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Flood Risk Statement & Drainage Strategy

Garwood Street, South Shields

for

South Tyne Building Supplies

JK-7325

November 2023

Flood Risk Statement & Drainage Strategy

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for

South Tyne Building Supplies

Revision	Date of issue	Comments	Prepared By	Checked By
0	10.11.23	First Issue	SB	AH
1	26.02.24	Updated to suit revised layout	SB	AH

Should you have any queries relating to this document please contact:

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Introduction

This statement identifies flooding or surface water management issues relating redevelopment of the brown field site to the west of the Garwood Street in South Shields. As the development is entirely within Flood Zone 1, occupies less than a hectare and will not constitute a change of use to a more vulnerable class, this statement is intended to provide a summary of the key flood risk information and is not formatted to provide the level of detail that would typically be presented in a comprehensive flood risk assessment.

Site Location

The proposed development is located to the west of Garwood street and south of Smith street in South Shields. The developable site is the eastern side of a wider site that is subject to future development. The site is brown field that was previously occupied by residential properties that have been demolished.

The proposed developable area is centred on National Grid Reference 435769mE, 565854mN and the development zone covers an area of approximately 0.79 hectares. The lowest level of the site is 4m AoD which is at proposed site access from Smith Street. The high point of the developable area is 6m AoD this is along the Southern boundary at the bottom of a large embankment.

Nearby water features include the following: -

- River Tyne (Main River) - approximately 400m to the west of the site

The Proposed Development

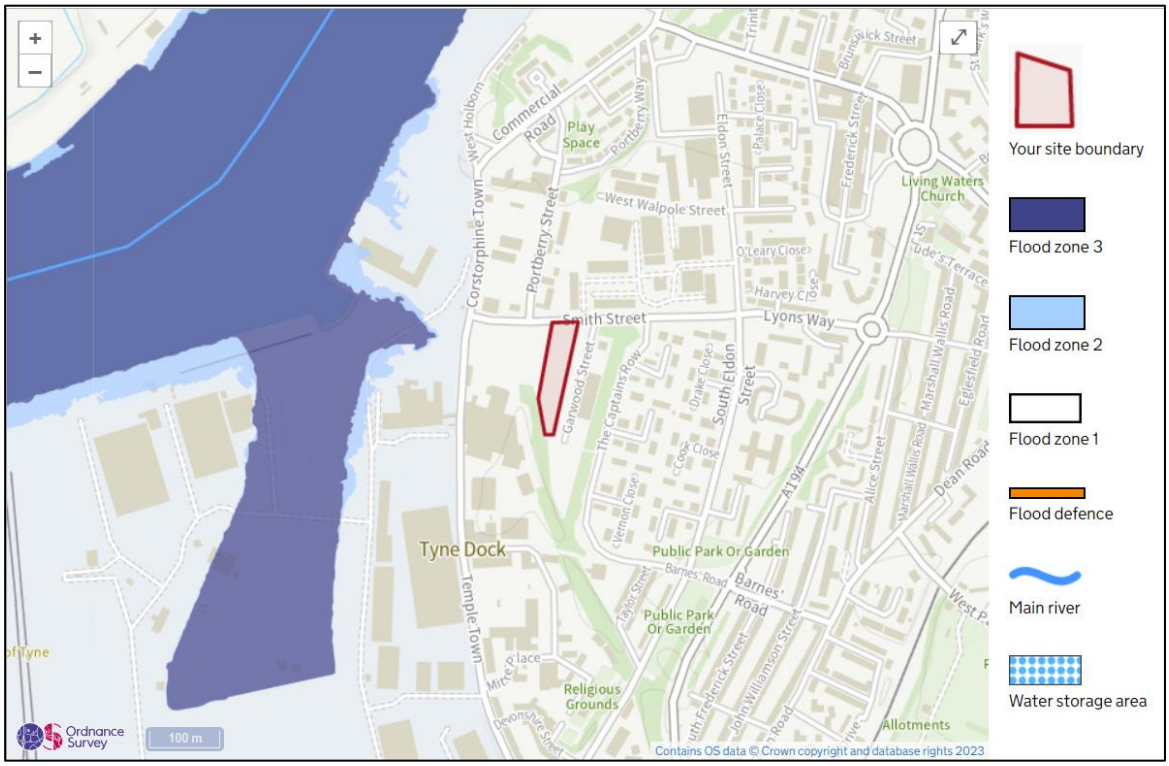
The proposed development consists of a 9 commercial units and the associated access road and parking.

Proposed Site Layout – IB Architects

Fluvial and Tidal Flood Risk

The flood maps for planning provided by the EA indicate the extent of extreme flooding from surface water, rivers or the sea and reservoirs that would occur without the presence of flood defences. The maps indicate that the site is **entirely within Flood Zone 1** and therefore has less than 0.1% chance of fluvial flooding each year.

It should be noted that the flood map areas assume no defences and does not consider the likelihood that flood risk will be increased by climatic change.

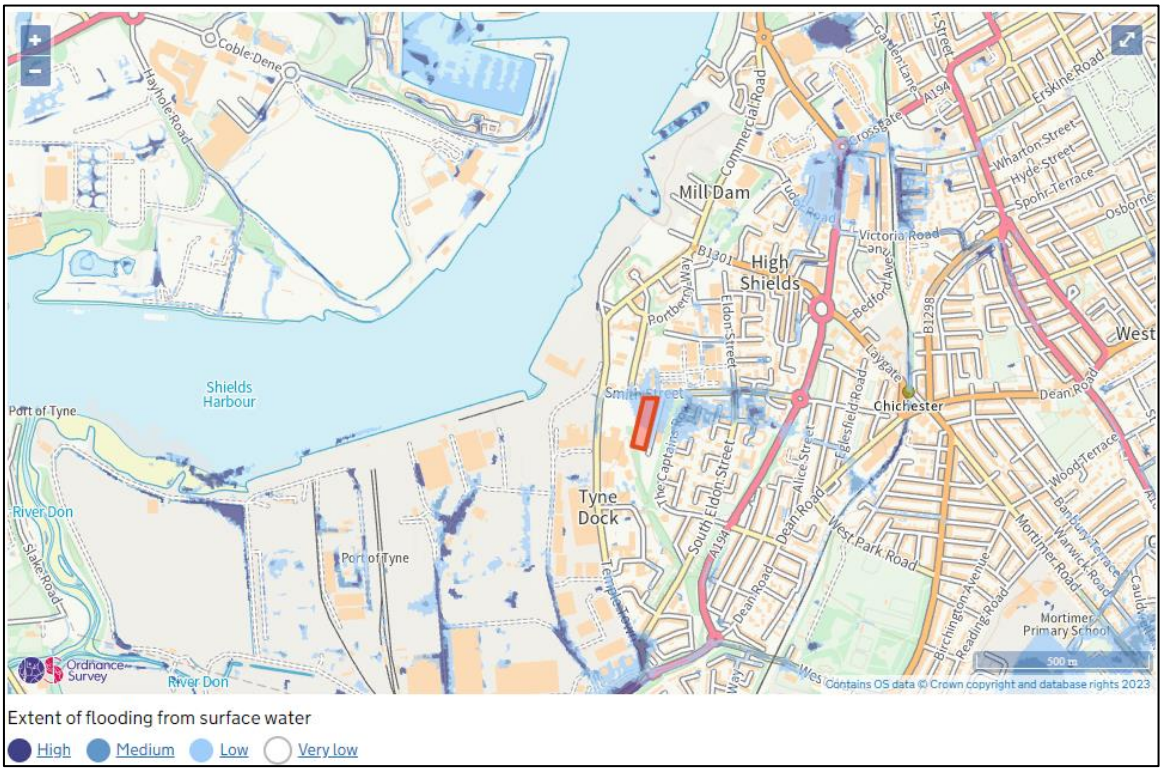


Flood Risk Zones (Fluvial and Tidal) – EA

Surface Water Flood Risk

The plan below is an extract from the EA surface water flood risk map which shows that there is a **low risk of surface water flooding** within the site boundary covering approximately 50% of the site. As the site is currently brown field with no formal drainage present this would be expected.

The EA flood plans represent the best available current information on the extent of flood risk. However, it should be noted, that these maps are indicative only, and are to be used as a basis of consultation and not as the sole basis for decisions on where planning policies apply.



Surface Water Flood Risk - EA

The way in which the Environment Agency categorises is summarised in the table below:-

High	Flooding occurring as a result of rainfall with a greater than 1 in 30 chance in any given year (annual probability of flooding 3.3%)
Medium	Flooding occurring as a result of rainfall of between 1 in 100 (1%) and 1 in 30 (3.3%) chance in any given year
Low	Flooding occurring as a result of rainfall of between 1 in 1000 (0.1%) and 1 in 100 (1%) chance in any given year
Very Low	Flooding occurring as a result of rainfall with less than 1 in 1000 (0.1%) chance in any given year

Surface Water Flood Risk Zone Definitions – EA

Surface water flood maps use LIDAR information to identify low areas of topography where surface water can become trapped and in lieu of more detailed information, a particular discharge rate is assumed to quantify how quickly the flood water will drain.

It should be noted that the proposed development will be constructed over this area which is shown to be at risk of surface water flooding and the new drainage system has been designed to accommodate all storm events for up to and including the 1 in 100 year event with a 45% allowance for climate change, with no resulting flooding.

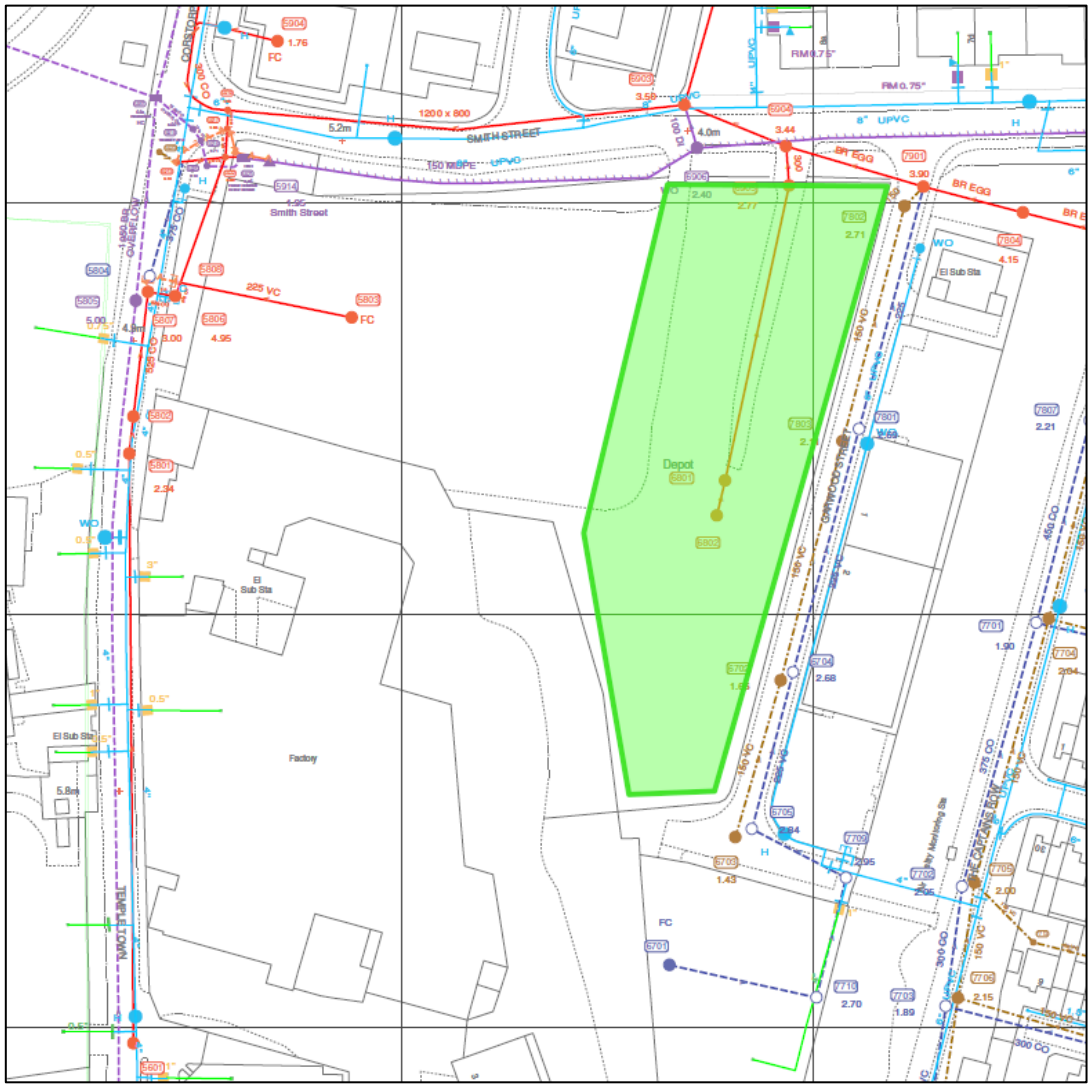
Other Flood Risks

The site is **at risk of flooding from reservoirs** in the event these structures were to fail. The likelihood of this happening is considered to be minimal and as a result deemed not to be a significant risk. The phase 1 SI and online Magic Maps GIS identify that the site is at low risk of flooding from groundwater, however additional intrusive site investigation is to be carried out at later stages.

Existing Drainage

There is currently identified on site an adopted combined sewer. This is believed to have served the residential properties that used to occupy the site. This drain is now considered to be out of use and the upstream chambers were not located during a survey works.

In addition to the combined sewer the site has surface water and foul drainage to the east in Garwood street and a large diameter combined sewer to the north in Smith Street.



Public Sewer Network – Northumbrian Water

Surface Water Drainage

Discharge Location

Infrastructure protocol states that a designer should consider the following in order of preference before finalising a surface water design statement for the development.

1. Discharge via infiltration, or where this is not reasonably practicable,
2. Discharge to a watercourse, or where this is not reasonably practicable,
3. Discharge to a public sewer network.

Method 1 – Discharge via infiltration

The initial ground investigation confirms that the ground conditions are unlikely to be suitable for surface water discharge via Infiltration.

Therefore, it is considered unfeasible to rely on this method of discharge.

Method 2 – Discharge to a watercourse

The nearest watercourse is approximately 400m away from the site. Any discharge directly into the watercourse would require a new drain to be laid under an existing public highway and then under an area of land which is under third party ownership.

Method 3 – Discharge to a public sewer network

An existing public surface water overflow sewer with a diameter of 1200mm lies under the junction of Smith Street, Temple Town and Corstorphine Town. This drain then heads west and ultimately discharges into the river Tyne. A pre-planning enquiry has been submitted to Northumbrian Water to explore the possibility of a connection into their sewer network. Their response confirms that a maximum discharge rate of 7l/s can be accommodated within the sewer at manhole 5916 if methods 1 and 2 above are unfeasible.

Method 3 provides the most feasible surface water discharge option.

Proposed Drainage Design Strategy

Existing Drainage

Before considering the proposed drainage strategy it is important to consider how surface water from the site currently drains. It can be seen from a walkover survey and the topographical survey that although the NWL plans show existing sewer infrastructure, the site does not currently benefit from any formal positive drainage system. This is also backed up by the surface water flooding plan from the EA included earlier in this report.

To find the greenfield run off rates for the site the ICP SUDS method within InfoDrainage software has been used and is summarised below.

Storm Event	Greenfield run off rate per hectare (litres/second/hectare)	Discharge Rate for the development based on impermeable areas - 0.49ha (l/s)
1 in 1 year	1.4	0.7
1 in 30 year	2.9	1.4
1 in 100 year	3.4	1.7
QBAR	1.7	0.8

Proposed Drainage

Separate foul and surface water drainage will be provided to service the development. These drains will connect to the existing NWL public sewer via the manholes identified in the PPE response (**Appendix C**).They have accepted that the foul flows can discharge unrestricted into Manhole 6905. They have advised that a maximum discharge rate of 7.0l/s will be acceptable into manhole 5916.

The drainage strategy can be found in **Appendix E**. This shows that the parking bays will be constructed using a permeable construction that will provide source control, attenuation and a level treatment that will improve the water quality. The remainder of the site impermeable areas will be drained by traditional methods, RWPs and road gullies. The surface water flows from the site will be restricted to 7l/s as advised by NWL. This will be achieved using a hydrobrake flow control with the excess flows stored in a below ground cellular attenuation system. Details of which are included in the drainage strategy.

Although this is a brownfield site, in accordance with the NPPF and LLFA requirements, surface water discharge will be required to be limited as close as possible to the greenfield runoff rate based of the drained areas of the development. Exceedance flows generated by the development are required to be managed on site. National Standards and Core Strategic Policy CS17 and UDP Policy POL14 require surface water drainage systems to be designed to meet the following requirements:

- No surcharge for a 1 in 2-year return period event
- No flooding for a 1 in 30-year return period event
- No flooding of buildings or third-party land for a 1 in 100 year return period event with an allowance for climate change. As stated previously in this report, 45% climate change will be applied to peak rainfall rates in keeping with current EA guidance.

Hydraulic modelling has been undertaken and the results are presented in **Appendix F.** These show that the drainage system will attenuate surface water flows to 7.0l/s which is the

allowable discharge rate from NWL for all events up to and including the 1 in 100 plus 45% climate change event.

No flooding will occur for all events up to and including the 1 in 100 plus 45% climate change event. Modelling shows surcharging during the 1 in 1 year, 1 in 30 year and 1 in 100 year events. The surcharge events are within design tolerances for the network and do not present a risk to the safe operation of the site or impede access/egress.

Flows will be restricted using four Hydrobrake Optimum device.

Water Quality

CIRIA Document C753 – The SuDS Manual provides guidance on the required Water Quality Management. For sites which will drain to a surface water system, a table is provided containing pollution hazard indices for different land use classifications (see below).

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]

Pollution Hazard Indices – C753

For the building, access road and associated parking areas the 'pollution hazard level' is adjudged to be 'Low'. This is because there is less risk of pollutants washing into the surface water drainage system compared to heavily used roads or industrial premises. The 'pollution hazard level' of runoff from the roofs of residential buildings is adjudged to be 'very low'. The anticipated pollution hazard indices comprise of Total Suspended Solids (TSS),

Heavy metals (Metals) and Hydrocarbons. The table confirms the following mitigation indices for this development.

Area	Hazard Level	TSS	Metals	Hydrocarbons
Roofs	Low	0.3	0.2	0.05
External Trafficked Areas	Medium	0.7	0.6	0.7

C753 provides indicative SuDS mitigation indices that can be achieved for a range of SuDS components.

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.		

SuDS Mitigation Indices – C753

All parking areas are proposed to be drained via permeable paving, which will provide a suitable level of treatment for the proposed use. The main access road and roof drainage, as well as the treated car park run off will all pass through a downstream defender.

Maintenance

The surface water drainage must be maintained to ensure that it will continue to perform as designed. The drainage within the curtilage of the site and prior to the connection, with either the existing private sewers or the public networks, will be maintained by the owner/occupier.

C753 provides typical maintenance activities and required frequency for a range of drainage components. Those listed below are applicable to the drainage system proposed at this development.

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Permeable Paving Maintenance – C753

Specific maintenance information will be provided by the manufacturer of the permeable paving system that is installed and this information will be added to an Opereation and Maintenance manual to be provided to the occupier.

Maintenance information for the other drainage components can be found below based on industry best practice.

Drainage Component	Comments	Regular Maintenance	Occasional Maintenance	Remedial Maintenance
Flow Control Chamber	Positioned within road junction but to one side to facilitate access	Inspect monthly for 3 months then annually and after every significant rainfall event.	Ensure pivoting by-pass door is in good working order using the operating rope which should be within reach of the chamber cover. Remove silt from chamber when it exceeds 100mm.	Ensure unit is securely fixed to chamber wall and fix any broken parts
Silt Trap chambers / Gullies with silt traps	These have positioned prior to flows entering the piped drainage system and prior to RWPs connecting into permeable paving sub base	Inspect monthly for 3 months to check silt accumulation and establish silt removal frequencies.	Remove silt from chamber every 2 years or when it exceeds 100mm.	Repair physical damage if necessary
Pipes drainage system and manholes	These have been positioned where there is good access	Inspect monthly for 3 months and then annually. Identify any areas that are not operating correctly and if necessary, take remedial action.	Every 5 years or as required survey inside pipes using CCTV to check for sediment build up and remove if necessary.	Repair physical damage if necessary

Drainage System Maintenance Schedule

Foul Water Drainage

A pre-planning enquiry has been submitted to NWL for them to assess whether new foul drainage from the development can be connected into the existing combined public sewer which runs within our site boundary. Their response in **Appendix C** confirms that this is acceptable. Our intension is to connect into the manhole at the boundary 6905 with the existing length on drainage within the site boundary legally abandoned and removed as part of our works, once this length is proven to no longer be a live drain.

All private foul water drainage should be designed in accordance with the current Building Regulations Part H and will be maintained by the owner/occupier.

Conclusions

Flood Risk

Jasper Kerr Consulting Engineers Ltd were commissioned by South Tyne Building Supplies to undertake a Flood Risk Assessment (FRA) and Drainage Strategy to be submitted with the full Planning Application for the proposed development at a vacant development plot to the south of Smith Street, South Shields. The development comprises nine mixed-use commercial units with associated infrastructure and parking. The overall development covers an area of 0.79 with the positively drainage impermeable area equating to 0.58Ha.

The EA's Flood Zone Maps shows that the site is located within Flood Zone 1, where there is less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year. It can therefore be considered that the Sequential Test has been passed.

In accordance with Planning Policy Guidance, as the site is within Flood Zone 1, incorporating "Less Vulnerable" development, the development is appropriate without the need for an Exception Test.

EA flood plans show that there is 1 area within the existing site which is classified as having a low surface water flood risk. The area in question is to the north of the site, this area is very flat and currently doesn't benefit from any positive drainage. The site will be reprofiled and positive drainage installed which will effectively remove the majority of the contributing area for the surface run-off from the site and hence the source of this area of standing water will be removed.

It has been demonstrated that the proposed development will have a low to very low risk of flooding from surface water, sewers and groundwater.

This Flood Risk Assessment has confirmed that the proposed development is appropriate and sustainable in the terms as set out in NPPF.

Drainage Strategy

The site is underlain with glacial till which is relatively impermeable and therefore the site is not suitable to discharge surface water via infiltration.

The nearest watercourse is approximately 400m away from the site. Any discharge directly into the watercourse would require a new drain to be laid under an existing public highway (Broad Law) and then under an area of land which is under third party ownership. This would cause heavy disruption to the area particular in the location at the roundabout immediately south of the proposed development.

There are public sewers within the highways to the north and the east of the development. The most acceptable sewer for surface water is a manhole to the west of the whole site boundary without crossing third party land. A pre-planning enquiry has been submitted to Northumbrian Water who have confirmed that they will permit surface water to discharge into the surface water sewer at a rate not exceeding 7l/s. They have also confirmed that foul water from the development can connect into the combined sewer within the site boundary prior to the connection within Smith Street.

The drainage strategy presented in **Appendix E** shows that surface water will be attenuated at a rate equivalent to the calculated greenfield runoff rate for the 1 in 100 plus 40% climate change event. The discharge will be limited to 7l/s through the use of a hydrobrake flow control device. Storage of attenuated storm water will be catered for in a combination of permeable parking bays and a cellular storage structure.

Report Conditions

The report is based on the information that has been acquired and/or made available to Jasper Kerr Consulting Engineers Ltd via the various searches and consultations undertaken as part of this assessment. In some cases, anecdotal information has been relied upon, where documented evidence has been lacking.

The conclusions drawn in the above report are considered correct although any subsequent additional information may allow refinement of the conclusions.

All work carried out in preparing this report has utilised and is based upon Jasper Kerr Consulting Engineers Ltd professional knowledge and understanding of current UK standards and codes, technology and legislation. Changes in this legislation and guidance may occur at any time in the future and cause any conclusions to become inappropriate or incorrect.

This report has been prepared using information contained in maps and documents prepared by others. Jasper Kerr Consulting Engineers Ltd can accept no responsibility for the accuracy of such information.

Appendix A

Site Location Plan


Garwood Street Site
Legend
1 More than 2 Brew
Feature 1
Feature 2
Garwood St
Site Boundary
Smith St
Portberry St
Quality Glass (dg)
1 More than 2 Brew
Viking Plywood & Timber
Vforce
BST Fabrics
Garwood St
Avides Ne Limited
Jumbo Jim Soft Play
The Captains Row
Anson Cl
Raleigh Cl
Cook Cl
Temple Town
Ford Engineering
The Waggy Warehouse
Riverview Cars
south shields storage.com
Westoe Removals & Storage
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
N
100 m

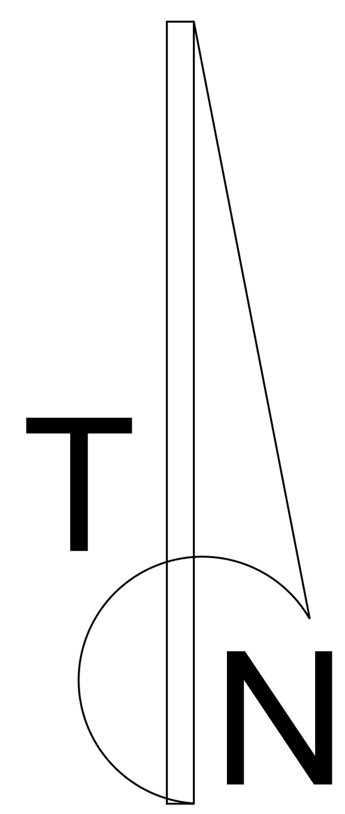
Appendix B

Topographic Survey

Legend

Water pipe	
Underground electric cable	
CCTV Underground Cable	
Surface Water Pipe	
Foul Water Pipe	
Unidentified Cable	
Overhead electric cable	
Gas underground	
BT underground	

NB: All underground services shown on this drawing have been surveyed using a cable locator instrument, however there could be obstructions preventing some services been located. Therefore every precaution should be taken when excavating. Hand excavated trial pits should be undertaken before hand to expose these services where possible.
This drawing indicates the approximate positions and depths only and should not be used for design until the services have been exposed and positions checked.
Pipe runs are assumed straight between manholes unless otherwise indicated.
Plastic and concrete pipes or ducts are not traceable using these methods and record drawings should be used where possible and trial pits dug to expose the positions.



Survey Stations

Survey Codes

B Building
BH Borehole
BB Bottom Bank
BHT Building Height
BL Block
BOL Bollard
BT BOX
BTCL BT Cover Level
BUS Bus Stop
C Channel
C1 Channel
CABCL Cabel Cover Level
CAM Camera
COL Column
Con Concrete
C PITCH Cricket Pitch
D Design
DR Drain
DT Diesal Tank
EBOX Electric Box
ELC Electric Cable
EP Electric Pole
ER Edge Road
F Fence
FH Fire Hydrant
FL Floor Level
FLAG Flag Post
G Gate
GU Gully
GV Gas Valve
Hed Hedge
HW Head Wall
L LIGHT
LONG JUMP L J Pitt
LP Light Pole
METER Water Meter
MH Man Hole
MHCL,C Circular MH
P Pathway
PIPE Pipe level
PLANT Plantines
POST Fence post
PUMP
RAIL
RE Rodding Eye
SIL Sewer Invert Level
SP Sign Post
STA Stairs
SCL Sewer Cover Level
SWCL Surface Water Invert Level
SWIL Surface Water Invert Level
STN Station
SUMP
Swire Stay Wire
TANK Tank
TAR Tarmac
TB Top Bank
TP Telephone Pole
TRE600 Tree + Circumfrance
TREE
TRAF Traffic Lights
V Valve
V1 Valve
VEG Vegitation
L Level
VENT
W Wall
W1 Wall
WV Water Valve

Date		Revision Description

112 Hurstwood Road
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Mobile : 0790 532 9212

Project :

South Tyneside Building Supplie Garwood Street South Shields

Drawing title :Topo Survey

Datum : MSL
System : Ordnance Survey
Scale : 1 : 500
Date : 26/08/2022
Drawn by : D.Cowan
Checked by :
Surveyed by: D.Cowan

Job no.	Drawing no.	Rev.
No : 347	Survey Dwg No:Garwoodtopo	

Appendix C

NWL Sewer Record Plan and Correspondence

Northumbrian Water
Developer Services
Leat House
Pattinson Road
Washington
NE38 8LB

Direct Line: 07596315994
Email: developmentenquiries@nwl.co.uk
Our Ref: 309358

Thursday, 19 October 2023

Jasper Kerr
Unit 7 Riverside Studios
Newcastle upon Tyne
NE4 7YL

Dear Owen,

Re: Pre-Planning Enquiry – Garwood Street

Further to the Point of Connection Application for the above site, received October 2nd 2023, we are now able to provide the following response.

We have based our response on the information in your application and accompanying correspondence. Therefore, should any of the information now be different, then you must ensure that you inform us of any changes as further Network Modelling may be required and our response may also change, leading to this response being invalid.

Northumbrian Water assesses the impact of the proposed development on our assets and assesses the capacity within our networks to accommodate and treat the anticipated flows arising from the development. We do not therefore offer comment on aspects of planning applications that are outside of our area of control.

Enclosed in this response is a scaled plan showing the **approximate** position of the water and sewerage networks within the vicinity of this site.

We have changed the way contractors and developers can access our assets.

Historically only our own staff and framework contractors could access our sewerage network. As of 1st January 2018, we are allowing third party contractors to access our sewer network on a site by site basis, subject to certain conditions.

Further information (including how to apply) is available from our web site - https://www.nwl.co.uk/services/developers/developer-sewerage-services/

Also enclosed is our extract showing locations within the approximate vicinity of this site that have, from our records, experienced flooding. This has been provided to demonstrate the known flood risks within the vicinity which have been considered as part of our assessment on this enquiry.

We have also carried out a review of your application and can confirm the following:

Sewerage and Sewage Treatment

Northumbrian Water would ask that you please separate the foul and surface water flows in accordance with Part H of the Building Regulations prior to the final connection to the public sewer.

All new connections to the public sewerage system must first be approved through the Section 106 of the Water Industry Act 1991 process prior to construction.

Should you decide to proceed with this development, a fully completed Sewer Connection application form will be required. These are available to download from the following link:

https://www.nwl.co.uk/services/developers/developer-sewerage-services/new-sewer-connections-s106/

- Foul Water Discharge

The foul flows can discharge without restriction into the **300mm** diameter **combined** public sewer off Smith Street at the north east corner of the site via manhole **6905.**

- Surface Water Discharge

No surface water flow from the proposed development will be allowed to connect into the existing public sewerage system unless it is proven that the alternative options which are listed within Part H of the Building Regulations 2003 are not available:

Rainwater from a system provided pursuant to sub-paragraphs (1) or (2) shall discharge to one of the following, listed in order of priority –

(a) an adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,

(b) a watercourse; or, where that is not reasonably practicable,

(c) a sewer.

If the more sustainable options prove to be unfeasible, a restricted surface water flow of **7 l/sec** would be permitted to discharge into the **1200mm** diameter **overflow sewer** at the junction of Smith Street and Corstophine Town to the north west corner of the site at or between manholes **5916, 5918 and 5901**. Any excess in flows must be attenuated on site.

- For Information

The Lead Local Flood Authority may require surface water flows to discharge at a different rate to that which has been agreed by Northumbrian Water. As the statutory consultee on flood risk and drainage matters, they have the authority to do so therefore, we suggest that you contact them to discuss this in further detail.

Written approval for all individual connections (direct or indirect) to the public sewerage system should be obtained through the Section 106 process, following completion of the detailed drainage design and before the commencement of any drainage works on site.

- Protection of Existing Sewerage Assets

We wish to draw your attention to the existing sewers which pass through the site. These sewers could be diverted, protected or accommodated within your site layout with an appropriate easement.

Part H of the Building Regulations also details the reasons why Northumbrian Water does not permit buildings to be built over or near to its sewerage network:

- Undue risk in the event of failure of the drain or sewer
- Maintaining access
- Protection of the drain or sewer during construction
- Protection from settlement
- Protection against piling

To discuss the diversion of this asset in further detail, please contact:

Laura King
07966230147
laura.king@nwl.co.uk

- Sewage Treatment Capacity

The Sewage Treatment Works to which this development finally discharges to is **Howdon** and these works are able to accept the additional flows.

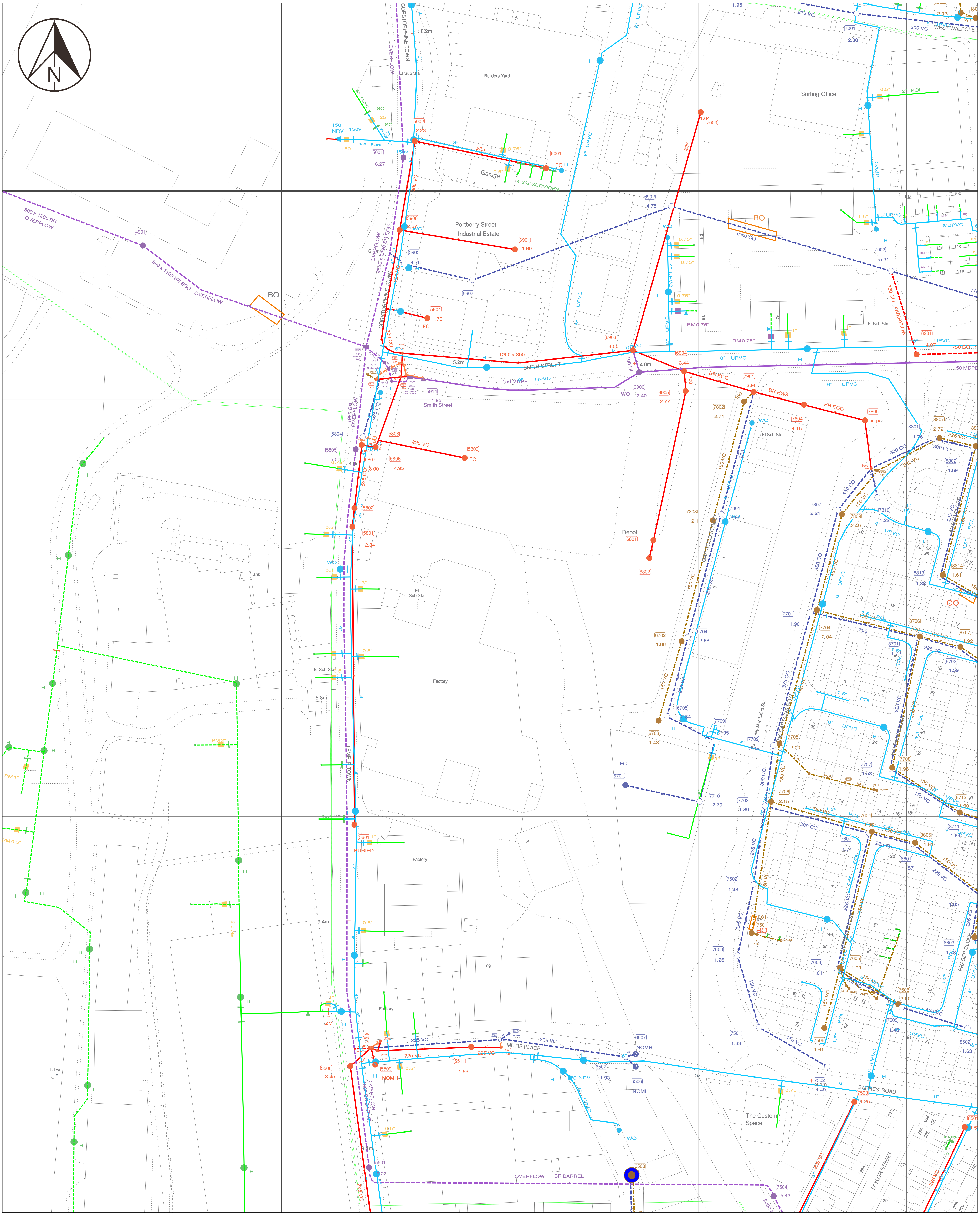
Please note that this response is valid for 1 year only and you should resubmit your proposals should this period lapse prior to your development beginning.

Should you require any further assistance or information, then please do not hesitate to contact me at developmentenquiries@nwl.co.uk or alternatively on 07596315994, please quote our reference number above in any future correspondence.

Yours sincerely,

L Roberts

Laura Roberts
Technical Support Advisor
Developer Services



Waste Water -

NWL Responsibility	Private/Non NWL	Proposed
Combined	Combined	Combined
Foul	Foul	Foul
Surface	Surface	Surface
Treated Eff	Treated Eff	
Untreated Eff	Trade Eff	
Overflow	Watercourse	

Water Network -

Network Types	
Distribution	AB Asbestos
Treated	Abandoned
Raw	Out of Comm
Fire	Proposed
Supply	
Private	

User : BOWMS

Date : 26/07/2023 10:48:06

Map Sheet : NZ3565NE

Title :

Centre Point : 435600,565800

Paper / Scale : A2@1:1250

NORTHUMBRIAN WATER *living water*

10 m

Appendix D

Proposed Site Plan

All dimensions are to be checked on site. Do note scale from this drawing
Proposals are subject to site survey and statutory approvals

Option 12
Total development area 31,600ft²

1:500 Scale in Metres
0 5 10 15 20 25 30 35 40 45 50

Rev	Description	Date
P1	First Issue	11.12.23

IBA ARCHITECTS
Keel Row 4 | The Watermark | Gateshead | NE11 9SZ
E: info@iba-architects.com T: 0191 461 1411
www.iba-architects.com

Project: Proposed Industrial Development
Smith Street/Garwood Street
South Shields

Title: Proposed Site Plan
Option 12

Client: South Tyne Building Supplies

1598/Drawings/Proposed Site Plan

Drawn:	AG	Scale:	1:500 @A2
Checked:	SGK	Date:	11.12.23

PRELIMINARY

1598	SK12	P1

Appendix E

Proposed Drainage Strategy

DO NOT SCALE

N

5916
CL: 5.199
IL: TBC

MIN COVER LEVEL = 4.50
SOFFIT OF CRATE = 3.808

FFL 5.000
FFL 4.800
FFL 5.025
FFL 5.025
FFL 5.025
FFL 5.025

SW10 CL: 5.460 IL: 1.178
SW9 CL: 5.348 IL: 1.766
SW8 CL: 5.000 IL: 2.238
SW7 CL: 5.388 IL: 2.283
SW6 IL: 2.308
SW4 CL: 5.427 IL: 3.098
SW5 CL: 4.002 IL: 2.967
SW12 CL: 5.000 IL: 3.302
SW3 CL: 5.000 IL: 3.269
SW2 CL: 5.778 IL: 4.185
SW11 CL: 5.271 IL: 3.921
F5 CL: 4.945 IL: 2.767
F6 CL: 4.944 IL: 2.279
F4 CL: 4.696 IL: 3.037
F3 CL: 4.909 IL: 3.244
F2 CL: 5.399 IL: 3.939

1500 1/100 1.009
1500 1/100 1.006
1500 1/400 1.000
1500 180 2.001
1500 1/100 1.005
1500 1/100 3.000
1500 180 1.000
1500 180 1.000
3000 1/100 1.000
3000 1/250 1.000
1500 1/48 2.000
1500 180 1.000

TARMAC
GRAVEL
SMITH STREET
Garwood Street
PAVING
EBOX
TRE300
TRE200
FH
RHT
BRICK BUILDING
BUILDING
Approx position of trees
Thick Overgrowth Bra
Road 2
Road 3

KEY

- EXISTING ADOPTED SURFACE WATER
- EXISTING ADOPTED FOUL WATER
- EXISTING ADOPTED COMBINED WATER
- PROPOSED SURFACE WATER
- PROPOSED FOUL WATER
- PROPOSED CELLULAR STORAGE
- PROPOSED PERMEABLE PAVING
- PROPOSED ROAD GULLEY

Rev	Date	By	Description	Chk	App
P02	26/02/24	OH	AMENDED TO SUIT NEW ARCHITECT PLAN	SB	SB
P01	27/09/23	SB	FIRST ISSUE	DH	DH

Drawing Status: PRELIMINARY

JASPER KERR CONSULTING
Albony Court
Newcastle Business Park
Newcastle upon Tyne
NE4 7YB
www.jasperkerr.co.uk

Client: SOUTH TYNE BUILDING SUPPLIES

Architect: IBA ARCHITECHTS

Project: HARWOOD STREET SOUTH
TYNE BUILDING SUPPLIES

Title: DRAINAGE LAYOUT
SHEET 1 OF 2

Scale @ A1	Checked	Approved
1:250	DH	DH

Project No.	Designed	Drawn	Date
JK-7325	SB	SB	NOVEMBER 23

Drawing No.: C-0001
Rev.: P02

DO NOT SCALE

KEY

- EXISTING ADOPTED SURFACE WATER
- EXISTING ADOPTED FOUL WATER
- EXISTING ADOPTED COMBINED WATER
- PROPOSED SURFACE WATER
- PROPOSED FOUL WATER
- PROPOSED CELLULAR STORAGE
- PROPOSED PERMEABLE PAVING
- PROPOSED ROAD GULLEY

Rev	Date	By	Description	Chk	App
P02	26/02/24	OH	AMENDED TO SUIT NEW ARCHITECT PLAN	SB	SB
P01	27/09/23	SB	FIRST ISSUE	DH	DH

Drawing Status: PRELIMINARY

JASPER KERR CONSULTING
Albany Court
Newcastle Business Park
Newcastle upon Tyne
NE4 7YB
www.jasperkerr.co.uk

Client: SOUTH TYNE BUILDING SUPPLIES

Architect: IBA ARCHITECHTS

Project: HARWOOD STREET SOUTH
TYNE BUILDING SUPPLIES

Title: DRAINAGE LAYOUT
SHEET 2 OF 2

Scale @ A1	Checked	Approved
1:250	DH	DH

Project No.	Designed	Drawn	Date
JK-7325	SB	SB	NOVEMBER 23

Drawing No.: C-0002 Rev.: P02

Appendix F

Drainage Calculations

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Surface Network 1	Company Address:		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
S10	Manhole	435558.750	565900.354	5.460	4.282	1.178	Circular	1.350
5916	Manhole	435556.614	565918.347	5.199	4.782	0.417	Circular	1.350
S9	Manhole	435617.404	565899.169	5.386	3.622	1.765	Circular	1.200
S8	Manhole	435664.959	565904.599	5.000	2.767	2.233	Circular	1.500
S1	Manhole	435650.874	565770.315	6.383	1.813	4.570	Circular	1.350
S2	Manhole	435659.337	565808.398	5.740	2.373	3.367	Circular	1.350
S3	Manhole	435635.686	565814.794	6.006	2.737	3.269	Circular	1.350
S4	Manhole	435648.119	565864.538	5.427	2.329	3.098	Circular	1.350
S5	Manhole	435677.260	565857.118	4.976	2.009	2.967	Circular	1.350
S7	Manhole	435687.440	565902.767	5.398	3.114	2.283	Circular	1.350
S11	Manhole	435684.767	565800.509	5.296	1.375	3.921	Circular	1.200
S12	Manhole	435694.916	565852.076	5.000	1.698	3.302	Circular	1.200

Name	Lock
S10	None
5916	None
S9	None
S8	None
S1	None
S2	None
S3	None
S4	None
S5	None
S7	None
S11	None
S12	None

Inlets

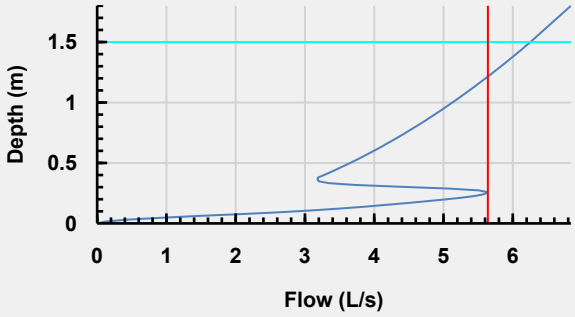
Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
S10	Inlet	1.009	(None)	No Restriction
5916	Inlet	1.010	(None)	No Restriction
S9	Inlet	1.008	(None)	No Restriction
S8	Inlet	1.007	(None)	No Restriction
	Inlet (1)	Catchment Area (15)	(None)	No Restriction
S1	Inlet	Catchment Area (6) Catchment Area (7)	(None)	No Restriction
S2	Inlet	1.000 2.000	(None)	No Restriction
	Inlet (1)	Catchment Area (8)	(None)	No Restriction
	Inlet (2)	Pipe (1) Pipe (2)	(None)	No Restriction
S3	Inlet	1.001	(None)	No Restriction
	Inlet (2)	Catchment Area (9)	(None)	No Restriction
S4	Inlet	1.002	(None)	No Restriction
	Inlet (1)	Catchment Area (10)	(None)	No Restriction
S5	Inlet	1.003 Pipe (3) Pipe (4) Pipe (5) Catchment Area (11) 3.000	(None)	No Restriction
S7	Inlet (1)	1.006	(None)	No Restriction
S11	Inlet	Pipe	(None)	No Restriction

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Surface Network 1	Company Address:		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
S10	Outlet	1.010	Free Discharge
S9	Outlet	1.009	Free Discharge
S8	Outlet	1.008	Hydro-Brake®

Invert Level (m)	2.233
Design Depth (m)	1.500
Design Flow (L/s)	6.25
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0104-6250-1500-6250



S1	Outlet	1.000	Free Discharge
S2	Outlet	1.001	Free Discharge
S3	Outlet	1.002	Free Discharge
S4	Outlet	1.003	Free Discharge
S5	Outlet	1.004	Free Discharge
S7	Outlet	1.007	Free Discharge
S11	Outlet	2.000	Free Discharge
S12	Outlet	3.000	Free Discharge

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	Company Address:		

Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	5.295
Depth (m)	0.520
Base Level (m)	4.775
Paving Layer Depth (mm)	220
Membrane Percolation (m/hr)	1000.0
Porosity (%)	30
Length (m)	5.128
Long. Slope (1:X)	100.00
Width (m)	23.671
Total Volume (m^3)	10.924

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0

Porous Paving (1)

Type : Porous Paving

Dimensions

Exceedance Level (m)	5.679
Depth (m)	0.520
Base Level (m)	5.159
Paving Layer Depth (mm)	220
Membrane Percolation (m/hr)	1000.0
Porosity (%)	30
Length (m)	4.939
Long. Slope (1:X)	100.00
Width (m)	14.889
Total Volume (m³)	6.618

Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (1)
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	Company Address:		

Porous Paving (2)

Type : Porous Paving

Dimensions

Exceedance Level (m)	5.238
Depth (m)	0.520
Base Level (m)	4.718
Paving Layer Depth (mm)	220
Membrane Percolation (m/hr)	1000.0
Porosity (%)	30
Length (m)	4.936
Long. Slope (1:X)	100.00
Width (m)	47.202
Total Volume (m³)	20.971

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (2)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (2)
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	Company Address:		

Porous Paving (3)

Type : Porous Paving

Dimensions

Exceedance Level (m)	5.200
Depth (m)	0.520
Base Level (m)	4.680
Paving Layer Depth (mm)	220
Membrane Percolation (m/hr)	1000.0
Porosity (%)	30
Length (m)	6.893
Long. Slope (1:X)	100.00
Width (m)	46.182
Total Volume (m³)	28.651

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (3)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (3)
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0

Porous Paving (4)

Type : Porous Paving

Dimensions

Exceedance Level (m)	5.200
Depth (m)	0.520
Base Level (m)	4.680
Paving Layer Depth (mm)	220
Membrane Percolation (m/hr)	1000.0
Porosity (%)	30
Length (m)	31.199
Long. Slope (1:X)	100.00
Width (m)	4.985
Total Volume (m³)	13.997

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (4)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (4)
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0

Porous Paving (5)

Type : Porous Paving

Dimensions

Exceedance Level (m)	5.200
Depth (m)	0.520
Base Level (m)	4.680
Paving Layer Depth (mm)	220
Membrane Percolation (m/hr)	1000.0
Porosity (%)	30
Length (m)	26.173
Long. Slope (1:X)	100.00
Width (m)	5.057
Total Volume (m³)	11.913

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (5)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (5)
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	500.0

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	Company Address:		

1.005

Type : Cellular Storage

Dimensions

Exceedance Level (m)	4.992
Depth (m)	1.500
Base Level (m)	2.308
Number of Crates Long	50
Number of Crates Wide	14
Number of Crates High	3
Porosity (%)	95
Crate Length (m)	0.5
Crate Width (m)	0.5
Crate Height (m)	0.5
Total Volume (m³)	250.559

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1.004 Catchment Area (13) Catchment Area (14) Catchment Area (12)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.006
Outlet Type	Free Discharge

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Connections Storm Phase: Surface Network 1	Company Address:		

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
1.010	18.120	Pipe	23.820		0.6	150	5.460	1.178
1.009	58.665	Pipe	99.992		0.6	150	5.386	1.765
1.007	22.556	Pipe	450.214		0.6	450	5.398	2.283
1.003	30.070	Pipe	229.399		0.6	300	5.427	3.098
1.000	39.012	Pipe	34.579		0.6	225	6.383	4.570
1.008	47.864	Pipe	102.209		0.6	150	5.000	2.233
1.001	24.501	Pipe	250.000		0.6	300	5.740	3.367
1.002	51.274	Pipe	300.000		0.6	300	6.006	3.269
1.004	15.584	Pipe	23.648		0.6	300	4.976	2.967
1.006	6.892	Pipe	276.795		0.6	450	5.326	2.308
Pipe (1)	12.879	Pipe	7.189		0.6	100	6.020	5.159
Pipe (3)	8.465	Pipe	4.942		0.6	100	5.082	4.680
Pipe (4)	31.076	Pipe	18.141		0.6	100	5.084	4.680
Pipe (5)	28.789	Pipe	16.806		0.6	100	5.053	4.680
2.000	26.625	Pipe	48.060		0.6	150	5.296	3.921
3.000	18.362	Pipe	99.255		0.6	150	5.000	3.302
Pipe (2)	6.791	Pipe	5.029		0.6	100	5.625	4.718
Pipe	13.309	Pipe	15.584		0.6	100	5.714	4.775

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Lock	Flow Restriction (L/s)
1.010	5.199	0.417	None	
1.009	5.460	1.178	None	
1.007	5.000	2.233	None	
1.003	4.976	2.967	None	
1.000	5.740	3.442	None	
1.008	5.386	1.765	None	7.0
1.001	6.006	3.269	None	
1.002	5.427	3.098	None	
1.004	5.086	2.308	Levels	
1.006	5.398	2.283	None	
Pipe (1)	5.740	3.367	None	
Pipe (3)	4.976	2.967	None	
Pipe (4)	4.976	2.967	None	
Pipe (5)	4.976	2.967	None	
2.000	5.740	3.367	None	
3.000	4.976	3.117	None	
Pipe (2)	5.740	3.367	None	
Pipe	5.296	3.921	None	

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Surface Network 1	Company Address:		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Porous Paving		Time of Concentration	0.012	100	0	100	0.012
Catchment Area (1)	Porous Paving (1)		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (2)	Porous Paving (2)		Time of Concentration	0.024	100	0	100	0.024
Catchment Area (3)	Porous Paving (3)		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (4)	Porous Paving (4)		Time of Concentration	0.015	100	0	100	0.015
Catchment Area (5)	Porous Paving (5)		Time of Concentration	0.013	100	0	100	0.013
Catchment Area (6)	S1		Time of Concentration	0.075	100	0	100	0.075
Catchment Area (7)	S1		Time of Concentration	0.050	100	0	100	0.050
Catchment Area (8)	S2		Time of Concentration	0.048	100	0	100	0.048
Catchment Area (9)	S3		Time of Concentration	0.069	100	0	100	0.069
Catchment Area (10)	S4		Time of Concentration	0.070	100	0	100	0.070
Catchment Area (11)	S5		Time of Concentration	0.082	100	0	100	0.082
Catchment Area (12)	1.005		Time of Concentration	0.024	100	0	100	0.024
Catchment Area (13)	1.005		Time of Concentration	0.033	100	0	100	0.033
Catchment Area (14)	1.005		Time of Concentration	0.022	100	0	100	0.022
Catchment Area (15)	S8		Time of Concentration	0.052	100	0	100	0.052
TOTAL		**0.0**		**0.630**				**0.630**

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	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

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

Add. Increment (mm)	75
Max. Diameter (mm)	0

Diameter (mm)	Min. Slope (1:X)	Max. Slope (1:X)
100	0.00	0.00
150	0.00	0.00

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Surface Network 1	Company Address:		

Manhole Options

Apply Offset	☐

Manhole Size Library

Default

Diameter / Width

Connection (mm)	Diameter / Length (m)	Width (m)
0	1.200	0.000
375	1.350	0.000
500	1.500	0.000
0	0.000	0.000

Additional Sizing

Connection (mm)	900
Diameter / Length (m)	0.900
Width (m)	0.000

Depth

Depth (m)	Diameter / Length (m)	Width (m)
0.000	1.050	0.000
1.500	1.200	0.000

Benching Requirements

Landing Width (mm)	500
Benching Width (mm)	225

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address:		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Use Catchment Values
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Surface Network 1	Company Address:		

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 100 years: +45 %: 30 mins: Winter	0.01	2.5	3.984
Catchment Area (1)	FSR: 100 years: +45 %: 30 mins: Winter	0.01	1.5	2.412
Catchment Area (2)	FSR: 100 years: +45 %: 30 mins: Winter	0.02	4.9	7.800
Catchment Area (3)	FSR: 100 years: +45 %: 30 mins: Winter	0.03	6.5	10.320
Catchment Area (4)	FSR: 100 years: +45 %: 30 mins: Winter	0.01	3.0	4.818
Catchment Area (5)	FSR: 100 years: +45 %: 30 mins: Winter	0.01	2.7	4.290
Catchment Area (6)	FSR: 100 years: +45 %: 15 mins: Winter	0.07	38.6	17.933
Catchment Area (7)	FSR: 100 years: +45 %: 15 mins: Winter	0.05	26.1	12.112
Catchment Area (8)	FSR: 100 years: +45 %: 15 mins: Winter	0.05	24.9	11.543
Catchment Area (9)	FSR: 100 years: +45 %: 15 mins: Winter	0.07	35.8	16.632
Catchment Area (10)	FSR: 100 years: +45 %: 15 mins: Winter	0.07	36.4	16.875
Catchment Area (11)	FSR: 100 years: +45 %: 15 mins: Winter	0.08	42.4	19.686
Catchment Area (12)	FSR: 100 years: +45 %: 15 mins: Winter	0.02	12.6	5.842
Catchment Area (13)	FSR: 100 years: +45 %: 15 mins: Winter	0.03	16.9	7.862
Catchment Area (14)	FSR: 100 years: +45 %: 15 mins: Winter	0.02	11.6	5.380
Catchment Area (15)	FSR: 100 years: +45 %: 15 mins: Winter	0.05	27.0	12.538

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Surface Network 1	Company Address:		

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 30 years: +0 %: 30 mins: Winter	0.01	1.3	2.106
Catchment Area (1)	FSR: 30 years: +0 %: 30 mins: Winter	0.01	0.8	1.278
Catchment Area (2)	FSR: 30 years: +0 %: 30 mins: Winter	0.02	2.6	4.134
Catchment Area (3)	FSR: 30 years: +0 %: 30 mins: Winter	0.03	3.4	5.471
Catchment Area (4)	FSR: 30 years: +0 %: 30 mins: Winter	0.01	1.6	2.556
Catchment Area (5)	FSR: 30 years: +0 %: 30 mins: Winter	0.01	1.4	2.280
Catchment Area (6)	FSR: 30 years: +0 %: 15 mins: Winter	0.07	20.7	9.599
Catchment Area (7)	FSR: 30 years: +0 %: 15 mins: Winter	0.05	14.0	6.486
Catchment Area (8)	FSR: 30 years: +0 %: 15 mins: Winter	0.05	13.3	6.177
Catchment Area (9)	FSR: 30 years: +0 %: 15 mins: Winter	0.07	19.2	8.901
Catchment Area (10)	FSR: 30 years: +0 %: 15 mins: Winter	0.07	19.5	9.035
Catchment Area (11)	FSR: 30 years: +0 %: 15 mins: Winter	0.08	22.7	10.539
Catchment Area (12)	FSR: 30 years: +0 %: 15 mins: Winter	0.02	6.7	3.128
Catchment Area (13)	FSR: 30 years: +0 %: 15 mins: Winter	0.03	9.1	4.209
Catchment Area (14)	FSR: 30 years: +0 %: 15 mins: Winter	0.02	6.2	2.879
Catchment Area (15)	FSR: 30 years: +0 %: 15 mins: Winter	0.05	14.5	6.711

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FSR: 1 years: +0 %: 30 mins: Winter	0.01	0.5	0.858
Catchment Area (1)	FSR: 1 years: +0 %: 30 mins: Winter	0.01	0.3	0.522
Catchment Area (2)	FSR: 1 years: +0 %: 30 mins: Winter	0.02	1.1	1.692
Catchment Area (3)	FSR: 1 years: +0 %: 30 mins: Winter	0.03	1.4	2.232
Catchment Area (4)	FSR: 1 years: +0 %: 30 mins: Winter	0.01	0.6	1.038
Catchment Area (5)	FSR: 1 years: +0 %: 30 mins: Winter	0.01	0.6	0.930
Catchment Area (6)	FSR: 1 years: +0 %: 15 mins: Winter	0.07	8.5	3.934
Catchment Area (7)	FSR: 1 years: +0 %: 15 mins: Winter	0.05	5.7	2.654
Catchment Area (8)	FSR: 1 years: +0 %: 15 mins: Winter	0.05	5.4	2.532
Catchment Area (9)	FSR: 1 years: +0 %: 15 mins: Winter	0.07	7.8	3.646
Catchment Area (10)	FSR: 1 years: +0 %: 15 mins: Winter	0.07	8.0	3.697
Catchment Area (11)	FSR: 1 years: +0 %: 15 mins: Winter	0.08	9.3	4.314
Catchment Area (12)	FSR: 1 years: +0 %: 15 mins: Winter	0.02	2.8	1.282
Catchment Area (13)	FSR: 1 years: +0 %: 15 mins: Winter	0.03	3.7	1.726
Catchment Area (14)	FSR: 1 years: +0 %: 15 mins: Winter	0.02	2.5	1.180
Catchment Area (15)	FSR: 1 years: +0 %: 15 mins: Winter	0.05	5.9	2.744

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Outflow

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
S10	FSR: 100 years: +45 %: 360 mins: Winter	5.460	1.178	1.223	0.045	6.8	0.064	0.000	6.8	241.498	OK
5916	FSR: 100 years: +45 %: 360 mins: Winter	5.199	0.417	0.461	0.044	6.8	0.000	0.000	6.8	241.498	OK
S9	FSR: 100 years: +45 %: 360 mins: Winter	5.386	1.765	1.834	0.069	6.8	0.078	0.000	6.8	241.707	OK
S8	FSR: 100 years: +45 %: 120 mins: Winter	5.000	2.233	4.317	2.084	14.7	3.682	0.000	6.8	82.016	Surcharged
S1	FSR: 100 years: +45 %: 15 mins: Summer	6.383	4.570	4.709	0.139	61.5	0.199	0.000	60.5	26.603	OK
S2	FSR: 100 years: +45 %: 15 mins: Winter	5.740	3.367	4.265	0.898	83.5	1.286	0.000	65.7	46.918	Surcharged
S3	FSR: 100 years: +45 %: 15 mins: Winter	6.006	3.269	4.162	0.893	101.5	1.278	0.000	96.1	62.363	Surcharged
S4	FSR: 100 years: +45 %: 15 mins: Winter	5.427	3.098	3.732	0.634	132.5	0.907	0.000	128.2	78.856	Surcharged
S5	FSR: 100 years: +45 %: 15 mins: Winter	4.976	2.967	3.194	0.227	171.5	0.324	0.000	167.9	102.065	OK
S7	FSR: 100 years: +45 %: 240 mins: Winter	5.398	2.283	4.895	2.612	21.5	3.738	0.000	15.8	139.962	Surcharged
S11	FSR: 100 years: +45 %: 60 mins: Winter	5.296	3.921	3.947	0.026	1.9	0.029	0.000	1.9	4.775	OK
S12	FSR: 100 years: +45 %: 720 mins: Winter	5.000	3.302	4.899	1.597	1.9	1.806	0.000	2.1	7.232	Surcharged

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

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
S10	FSR: 30 years: +0 %: 720 mins: Winter	5.460	1.178	1.219	0.041	5.6	0.058	0.000	5.6	279.266	OK
5916	FSR: 30 years: +0 %: 720 mins: Winter	5.199	0.417	0.457	0.040	5.6	0.000	0.000	5.6	279.266	OK
S9	FSR: 30 years: +0 %: 600 mins: Summer	5.386	1.765	1.827	0.062	5.6	0.070	0.000	5.6	237.083	OK
S8	FSR: 30 years: +0 %: 480 mins: Summer	5.000	2.233	3.041	0.808	6.2	1.427	0.000	5.6	212.095	Surcharged
S1	FSR: 30 years: +0 %: 15 mins: Winter	6.383	4.570	4.667	0.097	34.6	0.139	0.000	34.1	15.998	OK
S2	FSR: 30 years: +0 %: 15 mins: Winter	5.740	3.367	3.563	0.196	47.7	0.281	0.000	43.7	24.249	OK
S3	FSR: 30 years: +0 %: 15 mins: Winter	6.006	3.269	3.504	0.235	62.8	0.337	0.000	56.2	32.854	OK
S4	FSR: 30 years: +0 %: 15 mins: Winter	5.427	3.098	3.330	0.232	75.7	0.332	0.000	69.8	41.577	OK
S5	FSR: 30 years: +0 %: 15 mins: Winter	4.976	2.967	3.113	0.146	92.8	0.209	0.000	90.6	53.995	OK
S7	FSR: 30 years: +0 %: 480 mins: Summer	5.398	2.283	3.041	0.758	5.2	1.084	0.000	5.4	193.957	Surcharged
S11	FSR: 30 years: +0 %: 60 mins: Winter	5.296	3.921	3.940	0.019	0.9	0.021	0.000	0.9	2.429	OK
S12	FSR: 30 years: +0 %: 15 mins: Summer	5.000	3.302	3.302	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Outflow

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
S10	FSR: 1 years: +0 %: 180 mins: Winter	5.460	1.178	1.219	0.041	5.6	0.058	0.000	5.6	76.208	OK
5916	FSR: 1 years: +0 %: 180 mins: Winter	5.199	0.417	0.457	0.040	5.6	0.000	0.000	5.6	76.208	OK
S9	FSR: 1 years: +0 %: 180 mins: Winter	5.386	1.765	1.827	0.062	5.6	0.070	0.000	5.6	76.302	OK
S8	FSR: 1 years: +0 %: 240 mins: Winter	5.000	2.233	2.553	0.320	5.8	0.565	0.000	5.6	88.401	Surcharged
S1	FSR: 1 years: +0 %: 15 mins: Winter	6.383	4.570	4.630	0.060	14.2	0.086	0.000	13.4	6.583	OK
S2	FSR: 1 years: +0 %: 15 mins: Winter	5.740	3.367	3.474	0.107	18.9	0.153	0.000	17.6	9.721	OK
S3	FSR: 1 years: +0 %: 15 mins: Winter	6.006	3.269	3.397	0.128	25.5	0.183	0.000	22.6	13.207	OK
S4	FSR: 1 years: +0 %: 15 mins: Winter	5.427	3.098	3.230	0.132	30.5	0.189	0.000	27.2	16.727	OK
S5	FSR: 1 years: +0 %: 15 mins: Winter	4.976	2.967	3.057	0.090	36.5	0.129	0.000	35.1	21.590	OK
S7	FSR: 1 years: +0 %: 120 mins: Winter	5.398	2.283	2.547	0.264	5.3	0.377	0.000	5.5	51.124	OK
S11	FSR: 1 years: +0 %: 60 mins: Winter	5.296	3.921	3.933	0.012	0.4	0.014	0.000	0.4	0.963	OK
S12	FSR: 1 years: +0 %: 15 mins: Summer	5.000	3.302	3.302	0.000	0.0	0.000	0.000	0.0	0.000	OK

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flooded Volume

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
1.005	FSR: 100 years: +45 %: 15 mins: Summer	2.949	2.949	0.641	0.641	199.0	106.611	0.000	0.000	4.4	3.331	57.451	OK
Porous Paving	FSR: 100 years: +45 %: 15 mins: Summer	4.871	4.794	0.045	0.019	1.8	1.164	0.000	0.000	1.2	1.168	89.343	OK
Porous Paving (1)	FSR: 100 years: +45 %: 15 mins: Summer	5.252	5.171	0.044	0.012	1.1	0.623	0.000	0.000	0.7	0.782	90.585	OK
Porous Paving (2)	FSR: 100 years: +45 %: 15 mins: Summer	4.812	4.738	0.045	0.020	3.5	2.280	0.000	0.000	2.5	2.292	89.130	OK
Porous Paving (3)	FSR: 100 years: +45 %: 15 mins: Summer	4.798	4.702	0.049	0.022	4.6	3.375	0.000	0.000	2.9	2.667	88.219	OK
Porous Paving (4)	FSR: 100 years: +45 %: 15 mins: Summer	5.044	4.693	0.052	0.013	2.1	2.294	0.000	0.000	0.5	0.527	83.613	OK
Porous Paving (5)	FSR: 100 years: +45 %: 15 mins: Summer	4.996	4.693	0.055	0.013	1.9	1.930	0.000	0.000	0.5	0.583	83.800	OK

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flooded Volume

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
1.005	FSR: 30 years: +0 %: 15 mins: Summer	2.627	2.627	0.319	0.319	106.3	52.953	0.000	0.000	5.9	4.534	78.866	OK
Porous Paving	FSR: 30 years: +0 %: 15 mins: Summer	4.851	4.789	0.024	0.014	0.9	0.698	0.000	0.000	0.6	0.548	93.613	OK
Porous Paving (1)	FSR: 30 years: +0 %: 15 mins: Summer	5.233	5.167	0.025	0.009	0.6	0.368	0.000	0.000	0.4	0.386	94.433	OK
Porous Paving (2)	FSR: 30 years: +0 %: 15 mins: Summer	4.792	4.732	0.025	0.015	1.9	1.373	0.000	0.000	1.3	1.073	93.452	OK
Porous Paving (3)	FSR: 30 years: +0 %: 15 mins: Summer	4.775	4.696	0.026	0.016	2.4	2.014	0.000	0.000	1.5	1.221	92.972	OK
Porous Paving (4)	FSR: 30 years: +0 %: 15 mins: Summer	5.020	4.689	0.028	0.009	1.1	1.252	0.000	0.000	0.3	0.255	91.056	OK
Porous Paving (5)	FSR: 30 years: +0 %: 15 mins: Summer	4.971	4.690	0.029	0.010	1.0	1.065	0.000	0.000	0.3	0.284	91.063	OK

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flooded Volume

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
1.005	FSR: 1 years: +0 %: 15 mins: Summer	2.426	2.426	0.118	0.118	41.2	19.606	0.000	0.000	4.1	4.231	92.175	OK
Porous Paving	FSR: 1 years: +0 %: 15 mins: Summer	4.836	4.784	0.010	0.009	0.4	0.345	0.000	0.000	0.3	0.172	96.846	OK
Porous Paving (1)	FSR: 1 years: +0 %: 15 mins: Summer	5.218	5.164	0.010	0.006	0.2	0.174	0.000	0.000	0.2	0.134	97.374	OK
Porous Paving (2)	FSR: 1 years: +0 %: 15 mins: Summer	4.777	4.727	0.010	0.009	0.8	0.674	0.000	0.000	0.5	0.332	96.786	OK
Porous Paving (3)	FSR: 1 years: +0 %: 15 mins: Summer	4.760	4.690	0.011	0.010	1.0	0.976	0.000	0.000	0.5	0.348	96.594	OK
Porous Paving (4)	FSR: 1 years: +0 %: 15 mins: Summer	5.003	4.686	0.011	0.006	0.5	0.537	0.000	0.000	0.1	0.085	96.162	OK
Porous Paving (5)	FSR: 1 years: +0 %: 15 mins: Summer	4.954	4.686	0.012	0.006	0.4	0.458	0.000	0.000	0.1	0.094	96.154	OK

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flow

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
1.010	FSR: 100 years: +45 %: 360 mins: Winter	Pipe	S10	5916	5.460	1.223	0.044	241.498	1.6	0.19	6.8	OK
1.009	FSR: 100 years: +45 %: 360 mins: Winter	Pipe	S9	S10	5.386	1.834	0.057	241.707	1.1	0.39	6.8	OK
1.007	FSR: 100 years: +45 %: 240 mins: Winter	Pipe	S7	S8	5.398	4.895	0.450	138.003	0.1	0.1	15.8	Surcharged
1.003	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	S4	S5	5.427	3.732	0.300	78.856	1.8	1.75	128.2	Surcharged
1.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	S1	S2	6.383	4.709	0.225	26.603	1.6	0.68	60.5	OK
1.008	FSR: 100 years: +45 %: 360 mins: Winter	Pipe	S8	S9	5.000	4.936	0.067	242.132	0.9	0.39	6.8	Surcharged
1.001	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	S2	S3	5.740	4.265	0.300	46.162	0.9	0.94	65.7	Surcharged
1.002	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	S3	S4	6.006	4.162	0.300	62.363	1.4	1.51	96.1	Surcharged
1.004	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	S5	1.005	4.976	3.194	0.300	102.065	3.5	0.73	167.9	OK
1.006	FSR: 100 years: +45 %: 180 mins: Winter	Pipe	1.005	S7	5.326	4.874	0.450	89.577	0.3	0.13	24.9	Surcharged
Pipe (1)	FSR: 100 years: +45 %: 60 mins: Winter	Pipe	Porous Paving (1)	S2	6.020	5.198	0.100	2.926	0.2	0.05	1.1	OK
Pipe (3)	FSR: 100 years: +45 %: 60 mins: Winter	Pipe	Porous Paving (3)	S5	5.082	4.731	0.100	11.816	0.6	0.16	4.4	OK
Pipe (4)	FSR: 100 years: +45 %: 180 mins: Winter	Pipe	Porous Paving (4)	S5	5.084	4.819	0.100	6.725	0.1	0.07	1.0	Surcharged
Pipe (5)	FSR: 100 years: +45 %: 180 mins: Winter	Pipe	Porous Paving (5)	S5	5.053	4.817	0.100	6.464	0.1	0.07	1.0	Surcharged

2.000	FSR: 100 years: +45 %: 60 mins: Winter	Pipe	S11	S2	5.296	3.947	0.140	4.775	0.2	0.07	1.9	OK
3.000	FSR: 100 years: +45 %: 720 mins: Winter	Pipe	S12	S5	5.000	4.899	0.150	0.104	0.1	0.12	2.1	Surcharged
Pipe (2)	FSR: 100 years: +45 %: 60 mins: Winter	Pipe	Porous Paving (2)	S2	5.625	4.762	0.100	9.459	0.5	0.14	3.7	OK
Pipe	FSR: 100 years: +45 %: 60 mins: Winter	Pipe	Porous Paving	S11	5.714	4.819	0.025	4.790	1.2	0.12	1.9	OK

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

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
1.010	FSR: 30 years: +0 %: 720 mins: Winter	Pipe	S10	5916	5.460	1.219	0.040	279.266	1.5	0.15	5.6	OK
1.009	FSR: 30 years: +0 %: 600 mins: Summer	Pipe	S9	S10	5.386	1.827	0.051	237.083	1.1	0.32	5.6	OK
1.007	FSR: 30 years: +0 %: 480 mins: Summer	Pipe	S7	S8	5.398	3.041	0.450	193.957	0.1	0.04	5.4	Surcharged
1.003	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S4	S5	5.427	3.330	0.189	41.577	1.5	0.95	69.8	OK
1.000	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S1	S2	6.383	4.667	0.109	15.998	1.8	0.38	34.1	OK
1.008	FSR: 30 years: +0 %: 720 mins: Summer	Pipe	S8	S9	5.000	3.011	0.060	249.587	0.8	0.32	5.6	Surcharged
1.001	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S2	S3	5.740	3.563	0.216	24.249	0.8	0.62	43.7	OK
1.002	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S3	S4	6.006	3.504	0.234	32.854	1.0	0.88	56.2	OK
1.004	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S5	1.005	4.976	3.113	0.199	53.995	3.0	0.39	90.6	OK
1.006	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	1.005	S7	5.326	2.627	0.331	4.192	0.2	0.03	5.9	OK
Pipe (1)	FSR: 30 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (1)	S2	6.020	5.182	0.072	1.501	0.2	0.02	0.6	OK
Pipe (3)	FSR: 30 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (3)	S5	5.082	4.710	0.058	5.976	1.0	0.08	2.2	OK
Pipe (4)	FSR: 30 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (4)	S5	5.084	4.731	0.056	1.248	0.3	0.03	0.4	OK
Pipe (5)	FSR: 30 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (5)	S5	5.053	4.730	0.056	1.334	0.3	0.03	0.4	OK

2.000	FSR: 30 years: +0 %: 60 mins: Winter	Pipe	S11	S2	5.296	3.940	0.075	2.429	0.3	0.04	0.9	OK
3.000	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S12	S5	5.000	3.302	0.000	0.000	0.0	0	0.0	OK
Pipe (2)	FSR: 30 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (2)	S2	5.625	4.745	0.075	4.840	0.7	0.06	1.8	OK
Pipe	FSR: 30 years: +0 %: 60 mins: Winter	Pipe	Porous Paving	S11	5.714	4.802	0.018	2.449	1.0	0.06	0.9	OK

Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Company Address:		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

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
1.010	FSR: 1 years: +0 %: 180 mins: Winter	Pipe	S10	5916	5.460	1.219	0.040	76.208	1.5	0.15	5.6	OK
1.009	FSR: 1 years: +0 %: 180 mins: Winter	Pipe	S9	S10	5.386	1.827	0.051	76.302	1.1	0.32	5.6	OK
1.007	FSR: 1 years: +0 %: 120 mins: Winter	Pipe	S7	S8	5.398	2.547	0.289	51.124	0.1	0.04	5.5	OK
1.003	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	S4	S5	5.427	3.230	0.111	16.727	1.1	0.37	27.2	OK
1.000	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	S1	S2	6.383	4.630	0.060	6.583	1.6	0.15	13.4	OK
1.008	FSR: 1 years: +0 %: 240 mins: Winter	Pipe	S8	S9	5.000	2.553	0.060	88.378	0.8	0.32	5.6	Surcharged
1.001	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	S2	S3	5.740	3.474	0.117	9.721	0.7	0.25	17.6	OK
1.002	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	S3	S4	6.006	3.397	0.130	13.207	0.8	0.35	22.6	OK
1.004	FSR: 1 years: +0 %: 15 mins: Winter	Pipe	S5	1.005	4.976	3.057	0.089	21.590	2.9	0.15	35.1	OK
1.006	FSR: 1 years: +0 %: 120 mins: Winter	Pipe	1.005	S7	5.326	2.547	0.251	51.700	0.3	0.03	5.3	OK
Pipe (1)	FSR: 1 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (1)	S2	6.020	5.170	0.042	0.603	0.2	0.01	0.2	OK
Pipe (3)	FSR: 1 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (3)	S5	5.082	4.694	0.036	2.340	0.8	0.03	0.8	OK
Pipe (4)	FSR: 1 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (4)	S5	5.084	4.702	0.035	0.467	0.2	0.01	0.1	OK
Pipe (5)	FSR: 1 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (5)	S5	5.053	4.701	0.035	0.501	0.2	0.01	0.2	OK
2.000	FSR: 1 years: +0 %: 60 mins: Winter	Pipe	S11	S2	5.296	3.933	0.043	0.963	0.2	0.01	0.4	OK
3.000	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S12	S5	5.000	3.302	0.000	0.000	0.0	0	0.0	OK
Pipe (2)	FSR: 1 years: +0 %: 60 mins: Winter	Pipe	Porous Paving (2)	S2	5.625	4.731	0.043	1.922	0.5	0.03	0.7	OK
Pipe	FSR: 1 years: +0 %: 60 mins: Winter	Pipe	Porous Paving	S11	5.714	4.788	0.011	0.975	0.7	0.02	0.4	OK

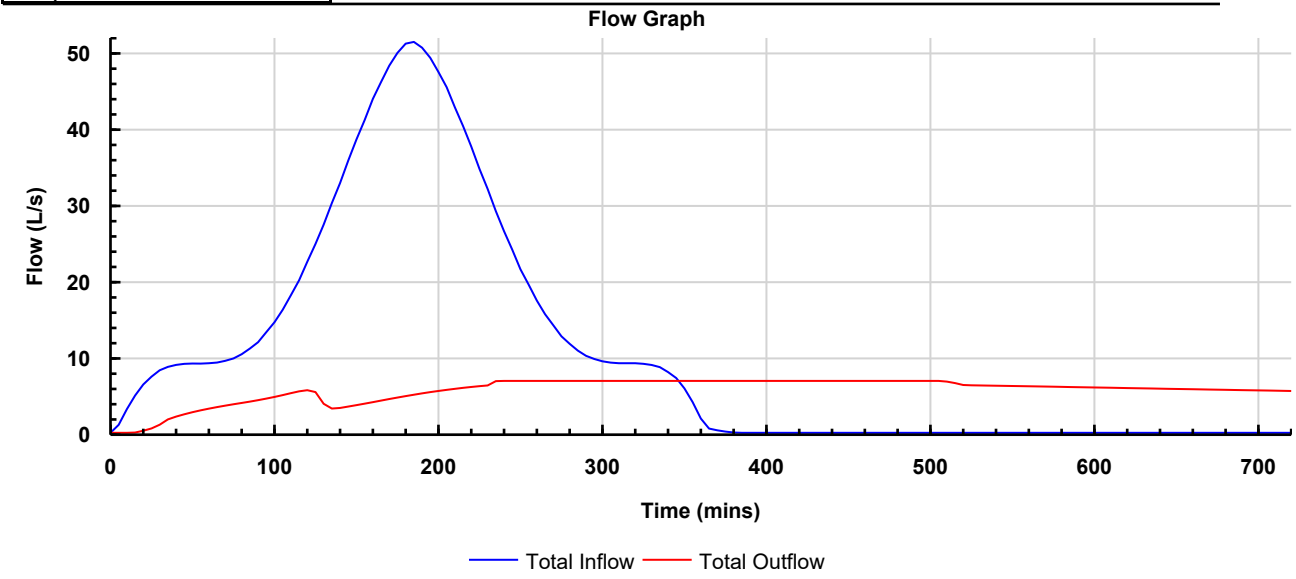
Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Surface Network 1	Company Address:		

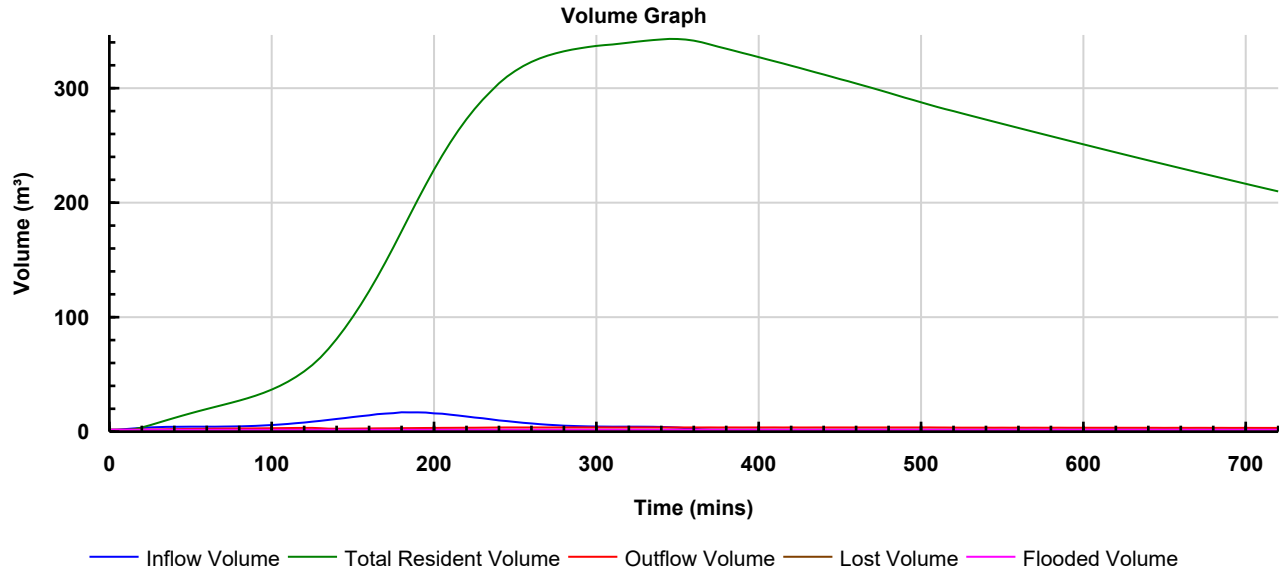
Surface Network 1
FSR: 100 years: Increase Rainfall (%): +45: 360 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
5916			6.8	241.498
TOTAL	51.5	444.010	6.8	241.498

Graphs





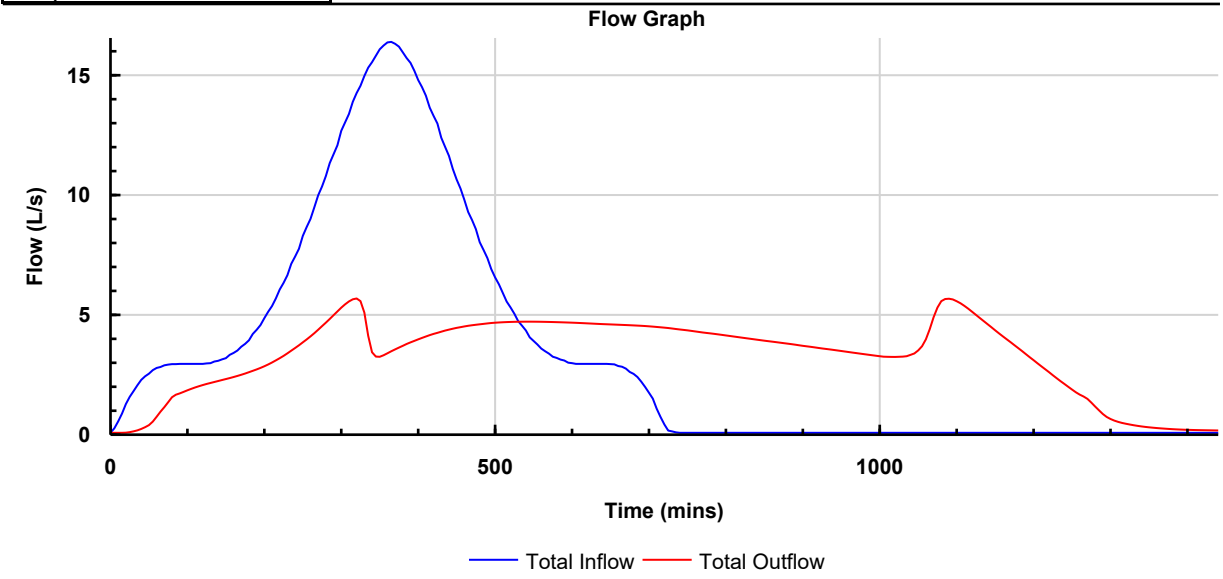
Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Surface Network 1	Company Address:		

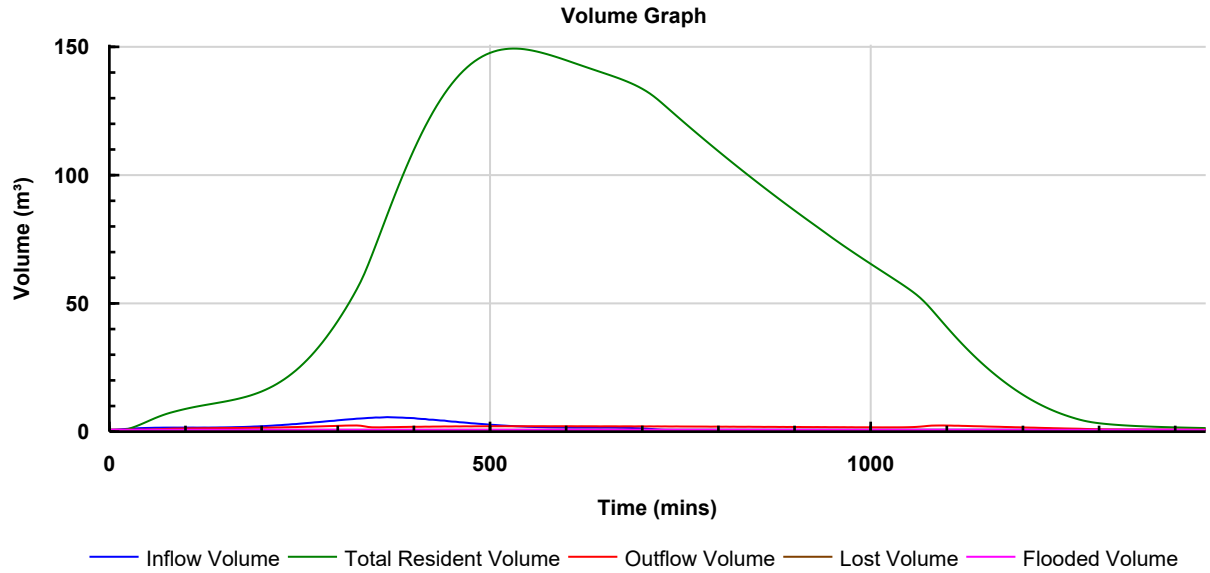
Surface Network 1
FSR: 30 years: Increase Rainfall (%): +0: 720 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
5916			5.6	279.266
TOTAL	16.4	280.774	5.6	279.266

Graphs





Project:	Date: 21/02/2024		
	Designed by: Jasper Kerr	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Surface Network 1	Company Address:		

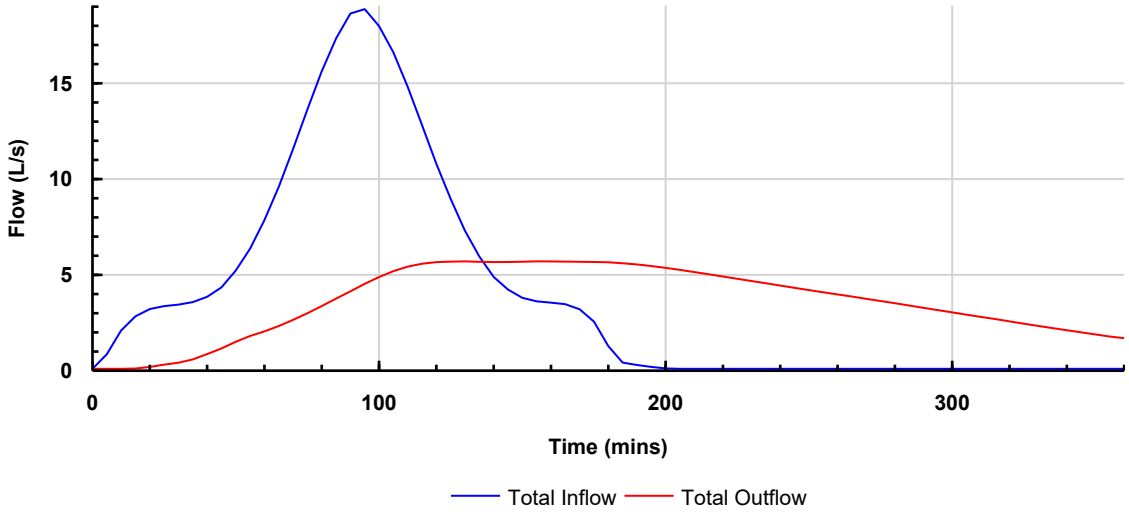
Surface Network 1
FSR: 1 years: Increase Rainfall (%): +0: 180 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
5916			5.6	76.208
TOTAL	18.9	82.995	5.6	76.208

Graphs

Flow Graph



Volume Graph