	1.0	0.16	13.6	OK

2-9.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S253	S254	169.6	168.270	0.121	17.158	1.8	0.44	38.3	OK
2-9.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S254	S255	168.2	166.871	0.158	32.013	2.4	0.68	70.8	OK
2-9.004	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S255	S256	166.1	164.812	0.189	43.622	2.7	0.9	95.3	OK
2-9.005	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S256	S257	164.7	163.504	0.183	45.496	2.8	0.91	97.2	OK
2-9.006	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S257	S259	164.0	162.653	0.158	47.918	2.7	0.58	102.3	OK
2-9.007	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S259	S260	163.7	162.335	0.158	54.647	3.3	0.36	117.0	OK
2-9.008	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S260	S265	160.3	158.966	0.253	64.268	1.7	0.7	136.5	OK
2-10.000	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S261	S262	166.5	165.081	0.077	3.512	0.7	0.08	7.9	OK
2-10.001	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S262	S263	165.3	163.970	0.118	27.167	2.9	0.47	61.4	OK
2-10.002	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S263	S264	163.5	162.156	0.161	34.871	2.6	0.59	78.3	OK
2-10.003	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S264	S265	161.4	160.177	0.184	48.379	3.1	0.93	106.4	OK
2-9.009	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S265	S266	160.1	158.772	0.252	115.189	2.7	0.76	247.3	OK
2-9.010	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S266	S267	160.0	158.521	0.219	115.130	3.2	0.36	245.1	OK
2-9.011	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S267	S268	158.0	156.550	0.241	133.812	3.3	0.47	284.7	OK
2-6.016	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S268	S269	157.3	155.769	0.327	284.321	3.7	0.58	574.3	OK
2-6.017	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S269	S270	156.8	155.010	0.346	290.870	3.4	0.29	576.1	OK
2-6.018	1in30yr: 30 years: +0 %: 15 mins: Winter	Pipe	S270	Pond	156.7	154.043	0.386	303.435	3.1	0.65	597.3	OK
2-1.018	1in30yr: 30 years: +0 %: 600 mins: Winter	Pipe	Pond	S271	154.8	153.702	0.132	2053.196	1.6	0.83	45.6	Surcharged

2-1.019	1in30yr: 30 years: +0 %: 600 mins: Winter	Pipe	S271	S272	154.8	152.823	0.086	2062.191	2.5	0.15	41.6	OK
2-1.020	1in30yr: 30 years: +0 %: 480 mins: Winter	Pipe	S272	S273	153.5	150.967	0.080	1724.046	2.7	0.14	41.0	OK
2-1.021	1in30yr: 30 years: +0 %: 480 mins: Winter	Pipe	S273	S274	151.2	149.582	0.084	1723.909	2.5	0.16	41.0	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 2	Company Address:		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	1in30yr: 30 years: +0 %: 600 mins: Winter	153.702	153.702	1.752	1.752	163.5	1750.392	0.000	0.000	41.1	2062.687	46	OK

STORM SEWER DESIGN

Rainfall Simulation

1:100 year event

Project:	Date: 09/05/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 2	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S201	1in100yr: 100 years: +0 %: 15 mins: Winter	173.638	172.213	172.307	0.094	41.5	0.134	0.000	41.2	18.139	OK
S202	1in100yr: 100 years: +0 %: 15 mins: Winter	172.251	170.825	170.953	0.128	71.6	0.184	0.000	70.7	31.384	OK
S203	1in100yr: 100 years: +0 %: 15 mins: Winter	170.848	169.348	169.518	0.170	86.3	0.244	0.000	85.1	38.183	OK
S204	1in100yr: 100 years: +0 %: 15 mins: Winter	170.497	168.705	168.878	0.173	127.4	0.247	0.000	126.3	56.600	OK
S205	1in100yr: 100 years: +0 %: 15 mins: Winter	168.637	166.760	167.289	0.529	202.2	0.758	0.000	182.7	89.848	Surcharged
S206	1in100yr: 100 years: +0 %: 15 mins: Winter	167.244	165.590	165.919	0.329	228.2	0.471	0.000	222.3	109.731	OK
S207	1in100yr: 100 years: +0 %: 15 mins: Winter	166.834	165.259	165.486	0.227	250.7	0.324	0.000	247.2	121.954	OK
S208	1in100yr: 100 years: +0 %: 15 mins: Summer	169.527	168.102	168.190	0.088	29.9	0.126	0.000	29.7	11.660	OK
S209	1in100yr: 100 years: +0 %: 15 mins: Winter	168.532	167.024	167.185	0.161	81.2	0.231	0.000	79.6	35.525	OK
S210	1in100yr: 100 years: +0 %: 15 mins: Winter	167.245	165.745	166.084	0.339	168.6	0.485	0.000	151.0	74.340	Surcharged
S211	1in100yr: 100 years: +0 %: 15 mins: Winter	166.398	164.898	165.188	0.290	161.4	0.414	0.000	158.5	78.957	OK
S212	1in100yr: 100 years: +0 %: 15 mins: Winter	165.792	164.292	164.630	0.338	224.3	0.484	0.000	222.6	107.421	Surcharged
S213	1in100yr: 100 years: +0 %: 15 mins: Winter	165.337	163.312	163.817	0.505	469.8	0.722	0.000	441.2	229.434	Surcharged

S214	1in100yr: 100 years: +0 %: 15 mins: Summer	163.348	161.156	162.222	1.066	445.3	1.525	0.000	444.3	204.933	Surcharged
S215	1in100yr: 100 years: +0 %: 15 mins: Winter	162.525	160.297	161.356	1.059	461.2	1.515	0.000	461.4	237.617	Surcharged
S216	1in100yr: 100 years: +0 %: 15 mins: Winter	160.766	158.966	159.637	0.671	480.2	1.709	0.000	475.1	245.887	Surcharged
S217	1in100yr: 100 years: +0 %: 15 mins: Winter	161.314	158.769	159.296	0.527	540.5	1.340	0.000	527.8	274.631	OK
S218	1in100yr: 100 years: +0 %: 15 mins: Winter	163.966	162.541	162.590	0.049	15.6	0.055	0.000	15.3	6.800	OK
S219	1in100yr: 100 years: +0 %: 15 mins: Winter	162.237	158.656	159.001	0.345	581.5	0.878	0.000	565.4	297.990	OK
S220	1in100yr: 100 years: +0 %: 15 mins: Winter	160.743	157.962	158.235	0.273	617.3	0.696	0.000	605.4	320.554	OK
S221	1in100yr: 100 years: +0 %: 15 mins: Winter	159.661	158.236	158.345	0.109	54.3	0.155	0.000	53.7	23.716	OK
S223	1in100yr: 100 years: +0 %: 15 mins: Winter	159.217	156.336	156.638	0.302	694.7	0.769	0.000	678.4	359.667	OK
S224	1in100yr: 100 years: +0 %: 15 mins: Summer	159.307	157.695	157.758	0.063	21.6	0.091	0.000	21.3	8.419	OK
S226	1in100yr: 100 years: +0 %: 15 mins: Winter	157.162	155.737	155.932	0.195	42.5	0.279	0.000	39.1	18.632	OK
S227	1in100yr: 100 years: +0 %: 15 mins: Winter	157.947	155.441	155.669	0.228	56.3	0.326	0.000	55.4	26.124	OK
S228	1in100yr: 100 years: +0 %: 15 mins: Winter	158.800	155.374	155.594	0.220	55.4	0.315	0.000	53.9	26.103	OK
S229	1in100yr: 100 years: +0 %: 15 mins: Winter	158.800	155.308	155.514	0.206	53.9	0.295	0.000	52.4	26.068	OK
S230	1in100yr: 100 years: +0 %: 15 mins: Winter	158.736	154.817	155.138	0.321	750.7	1.111	0.000	745.0	394.384	OK
S231	1in100yr: 100 years: +0 %: 15 mins: Winter	158.364	153.889	154.314	0.425	745.0	1.474	0.000	729.5	394.280	OK

S232	1in100yr: 100 years: +0 %: 600 mins: Winter	154.868	153.218	153.940	0.722	105.2	2.502	0.000	103.7	1496.494	OK
S233	1in100yr: 100 years: +0 %: 15 mins: Winter	174.665	173.240	173.303	0.063	20.0	0.090	0.000	19.8	8.718	OK
S234	1in100yr: 100 years: +0 %: 15 mins: Winter	172.946	171.521	171.638	0.117	55.3	0.168	0.000	54.6	24.237	OK
S235	1in100yr: 100 years: +0 %: 15 mins: Winter	172.182	170.757	170.940	0.183	65.0	0.262	0.000	62.6	28.759	OK
S236	1in100yr: 100 years: +0 %: 15 mins: Winter	171.516	170.016	170.236	0.220	103.7	0.315	0.000	103.2	46.699	OK
S237	1in100yr: 100 years: +0 %: 15 mins: Winter	171.025	169.525	169.826	0.301	125.6	0.431	0.000	117.1	56.457	Surcharged
S238	1in100yr: 100 years: +0 %: 15 mins: Winter	170.757	169.257	169.422	0.165	125.5	0.236	0.000	126.7	60.097	OK
S239	1in100yr: 100 years: +0 %: 15 mins: Winter	169.685	168.185	168.359	0.174	145.4	0.249	0.000	144.6	68.244	OK
S240	1in100yr: 100 years: +0 %: 15 mins: Winter	168.192	166.767	166.902	0.135	13.6	0.194	0.000	11.7	5.921	OK
S241	1in100yr: 100 years: +0 %: 15 mins: Winter	168.014	166.514	166.888	0.374	185.8	0.535	0.000	170.4	89.537	Surcharged
S242	1in100yr: 100 years: +0 %: 15 mins: Summer	167.591	166.090	166.343	0.253	203.4	0.362	0.000	203.9	90.504	OK
S243	1in100yr: 100 years: +0 %: 15 mins: Winter	166.896	165.396	165.630	0.234	210.9	0.335	0.000	213.8	106.573	OK
S244	1in100yr: 100 years: +0 %: 15 mins: Winter	165.005	163.367	163.591	0.224	267.6	0.320	0.000	266.7	130.102	OK
S245	1in100yr: 100 years: +0 %: 15 mins: Winter	163.257	161.682	161.902	0.220	276.3	0.314	0.000	274.6	134.251	OK
S246	1in100yr: 100 years: +0 %: 15 mins: Winter	161.890	160.315	160.527	0.212	316.9	0.304	0.000	316.0	152.677	OK
S247	1in100yr: 100 years: +0 %: 15 mins: Winter	161.924	159.988	160.074	0.086	35.5	0.123	0.000	35.3	15.432	OK

S248	1in100yr: 100 years: +0 %: 15 mins: Summer	160.487	158.413	159.278	0.865	369.2	1.238	0.000	368.2	157.888	Surcharged
S249	1in100yr: 100 years: +0 %: 15 mins: Winter	160.264	158.393	158.747	0.354	393.1	0.507	0.000	387.0	186.522	OK
S250	1in100yr: 100 years: +0 %: 15 mins: Winter	158.372	156.797	157.131	0.334	394.2	0.478	0.000	387.0	189.586	OK
S251	1in100yr: 100 years: +0 %: 15 mins: Winter	170.537	169.112	169.171	0.059	12.0	0.084	0.000	11.9	5.231	OK
S252	1in100yr: 100 years: +0 %: 15 mins: Winter	170.152	168.727	168.796	0.069	17.8	0.099	0.000	17.6	7.842	OK
S253	1in100yr: 100 years: +0 %: 15 mins: Winter	169.597	168.165	168.288	0.123	50.3	0.176	0.000	49.4	22.136	OK
S254	1in100yr: 100 years: +0 %: 15 mins: Winter	168.159	166.734	166.904	0.170	93.3	0.243	0.000	88.4	41.211	OK
S255	1in100yr: 100 years: +0 %: 15 mins: Winter	166.058	164.633	165.406	0.773	122.8	1.106	0.000	112.0	56.205	Surcharged
S256	1in100yr: 100 years: +0 %: 15 mins: Winter	164.730	163.305	163.832	0.527	117.6	0.754	0.000	115.2	58.728	Surcharged
S257	1in100yr: 100 years: +0 %: 15 mins: Winter	163.961	162.461	162.675	0.214	119.7	0.306	0.000	120.3	61.856	OK
S259	1in100yr: 100 years: +0 %: 15 mins: Winter	163.748	162.210	162.347	0.137	139.2	0.196	0.000	137.6	70.539	OK
S260	1in100yr: 100 years: +0 %: 15 mins: Winter	160.275	158.700	159.013	0.313	165.5	0.448	0.000	161.1	82.961	OK
S261	1in100yr: 100 years: +0 %: 15 mins: Winter	166.463	165.038	165.086	0.048	10.4	0.054	0.000	10.3	4.533	OK
S262	1in100yr: 100 years: +0 %: 15 mins: Winter	165.283	163.858	163.990	0.132	80.1	0.149	0.000	79.2	35.051	OK
S263	1in100yr: 100 years: +0 %: 15 mins: Winter	163.456	162.031	162.182	0.150	102.0	0.170	0.000	101.2	44.958	OK
S264	1in100yr: 100 years: +0 %: 15 mins: Winter	161.405	159.980	160.937	0.957	141.1	1.083	0.000	134.5	62.424	Surcharged

S265	1in100yr: 100 years: +0 %: 15 mins: Winter	160.107	158.457	158.819	0.362	303.6	0.640	0.000	301.1	148.706	OK
S266	1in100yr: 100 years: +0 %: 15 mins: Winter	159.981	158.331	158.545	0.214	301.1	0.378	0.000	297.1	148.643	OK
S267	1in100yr: 100 years: +0 %: 15 mins: Winter	157.952	156.302	156.586	0.284	352.6	0.502	0.000	345.5	172.734	OK
S268	1in100yr: 100 years: +0 %: 15 mins: Winter	157.265	155.384	155.840	0.456	743.3	1.160	0.000	736.3	367.013	OK
S269	1in100yr: 100 years: +0 %: 15 mins: Winter	156.832	154.740	155.070	0.330	755.9	0.839	0.000	749.8	375.480	OK
S270	1in100yr: 100 years: +0 %: 15 mins: Winter	156.650	153.622	154.151	0.529	787.4	1.346	0.000	772.3	391.336	OK
S271	1in100yr: 100 years: +0 %: 360 mins: Winter	154.800	152.732	152.830	0.098	51.9	0.111	0.000	47.1	1540.579	OK
S272	1in100yr: 100 years: +0 %: 600 mins: Winter	153.453	150.883	150.973	0.090	47.0	0.128	0.000	46.5	2427.972	OK
S273	1in100yr: 100 years: +0 %: 600 mins: Winter	151.246	149.494	149.588	0.094	46.5	0.107	0.000	46.5	2427.840	OK
S274	1in100yr: 100 years: +0 %: 600 mins: Winter	149.417	148.925	149.011	0.086	46.5	0.000	0.000	46.5	2427.840	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 2	Company Address:		



Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
2-1.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S201	S202	173.6	172.307	0.111	18.139	2.1	0.36	41.2	OK
2-1.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S202	S203	172.3	170.953	0.149	31.384	2.5	0.61	70.7	OK
2-1.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S203	S204	170.8	169.518	0.157	38.183	2.9	0.75	85.1	OK
2-1.003	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S204	S205	170.5	168.878	0.300	56.600	2.1	0.62	126.3	OK
2-1.004	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S205	S206	168.6	167.289	0.300	89.848	2.6	1.04	182.7	Surcharged
2-1.005	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S206	S207	167.2	165.919	0.278	109.731	2.6	0.91	222.3	OK
2-1.006	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S207	S213	166.8	165.486	0.354	121.954	3.0	0.65	247.2	OK
2-2.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S208	S209	169.5	168.190	0.087	13.065	2.1	0.3	29.7	OK
2-2.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S209	S210	168.5	167.185	0.250	35.525	1.4	0.57	79.6	OK
2-2.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S210	S211	167.2	166.084	0.295	74.340	2.3	0.99	151.0	Surcharged
2-2.003	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S211	S212	166.4	165.147	0.266	70.475	2.6	0.85	158.9	OK
2-2.004	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S212	S213	165.8	164.630	0.300	107.421	3.5	0.9	222.6	Surcharged
2-1.007	1in100yr: 100 years: +0 %: 30 mins: Summer	Pipe	S213	S214	165.3	163.563	0.375	285.266	4.5	0.77	446.0	OK
2-1.008	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S214	S215	163.3	162.218	0.375	229.553	4.0	0.77	444.7	Surcharged

2-1.009	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S215	S216	162.5	161.347	0.375	212.030	4.2	1.09	461.5	Surcharged
2-1.010	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S216	S217	160.8	159.637	0.562	245.887	1.7	1.39	475.1	Surcharged
2-1.011	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S217	S219	161.3	159.296	0.436	274.631	2.2	1.13	527.8	OK
2-3.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S218	S219	164.0	162.590	0.049	6.800	2.4	0.1	15.3	OK
2-1.012	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S219	S220	162.2	159.001	0.309	297.990	3.6	0.41	565.4	OK
2-1.013	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S220	S223	160.7	158.235	0.288	320.554	4.2	0.29	605.4	OK
2-4.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S221	S223	159.7	158.345	0.105	23.716	2.9	0.43	53.7	OK
2-1.014	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S223	S230	159.2	156.638	0.283	359.667	4.8	0.32	678.4	OK
2-5.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S224	S226	159.3	157.758	0.129	9.425	1.0	0.18	21.4	OK
2-5.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S226	S227	157.2	155.932	0.180	18.632	1.1	0.97	39.1	OK
2-5.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S227	S228	157.9	155.669	0.224	26.124	1.0	0.77	55.4	OK
2-5.003	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S228	S229	158.8	155.594	0.213	26.103	1.0	0.75	53.9	OK
2-5.004	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S229	S230	158.8	155.514	0.192	26.068	1.1	0.73	52.4	OK
2-1.015	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S230	S231	158.7	155.138	0.373	394.384	3.4	0.27	745.0	OK
2-1.016	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S231	S232	158.4	154.314	0.532	394.280	2.2	0.41	729.5	OK
2-1.017	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S232	Pond	154.9	153.866	0.590	392.968	2.0	1.02	739.6	OK
2-6.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S233	S234	174.7	173.303	0.090	8.718	1.3	0.17	19.8	OK
2-6.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S234	S235	172.9	171.638	0.150	24.237	1.9	0.51	54.6	OK

2-6.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S235	S236	172.2	170.940	0.175	28.759	1.9	0.91	62.6	OK
2-6.003	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S236	S237	171.5	170.236	0.261	46.699	1.6	0.8	103.2	OK
2-6.004	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S237	S238	171.0	169.817	0.228	50.400	2.1	1.05	118.4	OK
2-6.005	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S238	S239	170.8	169.422	0.170	60.097	3.1	0.51	126.7	OK
2-6.006	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S239	S241	169.7	168.359	0.274	68.244	2.3	0.63	144.6	OK
2-7.000	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S240	S241	168.2	166.868	0.176	5.287	0.8	0.27	14.4	OK
2-6.007	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S241	S242	168.0	166.855	0.297	79.937	2.6	0.89	176.3	Surcharged
2-6.008	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S242	S243	167.6	166.343	0.243	90.504	3.4	0.8	203.9	OK
2-6.009	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S243	S244	166.9	165.630	0.223	106.573	3.8	0.85	213.8	OK
2-6.010	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S244	S245	165.0	163.591	0.222	130.102	3.9	0.58	266.7	OK
2-6.011	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S245	S246	163.3	161.902	0.216	134.251	4.2	0.53	274.6	OK
2-6.012	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S246	S248	161.9	160.527	0.375	152.677	2.9	0.61	316.0	OK
2-8.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S247	S248	161.9	160.074	0.225	15.432	1.5	0.31	35.3	OK
2-6.013	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S248	S249	160.5	159.277	0.375	176.872	3.4	3.28	371.1	Surcharged
2-6.014	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S249	S250	160.3	158.747	0.344	186.522	3.7	0.95	387.0	OK
2-6.015	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S250	S268	158.4	157.131	0.302	189.586	4.1	0.87	387.0	OK
2-9.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S251	S252	170.5	169.171	0.064	5.231	1.3	0.15	11.9	OK
2-9.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S252	S253	170.2	168.796	0.096	7.842	1.1	0.21	17.6	OK

2-9.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S253	S254	169.6	168.288	0.146	22.136	1.8	0.57	49.4	OK
2-9.003	1in100yr: 100 years: +0 %: 15 mins: Summer	Pipe	S254	S255	168.2	166.901	0.225	36.778	2.4	0.87	90.4	OK
2-9.004	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S255	S256	166.1	165.406	0.225	56.205	2.8	1.05	112.0	Surcharged
2-9.005	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S256	S257	164.7	163.832	0.225	58.728	2.9	1.08	115.2	Surcharged
2-9.006	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S257	S259	164.0	162.675	0.175	61.856	2.8	0.68	120.3	OK
2-9.007	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S259	S260	163.7	162.347	0.187	70.539	3.3	0.43	137.6	OK
2-9.008	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S260	S265	160.3	159.013	0.300	82.961	1.8	0.82	161.1	OK
2-10.000	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S261	S262	166.5	165.086	0.090	4.533	0.7	0.1	10.3	OK
2-10.001	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S262	S263	165.3	163.990	0.141	35.051	3.0	0.61	79.2	OK
2-10.002	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S263	S264	163.5	162.182	0.225	44.958	2.6	0.77	101.2	OK
2-10.003	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S264	S265	161.4	160.937	0.225	62.424	3.4	1.18	134.5	Surcharged
2-9.009	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S265	S266	160.1	158.819	0.288	148.706	2.8	0.93	301.1	OK
2-9.010	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S266	S267	160.0	158.545	0.249	148.643	3.3	0.44	297.1	OK
2-9.011	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S267	S268	158.0	156.586	0.295	172.734	3.3	0.57	345.5	OK
2-6.016	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S268	S269	157.3	155.840	0.393	367.013	3.8	0.74	736.3	OK
2-6.017	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S269	S270	156.8	155.070	0.429	375.480	3.5	0.38	749.8	OK
2-6.018	1in100yr: 100 years: +0 %: 15 mins: Winter	Pipe	S270	Pond	156.7	154.151	0.474	391.336	3.2	0.84	772.3	OK
2-1.018	1in100yr: 100 years: +0 %: 480 mins: Winter	Pipe	S271	S271	154.8	153.938	0.142	2000.023	1.6	0.94	52.0	Surcharged

2-1.019	1in100yr: 100 years: +0 %: 360 mins: Winter	Pipe	S271	S272	154.8	152.830	0.092	1540.579	2.6	0.17	47.1	OK
2-1.020	1in100yr: 100 years: +0 %: 600 mins: Winter	Pipe	S272	S273	153.5	150.973	0.086	2427.972	2.8	0.16	46.5	OK
2-1.021	1in100yr: 100 years: +0 %: 600 mins: Winter	Pipe	S273	S274	151.2	149.588	0.090	2427.840	2.6	0.18	46.5	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 2	Company Address:		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	1in100yr: 100 years: +0 %: 600 mins: Winter	153.940	153.940	1.990	1.990	208.0	2236.571	0.000	0.000	46.6	2428.848	32	OK

STORM SEWER DESIGN

Rainfall Simulation

1:100 year event +40% Climate Change

Project:	Date: 09/05/2023	
	Designed by: Bletchl	Checked by: Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 2	Company Address:	

Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S201	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	173.638	172.213	172.327	0.114	58.1	0.163	0.000	57.7	25.371	OK
S202	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	172.251	170.825	171.021	0.196	100.2	0.280	0.000	85.7	43.864	OK
S203	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	170.848	169.348	170.198	0.850	107.5	1.217	0.000	101.9	53.258	Surcharged
S204	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	170.497	168.705	169.666	0.961	157.1	1.375	0.000	144.5	79.013	Surcharged
S205	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	168.637	166.760	168.639	1.879	250.7	5.146	2.460	224.3	124.929	Flood
S206	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	167.244	165.590	166.818	1.228	288.0	1.757	0.000	272.6	152.968	Surcharged
S207	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	166.834	165.259	166.271	1.012	312.3	1.448	0.000	296.7	169.920	Surcharged
S208	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.527	168.102	168.208	0.106	41.9	0.151	0.000	39.0	18.134	OK
S209	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	168.532	167.024	168.074	1.050	111.2	1.502	0.000	108.4	49.477	Surcharged
S210	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	167.245	165.745	167.252	1.507	233.1	9.624	7.478	156.2	104.147	Flood
S211	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	166.398	164.898	166.371	1.473	169.2	2.108	0.000	165.7	98.865	Surcharged
S212	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	165.792	164.292	165.797	1.505	260.3	7.246	5.100	235.3	150.796	Flood
S213	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	165.337	163.312	165.014	1.702	513.6	2.436	0.000	505.2	321.126	Surcharged

S214	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.348	161.156	163.036	1.880	505.2	2.691	0.000	506.8	321.283	Surcharged
S215	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	162.525	160.297	161.950	1.653	525.3	2.365	0.000	525.9	332.576	Surcharged
S216	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	160.766	158.966	159.789	0.823	545.3	2.093	0.000	543.9	344.951	Surcharged
S217	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	161.314	158.769	159.366	0.597	633.3	1.518	0.000	623.5	384.861	OK
S218	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.966	162.541	162.599	0.058	21.8	0.066	0.000	21.5	9.519	OK
S219	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	162.237	158.656	159.046	0.390	698.6	0.992	0.000	685.4	417.655	OK
S220	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	160.743	157.962	158.273	0.311	758.1	0.792	0.000	747.2	449.276	OK
S221	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	159.661	158.236	158.371	0.135	76.0	0.193	0.000	75.2	33.199	OK
S223	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	159.217	156.336	156.687	0.351	872.2	0.893	0.000	860.6	504.047	OK
S224	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	159.307	157.695	157.770	0.075	30.2	0.107	0.000	30.0	13.174	OK
S226	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	157.162	155.737	156.213	0.476	59.6	0.681	0.000	54.5	26.076	Surcharged
S227	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	157.947	155.441	155.770	0.329	78.6	0.471	0.000	75.5	36.566	Surcharged
S228	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	158.800	155.374	155.662	0.288	75.5	0.412	0.000	73.4	36.548	OK
S229	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	158.800	155.308	155.563	0.255	73.4	0.365	0.000	71.3	36.513	OK
S230	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	158.736	154.817	155.197	0.380	959.8	1.317	0.000	950.1	552.686	OK
S231	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	158.364	153.889	154.389	0.500	950.1	1.732	0.000	942.7	552.656	OK

S232	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	154.868	153.218	154.362	1.144	128.9	3.962	0.000	127.3	2199.143	Surcharged
S233	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	174.665	173.240	173.315	0.075	27.9	0.107	0.000	27.9	10.889	OK
S234	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	172.946	171.521	171.790	0.269	78.0	0.385	0.000	63.3	33.894	Surcharged
S235	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	172.182	170.757	171.481	0.724	75.1	1.037	0.000	78.3	39.985	Surcharged
S236	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	171.516	170.016	170.729	0.713	128.5	1.020	0.000	125.2	65.205	Surcharged
S237	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	171.025	169.525	170.194	0.669	156.5	0.957	0.000	154.1	78.923	Surcharged
S238	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	170.757	169.257	169.491	0.234	165.9	0.334	0.000	166.0	83.967	OK
S239	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.685	168.185	168.988	0.803	192.2	1.150	0.000	176.6	95.406	Surcharged
S240	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	168.192	166.767	167.905	1.138	19.0	1.629	0.000	28.3	8.361	Surcharged
S241	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	168.014	166.514	167.889	1.375	222.3	1.968	0.000	225.4	125.323	Surcharged
S242	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	167.591	166.090	167.136	1.046	252.4	1.497	0.000	252.1	141.811	Surcharged
S243	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	166.896	165.396	166.191	0.795	262.6	1.137	0.000	265.0	149.140	Surcharged
S244	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	165.005	163.367	163.628	0.261	325.5	0.374	0.000	325.8	182.015	OK
S245	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.257	161.682	162.355	0.673	339.2	0.964	0.000	328.1	187.839	Surcharged
S246	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	161.890	160.315	161.616	1.301	369.5	1.862	0.000	369.0	213.755	Surcharged
S247	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	161.924	159.988	160.604	0.616	49.8	0.881	0.000	41.6	21.619	Surcharged

S248	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	160.487	158.413	160.487	2.074	425.7	3.206	0.238	431.4	247.704	Surcharged
S249	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	160.264	158.393	159.871	1.478	450.6	2.115	0.000	451.1	260.757	Surcharged
S250	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	158.372	156.797	157.632	0.835	457.4	1.195	0.000	457.9	265.602	Surcharged
S251	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	170.537	169.112	169.183	0.071	16.8	0.102	0.000	16.6	7.323	OK
S252	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	170.152	168.727	168.808	0.081	25.0	0.117	0.000	24.6	10.957	OK
S253	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	169.597	168.165	168.742	0.577	70.4	0.826	0.000	55.8	30.845	Surcharged
S254	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	168.159	166.734	168.137	1.403	112.4	2.007	0.000	106.4	57.675	Surcharged
S255	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	166.058	164.633	166.061	1.428	151.7	5.329	3.289	126.8	78.726	Flood
S256	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	164.730	163.305	164.168	0.863	133.0	1.235	0.000	132.2	82.279	Surcharged
S257	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.961	162.461	162.706	0.245	142.2	0.351	0.000	142.1	86.661	OK
S259	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.748	162.210	162.365	0.155	170.0	0.222	0.000	169.6	98.785	OK
S260	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	160.275	158.700	159.173	0.473	208.7	0.677	0.000	206.2	116.137	Surcharged
S261	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	166.463	165.038	165.094	0.056	14.5	0.063	0.000	14.3	6.331	OK
S262	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	165.283	163.858	164.348	0.490	112.2	0.554	0.000	97.0	48.994	Surcharged
S263	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	163.456	162.031	163.216	1.185	128.9	1.340	0.000	122.8	62.911	Surcharged
S264	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	161.405	159.980	161.409	1.429	178.7	5.235	3.624	152.0	87.422	Flood

S265	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	160.107	158.457	158.890	0.433	369.4	0.766	0.000	367.5	208.278	OK
S266	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	159.981	158.331	158.573	0.242	367.5	0.428	0.000	365.2	208.214	OK
S267	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	157.952	156.302	156.647	0.345	442.9	0.610	0.000	435.4	241.951	OK
S268	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	157.265	155.384	155.915	0.531	875.9	1.352	0.000	877.2	458.848	OK
S269	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	156.832	154.740	155.135	0.395	881.7	1.006	0.000	854.5	653.329	OK
S270	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	156.650	153.622	154.757	1.135	970.1	2.889	0.000	1061.4	488.638	Surcharged
S271	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	154.800	152.732	152.841	0.109	62.1	0.124	0.000	56.1	3494.725	OK
S272	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	153.453	150.883	150.982	0.099	56.1	0.141	0.000	55.1	3494.135	OK
S273	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	151.246	149.494	149.598	0.104	55.1	0.118	0.000	55.0	3494.012	OK
S274	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	149.417	148.925	149.019	0.094	55.0	0.000	0.000	55.0	3494.012	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 2	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
2-1.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S201	S202	173.6	172.327	0.155	25.371	2.2	0.51	57.7	OK
2-1.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S202	S203	172.3	171.000	0.225	39.148	2.6	0.77	90.2	OK
2-1.002	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S203	S204	170.8	170.198	0.225	53.258	2.9	0.9	101.9	Surcharged
2-1.003	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S204	S205	170.5	169.480	0.300	98.268	2.1	0.72	146.9	Surcharged
2-1.004	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S205	S206	168.6	168.637	0.300	111.468	3.2	1.3	227.9	Flood
2-1.005	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S206	S207	167.2	166.818	0.375	152.968	2.5	1.12	272.6	Surcharged
2-1.006	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S207	S213	166.8	166.271	0.375	169.920	3.2	0.77	296.7	Surcharged
2-2.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S208	S209	169.5	168.204	0.225	16.171	2.1	0.42	41.7	OK
2-2.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S209	S210	168.5	168.074	0.300	49.477	1.5	0.77	108.4	Surcharged
2-2.002	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S210	S211	167.2	167.249	0.300	129.369	2.3	1.06	161.3	Flood
2-2.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S211	S212	166.4	166.369	0.300	110.732	2.7	0.9	168.1	Surcharged
2-2.004	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S212	S213	165.8	165.797	0.300	150.796	3.6	0.95	235.3	Flood
2-1.007	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S213	S214	165.3	165.014	0.375	321.126	4.6	0.87	505.2	Surcharged
2-1.008	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S214	S215	163.3	163.036	0.375	321.283	4.6	0.87	506.8	Surcharged

2-1.009	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S215	S216	162.5	161.950	0.375	332.576	4.8	1.25	525.9	Surcharged
2-1.010	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S216	S217	160.8	159.789	0.600	344.951	1.9	1.59	543.9	Surcharged
2-1.011	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S217	S219	161.3	159.366	0.493	384.861	2.3	1.34	623.5	OK
2-3.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S218	S219	164.0	162.599	0.058	9.519	2.7	0.14	21.5	OK
2-1.012	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S219	S220	162.2	159.046	0.350	417.655	3.7	0.49	685.4	OK
2-1.013	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S220	S223	160.7	158.273	0.331	449.276	4.3	0.36	747.2	OK
2-4.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S221	S223	159.7	158.371	0.130	33.199	3.2	0.6	75.2	OK
2-1.014	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S223	S230	159.2	156.687	0.328	504.047	5.0	0.41	860.6	OK
2-5.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S224	S226	159.3	157.770	0.225	13.174	1.0	0.25	30.0	OK
2-5.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S226	S227	157.2	156.213	0.225	26.076	1.4	1.35	54.5	Surcharged
2-5.002	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S227	S228	157.9	155.770	0.300	36.566	1.1	1.05	75.5	Surcharged
2-5.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S228	S229	158.8	155.662	0.272	36.548	1.1	1.02	73.4	OK
2-5.004	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S229	S230	158.8	155.563	0.232	36.513	1.2	0.99	71.3	OK
2-1.015	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S230	S231	158.7	155.197	0.440	552.686	3.5	0.34	950.1	OK
2-1.016	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S231	S232	158.4	154.389	0.635	552.656	2.4	0.54	942.7	OK
2-1.017	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S232	Pond	154.9	153.989	0.684	548.464	2.2	1.29	936.6	Surcharged
2-6.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S233	S234	174.7	173.314	0.172	12.187	1.4	0.24	28.2	OK
2-6.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S234	S235	172.9	171.737	0.225	30.255	2.0	0.62	66.7	OK

2-6.002	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S235	S236	172.2	171.481	0.225	39.985	2.0	1.14	78.3	Surcharged
2-6.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S236	S237	171.5	170.729	0.300	65.205	1.8	0.97	125.2	Surcharged
2-6.004	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S237	S238	171.0	170.194	0.300	78.923	2.2	1.37	154.1	Surcharged
2-6.005	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S238	S239	170.8	169.491	0.300	83.967	3.1	0.67	166.0	OK
2-6.006	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S239	S241	169.7	168.988	0.300	95.406	2.5	0.77	176.6	Surcharged
2-7.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S240	S241	168.2	167.905	0.225	8.307	0.7	0.53	28.3	Surcharged
2-6.007	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S241	S242	168.0	167.889	0.300	125.268	3.2	1.14	225.4	Surcharged
2-6.008	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S242	S243	167.6	167.136	0.300	141.811	3.6	0.99	252.1	Surcharged
2-6.009	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S243	S244	166.9	166.191	0.300	149.140	3.8	1.05	265.0	Surcharged
2-6.010	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S244	S245	165.0	163.628	0.375	182.015	4.1	0.7	325.8	OK
2-6.011	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S245	S246	163.3	161.954	0.375	233.471	4.3	0.64	330.0	OK
2-6.012	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S246	S248	161.9	161.388	0.375	190.808	3.4	0.71	370.4	Surcharged
2-8.000	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S247	S248	161.9	160.411	0.225	26.921	1.5	0.38	42.8	Surcharged
2-6.013	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S248	S249	160.5	160.487	0.375	247.704	3.9	3.82	431.4	Surcharged
2-6.014	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S249	S250	160.3	159.871	0.375	260.757	4.1	1.1	451.1	Surcharged
2-6.015	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S250	S268	158.4	157.632	0.375	265.602	4.1	1.03	457.9	Surcharged
2-9.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S251	S252	170.5	169.183	0.076	7.323	1.4	0.2	16.6	OK
2-9.001	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S252	S253	170.2	168.808	0.199	9.783	1.1	0.29	25.0	OK

2-9.002	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S253	S254	169.6	168.482	0.225	38.362	1.7	0.67	57.7	Surcharged
2-9.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S254	S255	168.2	168.137	0.225	57.675	2.7	1.02	106.4	Surcharged
2-9.004	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S255	S256	166.1	166.061	0.225	78.726	3.2	1.19	126.8	Flood
2-9.005	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S256	S257	164.7	164.168	0.225	82.279	3.3	1.24	132.2	Surcharged
2-9.006	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S257	S259	164.0	162.706	0.200	86.661	2.9	0.81	142.1	OK
2-9.007	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S259	S260	163.7	162.365	0.277	98.785	3.3	0.53	169.6	OK
2-9.008	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S260	S265	160.3	159.173	0.375	116.137	1.9	1.06	206.2	Surcharged
2-10.000	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S261	S262	166.5	165.094	0.225	6.331	0.7	0.14	14.3	OK
2-10.001	1in100yr+40 CC: 100 years: +40 %: 30 mins: Summer	Pipe	S262	S263	165.3	164.096	0.225	60.857	2.8	0.75	97.6	Surcharged
2-10.002	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S263	S264	163.5	163.216	0.225	62.911	3.1	0.93	122.8	Surcharged
2-10.003	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S264	S265	161.4	161.409	0.225	87.422	3.8	1.34	152.0	Flood
2-9.009	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S265	S266	160.1	158.890	0.338	208.278	2.9	1.13	367.5	OK
2-9.010	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S266	S267	160.0	158.573	0.294	208.214	3.5	0.53	365.2	OK
2-9.011	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S267	S268	158.0	156.647	0.363	241.951	3.2	0.72	435.4	OK
2-6.016	1in100yr+40 CC: 100 years: +40 %: 15 mins: Winter	Pipe	S268	S269	157.3	155.915	0.431	514.039	4.2	0.89	881.4	OK
2-6.017	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S269	S270	156.8	155.115	0.600	469.058	3.5	0.46	917.6	OK
2-6.018	1in100yr+40 CC: 100 years: +40 %: 15 mins: Summer	Pipe	S270	Pond	156.7	154.757	0.600	488.638	3.8	1.15	1061.4	Surcharged
2-1.018	1in100yr+40 CC: 100 years: +40 %: 480 mins: Winter	Pipe	Pond	S271	154.8	154.355	0.158	2428.754	1.7	1.14	62.6	Surcharged

2-1.019	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	Pipe	S271	S272	154.8	152.841	0.102	3494.725	2.7	0.21	56.1	OK
2-1.020	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	Pipe	S272	S273	153.5	150.982	0.094	3494.135	2.9	0.19	55.1	OK
2-1.021	1in100yr+40 CC: 100 years: +40 %: 720 mins: Winter	Pipe	S273	S274	151.2	149.598	0.099	3494.012	2.7	0.21	55.0	OK

Project:	Date: 09/05/2023		
	Designed by: Bletchl	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 2	Company Address:		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	1in100yr+40CC: 100 years: +40 %: 720 mins: Winter	154.362	154.362	2.412	2.412	254.7	3175.311	0.000	0.000	55.1	3495.139	3	OK