

Lawnswood Road, Ridgehill

FLOOD RISK ASSESSMENT



Lawnswood Road, Ridgehill

FLOOD RISK ASSESSMENT

REPORT (RV0) PUBLIC

PROJECT NO. 70066405 OUR REF. NO. FRA001

DATE: DECEMBER 2019

WSP

The Mailbox Level 2 100 Wharfside Street Birmingham B1 1RT Phone: +44 1213 524 700 Fax: +44 121 352 4701 WSP.com

QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft for Comment	Issue		
Date	December 2019	December 2019		
Prepared by	Phoebe Secker	Phoebe Secker		
Signature				
Checked by	Alison Caldwell	Alison Caldwell		
Signature				
Authorised by	Dave Woolley	Dave Woolley		
Signature				
Project number	70066405	70066405		
Report number	FRA001	FRA001		
File reference	70066405 FRA001 Rv0	70066405 FRA001 Rv1		

CONTENTS

1.	INTRODUCTION	3
2.	SITE SETTING	5
3.	POLICY CONTEXT	10
4.	ASSESSMENT OF FLOOD RISK	12
5.	SURFACE WATER DRAINAGE	18
6.	FOUL DRAINAGE	26
7.	OPERATION AND MAINTENANCE	27
8.	CONCLUSIONS	30

TABLES

Table 1 - Stakeholder Consultation Summary	4
Table 2 - BGS Borehole Summary	8
Table 3 - Flood Risk Overview	12
Table 4 - SuDS Drainage Hierarchy	19
Table 5 - Summary of SuDS Selection	20
Table 6 - Greenfield Run-Off Rates	21
Table 7 - Site Run-Off Assessment	21
Table 8 - Site Attenuation Requirements	22
Table 9 - Development Creep Assessment	23
Table 10 - Swale Indicative Maintenance Schedule	27
Table 11 - Flow Control (e.g Hydrobrake) Indicative Maintenance Schedule	28
Table 12 - Detention Basin Indicative Maintenance Schedule	28

۱۱SD

FIGURES

Figure 1 – Site Location	5
Figure 2 – 1m DTM LiDAR Extract	6
Figure 3 – Severn Trent Water Sewer Map Extract	7
Figure 4 – BGS Map Extract	8
Figure 5 – Environment Agency Flood Map for Planning	13
Figure 6 – Surface Water Flood Risk Map	14
Figure 7 – Environment Agency Reservoir Flood Map	16
Figure 8 – Baseline Drainage Features	18

APPENDICES

- APPENDIX A DRAWINGS
- **APPENDIX B CALCULATIONS**
- APPENDIX B.1 GREENFIELD RUN-OFF
- APPENDIX B.2 1 IN 100 YEAR
- APPENDIX B.3 1 IN 100 YEAR + CLIMATE CHANGE
- APPENDIX B.4 1 IN1 00 YEAR + CLIMATE CHANGE & CREEP
- APPENDIX C CORRESPONDENCE

EXECUTIVE SUMMARY

This Flood Risk Assessment has been undertaken to support the proposed local plan allocation for residential development at 'Land at Lawnswood Road, Wordsley' in accordance with the guidelines set out in the National Planning Policy Framework (NPPF) and other relevant local and national guidance.

Item	Overview	
Site Location	The site is located to the north and south of Lawnswood Road in two parcels and is bound to the west by the A449 and to the east by an existing residential development.	
	NGR: 387236, 287142	
Development Proposals	The development proposals comprise residential uses.	
Environment Agency Flood Zone(s)	Flood Zone 1.	
Vulnerability Classification(s)	More Vulnerable.	
Fluvial Flood Risk	Low Risk	
Tidal Flood Risk	Very Low Risk.	
Surface Water Flood Risk	Low Risk	
Groundwater Flood Risk	Low Risk	
Sewer Flood Risk	Low Risk	
Artificial Flood Risk	Low Risk	
Storm Drainage	The proposed drainage strategy aims to mimic the behaviour of the site pre-development (greenfield), through the utilisation of conveyance swales, attenuation basin, and flow control devices (e.g. hydrobrake). The maximum peak rate of discharge from the site will be 33.3l/s and the total storage volume required is 10,500m ³ for the critical 1 in 100 year event plus climate change.	
Foul Drainage	The proposed foul flows will discharge into the Severn Trent Water network surrounding the site.	

۱۱SD

1. INTRODUCTION

1.1. BACKGROUND

- 1.1.1. WSP has been appointed by Clowes Developments to prepare a high level Flood Risk Assessment (FRA) and Drainage Strategy to support the proposed local plan allocation for residential development at 'Land at Lawnswood Road, Wordsley' (approximate Post Code: DY7 5AW).
- 1.1.2. The objective of the study is to demonstrate that the site may be developed safely, without exposing the development to an unacceptable degree of flood risk or increasing the flood risk to third parties. The objectives are to:
 - Confirm the sources of flooding which may affect the site;
 - Provide a drainage strategy for the proposed development
 - Provide an appraisal of the availability and adequacy of existing information; and
 - Undertake an appraisal of the flood risk posed to the site and potential impact of the development on flood risk elsewhere.

1.2. LIMITATIONS

- 1.2.1. WSP has prepared this report in accordance with the instructions of their client, Clowes Developments, for their sole and specific use. Any person who uses any information contained herein do so at their own risk. © WSP UK Ltd 2019.
- 1.2.2. The conclusions and recommendations contained herein are limited by the availability of background information and the planned use for the site.
- 1.2.3. Third party information has been used in the preparation of this report, which WSP UK Ltd, by necessity assumes is correct at the time of writing. Whilst all reasonable checks have been made on data sources and the accuracy of the data, WSP UK Ltd accepts no liability for same.

1.3. CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015

1.3.1. The revised Construction (Design and Management) Regulations 2015 (CDM Regulations) came into force on April 2015 to update certain duties on all parties involved in a construction project, including those promoting the development. One of the designer's responsibilities under clause 9 (1) is to ensure that the client organisation, in this instance Clowes Developments, is made aware of their duties under the CDM Regulations.

1.4. SCOPE OF ASSESSMENT

- 1.4.1. This assessment has been undertaken in accordance with the overarching national requirements for Flood Risk Assessments for proposed developments which may include, but are not limited to, the following:
 - National Planning Policy Framework (NPPF)
 - Development and Flood Risk (C624)
 - The SuDS Manual (CIRIA C753)
 - Flood Risk Assessments: Climate Change Allowances 2017
 - DEFRA R&D Technical Report W5-074/A/TR/1 Revision D

- Rainfall Runoff Management for Developments Report SC030219
- 1.4.2. This flood risk assessment is solely to be used support the proposed local plan allocation for residential development at 'Land at Lawnswood Road, Wordsley.'

1.5. CONSULTATION

1.5.1. Ahead of production of this report, initial pre-application consultation requests were issued to the relevant stakeholders with the following responses received.

Stakeholder	Date Received	Comments
Staffordshire Lead Local Flood Authority (LLFA)	25.11.2019	At the time of writing, a historic flood enquiry had been made to Staffordshire County Council LLFA however, no response had been received.
Environment Agency (EA)	28.11.2019	A Product 4 Request was received from the Environment Agency which confirmed that the site is wholly within Flood Zone 1.
Severn Trent Water	10.12.2019	Severn Trent Water confirmed there have been incidents of sewer flooding within the area, however given the sensitive nature of the information no further information was available.
Severn Trent Water	03.12.2019	A pre-development enquiry was issued to Severn Trent Water on the 3 rd December however, at the time of writing no response has been received.

Table 1 - Stakeholder Consultation Summary

1.5.2. The full consultation responses are contained in Appendix C and have been thereafter used, where relevant within the report.

2. SITE SETTING

2.1. LOCATION

- 2.1.1. 'Land at Lawnswood Road, Wordsley,' hereafter referred to as the 'site,' is located to the north and south of Lawnswood Road. The site comprises two parcels, bound to the west by the A449 and to the east by an existing residential development, hereafter referred to as the northern and southern parcels respectively.
- 2.1.2. A site location plan is shown in Figure 1 and is also included in Appendix A.



Figure 1 – Site Location

2.2. DEVELOPMENT PROPOSALS

2.2.1. It is proposed to promote the site for allocation within the Local Plan for residential uses.

2.3. TOPOGRAPHY

- 2.3.1. From a review of the existing publicly available Environment Agency 1m DTM LiDAR (downloaded November 2019), the southern parcel generally falls from east to west from a level of approximately 124mAOD in the south-eastern corner of the site to 73mAOD.
- 2.3.2. The northern parcel generally falls from east to west from a high point of 99mAOD along the southeastern boundary, where the existing woodland is located, to a low point along the centre of the western boundary 73mAOD where an existing culvert is located.
- 2.3.3. An extract of the available Environment Agency 1m DTM LiDAR is available in Figure 2.

Figure 2 – 1m DTM LiDAR Extract Approximate Site Boundary 1m DTM LiDAR 70 73 76 79 82 85 88 91 94 97 100 Existing Surface Water Flow Direction

2.4. EXISTING DRAINAGE NETWORK

- 2.4.1. The River Stour lies approximately 750m west and 450m south of the site.
- 2.4.2. The Severn Trent Water asset maps identify a number of existing sewers within the vicinity of the site, including a 450mm diameter combined rising main which crosses the far west of the northern parcel of the site and a 160mm and 80mm foul sewer which crosses the south of the southern parcel of the site.
- 2.4.3. The Severn Trent Water sewer asset maps are contained within Appendix C and an extract is available within Figure 4.

Figure 3 – Severn Trent Water Sewer Map Extract



2.5. GEOLOGICAL AND HYDROGEOLOGICAL CONTEXT Geology

- 2.5.1. Reference to the British Geological Survey (BGS) published mapping identifies the west of the site to be underlain by a bedrock of Wildmoor Sandstone Member, including the majority of the northern parcel whilst the east of the site, including all of the southern parcel, is underlain of a bedrock of Bridgnorth Sandstone Formation. Whilst the majority of the site is not identified to have overlying superficial deposits, the far east of the northern parcel of the site has overlying superficial deposits of Chester Formation Sandstone Conglomerate whilst the far west has Glaciofluvial Terrace Deposits Devensian Sand & Gravel.
- 2.5.2. An extract of the publically available BGS mapping is available within Figure 3.

۱۱SD

Figure 4 – BGS Map Extract



- KEY
 - Approximate Site Boundary
 - Wildmoor Sandstone Member
 - Bridgnorth Sandstone Formation
 - Chester Formation Sandstone Conglomerate

2.5.3. There are several publicly available borehole logs registered within the site boundary. The deepest of which is located within the northern parcel, in the south west corner, and has a depth of approximately 5.0m. Its profile is available in Table 2.

Description	Approximate Depth [mBGL]
Top Soil	0 – 0.3
Loose reddish-brown silty sand with occasional sandstone and gravel	0.3 – 1.5
Very dense silty sand slightly cemented and thinly laminated with occasional sandstone	1.5 - 2.5
Reddish brown grained sandstone very weak (Wildmoor Sandstone)	2.5 – 5.0

Table 2 - BGS Borehole Summary

Hydrogeology

2.5.4. According to the Source Protection Zone map provided by the Environment Agency, the site lies within Source Protection Zone III. That is defined as "the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is >0.75. There is still the need to define individual source protection areas to assist operators in catchment management";

- 2.5.5. The online BGS Aquifer Map (Superficial Deposits Designation) indicates that a small area of the northern parcel of the site is underlined by a 'Secondary A' aquifer. That is: "*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;*"
- 2.5.6. The online BGS Aquifer Map (Bedrock Designation) indicates that the site comprises stratum that is considered a 'Principal' aquifer. That is *"These are layers of rock or drift deposits that have high intergranular and/or fracture permeability meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer".*
- 2.5.7. As such, whilst underlying geology suggests the ground conditions may be suitable for an infiltration led surface water drainage strategy, underlying aquifers and source protection zone may mean that it is unsuitable.

3. POLICY CONTEXT

3.1. NATIONAL PLANNING POLICY FRAMEWORK 2019

- 3.1.1. The Updated National Planning Policy Framework (NPPF), most recently published in February 2019, sets out the Government's national policies for flood risk management in a land use planning context within England.
- 3.1.2. Paragraph 155 of the NPPF states "Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere."
- 3.1.3. The guidance further states that local planning authorities should "ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment."
- 3.1.4. Allocation and planning of development should therefore be considered against a risk-based search sequence as provided by the guidance.

3.2. LOCAL PLANNING POLICY

South Staffordshire Core Strategy (December 2012)

- 3.2.1. Core Policy 2: Protecting and Enhancing the Natural and Historic Environment identifies that development proposals should have regard to and support the actions and objectives of the Severn and Humber River Basin Management Plans (RBMPs) and also have regard to the River Severn and River Trent Catchment Flood Management Plans (CFMPs).
- 3.2.2. In addition, point J, K and L of Core Policy 3 (Sustainable Development and Climate Change) identify the following;

"j) guiding development away from known areas of flood risk as identified in the Strategic Flood Risk Assessment, Surface Water Management Plan and consistent with NPPF;

k) ensuring the use of sustainable drainage (Sustainable Drainage Systems) in all new development and promoting the retrofitting of SUDs where possible;

I) ensuring that all development includes pollution prevention measures where appropriate to prevent risk of pollution to controlled waters"

3.2.3. Given this, the surface water drainage strategy proposed for this site demonstrates the use SuDS features and provides treatment for surface water runoff.

South Staffordshire Sustainable Development SPD (2018)

- 3.2.4. The 2018 Sustainable Development SPD published by South Staffordshire Council has a chapter on Water Conservation and Quality which advocate the following:
 - Greywater Recycling,
 - Rainwater Harvesting,
 - Permeable Surfaces, and
 - Sustainable Drainage Systems.

vsp

3.2.5. As previously noted, the surface water drainage strategy proposed for this site demonstrates the use SuDS features.

Staffordshire SuDS Handbook (February 2017)

- 3.2.6. A SuDS Handbook has been produced by Staffordshire Lead Local Flood Authority (LLFA) which includes SuDS design guidance which identifies information relating to different types of SuDS which could be used on development site depending on different site constraints (e.g. topography or underlying geology).
- 3.2.7. The document also identifies that Climate Change should be considered through the development as well as Urban Creep to account for an increase in impermeable area across the lifetime of a development.
- 3.2.8. The SuDS Handbook will be taken into consideration within the surface water drainage strategy design for this site.

South Staffordshire Strategic Flood Risk Assessment (SFRA) (October 2019)

- 3.2.9. The South Staffordshire SFRA provides flood risk mapping for the district. The site is included on Map G2 of Appendix A. This identifies that the proposed development site is an area of less than 25% susceptible from groundwater flooding.
- 3.2.10. It also confirms that the site is wholly within Flood Zone 1 and confirms that there are some identified areas of surface water ponding within the site. There are no flood warning areas or flood alert areas identified within the site.
- 3.2.11. Severn Trent Water properties at risk register was reviewed as part of the SFRA and did not identify the site location as an area at risk from sewer flooding.
- 3.2.12. Further assessment of flood risk to the site has been undertaken and is summarised within this report.

4. ASSESSMENT OF FLOOD RISK

4.1. OVERVIEW

4.1.1. Having completed a desk-based assessment, the possible flooding mechanisms at the site are summarised in Table 3.

Mechanism	Risk	Comment
Fluvial	Low	The site is located wholly within Flood Zone 1, outside the maximum extent of flooding from nearby Main Rivers in the 1 in 100 year & 1 in 1,000 year event.
Tidal	Low	The site is located in land.
Surface Water	Low	Some surface water flow paths and surface water ponding is identified within the site boundary however, the surface water mapping may not represent culverts and other existing drainage features on site.
Ground Water	Low	The SFRA mapping does not identify the site is at risk from groundwater flooding and the borehole records on site did record water in their length.
Sewers	Low	Whilst there are Severn Trent Water sewers crossing the site boudanry, no records identifying the site to be at risk have been provided.
Artificial Sources	Low	The site is located outside the maximum extent of flooding in the reservoir flood risk map and

Table 3 - Flood Risk Overview

4.2. HISTORIC FLOODING

4.2.1. The Environment Agency were consulted through writing this report and did not identify any historic reports of flooding.

4.3. FLUVIAL FLOOD RISK

- 4.3.1. Reference to the publicly available Flood Map for Planning identifies the site to currently lie wholly within Flood Zone 1, outside of both the 1 in 100 and 1 in 1,000 year flood events of the River Stour, which runs approximately 750m west of the site and 450m south of the site.
- 4.3.2. The current Flood Map for Planning is reprinted as Figure 5.

vsp



Figure 5 – Environment Agency Flood Map for Planning

Vulnerability Classification

4.3.3. The development is classified as '*More Vulnerable*' under the NPPF which is defined as follows:

"More Vulnerable

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- **Buildings used for dwelling houses**, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan."
- 4.3.4. Given the sites location within Flood Zone 1, in accordance with current national guidance, the site is not required to undertake the Sequential and Exception Tests and is considered to be in an appropriate location for development.

Identified Fluvial Flood Risk: Low

4.4. TIDAL FLOOD RISK

4.4.1. Due to its inland location, tidal flooding is not considered a risk to this site.

Identified Tidal Flood Risk: Very Low

4.5. SURFACE WATER FLOOD RISK

- 4.5.1. The 'Long Term Flood Risk Information,' in particular relating to the 'Flood Risk from Surface Water' has been reviewed and identifies the site to be at predominantly very low risk of surface water flooding, with localised areas of surface water ponding identified within the northern parcel; at the northern site boundary and at the centre of both the eastern boundary and southern boundary of the site as identified in Figure 6. The entirety of the southern parcel is identified to be at very low risk of surface water flooding.
- 4.5.2. Where the surface water ponding is identified along the western boundary of the northern parcel, an existing culvert, passing under the A449, has been identified which will allow surface water to flow west, away from the site.
- 4.5.3. The Flood Risk from Surface Water map is reprinted as Figure 6.

Figure 6 – Surface Water Flood Risk Map



- 4.5.4. The production of this mapping has been undertaken at a national scale to provide the first publicly available generation of surface water flood risk mapping. The two previous generations were primarily developed for regulator use as the approach and risk was refined. For example, the first did not include any allowance for sewers, whilst the second incorporated a national loss coefficient.
- 4.5.5. Although this generation incorporates local estimates of the sewer infiltration loss, generally at a LLFA level along with various other refinements in runoff estimation, it does not allow for local improvements to the underlying Digital Terrain Model (DTM). This means that local features such as the adjoining highways are represented as determined from the LiDAR without any consideration to drainage



features such as culverts or small watercourses which typically provide the associated surface water drainage.

4.5.6. As part of the final site design, to ensure that there is no increase to the flood risk to the development or third-party land, appropriate measures will be implemented in accordance with best practice guidance to ensure any surface water is directed away from the existing and proposed properties.

Identified Surface Water Flood Risk: Low

4.6. GROUND WATER FLOOD RISK

- 4.6.1. Correspondence from the Environment Agency did not identify that the site was at risk from ground water flooding. In addition, the South Staffordshire SFRA provides flood risk mapping for the district, the site is included on Map G2 of Appendix A of the SFRA. This identifies that the site is located in an area of less than 25% susceptibility to groundwater.
- 4.6.2. There are several publicly available borehole logs registered within the site boundary. The deepest of which is located south-west of the northern parcel with a depth of approximately 5.0m, which did not hit water in its length.
- 4.6.3. Given this, groundwater flood risk to the site may be considered to be low.

Identified Groundwater Flood Risk: Low

4.7. SEWER FLOOD RISK

- 4.7.1. Sewer flooding occurs as a result of a number of influencing factors. It is most likely to occur during storms, when large volumes of rainwater enter the sewers. However, it can also occur when pipes become blocked or damaged.
- 4.7.2. Existing sewerage systems are present on land surrounding the site, by way of existing highway and adopted public sewers serving built development.
- 4.7.1. The Severn Trent Water asset maps also identify a number of existing sewers present serving the existing development site including a 450mm diameter combined rising main which crosses the far west of the northern parcel of the site and a 160mm and 80mm foul sewer which crosses the south of the southern parcel of the site.
- 4.7.2. Severn Trent Water were contacted with regards to historic sewer flood records and confirmed that there have been incidents of sewer flooding within the area, however given the sensitive nature of the development they could not disclose any further information. Given this, it is Severn Trent Waters duty to ensure that there is adequate capacity within their network to receive flows from new developments and provide upgrades through the AMP cycle.
- 4.7.3. Severn Trent Water properties at risk register was reviewed as part of the South Staffordshire SFRA and did not identify the site location as an area at risk from sewer flooding.
- 4.7.4. Given this, the site may be considered to be at low risk from sewer flooding.

Identified Sewer Flood Risk: Low

4.8. ARTIFICIAL SOURCE FLOOD RISK

Reservoirs

- 4.8.1. The Long Term Flood Risk Information, Flood Risk from Reservoirs map identifies the site to lie outside of the zone of influence for the nearby reservoirs.
- 4.8.2. An extract of the Environment Agency Mapping is shown in Figure 7.

Figure 7 – Environment Agency Reservoir Flood Map



4.8.3. Given the nature of these features, flooding from this source is rare and indeed it has been confirmed by the Environment Agency that:

"Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, we ensure that reservoirs are inspected regularly and essential safety work is carried out"

4.8.4. Given the site is identified to be outside the maximum extent of reservoir flooding from nearby reservoirs, flood risk from this source is considered low.

Identified Flood Risk from Reservoirs: Low

Canals

- 4.8.5. Canal flooding is generally rare and the canal network is designed in such a way so as to direct all additional water beyond the navigation capacity to impounding areas or surrounding watercourses to be conveyed downstream. The risk from canal flooding becomes more of a concern where the structure is elevated on an earth embankment and if there is a rare instance of a catastrophic breach, leading to a sudden drain-down of the pound and resultant overland flow flood risk to development immediately downstream.
- 4.8.6. The Staffordshire and Worcestershire Canal lies approximately 1.2km south of the site, canal flooding is generally rare, and the canal network is designed in such a way so as to direct all additional water

Reservoir Flood Extent

beyond the navigation capacity to impounding areas or surrounding watercourses to be conveyed downstream.

4.8.7. Given that the existing topography of the land surrounding the site slopes towards to the canal, and that canal flooding is considered rare, the flood risk from this source may be considered to be low.

Identified Flood Risk from Canals: Low

4.9. DEVELOPMENT EXCEEDANCE FLOWS

- 4.9.1. Careful regard has to be made in respect of potential exceedance flows, being events that are more extreme than current design criteria. Various national guidance has been published on the matter of exceedance flows and measures that should be incorporated into a development to ensure the safety of occupiers and those using the infrastructure.
- 4.9.2. Published guidance in the form of Sewers for Adoption 7th Edition and the Environment Agency document "Improving the Flood Performance of New Buildings: Flood Resilient Construction" advocate the design of developments that implement infrastructure routes that will safely convey flood waters resulting from sewer flooding or overland flows away from buildings and along defined corridors.
- 4.9.3. The principal aim is to direct exceedance flows away from properties and along defined corridors. At a local level, this may mean water being conveyed along a length of highway, as long as the predicted flow depths and velocities are acceptable. More strategically, the implementation of conveyance corridors are important in avoiding deep and high velocity flows that present a high risk.
- 4.9.4. Whilst many of the measures for dealing with exceedance flows must be dealt with at detailed design stage, the strategic layout for the site provides a framework that can effectively deal with any future exceedance flows.
- 4.9.5. Given the baseline site characteristics and further measures to be implemented within the proposed development, the risk of flooding from exceedance flows may be considered to be low.

Identified Flood Risk from Exceedance Flows: Low

5. SURFACE WATER DRAINAGE

5.1. EXISTING SURFACE WATER DRAINAGE REGIME

- 5.1.1. The River Stour lies approximately 750m west and 450m south of the site.
- 5.1.2. The Severn Trent Water asset maps also identify a number of existing sewers present serving the existing development site including a 450mm diameter combined rising main which crosses the far west of the northern parcel of the site and a 160mm and 80mm foul sewer which crosses the south of the southern parcel of the site.
- 5.1.3. An existing drainage features plan is available within Appendix A, an extract of which is contained in Figure 8.



Figure 8 – Baseline Drainage Features

5.2. DRAINAGE STRATEGY

Discharge Location

5.2.1. In order to determine the most appropriate receptor for storm water discharges from the proposed development, the Planning Practice Guidance (PPG) provides the following order of priority, supported by the Environment Agency and Lead Local Flood Authority:

		Discharge Location	Availability	Comments
Search Sequence		Re-Use	-	Space for further re-use will be considered at a later design stage.
		Infiltration	-	Infiltration testing may be undertaken to determine the infiltration potential of the site prior to a later design stage.
		Watercourse	✓	An existing watercourse has been identified at the west of the southern parcel, with an existing culvert identified at the centre of the western site boundary of the southern parcel. In addition, there is are existing highway drains present surrounding the site where connections could be made.
		Surface Water Sewer	-	While considered unlikely, should the need for a positive connection be required existing public surface water sewers have been identified serving the existing development south and east of the site.
		Combined Sewer	-	While considered unlikely, should the need for a positive connection be required a combined rising main is identified on the Severn Trent Water asset maps crossing the western boundary of the site.
	•	Foul Sewer	×	Whilst foul sewers are identified south and east of the site serving the existing development, a connection is not proposed into these.

Table 4 - SuDS Drainage Hierarchy

- 5.2.2. In accordance with the above search sequence, it is proposed to discharge surface water flows to the existing naturalised watercourse adjacent to the southern parcel and the existing culvert adjacent to the northern parcel.
- 5.2.3. Existing public sewers are present serving the existing development surrounding the site which could be utilised should the need arise.

SuDS Proposals

- 5.2.4. Current guidance requires that all new developments implement Sustainable Drainage Systems (SuDS) as the primary means of controlling surface water run-off in order to maintain flow rates and volumes discharged to the identified receptor post development.
- 5.2.5. In addition to the water control benefits, The SuDS Manual (CIRIA C753) states that "SuDS can treat and clean surface water runoff from urban areas so that the receiving environment is protected, while at the same time conveying, storing and infiltrating surface water to protect flood risk, river morphology and water resources, and delivering amenity and biodiversity value for the development."
- 5.2.6. At the proposed site, a surface water drainage strategy has been prepared in conjunction with the masterplan development ensuring space for multi-functional SuDS within the site boundary. Table 5 below provides a summary of the SuDS selection process and identifies potential features that are proposed as part of the surface water drainage strategy.

vsp

Feature	Description	Selection	
Green Roofs	Green roofs are systems which cover a building's roof with vegetation. They are laid over a drainage layer, with other layers providing protection, waterproofing and insulation.	 ✓ / × Green roofs could be further considered at a later design stage 	
Filter Strips	These are wide, gently sloping areas of grass or other dense vegetation that treat runoff from adjacent impermeable areas.	 ✓ / × The use of filter strips could be further considered at a later design stage. 	
Pervious Surfaces	Pervious surfaces allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or release to surface water.	 ✓ / × Pervious surface could be considered to help manage pollution from trafficked areas at a later design stage 	
Swales	Swales are broad, shallow channels covered by grass or other suitable vegetation. They are designed to convey and/or store runoff, and can infiltrate the water into the ground (if ground conditions allow).	✓ Swales have been proposed to provide water quality benefits to the proposed development as well as provide some attenuation capacity.	
Infiltration Basins	Infiltration basins are depressions in the surface that are designed to store runoff and infiltrate the water to the ground. They may also be landscaped to provide aesthetic and amenity value.	tion basins are depressions in the e that are designed to store runoff filtrate the water to the ground. nay also be landscaped to provide tic and amenity value. ✓ / × Infiltration testing could be undertaken at a later design stage where an infiltration led drainage strategy would be explored for the site.	
Wet Ponds	Wet ponds are basins that have a permanent pool of water for water quality treatment. They provide temporary storage for additional storm runoff above the permanent water level. Wet ponds may provide amenity and wildlife benefits.	 ✓ / × Attenuation basins have been proposed on site however, the exact wet-dry nature will be determined at the detailed design stage. 	
Attenuation Basins	Attenuation basins are normally dry, though they may have small permanent pools at the inlet and outlet. They are designed to detain a certain volume of runoff as well as providing water quality treatment.	 ✓ / × Attenuation basins have been proposed on site however, the exact wet-dry nature will be determined at the detailed design stage. 	

Table 5 - Summary of SuDS Selection

Greenfield Run-Off

5.2.7. Current best practice guidance identifies that FEH rainfall data largely supersede the previously used FSR Rainfall data. Therefore, the catchment descriptors for the proposed development site have been purchased from the FEH web service and the QMED discharge rate from the site will be calculated, as identified in Table 6 and contained within Appendix B.

Table 6 - Greenfield Run-Off Rates

Event	50ha (I/s)	1ha (l/s)
QMED	79.00	1.58

Development Run-Off & Attenuation

- 5.2.8. As the site is currently undeveloped, the proposals will result in an increase in impermeable area, which will increase the overall rate of water discharging from the site if left un-attenuated.
- 5.2.9. The surface water drainage strategy drawing 6405-D-002 in Appendix A indicates the site catchments based on the site topography as calculated in Table 7.

Catchment	Area Identified for Proposed Residential Development Area (ha)	Proposed Impermeable Area (ha)	QMED (I/s)
А	3.10	2.02	4.90
В	0.80	0.52	1.26
С	2.80	1.82	4.42
D	4.70	3.06	7.43
E	1.90	1.24	3.00
F	0.50	0.33	0.79
G	6.10	3.97	9.64
Total	19.90	12.94	31.44

Table 7 - Site Run-Off Assessment

- 5.2.10. Where long term storage is not proposed, in order to mitigate for the increased volume of run-off associated with built development, peak flows in the 1 in 100 year event must be attenuated to the QMED discharge rates for each catchment.
- 5.2.11. Where the development run-off from each catchment falls below 2l/s value, a maximum proposed peak discharge rate of 2l/s has been utilised to help reduce the risk of blockage of a flow control within the drainage network.
- 5.2.12. Assessments have thereafter been completed to determine the characteristics of the SuDS features required. The Micro Drainage Source Control module has been utilised to provide routing calculations

for the 1 in 100 year flood event to identify the size and nature of storage required, ensuring the peak outflows are in line with those identified in Table 7.

5.2.13. A summary of the nature of SuDS proposed is contained in Table 8, whilst the drainage strategy is shown on D-002 in Appendix A and Micro Drainage summary calculations are contained in Appendix B.

Catchment	Proposed Discharge Rate (I/s)	Approximate Storage Volume Required (m ³)	Potential SuDS
А	4.9	1,640	Attenuation Basin & Conveyance Swales
В	2.0	390	Attenuation Basin
С	4.4	1,480	Attenuation Basin & Conveyance Swales
D	7.4	2,500	Attenuation Basin & Swales
E	3.0	1,000	Attenuation Basin & Conveyance Swales
F	2.0	240	Attenuation Basin & Conveyance Swales
G	9.6	3,250	Attenuation Basin
Total	33.3	10,250	

 Table 8 - Site Attenuation Requirements

- 5.2.14. In accordance with legislative requirements, the detention proposals have also been assessed for the potential effects of climate change. The 1 in 100 year (1% AEP) return events have been modelled for 40% climate change (including peak rainfall intensity). Calculations for the climate change scenarios are also contained in the Appendix B.
- 5.2.15. Climate change assessments show each attenuation feature to perform adequately by retaining the additional flows within the system without overflow or unacceptable consequences.
- 5.2.16. The surface water drainage strategy will be designed in accordance with Sewers for Adoption (7th Edition) such that the proposed network will not surcharge during the critical 1 in 2 year event and will not flood during the 1 in 30 year event. For the 1 in 100 year return period, the sewer network will be designed so that surface flooding will be contained and conveyed within the highway boundary and directed to the attenuation basin.
- 5.2.17. The 1 in 30 year criterion meets the requirements of BS EN 752 and is also in accordance with Sewers for Adoption 7th Edition. However, the design of the system exceeds the requirements of these documents by accommodating the volumes and flow rates generated by the 1 in 100 year event.

5.2.18. The surface water drainage strategy is based upon the site masterplanning details at the time of production. Changes to the site development profile, impermeable areas across the site or other such aspects of the scheme will result in the need to revise the calculations.

Development Creep

- 5.2.19. Over the lifetime of a development, it is possible that the overall impermeable area within the site could increase by as much as 10% through the house buyers undertaking activities such as property extensions and introducing paved gardens.
- 5.2.20. Table 9 shows how this increase in impermeable area relates to the primary catchments within the site.

Catchment	Impermeable Area (ha)	10% Creep (ha)	Total Impermeable Area (ha)
А	2.02	0.20	2.22
В	0.52	0.05	0.57
С	1.82	0.18	2.00
D	3.06	0.31	3.36
E	1.24	0.12	1.36
F	0.33	0.03	0.36
G	3.97	0.40	4.36
Total	12.94	1.29	9.87

Table 9 - Development Creep Assessment

- 5.2.21. Micro Drainage calculations contained in Appendix B confirm that the proposed SuDS system has sufficient capacity to accommodate a 10% increase in impermeable area during the 1 in 100 year + 40% event without overflow.
- 5.2.22. In addition to this, during the detailed design phase, the positive impacts of the potential source control measures (permeable paving et al.,) should be further considered.
- 5.2.23. Without the benefit of a detailed plot level masterplan, it is not possible to appraise the function of the individual source control systems down to plot level. Source control measures should be further considered during detailed design and implemented as far as reasonably practicable.
- 5.2.24. As such, the impacts of development creep on the proposed SuDS system are not considered to pose a significant risk to the site.

Climate Change

5.2.25. The purpose of the proposed drainage strategy is to ensure that the proposed scheme does not exacerbate any existing flood risks upstream or downstream of the site, in accordance with the principles set out within the NPPF.

- 5.2.26. SuDS will be implemented throughout this development scheme. The conceptual SuDS strategy for the proposed development has been devised using the principles outlined within the current published guidance in the form of the NPPF, PPG and CIRIA amongst others.
- 5.2.27. The impact of climate change is a key factor when determining a drainage strategy. The NPPF and PPG guidance advocate a "development lifespan" approach for dealing with climate change allowances.
- 5.2.28. In light of this and in accordance with local requirements, an increase of 40% in peak rainfall intensity has been used as the allowance for climate change within the proposed drainage design to determine the performance of the drainage system.
- 5.2.29. Climate change assessments show each attenuation feature to perform adequately by retaining the additional flows within the system without overflow or unacceptable consequences. Calculations for the climate change scenarios are also contained in the Appendix B.

SuDS Management Train

- 5.2.30. The SuDS Manual (CIRIA C753) states the SuDS Management Train is a central design concept for SuDS. SuDS should not be thought of as an individual component, but as an interconnected system designed to manage, treat and make best use of surface water, from where it falls as rain to the point at which it is discharged into the receiving environment beyond the boundaries of the site.
- 5.2.31. There are six specific functions provided by SuDS components (rainwater harvesting, pervious surface systems, infiltration systems, conveyance systems, storage systems and treatment systems), which are not independent with one component being able to provide two or more functions.
- 5.2.32. There are many types of SuDS components which means that SuDS can be delivered anywhere, tailored to individual local contexts. Wherever possible, runoff should be managed at source with residual flows then conveyed downstream to further storage or treatment components.
- 5.2.33. Treatment design should implement SuDS components that use a range of treatment processes to reduce contaminant level in runoff to acceptable levels. This can be facilitated by the SuDS management train of a number of components in series that provide a range of treatment processes, delivering gradual improvement in water quality and providing an environmental buffer for accidental spills or unexpected high pollutant loadings from the site
- 5.2.34. The above has been considered in applying SuDS into the proposed development to help provide; prevention in terms of pollution, source control and site controls.
- 5.2.35. The proposed development will utilise attenuation basins and swales to provide attenuation storage on site. Flows will be limited, via a flow control device (e.g. hydrobrake) to ensure that maximum peak discharge rates do not exceed 38.4l/s for any event up to and including the 1 in 100 year plus climate change event.

Health and Safety

5.2.36. The proposed layout of the SuDS features will be designed in accordance with the best practice SuDS guidance documents and national standards, supplemented, where appropriate, with Leicestershire County Council guidance and the requirements of the water company and maintenance company to ensure the features are effective not only in terms of their hydraulic design but also from a safety perspective during construction, operation and maintenance.

vsp

5.2.37. Detailed health and safety risk assessments should be completed for the individual drainage features proposed as part of the final site design, setting out the risks and incorporating proposals for how these are to be managed.



6. FOUL DRAINAGE

6.1. EXISTING FOUL WATER DRAINAGE REGIME

6.1.1. Network Asset Plans obtained from Severn Trent Water identify a number of existing sewers present serving the existing development site including a 450mm diameter combined rising main which crosses the far west of the northern parcel of the site and a 160mm and 80mm foul sewer which crosses the south of the southern parcel of the site.

6.2. PROPOSED FOUL FLOWS

- 6.2.1. Peak design discharges have been calculated based on a maximum number of 900 dwellings, it has been estimated that a maximum of 550 dwellings will be proposed in the northern parcel and a maximum of 350 dwellings will be proposed in the southern parcel.
 - Residential = 4,000 litres / dwelling / day (peak)
- 6.2.2. Assessed in accordance with Sewers for Adoption requirements, it is anticipated that the planned development will produce a peak flow discharge of approximately 25l/s from the northern parcel and 16l/s from the southern parcel. Therefore, a maximum peak discharge from the site is proposed of 41l/s.

6.3. NETWORK CAPACITY AVAILABILITY

6.3.1. A pre-development enquiry has been sent to Severn Trent Water to confirm the available capacity within their network however, at the time of writing no response has been received.

6.4. IMPLEMENTATION PROPOSALS

6.4.1. A Severn Trent Water developer enquiry has been sought to identify proposed points of connection with available capacity for the proposed site. At the time of writing, no response has been received.

7. OPERATION AND MAINTENANCE

7.1. SURFACE WATER FEATURES

- 7.1.1. The proposed on-site surface water and foul drainage sewerage networks will be designed to the current version of Sewers for Adoption and will be offered for adoption by Severn Trent Water.
- 7.1.2. With regards to SuDS, in view of the recent central government decision not to create SAB's, some uncertainty remains regarding by whom and how these features will be adopted and maintained. With the above in mind, it is likely that, should the SuDS be offered to the council for adoption and maintenance, commuted sums will be required for all adoptable SuDS processes.
- 7.1.3. As an alternative, it is becoming increasingly common for SuDS features to be operated and maintained by a third-party private maintenance company. Should this be necessary, a third-party management company would be established to maintain the features in perpetuity. An adoption agreement between the final site developer and Maintenance Company would be based upon the CIRIA ICoP MA2 SuDS Maintenance Framework Agreement.
- 7.1.4. A typical maintenance schedule of the attenuation and flow control devices proposed on site are shown in tables below.

FREQUENCY	ACTION
Monthly	 Litter and debris removal. Mow grasses (where required to promote lateral runoff inflow) and remove resultant clippings (during growing season only). Remove nuisance and invasive vegetation (for 12 months following installation). Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required.
Six Monthly	 Remove nuisance and invasive vegetation.
Annually	 Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where required. Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, where required. Inspect and document the presence of wildlife.
As-Required	 Repair erosion or other damage by re-turfing, reseeding or replacing filter material. Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface where required. (typically every 60 month period). Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip, where required. Remove and dispose of oils or petrol residues using safe standard practices.
Following all significant storm events	 Inspect and carry out essential recovery works to return the feature to full working order.

Table 10 - Swale Indicative Maintenance Schedule



FREQUENCY	ACTION	
Monthly	 Inspect and identify any areas that are not operating correctly. If required, take remedial action (for three months following installation) 	
Six Monthly	 Inspect and identify any areas that are not operating correctly. If required, take remedial action. Remove sediment from pre-treatment structures 	
Annually	 N/A 	
Following all significant storm events	 Inspect and carry out essential recovery works to return the feature to full working order. 	

Table 11 - Flow Control (e.g Hydrobrake) Indicative Maintenance Schedule

Table 12 - Attenuation Basin Indicative Maintenance Schedule

Monthly	 Litter and debris removal. Mow grasses (where required to promote lateral runoff inflow) and remove resultant clippings (during growing season only). Remove nuisance and invasive vegetation (for 12 months following installation). Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required.
Six Monthly	 Remove nuisance and invasive vegetation.
Annually	 Remove all dead growth prior to the start of growing season. Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, where required. Inspect and document the presence of wildlife. Remove sediment from inlets, outlet and forebay Manage wetland plants, where required
As-Required	 Prune and trim trees and remove cuttings. Remove sediment from forebay, when 50% full and from micropools if volume reduced by more than 25% Repair erosion or other damage by re-turfing or reseeding Re-level uneven surfaces and reinstate design levels (typically once every 60 month period) Remove and dispose of oils or petrol residues using safe standard practices
Following all significant storm events	 Inspect and carry out essential recovery works to return the feature to full working order.

7.1.5. The proposed maintenance regimes for the devices should be in accordance with The SuDS Manual (CIRIA C753) and other best practice guidelines and in accordance with manufacturer's recommendations. This will ensure the design performance, structural integrity and where applicable-appearance of each feature is maintained throughout its lifetime.

7.1.6. The details of the party responsible for maintenance of each feature will be confirmed prior to occupation of the proposed development. Until such times as this may be determined.

7.2. FOUL DRAINAGE NETWORK

7.2.1. The foul drainage system will be offered for the adoption of Severn Trent Water under S104 of the Water Industry Act 1991.

8. CONCLUSIONS

- 8.1.1. The risk of flooding to and from the proposed development has been assessed largely in accordance with the NPPF February 2019.
- 8.1.2. This assessment demonstrates that the site lies within an appropriate location for the proposed land uses in accordance with the vulnerability classifications of the NPPF and supported by the Planning Authority and the Environment Agency.
- 8.1.3. Management of extreme event flood risk may be achieved through ensuring the finished floor levels of the proposed building are set at a minimum of 150mm above adjacent roads and open space levels in areas where designated overland flood routes are identified.
- 8.1.4. The proposed surface water drainage strategy aims to mimic the behaviour of the site predevelopment (greenfield), through the utilisation of conveyance swales, attenuation basins, and flow control devices. The maximum peak rate of discharge from the site is proposed to be 33.3I/s and the total approximate storage volume required is 10,500m³ for the critical 1 in 100 year event plus climate change.
- 8.1.5. In addition to the NPPF, the proposed surface water drainage strategy complies with local policy and site-specific requirements.
- 8.1.6. The responsibility for the operation and maintenance of each SuDS feature will be confirmed prior to construction. The SuDS used on site will be maintained in accordance with manufacturer's recommendations and current best practice and guidelines to ensure routine operation.
- 8.1.7. Safe access and egress will be available to and from the site for events up to and including the 1 in 100 year plus climate change (40%) rainfall events.
- 8.1.8. This report demonstrates that the proposed development can be undertaken in a sustainable manner without increasing the flood risk either at the site or to any third-party land in line with NPPF requirements.

Appendix A

INFILTRATION TESTING

)






Ordnance Survey material is used with the permission of the Controller of HMSO, Crown copyright 0100031673



LEGEND



Land use

Residential development (20.05ha)

Public Open Space



Access & movement

• • • • Existing footway

🛯 🗖 🗳 Strategic pedestrian/ cycle link



Redirected public footpath

Primary avenue

– – 🗲 Residential street

---→ Informal street



Landscape features

Contour levels

Existing tree canopy

Existing hedgerow

Proposed tree/ vegetation

Existing waterbody

Existing watercourse

Proposed attenuation basin



Historic setting Grade II listed building



Local historic environment record



metres



Node Imperial & Whitehall 23 Colmore Row Birmingham B3 2BS

thisisnode.com | 0121 667 9259

 $Ordnance \ Survey \ material \ is used \ with \ the \ permission \ of \ the \ Controller \ of \ HMSO, \ Crown \ copyright \ 0100031673$





								-		
	AINAGE CA		LS	<u>NOTES</u>		DONOI	SCALE	<u>-</u>		
IMENT	PROPOSED IMPERMEABLE AREA	[m ³] REQUIRED FOR THE 1 IN 100 YEAR + CLIMATE CHANGE	PROPOSED DISCHARGE RATE [I/s]	1. DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED. 2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SCHEME DRAWINGS. 3. THIS DRAWING IS NOT TO BE REPRODUCED IN ANY PART OR FORM						RM
		EVENT		WITHOUT CONSEN RESERVED.	NT OF	WSP DEVELC	PMENT LIMITE	ED. ALL COPY	RIGHT	
4 3	0.52	1640 390	4.9 2.00	4. DO NOT SCALE. IF IN DOUBT CONTACT WSP DEVELOPMENT LIMITED 5. EXISTING ROAD LEVELS AND DRAINAGE INVERT LEVELS SHALL BE						ED.
))	1.82	1480	4.4	CHECKED PRIOR DISCREPANCY SH	TO C IALL E	ONSTRUCTION	COMMENCEN TO THE ENG	IENT. ANY INEER.		
)	3.06	2500	7.4	6. THE LOCATION	I AND	DEPTHS OF D WITH THE	ALL EXISTING	SERVICE APP HORITIES PRIC	PARATU PR TO	IS
-	1.24	1000	3.00	7. ILLUSTRATIVE	PLAN	BASED ON:	ACE.			
	0.33	240	2.0	7.1. SEVERN 1 31/07/20	reni)19). ent a	WAIEK ASSEI	MAPS (DAIA		C	
	3.97	3250	9.6	(EXTENTS		ILOADED NOVI	EMBER 2019)	LUUU MAPPIN		
		10,500	33.3	7.3. SITE TOPC 7.4. DESIGN FI	GRAP	HIC SURVEY, /ORK REVB, N	NODE (3RD D	ECEMBER 20 DECEMBER 20	19).)19)	
• 123.jn				8.1. CALCULATI CONTROL 8.2. PROPOSEI 8.3. PONDS AS FREEBOAR CHANGE E 8.4. SWALES F	ONS MODU O QME SSUME D UP EVENT	UNDERTAKEN ILE. ID DISCHARGE D 1m DEEP, TO THE 1 IN ONVEYANCE O	IN MICRODRA RATE. 1:3 SIDE SL 100 YEAR NLY.	INAGE SOURC OPES, 300mr + 40% CLIMA	E n TE	
2014 Bit 100 B				8.5. RESIDENTI 8.6. SUBJECT LOCAL FL 9. NO EARTHWOF PROPOSED. ALL DESIGN.	AL AR TO AG OOD A RKS E ATTEN	EAS ASSUMEE REEMENT FRO AUTHORITY. XERCISE HAS UATION SUBJI) 65% IMPER DM SEVERN 1 BEEN UNDEF ECT TO DETA	MEABLE. "RENT WATER RTAKEN FOR ⁻ LED EARTHWC	/ LEA THE)RKS	D
				KEY						
FT.			T.F.	SITE BC	UNDA	RY				
				- EXISTING	g wat	ERCOURSE				
	$\left \left \left$	IAAK	AMARS VIDER A	- EXISTING	g higi	HWAY DRAIN				
		山松哥	VENUE	EXISTING	G SUR	FACE WATER	SEWER			
			A Y	EXISTING	G FOU	L WATER SEV	/ER			
					G CON	IBINED RISING	G MAIN			
			K Y		3 FUU 3 CUI	VFRT	ING MAIN			
				EXISTING	G PON	ID				
		FILAL	AS I							
+ 104.94			<u>}</u>	PROPOS	SED SI	JRFACE WATE	R FLOW ROU	TE		
				PROPOS	SED A	ITENUATION P	OND			
				PROPOS	SED SI	JRFACE WATE	r sewer			
				PROPOS	SED SI	WALE				
				PROPOS	SED SI	JRFACE WATE	r drainage	CATCHMENT		
Į.	SPINNEY CLOSE			> PROPOS	SED SI	JRFACE WATE	R HEADWALL		THE	_
				RELEVANT LOG BE UND PRELIMINA	CAL AI ERSTO	UTHORITIES O OD THAT ALL ND NOT FOR	R STATUTORY DRAWINGS A CONSTRUCTIO	BODIES, IT S RE ISSUED A N. SHOULD T	SHOULI STOULI S THE	D
14	HL-HL-H			APPROVAL	BEING	GIVEN, IT IS	ENTIRELY AT	THEIR OWN	RISK.	
		JTHE HE	5	DITCH. SU	CON BJECT	NECTION TO (TO CONFIRM	COMBINED RIS IATION FROM	SING MAIN OR RELATIVE PAF	HIGHN RTIES.	WAY
5				P02 12/12/2019	PS	UPDATED MASTER	PLAN		AC	DW
				P01 05/12/2019 REV DATE	PS BY	DRAFT FOR COMM DESCRIPTION	IENT		AC CHK	APP
H.			Ā	DRAWING STATUS:						
					52	2 - FOR INI	FORMATIC	JN		
						119	S P			
				The Mailbo	ox, Leve T+ 44 (el 2, 100 Wharfsi 0) 121 352 4700 wsp	de Street, Birmir , F+ 44 (0) 121 (.com	igham, B1 1RT, I 352 4701	UK	
	ILF		F		CL	OWES DE	/ELOPMEN	ITS		
The second secon			- Fr	ARCHITECT:		NO	DE			
			The second	SITE/PROJECT:		LAWNSWO	DOD ROAD			
			to the second se	PROPOSEI) SUI	RFACE WA	TER DRAIN	AGE STRA	TEGY	,
			ALL+	SCALE @ A1: 1:2000		CHECKED:	кС	APPROVED:	V	
	\bigvee	H.H.F.	TH.	PROJECT NO: 70066405		DESIGNED:	DRAWN: PS	DATE: Decem	ber 19	
		Har II	H	DRAWING No:		I		Doodii	REV:	
\			TT .		700)66405-D-	-002		P0	2
		Const. Bay	F-F-		(c) WSP	UK Ltd			



Appendix B

CALCULATIONS

Appendix B.1

11.

GREENFIELD RUN-OFF

WSP Group Ltd		Page 1					
•	Lawnswood Road						
	FEH Discharge	Sec.					
		Mirro					
Date 05/12/2019	Designed by PS	Dcainago					
File	Checked by AC	Diamaye					
XP Solutions	Source Control 2018.1						
FEH Mean Annual Flood							

Input

Site Location	GB	386300	285500	SO	86300 85500
Area (ha)					50.000
SAAR (mm)					698
URBEXT (2000)					0.2963
SPRHOST					31.010
BFIHOST					0.576
FARL					0.979

Results

QMED Rural (1/s) 79.0 QMED Urban (1/s) 120.4

WSP Group Ltd		Page 1
-	Lawnswood Road	
	T_0H124	
·	Designed by DC	MICro
Date 02/12/2019	Designed by PS	Drainage
File	Checked by AC	
XP Solutions	Source Control 2018.1	
<u>IH 124</u>	<u>Mean Annual Flood</u>	
	Input	
Return Period (year Area (f SAAR (r	rs) 100 Soil 0.150 na) 50.000 Urban 0.000 nm) 700 Region Number Region 4	
	Results 1/s	
	QBAR Rural 20.2	
	QBAR Urban 20.2	
	Q100 years 52.0	
	Q1 year 16.8	
	Q2 years 18.1	
	Q5 years 24.9	
	Q10 years 30.2	
	Q20 years 30.0	
	Q30 years 39.7	
	Q50 years 44.6	
	Q100 years 52.0	
	Q200 years 61.2	
	Q250 years 64.2	
×	21000 years 04.2	
©198	2-2018 Innovyze	

Appendix B.2

11.

1 IN 100 YEAR

WSP Group Ltd							Page 1
•		Lawr	nswood	Road			
		Cato	chment	А			Contraction of the
		1 ir	n 100 Y	Y			Micco
Date 11/12/2019		Desi	lgned k	by PS			
File CATCHMENT A.SRO	CX	Chec	cked by	y AC			Diamage
XP Solutions		Sour	ce Cor	ntrol 2	2018.1		280
Summ	ary of Resu	ults fo	or 100	year R	leturn	Period	
	<u> </u>			4			
	Storm	Max	Max	Max	Max	Status	
	Event	Level	Depth (Control	Volume		
		(m)	(m)	(1/s)	(m³)		
1	5 min Summer	83.171	0.171	4.9	437.3	ОК	
3	0 min Summer	83.222	0.222	4.9	572.3	ОК	
6	0 min Summer	83.275	0.275	4.9	713.7	O K	
12	0 min Summer	83.318	0.318	4.9	831.1	ОК	
18	0 min Summer	83.340	0.340	4.9	892.1	OK	
24	o min Summer	03.334 83 368	0.368	4.9 4 9	969 8	OK	
48	0 min Summer	83.374	0.374	4.9	986.8	0 K	
60	0 min Summer	83.377	0.377	4.9	993.4	ΟK	
72	0 min Summer	83.377	0.377	4.9	993.8	O K	
96	0 min Summer	83.374	0.374	4.9	984.4	O K	
144	0 min Summer	83.360	0.360	4.9	947.1	OK	
210	0 min Summer	83.343	0.343	4.9 4 9	899.0	OK	
432	0 min Summer	83.313	0.313	4.9	817.7	ОК	
576	0 min Summer	83.300	0.300	4.9	782.4	0 K	
720	0 min Summer	83.290	0.290	4.9	756.0	O K	
864	0 min Summer	83.283	0.283	4.9	736.0	ОК	
1008	5 min Summer	83.278	0.278	4.9	/21.8	OK	
	0 min Winter	83.248	0.248	4.9	490.0 641.6	O K	
		00.210	0.210		011.0	0 11	
	Storm	Rain	Floode	d Disch	arge Ti	.me-Peak	
	Event	(mm/nr)	volume (m ³)	≥ VOLU (m³	ime	(mins)	
			()	(111	,		
1	5 min Summer	116.400	0.	0 3	00.1	23	
3	0 min Summer	76.400	0.	0 3	78.0	38	
6	0 min Summer	47.900	0.	U 6	18.3	68	
12	0 min Summer	20.200	0.	0 / 0 7	⊥∠.4 54 1	128 186	
24	0 min Summer	16.100	0.	0 7	74.7	246	
36	0 min Summer	11.433	0.	0 7	87.2	366	
48	0 min Summer	8.908	0.	0 7	83.8	484	
60	0 min Summer	7.323	0.	0 7	74.3	604	
72	U min Summer	6.233	0.	U 7	63.6 41 5	062	
144	0 min Summer	3.375	0.	0 6	⊐⊥.J 96.6	1404	
216	0 min Summer	2.375	0.	0 11	99.9	1708	
288	0 min Summer	1.865	0.	0 12	35.5	2072	
432	0 min Summer	1.353	0.	0 12	48.4	2860	
576	0 min Summer	1.097	0.	0 15	62.0 77 1	3688	
720	0 min Summer	0.945	0.	0 17	//.⊥ 90.4	4036 5280	
1008	0 min Summer	0.774	0.	0 18	95.8	6144	
1	5 min Winter	116.400	0.	0 3	34.2	23	
3	0 min Winter	76.400	0.	0 4	02.3	37	
	@1	000-00	19	0177750			
	©_	1902-20	uro inr	lovyze			

NSP Group Ltd							Page 2
		Lawr	nswood	Road			
		Cato	chment	A			The second
		1 ir	n 100 Y				Micco
ate 11/12/2019)	Desi	lgned b	y PS			
ile CATCHMENT	A.SRCX	Chec	cked by	AC			Digitig
P Solutions		Soui	ce Con	trol 2	2018.1	1	
	Summary of Resu	ults fo	or 100 ·	year R	eturn	Period	
				-			
	Storm	Max	Max	Max	Max	Status	
	Event	Level	Depth C	ontrol	Volume	9	
		(m)	(m)	(1/s)	(m ³)		
	60 min Winter	83.307	0.307	4.9	800.4	4 ОК	
	120 min Winter	83.355	0.355	4.9	933.0	ОК	
	180 min Winter	83.380	0.380	4.9	1002.4	4 ОК	
	240 min Winter	83.395	0.395	4.9	1045.2	2 ОК	
	360 min Winter	83.412	0.412	4.9	1092.8	в ок	
	480 min Winter	83.420	0.420	4.9	1114.2	2 OK	
	600 min Winter	83.424	0.424	4.9	1123.9	y OK	
	960 min Winter	83 423	0.423	4.9	1120.0	B OK	
	1440 min Winter	83.412	0.412	4.9	1090.5	5 OK	
	2160 min Winter	83.389	0.389	4.9	1028.5	5 ОК	
	2880 min Winter	83.372	0.372	4.9	979.	7 ОК	
	4320 min Winter	83.346	0.346	4.9	907.0	б ОК	
	5760 min Winter	83.324	0.324	4.9	846.6	б ОК	
	7200 min Winter	83.305	0.305	4.9	796.3	3 ОК	
	8640 min Winter	83.290	0.290	4.9	754.0	о к	
	Storm	Rain	Flooded	d Discha	arge T	ime-Peak	
	Event	(mm/hr)	Volume	Volu	ime	(mins)	
			(m°)	(m ³)		
	60 min Winter	47.900	0.0) 68	85.2	66	
	120 min Winter	28.200	0.0) 7	72.8	126	
	180 min Winter	20.392	0.0) 80	00.2	184	
	240 min Winter	16.100	0.0) 80	05.5	242	
	360 min Winter	11.433	0.0) 79	96.2	360	
	480 min Winter	8.908	0.0	ידי נ זידי נ	84.6 73 1	4/8	
	720 min Winter	6 222	0.0	י י זר (/J.⊥ 62 0	394 712	
	960 min Winter	4,829	0.0) 74	40.7	942	
	1440 min Winter	3.375	0.0) 70	00.5	1388	
	2160 min Winter	2.375	0.0) 132	26.3	1996	
	2880 min Winter	1.865	0.0) 135	52.5	2244	
	4320 min Winter	1.353	0.0) 130	08.6	3156	
	5760 min Winter	1.097	0.0) 175	50.4	4032	
	7200 min Winter	0.945	0.0) 187	78.9	4896	
	8640 min Winter	0.844	0.0) 200	05.6	5712	
	10080 min Winter	0.//4	0.0	212	24.8	UdCd	

WSP Group Ltd		Page 3
•	Lawnswood Road	
	Catchment A	The second second
	1 in 100 Y	Mirco
Date 11/12/2019	Designed by PS	Desinado
File CATCHMENT A.SRCX	Checked by AC	Diamaye
XP Solutions	Source Control 2018.1	
<u>Ra</u>	<u>infall Details</u>	
Rainfall Mode	el FEH	
Return Period (years	5) 100	
FEH Rainfall Versio	on 2013	
Site Locatio	on GB 386300 285500 SO 86300 85500	
Summer Storn	ns Yes	
Winter Storm	ns Yes	
Cv (Summer	r) 0.750	
CV (Winter Shortest Storm (mins	s) 0.840	
Longest Storm (mins	s) 10080	
Climate Change	% +0	
Tin	ne Area Diagram	
	<u></u>	
Tota	al Area (ha) 2.020	
Time (mins)	Area Time (mins) Area	
From: To:	(ha) From: To: (ha)	
0 4	4 1.010 4 8 1.010	
©198	32-2018 Innovyze	

WSP Group Ltd					Page 4						
•	Lawnswood 1	Road									
	Catchment 2	A			The state						
•	1 in 100 Y				Mirrn						
Date 11/12/2019	Designed b	y PS			Drainag	D					
File CATCHMENT A.SRCX	le CATCHMENT A.SRCX Checked by AC										
XP Solutions	Source Con	trol 201	8.1								
Model Details											
Storage is Online Cover Level (m) 84.000											
Tank	or Pond Str	<u>ucture</u>									
Inver	t Level (m)	83.000									
Depth (m) Are	a (m²) Depth	(m) Area	(m²)								
0.000	2500.0 1	.000 32	260.0								
<u>Hydro-Brake®</u>	<u>Optimum Ou</u>	tflow Cc	ntrol								
Unit	Reference MD	-SHE-0109	-4900-0	700-4900							
Design	n Head (m) Flow (l(s)			0.700							
Design	Flush-Flo™		Ca	alculated							
	Objective M	linimise u	pstrear	n storage							
A	pplication			Surface							
Dia	Available meter (mm)			109							
Invert	Level (m)			83.000							
Minimum Outlet Pipe Dia	meter (mm)			150							
Suggested Manhole Dia	meter (mm)			1200							
Control Po	ints Hea	ad (m) Flo	ow (1/s)							
E E E E E E E E E E E E E E E E E E E	lush-Flo™	0.214	4.	9							
	Kick-Flo®	0.482	4.	1							
Mean Flow over H	lead Range	-	4.	2							
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on Should anothe n these stora	the Head/ r type of ge routin	Dischar contro g calcu	ge relati ol device ulations w	onship for t other than a will be	he					
Depth (m) Flow (1/s) Depth (m) Flow	(1/s) Depth	(m) Flow	(1/s)	Depth (m)	Flow (l/s)						
0.100 3.7 1.200	6.3 3	.000	9.7	7.000	14.5						
0.200 4.9 1.400	6.8 3	.500	10.4	7.500	15.0						
0.300 4.8 1.800	7.6 4	.500	11.7	8.500) 15.9						
0.500 4.2 2.000	8.0 5	.000	12.4	9.000	16.4						
0.600 4.6 2.200	8.4 5	.500	12.9	9.500	16.9						
	8.7 6	.000 500	13.5								
©198	2-2018 Inno	ovyze									

WSP Group Ltd						Page 1
•		Lawr	nswood B	Road		
		Cato	chment B	3		100 m
		1 ir	n 100 Y			Mirro
Date 11/12/2019	9	Desi	lgned by	y PS		Drainago
File Catchment	B.SRCX	Chec	cked by	AC		Diamaye
XP Solutions		Sour	rce Cont	crol 2018.	1	
	Summary of Resu	<u>ilts fo</u>	<u>or 100 y</u>	<u>vear Return</u>	<u>n Period</u>	
					-	
	Storm	Max	Max Depth Co	Max Max	Status	
	livenc	(m)	(m) ((1/s) (m ³)	-	
				0 0 111		
	15 min Summer	88.220	0.220	2.0 111.	1 OK	
	60 min Summer	88.343	0.343	2.0 181.	4 O K	
	120 min Summer	88.391	0.391	2.0 209.	5 ОК	
	180 min Summer	88.413	0.413	2.0 223.	1 ОК	
	240 min Summer	88.425	0.425	2.0 230.	6 ОК	
	360 min Summer	88.436	0.436	2.0 237.	0 ОК	
	480 min Summer	88.436	0.436	2.0 237.	з ок	
	600 min Summer	88.432	0.432	2.0 234.	8 O K	
	720 min Summer	88.426	0.426	2.0 230.	7 ОК	
	960 min Summer	88.408	0.408	2.0 219.	9 OK 7 OK	
	2160 min Summer	88 3//	0.378	2.0 201.	7 OK	
	2880 min Summer	88 316	0.316	2.0 161.	4 OK	
	4320 min Summer	88.273	0.273	2.0 141.	4 O K	
	5760 min Summer	88.242	0.242	2.0 123.	8 O K	
	7200 min Summer	88.218	0.218	2.0 110.	6 ОК	
	8640 min Summer	88.199	0.199	2.0 100.	5 ОК	
	10080 min Summer	88.184	0.184	2.0 92.	7 ОК	
	15 min Winter	88.245	0.245	2.0 125.	4 ОК	
	30 min Winter	88.313	0.313	2.0 163.	9 ОК	
	Storm	Rain	Flooded	Discharge 1	'ime-Peak	
	Event	(mm/hr)	Volume	Volume	(mins)	
			(m³)	(m³)		
	15 min Summer	116.400	0.0	104.0	23	
	30 min Summer	76.400	0.0	134.8	37	
	60 min Summer	47.900	0.0	181.9	68	
	120 min Summer	28.200	0.0	213.9	126	
	180 min Summer	20.392	0.0	231.6	186	
	240 min Summer	11 /22	0.0	243.3 250 1	246 364	
	480 min Summer	11.433 8 908	0.0	230.1 267 0	204 484	
	600 min Summer	7.323	0.0	273.1	602	
	720 min Summer	6.233	0.0	277.7	722	
	960 min Summer	4.829	0.0	283.7	918	
	1440 min Summer	3.375	0.0	286.5	1104	
	2160 min Summer	2.375	0.0	330.4	1472	
	2880 min Summer	1.865	0.0	345.6	1876	
	4320 min Summer	1 007	0.0	3/5.0	268U 3456	
	7200 min Summer	T.03/	0.0	409.4 440 /	5400 4181	
	8640 min Summer	0.844	0.0	471.7	4928	
	10080 min Summer	0.774	0.0	503.0	5648	
	15 min Winter	116.400	0.0	116.3	23	
	30 min Winter	76.400	0.0	148.5	37	
	 ۵	982-20	18 Tnnc	WWZE		
	0	202 20		~ <u>y</u> <u>2</u> <u>C</u>		

WSP Group Ltd							Page 2
•		Lawr	nswood	Road			
•		Cato	chment	В			and the second second
		1 ir	л 100 Y				Mission
$D_{2} + 0.11/12/201$	9	Dog	anod h	TT DC			- MILIO
Date 11/12/201		Desi		y rs			Drainaci
File Catchment	B.SRCX	Chec	скеа ру	AC			an a fai li ta a faith faitheasta a
XP Solutions		Sour	rce Con	trol 2	018.1		
		1	100			D	
	<u>Summary of Rest</u>	<u>ilts ic</u>	or 100	<u>year R</u>	eturn	Perloa	
	Storm	Max	Max	Max	Max	Status	
	Event	Level	Depth C	ontrol	Volume		
		(m)	(m)	(1/s)	(m ³)		
		0.0 0.01	0 001	0.0	000 7	o #	
	60 min Winter	88.381	0.381	2.0	203.7	OK	
	180 min Winter	88 460	0.434	2.0	251.9	0 K	
	240 min Winter	88.474	0.474	2.0	261.0	0 K	
	360 min Winter	88.487	0.487	2.0	269.2	0 K	
	480 min Winter	88.490	0.490	2.0	270.7	O K	
	600 min Winter	88.487	0.487	2.0	269.3	0 K	
	720 min Winter	88.483	0.483	2.0	266.3	0 K	
	960 min Winter	88.469	0.469	2.0	257.5	0 K	
	1440 min Winter	88.431	0.431	2.0	234.2	ОК	
	2160 min Winter	88.385	0.385	2.0	206.1	ОК	
	2880 min Winter	88.345	0.345	2.0	182.7	ОК	
	4320 min Winter	88.281	0.281	2.0	145.6	ОК	
	5760 min Winter	88.230	0.230	2.0	117.6	ОК	
	7200 min Winter	88.192	0.192	2.0	96.9	ΟK	
	8640 min Winter	88.163	0.163	2.0	81.6	ΟK	
	10080 min Winter	88.142	0.142	1.9	70.4	0 K	
	Storm	Rain	Flooded	d Discha	arge T	ime-Peak	
	Event	(mm/hr)	Volume (m ³)	Volu (m³	me)	(mins)	
			((,		
	60 min Winter	47.900	0.0	20)3.6	66	
	120 min Winter	28.200	0.0	23	39.0	124	
	180 min Winter	20.392	0.0) 25	08.1	184	
	240 min Winter	16.100	0.0	J 27	/0.4	242	
	360 min Winter	11.433	0.0	J 28	35.2	358	
	480 min Winter	8.908 7 222	0.0	J 25	13.U	4/4	
	720 min Winter	1.323	0.0	ע בא ער ר	20.4 20.2	590 704	
	960 min Winter	U.200 1 200	0.0	, ∠s) ⊃r	2.J 28 5	004 009	
	1440 min Winter	+.0∠9 3 375	0.0) 25) 20	20.5 20 6	920 1330	
	2160 min Winter	2 375	0.0) 23) 25	70.1	1620	
	2880 min Winter	1.865	0.0) २१) २१	37.1	2.048	
	4320 min Winter	1.353	0.0) 41	19.8	2892	
	5760 min Winter	1.097	0.0) 45	58.7	3640	
	7200 min Winter	0.945	0.0) 49	93.5	4392	
	8640 min Winter	0.844	0.0) 52	28.7	5104	
	10080 min Winter	0.774	0.0	56	54.0	5760	

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment B	
	1 in 100 Y	NH-
Date 11/12/2019	Designed by PS	MICIO
File Catchment B SRCX	Checked by IC	Drainage
VD Solutions	Course Control 2018 1	
	Source control 2016.1	
<u>Ra</u>	infall Details	
Rainfall Mode		FEH
Return Period (years	5)	100
FEH Rainfall Versio	n	2013
Site Locatio	on GB 386300 285500 SO 86300 8	35500
Data Tyr Summer Storn	De Cator	Yes
Winter Storn	ns	Yes
Cv (Summe)	c) (.750
Cv (Winter	<u>(</u>) (0.840
Shortest Storm (mins Longest Storm (mins	5)	15
Climate Change	-,	+0
Tin	<u>ne Area Diagram</u>	
Tota	al Area (ha) 0.520	
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
0 4	0.260 4 8 0.260	
	0.0010 Ta	
©198	32-2018 Innovyze	

WSP Group Ltd				Page 4							
•	Lawnswood Ro	bad									
•	Catchment B										
•	1 in 100 Y			Micro							
Date 11/12/2019	Designed by	PS		Nainage							
File Catchment B.SRCX	Checked by A	7C		Dramage							
XP Solutions	Source Conti	col 2018.1									
<u> </u>	Model Details										
Storage is On	Storage is Online Cover Level (m) 89.000										
Tank	or Pond Stru	<u>cture</u>									
Inver	rt Level (m) 88	.000									
Depth (m) Are	ea (m ²) Depth (m) Area (m²)	N								
0.000	4/4.0 1.0	00 83U.l	J								
<u>Hydro-Brake®</u>	Optimum Out	flow Contr	<u>ol</u>								
Unit	Reference MD-S	SHE-0071-200	0-0700-2000								
Design	n Head (m) Flow (l/s)		0.700								
Design	Flush-Flo™		Calculated								
	Objective Min	nimise upstro	eam storage								
A	pplication		Surface								
Dia	meter (mm)		71								
Invert	Level (m)		88.000								
Minimum Outlet Pipe Dia Suggested Manhole Dia	meter (mm)		100 1200								
Control Po	ints Head	(m) Flow (1	./s)								
Design Point (Ca	alculated) 0	.700	2.0								
E E E E E E E E E E E E E E E E E E E	flush-Flo™ 0	.207	2.0								
	Kick-Flo® 0	.450	1.6								
Mean Flow over H	lead Range	-	1.7								
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on th Should another n these storage	ne Head/Discl type of con e routing ca	harge relati trol device lculations w	onship for the other than a ill be							
Depth (m) Flow (1/s) Depth (m) Flow	7 (l/s) Depth (m) Flow (1/s	3) Depth (m)	Flow (l/s)							
0.100 1.8 1.200	2.6 3.0	00 3.	9 7.000	5.8							
0.200 2.0 1.400	2.9 3.5	00 4.	.∠ /.500 .5 8.000	6.2							
0.400 1.8 1.800	3.1 4.5	00 4.	7 8.500	6.4							
0.500 1.7 2.000	3.2 5.0	00 5.	.0 9.000	6.6							
0.600 1.9 2.200	3.4 5.5	00 5.	2 9.500	6.8							
1.000 2.4 2.600	3.5 6.0	00 5.	. 6								
©198	32-2018 Innov	yze									

WSP Group Ltd						Page 1
•		Lawr	nswood H	Road		
		Cato	chment (2		N
		1 ir	n 100Y			Micco
Date 11/12/2019		Desi	laned by	v PS		
File Catchment	C.SRCX	Chec	cked bv	AC		Drainage
XP Solutions		Sour	rce Cont	trol 2018.	1	
	Summarv of Resu	ults fo	or 100 v	vear Return	n Period	
	<u></u>					
	Storm	Max	Max	Max Max	Status	
	Event	Level	Depth Co	ontrol Volum	e	
		(m)	(m)	(l/s) (m ³)		
	15 min Summer	75.174	0.174	4.4 393.	9 ок	
	30 min Summer	75.226	0.226	4.4 515.	6 ОК	
	60 min Summer	75.279	0.279	4.4 642.	9 ОК	
	120 min Summer	75.322	0.322	4.4 748.	6 ОК	
	240 min Summer	75.344	0.344	4.4 803. 4 4 837	O OK	
	360 min Summer	75.373	0.373	4.4 873.	з ок З ок	
	480 min Summer	75.379	0.379	4.4 888.	4 ОК	
	600 min Summer	75.381	0.381	4.4 894.	1 ОК	
	720 min Summer	75.381	0.381	4.4 894.	3 ОК	
	1440 min Summer	75.364	0.364	4.4 851.	6 OK 4 OK	
	2160 min Summer	75.346	0.346	4.4 806.	7 ОК	
	2880 min Summer	75.333	0.333	4.4 775.	1 ОК	
	4320 min Summer	75.315	0.315	4.4 731.	1 ОК	
	5760 min Summer	75.302	0.302	4.4 698.	ЗОК	
	8640 min Summer	75.292	0.292	4.4 655.	0 0 K 7 0 K	
	10080 min Summer	75.279	0.279	4.4 642.	7 ОК	
	15 min Winter	75.194	0.194	4.4 441.	5 ОК	
	30 min Winter	75.252	0.252	4.4 578.	0 ОК	
	Storm	Rain	Flooded	Discharge 1	Time-Peak	
	Event	(mm/hr)	Volume	Volume	(mins)	
			(m³)	(m³)		
	15 min Summer	116.400	0 0	276 7	23	
	30 min Summer	76.400	0.0	344.7	38	
	60 min Summer	47.900	0.0	563.3	68	
	120 min Summer	28.200	0.0	647.6	128	
	180 min Summer	20.392	0.0	684.2 701.2	186	
	360 min Summer	11.433	0.0	709.9	240 366	
	480 min Summer	8.908	0.0	704.8	484	
	600 min Summer	7.323	0.0	695.8	604	
	720 min Summer	6.233	0.0	686.4	724	
	960 min Summer 1440 min Summer	4.829	0.0	667.U 627 7	962 1406	
	2160 min Summer	2.375	0.0	1087.4	1708	
	2880 min Summer	1.865	0.0	1120.0	2076	
	4320 min Summer	1.353	0.0	1130.2	2892	
	5760 min Summer	1.097	0.0	1410.5	3688	
	8640 min Summer	0.945	0.0	1617.8	5352	
	10080 min Summer	0.774	0.0	1714.2	6152	
	15 min Winter	116.400	0.0	306.9	23	
	30 min Winter	76.400	0.0	364.3	37	
	©	1982-20	18 Inno	ovyze		
				4		

±							Page 2
		Lawr	nswood i	Road			
		Cato	chment (С			and the second
		1 ir	n 100Y				Micco
ate 11/12/2019)	Desi	gned b	y PS			
ile Catchment	C.SRCX	Chec	ked bv	AC			Urainac
P Solutions		Sour	ce Con	$\frac{1}{1}$	018 1		
				0101 1			
	Summary of Resu	ults fo	r 100 s	vear Re	turn	Period	
	<u>building</u> of Rebe	100 10	1 100	your no	JUULII	101100	
	Storm	Max	Max	Max	Max	Status	
	Event	Level	Depth Co	ontrol N	/olume		
		(m)	(m)	(l/s)	(m³)		
	60 min Winter	75 311	0 311	ΔΔ	721 0	0 K	
	120 min Winter	75.359	0.359	4.4	840.5	0 K	
	180 min Winter	75.384	0.384	4.4	902.9	ОК	
	240 min Winter	75.400	0.400	4.4	941.4	ОК	
	360 min Winter	75.417	0.417	4.4	984.2	O K	
	480 min Winter	75.424	0.424	4.4 1	L003.4	O K	
	600 min Winter	75.428	0.428	4.4 1	L012.0	0 K	
	720 min Winter	75.429	0.429	4.4 1	L014.5	O K	
	960 min Winter	15.427	0.427	4.4 1	LUU9.4	O K	
	2160 min Winter	75.410	0.410	4.4 4.4	901.1	OK	
	2880 min Winter	75.375	0.375	4.4	879.1	0 K	
	4320 min Winter	75.348	0.348	4.4	812.8	0 K	
	5760 min Winter	75.326	0.326	4.4	756.9	ОК	
	7200 min Winter	75.307	0.307	4.4	710.9	O K	
	8640 min Winter	75.291	0.291	4.4	672.4	0 K	
	Storm	Rain	Flooded	Discha	rge Ti	me-Peak	
	Event	(mm/hr)	Volume	Volum	ne	(mins)	
			(m³)	(m³)			
	60 min Winter	47.900	0.0	62	3.4	66	
	120 min Winter	28.200	0.0	70	0.3	126	
	180 min Winter	20.392	0.0	72	1.9	184	
	240 min Winter	16.100	0.0	72	4.0	242	
	360 min Winter	11.433	0.0	71	4.4	360	
	400 min Winter	0.908 7 202	0.0	10	ン・ダ ス フ	4/8 59/	
	720 min Winter	6.233	0.0	68	3.9	712	
	960 min Winter	4.829	0.0	66	5.3	942	
	1440 min Winter	3.375	0.0	63	0.3	1388	
	2160 min Winter	2.375	0.0	120	1.3	2008	
	2880 min Winter	1.865	0.0	122	4.6	2248	
	4320 Min Winter 5760 min Winter	1 007	0.0	118 150	1.U	7U30 7C70	
	7200 min Winter	0.945	0.0	169	6.9	4896	
	8640 min Winter	0.844	0.0	181	1.9	5712	
	10080 min Winter	0.774	0.0	192	0.8	6560	

WSP Group Ltd		Page 3
•	Lawnswood Road	
	Catchment C	Para and
	1 in 100Y	Micco
Date 11/12/2019	Designed by PS	
File Catchment C.SRCX	Checked by AC	Drainage
XP Solutions	Source Control 2018.1	
<u>Ra</u>	infall Details	
Rainfall Mode	el FE	Н
Return Period (years	5) 10	0
FEH Rainfall Versio	on 201	3
Site Locatio	on GB 386300 285500 SO 86300 8550	0
Data Tyr Summer Storm	De Catchmen	C.
Winter Storn	ns Ye	s
Cv (Summer	c) 0.75	0
Cv (Winter	c) 0.84	0
Shortest Storm (mins	5) 1	5
Longest Storm (mins	s) 1008 °	0
	ъ т	0
Tin	ne Area Diagram	
Tota	al Area (ha) 1.820	
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
0 4	0.910 4 8 0.910	
©198	32-2018 Innovyze	
	-	

WSP Group Ltd						Page	e 4				
•	Lawnswood R	oad									
	Catchment C					- C	~				
•	1 in 100Y					Mir	TO				
Date 11/12/2019	Designed by	PS				Dra	inano				
File Catchment C.SRCX	Checked by	AC					mage				
XP Solutions	Source Cont	rol 2018	3.1								
<u>N</u>	Nodel Details	<u>5</u>									
Storage is On	Storage is Online Cover Level (m) 76.000										
Tank	or Pond Stru	<u>icture</u>									
Inver	t Level (m) 75	5.000									
Depth (m) Are	a (m²) Depth	(m) Area	(m²)								
0.000	2200.0 1.0	000 30	20.0								
<u>Hydro-Brake®</u>	<u>Optimum Out</u>	flow Co	<u>ntrol</u>								
Unit	Reference MD-	SHE-0104-	4400-0	0700-440	0 0						
Design	n Head (m) Flow (l/s)			0.7	00 4						
Design	Flush-Flo™		Ca	alculate	ed.						
	Objective Mi	nimise up	ostrear	n stora	ge						
A	pplication			Surfa	ce						
Dia	meter (mm)			10	25 04						
Invert	Level (m)			75.00	00						
Minimum Outlet Pipe Dia	meter (mm)			1	50						
Suggested Mannote Dia			<i>(</i> 7 <i>(</i>	120	50						
Design Point (Ca	lculated) (1 (m) FIO	w (1/s 4)							
F	lush-Flo™ (0.214	4.	4							
	Kick-Flo® (0.480	3.	7							
Mean Flow over H	lead Range	-	3.	8							
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on t Should another n these storag	he Head/I type of e routing	Dischan contro g calcu	rge rela ol devio ulations	atic ce c s wi	onship other 111 be	for the than a				
Depth (m) Flow (1/s) Depth (m) Flow	(1/s) Depth	(m) Flow	(l/s)	Depth	(m)	Flow	(l/s)				
0.100 3.5 1.200	5.6 3.0	000	8.7	7.0	000		13.0				
	6.1 3.5	500	9.3	7.5	500		13.4				
0.400 4.1 1.800	6.8 4.9	500	10.5	8.5	500		13.8				
0.500 3.8 2.000	7.2 5.0	000	11.1	9.0	000		14.7				
0.600 4.1 2.200	7.5 5.5	500	11.6	9.5	500		15.1				
1.000 5.2 2.600	8.1 6.5	500 500	12.1								
©198	2-2018 Innov	vyze									

Mar Group Ica						Page 1
•	Lawr	nswood 1	Road			
	Cato	chment l	D			Contraction of the
	1 ir	n 100 Y				Micro
Date 11/12/2019	Des	igned by	y PS			Drainago
File Catchment D.SRCX	Cheo	cked by	AC			Diamaye
XP Solutions	Soui	rce Cont	trol 20	018.1		L.
Summary of Re	<u>esults fo</u>	or 100 y	<u>year Re</u>	eturn	Period	
Storm	Max	Max Donth Co	Max	Max	Status	
Evenc	(m)	(m)	(1/s)	(m ³)		
15 min Summ	ner 74.673	0.173	7.3	662.7	ОК	
30 min Summ 60 min Summ	ler 74.725	0.225	7 4 1	867.3	OK	
120 min Summ	ner 74.824	0.324	7.4 1	1260.1	0 K	
180 min Summ	ner 74.847	0.347	7.4 1	1353.0	ОК	
240 min Summ	ner 74.861	0.361	7.4 1	1410.1	ОК	
360 min Summ	ner 74.876	0.376	7.4 1	1472.3	ΟK	
480 min Summ	ner 74.882	0.382	7.4 1	1499.2	O K	
600 min Summ	ner 74.885	0.385	7.4 1	1510.1	O K	
720 min Summ	ner 74.886	0.386	7.4 1	1511.7	ОК	
960 min Summ	ner 74.883	0.383	7.4 1	1499.5	ОК	
1440 min Summ	ner /4.8/0	0.370	7.4	1270 7	OK	
2100 IIIII Sulli 2880 min Sulm	lef 74.855	0.355	7 4 1	1332 9	OK	
4320 min Summ	er 74.826	0.326	7.4 1	1268.8	0 K	
5760 min Summ	ner 74.814	0.314	7.4 1	1220.6	ОК	
7200 min Summ	ner 74.805	0.305	7.4 1	1184.7	ОК	
8640 min Summ	ner 74.798	0.298	7.4 1	1157.2	0 K	
10080 min Summ	ner 74.793	0.293	7.4 1	1137.8	ОК	
15 min Wint	er 74.693	0.193	7.4	742.6	ОК	
30 min Wint	er 74.752	0.252	7.4	972.3	ОК	
Storm	Rain	Flooded	Discha	rge Ti	me-Peak	
Event	(mm/hr)	Volume	Volum	ne	(mins)	
		(m ⁻)	(m-)	•		
15 min Summ	er 116.400	0.0	42	4.6	23	
30 min Summ	er 76.400	0.0	54	8.2	38	
60 min Summ	er 47.900	0.0	90	6.6	68	
120 min Summ	er 20.200 er 20.200	0.0	104 111	d./	104	
240 min Summ	∈⊥ ∠∪.392 er 16 100	0.0	114	∃.U 8.4	100 246	
360 min Summ	er 11.433	0.0	117	4.8	366	
480 min Summ	er 8.908	0.0	117	5.4	484	
600 min Summ	er 7.323	0.0	116	5.2	604	
720 min Summ	er 6.233	0.0	114	9.2	724	
960 min Summ	er 4.829	0.0	111	4.4	962	
1440 min Summe	er 3.375	0.0	104	3.1	1402	
2160 min Summ	er 2.3/5 er 1.965	0.0	⊥/8 1 Q ⊃	5.0 5.1	⊥/U8 2072	
4320 min Summ	er 1353	0.0	185	2.0	2860	
5760 min Summ	er 1.097	0.0	235	0.1	3688	
7200 min Summ	er 0.945	0.0	252	1.5	4536	
8640 min Summ	er 0.844	0.0	268	8.7	5280	
10080 min Summ	er 0.774	0.0	284	1.1	6152	
15 min Winte	er 116.400	0.0	47	7.3	23	
30 min Winte	er /6.400	0.0	59	2.2	31	
	©1982-20	18 Innc	ovyze			

WSP Group Ltd							Page 2
•		Lawr	nswood	Road			
		Cato	chment	D			"Constant
•		1 ir	n 100 Y				Micco
Date 11/12/201	9	Des	igned b	V PS			
File Catchment	D SRCX	Chec	rked by	AC			Urainac
XP Solutions	2.01011	5011	rce Con	trol 2	2018 1		
AI DOIUCIONS		5001			-010.1	-	
	Summary of Posi	lte fo	r 100	voar P	oturn	Period	
	<u>Summary or Nest</u>	ILLS IL		<u>year</u> n	ecurn	Terrou	
	Storm	Max	Max	Max	Max	Status	
	Event	Level	Depth C	ontrol	Volume	3	
		(m)	(m)	(l/s)	(m³)		
		- 4 01 0	0 010		1010		
	60 min Winter	74.812	0.312	7.4	1213.0) OK	
	180 min Winter	74.888	0.388	7.4	1520.0		
	240 min Winter	74.904	0.404	7.4	1585.3	O K	
	360 min Winter	74.921	0.421	7.4	1658.3	в ок	
	480 min Winter	74.929	0.429	7.4	1691.7	ОК	
	600 min Winter	74.933	0.433	7.4	1707.2	OK	
	720 min Winter	74.934	0.434	7.4	1712.5	O K	
	960 min Winter	74.933	0.433	7.4	1662 8	OK OK	
	2160 min Winter	74.922	0.401	7.4	1574.2	C K	
	2880 min Winter	74.884	0.384	7.4	1505.5	ОК	
	4320 min Winter	74.859	0.359	7.4	1404.4	ОК	
	5760 min Winter	74.838	0.338	7.4	1318.2	O K	
	7200 min Winter	74.820	0.320	7.4	1246.8	ОК	
	8640 min Winter	74.805	0.305	7.4	1186.4	OK	
	10000 WITH WINCEL	14.195	0.295	/.4	1130.0) OK	
	Storm	Rain	Flooded	l Disch	arge T	ime-Peak	
	Event	(mm/nr)	(m ³)	voiu (m ³	ime ')	(mins)	
			()	(,		
	60 min Winter	47.900	0.0) 10	07.3	66	
	120 min Winter	28.200	0.0) 11	43.9	126	
	180 min Winter	20.392	0.0		93.4	184	
	240 min Winter 360 min Winter	11 433	0.0) 12	09.2 03.0	242	
	480 min Winter	8.908	0.0	11	85.5	478	
	600 min Winter	7.323	0.0) 11	67.9	594	
	720 min Winter	6.233	0.0) 11	50.5	710	
	960 min Winter	4.829	0.0) 11	16.7	942	
	1440 min Winter	3.375	0.0) 10	51.9	1388	
	∠160 min Winter 2880 min Winter	2.3/5	0.0) 20. 19.	/4.6 11 8	1996 2244	
	4320 min Winter	1.353	0.0) 19	51.1	3156	
	5760 min Winter	1.097	0.0	26	34.1	4032	
	7200 min Winter	0.945	0.0	28	25.3	4896	
	8640 min Winter	0.844	0.0) 30	12.4	5712	
	10080 min Winter	0.774	0.0) 31	85.0	6560	

WSP Group Ltd		Page 3							
	Lawnswood Road								
	Catchment D	M							
	1 in 100 y	No.							
·	Designed by PS	MICrO							
Filo Catchmont D SPCV	Checked by AC	Drainage							
VD Colutions	Checked by AC								
XP Solutions	Source Control 2018.1								
<u>Ra:</u>	infall Details								
Rainfall Mode	el FEH								
Return Period (years	3) 100								
FEH Rainfall Versic	on 2013								
Site Locatio	on GB 386300 285500 SO 86300 85500								
Summer Storm	Se Calchillent								
Winter Storm	ns Yes								
Cv (Summer	0.750								
Cv (Winter	c) 0.840								
Shortest Storm (mins	5) 15								
Longest Storm (mins	s) 10080 s								
Tim	ne Area Diagram								
Tota	al Area (ha) 3.060								
Time (mins) From: To:	Time (mins) Area Time (mins) Area From: To: (ha) From: To: (ha)								
0.4	1 530 4 9 1 530								
r v	1.550 4 0 1.550								
©198	2-2018 Innovyze								

WSP Group Ltd					Page 4
•	Lawnst	wood Road	l		
•	Catchr	ment D			The second
•	1 in 1	100 Y			Mirro
Date 11/12/2019	Design	ned by PS	,		Drainage
File Catchment D.SRCX	Checke	ed by AC			Diamage
XP Solutions	Source	e Control	2018.1		
	Model I	Details			
Storage is	Online Co	ver Level	(m) 75.500		
Tan	<u>k or Pon</u>	d Structi	ire		
In	vert Level	(m) 74.50	00		
Depth (m)	Area (m²)	Depth (m)	Area (m²)		
0.000	3760.0	1.000	4630.0		
<u>Hydro-Brak</u>	e® Optim	um Outflo	ow Control	-	
Ur	nit Refere	nce MD-SHE	-0131-7400-	0700-7400	
Desic	sign Head	(m) (s)		0.700 7 4	
Desto	Flush-F	lo™	С	alculated	
	Object	ive Minim	ise upstrea	m storage	
C1	Applicat	ion blo		Surface	
	Diameter (1	mm)		131	
Inve	ert Level	(m)		74.500	
Minimum Outlet Pipe I	Diameter (1	mm)		150	
Suggested Mannole I	lameter (mm)	/_ /	1200	
Control Design Point	Points	Head (n	a) Flow (1/s	3)	
	Flush-Fl	.o™ 0.23	30 7	.4	
	Kick-Fl	.o® 0.50	01 6	.3	
Mean Flow ove	r Head Ran	ige	- 6	.2	
The hydrological calculations have Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised t invalidated	e been bas . Should then these	ed on the another ty storage r	Head/Discha pe of contr outing calc	rge relation ol device of ulations with	onship for the other than a ill be
Depth (m) Flow (1/s) Depth (m) F	low (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100 4.7 1.200	9.5	3.000	14.7	7.000	22.1
0.300 7.3 1.600	10.2	4.000	15.0	8.000	22.0
0.400 7.1 1.800	11.5	4.500	17.9	8.500	24.2
0.500 6.4 2.000	12.1	5.000	18.8	9.000	24.9
	12.7	5.500	19.7	9.500	25.6
1.000 8.7 2.600	13.7	6.500	21.3		
	000 0010				
©1	1982-2018	3 Innovyz	e		

WSP Group Ltd							Page 1
•		Lawn	swood	Road			
		Catc	hment	E			"Loon of
•		1 in	100 Y				Mirco
Date 05/12/2019		Desi	aned b	V PS			
File Catchment E	SBCX	Chec	ked hv				Urainage
VD Colutions	· biten	Cours	Red by	+ mol 2	010 1		2
XP Solutions		Sour	ce con	trol Z	018.1		
		1	100			Design	
<u>S</u>	ummary of Rest	<u>ilts io</u>	r 100	<u>year Re</u>	eturn	Period	
	0 to 2 mm	Mass	Man	Mass	Man	<u>Chatura</u>	
	Event	Lovel	Denth (Control	Volume	Status	
	Litene	(m)	(m)	(1/s)	(m ³)		
	15 min Summer	103.180	0.180	3.0	268.3	O K	
	30 min Summer	103.234	0.234	3.0	351.1	ОК	
	120 min Summer	103.289	0.289	3.0	437.8	OK	
	180 min Summer	103.355	0.355	3.0	546 7	O K	
	240 min Summer	103.370	0.370	3.0	569.3	0 K	
	360 min Summer	103.385	0.385	3.0	593.5	0 K	
	480 min Summer	103.391	0.391	3.0	603.4	ОК	
	600 min Summer	103.393	0.393	3.0	606.9	ΟK	
	720 min Summer	103.393	0.393	3.0	606.7	O K	
	960 min Summer	103.389	0.389	3.0	599.9	ΟK	
	1440 min Summer	103.373	0.373	3.0	574.9	ΟK	
	2160 min Summer	103.353	0.353	3.0	541.6	ΟK	
	2880 min Summer	103.338	0.338	3.0	517.9	ОК	
	4320 min Summer	103.318	0.318	3.0	484.7	OK	
	7200 min Summer	103.303	0.303	3.0	400.5	OK	
	8640 min Summer	103.283	0.283	3.0	429.3	O K	
1	.0080 min Summer	103.277	0.277	3.0	419.8	0 K	
	15 min Winter	103.201	0.201	3.0	300.7	ОК	
	30 min Winter	103.261	0.261	3.0	393.7	ОК	
	a .	. .					
	Storm	Rain	Flooded	1 Discha	rge Tu	me-Peak	
	Event	(mm/nr)	(m ³)	vo1ui (m ³)	ne ()	mins)	
			(111)	(111)	,		
	15 min Summer	116.400	0.0	20	0.3	23	
	30 min Summer	76.400	0.0	24	2.6	38	
	60 min Summer	47.900	0.0) 39	5.6	68	
	120 min Summer	28.200	0.0) 45	3.0	128	
	180 min Summer	20.392	0.0	J 47	6.2	186	
	240 min Summer	11 422	0.0	J 48	5.4	246	
	480 min Summer	11.433 8 908	0.0) 40) /18	1 5	787	
	600 min Summer	7.323	0.0) 47	5.5	604	
	720 min Summer	6.233	0.0) 46	9.3	72.4	
	960 min Summer	4.829	0.0) 45	6.8	962	
	1440 min Summer	3.375	0.0	43	2.0	1428	
	2160 min Summer	2.375	0.0) 75	3.1	1712	
	2880 min Summer	1.865	0.0) 77	7.3	2076	
	4320 min Summer	1.353	0.0) 78	5.6	2892	
	5760 min Summer	1.097	0.0) 96	6.4	3688	
	/200 min Summer	0.945	0.0	J 103	8.5	4536	
1	0040 min Summer	0.844	0.0	ノ エエエ コープ	0.3	030Z	
1	15 min Winter	116 400) 11/) 22	0.1	23	
	30 min Winter	76.400	0.0) 25	2.0	37	
				_0	-	-	
	©	1982-20	18 Inn	ovyze			

WSP Group Ltd						
•		Lawr	nswood	Road		
		Cato	chment	Е		
		1 ir	n 100 Y			
Date 05/12/2019	9	Desi	aned h	V PS		
Eilo Catabmont	F CDCV	Choc	skod bi			
	L.SRCA			AC	010 1	
KP Solutions		Sour	ce Cor	itrol 2	018.1	
				_		
	<u>Summary of Res</u>	<u>ults fo</u>	<u>r 100</u>	<u>year Re</u>	eturn	Period
	Storm	Max	Max	Max	Max	Status
	Event	Level	Depth	Control	Volume	1
		(m)	(m)	(l/s)	(m³)	
	CO min Minton	102 200	0 222	2 0	401 0	0 7
	120 min Winter	102.322	0.322	2.0	491.0	OK
	120 min Winter	103.372	0.372	3.0	572.2 614 5	OK
	240 min Winter	103 /12	0.397	3.U 3.U	640 6	O K
	360 min Winter	103 430	0 430	3.U 3.D	669 6	0 K
	480 min Winter	103.438	0.438	3.0	682.4	0 K
	600 min Winter	103.442	0.442	3.0	688.1	0 K
	720 min Winter	103.442	0.442	3.0	689.6	ОК
	960 min Winter	103.440	0.440	3.0	685.6	ОК
	1440 min Winter	103.428	0.428	3.0	665.0	ОК
	2160 min Winter	103.403	0.403	3.0	623.9	ΟK
	2880 min Winter	103.383	0.383	3.0	590.0	ОК
	4320 min Winter	103.353	0.353	3.0	541.2	ΟK
	5760 min Winter	103.328	0.328	3.0	500.6	ΟK
	7200 min Winter	103.307	0.307	3.0	467.6	O K
	8640 min Winter	103.290	0.290	3.0	440.2	ΟK
	10080 min Winter	103.276	0.276	3.0	417.9	ОК
	Storm	Bain	Floode	d Discha	rae Ti	me-Peak
	Event	(mm/hr)	Volume	Volu	ne ne	(mins)
			(m³)	(m ³)		,
	60 min Winter	47 900	0) 43	6.7	66
	120 min Winter	28.200	0.	0 48	5.9	126
	180 min Winter	20.392	0.	0 49	5.1	184
	240 min Winter	16.100	0.	0 49	2.8	242
	360 min Winter	11.433	0.	0 48	4.8	360
	480 min Winter	8.908	0.	0 47	7.0	478
	600 min Winter	7.323	0.	0 46	9.9	596
	720 min Winter	6.233	0.	0 46	3.2	712
	960 min Winter	4.829	0.	0 45	1.2	942
	1440 min Winter	3.375	0.	0 42	9.7	1390
	2160 min Winter	2.375	0.	0 83	1.5	2012
	2880 min Winter	1.865	0.	0 84	8.2	2248
	4320 min Winter	1.353	0.	0 81	6.7	3156
	5760 min Winter	1.097	0.	0 108	2.6	4032
	7200 min Winter	0.945	0.	0 116	3.2	4896
	8640 min Winter	0.844	0.	0 124	3.3	5712
	10080 min Winter	0.774	0.	u 132	υ.7	6560

Lawnswood Road Catchment E 1 100 Y Date 05/12/2019 Designed by PS File Catchment F.S.RCX Checked by AC XF Solutions Source Control 2018.1 Enter Server 2018.200 205500 50 56300 85300 85300 Server 2018 200 205500 50 56300 85300 85300 85300 Server 2018 100000 Colspan="2">Colspan="2"Colspan="2"Colspan="2"Colspan="2"Colspan="2"Colspan="2"Colspan="2"Co	WSP Group Ltd		Page 3	
i i i io		Lawnswood Road		
I in 100 Y Designed by PS Checked by AC Checke		Catchment E		
besigned by PS Checked by AC Source Control 2018.1 Checked by AC Source Control 2018.1 Checked by AC Checked by AC Source Control 2018.1 Checked by AC Checked by AC Control 2018.1 Checked by AC Checked by AC Control 2018.1 Checked by AC Checked by AC Control 2018.1 Checked by AC Control 2018.1 Checked by AC Checked by AC Control 2018.1 Checked by AC Checked by AC Chec		1 in 100 Y	Mission	
Bile Gathment B.SRCX Checked by AC Solutions Soluce Control 2018.1 Checked by AC Checked by AC Checked by AC Solutions Checked by AC Checked by AC <td>Date 05/12/2019</td> <td>Designed by PS</td> <td></td>	Date 05/12/2019	Designed by PS		
Autocational (all all all all all all all all all	File Catchment E SRCX	Checked by AC	Drainage	
Butte Cuitton totot. Apple Cuitton totot. Experimental Version Fit Experimental Version Control of Control	VP Solutions	Source Control 2018 1	4	
<section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header>		Source control 2010.1		
	<u>Ra</u>	infall Details		
Return Period (years)100FEH Rainfall Version203Site Location GE 366300 285500 SO 66300 85500Data TypeCatchmentSummer StormsYeasCo (Summer)0.340Stortest Storm (mins)10080Climate Change S10Time (mins) AreaTime (mins) AreaFrom:To:Yeas04 0.6204 8 0.620	Rainfall Mode	21	FEH	
FEH Rainfall Version 2013 Site Location GB 366300 285500 85300 85300 Catchment Summer Storms Yes Winter Storms Yes C (Summer) 0.750 C (Summer) 0.800 Shortest Storm (mins) 1080 Climate Change 3 10 Time Area Diagram G (Summer) 10 O (A 0.620) (B 0.620)	Return Period (years	5)	100	
Site Location GB 386500 285500 80 600 80500 Darype Catument Numer Storms Yes Numer Storms Yes C (Summer) 0.750 C (Summer) 0.800 C (Summer) 10000 C (Summer) <t< td=""><td>FEH Rainfall Versio</td><td>n</td><td>2013</td></t<>	FEH Rainfall Versio	n	2013	
Lat type Carametri Summer is torms Yes CY (Winter) 0.840 Shortest Storm (mins) 10080 Climate Change % 40 Total Area (ha) 1.240 Time (mins) Area Time (mins) Area From: To: (ha) 0 4 0.620 4 8 0.620	Site Locatio	on GB 386300 285500 SO 86300 8	35500	
Witter Storms Yeig Cv (Summer) 0.830 Shotes Storm (mins) 15 Claste Change S	Data Typ Summer Storn	De Cator.	Yes	
CV (SUMER) 0.750 CV (WINTEY) 0.800 Stortest Storm (mins) 10000 Climate Changes 0 LIME ARE DIAGNA LIME ARE DIAGNA LIME ARE DIAGNA LIME (mins) LIME (mins)	Winter Storn	ns	Yes	
CV (WINCH) 0.840 Shortest Storm (mins) 10080 Climate Change 8 +0 Lime Change 1 Acta Time Area Diagram Acta Total Area (ha) 1.240 Marce (mins) 0 4 0.620 4 8 0.620	Cv (Summer	c) C	.750	
Shortest Storm (mins)108Climate Change %-0Climate Change %Climate Change % <td co<="" td=""><td>Cv (Winter</td><td>c) C</td><td>.840</td></td>	<td>Cv (Winter</td> <td>c) C</td> <td>.840</td>	Cv (Winter	c) C	.840
Bunder Storm (mins) 1000 10 Climate Change S 1 Climate Change S 1<	Shortest Storm (mins	5)	15	
Cinitate change s For Area Diagram Total Area (ha) 1.240 Time (mins) Area From: To: (ha) 0 4 0.620 4 0.620	Longest Storm (mins	s) 1	.0080	
Time Area Diagram Total Area (ha) 1.240 Time (mins) Area (ha) (from: from:		°0	ιU	
Total Area (ha) 1.240 Time (mins) Area (reg) (has mins) Area (reg) (has mins) (reg) (reg) (has mins) (reg)	Tin	ne Area Diagram		
Time (mins) Area Time (mins) Area From: To: (ha) 0 4 0.620 4 8 0.620	Tota	al Area (ha) 1.240		
0 4 0.620 4 8 0.620	Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)		
0 4 0.020 4 8 0.020				
01982-2018 Innovvze	U 4	4 8 0.620		
01982-2018 Innovvze				
01982-2018 Innovvze				
01982-2018 Innovvze				
01982-2018 Innovze				
©1982-2018 Innovvze				
	©198	32-2018 Innovyze		

WSP Group Ltd		Page 4
•	Lawnswood Road	
	Catchment E	Contraction
•	1 in 100 Y	Mirro
Date 05/12/2019	Designed by PS	Drainago
File Catchment E.SRCX	Checked by AC	Dramage
XP Solutions	Source Control 2018.1	
<u>M</u>	odel Details	
Storage is Onl	ine Cover Level (m) 104.000	
Tank	or Pond Structure	
Inver	: Level (m) 103.000	
Depth (m) Are	a (m ²) Depth (m) Area (m ²)	
0.000	1440.0 1.000 2010.0	
<u>Hydro-Brake®</u>	Optimum Outflow Control	
Unit	Reference MD-SHE-0087-3000-0	700-3000
Design	Head (m)	0.700
Design	'lush-Flo™ Ca	lculated
	Objective Minimise upstream	storage
A	pplication	Surface
Dia	Available neter (mm)	res 87
Invert	Level (m)	103.000
Minimum Outlet Pipe Dia	neter (mm)	100
Suggested Manhole Dia	eter (mm)	1200
Control Po	nts Head (m) Flow (l/s)	
Design Point (Ca	lush-Flo™ 0.210 3.0)
	Kick-Flo® 0.465 2.5	
Mean Flow over H	ead Range - 2.6	5
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on the Head/Dischar Should another type of contro h these storage routing calcu	ge relationship for the l device other than a lations will be
Depth (m) Flow (1/s) Depth (m) Flow	(1/s) Depth (m) Flow (1/s)	Depth (m) Flow (l/s)
0.100 2.6 1.200	3.8 3.000 5.9	7.000 8.8
0.200 3.0 1.400	4.1 3.500 6.3 4.4 4.000 6.3	7.500 9.1
0.300 2.9 1.800	4.6 4.500 7.1	8.500 9.7
0.500 2.6 2.000	4.9 5.000 7.5	9.000 9.9
0.600 2.8 2.200	5.1 5.500 7.8	9.500 10.2
1.000 3.2 2.400	5.5 6.500 8.5	
©198	2-2018 Innovyze	

WSP Group Ltd							Page 1
•		Lawr	nswood 1	Road			
		Cato	chment 1	F			Contract 1
		1 ir	n 100 Y				Mirco
Date 11/12/2019	9	Desi	igned b	y PS			Dcainago
File Catchment	F.SRCX	Chec	cked by	AC			Diamaye
XP Solutions		Soui	rce Con	trol 201	8.1		
	<u>Summary of Resu</u>	<u>ilts fo</u>	o <u>r 100 y</u>	year Ret	urn	<u>Period</u>	
	6 to 2000					0 h a h a a	
	Event	Level	Depth Co	ontrol Vol	lume	Status	
		(m)	(m)	(1/s) (r	m³)		
	15 min Cummor	07 142	0 1 4 2	20.	70 5	O V	
	30 min Summer	97.143	0.143	2.0	91.9	0 K	
	60 min Summer	97.225	0.225	2.0 11	13.6	ОК	
	120 min Summer	97.255	0.255	2.0 12	29.9	O K	
	180 min Summer	97.268	0.268	2.0 13	36.9	ΟK	
	240 min Summer	97.273	0.273	2.0 14	40.0	ОК	
	360 min Summer	91.274	0.274	2.0 1	4U.7	O K	
	400 min Summer	97.269 97.269	U.269 0 262	2.U L. 2 0 1'	31.5 33 6	OK	
	720 min Summer	97.255	0.255	2.0 1	30.0	0 K	
	960 min Summer	97.243	0.243	2.0 12	23.4	ОК	
	1440 min Summer	97.222	0.222	2.0 11	11.8	ОК	
	2160 min Summer	97.194	0.194	2.0	97.2	ОК	
	2880 min Summer	97.172	0.172	2.0 8	85.4	O K	
	4320 min Summer	97.140	0.140	1.9 (68.8	0 K	
	5760 min Summer	97.119	0.119	1.9 5	58.0	ОК	
	7200 min Summer	97.105	0.105	1.9 :	50.9 46 2	OK	
	10080 min Summer	97.089	0.089	1.7	43.3	O K	
	15 min Winter	97.160	0.160	2.0	79.1	ОК	
	30 min Winter	97.206	0.206	2.0 10	03.2	O K	
	Storm	Rain	Flooded	Discharg	e Tir	me-Peak	
	Event	(mm/hr)	Volume	Volume	(mins)	
			(m³)	(m³)			
	15 min Summer	116.400	0.0	65.	3	22	
	30 min Summer	76.400	0.0	86.	6	37	
	60 min Summer	47.900	0.0	115.	0	66	
	120 min Summer	28.200	0.0	135.	/	126	
	240 min Summer	20.392	0.0	14/. 155	∠ 0	104 244	
	360 min Summer	11.433	0.0	165.	1	362	
	480 min Summer	8.908	0.0	171.	4	480	
	600 min Summer	7.323	0.0	176.	0	522	
	720 min Summer	6.233	0.0	179.	7	576	
	960 min Summer	4.829	0.0	185.	2	694	
	1440 min Summer	3.375	0.0	193.	⊥ ∕I	956 1360	
	2880 min Summer	2.3/3	0.0	209. 219	- 0	1736	
	4320 min Summer	1.353	0.0	237.	2	2472	
	5760 min Summer	1.097	0.0	259.	4	3176	
	7200 min Summer	0.945	0.0	279.	0	3896	
	8640 min Summer	0.844	0.0	298.	7	4584	
	10080 min Summer	0.774	0.0	318.	1	5336	
	15 min Winter	116.400	0.0	13.	Э 1	22	
	Jo mili Milicer	/0.400	0.0	51.	-	51	
	©	1982-20	18 Inno	ovyze			

• • Date 11/12/2019 File Catchment F XP Solutions <u>S</u>	.SRCX Summary of Resu Storm Event	Lawr Catc 1 ir Desi Chec Sour 11ts fo Max	nswood 1 chment 1 i 100 Y igned by cked by cce Cont r 100 y	Road F AC trol 2 year Re	018.1 eturn	Period	Micro Drainad
Date 11/12/2019 File Catchment F XP Solutions	.SRCX Summary of Resu Storm Event	Catc 1 ir Desi Chec Sour 11ts fo Max	chment : n 100 Y igned by cked by cce Cont r 100 y	F Y PS AC trol 2 Zear Re	018.1 eturn	Period	— Micro Drainad
Date 11/12/2019 File Catchment F XP Solutions <u>S</u>	.SRCX Summary of Resu Storm Event	1 ir Desi Chec Sour 11ts fo Max	n 100 Y igned by cked by cce Cont r 100 y	y PS AC trol 2 <u>zear R</u> e	018.1 eturn	Period	Micro Drainad
Date 11/12/2019 File Catchment F XP Solutions	.SRCX Summary of Resu Storm Event	Desi Chec Sour 11ts fo	igned by cked by cce Cont	y PS AC trol 2 year Re	018.1 eturn	Period	Drainag
File Catchment F XP Solutions	.SRCX Summary of Resu Storm Event	Chec Sour ilts fo	cked by cce Cont r 100 s	AC AC trol 2 year Re	018.1 ≥turn	Period	Drainac
File Catchment F XP Solutions <u>S</u>	.SRCX Summary of Resu Storm Event	Chec Sour 11ts fo Max	cked by cce Cont or 100 y	AC trol 2 year Re	018.1 eturn	Period	
XP Solutions	ummary of Resu Storm Event	Sour 11ts fo Max	rce Con [.] or 100 y	trol 2 year Re	018.1 eturn	Period	
<u>S</u>	Summary of Resu Storm Event	<u>ilts fo</u> Max	or 100 y	year Re	eturn	Period	
<u>S</u>	Summary of Resi Storm Event	<u>ilts fo</u> Max	or 100 y	year Re	<u>eturn</u>	Period	
	Storm Event	Max	-			~	
	Storm Event	Max					
	Event		Max	Max	Max	Status	
		Level	Depth Co	ontrol v	Volume		
		(m)	(m)	(l/s)	(m³)		
	60 min Winter	97.251	0.251	2.0	127.7	0 K	
	120 min Winter	97.285	0.285	2.0	146.4	OK	
	180 min Winter	91.299	0.299	2.0	154./	O K	
	240 Min Winter	91.301 97 310	0.307	2.0	160 4	O K	
	480 min Winter	97.31U 97 305	0.310	∠.U 2 ∩	158 0	0 K	
	600 min Winter	97 292	0.202	2.0	152 0	0 K	
	720 min Winter	97 289	0.289	2.0	148 Q	0 K	
	960 min Winter	97 273	0.205	2.0	139 9	0 K	
	1440 min Winter	97.244	0.244	2.0	123.9	0 K	
	2160 min Winter	97.205	0.205	2.0	102.7	0 K	
	2880 min Winter	97.172	0.172	2.0	85.5	0 K	
	4320 min Winter	97.126	0.126	1.9	61.8	0 K	
	5760 min Winter	97.099	0.099	1.8	47.9	ОК	
	7200 min Winter	97.086	0.086	1.7	41.5	ОК	
	8640 min Winter	97.078	0.078	1.5	37.6	ОК	
	10080 min Winter	97.073	0.073	1.4	34.9	ΟK	
	Storm Event	Rain (mm/hr)	Flooded Volume	Discha Volu	urge Ti me)	me-Peak (mins)	
			(m-)	(m-)	,		
	60 min Winter	47.900	0.0	12	.9.0	66	
	120 min Winter	28.200	0.0	15	2.1	124	
	180 min Winter	20.392	0.0	16	5.1	182	
	240 min Winter	16.100	0.0	17	3.7	240	
	360 min Winter	11.433	0.0	18	(5.0	354	
	480 min Winter	8.908	0.0	19	12.0	466	
	600 min Winter	1.323	0.0	19	//.⊥ \1_2	574	
	120 min Winter	0.233	0.0	20	1.Z	0/Z	
	1440 min Winter	4.029 3 375	0.0	∠U ⊨ ⊃1	6.0	1044	
	2160 min Winter	2 275	0.0	21 21 ا	34 7	1472	
	STOC WITH MITHCET	1.865	0.0	20	5.5	1872	
	2880 min Winter	T.000	0.0		C 1	2506	
	2880 min Winter 4320 min Winter	1.353	$\cap \cap$	26	10. I	/ 7 M h	
	2880 min Winter 4320 min Winter 5760 min Winter	1.353	0.0	1 26 29	10.7	2590 3240	
	2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter	1.353 1.097 0.945	0.0	26	00.1 0.7 2.7	2396 3240 3960	
	2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	1.353 1.097 0.945 0.844	0.0 0.0 0.0	26 29 31 33	0.7 .2.7 .4.8	2396 3240 3960 4664	
	2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.353 1.097 0.945 0.844 0.774	0.0 0.0 0.0 0.0 0.0	26 29 31 33 35	2.7 4.8 6.9	2396 3240 3960 4664 5344	

Interpretent Lawnswood Road (Catchment F In 100 Y Date 11/12/2019 Designed by PS (Checked by AC Designed by CS File Catchment F.SRCX Source Control 2018.1 Baine State Sta	WSP Group Ltd		Page 3	
Catchinent F 1 100 Y Data 11/12/2019 Checked by P5 Checked by A2 XF Solutions Source Control Zolts.1		Lawnswood Road		
In 100 Y Designed by R5 Checked by AC Source Control 2018. In 100 Y Designed by R5 Checked by AC Source Control 2018. Inter Control 20		Catchment F		
Date 11/12/2019 Designed by PS Checked by AC Y Solutions Source Control 2018.1 Eatin T Ford (years) Source Control 2018.1 Y C (Winter) Cathenet Source Years Y (Winter) Cathenet Source (mins) Y (Winter) Years Y (Winter) Years Y (Winter) Years <t< td=""><td></td><td>1 in 100 Y</td><td>No.</td></t<>		1 in 100 Y	No.	
Checked by AC Checked by AC XP Solutions Source Control 2018.1 Checked by AC Source Control 2018.1 Checked by AC Source Control 2018.1 Checked by AC Checked by AC Source Control 2018.1 Checked by AC Checked by AC Source Control 2018.1 Checked by AC Checked by AC Source Control 2018.1 Checked by AC Source Control 2018.1 Checked by AC Source Control 2018.1 Source Control 2018.1 Checked by AC Source Control 2018.1 Checked by AC Source Control 2018.2 Source Control 2018.2 Source Control 2018.2 Control 2018.2 Checked by AC Source Control 2018.2 Control 2018.2 Control 2018.2 <td colspan<="" td=""><td>· Date 11/12/2019</td><td>Designed by PS</td><td>MICIO</td></td>	<td>· Date 11/12/2019</td> <td>Designed by PS</td> <td>MICIO</td>	· Date 11/12/2019	Designed by PS	MICIO
Proceeding ind Source Control 2018.1 Serve Control 2018.1 Anight Media En Anight Media En Restain Period (years) 2013 Site Location (6: 386300 285500 50 66308 500 2013 Summer Storms Yeas V (Winter) 0.840 Shortes Storm (mins) 10080 C (Winter) 10080 C (Winter) 10080 C (Minter) 10080 Source Storm 10080 C (Winter) 10080 C (Winter) 10080 C (Minter) 10080 C (Minter) 10080 C (Minter) 10080 C (Minter) 10080 <	File Catchment F SRCX	Checked by IC	Drainage	
source control 2011 Einfall Medi EX Marfall Medi EX Status Infall Version 2013 Status	VD Solutions	Course Control 2019 1		
<section-header></section-header>		Source control 2018.1		
Kainfall ModelFEH 100FR Rainfall Version2013Site Location (B 386300 285500 80 85300 85500Summer StormsYes CatchmentSummer StormsYes CatchmentC Winter StormsYes CatchmentC Winter StormsNes CatchmentC Winter StormsYes CatchmentC Winter StormsNes CatchmentC Winter Storms10080 Climate Change %C Winter Storms10080 Climate Change %C Winter Catch (Mins)10080 	<u>Ra.</u>	infall Details		
Return Period (years)100FER califall Version203Size Coation GB 386300 285500 50 86300 65500Data TypCatchmentSummer StormsYesSummer StormsYesCo (Winter)0.840Co (Winter)0.840Co (Winter)0.800Co (Winter)<	Rainfall Mode			
FEH Rainfall Version2013 Site Location (BS 366300 285500 806 6000 65500 Data Type2013 Catchment Summer StormsYes Cotchment VersionYes Cotchment O 0.840 Shortest Storm (mins)10 10 1000 Climate Change %Yes VersionYes Cotchment O 0.840 Shortest Storm (mins)10 1000 10000 Climate Change %Yes VersionYes VersionYes VersionYes Version VersionYes Version Version Cotchment Montest Storm (mins)10 10000 10000 Climate Change %Yes Version Version Notest Storm (mins)10 10000 10000 Climate Change %Yes Version Version Notest Storm (mins)Yes Notest Storm (mins)10 Notest Storm (mins)10 Notest Storm (mins)Yes Notest Storm (mins)	Return Period (years	s) 100		
Site Location GB 386300 285500 8500 Data TypeCatchment Summer StormsSummer StormsYes (Yes)O' (Summer)0.840 10080 Climate Change %Shortest Storm (mins)10080 Climate Change %O' A Dial Area DiagramTime (mins) Area From: To: (ha)O' A 0.1654O' A 0.165	FEH Rainfall Versio	on 2013		
Lace typeCelturitieSumer StormsYesWinter StormsYesWinter Storms0.750CV (Winter)0.840Stortest Storm (mins)10080Climate Charge 810Inter Area DiagramTata Area (ha) 0.330Total Area (ha) 0.330Total Area (ha) 0.330Total Area (ha) 0.330Total Area (ha) 0.330O 4 0.165A 0 0 4 0.165	Site Locatio	on GB 386300 285500 SO 86300 85500		
Winter StormsYes 0.750 0.840Shortest Storm (mins)1050 1000 1000 1000 1000Climate Change %Time Area Diagram Total Area (ha) 0.330Time (mins) Area From: To: (ha)04 0.1654 8 0.165	Summer Storn	ns Yes		
Cv (Summer)0.750 0.840Shortest Storm (mins)15 10000 10000 10000 10000Climate Change %+0Time Area DiagramTotal Area (ha) 0.330Time (mins) Area From: To:Time (mins) Area From: To:(ha) (ha)040.165480.165	Winter Storm	ns Yes		
Cv (winter)0.40Shortest Storm (mins)10080Climate Change 8+0Time Area DiagramTotal Area (ha) 0.330Time (mins) AreaFrom: To: (ha)O 4 0.1654 8 0.165	Cv (Summer	c) 0.750		
Longest Storm (mins) 1000 Climate Change % 1000 Time Area Diagram 1000 Total Area (ha) 0.330 1000 Time (mins) Area Time (mins) Area 1000 Erom: To: (ha) 1000 0 40.165 4 80.165	CV (Winter Shortest Storm (mins	r) U.840 s) 15		
climate Change % +0 Image Area Diagram Total Area (ha) 0.330 Image (mins) Area From: To: (ha) Image (mins) Area From: To: (ha) 0 4 0.165 4 0.165	Longest Storm (mins	s) 10080		
Time Area DiagramTotal Area (ha) 0.330Time (mins) Area From: To: (ha)004040404040404040404040404040404040404010 <tr< td=""><td>Climate Change</td><td>% +0</td><td></td></tr<>	Climate Change	% +0		
Total AreaTime(mins)AreaFrom:To:(ha)From:To:(ha)040.165480.165	Tin	ne Area Diagram		
Time(mins)AreaFrom:To:(ha)040.165480.165	Tota	al Area (ha) 0.330		
From: To: (ha) 0 4 0.165 4 8 0.165	Time (mins)	Area Time (mins) Area		
0 4 0.165 4 8 0.165	From: To:	(ha) From: To: (ha)		
	0 4	0.165 4 8 0.165		
©1982-2018 Innovyze	©198	2-2018 Innovyze		

WSP Group Ltd						Page 4
•	Lawnswo	ood Road	l			
	Catchme	ent F				Sec. 1
•	1 in 10	Y 00				Mirro
Date 11/12/2019	Designe	ed by PS				Drainage
File Catchment F.SRCX	Checked	d by AC				
XP Solutions	Source	Control	2018.1	L		
D.		taila				
<u>I</u>	IODEL DE	lalls				
Storage is On	line Cove	er Level	(m) 98.0	00		
Tank	or Pond	Structu	<u>ire</u>			
Inver	t Level	(m) 97.00	00			
Depth (m) Are	a (m²) De	epth (m)	Area (m ²	²)		
0.000	470.0	1.000	820	.0		
<u>Hydro-Brake®</u>	Optimun	m Outflo	ow Cont:	rol		
Unit	Referenc	ce MD-SHE	-0071-20	00-0700-	2000	
Desig	n Head (m	n)		0	.700	
Design	Flow (1/s Flush-Flo	5) D TM		Calcul	2.U ated	
	Objectiv	ve Minim	ise upst	ream sto	rage	
A	pplicatio	on		Sur	face	
Sump	Availabl meter (mm				Yes 71	
Invert	Level (m	n)		97	.000	
Minimum Outlet Pipe Dia	meter (mm	n)			100	
Suggested Manhole Dia	meter (mm	n)			1200	
Control Po	ints	Head (m	n) Flow	(l/s)		
Design Point (Ca	lculated)) 0.70	0	2.0		
E	'lush-Flo ^m Kick-Flom	™ 0.20 © 0.45	50	2.0		
Mean Flow over H	lead Range	e 0.43	-	1.7		
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based Should an n these s	i on the l nother typ storage re	head/Dis pe of co: outing c	charge r ntrol de alculati	elatic vice c ons wi	onship for the other than a ill be
Depth (m) Flow (l/s) Depth (m) Flow	7 (1/s) D	epth (m)	Flow (l,	/s) Dept	h (m)	Flow (l/s)
0.100 1.8 1.200	2.6	3.000	3	3.9	7.000	5.8
	2.7	3.500	2	1.2	/.500 8 000	6.0
0.400 1.8 1.800	3.1	4.500	4	1.7	8.500	6.4
0.500 1.7 2.000	3.2	5.000	,	5.0	9.000	6.6
0.600 1.9 2.200	3.4	5.500		5.2	9.500	6.8
1.000 2.4 2.600	3.5	6.000		5.6		
	/					
©1 98	2-2018	Innovvz	е			

WSP Group Ltd						Page 1
•		Lawr	nswood B	Road		
		Cato	chment (5		Con 1
		1 ir	n 100Y			Mirro
Date 11/12/2019	9	Desi	gned by	Y PS		Dcainago
File Catchment	G.SRCX	Chec	cked by	AC		Diamage
XP Solutions		Sour	cce Cont	crol 2018.1	L	
	Summary of Resu	<u>ilts fo</u>	<u>r 100 y</u>	<u>vear Return</u>	Period	
					.	
	Storm	Max Level	Max Depth Co	Max Max	Status	
		(m)	(m) ((1/s) (m ³)	-	
	15	74 101	0 1 0 1			
	15 min Summer 30 min Summer	74.181	0.181	9.5 866.4) OK	
	60 min Summer	74.293	0.293	9.7 1414.2	2 ОК	
	120 min Summer	74.340	0.340	9.7 1647.6	б ок	
	180 min Summer	74.364	0.364	9.7 1769.3	3 ОК	
	240 min Summer	74.379	0.379	9.7 1844.2	2 OK	
	360 min Summer	74.396	0.396	9.7 1926.1	L OK	
	480 min Summer	74.403	0.403	9./ 1961.	V OK	
	720 min Summer	74.406	0.406	9.7 1976.3	D OK	
	960 min Summer	74.403	0.403	9.7 1964.1		
	1440 min Summer	74.390	0.390	9.7 1897.2	2 O K	
	2160 min Summer	74.373	0.373	9.7 1811.8	3 ОК	
	2880 min Summer	74.361	0.361	9.7 1752.9	о к	
	4320 min Summer	74.345	0.345	9.7 1672.0	5 ОК	
	5760 min Summer	74.333	0.333	9.7 1612.4	1 ОК	
	7200 min Summer	74.324	0.324	9.7 1567.3	ЗОК	
	8640 min Summer	/4.31/ 7/ 312	0.317	9.7 1532.9	OK VOK	
	15 min Winter	74.312	0.312	9 6 970 8	S OK	
	30 min Winter	74.264	0.264	9.7 1271.2	2 O K	
	Storm	Rain	Flooded	Discharge T	ime-Peak	
	Event	(mm/hr)	Volume	Volume	(mins)	
			(m³)	(m³)		
	15 min Summer	116.400	0.0	539.3	23	
	30 min Summer	76.400	0.0	703.7	38	
	60 min Summer	47.900	0.0	1169.1	68	
	120 min Summer	28.200	0.0	1355.1	128	
	180 min Summer	20.392	0.0	1441.8	186	
	240 min Summer	16.100	0.0	1488.3	246	
	360 min Summer	LL.433	0.0	1526.4	366	
	400 MILD SUMMER	0.908 7 202	0.0	153U.Z	484 607	
	720 min Summer	6.233	0.0	1499.6	724	
	960 min Summer	4.829	0.0	1453.3	962	
	1440 min Summer	3.375	0.0	1358.5	1402	
	2160 min Summer	2.375	0.0	2317.0	1708	
	2880 min Summer	1.865	0.0	2380.6	2072	
	4320 min Summer	1.353	0.0	2402.8	2860	
	7200 min Summer	1.097	0.0	3U62./ 3295 1	3688 1536	
	8640 min Summer	0.844	0.0	3501 2	5280	
	10080 min Summer	0.774	0.0	3696.8	6152	
	15 min Winter	116.400	0.0	608.7	23	
	30 min Winter	76.400	0.0	764.6	37	
	©	L982-20	18 Innc	ovyze		

WSP Group Ltd						Page 2
•		Lawr	nswood i	Road		
		Cato	chment (G		and the second
		1 ir	100Y			M
- 	0		anod 1-	T DC		MILIO
Dale 11/12/201	<i>y</i>	Des.		y PS		Drainac
'ile Catchment	G.SRCX	Cheo	cked by	AC		and Bardel Children in
XP Solutions		Soui	cce Con	trol 2018	.1	
	<u>Summary of Res</u> u	ults fo	or 100 y	year Retui	<u>rn Period</u>	
	Storm	Max	Max	Max Max	x Status	
	Event	Level	Depth Co	ontrol Volu	me	
		(m)	(m)	(l/s) (m³)	
	CO min Minter	74 220	0 200	0 7 1 5 0 5	0 0 1	
	60 min Winter	74.328	0.328	9.7 1040	.9 OK	
	120 min Winter	74.300	0.300	9.7 1049	6 0 K	
	240 min Winter	74 425	0.400	9 7 2073	.0 O K	
	360 min Winter	74.444	0.444	9.7 2169	.3 OK	
	480 min Winter	74.452	0.452	9.7 2213	.5 ОК	
	600 min Winter	74.456	0.456	9.7 2234	.4 ОК	
	720 min Winter	74.458	0.458	9.7 2241	.8 OK	
	960 min Winter	74.456	0.456	9.7 2234	.3 ОК	
	1440 min Winter	74.446	0.446	9.7 2179	.7 ОК	
	2160 min Winter	74.423	0.423	9.7 2066	.2 ОК	
	2880 min Winter	74.406	0.406	9.7 1978	.2 O K	
	4320 min Winter	74.380	0.380	9.7 1849	.8 O K	
	5760 min Winter	74.359	0.359	9.7 1739	.9 ОК	
	7200 min Winter	74.340	0.340	9.7 1648	.7 ОК	
	8640 min Winter	74.325	0.325	9./ 15/1	.5 OK	
	10000 WIN WINCEL	14.312	0.512	J.1 1307	.5 0 K	
	Storm	Rain	Flooded	Discharge	Time-Peak	
	Event	(mm/nr)	(m ³)	(m ³)	(mins)	
	60 min Winter	47.900	0.0	1300.8	66	
	120 min Winter	28.200	0.0	1481.6	126	
	180 min Winter	20.392	0.0	1550.0	184	
	240 min Winter	11 422	0.0	15/4.4	242	
	480 min Winter	11.433 g ano	0.0	15/1.1 15/7 0	36U 179	
	600 min Winter	7 323	0.0	1524 1	594	
	720 min Winter	6.233	0.0	1500.8	710	
	960 min Winter	4.829	0.0	1455.5	942	
	1440 min Winter	3.375	0.0	1368.9	1388	
	2160 min Wintor	2.375	0.0	2563.0	1996	
	ZIOO MIIN WINCEL	1 0 6 5	0.0	2611.3	2244	
	2880 min Winter	1.865	0.0			
	2880 min Winter 4320 min Winter	1.865	0.0	2537.0	3156	
	2880 min Winter 4320 min Winter 5760 min Winter	1.865 1.353 1.097	0.0	2537.0 3433.2	3156 4032	
	2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter	1.865 1.353 1.097 0.945	0.0	2537.0 3433.2 3681.4	3156 4032 4896	
	2880 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 8640 min Winter	1.865 1.353 1.097 0.945 0.844	0.0 0.0 0.0	2537.0 3433.2 3681.4 3923.4	3156 4032 4896 5712	
	2800 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.865 1.353 1.097 0.945 0.844 0.774	0.0 0.0 0.0 0.0 0.0	2537.0 3433.2 3681.4 3923.4 4145.1	3156 4032 4896 5712 6560	
	2800 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.865 1.353 1.097 0.945 0.844 0.774	0.0 0.0 0.0 0.0 0.0	2537.0 3433.2 3681.4 3923.4 4145.1	3156 4032 4896 5712 6560	
	2800 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.865 1.353 1.097 0.945 0.844 0.774	0.0 0.0 0.0 0.0 0.0	2537.0 3433.2 3681.4 3923.4 4145.1	3156 4032 4896 5712 6560	
	2800 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.865 1.353 1.097 0.945 0.844 0.774	0.0 0.0 0.0 0.0 0.0	2537.0 3433.2 3681.4 3923.4 4145.1	3156 4032 4896 5712 6560	
	2800 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.865 1.353 1.097 0.945 0.844 0.774	0.0 0.0 0.0 0.0 0.0	2537.0 3433.2 3681.4 3923.4 4145.1	3156 4032 4896 5712 6560	
	2800 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.865 1.353 1.097 0.945 0.844 0.774		2537.0 3433.2 3681.4 3923.4 4145.1	3156 4032 4896 5712 6560	
	2800 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.865 1.353 1.097 0.945 0.844 0.774		2537.0 3433.2 3681.4 3923.4 4145.1	3156 4032 4896 5712 6560	
WSP Group Ltd		Page 3				
--------------------------	--	-----------				
•	Lawnswood Road					
	Catchment G	Margare 1				
	1 in 100Y	Mirco				
Date 11/12/2019	Designed by PS					
File Catchment G.SRCX	Checked by AC	Drainage				
XP Solutions	Source Control 2018.1					
<u>Ra</u>	infall Details					
Rainfall Mode	21	FEH				
Return Period (years	5)	100				
FEH Rainfall Versio	n	2013				
Site Locatio	on GB 386300 285500 SO 86300 8.	5500				
Data Tyr Summer Storm	De Catchi	Ves				
Winter Storn	ns	Yes				
Cv (Summer	c) 0	.750				
Cv (Winter	c) 0	.840				
Shortest Storm (mins	5)	15				
Longest Storm (mins	5) 1 2	40				
	70	τŪ				
Tin	ne Area Diagram					
Tota	al Area (ha) 4.000					
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)					
0 4	2.000 4 8 2.000					
<u>ଲ</u> ୀ ସନ	32-2018 Innovyze					
0198	2 2010 IUUOAASE					

WSP Group Ltd					Page 4
•	Lawnswood	l Road			
•	Catchment	G			The second
•	1 in 100Y	-			Mirro
Date 11/12/2019	Designed	by PS			Drainage
File Catchment G.SRCX	Checked b	by AC			Diamage
XP Solutions	Source Co	ontrol	2018.1		
Notorage is On	<u>Iodel Deta</u> line Cover	<u>ils</u> Level (m	a) 75.000		
Tank	or Pond Si	tructur	e		
Inver	t Level (m)	74.000	-		
Depth (m) Are	ea (m ²) Dept	th (m) A	rea (m²)		
0.000	4700.0	1.000	5580.0		
<u>Hydro-Brake®</u>	Optimum (Dutflow	Control		
Unit	Reference	MD-SHE-0	148-9700-0	700-9700	
Desig	n Head (m)			0.700	
Design	Flow (l/s) Flush-Flo™		C	9.7	
	Objective	Minimis	se upstream	storage	
A	pplication		-	Surface	
Sump	Available			Yes	
Invert	Level (m)			74.000	
Minimum Outlet Pipe Dia	meter (mm)			225	
Suggested Manhole Dia	meter (mm)			1200	
Control Po	ints H	lead (m)	Flow (l/s)	
Design Point (Ca	lculated)	0.700	9.	7	
E	'lush-Flo™	0.245	9.	7	
Mean Flow over H	Kick-Flo® lead Range	0.513	8. 8.	4 1	
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based o Should anot n these sto	n the He her type rage rou	ad/Dischar of contro ting calcu	ge relation device of lations with	onship for the other than a ill be
Depth (m) Flow (l/s) Depth (m) Flow	7 (l/s) Dept	th (m) F	low (l/s)	Depth (m)	Flow (l/s)
0.100 5.3 1.200	12.5	3.000	19.3	7.000	29.1
0.200 9.6 1.400	14.3	4.000	20.8	8.000	29.9
0.400 9.3 1.800	15.2	4.500	23.5	8.500	31.9
0.500 8.6 2.000	15.9	5.000	24.7	9.000	32.8
	17 4	5.500	25.9	9.500	33.1
1.000 11.5 2.600	18.1	6.500	28.0		
	,		I		
©198	2-2018 In	novyze			

Appendix B.3

1 IN 100 YEAR + CLIMATE CHANGE

WSP Group Ltd						Page 1
•	Lawn	iswood B	Road			
	Cato	Catchment A				"Contraction
	1 in	100 Y		Mirco		
Date 11/12/2019	Desi	.gned by	y PS			
File CATCHMENT A.SRCX	Chec	ked by	AC			Diamage
XP Solutions	Sour	ce Cont	trol 2	2018.1		
Summary of Results	for 10)0 year	Retu	rn Per	iod (+40%)	
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth Co	ontrol	Volume		
	(m)	(m) ((1/s)	(m ³)		
15 min Summer	83.237	0.237	4.9	613.2	O K	
30 min Summer	83.308	0.308	4.9	803.4	O K	
60 min Summer	83.380	0.380	4.9	1003.3	O K	
120 min Summer	83.441	0.441	4.9	1171.9	ОК	
180 min Summer	83.472	0.4/2	4.9	1201.6	OK	
240 min Summer	03.492	0.492	4.9	130/ 0	OK	
260 min Summer	03.313 83 526	0.515	4.9 1 0	1416 Q	OK	
600 min Summer	83.533	0.533	4.9	1434.8	O K	
720 min Summer	83.536	0.536	4.9	1444.1	0 K	
960 min Summer	83.537	0.537	4.9	1448.7	0 K	
1440 min Summer	83.532	0.532	4.9	1432.7	ΟK	
2160 min Summer	83.516	0.516	4.9	1386.6	0 K	
2880 min Summer	83.500	0.500	4.9	1339.5	O K	
4320 min Summer	83.480	0.480	4.9	1284.8	O K	
5760 min Summer	83.469	0.469	4.9	1252.4	0 K	
7200 min Summer	83.463	0.463	4.9	1236.2	ОК	
8640 min Summer	83.461	0.461	4.9	1230.0	OK	
10080 min Summer	83.462	0.462	4.9	697 2	OK	
30 min Winter	83.343	0.343	4.9	900.4	0 K	
Storm	Rain	Flooded	Disch	arge Ti	.me-Peak	
Event	(mm/nr)	(m ³)	VOLU (m ³	ime	(mins)	
		()	(,		
15 min Summer	162.960	0.0	3	94.2	23	
30 min Summer	106.960	0.0	4	16.3	38	
60 min Summer	67.060	0.0	8	00.5	68	
120 min Summer	39.480	0.0	8	12.1	128	
180 min Summer	20.549	0.0	/	90.0 79 5	246 TAR	
360 min Summer	16 007	0.0	י ר	, 2.J 57 4	240 366	
480 min Summer	12.471	0.0	7.	42.0	486	
600 min Summer	10.252	0.0	7	29.3	606	
720 min Summer	8.727	0.0	7	17.9	726	
960 min Summer	6.761	0.0	6	97.0	964	
1440 min Summer	4.725	0.0	6	59.1	1442	
2160 min Summer	3.324	0.0	14	29.9	2160	
2880 min Summer	2.610	0.0	13	67.6	2512	
4320 min Summer	1.895	0.0	12	48.8	3248	
5760 min Summer	1,536	0.0	21	11.9	4040	
ALCO MIN Summer	⊥.3ZZ 1 100	0.0	23	20.3 45 /	4090 5710	
10080 min Summer	1.083	0.0	24	-J 51.7	6560	
15 min Winter	162.960	0.0	4	12.7	23	
30 min Winter	106.960	0.0	4	14.9	37	
	0.0.0	10 -				

WSP Group Ltd					Page 2
	Law	nswood	Road		
	Cat	chment	A		"Loop
	1 i:	n 100 Y	+ 40%CC		Mirco
Date 11/12/2019	Des	igned b	y PS		
File CATCHMENT A.SRCX	Che	cked by	AC		Didlildl
XP Solutions	Sou	rce Con	trol 2018	.1	
				-	
<u>Summary of Resu</u>	<u>lts for 1</u>	00 year	<u>Return P</u>	<u>eriod (+408</u>	5)
Storm	Max	Max	Max Max	s Status	
Event	Level	Depth C	ontrol Volu	me	
	(m)	(m)	(1/S) (m ⁻)	
60 min Win	ter 83.424	0.424	4.9 1124	.8 ОК	
120 min Wir	ter 83.491	0.491	4.9 1315	.3 ОК	
180 min Win	ter 83.526	0.526	4.9 1416	.9 OK	
240 min Win 260 min Min	ter 83.549	0.549	4.9 1481	.2 OK	
360 min Win 490 min Tri-	ter 83.5/4	0.5/4	4.9 1556 / 0 1504	.1 UK	
400 MLII WIR 600 min Min	ter 83 595	0.30/	4.9 1094 4 9 1616	0 0 K	
720 min Wir	ter 83.599	0.599	4.9 1628	.3 OK	
960 min Win	ter 83.602	0.602	4.9 1637	.0 OK	
1440 min Wir	ter 83.598	0.598	4.9 1626	.8 OK	
2160 min Wir	ter 83.585	0.585	4.9 1587	.8 ОК	
2880 min Wir	ter 83.569	0.569	4.9 1541	.4 ОК	
4320 min Wir	ter 83.544	0.544	4.9 1468	.6 O K	
5760 min Win	ter 83.530	0.530	4.9 1426	.5 ОК	
7200 min Win OC40 min Win	ter 83.519	0.519	4.9 1396	.5 OK	
8640 min Wir 10080 min Wir	ter 83.512	0.512	4.9 13/4	.8 OK	
Storm Event	Rain (mm/hr)	Flooded	d Discharge Volume	Time-Peak (mins)	
		(m³)	(m ³)		
60 min Win	ter 67.060	0.0	820.5	68	
120 min Win	ter 39.480	0.0	792.6	126	
180 min Win	ter 28.549	0.0	771.3	184	
240 min Win 260 min Win	ter 22.540) O.(J 758.8	244	
360 Min Win 480 min Win	ter 10.007 ter 12.471	0.0) 732.8	362	
600 min Win	ter 10.252	2 0.0	723.8	596	
720 min Win	ter 8.727	0.0	715.6	714	
	ter 6.761	0.0	0 700.7	948	
960 min Win					
960 min Win 1440 min Win	ter 4.725	5 0.0	675.1	1410	
960 min Win 1440 min Win 2160 min Win	ter 4.725 ter 3.324	5 0.0 4 0.0	675.1 1435.0	1410 2080	
960 min Win 1440 min Win 2160 min Win 2880 min Win	ter 4.725 ter 3.324 ter 2.610		675.1 0 1435.0 0 1379.1	1410 2080 2736	
960 min Win 1440 min Win 2160 min Win 2880 min Win 4320 min Win 5760 min Win	ter 4.725 ter 3.324 ter 2.610 ter 1.895		675.1 1435.0 1379.1 1273.7 2426.2	1410 2080 2736 3424 4376	
960 min Win 1440 min Win 2160 min Win 2880 min Win 4320 min Win 5760 min Win 7200 min Win	ter 4.725 ter 3.324 ter 2.610 ter 1.895 ter 1.536 ter 1.322	5 0.0 4 0.0 5 0.0 5 0.0 5 0.0 5 0.0 5 0.0 5 0.0 5 0.0	675.1 1435.0 1379.1 1273.7 2426.2 2566.0	1410 2080 2736 3424 4376 5328	
960 min Win 1440 min Win 2160 min Win 2880 min Win 4320 min Win 5760 min Win 7200 min Win 8640 min Win	ter 4.725 ter 3.324 ter 2.610 ter 1.895 ter 1.536 ter 1.322 ter 1.182	5 0.0 4 0.0 5 0.0 5 0.0 5 0.0 5 0.0 6 0.0 6 0.0 7 0.0 6 0.0 7 0.0 6 0.0 7 0.0 7 0.0	0 675.1 0 1435.0 1379.1 1273.7 2426.2 2566.0 2601.7	1410 2080 2736 3424 4376 5328 6232	
960 min Win 1440 min Win 2160 min Win 2880 min Win 4320 min Win 5760 min Win 7200 min Win 8640 min Win 10080 min Win	ter 4.725 ter 3.324 ter 2.610 ter 1.895 ter 1.536 ter 1.322 ter 1.182 ter 1.083	5 0.0 4 0.0 5 0.0 5 0.0 6 0.0 7 0.0 6 0.0 7 0.0 8 0.0	675.1 1435.0 1379.1 1273.7 2426.2 2566.0 2601.7 2496.7	1410 2080 2736 3424 4376 5328 6232 7168	
960 min Win 1440 min Win 2160 min Win 2880 min Win 4320 min Win 5760 min Win 7200 min Win 8640 min Win 10080 min Win	ter 4.725 ter 3.324 ter 2.610 ter 1.895 ter 1.536 ter 1.322 ter 1.182 ter 1.083	5 0.0 4 0.0 5 0.0 5 0.0 5 0.0 2 0.0 8 0.0	675.1 1435.0 1379.1 1273.7 2426.2 2566.0 2601.7 2496.7	1410 2080 2736 3424 4376 5328 6232 7168	
960 min Win 1440 min Win 2160 min Win 2880 min Win 4320 min Win 5760 min Win 7200 min Win 8640 min Win 10080 min Win	ter 4.725 ter 3.324 ter 2.610 ter 1.895 ter 1.536 ter 1.322 ter 1.182 ter 1.083	5 0.0 4 0.0 5 0.0 5 0.0 2 0.0 2 0.0 3 0.0	675.1 1435.0 1379.1 1273.7 2426.2 2566.0 2601.7 2496.7	1410 2080 2736 3424 4376 5328 6232 7168	
960 min Win 1440 min Win 2160 min Win 2880 min Win 4320 min Win 5760 min Win 7200 min Win 8640 min Win 10080 min Win	ter 4.725 ter 3.324 ter 2.610 ter 1.895 ter 1.536 ter 1.322 ter 1.182 ter 1.083	5 0.0 4 0.0 5 0.0 5 0.0 2 0.0 2 0.0 3 0.0	675.1 1435.0 1379.1 1273.7 2426.2 2566.0 2601.7 2496.7	1410 2080 2736 3424 4376 5328 6232 7168	

WSP Group Ltd		Page 3
	Lawnswood Road	di
	Catchment A	
	1 in 100 Y + 40%CC	Micco
Date 11/12/2019	Designed by PS	Desinado
File CATCHMENT A.SRCX	Checked by AC	Diamaye
XP Solutions	Source Control 2018.1	
<u>Ra</u>	<u>infall Details</u>	
Rainfall Mode	el FEH	
Return Period (years	s) 100	
FEH Rainfall Versio	on 2013	
Site Locatio	on GB 386300 285500 SO 86300 85500	
Summer Storn	ns Yes	
Winter Storm	ns Yes	
Cv (Summer	r) 0.750	
CV (Winter Shortest Storm (mine	⊥) U.840 s) 15	
Longest Storm (mins	s) 10080	
Climate Change	% +40	
Tin	ne Area Diagram	
Tota	al Area (ha) 2.020	
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
0 4	4 1.010 4 8 1.010	
©198	32-2018 Innovyze	
L		

WSP Group Ltd			Page 4
•	Lawnswood Road		
	Catchment A		The second second
	1 in 100 Y + 40%CC		Micro
Date 11/12/2019	Designed by PS		Drainago
File CATCHMENT A.SRCX	Checked by AC		Diamage
XP Solutions	Source Control 2018	.1	
<u> </u>	<u>odel Details</u>		
Storage is On	ine Cover Level (m) 84	.000	
<u>Tank</u>	<u>r Pond Structure</u>		
Inve	Level (m) 83.000		
Depth (m) Are	a (m²) Depth (m) Area	(m²)	
0.000	2500.0 1.000 32	60.0	
<u>Hydro-Brake®</u>	<u>Optimum Outflow Cor</u>	<u>ntrol</u>	
Unit	Reference MD-SHE-0109-	4900-0700-4900	
Desig	Head (m)	0.700	
Design	low (l/s) lush-Flo™	4.9 Calculated	
	Objective Minimise up	stream storage	
A	plication	Surface	
Sump	Available eter (mm)	Yes 109	
Invert	Level (m)	83.000	
Minimum Outlet Pipe Dia	eter (mm)	150	
Suggested Manhole Dia	eter (mm)	1200	
Control Po	nts Head (m) Flow	/ (l/s)	
Design Point (Ca	culated) 0.700	4.9	
E	ush-Flo™ 0.214	4.9	
Mean Flow over H	ad Range -	4.2	
	5		
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	en based on the Head/D hould another type of these storage routing	ischarge relatic control device c calculations wi	onship for the other than a ill be
Depth (m) Flow (1/s) Depth (m) Flow	(l/s) Depth (m) Flow	(l/s) Depth (m)	Flow (l/s)
0.100 3.7 1.200	6.3 3.000	9.7 7.000	14.5
0.200 4.9 1.400	6.8 3.500	10.4 7.500	15.0
	7.2 4.000	11.1 8.000 11.7 8.500	15.5
0.500 4.2 2.000	8.0 5.000	12.4 9.000	16.4
0.600 4.6 2.200	8.4 5.500	12.9 9.500	16.9
0.800 5.2 2.400	8.7 6.000	13.5	
1.000 5.8 2.600	9.1 6.500	14.0	
©198	2-2018 Innovyze		

WSP Group Ltd						Page 1
•	Lawn	iswood H	Road			
	Cato	hment H	В			Sec. 1
	1 in	100 Y	+ 40%	CC		Misso
Date 11/12/2019	Desi	aned by	V PS			
File Catchment B SBCX	Chec	ked by				Drainage
VD Gelutione	Chec	Keu by		010 1		
XP Solutions	Sour	ce com	trol Z	018.1		
Summary of Deculto	for 10		Dotur	n Dor	ind (+10%)	
<u>Summary of Results</u>	101 10	JU year	Retur	n rer	<u>100 (+403)</u>	
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth Co	ontrol '	Volume	000000	
	(m)	(m)	(1/s)	(m³)		
15 min Summer	88.301	0.301	2.0	157.1	OK	
50 min Summer	88 466	0.384	2.0	205.5	OK	
120 min Summer	88 531	0.400	2.0	297 2	0 K	
180 min Summer	88 562	0.551	2.0	317 9	0 K	
240 min Summer	88,580	0.580	2.0	330 0	0 K	
360 min Summer	88.598	0.598	2.0	341.8	0 K	
480 min Summer	88,603	0.603	2.0	345.3	0 K	
600 min Summer	88.603	0.603	2.0	345.2	0 K	
720 min Summer	88.600	0.600	2.0	342.9	ОК	
960 min Summer	88.588	0.588	2.0	335.1	ОК	
1440 min Summer	88.557	0.557	2.0	314.7	ОК	
2160 min Summer	88.521	0.521	2.0	290.6	ΟK	
2880 min Summer	88.492	0.492	2.0	272.5	ОК	
4320 min Summer	88.450	0.450	2.0	245.8	O K	
5760 min Summer	88.415	0.415	2.0	224.5	O K	
7200 min Summer	88.390	0.390	2.0	209.3	O K	
8640 min Summer	88.371	0.371	2.0	197.7	0 K	
10080 min Summer	88.356	0.356	2.0	188.9	0 K	
15 min Winter	88.334	0.334	2.0	176.1	0 K	
30 min Winter	88.425	0.425	2.0	230.6	ОК	
Storm	Rain	Flooded	Discha	arge Ti	me-Peak	
Event	(mm/hr)	Volume	Volu	me	(mins)	
		(m³)	(m³)		
		-			~~	
15 min Summer 1	162.960	0.0	14	2.8	23	
30 min Summer 1	106.960	0.0	16	00.J	38	
60 min Summer	01.060	0.0	25)3.⊥)2 €	68 196	
120 min Summer	39.48U	0.0	25	12.0	100	
100 min Summer	20.049	0.0	3L 21	צ.טי ר צ	100	
240 min Summer 360 min Summer	16 007	0.0	31 21	2 1	240 366	
ARO min Summer	12 171	0.0	31 21	19 N	282	
600 min Summer	10.252	0.0	30	5.7	604	
720 min Summer	8.727	0.0	30	2.3	72.4	
960 min Summer	6.761	0.0	29	95.6	962	
1440 min Summer	4.725	0.0	28	31.8	1346	
2160 min Summer	3.324	0.0	46	51.3	1688	
2880 min Summer	2.610	0.0	48	81.3	2076	
4320 min Summer	1.895	0.0	51	2.0	2900	
5760 min Summer	1.536	0.0	57	3.5	3688	
7200 min Summer	1.322	0.0	61	7.1	4472	
8640 min Summer	1.182	0.0	66	51.2	5272	
10080 min Summer	1.083	0.0	70	5.4	6048	
15 min Winter 1	162.960	0.0	15	5.9	23	
30 min Winter	100.960	0.0	Τe	00.0	3/	
©1	982-20	18 Inno	ovyze			
			7 = 0			

							2
•		Lawr	nswood I	Road			
		Cato	chment H	В			and the second
		1 ir	n 100 Y	+ 408	CC		Micco
Date 11/12/2010	9	Desi	aned h	V PS			
Eile Catabrant	D CDCV	Char	led by				Drainac
	D. SKCA		sked by	AC			
XP Solutions		Soui	cce Cont	trol 2	2018.1		
~		C 1.			-		`
Sum	<u>nmary of Results</u>	for 1	<u>00 year</u>	Retui	rn Pei	<u>ciod (+40%</u>	<u>)</u>
	a 1					<u>.</u>	
	Storm	Max	Max Domth Co	Max	Max	Status	
	Event	(m)	(m)	(1/s)	(m ³)	1	
		(,	(,	(_/5/	()		
	60 min Winter	88.516	0.516	2.0	287.4	O K	
	120 min Winter	88.586	0.586	2.0	333.9	ΟK	
	180 min Winter	88.621	0.621	2.0	357.5	ОК	
	240 min Winter 360 min Winter	88.642	0.642	2.0	371.6	OK	
	480 min Winter	88.669	0.669	2.0	390.9	O K	
	600 min Winter	88.671	0.671	2.0	391.8	O K	
	720 min Winter	88.669	0.669	2.0	390.3	ОК	
	960 min Winter	88.659	0.659	2.0	383.6	ОК	
	1440 min Winter	88.631	0.631	2.0	364.4	O K	
	2160 min Winter	88.587	0.587	2.0	334.2	ОК	
	2880 min Winter	88.553	0.553	2.0	311.9	OK	
	4320 min Winter 5760 min Winter	88.498	0.498	2.0	276.0	OK	
	7200 min Winter	88.399	0.399	2.0	214.8	0 K	
	8640 min Winter						
		88.362	0.362	2.0	192.2	ОК	
	10080 min Winter	88.362 88.331	0.362 0.331	2.0 2.0	192.2 174.1	0 K 0 K	
	10080 min Winter	88.362 88.331	0.362 0.331	2.0 2.0	192.2 174.1	ОК	
	10080 min Winter	88.362 88.331	0.362	2.0 2.0	192.2 174.1	0 K 0 K	
	10080 min Winter Storm	88.362 88.331 Rain	0.362 0.331 Flooded	2.0 2.0 Disch	192.2 174.1 arge T:	OK OK	
	10080 min Winter Storm Event	88.362 88.331 Rain (mm/hr)	0.362 0.331 Flooded Volume (m ³)	2.0 2.0 Discha Volu (m ³	192.2 174.1 arge T: me)	OK OK ime-Peak (mins)	
	10080 min Winter Storm Event	88.362 88.331 Rain (mm/hr)	0.362 0.331 Flooded Volume (m ³)	2.0 2.0 Discha Volu (m ³	192.2 174.1 arge T: me) 80.8	OK OK ime-Peak (mins)	
	10080 min Winter Storm Event 60 min Winter 120 min Winter	88.362 88.331 Rain (mm/hr) 67.060 39.480	0.362 0.331 Flooded Volume (m ³) 0.0 0.0	2.0 2.0 Discha Volu (m ³ 2: 3:	192.2 174.1 arge T: me) 80.8 14.1	0 K 0 K ime-Peak (mins) 66 126	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter	88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0	2.0 2.0 Discha Volu (m ³ 2: 3: 3: 3:	192.2 174.1 arge T: me) 80.8 14.1 16.5	0 K 0 K ime-Peak (mins) 66 126 184	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter	88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0	2.0 2.0 Discha Volu (m ³ 2: 3: 3: 3: 3:	192.2 174.1 arge T: mme) 80.8 14.1 16.5 15.0	0 K 0 K ime-Peak (mins) 66 126 184 242	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter	88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0	2.0 2.0 Discha Volu (m ³ 3: 3: 3: 3: 3: 3:	192.2 174.1 arge T: mme) 80.8 14.1 16.5 15.0 11.9	0 K 0 K ime-Peak (mins) 66 126 184 242 360	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0	2.0 2.0 Discha Volu (m ³ 2: 3: 3: 3: 3: 3: 3: 3:	192.2 174.1 arge T: me) 80.8 14.1 16.5 15.0 11.9 08.9	0 K 0 K ime-Peak (mins) 66 126 184 242 360 476	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	2.0 2.0 Dischi Volu (m ³ 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3:	192.2 174.1 arge T: me) 80.8 14.1 16.5 15.0 11.9 08.9 06.1 03.2	0 K 0 K ime-Peak (mins) 66 126 184 242 360 476 594 709	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	2.0 2.0 Disch: Volu (m ³ 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3:	192.2 174.1 arge T: mme) 80.8 14.1 16.5 15.0 11.9 08.9 06.1 03.3 97.8	0 K 0 K ime-Peak (mins) 66 126 184 242 360 476 594 708 936	
	10080 min Winter 10080 min Winter Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.0 2.0 Disch: Volu (m ³ 2: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3:	192.2 174.1 arge T: me) 80.8 14.1 16.5 15.0 11.9 08.9 06.1 03.3 97.8 86.8	ОК ОК (mins) 66 126 184 242 360 476 594 708 936 1374	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.0 2.0 Discha Volu (m ³ 2; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3; 3;	192.2 174.1 arge T: mme) 80.8 14.1 16.5 15.0 11.9 08.9 06.1 03.3 97.8 86.8 15.2	<pre>O K O K ime-Peak (mins) 66 126 184 242 360 476 594 708 936 1374 1772</pre>	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.0 2.0 Discha Volu (m ³ 2: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 5: 5:	192.2 174.1 arge T: mme) 80.8 14.1 16.5 15.0 11.9 08.9 06.1 03.3 97.8 86.8 15.2 35.7	<pre>O K O K ime-Peak (mins)</pre> 66 126 184 242 360 476 594 708 936 1374 1772 2200	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 960 min Winter 1440 min Winter 2160 min Winter 280 min Winter 4320 min Winter	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.0 2.0 Discha Volu (m ³ 2: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3:	192.2 174.1 arge T: mme) 80.8 14.1 16.5 15.0 11.9 08.9 06.1 03.3 97.8 86.8 15.2 35.7 36.1	O K O K ime-Peak (mins) 66 126 184 242 360 476 594 708 936 1374 1772 2200 3152	
	10080 min Winter 10080 min Winter Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2480 min Winter 260 min Winter 2760 min Winter 320 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.0 2.0 Discha Volu (m ³ 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3:	192.2 174.1 arge T: mme) 80.8 14.1 16.5 15.0 11.9 08.9 06.1 03.3 97.8 86.8 15.2 35.7 36.1 42.3	O K O K ime-Peak (mins) 666 126 184 242 360 476 594 708 936 1374 1772 2200 3152 4040	
	10080 min Winter 10080 min Winter Event 60 min Winter 120 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 1440 min Winter 280 min Winter 280 min Winter 320	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1100</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.0 2.0 Discha Volu (m ³ 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3:	192.2 174.1 arge T: mme) 80.8 14.1 16.5 15.0 11.9 08.9 06.1 03.3 97.8 86.8 15.2 35.7 36.1 42.3 91.2	O K O K ime-Peak (mins) 66 126 184 242 360 476 594 708 936 1374 1772 2200 3152 4040 4832 5624	
	Storm Event 60 min Winter 120 min Winter 120 min Winter 180 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 1440 min Winter 2880 min Winter 2880 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	<pre>88.362 88.331 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.182 1.083</pre>	0.362 0.331 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	2.0 2.0 Discha Volu (m ³ 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 3: 5: 5: 5: 5: 5: 5: 5: 5: 5: 5: 5: 7;	192.2 174.1 arge T: me) 80.8 14.1 16.5 15.0 11.9 06.1 03.3 97.8 86.8 15.2 35.7 36.1 42.3 91.2 40.8 90.8	O K O K ime-Peak (mins) 66 126 184 242 360 476 594 708 936 1374 1772 2200 3152 4040 4832 5624 6448	

©1982-2018 Innovyze

WSP Group Ltd		Page 3
	Lawnswood Boad	
	Catchment B	1
	1 in 100 V + 408 CC	
·	Designed by PS	– Micro
Filo Catchmont P SPCY	Checked by AC	Drainage
Plie Calcillient B.SRCA	Checked by AC	
XP Solutions	Source Control 2018.1	
Ba	infall Details	
Rainfall Mode	el FEH	
Return Period (years	s) 100	
FEH Rainfall Versio	on 2013 on GB 386300 285500 SO 86300 85500	
Data Typ	De Catchment	
Summer Storr	ns Yes	
Winter Storr	ns Yes	
CV (Summe) CV (Winter	r) 0.750	
Shortest Storm (mins	s) 15	
Longest Storm (mins	s) 10080	
Climate Change	8 +40	
Tin	ne Area Diagram	
	<u>ic filed blugtum</u>	
Tota	al Area (ha) 0.520	
Time (mine)	Area (mine) Area	
From: To:	(ha) From: To: (ha)	
0 4	4 0.260 4 8 0.260	
	0.0010 -	
©198	32-2018 Innovyze	

WSP Group Ltd		Page 4
•	Lawnswood Road	
•	Catchment B	
•	1 in 100 Y + 40% CC	Micro
Date 11/12/2019	Designed by PS	Drainage
File Catchment B.SRCX	Checked by AC	Drainiacje
XP Solutions	Source Control 2018.1	
<u> </u>	lodel Details	
Storage is On	line Cover Level (m) 89.000	
Tank	or Pond Structure	
Inver	t Level (m) 88.000	
Depth (m) Are	a (m ²) Depth (m) Area (m ²)	
0.000	474.0 1.000 830.0	
<u>Hydro-Brake®</u>	Optimum Outflow Control	
Unit	Reference MD-SHE-0071-2000-0)700-2000
Design	n Head (m) Flow (l/s)	0.700
Design	Flush-Flo™ Ca	alculated
	Objective Minimise upstream	n storage
A	oplication Available	Surface
Dia	meter (mm)	71
Invert	Level (m)	88.000
Minimum Outlet Pipe Dia Suggested Manhole Dia	meter (mm) meter (mm)	100 1200
Control Po	ints Head (m) Flow (1/s)
Design Point (Ca	lculated) 0.700 2.	0
E	'lush-Flo™ 0.207 2.	0
Mean Flow over H	$\begin{array}{cccc} \text{KlCK-Flow} & \text{U.450} & \text{I.} \\ \text{lead Range} & - & \text{I.} \\ \end{array}$	6 7
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on the Head/Dischar Should another type of contro n these storage routing calcu	ge relationship for the device other than a lations will be
Depth (m) Flow (1/s) Depth (m) Flow	7 (1/s) Depth (m) Flow (1/s)	Depth (m) Flow (1/s)
0.100 1.8 1.200	2.6 3.000 3.9	7.000 5.8
0.300 2.0 1.600	2.9 4.000 4.2	8.000 6.2
0.400 1.8 1.800	3.1 4.500 4.7	8.500 6.4
0.500 1.7 2.000	3.2 5.000 5.0	9.000 6.6
0.600 1.9 2.200	3.4 5.500 5.2	9.500 6.8
1.000 2.4 2.600	3.7 6.500 5.4	
	1 1 1 1 1 1 1 1	
@1.00	2-2019 Innorma	
C198	z-zuis innovyze	

WSP Group Ltd						Page 1
•	Lawn	swood	Road			
	Catc	hment	С			Contraction of the
	1 in	100Y	+ 40%	CC		Mirco
Date 11/12/2019	Desi	gned b	y PS			Desinado
File Catchment C.SRCX	Chec	ked by	AC			Diamage
XP Solutions	Sour	ce Con	trol 2	2018.1		
Summary of Results	for 10)0 year	Retu	rn Per	iod (+40%)	
Storm	Max	Max	Max	Max	Status	
Event	(m)	Depth C	ontrol (1/s)	(m ³)		
	(111)	(11)	(1/3)	()		
15 min Summer -	75.241	0.241	4.4	552.5	ОК	
30 min Summer	75.312	0.312	4.4	723.8	ОК	
60 min Summer	75.385	0.385	4.4	903.9	OK	
120 min Summer	75 445	0.445	4.4	1136 5	OK	
240 min Summer	75.496	0.496	4 4	1187 7	0 K	
360 min Summer	75.519	0.519	4.4	1246.6	0 K	
480 min Summer	75.530	0.530	4.4	1275.9	ОК	
600 min Summer	75.536	0.536	4.4	1291.7	ОК	
720 min Summer 7	75.539	0.539	4.4	1300.0	ОК	
960 min Summer 7	75.541	0.541	4.4	1303.7	O K	
1440 min Summer 7	75.535	0.535	4.4	1288.6	O K	
2160 min Summer	75.519	0.519	4.4	1246.2	0 K	
2880 min Summer	75.502	0.502	4.4	1203.0	ОК	
4320 min Summer	75.483	0.483	4.4	1102 0	OK	
7200 min Summer	75 465	0.471	4.4 4.4	1108 0	OK	
8640 min Summer	75.463	0.463	4.4	1102.0	ОК	
10080 min Summer	75.464	0.464	4.4	1104.2	0 K	
15 min Winter	75.269	0.269	4.4	619.1	ОК	
30 min Winter	75.348	0.348	4.4	811.2	ОК	
Storm	Rain	Flooded	l Disch	arge Ti	me-Peak	
Event (mm/hr)	Volume	Volu	ime	(mins)	
		(m³)	(m ³	[•])		
15	62 0.00	0.0		EO 1	2.2	
LO MIN SUMMER 1 30 min Summer 1	06 960	0.0	, 3) 2	J0.⊥ 73.5	∠ ⊃ 38	
60 min Summer	67.060	0.0) 7	23.2	68	
120 min Summer	39.480	0.0) 7	27.7	128	
180 min Summer	28.549	0.0) 7	11.6	188	
240 min Summer	22.540	0.0) 6	97.1	246	
360 min Summer	16.007	0.0) 6	78.0	366	
480 min Summer	12.471	0.0) 6	64.8	486	
600 min Summer	10.252	0.0) 6	53.8	606	
/20 min Summer	8.127	0.0	v 6	44.U 26.0	/26	
1440 min Summer	4.725	0.0	, 6) 5	20.0 93.4	1442	
2160 min Summer	3.324	0.0) 12	85.8	2160	
2880 min Summer	2.610	0.0) 12	30.8	2512	
4320 min Summer	1.895	0.0) 11	22.7	3288	
5760 min Summer	1.536	0.0) 19	66.7	4040	
7200 min Summer	1.322	0.0) 21	00.5	4896	
8640 min Summer	1.182	0.0) 22	09.2	5712	
10080 min Summer	1.083	0.0	22	U6.9 71 0	6560	
LO MIN WINTER L 30 min Winter 1	06 960	0.0	, 3) 2	72.0	∠⊃ 37	
Jo with wincel I		0.0		. 2 • 0	51	
©19	982-20	18 Inno	ovyze			

WSP Group Lta						Page 2
•	Lawr	nswood 2	Road			
	Cato	chment	С			Marca I.
	1 ir	100Y	+ 40% CC			MB
Data 11/12/2019	Dog	anod h	7 DC			
	Desi	lynea b	y rs			Drainage
File Catchment C.SRCX	Chec	скеа ру	AC			
XP Solutions	Soui	rce Con	trol 201	.8.1		
<u>Summary of Resul</u>	ts for 1	<u>00 year</u>	Return	Period	<u> (+40응)</u>	-
Storm	Max	Max	Max N	lax St	atus	
Event	(m)	Jepth Co	ontrol vo	rume m ³)		
	(111)	(111)	(1/3) (,		
60 min Wint	cer 75.428	0.428	4.4 10	13.4	O K	
120 min Wint	ter 75.495	0.495	4.4 11	85.0	O K	
180 min Wint	ter 75.530	0.530	4.4 12	76.4	O K	
240 min Wint	ter 75.552	0.552	4.4 13	34.2	ОК	
360 min Wint	cer 75.578	0.578	4.4 14	01.5	ОК	
480 min Wint	ter 75.591	0.591	4.4 14	35.8	ОК	
600 min Wint	ter 75.598	0.598	4.4 14	55.2	ΟK	
720 min Wint	cer 75.602	0.602	4.4 14	66.1	OK	
960 min Wint	ter 75.605	0.605	4.4 14	73.6	ОК	
1440 min Wint	ter /5.601	0.601	4.4 14	63.8	OK	
2160 min Wint	cer /5.588	0.588	4.4 14	28.U 05 5	OK	
2880 Min Wint 4220 min Wint	cer /5.5/2	0.572	4.4 13	83.3 10 7	OK	
4320 MIII WIN	-or 75 532	0.547	4.4 13	10./ 80 1	OK	
7200 min Wint	er 75 521	0.552	4 4 12	52 7	0 K	
8640 min Wint	er 75.514	0.514	4.4 12	33.1	0 K	
10080 min Wint	cer 75.509	0.509	4.4 12	20.8	0 K	
Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharg Volume (m³)	ge Time- (min	Peak ns)	
		(()			
60 min Wint	er 67.060	0.0	735.	6	68	
120 min Wint	er 39.480	0.0	708.	. б	126	
180 min Wint	er 28.549	0.0	690.		184	
240 min Wint 360 min Wint	et 22.540	0.0	619.	3	∠44 362	
480 min Wint	er 12 471	0.0	657	2	480	
600 min Wint	er 10.252	0.0	649	6	596	
720 min Wint	er 8.727	0.0	642.	.7	714	
960 min Wint	er 6.761	0.0	630.	.3	948	
1440 min Wint	er 4.725	0.0	609.	2	1410	
	er 3.324	0.0	1290.	2	2080	
2160 min Wint		0.0	1241.	2	2736	
2160 min Wint 2880 min Wint	er 2.610	0.0			3456	
2160 min Wint 2880 min Wint 4320 min Wint	er 2.610 er 1.895	0.0	1149.	. 0	5150	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint	er 2.610 er 1.895 er 1.536	0.0	1149. 2191.	. 0 . 5	4376	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint	er 2.610 er 1.895 er 1.536 er 1.322	0.0	1149. 2191. 2318.	. 0 . 5 . 2	4376 5328	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182	0.0	1149. 2191. 2318. 2342.	.0 .5 .2 .9	4376 5328 6232 7169	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083	0.0 0.0 0.0 0.0	1149. 2191. 2318. 2342. 2247.	0 5 2 9 4	4376 5328 6232 7168	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083	0.0 0.0 0.0 0.0 0.0	1149. 2191. 2318. 2342. 2247.	0 5 2 9	4376 5328 6232 7168	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083	0.0 0.0 0.0 0.0 0.0	1149. 2191. 2318. 2342. 2247.	0 5 2 9	4376 5328 6232 7168	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083		1149 2191 2318 2342 2247	0 5 2 9 4	4376 5328 6232 7168	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083		1149 2191 2318 2342 2247	0 5 2 9 4	4376 5328 6232 7168	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083		1149. 2191. 2318. 2342. 2247.	0 5 2 9 4	4376 5328 6232 7168	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083		1149. 2191. 2318. 2342. 2247.	0 5 2 9 4	4376 5328 6232 7168	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083		1149. 2191. 2318. 2342. 2247.	0 5 2 9 4	4376 5328 6232 7168	
2160 min Wint 2880 min Wint 4320 min Wint 5760 min Wint 7200 min Wint 8640 min Wint 10080 min Wint	er 2.610 er 1.895 er 1.536 er 1.322 er 1.182 er 1.083	0.0 0.0 0.0 0.0 0.0	1149. 2191. 2318. 2342. 2247.	0 5 2 9 4	4376 5328 6232 7168	

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment C	
	1 in 100Y + 40% CC	Million
Date 11/12/2019	Designed by PS	
File Catchment C.SRCX	Checked by AC	Drainage
XP Solutions	Source Control 2018 1	
Ra	infall Details	
Rainfall Mode	۶]	FEH
Return Period (years	5)	100
FEH Rainfall Versio	n	2013
Site Locatio	on GB 386300 285500 SO 86300 8	35500
Summer Storn	is Calci	Yes
Winter Storm	is	Yes
Cv (Summer	c) C	0.750
Cv (Winter	c) C	1.840
Longest Storm (mins	s) 1	C1 0800
Climate Change		+40
Tin	ne Area Diagram	
Tota	al Area (ha) 1.820	
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
0 4	0.910 4 8 0.910	
©198	2-2018 Innovyze	

WSP Group Ltd		Page 4
•	Lawnswood Road	
•	Catchment C	
•	1 in 100Y + 40% CC	Micro
Date 11/12/2019	Designed by PS	Drainage
File Catchment C.SRCX	Checked by AC	brainage
XP Solutions	Source Control 2018.1	
<u> </u>	Model Details	
Storage is On	line Cover Level (m) 76.000	
<u>Tank</u>	or Pond Structure	
Inve	rt Level (m) 75.000	
Depth (m) Are	ea (m²) Depth (m) Area (m²)	
0.000	2200.0 1.000 3020.0	
<u>Hydro-Brake®</u>	<u>Optimum Outflow Control</u>	
Unit	Reference MD-SHE-0104-4400-0700-4	400
Desig Design	n Head (m) 0. Flow (l/s)	4.4
2001911	Flush-Flo™ Calcula	ated
	Objective Minimise upstream stor	rage
A Sump	pplication Suri Available	iace Yes
Dia	meter (mm)	104
Invert	Level (m) 75.	.000
Suggested Manhole Dia	meter (mm) meter (mm) 1	200
Control Po	ints Head (m) Flow (l/s)	
Design Point (Ca	alculated) 0.700 4.4	
E	Flush-Flo™ 0.214 4.4	
Mean Flow over H	KICK-FIO® 0.480 3.7 Head Range - 3.8	
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on the Head/Discharge re Should another type of control dev n these storage routing calculatio	lationship for the vice other than a ons will be
Depth (m) Flow (l/s) Depth (m) Flow	v (l/s) Depth (m) Flow (l/s) Depth	1 (m) Flow (l/s)
0.100 3.5 1.200	5.6 3.000 8.7 7	13.0
0.300 4.4 1.400	6.5 4 000 9.3 7	.500 13.4 3.000 13.8
0.400 4.1 1.800	6.8 4.500 10.5 8	3.500 14.3
0.500 3.8 2.000	7.2 5.000 11.1 9	.000 14.7
0.600 4.1 2.200	7.5 5.500 11.6 9	15.1
1.000 5.2 2.600	8.1 6.500 12.5	
	1	
©198	2-2018 Innovyze	

WSP Group Ltd						Page 1
•	Lawr	nswood H	Road			
	Cato	chment I	D			Sec. 1
	1 in	n 100 Y	+ 40%	CC		Misso
Date 11/12/2019	Desi	aned by	V PS			
File Catchment D SBCX	Chec	rked by				Drainage
VD Colutions	Cour	ca Cont	Frol 2	010 1		
	5001		LIUI Z	.010.1		
Summary of Results	for 1()n vear	Ratin	n Par	(+40%)	
<u>Summary Of Results</u>	101 10	JU <u>year</u>	Necui		100 (140%)	
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth Co	ontrol	Volume		
	(m)	(m)	(1/s)	(m³)		
15 min Cummon		0 0 4 1	7 4	000 0	O IZ	
30 min Summer	74.741	0.241	7.4	929.2	OK	
60 min Summer	74.888	0.388	7.4	1520.4	0 K	
120 min Summer	74.950	0.450	7.4	1776.2	0 K	
180 min Summer	74.983	0.483	7.4	1912.4	ОК	
240 min Summer	75.003	0.503	7.4	1999.0	ОК	
360 min Summer	75.027	0.527	7.4	2099.6	ОК	
480 min Summer	75.039	0.539	7.4	2150.1	ОК	
600 min Summer	75.046	0.546	7.4	2178.2	O K	
720 min Summer	75.050	0.550	7.4	2193.3	0 K	
960 min Summer	75.052	0.552	7.4	2202.0	O K	
1440 min Summer	75.047	0.547	7.4	2181.0	O K	
2160 min Summer	75.031	0.531	7.4	2115.5	O K	
2880 min Summer	75.015	0.515	7.4	2049.0	O K	
4320 min Summer	74.997	0.497	7.4	1974.1	O K	
5760 min Summer	74.987	0.487	7.4	1931.9	0 K	
7200 min Summer	74.982	0.482	7.4	1911.8	ОК	
8640 min Summer	74.981	0.481	7.4	1905.4	OK	
10080 min Summer	74.982	0.482	7.4	1041 2	OK	
30 min Winter	74.709	0.209	7.4	136/ 3	OK	
SU MIN WINCEL	/4.049	0.549	/.4	1004.0	0 K	
Storm	Rain	Flooded	Discha	arge Ti	lme-Peak	
Event	(mm/hr)	Volume	Volu	me	(mins)	
		(m³)	(m³)		
15 min Summor	162 960	0 0	5.7	76.2	23	
30 min Summer	106.960	0.0	5	70.2 28.8	20 38	
60 min Summer	67.060	0.0	110	90.8	68	
120 min Summer	39.480	0.0	12.	30.8	128	
180 min Summer	28.549	0.0	120	09.8	188	
240 min Summer	22.540	0.0	118	87.5	246	
360 min Summer	16.007	0.0	115	53.7	366	
480 min Summer	12.471	0.0	112	29.5	486	
600 min Summer	10.252	0.0	110	09.2	606	
720 min Summer	8.727	0.0	109	90.8	726	
960 min Summer	6.761	0.0	105	57.0	964	
1440 min Summer	4.725	0.0	99	95.0	1442	
2160 min Summer	3.324	0.0	215	56.9	2160	
2880 min Summer	2.610	0.0	205	58.9 72 5	2508	
4320 min Summer	1.895	0.0	18	/J.5 75 1	3244	
5/60 min Summer	1 200	0.0	32	/ J . L D1 0	4032	
8640 min Summer	1 1 2 2	0.0	243	52 3 51.U	4090 5701	
10080 min Summer	1 083	0.0	301	70.3	6552	
15 min Winter	162.960	0.0	6	13.1	2.3	
30 min Winter	106.960	0.0	62	28.1	37	
©1	982-20	18 Innc	ovyze			

Date 11/12/20 File Catchmer		Lawr	arroad D			
Date 11/12/20 File Catchmer		1 Dami	ISWOOD R	load		
Date 11/12/20 File Catchmer		Cato	chment D)		The second
Date 11/12/20 File Catchmer		1 ir	n 100 Y	+ 40% CC		Mirco
File Catchmer)19	Desi	igned by	' PS		
	nt D.SRCX	Cheo	cked by	AC		Digitidu
XP Solutions		Soui	rce Cont	rol 2018.	1	
5	<u>Summary of Results</u>	for 1	<u>00 year</u>	Return Pe	eriod (+40%)	<u>)</u>
	-		-			
	Storm	Max	Max	Max Max	Status	
	Event	Level	Depth Co	ntrol Volu	ne	
		(m)	(m) (1/s) (m ³))	
	60 min Winter	74.932	0.432	7.4 1704	.4 ОК	
	120 min Winter	75.002	0.502	7.4 1993	.3 ОК	
	180 min Winter	75.039	0.539	7.4 2147	.6 O K	
	240 min Winter	75.062	0.562	7.4 2245	.5 ОК	
	360 min Winter	75.089	0.589	7.4 2359	.8 OK	
	480 min Winter	/J.103	0.603	7 4 2418	.5 UK	
	ouu min Winter 720 min Winto∽	/3.11U 75 115	0.01U 0.615	7 A 2432	-2 UK 5 OF	
	960 min Winter	75.118	0.618	7.4 2486	.2 OK	
	1440 min Winter	75.115	0.615	7.4 2473	.5 OK	
	2160 min Winter	75.103	0.603	7.4 2418	.4 ОК	
	2880 min Winter	75.087	0.587	7.4 2351	.6 ОК	
	4320 min Winter	75.063	0.563	7.4 2249	.6 O K	
	5760 min Winter	75.049	0.549	7.4 2191	.4 ОК	
	7200 min Winter	75.039	0.539	7.4 2150	.1 ОК	
	8640 min Winter	75.032	0.532	7 / 2120	$7 \cap V$	
	10080 min Winter	75.028	0.528	7.4 2120	.3 OK	
	10080 min Winter Storm Event	75.028 Rain (mm/hr)	0.528 Flooded Volume	7.4 2120 7.4 2102 Discharge Volume	.) OK .3 OK Time-Peak (mins)	
	10080 min Winter Storm Event	75.028 Rain (mm/hr)	0.528 Flooded Volume (m ³)	7.4 2120 7.4 2102 Discharge Volume (m ³)	.) OK .3 OK Time-Peak (mins)	
	10080 min Winter Storm Event	75.028 Rain (mm/hr)	<pre>0.528 Flooded Volume (m³) 0.0</pre>	7.4 2120 7.4 2102 Discharge Volume (m ³)	.7 OK .3 OK Time-Peak (mins)	
	10080 min Winter Storm Event 60 min Winter 120 min Winter	75.028 Rain (mm/hr) 67.060 39.480	0.528 Flooded Volume (m ³) 0.0 0.0	7.4 2120 7.4 2102 Discharge (m ³) 1238.8 1208.3	.7 0 K .3 0 K Time-Peak (mins) 68 126	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter	75.028 Rain (mm/hr) 67.060 39.480 28.549	0.528 Flooded Volume (m ³) 0.0 0.0 0.0	<pre>7.4 2120 7.4 2102 Discharge Volume (m³) 1238.8 1208.3 1176.9</pre>	.7 0 K .3 0 K Time-Peak (mins) 68 126 184	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter	75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540	0.528 Flooded Volume (m ³) 0.0 0.0 0.0 0.0	7.4 2120 7.4 2102 Discharge Volume (m ³) 1238.8 1208.3 1176.9 1158.0	.7 O K .3 O K Time-Peak (mins) 68 126 184 244	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter	75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0	7.4 2120 7.4 2102 Discharge Volume (m ³) 1238.8 1208.3 1176.9 1158.0 1134.3	.7 O K .3 O K Time-Peak (mins) 68 126 184 244 362	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0	7.4 2120 7.4 2102 Discharge Volume (m ³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3	.7 O K .3 O K Time-Peak (mins) 68 126 184 244 362 480	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.2522	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	7.4 2120 7.4 2102 Discharge Volume (m ³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3 1102.7	.7 O K .3 O K Time-Peak (mins) 68 126 184 244 362 480 596	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	7.4 2120 7.4 2102 Discharge Volume (m ³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3 1102.7 1089.2	7 0 K 3 0 K Time-Peak (mins) 68 126 184 244 362 480 596 714 042	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter	<pre>75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725</pre>	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2120 7.4 2102 Discharge Volume (m ³) 1238.8 1208.3 1176.9 1158.0 1134.3 1177.3 1102.7 1089.2 1064.2 1019 5	.7 0 K .3 0 K Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1410	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter	<pre>75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324</pre>	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2120 7.4 2102 Discharge volume (m ³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3 1102.7 1089.2 1064.2 1019.5 2171.7	.7 0 K .3 0 K Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1410 2080	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter	<pre>75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610</pre>	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2120 7.4 2102 Discharge (m ³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3 1102.7 1089.2 1064.2 1019.5 2171.7 2082.7	7 0 K .3 0 K Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1410 2080 2716	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 280 min Winter 4320 min Winter	75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>7.4 2120 7.4 2102 Discharge Volume (m³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3 1102.7 1089.2 1064.2 1019.5 2171.7 2082.7 1915.0</pre>	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1410 2080 2716 3420	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 280 min Winter 5760 min Winter	75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>Discharge Volume (m³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3 1102.7 1089.2 1064.2 1019.5 2171.7 2082.7 1915.0 3646.8</pre>	7 0 K 3 0 K Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1410 2080 2716 3420 4376	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 280 min Winter 5760 min Winter 7200 min Winter	75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>Discharge Volume (m³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3 1102.7 1089.2 1064.2 1019.5 2171.7 2082.7 1915.0 3646.8 3850.3</pre>	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1410 2080 2716 3420 4376 5328	
	10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 1440 min Winter 2400 min Winter 260 min Winter 2800 min Winter 2800 min Winter 3000 min Winter	75.028 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	<pre>Discharge Volume (m³) 1238.8 1208.3 1176.9 1158.0 1134.3 1117.3 1102.7 1089.2 1064.2 1019.5 2171.7 2082.7 1915.0 3646.8 3850.3 3909.5</pre>	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1410 2080 2716 3420 4376 5328 6224	

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment D	1
	1 in 100 Y + 40% CC	Micco
Date 11/12/2019	Designed by PS	
File Catchment D.SRCX	Checked by AC	Drainage
XP Solutions	Source Control 2018.1	
Ra	infall Details	
Rainfall Mode Return Period (years	≥⊥ FEH ≈) 100	
FEH Rainfall Versio	on 2013	
Site Locatio	on GB 386300 285500 SO 86300 85500	
Data Tyr Summer Storn	be Catchment	
Winter Storn	ns Yes	
Cv (Summer	c) 0.750	
Cv (Winter Shortest Storm (mins	c) 0.840 s) 15	
Longest Storm (mins	5) 10080	
Climate Change	% +40	
mi -		
<u>111</u>	ne Area Diagram	
Tota	al Area (ha) 3.060	
Time (mins)	Area Time (mins) Area	
FIOM: 10.		
0 4	1.530 4 8 1.530	
©198	32-2018 Innovyze	

WSP Group Ltd				Page 4
•	Lawnswood R	oad		
	Catchment D			The second second
	1 in 100 Y	+ 40% CC		Mirco
Date 11/12/2019	Designed by	PS		Dcainago
File Catchment D.SRCX	Checked by	AC		Diamage
XP Solutions	Source Cont	rol 2018.1		
<u>1</u>	<u>Model Detail</u>	5		
Storage is Or	line Cover Lev	rel (m) 75.500		
<u>Tank</u>	or Pond Stru	<u>icture</u>		
Inve	rt Level (m) 7	4.500		
Depth (m) Are	ea (m²) Depth	(m) Area (m²)		
0.000	3760.0 1.	4630.0		
<u>Hydro-Brake@</u>	Optimum Out	flow Control	<u>-</u>	
Unit	Reference MD-	SHE-0131-7400-	0700-7400	
Desig	n Head (m)		0.700	
Design	Flow (1/s) Flush-Flo™	С	/.4 alculated	
	Objective Mi	nimise upstrea	m storage	
<i>P</i>	pplication		Surface	
Sump	Available meter (mm)		Yes 131	
Invert	Level (m)		74.500	
Minimum Outlet Pipe Dia	meter (mm)		150	
Suggested Manhole Dia	meter (mm)		1200	
Control Po	ints Hea	d (m) Flow (1/s	5)	
Design Point (Ca	alculated)	0.700 7	. 4	
1	Flush-Flo™	0.230 7	.4	
Mean Flow over 1	Kick-Flo® Jead Range	- 6	.3	
	icaa nange	0.1	• =	
The hydrological calculations have & Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on t Should another n these storag	he Head/Discha type of contr e routing calc	rge relatio ol device o ulations wi	onship for the other than a all be
Depth (m) Flow (1/s) Depth (m) Flow	v (l/s) Depth	(m) Flow (1/s)	Depth (m)	Flow (l/s)
0 100 4 7 1 200	95 3		7 000	22 1
0.200 7.4 1.400	10.2 3.	500 15.8	7.500	22.1
0.300 7.3 1.600	10.9 4.	16.9	8.000	23.5
0.400 7.1 1.800	11.5 4.	500 17.9	8.500	24.2
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	DOO 18.8 500 19.7	9.000	24.9
0.800 7.9 2.400	13.2 6.	20.5	9.500	23.0
1.000 8.7 2.600	13.7 6.	500 21.3		
©198	32-2018 Inno	vyze		

WSP Group Ltd						Page 1
•	Lawn	swood H	Road			
	Catc	hment H	Ξ			Contract of the
	1 in	100 Y	+ 40% (CC		Misco
Date 05/12/2019	Desi	aned by	v PS			
File Catchment E SBCX	Chec	ked by				Urainage
VP Solutions	Cour	ac Cont	Frol 201	10 1		2
	5001	Ce COIN	LIOI 201	10.1		
Summary of Posults	for 10		Poturn	Port	iad (+10%)	
<u>Summary of Results</u>	IOI IC	<u>year</u>	Recuill	LET.	<u>LOU (+40%)</u>	
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth C	ontrol Vo	olume		
	(m)	(m)	(1/s)	(m³)		
15	100 050	0 050	2 0 7		0.11	
15 min Summer	103.250	0.250	3.0	3/6.3	OK	
60 min Summer	103.323	0.323	3.0 4	493.0 615 6	0 K 0 K	
120 min Summer	103.350	0.350	3.0	719 0	0 K	
180 min Summer	103 492	0.492	3.0	773 9	0 K	
240 min Summer	103.512	0.512	3.0 8	308.4	0 K	
360 min Summer	103.535	0.535	3.0 8	347.8	0 K	
480 min Summer	103.546	0.546	3.0 8	367.1	0 K	
600 min Summer	103.552	0.552	3.0 8	377.3	ОК	
720 min Summer	103.555	0.555	3.0 8	382.3	ОК	
960 min Summer	103.556	0.556	3.0 8	383.7	ОК	
1440 min Summer	103.549	0.549	3.0 8	371.4	ОК	
2160 min Summer	103.531	0.531	3.0 8	340.0	ОК	
2880 min Summer	103.513	0.513	3.0 8	309.2	ОК	
4320 min Summer	103.492	0.492	3.0 -	774.0	ОК	
5760 min Summer	103.480	0.480	3.0 -	753.8	ОК	
7200 min Summer	103.474	0.474	3.0 -	743.3	O K	
8640 min Summer	103.472	0.472	3.0	739.2	O K	
10080 min Summer	103.473	0.473	3.0	740.4	O K	
15 min Winter	103.279	0.279	3.0 4	421.7	O K	
30 min Winter	103.360	0.360	3.0 5	552.6	O K	
Storm	Rain	Flooded	Dischard	те Тіт	ne-Peak	
Event	(mm/hr)	Volume	Volume	, (mins)	
		(m³)	(m³)		-	
				_		
15 min Summer	162.960	0.0	249.	.7	23	
30 min Summer	106.960	0.0	254.	.7	38	
60 min Summer	6/.060	0.0	497.	.8	68	
120 min Summer	ンダ・48U	0.0	490.	. ∠	⊥∠ŏ 100	
180 min Summer	20.049	0.0	4/6.	. כ ר	7 V C	
240 min Summer	16 007	0.0	407.	. /	240	
480 min Summer	12 471	0.0	400. 448	. 8	486	
600 min Summer	10 252	0.0	442	.0 3	606	
720 min Summer	8.727	0.0	436	. 6	72.6	
960 min Summer	6.761	0.0	42.6	.1	964	
1440 min Summer	4.725	0.0	407.	.2	1442	
2160 min Summer	3.324	0.0	879.	.3	2160	
2880 min Summer	2.610	0.0	843.	. 4	2508	
4320 min Summer	1.895	0.0	769.	. 6	3248	
5760 min Summer	1.536	0.0	1347.	. 8	4088	
7200 min Summer	1.322	0.0	1440.	. 8	4904	
8640 min Summer	1.182	0.0	1515.	.5	5792	
10080 min Summer	1.083	0.0	1499.	. 4	6648	
15 min Winter	162.960	0.0	254.	. 8	23	
30 min Winter	106.960	0.0	252.	. 9	37	
<u></u> 	982-20	18 Tnnc	00070			
	202 20	- U _ IIIIC	, y y 2 C			

WSP Group Ltd							Page 2
•		Lawn	nswood :	Road			
		Cato	hment	E			- Charles
		1 in	n 100 Y	+ 40% C	С		Micco
Date 05/12/2019	2	Desi	aned h	V PS			
Eilo Cotobmont	E CDCV	Choc	wheel by	y ID			Drainac
	L.SKCA		cked by	AC	0 1		
XP Solutions		Sour	ce Con	trol 201	8.1		
_							
Sun	<u>mary of Results</u>	for 10	<u>)0 year</u>	Return	Peri	<u>od (+40%)</u>	-
	Storm	Marr	Morr	More M	(a	Status	
	Event	Level	Depth (Control Vo	lume	Status	
	20010	(m)	(m)	(1/s) (1	m ³)		
	60 min Winter	103.443	0.443	3.0 6	90.3	ΟK	
	120 min Winter	103.511	0.511	3.0 8	07.0	ΟK	
	180 min Winter	103.547	0.547	3.0 8	68.9	ОК	
	240 min Winter	103.570	0.570	3.0 9	08.0	ОК	
	360 min Winter	102.595	0.595	3.0 9	33.3 76 1	υĸ	
	480 min Winter	102 015	0.608	3.0 9	/ b . l	U K	
	500 min Winter	103 610	U.015 0.610	3.0 9	00.0 05 7	O K	
	960 min Winter	103 622	0.019	3.0 9	90.1 99 9	OK	
	1440 min Winter	103.617	0.617	3 0 9	99.9	0 K	
	2160 min Winter	103.602	0.602	3.0 9	64.5	0 K	
	2880 min Winter	103.584	0.584	3.0 9	33.5	ОК	
	4320 min Winter	103.557	0.557	3.0 8	85.9	ОК	
	5760 min Winter	103.541	0.541	3.0 8	57.9	ОК	
	7200 min Winter	103.530	0.530	3.0 8	38.2	O K	
	8640 min Winter	103.522	0.522	3.0 83	24.4	ОК	
	10080 min Winter	103.517	0.517	3.0 8	15.9	ОК	
	Storm	Rain	Flooded	l Discharge	e Tim	e-Peak	
	Event	(mm/hr)	Volume	Volume	(n	nins)	
			(m³)	(m³)			
	60 min Winter	67.060	0.0	497.	7	68	
	120 min Winter	39.480	0.0	475.0	0	126	
	180 min Winter	28.549	0.0	464.2	2	184	
	240 min Winter	22.540	0.0	458.2	2	244	
	360 min Winter	16.007	0.0	451.3	1	362	
	480 min Winter	12.471	0.0	446.	5	480	
	600 min Winter	10.252	0.0	442.	7	596	
	720 min Winter	8.727	0.0	439.3	3	714	
	960 min Winter	6.761	0.0	433.0	6 0	948	
	1440 min Winter	4./25	0.0	424.(0	141U 2000	
	2880 min Winter	3.324 2 610	0.0	003.0 251 /	0 7	2000 2716	
	4320 min Winter	2.010	0.0	, 0J1. 1 797 -	, 1	3420	
	5760 min Winter	1 536	0.0	1503	- 9	4376	
	7200 min Winter	1.322	0.0	1594	4	532.8	
	8640 min Winter	1.182	0.0	1605.	9	6232	
	10080 min Winter	1.083	0.0	1538.2	2	7168	
	<u>(</u>	1982-20	18 Inna	ovvze			
	•	20		~ <u>, </u>			

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment E	
	1 in 100 Y + 40% CC	Micco
Date 05/12/2019	Designed by PS	
File Catchment E.SRCX	Checked by AC	Drainage
XP Solutions	Source Control 2018.1	
Ra	<u>infall Details</u>	
Rainfall Mode	el FEH	
Return Period (years	5) 100	
FEH Rainfall Versic	on 2013	
Data Tyr	DR GB 386300 285500 SO 86300 85500 De Catchment	
Summer Storn	ns Yes	
Winter Storn	ns Yes	
Cv (Summer	c) 0.750 c) 0.40	
Shortest Storm (mins	s) 0.040	
Longest Storm (mins	s) 10080	
Climate Change	% +40	
Tin	ne Area Diagram	
Tota	al Area (ha) 1.240	
Time (mins)	Area Time (mins) Area	
From: To:	(ha) From: To: (ha)	
0 4	0.620 4 8 0.620	
	1	
©198	32-2018 Innovyze	

WSP Group Ltd		Page 4
•	Lawnswood Road	
•	Catchment E	The second
•	1 in 100 Y + 40% CC	Mirro
Date 05/12/2019	Designed by PS	Drainago
File Catchment E.SRCX	Checked by AC	Diamaye
XP Solutions	Source Control 2018.1	
<u>№</u> Storage is Onl <u>Tank</u> Inver	<u>Model Details</u> Line Cover Level (m) 104.000 <u>or Pond Structure</u> t Level (m) 103.000	
Depth (m) Are	ea (m²) Depth (m) Area (m²)	
0.000	1440.0 1.000 2010.0	
<u>Hydro-Brake®</u>	<u>Optimum Outflow Control</u>	
Unit Desig Design A Sump Dia Invert Minimum Outlet Pipe Dia Suggested Manhole Dia	ReferenceMD-SHE-0087-3000-0700-3000n Head (m)0.700Flow (1/s)3.0Flush-Flo™CalculatedObjectiveMinimise upstream storagepplicationSurfaceAvailableYesmeter (mm)87Level (m)103.000meter (mm)1200	
Control Po	ints Head (m) Flow (l/s)	
Design Point (Ca	alculated) 0.700 3.0	
F	Flush-Flo™ 0.210 3.0	
Mean Flow over H	Kick-Flo® 0.465 2.5	
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated Depth (m) Flow (1/s) Depth (m) Flow	een based on the Head/Discharge relat Should another type of control device n these storage routing calculations	ionship for the other than a will be) Flow (1/s)
		,
0.100 2.6 1.200	3.8 3.000 5.9 7.00 4.1 3.500 6.3 7.50	0 8.8
0.300 2.9 1.600	4.4 4.000 6.7 8.00	0 9.1
0.400 2.8 1.800	4.6 4.500 7.1 8.50	0 9.7
0.500 2.6 2.000	4.9 5.000 7.5 9.00	0 9.9
0.600 2.8 2.200	5.1 5.500 7.8 9.50	0 10.2
	5.3 6.000 8.2	
01.00		
0198	zz-zorg runozyże	

WSP Group Ltd						Page 1
•	Lawn	swood i	Road			
	Cato	hment	F			Contract of
	1 in	100 Y	+ 40%	CC		Mirco
Date 11/12/2019	Desi	gned b	y PS			Desipado
File Catchment F.SRCX	Chec	ked by	AC			Diamage
XP Solutions	Sour	ce Con	trol 2	018.1		
Summary of Results	for 10)0 year	Retur	n Per	iod (+40%)	
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth Co	ontrol (1/e)	Volume (m ³)		
	()	(111)	(1/3)	(111)		
15 min Summer	97.198	0.198	2.0	99.2	ОК	
30 min Summer	97.254	0.254	2.0	129.5	ОК	
60 min Summer	97.310	0.310	2.0	105 1	OK	
120 min Summer	97.30Z	0.352	2.0	196 6	OK	
240 min Summer	97 382	0.382	2.0	202 6	0 K	
360 min Summer	97.390	0.390	2.0	207.1	0 K	
480 min Summer	97.388	0.388	2.0	206.1	ОК	
600 min Summer	97.383	0.383	2.0	202.8	0 K	
720 min Summer	97.375	0.375	2.0	198.0	ОК	
960 min Summer	97.358	0.358	2.0	188.1	O K	
1440 min Summer	97.331	0.331	2.0	172.5	O K	
2160 min Summer	97.298	0.298	2.0	154.0	O K	
2880 min Summer	97.271	0.271	2.0	139.0	0 K	
4320 min Summer	97.231	0.231	2.0	116.6	ОК	
5/60 min Summer	97.200	0.200	2.0	100.3	OK	
8640 min Summer	97.170 97.161	0.161	2.0	00.0 79.8	OK	
10080 min Summer	97.148	0.148	2.0	73.1	0 K	
15 min Winter	97.221	0.221	2.0	111.2	0 K	
30 min Winter	97.283	0.283	2.0	145.4	O K	
Storm	Rain	Flooded	Discha	arge Ti	mo-Dook	
Event	(mm/hr)	Volume	Volu	me	(mins)	
	(/	(m ³)	(m ³)	(
		-		-	~~	
15 min Summer 1	162.960	0.0	-	92.5	23	
30 min Summer 1	67 060	0.0	12	20.9 51 6	31	
60 min Summer 120 min Summer	01.U6U 39 100	0.0	10	уП З ОТ О	00 126	
180 min Summer	28.549	0.0	20)6.3	186	
240 min Summer	22.540	0.0	2.1	L6.9	246	
360 min Summer	16.007	0.0	23	30.6	364	
480 min Summer	12.471	0.0	23	39.1	482	
600 min Summer	10.252	0.0	24	15.2	602	
720 min Summer	8.727	0.0	24	19.8	720	
960 min Summer	6.761	0.0	25	56.8	818	
1440 min Summer	4.725	0.0	26	5.0	1042	
2160 min Summer	3.324	0.0	29	13.6)7 1	1432	
2000 min Summer	2.01U 1 205	0.0	30	,,•T 33 0	1024 2600	
5760 min Summer	1.536	0.0	33	53.6	3352	
7200 min Summer	1.322	0.0	30	91.1	4104	
8640 min Summer	1.182	0.0	41	18.9	4840	
10080 min Summer	1.083	0.0	44	16.6	5544	
15 min Winter 1	L62.960	0.0	10	03.6	22	
30 min Winter 1	L06.960	0.0	13	34.4	37	
©1 0	982-20	18 Inno	OVVZA			
	202 20		- 1 20			

Date 11/12/2019 File Catchment H							2
Date 11/12/2019 File Catchment H		Lawr	nswood F	Road			
Date 11/12/2019 File Catchment H		Cato	chment B	P			Sec. 1
Date 11/12/2019 File Catchment H		1 ir	n 100 Y	+ 40%	CC		Misso
File Catchment H		Des	aned hy	7 PS			
FILE Catchinent i	- CDCV	Cho	wheel by	7 I D 7 C			Drainag
	- SRCA		cked by	AC	10 1		
XP Solutions		Soui	rce Cont	crol 20	18.1		
Cum	ary of Bogulta	for 1	00	Doturr	Dor	ind (+10%	N N
<u>Sum</u>	<u>lary or Results</u>	101 1	<u>JU year</u>	Recuil	I Fer.	<u>100 (7408</u>	<u>) </u>
	Storm	Max	Max	Max	Max	Status	
	Event	Level	Depth Co	ntrol V	olume		
		(m)	(m) ((1/s)	(m³)		
	60 min Mintor	07 3/5	0 345	2 0	100 5	0 K	
	120 min Winter	97.343	0.345	2.0	208 4	0 K 0 K	
	180 min Winter	97.415	0.415	2.0	2200.4	0 K	
	240 min Winter	97.427	0.427	2.0	229.4	0 K	
	360 min Winter	97.437	0.437	2.0	235.7	ОК	
	480 min Winter	97.438	0.438	2.0	236.0	O K	
	600 min Winter	97.434	0.434	2.0	233.6	ΟK	
	720 min Winter	97.427	0.427	2.0	229.5	ΟK	
	960 min Winter	97.410	0.410	2.0	219.0	O K	
	1440 min Winter	97.373	0.373	2.0	197.4	0 K	
	2160 min Winter	97.330	0.330	2.0	172.1	O K	
	2880 min Winter	97.291	0.291	2.0	150.0	O K	
	4320 min Winter	97.229	0.229	2.0	115.6	0 K	
	5760 min Winter	97.183	0.183	2.0	90.9	OK	
	7200 min Winter	97.150	0.100	2.0	13.1	OK	
	10080 min Winter	97.120	0.120	19	61.7 53.3	O K O K	
	Storm	Rain	Flooded	Dischar	ge Ti	me-Peak	
	Event	(mm/hr)	(m ³)	Volum (m ³)	e (mins)	
			((
	60 min Winter	67.060	0.0	181	.1	66	
	60 min Winter 120 min Winter	67.060 39.480	0.0	181 213	.1	66 124	
	60 min Winter 120 min Winter 180 min Winter	67.060 39.480 28.549	0.0	181 213 230	1 3.0).6	66 124 182	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter	67.060 39.480 28.549 22.540	0.0 0.0 0.0 0.0	181 213 230 242	1 3.0 0.6 2.2	66 124 182 242	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter	67.060 39.480 28.549 22.540 16.007	0.0 0.0 0.0 0.0	181 213 230 242 257	1 3.0 0.6 2.2 7.0	66 124 182 242 358	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter	67.060 39.480 28.549 22.540 16.007 12.471	0.0 0.0 0.0 0.0 0.0 0.0	181 213 230 242 257 265	1 3.0 0.6 2.2 7.0 5.9	66 124 182 242 358 474 588	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727	0.0 0.0 0.0 0.0 0.0 0.0 0.0	181 213 230 242 257 265 272 272	1 3.0 0.6 2.2 7.0 5.9 2.2 5.8	66 124 182 242 358 474 588 700	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761		181 213 230 242 255 265 272 272 276 276	1 3.0 0.6 2.2 7.0 5.9 2.2 5.8 3.2	66 124 182 242 358 474 588 700 916	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	181 213 230 242 257 265 272 276 283 283	1 3.0 0.6 2.2 7.0 5.9 2.2 5.8 3.2 7.6	66 124 182 242 358 474 588 700 916 1130	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	181 213 230 242 257 265 272 276 283 287 328	1 3.0 0.6 2.2 7.0 5.9 2.2 5.8 3.2 7.6 3.9	66 124 182 242 358 474 588 700 916 1130 1564	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	181 213 230 242 257 265 272 276 283 287 328 344	.1 3.0 9.6 9.2 9.0 9.2 9.2 5.8 3.2 9.6 3.9 9.1	66 124 182 242 358 474 588 700 916 1130 1564 1992	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 4320 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	181 213 230 242 257 265 272 276 283 287 328 344 373	.1 3.0 0.6 2.2 2.0 5.9 2.2 5.8 3.2 2.6 3.9 4.1 3.5	66 124 182 242 358 474 588 700 916 1130 1564 1992 2808	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 5760 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	181 213 230 242 257 265 272 276 283 287 328 344 373 407	.1 3.0 0.6 2.2 7.0 5.9 2.2 5.8 3.2 7.6 3.9 4.1 3.5 7.4	66 124 182 242 358 474 588 700 916 1130 1564 1992 2808 3528	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	181 213 230 242 257 265 272 276 283 287 328 344 373 407 438	.1 3.0 0.6 2.2 2.0 5.9 2.2 5.8 3.2 2.6 3.9 4.1 3.5 2.4 3.3	66 124 182 242 358 474 588 700 916 1130 1564 1992 2808 3528 4256	
	60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 8640 min Winter	67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182		181 213 230 242 257 265 272 276 283 287 328 344 373 407 438 465	.1 3.0 0.6 2.2 2.0 5.9 2.2 5.8 3.2 2.6 3.9 4.1 3.5 2.4 3.3 9.5	66 124 182 242 358 474 588 700 916 1130 1564 1992 2808 3528 4256 4928	

©1982-2018 Innovyze

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment F	
	1 in 100 Y + 40% CC	Misso
Date 11/12/2019	Designed by PS	
File Catchment F.SRCX	Checked by AC	Drainage
XP Solutions	Source Control 2018.1	
Ra	infall Details	
Rainfall Mode Return Period (years	el FEH	
FEH Rainfall Versio	on 2013	
Site Locatio	on GB 386300 285500 SO 86300 85500	
Data Tyr	pe Catchment	
Winter Storr	ns Yes	
Cv (Summer	r) 0.750	
Cv (Winter Shortest Storm (ming	r) 0.840 s) 15	
Longest Storm (min	s) 10080	
Climate Change	% +40	
Tria	no Aros Disgram	
<u>1 11</u>	<u>ne Alea Diaglam</u>	
Tota	al Area (ha) 0.330	
Time (nine)		
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
0 4	4 0.165 4 8 0.165	
©198	32-2018 Innovyze	

WSP Group Ltd		Page 4							
•	Lawnswood Road								
•	Catchment F	The second							
•	1 in 100 Y + 40% CC	Micro							
Date 11/12/2019	Designed by PS	Drainage							
File Catchment F.SRCX	Checked by AC	in an							
XP Solutions	XP Solutions Source Control 2018.1								
<u> </u>	<u>lodel Details</u>								
Storage is On	line Cover Level (m) 98.000								
<u>Tank_</u>	<u>or Pond Structure</u>								
Inve	t Level (m) 97.000								
Depth (m) Are	a (m²) Depth (m) Area (m²)								
0.000	470.0 1.000 820.0								
<u>Hydro-Brake®</u>	Optimum Outflow Control								
Unit	Reference MD-SHE-0071-2000-0700-2	2000							
Design	n Head (m) $0.$.700							
Destân	Flow (1/S) Flush-Flo™ Calcula	ated							
	Objective Minimise upstream stor	rage							
A	pplication Surf	face							
Dia	Avallable meter (mm)	Yes 71							
Invert	Level (m) 97.	.000							
Minimum Outlet Pipe Dia Suggested Manhole Dia	meter (mm) meter (mm) 1	100 1200							
Control Po	ints Head (m) Flow (l/s)								
Design Point (Ca	alculated) 0.700 2.0								
F	'lush-Flo™ 0.207 2.0								
Mean Flow over F	Kick-Flo® 0.450 1.6 Mead Range - 1.7								
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on the Head/Discharge re Should another type of control dev n these storage routing calculatio	<pre>>lationship for the vice other than a ons will be</pre>							
Depth (m) Flow (l/s) Depth (m) Flow	(l/s) Depth (m) Flow (l/s) Depth	1 (m) Flow (l/s)							
0.100 1.8 1.200	2.6 3.000 3.9 7	7.000 5.8							
0.200 2.0 1.400	2.9 4.000 4.5 8	7.500 6.0 3.000 6.2							
0.400 1.8 1.800	3.1 4.500 4.7 8	3.500 6.4							
0.500 1.7 2.000	3.2 5.000 5.0 9	9.000 6.6							
0.600 1.9 2.200	3.4 5.500 5.2 9	9.500 6.8							
1.000 2.4 2.600	3.7 6.500 5.6								
	1 1								
01.00	0.0010 -								
©198	2-2018 Innovyze								

WSP Group Ltd						Page 1
•	Lawr	swood 1	Road			
	Cato	hment (G			A Contraction
	1 in	100Y -	+ 40%	CC		Misso
Date 11/12/2019	Desi	aned h	V PS			
Filo Catchmont C SPCY	Choc	kod by				Drainage
VD Solutions	Cour		+rol 0	0010 1		
	5001		LIOI 2	2010.1		
Summary of Deculta	for 10		Dotu	rn Doi	$d (\pm 10\%)$	
Summary of Results	TOT I	JU <u>year</u>	Retu	tii Per	<u>100 (+403)</u>	
Storm	Max	Max	Maw	Max	Status	
Event	Level	Depth Co	ontrol	Volume		
	(m)	(m)	(1/s)	(m³)		
15 min Summer	74.253	0.253	9.7	1214.7	ОК	
30 min Summer	74.329	0.329	9.7	1591.4	OK	
60 min Summer	74.408	0.408	9.7	1987.7	OK	
120 min Summer	74.4/4	0.4/4	9.7	2501 0		
240 min Summer	74.509	0.531	9.7	2611 1	O K	
360 min Summer	74 556	0 556	9.7	2745 7	O K	
480 min Summer	74.569	0.569	9.7	2811 6	O K	
600 min Summer	74.576	0.576	9.7	2848.2	O K	
720 min Summer	74.580	0.580	9.7	2867.8	OK	
960 min Summer	74.582	0.582	9.7	2879.2	OK	
1440 min Summer	74.576	0.576	9.7	2851.6	ОК	
2160 min Summer	74.560	0.560	9.7	2765.7	ОК	
2880 min Summer	74.544	0.544	9.7	2683.9	ОК	
4320 min Summer	74.527	0.527	9.7	2597.1	0 К	
5760 min Summer	74.518	0.518	9.7	2549.6	ОК	
7200 min Summer	74.514	0.514	9.7	2526.8	ОК	
8640 min Summer	74.512	0.512	9.7	2520.3	ОК	
10080 min Summer	74.514	0.514	9.7	2529.4	ОК	
15 min Winter	74.282	0.282	9.7	1361.1	ОК	
30 min Winter	74.367	0.367	9.7	1783.5	O K	
Storm	Rain	Flooded	Disch	arge T	ime-Peak	
Event	(mm/hr)	Volume	Volu	ıme	(mins)	
		(m³)	(m³	')		
	1.00 0.00	~ ~ ~	-	41 0		
15 min Summer	106 000	0.0		41.9 22 0	23	
30 min Summer	100.90U	0.0	ა. 1 ⊑	∠∠.U 45 1	20	
120 min Summer	39 480	0.0	16	07.7	128	
180 min Summer	28,549	0.0	15	78.0	188	
240 min Summer	22.540	0.0	15	49.1	246	
360 min Summer	16.007	0.0	15	08.8	366	
480 min Summer	12.471	0.0	14	79.1	486	
600 min Summer	10.252	0.0	14	53.5	606	
720 min Summer	8.727	0.0	14	30.0	724	
960 min Summer	6.761	0.0	13	86.0	964	
1440 min Summer	4.725	0.0	13	04.4	1442	
2160 min Summer	3.324	0.0	28	21.4	2160	
2880 min Summer	2.610	0.0	26	90.9	2480	
4320 min Summer	1.895	0.0	24	26.2	3240	
5760 min Summer	1.536	0.0	42	65.6	4040	
/200 min Summer	1 100	0.0	45	42.2 56 1	4896 5710	
10090 min Summer	1 NQ2	0.0	4/.	20.1 29 1	5/12	
15 min Winter	162 960	0.0	4/	94.7	23	
30 min Winter	106.960	0.0	8:	21.7	37	
©1	982-20	18 Inno	ovyze			

WSP GIOUP LLU							Page 2
•		Lawr	nswood	Road			
		Cato	chment	G			The second
		1 ir	n 100Y	+ 40%	CC		Mirco
Date 11/12/2019)	Desi	lqned b	y PS			
File Catchment	G.SRCX	Chec	cked bv	AC			Urainac
XP Solutions		Sour	ce Con	trol 2	2018 1		
MI DOIUCIONS		5001			.010.1		
Sum	mary of Results	for 1	00 vear	Retui	rn Per	iod (+40%))
<u>o uni</u>	<u>indry of Rebuilds</u>	101 1	<u>ycar</u>	11000		104 (1100	<u></u>
	Storm	Max	Max	Max	Max	Status	
	Event	Level	Depth C	ontrol	Volume		
		(m)	(m)	(l/s)	(m³)		
	60 min Winter	74 455	0 455	97	2228 3	ΟK	
	120 min Winter	74.529	0.529	9.7	2606.2	0 K	
	180 min Winter	74.568	0.568	9.7	2807.7	ОК	
	240 min Winter	74.593	0.593	9.7	2935.5	ОК	
	360 min Winter	74.621	0.621	9.7	3084.7	O K	
	480 min Winter	74.636	0.636	9.7	3161.2	O K	
	600 min Winter	74.644	0.644	9.7	3205.1	0 K	
	720 min Winter	74.649	0.649	9.7	3230.2	O K	
	960 min Winter	74.652	0.652	9.7	3249.1	O K	
	1440 min Winter	74.649	0.649	9.7	3231.8	OK	
	2160 min Winter	74.633	0.635	9.7	3071 /	OK	
	4320 min Winter	74.019	0.019	9.7	2945 3	0 K	
	5760 min Winter	74.581	0.581	9.7	2872.8	0 K	
	7200 min Winter	74.571	0.571	9.7	2821.6	0 K	
	8640 min Winter	74.564	0.564	9.7	2785.1	ОК	
	10080 min Winter	74.559	0.559	9.7	2762.7	O K	
	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	l Disch Volu (m ³	arge Ti ume	me-Peak (mins)	
	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	l Disch Volu (m ³	arge Ti ume ')	me-Peak (mins)	
	Storm Event 60 min Winter	Rain (mm/hr) 67.060	Flooded Volume (m ³)	d Disch Volu (m ³	arge Ti ume ') 15.3	me-Peak (mins) 68	
	Storm Event 60 min Winter 120 min Winter	Rain (mm/hr) 67.060 39.480	Flooded Volume (m ³) 0.0	l Disch Volu (m ³) 16) 15	arge Ti me 7) 15.3 76.9	me-Peak (mins) 68 126	
	Storm Event 60 min Winter 120 min Winter 180 min Winter	Rain (mm/hr) 67.060 39.480 28.549	Flooded Volume (m ³) 0.0 0.0	l Disch Volu (m ³) 16) 15) 15	arge Ti ume ') 15.3 76.9 41.9	ime-Peak (mins) 68 126 184 244	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007	Flooded Volume (m ³) 0.0 0.0 0.0	l Disch Volu (m ³) 16) 15) 15) 15) 15	arge Ti me () 15.3 76.9 41.9 20.9 93.8	68 (mins) 68 126 184 244 362	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0	 d Discharter Volu (m³) 16: 15: 15: 15: 15: 15: 14: 14: 	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7	68 (mins) 68 126 184 244 362 480	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	 d Discharter Volution (m³) 16: 15: 15: 15: 15: 15: 14: 14: 	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9	(mins) 68 126 184 244 362 480 596	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	 d Discharter (m³) 16 155 155 145 144 144 	arge Ti ume 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1	Ime-Peak (mins) 68 126 184 244 362 480 596 714	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	 d Discharter (m³) 163 155 155 155 144 144 144 144 144 	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4	Ime-Peak (mins) 68 126 184 244 362 480 596 714 946	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	 d Discharger (m³) 16: 15: 15: 15: 14: 	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3	Lme-Peak (mins) 68 126 184 244 362 480 596 714 946 1404	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Disch Volu (m ³) 16) 15) 15) 15) 15) 14) 14) 14) 14) 14) 14) 14) 14	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1	Eme-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Disch Volu (m ³) 16. 15. 15. 15. 14. 14. 14. 14. 14. 14. 14. 28. 27. 27. 27. 27. 27. 27. 27. 27	arge Ti me) 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.3 15.9 15.3 15	Eme-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 280 min Winter 4320 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Disch Volu (m ³) 16: 15: 15: 14: 14: 14: 14: 14: 14: 14: 14	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 20.2 15.2 15.2 15.3	me-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 5760 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Disch Volu (m ³) 16:) 15:) 15:) 14:) 14:) 14:) 14:) 14:) 14:) 14:) 28:) 27:) 25:) 47: 27:	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 19.3	ime-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 1440 min Winter 2460 min Winter 2880 min Winter 5760 min Winter 2804 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Disch Volu (m ³) 16 15 15 15 14 14 14 14 14 14 14 14 14 14	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 15.2 53.9 19.3 04.9	ime-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2480 min Winter 2880 min Winter 5760 min Winter 200 min Winter 5760 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	 d Discharter (m³) 16 15³ 15³ 15³ 14⁴ 14⁴ 14⁴ 14⁴ 14⁴ 14⁴ 28 27⁵ 28 27⁵ 47⁷ 50¹ 50¹ 51¹ 49¹ 	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 15.2 53.9 19.3 04.9 00.8	me-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 280 min Winter 5760 min Winter 5760 min Winter 5760 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	 d Discharter (m³) 16 15³ 15³ 15³ 14⁴ 1	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 15.2 53.9 19.3 04.9 00.8	ime-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 2880 min Winter 5760 min Winter 5760 min Winter 200 min Winter 3640 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Discha Volu (m ³) 16) 15) 15) 15) 14) 14) 14) 14) 14) 14) 28) 27) 25) 25) 47) 50) 51) 51) 49	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 15.2 53.9 19.3 04.9 00.8	Lme-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2480 min Winter 2480 min Winter 25760 min Winter 5760 min Winter 260 min Winter 360 min Winter 200 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Discha Volu (m ³) 16.) 15.) 15.) 15.) 14.) 14.) 14.) 14.) 14.) 14.) 28.) 27.) 25.) 25.) 49. }	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 19.3 04.9 00.8	Lme-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2480 min Winter 2400 min Winter 5760 min Winter 5760 min Winter 5760 min Winter 8640 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Discha Volu (m ³) 16.) 15.) 15.) 14.) 14.) 14.) 14.) 14.) 14.) 28.) 27.) 25.) 47.) 50.) 51.) 49.	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 15.2 53.9 19.3 04.9 00.8	Eme-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2880 min Winter 2880 min Winter 5760 min Winter 5760 min Winter 8640 min Winter 10080 min Winter	Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Disch Volu (m ³) 16) 15) 15) 15) 14) 14) 14) 14) 14) 28) 27) 25) 25) 47) 50) 51) 49	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 15.2 53.9 19.3 04.9 00.8	ime-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	
	Storm Event 60 min Winter 120 min Winter 120 min Winter 180 min Winter 360 min Winter 360 min Winter 720 min Winter 960 min Winter 1440 min Winter 2880 min Winter 2880 min Winter 5760 min Winter 5760 min Winter 8640 min Winter 10080 min Winter	Rain (nm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Discharder Volu (m ³) 16: 15: 15: 15: 14: 14:	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 15.2 53.9 19.3 04.9 00.8	ime-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2460 min Winter 2880 min Winter 5760 min Winter 5760 min Winter 8640 min Winter	Rain (nm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Discharter volument (m ³) 16: 15: 15: 15: 14: 14: 14: 14: 14: 14: 14: 28: 27: 25: 47: 50: 51: 49: 	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 15.2 53.9 19.3 04.9 00.8	ime-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	
	Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 2460 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 200 min Winter 8400 min Winter	Rain (nm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	d Discharder volu (m ³) 16 15 155 144 <	arge Ti me 15.3 76.9 41.9 20.9 93.8 73.7 55.9 39.1 07.4 50.3 56.1 37.9 15.2 53.9 19.3 04.9 00.8	me-Peak (mins) 68 126 184 244 362 480 596 714 946 1404 2076 2712 3412 4328 5264 6224 7160	

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment G	
	1 in 100 Y + 40% CC	NB-10
· Date 11/12/2019	Designed by PS	
File Catchment G SRCX	Checked by IC	Drainage
VP Solutions	Source Control 2018 1	
	Source control 2018.1	
<u>Ra</u>	infall Details	
Rainfall Mode		비고고
Return Period (years	5)	100
FEH Rainfall Versio	n	2013
Site Locatio	on GB 386300 285500 SO 86300 8	5500
Summer Storr	ns catch	Yes
Winter Storr	ns	Yes
Cv (Summer	c) 0	.750
Cv (Winter	c) 0	15
Longest Storm (mins	s) 1	.0080
Climate Change		+40
<u> </u>	<u>ne Area Diagram</u>	
Tota	al Area (ha) 4.000	
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
0 4	4 8 2.000	
©198	32-2018 Innovyze	

WSP Group Ltd						Pa	age 4
•	Lawnsv	wood Roa	d				
•	Catchn	ment G					
•	1 in 1	100Y + 4	0% CC			N	/irro
Date 11/12/2019	Desigr	ned by P	S				Icainado
File Catchment G.SRCX	Checke	ed by AC				-	namage
XP Solutions	Source	e Contro	1 201	8.1			
<u>M</u>	Iodel D	<u>etails</u>					
Storage is On.	line Co	ver Level	(m) 7	5.000			
Tank (or Pond	d Struct	<u>ure</u>				
Inver	t Level	(m) 74.0	00				
Depth (m) Are	a (m ²)	Depth (m)	Area	(m²)			
0.000	4700.0	1.000	5.	580.0			
<u>Hydro-Brake®</u>	Optim	um Outfl	<u>ow Cc</u>	ontrol	<u>.</u>		
Unit	Referen	nce MD-SHI	E-0148	-9700-	0700-970	0	
Design Design	n Head Flow (l.	(m) /s)			0.70	0 7	
Destgi	Flush-Fl	lo™		C	alculate	d	
	Object	ive Minin	nise u	pstrea	m storag	е	
Aj Sumo	pplicat: Availat	ion ble			Surfac	e	
Dia	meter (r	mm)			14	8	
Invert	Level	(m)			74.00	0	
Minimum Outlet Pipe Dian Suggested Manhole Dian	meter (r	nm)			22 120	5	
Control Po	inte	Head (m) Fl		••	0	
Design Point (Ca	lculate.	d) 0.7	0 0	9.	.7		
F	lush-Fl	о™ 0.2	45	9.	7		
	Kick-Fl	o® 0.5	13	8.	4		
Mean Flow over H	ead Ran	ge	-	8.	Ţ		
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een base Should a n these	ed on the another ty storage :	Head/ ype of routin	Discha: contro g calco	rge rela ol devic ulations	tions e oth will	hip for the er than a be
Depth (m) Flow (l/s) Depth (m) Flow	(1/s)	Depth (m)	Flow	(1/s)	Depth (m) Fl	ow (l/s)
0.100 5.3 1.200	12.5	3.000		19.3	7.0	00	29.1
	13.4	3.500		20.8	7.5	00	29.9
0.400 9.3 1.800	15.2	4.500		23.5	8.5	00	31.9
0.500 8.6 2.000	15.9	5.000		24.7	9.0	00	32.8
0.600 9.0 2.200	16.7	5.500		25.9	9.5	00	33.7
	17.4	6.000		27.0			
1.000 11.01 2.000	-~·-	0.000		20.0	I		
©198	2-2018	Innovy:	ze				

Appendix B.4

1 IN 100 YEAR + CLIMATE CHANGE & CREEP

WSP Group Ltd						Page 1		
•	Lawr	swood 1	Road					
	Cato	hment 2	A			and the second second		
	Development Creep							
Date 11/12/2019								
File CATCHMENT & SECX		Drainage						
VD Colutions				010 1				
Source control 2018.1								
Summary of Deculta	for 10		Dotu	rn Doi	$riad (\pm 10\%)$			
Summary of Results	101 10	<u>JU year</u>	Retu	<u>in rei</u>	<u>LIOU (+40%)</u>			
Storm	Mav	Max	Maw	Max	Status			
Event	Level	Depth Co	ontrol	Volume				
	(m)	(m)	(1/s)	(m³)				
15 min Summer	83.260	0.260	4.9	674.2	OK			
30 min Summer	83.337	0.337	4.9	883.3	O K			
120 min Summer	83 482	0.410	4.9	1290 4				
180 min Summer	83 517	0.402	1.J 2 9	1390 0				
240 min Summer	83.539	0.539	49	1453 1	0 K			
360 min Summer	83.564	0.564	4 9	1526 4	l OK			
480 min Summer	83.577	0.577	4.9	1563.6	5 0 K			
600 min Summer	83.584	0.584	4.9	1584.6	O K			
720 min Summer	83.588	0.588	4.9	1596.3	3 ОК			
960 min Summer	83.591	0.591	4.9	1604.1	ОК			
1440 min Summer	83.587	0.587	4.9	1592.1	ОК			
2160 min Summer	83.572	0.572	4.9	1549.6	5 ОК			
2880 min Summer	83.556	0.556	4.9	1502.4	ОК			
4320 min Summer	83.539	0.539	4.9	1452.1	ОК			
5760 min Summer	83.530	0.530	4.9	1427.2	2 ОК			
7200 min Summer	83.527	0.527	4.9	1418.7	O K			
8640 min Summer	83.528	0.528	4.9	1420.1	ОК			
10080 min Summer	83.531	0.531	4.9	1429.9	ок ок			
15 min Winter	83.290	0.290	4.9	755.5	ОК			
30 min Winter	83.376	0.376	4.9	990.2	2 OK			
Storm	Rain	Flooded	Disch	arge T	ime-Peak			
Event	(mm/hr)	Volume	Volu	ume	(mins)			
		(m ³)	(m ³	•)	· - ·			
					_			
15 min Summer	162.960	0.0	4	10.4	23			
30 min Summer	106.960	0.0	4	15.3	38			
60 min Summer	6/.060	0.0	8:	20.1	68			
120 min Summer	39.480	0.0	-7	96.6 74 1	128			
180 min Summer	20.049	0.0	/	/4.⊥ 60 €	TAA			
240 min Summer 360 min Summer	16 007	0.0	/ 7	00.0 43 7	240 366			
480 min Summor	12 471	0.0	7	-J./ 31 9	486			
600 min Summer	10.252	0.0	7	22.0	606			
720 min Summer	8.727	0.0	י, ר	13.0	726			
960 min Summer	6.761	0.0	6	96.3	964			
1440 min Summer	4.725	0.0	6	67.0	1442			
2160 min Summer	3.324	0.0	14	27.3	2160			
2880 min Summer	2.610	0.0	13	66.9	2624			
4320 min Summer	1.895	0.0	12	50.6	3332			
5760 min Summer	1.536	0.0	23	80.6	4144			
7200 min Summer	1.322	0.0	25	17.0	4968			
8640 min Summer	1.182	0.0	25	44.0	5800			
10080 min Summer	1.083	0.0	24	22.9	6656			
15 min Winter	162.960	0.0	4	17.5	23			
30 min Winter	106.960	0.0	4	11.6	38			
<u></u> 01	982-20	18 Inno						
	20		1					

WSP Group Ltd					Page 2
	Law	nswood	Road		
	Cat	chment	A		- Contraction
	Dev	elopme	nt Creep		Micco
Date 11/12/2019	Des	igned }	by PS		
File CATCHMENT A.SRCX	Che	cked b	, AC		Urainac
XP Solutions	S011	rce Co	$\frac{1}{2} - \frac{1}{2}$	8 1	
1 5014010115		100 001		0.1	
Summary of Re	sults for 1	00 vea	r Return	Period (+4	08)
Building Of Re	54105 101 1	<u>.00 yca</u>			<u> </u>
Storm	Max	Max	Max M	ax Status	
Event	Level	Depth (Control Vol	Lume	
	(m)	(m)	(l/s) (n	n³)	
60 min 1	Winter 83 464	0 464	4 9 123	375 OK	
120 min 1	Winter 83.537	0.537	4.9 144	47.7 ОК	
180 min V	Winter 83.576	0.576	4.9 155	59.8 ОК	
240 min 1	Winter 83.600	0.600	4.9 163	31.3 ОК	
360 min 1	Winter 83.628	0.628	4.9 171	L5.1 ОК	
480 min 1	Winter 83.643	0.643	4.9 175	58.6 ОК	
600 min V	Winter 83.652	0.652	4.9 178	34.0 ОК	
720 min 1	Winter 83.657	0.657	4.9 179	99.0 ОК	
960 min 1	Winter 83.661	0.661	4.9 181	L1.7 ОК	
1440 min N 2160 min I	Winter 83.659	0.659	4.9 180	16.4 OK	
2100 IIIII 1 2880 min 1	Winter 83 633	0.047	4.9 173	22.0 OK	
4320 min 1	Winter 83.609	0.609	4.9 165	57.5 ОК	
5760 min V	Winter 83.597	0.597	4.9 162	22.5 ОК	
7200 min 1	Winter 83.590	0.590	4.9 160	01.1 ОК	
8640 min 1	Winter 83.586	0.586	4.9 158	38.8 ОК	
10080 min 1	Winter 83.584	0.584	4.9 158	34.7 ОК	
Storm Event	Rain (mm/hr)	Floode Volume (m³)	d Discharg • Volume (m³)	e Time-Peak (mins)	
		()	()		
60 min W	linter 67.060	0.	0 811.	3 68	
120 min W 180 min W	linter 39.480) ().	0 773.	1 126	
240 min M	linter 22.543	90. D0	0 750	9 184 0 244	
360 min W	inter 16.007	70.	0 741.	2 362	
480 min W	inter 12.471	1 0.	0 735.	5 480	
600 min W	inter 10.252	20.	0 731.	0 598	
720 min W	linter 8.727	7 0.	0 727.	0 714	
960 min W	linter 6.761	1 0.	0 720.	3 948	
1440 min W	linter 4.725	o 0.	U 703.	J 1412	
2160 Min W 2880 min W	inter 2.324	± U.	∪ 1441. ∩ 1302	/ ∠U84 2 27/∩	
4320 min W	inter 1.895	5 0.	0 1306.	0 3500	
5760 min W	inter 1.536	6 0 .	0 2641.	5 4384	
7200 min W	inter 1.322	2 0.	0 2726.	1 5336	
8640 min W	inter 1.182	20.	0 2633.	3 6304	
10080 min W	linter 1.083	30.	0 2521.	2 7256	
	@1002_0	018 7~~	011170		

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment A	Sec.
	Development Creep	Mirco
Date 11/12/2019	Designed by PS	
File CATCHMENT A.SRCX	Checked by AC	Diamaye
XP Solutions	Source Control 2018.1	
<u>Ra</u>	infall Details	
Rainfall Mode	el FEH	
Return Period (years	s) 100	
FEH Rainfall Versio	on 2013 on CB 386300 285500 SO 86300 85500	
Data Typ	De Catchment	
Summer Storn	ns Yes	
Winter Storn	ns Yes	
CV (Summer CV (Winter	r) 0.840	
Shortest Storm (mins	s) 15	
Longest Storm (mins	5) 10080	
Climate Change	% +40	
Tin	ne Area Diagram	
Tota	al Area (ha) 2.220	
Time (mins)	Area Time (mins) Area	
From: To:	(ha) From: To: (ha)	
0 4	4 1.110 4 8 1.110	
 	32-2018 Innouvze	
0198	DZ-ZOIO IIIIOVYZE	

WSP Group Ltd		Page 4								
•	Lawnswood Road									
	Catchment A	Sec.								
	Development Creep	Mirro								
Date 11/12/2019	Designed by PS	Drainago								
File CATCHMENT A.SRCX	Checked by AC	Diamaye								
XP Solutions										
<u> </u>	<u>Iodel Details</u>									
Storage is On	line Cover Level (m) 84.000									
<u>Tank</u>	or Pond Structure									
Inve	rt Level (m) 83.000									
Depth (m) Are	ea (m²) Depth (m) Area (m²)									
0.000	2500.0 1.000 3260.0									
<u>Hydro-Brake®</u>	Optimum Outflow Control									
Unit	Reference MD-SHE-0109-4900-0700-4900									
Desig	n Head (m) 0.700									
Design	Flow (1/s) 4.9									
	Objective Minimise upstream storage									
A	pplication Surface									
Sump	Available Yes									
Dia Invert	Level (m) 109									
Minimum Outlet Pipe Dia	meter (mm) 150									
Suggested Manhole Dia	meter (mm) 1200									
Control Po	ints Head (m) Flow (l/s)									
Design Point (Ca	alculated) 0.700 4.9									
E	rlush-Flo™ 0.214 4.9									
Mean Flow over H	KICK-FIO® 0.482 4.1 Head Range - 4.2									
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on the Head/Discharge relati Should another type of control device n these storage routing calculations w	onship for the other than a fill be								
Depth (m) Flow (l/s) Depth (m) Flow	w (l/s) Depth (m) Flow (l/s) Depth (m)	Flow (l/s)								
0.100 3.7 1.200	6.3 3.000 9.7 7.000	14.5								
0.200 4.9 1.400	6.8 3.500 10.4 7.500	15.0								
0.300 4.8 1.600	7.2 4.000 11.1 8.000	15.5								
0.400 4.8 1.800	8.0 5.000 12.4 9.000	16.4								
0.600 4.6 2.200	8.4 5.500 12.9 9.500	16.9								
0.800 5.2 2.400	8.7 6.000 13.5									
1.000 5.8 2.600	9.1 6.500 14.0									
©198	32-2018 Innovyze									
WSP Group Ltd						Page 1				
---------------------------------------	-----------------	-------------------	-----------------	-----------------------------	------------	---------				
•	Lawr	nswood i	Road							
	Cato	hment	В			Sec. 1				
	Deve	lopmen	t Cree	р		Mirco				
Date 11/12/2019	Desi	.gned b	y PS							
File Catchment B.SRCX	Chec	ked by	AC			Diamage				
XP Solutions	Sour	ce Con	trol 2	018.1						
Summary of Results	for 10)0 year	Retur	n Per	iod (+40%)					
Storm	Max	Max	Max	Max	Status					
Event	Level	Depth Co	ontrol	Volume (m ³)						
	(,	(,	(1)0)	()						
15 min Summer	88.328	0.328	2.0	172.3	O K					
30 min Summer	88.417	0.417	2.0	225.6	ОК					
60 min Summer	88.506	0.506	2.0	281.2	OK					
120 min Summer	88.5/5	0.575	2.0	326.5	OK					
180 min Summer	00.009	0.009	2.0	363 0	0 K					
240 IIIII Summer	88 610	0.029	2.0	376 7	0 K					
180 min Summer	88 655	0.049	2.0	3,0.1	0 K					
400 IIIII SUIIIIIEI 600 min Summor	88 656	0.000	2.0	381 7	0 K 0 V					
720 min Summer	88 653	0.050	2.0	379 8	0 K					
960 min Summer	88 643	0.000	2.0	372 4	0 K					
1440 min Summer	88 613	0.613	2.0	351 9	0 K					
2160 min Summer	88 575	0.015	2.0	326 4	0 K					
2880 min Summer	88 547	0.575	2.0	307 8	0 K					
4320 min Summer	88 509	0.509	2.0	282 8	0 K					
5760 min Summer	88 481	0 481	2.0	265 1	0 K					
7200 min Summer	88.460	0.460	2.0	251.9	0 K					
8640 min Summer	88.441	0.441	2.0	240.3	0 K					
10080 min Summer	88.427	0.427	2.0	231.5	ОК					
15 min Winter	88.363	0.363	2.0	193.2	ОК					
30 min Winter	88.462	0.462	2.0	253.1	ОК					
Storm	Pain	Flooded	Discha	rae Ti	mo-Posk					
Event	(mm/hr)	Volume	Volu	mo	(mine)					
	(, ,	(m ³)	(m ³)	(
			•							
15 min Summer	162.960	0.0	15	53.6	23					
30 min Summer	106.960	0.0	16	5.9	38					
60 min Summer	6/.060	0.0	27	/5.5	68					
120 min Summer	39.480	0.0	31	11.2	128					
180 min Summer	28.549	0.0	31	10.J	TRP					
240 min Summer	22.540	0.0	. 31	13.1	240					
100 min Summer	12 /71	0.0	, 31 , 20	12.U	000					
400 min Summer	10 252	0.0	, 30 , 31)6 0	604					
720 min Summer	±U.2J2 8 707	0.0	, 30 , 31)3.1	704					
960 min Summer	6 761	0.0	, 30 , 20)].)7 ?	962					
1440 min Summer	4.725	0.0	23	35.3	1400					
2160 min Summer	3.324	0.0	50)4.6	1712					
2880 min Summer	2.610	0.0	52	24.9	2104					
4320 min Summer	1.895	0.0	52	24.9	2940					
5760 min Summer	1.536	0.0	62	28.6	3752					
7200 min Summer	1.322	0.0	6	76.3	4608					
8640 min Summer	1.182	0.0	1 72	24.9	5440					
10080 min Summer	1.083	0.0	77	73.5	6248					
15 min Winter	162.960	0.0	16	53.9	23					
30 min Winter	106.960	0.0	16	51.5	37					
<u></u>	982-20	18 7000	20000							
U CI	202-20	TO TUUC	Jvyze							

WSP Group Ltd						Page 2
•	Lav	wnswo	od Roa	d		
	Cat	tchme	nt B			"Loon of
	Dev	velop	ment C	reep		Micco
Date 11/12/2019	Des	signe	d by F	S		
File Catchment B.SRCX	Che	ecked	bv AC			Drainage
XP Solutions	Sol	irce	Contro	1 2018	1	
				1 2010.	•	
Summary of Results	for	100 v	vear Re	turn Pe	-riod (+40%)	
<u>Bunnary or Rebureb</u>	TOT	<u> </u>			<u>erroa (+100)</u>	
Storm 1	Max	Max	Max	Max	Status	
Event Le	evel	Depth	Contro	Volume		
	(m)	(m)	(l/s)	(m³)		
60 min Winter 88	.558	0.558	2.() 315.4	ОК	
120 min Winter 88	.635	0.635	2.0	366.7	0 K	
180 min Winter 88	.672	0.672	2.0	393.0	O K	
240 min Winter 88	.695	0.695	2.0	408.8	O K	
360 min Winter 88	.718	0.718	2.0	425.2	Flood Risk	
480 min Winter 88	.726	0.726	2.0	431.4	Flood Risk	
600 min Winter 88	.729	0.729	2.0	433.1	Flood Risk	
720 min Winter 88	.727	0.727	2.0) 432.1	Flood Risk	
960 min Winter 88	602	0./19	2.0	426.0	Flood Risk	
2160 min Winter 88	6193	0.693	2.0) 407.4	0 K	
2880 min Winter 88	615	0.615	2.0) 353 6	0 K	
4320 min Winter 88	.564	0.564	2.0) 318.9	ОК	
5760 min Winter 88	.522	0.522	2.0	291.3	ΟK	
7200 min Winter 88	.486	0.486	2.0	268.4	O K	
8640 min Winter 88	.452	0.452	2.0	247.1	O K	
10080 min Winter 88	.418	0.418	2.0	226.0	0 K	
Storm Event	Rain (mm/hr	Flo) Vol	oded Di Lume V n³)	scharge /olume (m³)	Time-Peak (mins)	
Storm Event	Rain (mm/hr	Flo :) Vol (n	oded Di Lume V a ³)	scharge /olume (m³)	Time-Peak (mins)	
Storm Event 60 min Winter	Rain (mm/hr	Flo ;) Vo] (n	oded Di Lume 7 n ³) 0.0	scharge Volume (m ³) 302.4	Time-Peak (mins)	
Storm Event 60 min Winter 120 min Winter	Rain (mm/hr 67.06 39.48	Flo :) Vol (n	oded Di Lume 7 n ³) 0.0 0.0	scharge /olume (m ³) 302.4 317.9 216 5	Time-Peak (mins) 66 126	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54	Flo :) Vo] (n :0 :0 :0	oded Di Lume 1 n³) 0.0 0.0 0.0	scharge /olume (m ³) 302.4 317.9 316.5 315.1	Time-Peak (mins) 66 126 184 242	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00	Flo vol (11 50 50 19 10 07	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0	scharge <i>Tolume</i> (m ³) 302.4 317.9 316.5 315.1 312.9	Time-Peak (mins) 66 126 184 242 360	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47	Flo (n 60 80 89 80 77 71	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 310.9	Time-Peak (mins) 66 126 184 242 360 476	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47 10.25	Flo (n 50 50 50 50 50 52	oded Di Lume V a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 310.9 309.0	Time-Peak (mins) 66 126 184 242 360 476 594	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47 10.25 8.72	Flo (n 60 80 80 80 80 80 80 80 80 80 80 80 80 80	oded Di Lume V n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 310.9 309.0 309.0 306.9	Time-Peak (mins) 66 126 184 242 360 476 594 708	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76	Flo (n 60 19 10 71 162 27 51	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 310.9 309.0 306.9 302.9	Time-Peak (mins) 66 126 184 242 360 476 594 708 936	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter	Rain (mm/hr 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72	Flo (n 60 77 71 62 27 71 52	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 310.9 309.0 309.0 306.9 302.9 295.7	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter	Rain (mm/hr 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32	Flo Vol (n 60 7 7 7 7 7 7 7 7 7 7	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 306.9 302.9 295.7 561.6 577.1	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 280 min Winter	Rain (mm/hr 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61	Flo Vol (n 50 30 30 30 30 30 30 30 3	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 306.9 302.9 295.7 561.6 577.1	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 5760 min Winter	Rain (mm/hr 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53	Flo Vol (n 50 30 30 30 30 30 30 30 3	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 306.9 302.9 295.7 561.6 577.1 542.4 704.0	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter	Rain (mm/hr 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32	Flo C C C C C C C C C C	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 310.9 309.0 309.0 306.9 302.9 295.7 561.6 577.1 542.4 704.0 757.4	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter	Rain (mm/hr 39.48 28.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18	Flo (n 0 0 0 19 10 12 12 12 12 13 14 15 14 15 14 15 15 15 15 15 15 15 15 15 15	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 309.0 309.0 309.0 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 240 min Winter 360 min Winter 480 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.16 1.08	Flo (n 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 306.9 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18	Flo Vol (n 50 30 30 30 30 30 30 30 30 30 30 30 30 30	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 309.0 309.0 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18	Flo Vol (m 60 77 71 62 77 61 62 77 61 62 77 61 62 86 62 86 63 86 86 86 86 86 86 86 86 86 86 86 86 86	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	Rain (mm/hr 39.48 28.54 22.54 16.00 12.47 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18 1.08	Flo (n 50 30 30 30 30 30 30 30 30 30 30 30 30 30	oded Di Lume Y a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	
60 min Winter 120 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	Rain (mm/hr 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18	Flo (n 50 30 30 30 30 30 30 30 30 30 30 30 30 30	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 306.9 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 10080 min Winter	Rain (mm/hr 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18	Flo (n 50 30 30 30 30 30 30 30 30 30 30 30 30 30	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 10080 min Winter	Rain (mm/hr 67.06 39.48 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18 1.08	Flo (n 0 0 0 19 0 19 0 17 1 22 27 51 25 24 0 0 55 24 0 0 55 24 33 33	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 306.9 309.0 306.9 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	
Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 480 min Winter 720 min Winter 720 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18	Flo Vol (n 60 80 99 80 77 71 82 84 80 85 86 82 83 86 82 83 83	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 306.9 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	
Storm Event	Rain (mm/hr 67.06 39.48 28.54 22.54 16.00 12.47 10.25 8.72 6.76 4.72 3.32 2.61 1.89 1.53 1.32 1.18 1.08	Flo (n 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	oded Di Lume 7 a ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge /olume (m ³) 302.4 317.9 316.5 315.1 312.9 309.0 309.0 309.0 302.9 295.7 561.6 577.1 542.4 704.0 757.4 811.7 866.8	Time-Peak (mins) 66 126 184 242 360 476 594 708 936 1384 1968 2224 3160 4088 4976 5888 6664	

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment B	
	Development Creen	
·	Designed by PS	MICrO
Date 11/12/2019	Charled by PS	Drainage
File Catchment B.SRCX	Checked by AC	
XP Solutions	Source Control 2018.1	
<u>Ra</u> _	infall Details	
Rainfall Mode	اخ	FEH
Return Period (years	5)	100
FEH Rainfall Versio	n	2013
Site Locatio	on GB 386300 285500 SO 86300 8	35500
Data Tyr Summer Storm	De Cator	Ves
Winter Storn	ns	Yes
Cv (Summer	<u>^</u>) (0.750
Cv (Winter	c) (0.840
Shortest Storm (mins	5)	15
Longest Storm (mins	5) <u> </u>	L0080
	70	+ 40
Tin	ne Area Diagram	
Tota	al Area (ha) 0.570	
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
	0.205	
0 4	0.205 4 0.205	
©198	2-2018 Innovyze	

WSP Group Ltd			Page 4
•	Lawnswood Road		
	Catchment B		"Course of
	Development Cree	р	Mirco
Date 11/12/2019	Designed by PS		Dcainago
File Catchment B.SRCX	Checked by AC		Diamage
XP Solutions	Source Control 2	018.1	
<u> </u>	<u>Iodel Details</u>		
Storage is On	line Cover Level (m)	89.000	
<u>Tank</u>	or Pond Structure	2	
Inve	rt Level (m) 88.000		
Depth (m) Are	a (m²) Depth (m) Ar	ea (m²)	
0.000	474.0 1.000	830.0	
<u>Hydro-Brake®</u>	Optimum Outflow	<u>Control</u>	
Unit	Reference MD-SHE-00	71-2000-0700-20)00
Desig	n Head (m)	0.7	100
Design	Flow (l/s) Flush-Flo™	2 Calculat	i.u ted
	Objective Minimise	e upstream stora	ige
A	pplication	Surfa	ice
Sump	Available	У	les 71
Invert	Level (m)	88.0	000
Minimum Outlet Pipe Dia	meter (mm)	1	00
Suggested Manhole Dia	meter (mm)	12	200
Control Po	ints Head (m)	Flow (l/s)	
Design Point (Ca	lculated) 0.700	2.0	
F	'lush-Flo™ 0.207	2.0	
Mean Flow over H	lead Range -	1.7	
	-		
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	een based on the Hea Should another type n these storage rout	d/Discharge rel of control devi ing calculatior	ationship for the .ce other than a is will be
Depth (m) Flow (l/s) Depth (m) Flow	7 (l/s) Depth (m) Fl	ow (l/s) Depth	(m) Flow (l/s)
0.100 1.8 1.200	2.6 3.000	3.9 7.	.000 5.8
0.200 2.0 1.400	2.7 3.500	4.2 7.	500 6.0
0.300 2.0 1.600	2.9 4.000	4.5 8.	.500 6.4
0.500 1.7 2.000	3.2 5.000	5.0 9.	.000 6.6
0.600 1.9 2.200	3.4 5.500	5.2 9.	.500 6.8
0.800 2.1 2.400	3.5 6.000	5.4	
1.000 2.4 2.600	3.1 0.000	3.0	
©198	2-2018 Innovyze		

WSP Group Ltd						Page 1
•	Lawr	swood 1	Road			
	Cato	hment (2			A Contraction
	Deve	lopment	t Cree	qe		Mirco
Date 11/12/2019	Desi	aned by	V PS	1		
File Catchment C SECX	Chec	ked by				Drainage
VD Colutions				0010 1		
XP Solutions	Sour	ce con	trol 2	2018.1	-	
Cummary of Deculta	for 10		Dotu	rn Doi	$(\pm 10\%)$	
Summary of Results	101 10	<u>JU year</u>	Retu	<u>rn re</u> i	<u>100 (+40%)</u>	
Storm	Mav	Max	Max	Max	Status	
Event	Level	Depth Co	ontrol	Volume		
	(m)	(m)	(l/s)	(m³)		
15 min Summer	75.264	0.264	4.4	607.4	OK	
30 min Summer	75.341 75.421	0.341	4.4	195.9	OK OK	
120 min Summer	75 487	0.421	4.4	1162 4		
180 min Summer	75 521	0.521	4 4	1252 0		
240 min Summer	75.543	0.543	4 4	1308 7	O K	
360 min Summer	75.568	0.568	4 4	1374 5	O K	
480 min Summer	75.580	0.580	4.4	1407.8	O K	
600 min Summer	75.587	0.587	4.4	1426.5	O K	
720 min Summer	75.591	0.591	4.4	1436.8	O K	
960 min Summer	75.594	0.594	4.4	1443.5	о к	
1440 min Summer	75.589	0.589	4.4	1431.9	ОК	
2160 min Summer	75.575	0.575	4.4	1392.7	ОК	
2880 min Summer	75.558	0.558	4.4	1349.3	о к	
4320 min Summer	75.540	0.540	4.4	1302.6	ОК	
5760 min Summer	75.532	0.532	4.4	1279.3	о к	
7200 min Summer	75.528	0.528	4.4	1271.1	. ОК	
8640 min Summer	75.529	0.529	4.4	1272.2	ок	
10080 min Summer	75.532	0.532	4.4	1281.0	0 К	
15 min Winter	75.294	0.294	4.4	680.6	ОК	
30 min Winter	75.380	0.380	4.4	892.0	о к	
Storm	Rain	Flooded	Disch	arge T	ime-Peak	
Event	(mm/hr)	Volume	Volu	ıme	(mins)	
		(m³)	(m³	')		
	1.00 5 -	-			~ ~	
15 min Summer	106.060	0.0	3	/0.4	23	
30 min Summer	106.960	0.0	3	12.4	38	
60 min Summer	0/.060	0.0	/.	30.U	68 100	
120 min Summer	39.48U	0.0		12.1 02 6	1∠0 100	
180 min Summer	20.049	0.0	0	ッム・0 81 0	246	
240 mini Summer	16 007	0.0	6	66 6	240	
480 min Summer	12 471	0.0	6	56 5	486	
600 min Summer	10.252	0.0	6	48.1	606	
720 min Summer	8.727	0.0	6	40.4	726	
960 min Summer	6.761	0.0	6	26.5	964	
1440 min Summer	4.725	0.0	6	02.1	1442	
2160 min Summer	3.324	0.0	12	83.9	2160	
2880 min Summer	2.610	0.0	12	31.1	2624	
4320 min Summer	1.895	0.0	11:	29.2	3332	
5760 min Summer	1.536	0.0	21	50.3	4144	
7200 min Summer	1.322	0.0	22	74.1	4968	
8640 min Summer	1.182	0.0	22	92.2	5800	
10080 min Summer	1.083	0.0	21	82.8	6664	
15 min Winter	106.000	0.0	3	/4.1	23	
30 min Winter	100.900	0.0	3	00.9	38	
©1	982-20	18 Inno	ovyze			
	-					

WSP Group Ltd						Page 2
•	Lawr	nswood	Road			
	Cato	chment	С			and the second second
	Deve	elopmen	t Cree	ep		Micco
Date 11/12/2019	Desi	laned b	v PS	-		
File Catchment C.SRCX	Chec	cked by	AC			Drainage
XP Solutions	Sour	ce Con	trol 2	018 1		
Summarv of Results	for 10	00 vear	r Retur	n Per	iod (+40%)	
						-
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth C	ontrol	Volume		
	(m)	(m)	(1/s)	(m³)		
60 min Winter	75.468	0.468	4.4	1114.8	ОК	
120 min Winter	75.541	0.541	4.4	1304.1	ОК	
180 min Winter	75.579	0.579	4.4	1405.0	O K	
240 min Winter	75.603	0.603	4.4	1469.3	ΟK	
360 min Winter	75.631	0.631	4.4	1544.6	ΟK	
480 min Winter	75.646	0.646	4.4	1583.6	ОК	
600 min Winter	/5.654	0.654	4.4	1606.4	ОК	
/20 min Winter	15.659	0.659	4.4	1630 0	O K	
200 MILLI WINTER 1440 min Winter	75 661	0.003	4.4 4 4	1625 5	OK	
2160 min Winter	75.649	0.649	4.4	1593.8	0 K	
2880 min Winter	75.635	0.635	4.4	1554.4	0 K	
4320 min Winter	75.611	0.611	4.4	1488.8	O K	
5760 min Winter	75.598	0.598	4.4	1456.4	ОК	
7200 min Winter	75.591	0.591	4.4	1436.6	ОК	
8640 min Winter	75.587	0.587	4.4	1425.3	0 K	
10080 min Winter	75.585	0.585	4.4	1421.7	ОК	
Storm	Rain	Flooded	d Discha	arge Ti	ime-Peak	
Event	(mm/hr)	Volume	Volu	me	(mins)	
		(m³)	(m³)		
60 min Winter	67.060	0.0	D 72	25.9	68	
120 min Winter	39.480	0.0	0 69	91.8	126	
180 min Winter	28.549	0.0) 6'	78.8	184	
240 min Winter	22.540	0.0) 6 [°]	72.2	244	
360 min Winter	16.007	0.0) 6	65.1	362	
480 min Winter	12.471	0.0	0 60	60.7	480	
600 min Winter	10.252	0.0	J 65	5/.3	598	
/20 min Winter	8.727	0.0	J 65	04.5	/14	
900 Min Winter 1440 min Winter	0./01 4 725	0.0	יט ע רא ר	17.0 31 Q	940 1419	
2160 min Winter	3.324	0.0) 120	96.6	2084	
2880 min Winter	2.610	0.0) 12!	53.5	2740	
4320 min Winter	1.895	0.0) 11'	79.4	3504	
	1.536	0.0	238	85.9	4392	
5/60 min Winter	1.322	0.0	245	58.4	5336	
7200 min Winter 7200 min Winter		0 (23'	72.2	6312	
7200 min Winter 7200 min Winter 8640 min Winter	1.182	0.0				
7200 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.182 1.083	0.0	22	72.7	7256	
7200 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.182 1.083	0.0) 22'	72.7	7256	
7200 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.182 1.083	0.0) 22'	72.7	7256	
7200 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.182 1.083	0.0) 22'	72.7	7256	
7200 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.182 1.083	0.0) 22	72.7	7256	
7200 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.182	0.() 22'	72.7	7256	
7200 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.182	0.(0 22	72.7	7256	
5/60 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	1.182 1.083	1.8 Tnn) 22 ⁻	72.7	7256	

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment C	1
	Development Creep	Alleren
Date 11/12/2019	Designed by PS	
File Catchment C SRCX	Checked by AC	Drainage
VP Solutions	Source Control 2018 1	
	Source control 2018.1	
<u>Ra</u>	infall Details	
Rainfall Mode	21	FEH
Return Period (years	5)	100
FEH Rainfall Versio	on	2013
Site Locatio	on GB 386300 285500 SO 86300 8	5500
Summer Storn	ns	Yes
Winter Storm	ns	Yes
Cv (Summer	c) 0	.750
Cv (Winter Shortest Storm (mins	c) 0 s)	.84U 15
Longest Storm (mins	5) 1	0080
Climate Change	 €	+40
Tin	a Araz Dizaram	
	le Alea Diagialli	
Tota	al Area (ha) 2.000	
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
0	1 000 4 8 1 000	
0 4	4 8 1.000	
©198	32-2018 Innovyze	
	-	

WSP Group Ltd		Page 4
•	Lawnswood Road	
	Catchment C	Contraction of the
	Development Creep	Mirco
Date 11/12/2019	Designed by PS	
File Catchment C.SRCX	Checked by AC	Diamatje
XP Solutions	Source Control 2018.1	
<u> </u>	<u>odel Details</u>	
Storage is On	ine Cover Level (m) 76.000	
Tank	or Pond Structure	
Inver	t Level (m) 75.000	
Depth (m) Are	a (m²) Depth (m) Area (m²)	
0.000	2200.0 1.000 3020.0	
<u>Hydro-Brake®</u>	<u>Optimum Outflow Control</u>	
Unit	Reference MD-SHE-0104-4400-0700	-4400
Desig	Head (m)	0.700
Design	'low (l/s) 'lush-Flo™ Calcu	4.4 lated
	Objective Minimise upstream st	orage
A	plication Su	rface
Sump	Available	Yes
Invert	Level (m) 7	5.000
Minimum Outlet Pipe Dia	neter (mm)	150
Suggested Manhole Dia	eter (mm)	1200
Control Po	nts Head (m) Flow (l/s)	
Design Point (Ca	lculated) 0.700 4.4	
E	lush-Flo™ 0.214 4.4	
Mean Flow over H	ead Range - 3.8	
The hydrological calculations have b Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	en based on the Head/Discharge Should another type of control d these storage routing calculat	relationsnip for the evice other than a ions will be
Depth (m) Flow (l/s) Depth (m) Flow	(1/s) Depth (m) Flow (1/s) Dep	th (m) Flow (l/s)
0.100 3.5 1.200	5.6 3.000 8.7	7.000 13.0
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	/.500 13.4 8.000 13.8
0.400 4.1 1.800	6.8 4.500 10.5	8.500 14.3
0.500 3.8 2.000	7.2 5.000 11.1	9.000 14.7
0.600 4.1 2.200	7.5 5.500 11.6	9.500 15.1
1.000 5.2 2.600	8.1 6.500 12.1	
-1.02	2-2018 Innowyze	

WSP Group Ltd						Page 1
•	Lawn	swood	Road			
	Cato	hment	D			Contract of the
	Deve	lopmen	t Cree	≥p		Mirco
Date 11/12/2019	Desi	gned b	y PS			
File Catchment D.SRCX	Chec	ked by	AC			Diginacia
XP Solutions	Sour	ce Con	trol 2	2018.1		
Summary of Results	for 10)0 year	Retu	rn Per	iod (+40%)	
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth C	ontrol	Volume		
	(11)	(11)	(1/5)	(
15 min Summer 7	74.764	0.264	7.4	1020.7	O K	
30 min Summer	74.843	0.343	7.4	1337.5	ОК	
60 min Summer	/4.924	0.424	7.4	1671.1	ОК	
120 min Summer	75 020	0.493	7.4	1953.8	OK	
240 min Summer	,J.UZ9 75 051	0.529	7.4 7.4	2203.2	0 K	
240 min Summer	75 070	0.572	7.4 7.4	2201.1	0 K	
180 min Summor	75 091	0.570	7.4 7./	2313.1	0 K	
600 min Summor	,J.U9⊥ 75 ∩aa	0.591	7.4 7.1	22/0.4	0 K	
720 min Summer	75 103	0.533	7.4	2403.1	O K	
960 min Summer	75 106	0.003	7.4	2421.0	0 K	
1440 min Summer	75 103	0.000	7.7	2433.2	O K	
2160 min Summer	75 089	0.003	7.4	2360 0	0 K	
2880 min Summer	75 073	0.573	7.4	2293 0	0 K	
4320 min Summer "	75 057	0.575	7.4	2223.0	0 K	
5760 min Summer	75 049	0.549	7 4	2192 8	0 K	
7200 min Summer	75.047	0.547	7.4	2183.4	0 K	
8640 min Summer	75.048	0.548	7.4	2187.9	ОК	
10080 min Summer	75.052	0.552	7.4	2204.0	ОК	
15 min Winter	74.795	0.295	7.4	1143.7	ОК	
30 min Winter	74.882	0.382	7.4	1498.9	ОК	
Storm	Rain	Flooded	l Disch	arge Ti	ime-Peak	
Event (mm/hr)	Volume	Volu	ıme	(mins)	
		(m³)	(m³	')		
15	62 0.00	0 0		07 0	2.2	
15 min Summer 1 30 min Summer 1	06 060	0.0		07.0 28.7	23 20	
SU min Summer 1	67 060	0.0	10	20.4 3/ /	20	
120 min Summor	39 120	0.0	12	54.4 13 6	128	
180 min Summor	28 5/0	0.0	11	10.0 80 9	188	
240 min Summer	22 540	0.0	11	60.4	246	
360 min Summer	16.007	0.0	11	34.1	366	
480 min Summer	12.471	0.0	11	15.3	486	
600 min Summer	10.252	0.0	10	99.1	606	
720 min Summer	8.727	0.0	10	84.2	726	
960 min Summer	6.761	0.0	10	56.4	964	
1440 min Summer	4.725	0.0	10	06.0	1442	
2160 min Summer	3.324	0.0	21	57.0	2160	
2880 min Summer	2.610	0.0	20	61.1	2620	
4320 min Summer	1.895	0.0	18	77.2	3328	
5760 min Summer	1.536	0.0	35	74.8	4096	
7200 min Summer	1.322	0.0	37	73.5	4968	
8640 min Summer	1.182	0.0	38:	22.5	5792	
10080 min Summer	1.083	0.0	36	44.0	6656	
15 min Winter 1	62.960	0.0	6	29.2	23	
30 min Winter 1	06.960	0.0	6	24.1	38	
	982-20	18 Tnn/	OVVZA			
013	20		- <u>-</u>			

•							
		Lawr	nswood I	Road			
•		Cato	chment l	D			"Loop to the
		Deve	elopment	t Creep)		Mirco
Date 11/12/201	9	Desi	Igned by	y PS			
File Catchment	D.SRCX	Chec	cked by	AC			Digitig
XP Solutions		Sour	ce Cont	trol 20	18.1		
Sui	mmary of Results	for 10	00 year	Return	n Per	iod (+40 ⁹	<u> </u>
	-						
	Storm	Max	Max	Max	Max	Status	
	Event	Level	Depth Co	ontrol V	olume		
		(m)	(m)	(1/s)	(m³)		
	60 min Winter	74.973	0.473	7.4 1	873.4	ΟK	
	120 min Winter	75.049	0.549	7.4 2	191.9	0 K	
	180 min Winter	75.089	0.589	7.4 2	362.1	ОК	
	240 min Winter	75.115	0.615	7.4 2	470.6	0 K	
	360 min Winter	75.144	0.644	7.4 2	598.2	ОК	
	480 min Winter	/5.160	0.660	7.4 2	004.8	O K	
	ouu min Winter	/J.169	0.674	7.4 2	/U4.1 727 5	ΟK	
	960 min Winter	75 179	0.679	7 4 2	748 0	OK	
	1440 min Winter	75.178	0.678	7.4 2	742.5	O K	
	2160 min Winter	75.167	0.667	7.4 2	694.1	0 K	
	2880 min Winter	75.152	0.652	7.4 2	632.1	ОК	
	4320 min Winter	75.129	0.629	7.4 2	531.7	ОК	
	5760 min Winter	75.118	0.618	7.4 2	484.0	ОК	
	7200 min Winter	75.111	0.611	7.4 2	455.3	ΟK	
	7200 min Winter 8640 min Winter	75.111 75.107	0.611	7.4 2	455.3 439.0	ОК	
	7200 min Winter 8640 min Winter 10080 min Winter	75.111 75.107 75.106	0.611 0.607 0.606	7.4 2 7.4 2 7.4 2	455.3 439.0 434.3	O K O K	
	7200 min Winter 8640 min Winter 10080 min Winter	75.111 75.107 75.106	0.611 0.607 0.606	7.4 2 7.4 2 7.4 2	455.3 439.0 434.3	0 K 0 K 0 K	
	7200 min Winter 8640 min Winter 10080 min Winter	75.111 75.107 75.106	0.611 0.607 0.606	7.4 2 7.4 2 7.4 2	455.3 439.0 434.3	0 K 0 K 0 K	
	7200 min Winter 8640 min Winter 10080 min Winter Storm	75.111 75.107 75.106	0.611 0.607 0.606 Flooded	7.4 2 7.4 2 7.4 2 7.4 2	455.3 439.0 434.3	OK OK OK	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event	75.111 75.107 75.106 Rain (mm/hr)	0.611 0.607 0.606 Flooded Volume (m ³)	7.4 2 7.4 2 7.4 2 Dischar Volum (m ³)	455.3 439.0 434.3 cge Tin e (OK OK OK me-Peak (mins)	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event	75.111 75.107 75.106 Rain (mm/hr)	0.611 0.607 0.606 Flooded Volume (m ³)	7.4 2 7.4 2 7.4 2 7.4 2 Dischar Voluma (m ³)	455.3 439.0 434.3 cge Ti:	OK OK OK me-Peak (mins)	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060	0.611 0.607 0.606 Flooded Volume (m ³) 0.0	7.4 2 7.4 2 7.4 2 Dischar Volum (m ³) 1233	455.3 439.0 434.3 ege Tir e	0 K 0 K 0 K me-Peak (mins)	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0	7.4 2 7.4 2 7.4 2 9 Dischar (m ³) 1233 1180	455.3 439.0 434.3 cge Ti: e (3.1).6	0 K 0 K 0 K me-Peak (mins) 68 126	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0	7.4 2 7.4 2 7.4 2 7.4 2 Dischar Volum (m ³) 1233 1180 1157	455.3 439.0 434.3 cge Ti: e (3.1).6 7.8 5.8	0 K 0 K 0 K me-Peak (mins) 68 126 184 244	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0	7.4 2 7.4 2 7.4 2 7.4 2 Dischar Volum (m ³) 1233 1180 1157 1145	455.3 439.0 434.3 ege Ti: e (3.1 0.6 7.8 5.8 .7	0 K 0 K 0 K (mins) 68 126 184 244 362	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0	7.4 2 7.4 2 7.4 2 7.4 2 Dischar Volum (m ³) 1233 1180 1157 1145 1131 1121	455.3 439.0 434.3 cge Ti e 3.1 0.6 7.8 5.8 1.7 1.7	0 K 0 K 0 K (mins) 68 126 184 244 362 480	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	7.4 2 7.4 12 7.4 1	455.3 439.0 434.3 cge Ti e 3.1 0.6 7.8 5.8 1.7 1.7 3.0	0 K 0 K 0 K (mins) 68 126 184 244 362 480 598	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	7.4 2 7.4 2.	455.3 439.0 434.3 cge Ti : e 3.1 0.6 7.8 5.8 1.7 1.7 3.0 5.1	0 K 0 K 0 K (mins) 68 126 184 244 362 480 598 714	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	7.4 2 7.4 2.	455.3 439.0 434.3 cge Ti : e 3.1 0.6 7.8 5.8 1.7 1.7 3.0 5.1 0.8	0 K 0 K 0 K (mins) 68 126 184 244 362 480 598 714 948	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2 7.4 2.	455.3 439.0 434.3 ege Ti: e (3.1).6 7.8 5.8 1.7 1.7 3.0 5.1).8 1.4	0 K 0 K 0 K (mins) 68 126 184 244 362 480 598 714 948 1412	
	7200 min Winter 8640 min Winter 10080 min Winter Storm Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2 7.4 2.	455.3 439.0 434.3 cge Ti e (3.1).6 7.8 5.8 1.7 1.7 3.0 5.1).8 1.4 5.2	0 K 0 K 0 K me-Peak (mins) 68 126 184 244 362 480 598 714 948 1412 2080	
	7200 min Winter 8640 min Winter 10080 min Winter Event 60 min Winter 120 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2 7.4 2.	455.3 439.0 434.3 cge Ti e (3.1).6 7.8 5.8 1.7 1.7 3.0 5.1).8 1.4 5.2 5.6	68 126 184 244 362 480 598 714 948 1412 2080 2740	
	7200 min Winter 8640 min Winter 10080 min Winter Event 60 min Winter 120 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 480 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2 7.4 2	455.3 439.0 434.3 ee (3.1).6 7.8 5.8 1.7 1.7 3.0 5.1).8 1.4 5.2 5.6 1.8	0 K 0 K 0 K 0 K (mins) 68 126 184 244 362 480 598 714 948 1412 2080 2740 3464	
	7200 min Winter 8640 min Winter 10080 min Winter Event 60 min Winter 120 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 3200 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 6.202	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2 7.4 2	455.3 439.0 434.3 cge Ti e 3.1 0.6 7.8 5.8 1.7 1.7 8.0 5.1 0.8 1.4 5.2 5.2 5.6 1.8 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2	0 K 0 K 0 K 0 K (mins) 68 126 184 244 362 480 598 714 948 1412 2080 2740 3464 4384 5220	
	7200 min Winter 8640 min Winter 10080 min Winter 10080 min Winter Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 720 min Winter 1440 min Winter 2160 min Winter 280 min Winter 320 min Winter 320 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2 7.4 2	455.3 439.0 434.3 cge Ti e 3.1 0.6 7.8 5.8 1.7 1.7 3.0 5.1 0.8 1.4 5.2 5.6 1.8 5.6 1.8 5.6 3.2 0.7	0 K 0 K 0 K 0 K (mins) 68 126 184 244 362 480 598 714 948 1412 2080 2740 3464 4384 5336 6304	
	7200 min Winter 8640 min Winter 10080 min Winter 10080 min Winter Event 60 min Winter 120 min Winter 180 min Winter 240 min Winter 360 min Winter 360 min Winter 720 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 5760 min Winter 7200 min Winter 2000 min Winter	75.111 75.107 75.106 Rain (mm/hr) 67.060 39.480 28.549 22.540 16.007 12.471 10.252 8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	0.611 0.607 0.606 Flooded Volume (m ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	7.4 2 7.4 2	455.3 439.0 434.3 rge Ti e 3.1 0.6 7.8 5.8 1.7 1.7 3.0 5.1 0.8 1.4 5.6 4.8 5.6 4.8 5.6 3.2 9.7 9.5	0 K 0 K 0 K 0 K me-Peak (mins) 68 126 184 244 362 480 598 714 948 1412 2080 2740 3464 4384 5336 6304 7168	

WSP Group Ltd		Page 3
	Lawnswood Road	
	Catchment D	
•	Development Creen	
·	Designed by PS	MICrO
Date 11/12/2019	Charled by PS	Drainage
File Catchment D.SRCX	Checked by AC	
XP Solutions	Source Control 2018.1	
<u>Ra</u> _	infall Details	
Rainfall Mode	اد	HITT
Return Period (years	5)	100
FEH Rainfall Versio	n	2013
Site Locatio	on GB 386300 285500 SO 86300 8	85500
Summer Storn	ns Catci	Yes
Winter Storm	ns	Yes
Cv (Summer	c) (0.750
Cv (Winter	<u>^</u>) ((0.840
Shortest Storm (mins	5)	15
Climate Change	s)	+40
	-	
Tin	<u>me Area Diagram</u>	
Tota	al Area (ha) 3.360	
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)	
	1 (00) 4 0 1 (00)	
0 4	1.000 4 01.000	
©198	2-2018 Innovyze	

WSP Group Ltd		Page 4
•	Lawnswood Road	
	Catchment D	"Long all
	Development Creep	Micro
Date 11/12/2019	Designed by PS	Dcainago
File Catchment D.SRCX	Checked by AC	Diamaye
XP Solutions	Source Control 2018.1	I
<u>1</u>	Model Details	
Storage is Or	line Cover Level (m) 75.500	
<u>Tank</u>	or Pond Structure	
Inve.	rt Level (m) 74.500	
Depth (m) Arc	ea (m²) Depth (m) Area (m²)	
0.000	3760.0 1.000 4630.0	
<u>Hydro-Brake@</u>	Optimum Outflow Control	
Unit	Reference MD-SHE-0131-7400-0700-740	00
Desig	n Head (m) 0.70)0
Design	Flush-Flo™ Calculate	.4 ed
	Objective Minimise upstream storage	je
<i>P</i>	Surfac	ce
Sump	Available Ye	≥S 31
Invert	Level (m) 74.50	00
Minimum Outlet Pipe Dia	umeter (mm) 15	50
Suggested Manhole Dia	umeter (mm) 120)0
Control Po	ints Head (m) Flow (l/s)	
Design Point (Ca	alculated) 0.700 7.4	
1	Flush-Flo [™] 0.230 7.4	
Mean Flow over 1	Kick-Flo® 0.501 6.3 Head Range - 6.2	
The hydrological calculations have & Hydro-Brake® Optimum as specified. Hydro-Brake Optimum® be utilised the invalidated	peen based on the Head/Discharge rela Should another type of control devic en these storage routing calculations	ationship for the se other than a s will be
Depth (m) Flow (1/s) Depth (m) Flow	w (l/s) Depth (m) Flow (l/s) Depth ((m) Flow (1/s)
0.100 4 7 1 200	9.5 3.000 14.7 70)00 22 1
0.200 7.4 1.400	10.2 3.500 15.8 7.5	500 22.8
0.300 7.3 1.600	10.9 4.000 16.9 8.0	23.5
0.400 7.1 1.800	11.5 4.500 17.9 8.5	500 24 . 2
	12.1 5.000 18.8 9.0	JUU 24.9
0.800 7.9 2.400	13.2 6.000 20.5	23.0
1.000 8.7 2.600	13.7 6.500 21.3	
	. ,	
©198	32-2018 Innovyze	

WSP Group Ltd						Page 1			
•	. Lawnswood Road								
	Catc	hment H	-			All and a second			
	Deve	lopment		Misco					
Date 05/12/2019									
File Catebrant E SPCY	Choo	kod by				Drainage			
FILE Calchment E.SRCA		ked by	AC	10 1					
XP Solutions	Sour	ce Cont	trol 20.	18.1					
<u>Summary of Results</u>	for 10	<u>)0 year</u>	Return	Per	<u>lod (+40%)</u>				
					.				
Storm	Max	Max Domth C	Max	Max	Status				
Evenc	(m)	(m)	(1/e)	(m ³)					
	(111)	(111)	(1/3)	(
15 min Summer	103.273	0.273	3.0	413.0	O K				
30 min Summer	103.353	0.353	3.0	541.1	O K				
60 min Summer	103.434	0.434	3.0	676.0	O K				
120 min Summer	103.502	0.502	3.0	790.1	0 K				
180 min Summer	103.537	0.537	3.0	850.6	OK				
240 min Summer	103.559	0.559	3.0	888.7	ОК				
360 min Summer	103.584	0.584	3.0	932.8	ОК				
480 min Summer	103.596	0.596	3.0	954.8	OK				
600 min Summer	102 603	0.603	3.0	966.9	U K				
720 min Summer	103.607	0.607	3.0	9/3.2	OK				
960 min Summer	103.609	0.609	3.0	9/6.6	OK				
1440 min Summer	103.603	0.603	3.0	966.5	OK				
2160 min Summer	103.560	0.560	3.0	937.0	OK				
4320 min Summer	103.500	0.500	3.0	903.4 871 1	O K O K				
5760 min Summer	103.539	0.538	3.0	853 6	O K				
7200 min Summer	103.535	0.535	3.0	846 9	0 K				
8640 min Summer	103 535	0.535	3.0	847 0	0 K				
10080 min Summer	103.538	0.538	3.0	852.5	0 K				
15 min Winter	103.304	0.304	3.0	462.8	ОК				
30 min Winter	103.393	0.393	3.0	606.5	ОК				
Storm	Rain	Flooded	Dischar	ge Tin	ne-Peak				
Event	(mm/hr)	Volume	Volume	e (mins)				
		(m³)	(m³)						
15 min Common	162 060	0 0	0 E 4	з	22				
15 min Summer	106 060	0.0	254	.) ?	23				
50 min Summer	67 060	0.0	203		50 68				
120 min Summor	39 <u>1</u> 80	0.0	499 177	. ७ २	128				
120 min Summer	28 549	0.0	477		188				
240 min Summer	22.540	0.0	459	• / . 1	246				
360 min Summer	16.007	0.0	4.51	.2	366				
480 min Summer	12.471	0.0	445	.8	486				
600 min Summer	10.252	0.0	441	.3	606				
720 min Summer	8.727	0.0	437	.4	726				
960 min Summer	6.761	0.0	430	.3	964				
1440 min Summer	4.725	0.0	418	.9	1442				
2160 min Summer	3.324	0.0	879	.8	2160				
2880 min Summer	2.610	0.0	846	.0	2620				
4320 min Summer	1.895	0.0	780	.7	3332				
5760 min Summer	1.536	0.0	1473	.1	4104				
7200 min Summer	1.322	0.0	1562	.0	4968				
8640 min Summer	1.182	0.0	1572	.9	5800				
10080 min Summer	1.083	0.0	1497	.9	6656				
15 min Winter	162.960	0.0	255	.8	23				
30 min Winter	106.960	0.0	249	.9	38				
 	982-20	18 Tnnc	17770						
	JUZ-ZU	TO TIUIC	, vyze						

±						Page 2
•	Lawn	nswood 1	Road			
	Cato	chment 1	Ξ			and the second
	Deve	elopmen	t Cree	p		Mirco
Date 05/12/2019	Desi	aned b	V PS	1		
Filo Catchmont E SPCY	Choo	kod by				Drainag
THE Calchinent E.SRCA		Ked by	AC	010 1		
XP Solutions	Sour	ce Con	trol 2	018.1		
	c 1.			_		
Summary of Results	for 10	<u>JU year</u>	Retur	<u>n Per</u>	<u>10d (+40종)</u>	_
Storm	Marr	More	Mare	More	Status	
Event	Level	Depth C	ontrol	Volume	Status	
	(m)	(m)	(1/s)	(m ³)		
60 min Winter	103.483	0.483	3.0	758.0	ОК	
120 min Winter	103.557	0.557	3.0	886.3	OK	
180 min Winter	103.596	0.596	3.0	954.6	OK	
240 min Winter 260 min Winter	103.621	0.621	3.0	998.0	0 K	
180 min Winter	103.049	0.049	3.U 3 N	1071 6	OK	
600 min Winter	103.003	0.003	3.0 २∩	1089 6	0 K	
720 min Winter	103 676	0.676	3.U 3 N	1098 1	0 K	
960 min Winter	103.680	0.680	3.0	1104.6	0 K	
1440 min Winter	103.677	0.677	3.0	1099.0	0 K	
2160 min Winter	103.663	0.663	3.0	1074.8	ОК	
2880 min Winter	103.647	0.647	3.0	1045.7	ОК	
4320 min Winter	103.621	0.621	3.0	998.4	ОК	
5760 min Winter	103.607	0.607	3.0	974.3	O K	
7200 min Winter	103.599	0.599	3.0	959.4	0 K	
8640 min Winter	103.594	0.594	3.0	950.6	0 K	
Sharm	Doin	Floodod	Diacha	maa Tii	no-Dook	
Event	(mm/hr)	Volume	Volu	nge II ng (mine)	
20000	((m ³)	(m ³))		
CO min Minter	67 060	0 0	4.0		<u> </u>	
120 min Winter	39 480	0.0	40	5 6	126	
180 min Winter	28.549	0.0	45	8.7	184	
240 min Winter	22.540	0.0	45	5.7	244	
360 min Winter	16.007	0.0	45	3.6	362	
480 min Winter	12.471	0.0	45	3.0	480	
	10.252	0 0	4 5			
600 min Winter		0.0	45	3.0	598	
600 min Winter 720 min Winter	8.727	0.0	45 45	3.0	598 714	
600 min Winter 720 min Winter <mark>960 min Winter</mark>	8.727 6.761	0.0	45 45 45	3.0 53.0 50.9	598 714 948	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter	8.727 6.761 4.725	0.0	45 45 45 44	3.0 3.0 0.9 1.6	598 714 948 1412	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter	8.727 6.761 4.725 3.324	0.0	45 45 44 88	3.0 3.0 0.9 1.6 9.2	598 714 948 1412 2080	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter	8.727 6.761 4.725 3.324 2.610	0.000.000000000000000000000000000000000	45 45 45 44 88 86	53.0 53.0 50.9 51.6 59.2 52.2	598 714 948 1412 2080 2740	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter	8.727 6.761 4.725 3.324 2.610 1.895	0.0 0.0 0.0 0.0 0.0 0.0 0.0	45 45 44 88 86 81	3.0 3.0 0.9 1.6 9.2 52.2 9.4	598 714 948 1412 2080 2740 3464	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	45 45 44 88 86 81 163	53.0 53.0 50.9 51.6 59.2 52.2 9.4 56.9 50.3	598 714 948 1412 2080 2740 3464 4384 5336	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	45 45 44 88 86 81 163 169 163	53.0 53.0 50.9 51.6 59.2 52.2 9.4 56.9 50.3 51.6	598 714 948 1412 2080 2740 3464 4384 5336 6304	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.536 1.322 1.182 1.083		43 45 45 44 88 86 81 163 169 163 156	3.0 3.0 9.2 9.4 6.9 0.3 1.6 9.4 6.9 0.3 1.6	598 714 948 1412 2080 2740 3464 4384 5336 6304 7256	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	45 45 44 88 86 81 163 169 163 156	53.0 53.0 53.0 50.9 51.6 59.2 52.2 9.4 56.9 0.3 1.6 54.4	598 714 948 1412 2080 2740 3464 4384 5336 6304 7256	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	45 45 44 88 86 81 163 169 163 156	53.0 53.0 53.0 50.9 51.6 59.2 52.2 59.4 56.9 50.3 51.6 54.4	598 714 948 1412 2080 2740 3464 4384 5336 6304 7256	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	45 45 44 88 86 81 163 169 163 156	53.0 53.0 53.0 50.9 51.6 59.2 52.2 59.4 56.9 50.3 51.6 54.4	598 714 948 1412 2080 2740 3464 4384 5336 6304 7256	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083		45 45 44 88 86 81 163 169 163 156	53.0 53.0 53.0 50.9 51.6 59.2 52.2 59.4 56.9 50.3 51.6 54.4	598 714 948 1412 2080 2740 3464 4384 5336 6304 7256	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083		45 45 44 88 86 81 163 169 163 156	53.0 53.0 50.9 51.6 59.2 52.2 59.4 56.9 50.3 51.6 54.4	598 714 948 1412 2080 2740 3464 4384 5336 6304 7256	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083		45 45 44 88 86 81 163 169 163 156	53.0 53.0 53.0 50.9 51.6 59.2 52.2 9.4 56.9 50.3 51.6 54.4	598 714 948 1412 2080 2740 3464 4384 5336 6304 7256	
600 min Winter 720 min Winter 960 min Winter 1440 min Winter 2160 min Winter 2880 min Winter 4320 min Winter 5760 min Winter 7200 min Winter 8640 min Winter 10080 min Winter	8.727 6.761 4.725 3.324 2.610 1.895 1.536 1.322 1.182 1.083		45 45 44 88 86 81 163 169 163 156	53.0 53.0 53.0 50.9 1.6 59.2 52.2 59.4 56.9 50.3 1.6 54.4	598 714 948 1412 2080 2740 3464 4384 5336 6304 7256	

WSP Group Ltd		Page 3					
	Lawnswood Road						
	Catchment E	1					
	Development Creen	NE					
· Date 05/12/2019	Designed by PS	MICIO					
Filo Catchmont E SPCV	Checked by AC	Drainage					
VD Colutions	Checked by AC						
XP Solutions	Source Control 2018.1						
<u>Rainfall Details</u>							
Rainfall Mode	21	FEH					
Return Period (years	5)	100					
FEH Rainfall Versio	on	2013					
Site Locatio	on GB 386300 285500 SO 86300 8	5500					
Summer Storn		Yes					
Winter Storn	15	Yes					
Cv (Summer	c) 0	.750					
Cv (Winter	c) 0	.840					
Shortest Storm (mins	5)	15					
Longest Storm (mins	s) 1	+40					
	7	740					
Tin	<u>ne Area Diagram</u>						
Tota	al Area (ha) 1.360						
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)						
0 4	0 680 / 8 0 680						
©198	2-2018 Innovyze						

WSP Group Ltd		Page 4					
•							
	Catchment E						
	Development Creep	Micro					
Date 05/12/2019	Designed by PS	Dcainago					
File Catchment E.SRCX	Checked by AC	Drainacje					
XP Solutions	' 						
Storage is Or	Model Details ine Cover Level (m) 104.	000					
Tank	or Pond Structure						
Inve	t Level (m) 103.000						
Depth (m) Ar	ea (m²) Depth (m) Area (m	²)					
0.000	1440.0 1.000 2010	.0					
<u>Hydro-Brake@</u>	Optimum Outflow Cont	rol					
Uni Design Design Sum Di. Inver Minimum Outlet Pipe Di. Suggested Manhole Di. Control P Design Point (C Mean Flow over	Reference MD-SHE-0087-30 n Head (m) Flow (1/s) Flush-Flo™ Objective Minimise upst pplication Available meter (mm) Level (m) meter (mm) meter (mm) ints Head (m) Flow Alculated) 0.700 Clush-Flo™ 0.210 Kick-Flo® 0.465 Nead Range -	00-0700-3000 0.700 3.0 Calculated ream storage Surface Yes 87 103.000 100 1200 (1/s) 3.0 3.0 2.5 2.6					
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated							
Depth (m) Flow (1/s) Depth (m) Flo	n (l/s) Depth (m) Flow (l	/s) Depth (m) Flow (l/s)					
0.1002.61.2000.2003.01.4000.3002.91.6000.4002.81.8000.5002.62.0000.6002.82.2000.8003.22.4001.0003.52.600	3.8 3.000 4.1 3.500 4.4 4.000 4.6 4.500 4.9 5.000 5.1 5.500 5.3 6.000 5.5 6.500	5.9 7.000 8.8 5.3 7.500 9.1 6.7 8.000 9.4 7.1 8.500 9.7 7.5 9.000 9.9 7.8 9.500 10.2 8.2 8.5 10.2					
©19	2-2018 Innovyze						

WSP Group Ltd						Page 1
•						
		Sec. 1				
	Deve	elopmen	t Cree	p		Mirco
Date 11/12/2019	Desi	.gned b	y PS			
File Catchment F.SRCX	Chec	ked by	AC			Diamage
XP Solutions						
Summary of Results	for 10)0 year	Retur	n Per	iod (+40%)	
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth C	ontrol	Volume (m ³)		
	(m)	()	(1/3)	()		
15 min Summer	97.238	0.238	2.0	120.5	O K	
30 min Summer	97.304	0.304	2.0	157.5	ОК	
60 min Summer	97.371	0.3/1	2.0	195./	OK	
120 min Summer	97.422	0.422	2.0	226.4	OK	
180 min Summer	91.44/ 07 161	0.44/	2.0	241.J 250 1	0 K	
240 min Summer	シィ・401 Q7 /72	0.401	2.0	257 0	0 K	
All min Summer	97.4/3 97 /75	0.4/5	∠.U 2 ∩	258 0	0 K	
400 min Summor	97 472	0.472	2.0	257 2	0 K	
720 min Summer	97.472	0.472	2.0	253 9	O K	
960 min Summer	97 451	0.451	2.0	200.0	O K	
1440 min Summer	97 417	0.417	2.0	277.0	0 K	
2160 min Summer	97 380	0.380	2.0	201 2	O K	
2880 min Summer	97 351	0.300	2.0	184 1	O K	
4320 min Summer	97 307	0.307	2.0	159 2	0 K	
5760 min Summer	97 275	0.275	2.0	140 8	0 K	
7200 min Summer	97 250	0.250	2.0	126.9	0 K	
8640 min Summer	97.230	0.230	2.0	116.1	0 K	
10080 min Summer	97.214	0.214	2.0	107.6	0 K	
15 min Winter	97.264	0.264	2.0	135.1	0 K	
30 min Winter	97.338	0.338	2.0	176.7	ОК	
C harman	Dein	1 1				
Storm	Rain	Floodec	1 Discha	arge 11	me-Peak	
Event	(mm/hr)	Volume (m ³)	Volu (m³	me \	(mins)	
		((111	,		
15 min Summer	162.960	0.0) 11	12.0	23	
30 min Summer	106.960	0.0) 14	44.0	37	
60 min Summer	67.060	0.0) 19	95.9	68	
120 min Summer	39.480	0.0) 23	30.1	126	
180 min Summer	28.549	0.0) 24	48.8	186	
240 min Summer	22.540	0.0) 26	51.0	246	
360 min Summer	16.007	0.0) 2"	/5.9	364	
480 min Summer	12.471	0.0	28	34.4	484	
600 min Summer	10.252	0.0	28	39./	604	
720 min Summer	8.727	0.0	29	92.9	/22	
960 min Summer	6./61	0.0	29	95.U	960	
1440 min Summer	4./25	0.0	ע 28 זיר ר	59.J	1510 1510	
2160 min Summer	3.324	0.0	י ג זי ג	2.5 72 2	1004	
2000 IIIII Summer	2.01U	0.0	, 3 , 10	12.2 13 E	1904	
4320 min Summer	1 500 1 500	0.0) 40	0.CL	2000 3161	
7200 min Summer	1 300) 44) //	±±•U 7/ /	2404 1210	
8640 min Summor	1 1 Q O	0.0	, 4) 5(, 18 2	5008	
10080 min Summor	1 083	0.0		11 Q	5744	
15 min Winter	162 960	0.0) 11	25.0	2/11	
30 min Winter	106.960	0.0)]!	56.8	37	
					-	
©1	982-20	18 Inn	ovyze			

WSP Group Ltd							Page 2
•		Lawr	nswood	Road			
		Cato	chment	F			Sec.
		Deve	elopme	nt Cree	a		Misso
- Date 11/12/2019		Des	igned b	NV PS	- I-		
Date II/IZ/2015		Des.					Drainac
File Catchment F	.SRCX	Chec		Y AC			
XP Solutions		Soui	rce Cor	ntrol 2	2018.1		
_					_		
Summ	<u>ary of Results</u>	for 1	<u>00 yea</u>	<u>r Retur</u>	n Pei	riod (+40%)	<u>)</u>
	0 h a sum					Chatas	
	Storm	Max	Max Depth (Max	Max	Status	
	lvenc	(m)	(m)	(1/s)	(m ³)	•	
				() =)	. ,		
	60 min Winter	97.411	0.411	2.0	219.8	ОК	
	120 min Winter	97.468	0.468	2.0	254.9	ОК	
	180 min Winter	97.496	0.496	2.0	272.3	ОК	
	240 min Winter	97.512	0.512	2.0	282.3	OK	
	360 min Winter	97.527	0.527	2.0	291.7	U K	
	400 min Winter	91.030	0.530	2.U	293.5		
	720 min Winter	91.529 97 501	0.529	2.0	292.9	O K	
	960 min Winter	97 511	0.524	∠.∪ 2 ∩	290.1 281 C		
	1440 min Winter	97.311	0.311	2.0	261 3		
	2160 min Winter	97 430	0.430	2.0	231 2		
	2880 min Winter	97.389	0.389	2.0	206.3	O K	
	4320 min Winter	97.322	0.322	2.0	167.5	O K	
	5760 min Winter	97.269	0.269	2.0	137.7	ОК	
	7200 min Winter	97.228	0.228	2.0	115.0	ОК	
	8640 min Winter	97.195	0.195	2.0	97.7	ОК	
	10080 min Winter	97.170	0.170	2.0	84.5	ОК	
	Storm	Rain	Floode	d Discha	arge T	ime-Peak	
	Event	(mm/hr)	Volume	e Volu	me	(mins)	
			(m³)	(m ³)		
	60 min Winter	67.060	0.	0 23	19.2	66	
	120 min Winter	39.480	0.	0 25	56.5	124	
	180 min Winter	28.549	Ο.	0 2	76.2	184	
	240 min Winter	22.540	0.	0 28	88.4	242	
	360 min Winter	16.007	0.	0 30	01.2	358	
	480 min Winter	12.471	0.	0 30	05.6	476	
	600 min Winter	10.252	0.	0 30	05.8	590	
	/20 min Winter	8.727	0.	U 30	U3./	/06	
	960 min Winter	6./61	0.	0 25	91.9 91 7	930 1256	
	2160 min Winter	4.125	0.	0 20	94./ 98./	166/	
	2880 min Winter	2 610	0.	0 1	16.7	2084	
	4320 min Winter	1.895	0	0 4	51.5	2940	
	5760 min Winter	1.536	0.	0 4	94.1	3744	
	7200 min Winter	1.322	0.	0 53	31.6	4472	
	8640 min Winter	1.182	0.	0 50	69.5	5192	
	10080 min Winter	1.083	0.	0 60	07.7	5944	
		000 00	10 -				
	©]	. 982-20	ıı¤ lnr	iovyze			

WSP Group Ltd		Page 3					
	Lawnswood Boad						
	Catchment F						
•	Development Green						
·	Development creep	Micro					
Date 11/12/2019	Charled by PS	Drainage					
File Catchment F.SRCX	Checked by AC						
XP Solutions	Source Control 2018.1						
Rainfall Details							
Rainfall Mode	اخ	FEH					
Return Period (years	5)	100					
FEH Rainfall Versio	n	2013					
Site Locatio	on GB 386300 285500 SO 86300	85500					
Data Tyr	De Catc	hment					
Winter Storn	ns	Yes					
Cv (Summer	<u>^</u>)	0.750					
Cv (Winter	c)	0.840					
Shortest Storm (mins	5)	15					
Longest Storm (mins	5)	10080					
Climate Change	50	+40					
Tin	ne Area Diagram						
Tota	al Area (ha) 0.400						
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)						
0 4	0 200 4 8 0 200						
<u>ଜ</u> ୀ ସନ	2-2018 Innovyze						

WSP Group Ltd				Page 4				
•	Lawnswood Roa	d						
	Catchment F		"Course of					
	Development C	reep		Mirro				
Date 11/12/2019	Designed by F	S		Dcainago				
File Catchment F.SRCX	Checked by AC			Diamaye				
XP Solutions								
<u> </u>	<u>Model Details</u>							
Storage is Online Cover Level (m) 98.000								
Tank	or Pond Struct	ure						
Inver	ct Level (m) 97.0	000						
Depth (m) Are	ea (m²) Depth (m)	Area (m²)						
0.000	470.0 1.000	820.0						
<u>Hydro-Brake®</u>	Optimum Outfl	<u>ow Control</u>						
Unit	Reference MD-SH	E-0071-2000-	0700-2000					
Desig	n Head (m)		0.700					
Design	Flush-Flo™	C	2.0 alculated					
	Objective Mini	mise upstrea	m storage					
A	pplication		Surface					
Sump	Available		Yes					
Invert	Level (m)		97.000					
Minimum Outlet Pipe Dia	meter (mm)		100					
Suggested Manhole Dia	meter (mm)		1200					
Control Po	ints Head	(m) Flow (l/s	;)					
Design Point (Ca	alculated) 0.7	2.	0					
E	Flush-Flo™ 0.2	207 2.	0					
Mean Flow over H	KICK-FLO® U.4 Jead Range	- 1.	6 7					
	ioda ilango							
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated								
Depth (m) Flow (1/s) Depth (m) Flow	v (l/s) Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)				
0.100 1.8 1.200	2.6 3.000	3.9	7.000	5.8				
0.200 2.0 1.400	2.7 3.500	4.2	7.500	6.0				
0.300 2.0 1.600	2.9 4.000) 4.5	8.000	6.4				
0.500 1.7 2.000	3.2 5.000	5.0	9.000	6.6				
0.600 1.9 2.200	3.4 5.500	5.2	9.500	6.8				
0.800 2.1 2.400	3.5 6.000	5.4						
1.000 2.4 2.600	3./ 6.500	5.6						
©1982-2018 Innovyze								

WSP Group Ltd						Page 1
•						
		Sec.				
		Mirco				
Date 11/12/2019		Desipado				
File Catchment G.SRCX	Chec	ked by	AC			Diamage
XP Solutions						
Summary of Results	for 10)0 year	Retu	rn Per	iod (+40%)	
Storm	Max	Max	Max	Max	Status	
Event	(m)	Depth C	ontrol (1/s)	(m ³)		
	(,	(/	(_, _,	()		
15 min Summer	74.275	0.275	9.7	1324.5	O K	
30 min Summer	74.358	0.358	9.7	1735.6	OK	
120 min Summer	74.444	0.444	9.7	2100.J 2535 7	OK	
180 min Summer	74 553	0.513	97	2731 9	0 K	
240 min Summer	74.577	0.577	9.7	2856.1	O K	
360 min Summer	74.605	0.605	9.7	3001.1	O K	
480 min Summer	74.619	0.619	9.7	3075.0	ОК	
600 min Summer '	74.627	0.627	9.7	3117.1	ΟK	
720 min Summer 7	74.632	0.632	9.7	3140.8	ОК	
960 min Summer '	74.635	0.635	9.7	3157.6	O K	
1440 min Summer '	74.631	0.631	9.7	3136.5	O K	
2160 min Summer '	74.616	0.616	9.7	3056.0	0 K	
2880 min Summer	74.599	0.599	9.7	2971.4	ОК	
4320 min Summer	74.583	0.583	9.7	2888.0	OK	
5/60 min Summer	74.576	0.576	9.7	2849.4	OK	
8640 min Summer	74.574	0.575	9.7	2843 9	0 K	
10080 min Summer	74.579	0.579	9.7	2863.8	0 K	
15 min Winter	74.307	0.307	9.7	1484.1	ОК	
30 min Winter '	74.399	0.399	9.7	1945.0	O K	
Storm	Rain	Flooded	l Disch	arge Ti	.me-Peak	
Event ((mm/hr)	Volume	Volu	ime	(mins)	
		(m³)	(m ³	•)		
15 min Common 1	62 060	0.0) 7	03 0	22	
30 min Summer 1	06.960	0.0	, /·) ጸ [.]	22.2	23 38	
60 min Summer	67.060	0.0) 16	05.0	68	
120 min Summer	39.480	0.0) 15	85.6	128	
180 min Summer	28.549	0.0) 15	47.6	188	
240 min Summer	22.540	0.0) 15	23.7	246	
360 min Summer	16.007	0.0	14	92.5	366	
480 min Summer	12.471	0.0) 14	69.3	486	
600 min Summer	10.252	0.0) 14	48.9	606	
720 min Summer	8.727	0.0) 14:	29.7	726	
960 min Summer	0./61 / 705	0.0	J 1.3	93.5 27 0	964 1772	
2160 min Summer	4.120 3 324	0.0	, ⊥3.) 28'	∠/•∪ 33.5	1442 2160	
2880 min Summer	2.610	0.0) 20	05.9	2516	
4320 min Summer	1.895	0.0) 24	60.7	3284	
5760 min Summer	1.536	0.0	46	28.0	4088	
7200 min Summer	1.322	0.0	48	89.6	4904	
8640 min Summer	1.182	0.0	49	84.0	5792	
10080 min Summer	1.083	0.0	47	66.9	6648	
15 min Winter 1	62.960	0.0) 8	19.1	23	
30 min Winter 1	106.960	0.0	J 8	11.2	38	
©1 °	982-20	18 Inn	ovvze			
			7 = -			

WER Group LEG						Page 2
•	La	wnswo	od Roa	ıd		
	Marca II					
	Mirco					
Date 11/12/2019	De	signe	d by F	- S		
File Catchment G.SRCX	Ch	ecked	bv AC	-		Urainage
XP Solutions	50	urce	Contro	1 2018	1	
		aree	0011010	. 2010.	•	
Summary of Result	s for	100 v	vear Re	eturn Pe	eriod (+40%))
<u></u>						
Storm	Max	Max	Max	Max	Status	
Event	Level	Depth	Contro	l Volume		
	(m)	(m)	(1/s)	(m³)		
60 min Winter	74.495	0.495	9.	7 2431.1	O K	
120 min Winter	74.575	0.575	9.	7 2844.2	O K	
180 min Winter	74.617	0.617	9.	7 3064.7	ОК	
240 min Winter 360 min Winter	74.644	0.644	9.	/ 3205.3 7 3370 /	O K O K	
480 min Winter	74.692	0.692	9. 9.	7 3456.3	0 K	
600 min Winter	74.701	0.701	9.	7 3506.7	Flood Risk	
720 min Winter	74.707	0.707	9.	7 3536.6	Flood Risk	
960 min Winter	74.712	0.712	9.	8 3562.3	Flood Risk	
1440 min Winter 2160 min Winter	74.710	0.710	9.	5 3553.2 7 3487 9	Flood Risk O K	
2880 min Winter	74.682	0.682	9.	7 3405.1	ОК	
4320 min Winter	74.658	0.658	9.	7 3279.8	O K	
5760 min Winter	74.647	0.647	9.	7 3218.6	O K	
7200 min Winter	74.639	0.639	9.	7 3180.7	ОК	
10080 min Winter	74.635	0.633	9.	7 3158.8	ОК	
Other and	Dair			h	Mima Daah	
Storm	Rair (mm/h	n Flo r) Vol	oded Di	.scharge	Time-Peak (mins)	
Storm Event	Rair (mm/h	n Flo r) Vol (n	oded Di Lume 7 n³)	.scharge Volume (m³)	Time-Peak (mins)	
Storm Event	Rair (mm/h	n Flo r) Vol (n	oded Di Lume 7 n ³)	.scharge Volume (m ³)	Time-Peak (mins)	
Storm Event 60 min Winte 120 min Winte	Rair (mm/h r 67.0	n Flo r) Voj (n 60	oded Di Lume (n ³)	.scharge Volume (m ³) 1611.9 1550.3	Time-Peak (mins) 68 126	
Storm Event 60 min Winte 120 min Winte 180 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5	n Flo r) Vol (n 60 80 49	oded Di Lume 7 n ³) 0.0 0.0 0.0	.scharge Volume (m ³) 1611.9 1550.3 1525.7	Time-Peak (mins) 68 126 184	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5	n Flo r) Vol (n 60 80 49 40	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8	Time-Peak (mins) 68 126 184 244	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0	Flo F) Vol (n 60 80 49 40 07 	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7	Time-Peak (mins) 68 126 184 244 362	
Storm Event 60 min Winte 120 min Winte 180 min Winte 360 min Winte 480 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4	n Flo r) Voj (n 60 80 49 40 07 71 52	oded Di Lume (n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475 0	Time-Peak (mins) 68 126 184 244 362 480 500	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 600 min Winte 720 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7	r) Flo r) Vol (n 60 80 49 40 07 71 52 27	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1	Time-Peak (mins) 68 126 184 244 362 480 596 714	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 6.7	r) Flo r) Vol (n 60 80 49 40 07 71 52 27 61	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9	Time-Peak (mins) 68 126 184 244 362 480 596 714 948	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 6.7 r 4.7	Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 6.7 r 4.7 r 3.3	a Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1465.1 2882.0	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 2880 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 6.7 r 4.7 r 3.3 r 2.6 r 1.0	Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24 10 95	oded Di Lume (n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587 0	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 2424	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 960 min Winte 1440 min Winte 280 min Winte 4320 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 6.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5	Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24 10 95 36	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376	
Storm Event 60 min Winte 120 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 2880 min Winte 4320 min Winte 5760 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 4.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3	a Flo (r) Vol (r) 60 80 49 40 07 71 52 27 61 25 24 10 95 36 22	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 480 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 4.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.1	Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24 10 95 36 22 82	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 2160 min Winte 2800 min Winte 2800 min Winte 5760 min Winte 7200 min Winte 8640 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 6.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.1 r 1.0	n Flo r) Vol (m 60 80 40 07 52 27 61 25 24 10 95 36 22 82 83	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3 4987.7	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232 7160	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 1440 min Winte 2160 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 6.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.1 r 1.0	a Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24 10 95 36 22 82 83	ocded Di Lume 0.0 n³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3 4987.7	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232 7160	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 480 min Winte 720 min Winte 720 min Winte 1440 min Winte 2160 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.0	Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24 10 95 36 22 83	oded Di Lume n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3 4987.7	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232 7160	
Storm Event 60 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 480 min Winte 720 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 2880 min Winte 4320 min Winte 5760 min Winte 7200 min Winte 8640 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.0	a Flo (r) Vol (r) 60 80 49 40 07 71 52 27 61 25 24 10 95 36 22 82 83	oded Di Lume (n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3 4987.7	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232 7160	
Storm Event 60 min Winte 120 min Winte 120 min Winte 180 min Winte 240 min Winte 360 min Winte 480 min Winte 480 min Winte 720 min Winte 720 min Winte 960 min Winte 2160 min Winte 2880 min Winte 2880 min Winte 5760 min Winte 5760 min Winte 8640 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.1 r 1.0	n Flo r) Vol (m 60 80 40 07 52 27 61 25 24 10 95 36 22 83	oded Di Lume 7 n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3 4987.7	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232 7160	
Storm Event 60 min Winte 120 min Winte 120 min Winte 120 min Winte 120 min Winte 240 min Winte 360 min Winte 480 min Winte 720 min Winte 960 min Winte 2160 min Winte 2880 min Winte 2880 min Winte 5760 min Winte 5760 min Winte 10080 min Winte	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 6.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.1 r 1.0	r Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24 10 95 36 22 83 83	oded Di Lume (n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3 4987.7	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232 7160	
Storm Event	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 4.7 r 4.7 r 1.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.1 r 1.0	Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24 10 95 36 22 83	oded Di Lume (n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3 4987.7	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232 7160	
Storm Event	Rair (mm/h r 67.0 r 39.4 r 28.5 r 22.5 r 16.0 r 12.4 r 10.2 r 8.7 r 4.7 r 3.3 r 2.6 r 1.8 r 1.5 r 1.3 r 1.0	Flo r) Vol (n 60 80 49 40 07 71 52 27 61 25 24 10 95 36 22 83	oded Di Lume n ³) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Scharge Volume (m ³) 1611.9 1550.3 1525.7 1512.8 1497.7 1486.3 1475.9 1466.1 1447.9 1405.9 2882.0 2775.5 2587.0 5140.8 5341.5 5211.3 4987.7	Time-Peak (mins) 68 126 184 244 362 480 596 714 948 1412 2080 2736 3424 4376 5328 6232 7160	

WSP Group Ltd		Page 3					
	Lawnswood Boad						
	Catchment G						
	Development Creen	A CONTRACTOR OF THE OWNER					
·	Decigned by PS	Micro					
Date 11/12/2019	Charled by PS	Drainage					
File Catchment G.SRCX	Checked by AC						
XP Solutions	Source Control 2018.1						
Rainfall Details							
Rainfall Mode		FEH					
Return Period (years	5)	100					
FEH Rainfall Versio	n	2013					
Site Locatio	on GB 386300 285500 SO 86300	85500					
Data Typ Summer Storn	De Catc	Yes					
Winter Storn	ns	Yes					
Cv (Summer	c)	0.750					
Cv (Winter	c)	0.840					
Shortest Storm (mins	5)	15					
Longest Storm (mins	5) 2	10080 +40					
	70	740					
Tin	ne Area Diagram						
Tota	al Area (ha) 4.360						
Time (mins) From: To:	Area Time (mins) Area (ha) From: To: (ha)						
0 4	2.180 4 8 2.180						
©198	32-2018 Innovyze						
	-						

WSP Group Ltd		Page 4						
•								
	Catchment G							
	Development Creep	Mirco						
Date 11/12/2019	Designed by PS							
File Catchment G.SRCX	Checked by AC	Diamaye						
XP Solutions								
<u> </u>	<u>odel Details</u>							
Storage is Online Cover Level (m) 75.000								
Tank	or Pond Structure							
Inver	t Level (m) 74.000							
Depth (m) Are	a (m²) Depth (m) Area (m²)							
0.000	4700.0 1.000 5580.0							
<u>Hydro-Brake®</u>	Optimum Outflow Control							
Unit	Reference MD-SHE-0148-9700-070)0-9700						
Desig	Head (m)	0.700						
Design	r⊥ow (⊥/s) rlush-Flo™ Calo	9./						
	Objective Minimise upstream s	storage						
A	oplication S	Surface						
Sump	Available	Yes 149						
Invert	Level (m)	74.000						
Minimum Outlet Pipe Dia	neter (mm)	225						
Suggested Manhole Dia	neter (mm)	1200						
Control Po.	nts Head (m) Flow (l/s)							
Design Point (Ca	lculated) 0.700 9.7							
E	lush-Flo™ 0.245 9.7							
Mean Flow over H	ead Range - 8.1							
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated								
Depth (m) Flow (l/s) Depth (m) Flow	(l/s) Depth (m) Flow (l/s) De	pth (m) Flow (l/s)						
0.100 5.3 1.200	12.5 3.000 19.3	7.000 29.1						
0.200 9.6 1.400	13.4 3.500 20.8	7.500 29.9						
	14.3 4.000 22.2 15.2 4.500 23.5	8.000 30.9 8.500 31.9						
0.500 8.6 2.000	15.9 5.000 24.7	9.000 32.8						
0.600 9.0 2.200	16.7 5.500 25.9	9.500 33.7						
0.800 10.3 2.400	17.4 6.000 27.0							
1.000 11.5 2.600	18.1 6.500 28.0							
©198	2-2018 Innovyze							

Appendix C

CORRESPONDENCE

Secker, Phoebe

From:	Enquiries_Westmids < Enquiries_Westmids@environment-agency.gov.uk >
Sent:	28 November 2019 09:03
То:	Secker, Phoebe
Subject:	Ref 152410 Product 4 Request - Lawnswood Road
Attachments:	152410 Map.pdf

Dear Phoebe

Enquiry regarding Flood Map for Planning (Rivers and Sea) Information for Lawnswood Road

Thank you for your enquiry which was received on 25 November.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

The information on Flood Zones in the area relating to this address is as follows:

The property is in an area located within Flood Zone 1 shown on our Flood Map for Planning (Rivers and Sea).

Note - This information relates to the area that the above named property is in and is not specific to the property itself as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.

Flood Zone definitions can be found at <u>www.gov.uk/guidance/flood-risk-and-coastal-</u> <u>change#Table-1-Flood-Zones</u>

Please find attached a copy of the Flood Map for Planning (Rivers and Sea) for the area relating to your address.

More information can be found on the website at: <u>https://flood-map-for-planning.service.gov.uk/</u> You can draw your development extent and the service then provides details on what level of Flood Risk Assessment you would require and the reasons why.

Name	Product 1
Description	Flood Map for Planning (Rivers and Sea) for planning SO8776986914
Licence	Open Government Licence
Information Warning - OS background mapping	The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub- license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.

Abstract

Attribution	Contains Environment Agency information © Environment Agency and/or
	database rights.
	Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey
	100024198.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning (<u>Flood Zone 2</u>, <u>Flood Zone 3</u>, <u>Flood Storage Areas</u>, <u>Flood Defences</u>, <u>Areas Benefiting</u> <u>from Defences</u>)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- <u>Current Flood Warnings</u>

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments.

https://www.gov.uk/planning-applications-assessing-flood-risk https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

Carolyn Fowler Customers & Engagement Officer West Midlands Area

For further information please contact the Customers & Engagement team on Tel: 02084 747856 Direct e-mail:- enquiries_WestMids@environment-agency.gov.uk

From: Secker, Phoebe [mailto:Phoebe.Secker@wsp.com] Sent: 25 November 2019 08:15 To: Enquiries, Unit <<u>enquiries@environment-agency.gov.uk</u>> Subject: Product 4 Request - Lawnswood Road

Hello,

We would like the Product 4 information for a site at Lawnswood Road, an approximate postcode is DY7 5AW (site co-ordinates 387309, 287480).

Please find the following site location plan for reference.



Kind regards, Phoebe Phoebe Secker BSc (Hons) MCIWEM Assistant Engineer

wsp

T +44 (0) 121 352 4926 F +44 (0) 121 352 4701

WSP, The Mailbox Level 2 100 Wharfside Street Birmingham B1 1RT

wsp.com

Confidential

This message, including any document or file attached, is intended only for the addressee and may contain privileged and/or confidential information. Any other person is strictly prohibited from reading, using, disclosing or copying this message. If you have received this message in error, please notify the sender and delete the message. Thank you.

WSP UK Limited, a limited company registered in England & Wales with registered number 01383511. Registered office: WSP House, 70 Chancery Lane, London, WC2A 1AF.

NOTICE: This communication and any attachments ("this message") may contain information which is privileged, confidential, proprietary or otherwise subject to restricted disclosure under applicable law. This message is for the sole use of the intended recipient(s). Any unauthorized use, disclosure, viewing, copying, alteration, dissemination or distribution of, or reliance on, this message is strictly prohibited. If you have received this message in error, or you are not an authorized or intended recipient, please notify the sender immediately by replying to this message, delete this message and all copies from your email system and destroy any printed copies.

-LAEmHhHzdJzBITWfa4Hqs7pbKI

Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act

Flood Map for Planning(Rivers & Sea)centred on SO8776986914created-281119







database right 2015. Land & Property Services © Crown copyright and database right. This document is the property of Jeremy Benn Associates Ltd. It shall not be reproduced in whole or in part, not disclosed to a third party, without the permission of Jeremy Benn Associates Ltd.



Public Fool Cravity Lawsal Orain	++++	Highuay Orain	¥	Harhole Fox	
Public Combined GravityLateral Disar	+++	Overflow Fipe		Hannole Surface (C
Public Surface Water Gravity Cateral Drain	*-*-	Disposal Pipe	+-+-	Abandoned Pipe	
Pressure Foul	S	Calverted Water Course		Sachen Hill Annung mit	destinger
Pressure Combined	<u> </u>	Pumping Station		Private servers are sho	កត់កម្មនង
Pressure Surface Hater	4	Fitting			

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on: 0800 783 4444 (24 hours)

- b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.
- d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.
- e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations). f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts). 3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated. 4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented. 5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings. 7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus. 8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side for larger sized pipes and 6 metres either side for larger sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus. 9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected. 10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you. 11. It may be necessary to adjust the finished level of any surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works. 12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus. 15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below. 16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

a) These general conditions and precautions. Such apparatus is referred to as ets described at conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW apparatus" in these general conditions and precautions.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose. Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.



Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
	C F		0 0	0 0
	F F		0 0	0 0
	F		0	0
	F F		0	0
	F F		0 0	0 0
	F		0	0
	F		0	0
	F F		0 0	0 0
0002	F F	112.5	0 110.15	0 2.34999999999
0003	F	109.3199	106.73	9999 2.5899
0004	F	104	102.85	1.1500000000 0001
0008	F	103.9	100.53	3.37
0104	F	103.36	101.22	2.14
0400 0401	F		0	0
0701	F	117.4199	115.9	1.5198999999 9999
0702 0801	F F	118.66	0 117.31	0 1.34999999999
0802	F		0	9999 0
0803	F	116.65	114.33	2.3200000000 0001
0804 0805	F F		0 0	0 0
0901 0905	F	113.4499 112.3099	111.42 108.95	2.0299 3.3599
0907	F	110.41	106.75	3.66
1001	E	101.4	08.82	9999 2 5800000000
1003	E	08 7700	90.02	0001 1 76989999999
1104	F	97.9	95.17	9999 2.73
1106	F	101.9499	100.13	1.8199
1200	F	105.8	0 104.38	1.42
1207 1208	F	102.8499 104.7239	100.48 103.53	2.3699 1.1939
1301 1303	F	111.2399 110.8799	108.78 109.71	2.4599 1.1699000000
1304	F	108.6699	107.21	0001 1.4599
1403	F	111.5199	110.46	1.0599000000 0001
1701 1703	F	112.4899 107 48	110.26 106.17	2.2299 1.31
1901	F	107.98	105.75	2.23
1902	F	105.01	104.23 102.72	2.02 2.2900000000 0001
1904	F	100.5	97.29	3.20999999999 9999
1905	F	103.3499	100.38	2.9699000000 0001
1906	F	97.47	94.02	3.45
2001	F	94.7099 93.76	91.95 91.23	2.7599 2.53
2006 2008	F F	91.3499 91.2799	89.23 88.32	2.1199 2.9599
2101 2102	F F	96.0699 95.2799	93.7 92.66	2.3699 2.6199
2103	F	99.47 100.37	97.44 98.56	2.03
2105	F	99.4899	97.68	1.8099
2106	F	97.93	95.99	1.9400000000 0001
2201	F	97.94 100.87	98.95	1.92
2204 2205	F F	99.41 99.3899	97.78 97.43	1.63 1.9598999999
2206	F	100.37	97.99	9999 2.3800000000
2208	F	103.68	102.19	0001 1.4900000000
2304	F	102.3799	101.62	0.7599000000
2306	F	100.19	98.06	2.13
2308 2402	F	99.44 104.4199	97.74 102.35	1.7 2.0699
2403 2504	F F	101.36 105.9499	98.83 104.31	2.53 1.6399
2602	F	106.9199	104.51	2.4098999999 9999
2605	F	105.3499	103.33	2.0199000000 0001
2702	F	108.7399	105.49	3.2499000000 0001
2802 2803	F F	97.55 92.5599	95.25 88.66	2.3 3.8999
2901	F	94.23	91.35	2.880000000 0001
2903 2904	F F	91.7799 91.43	90.11 89.84	1.6699 1.59
2909	F	91.9599	89.57	2.3899000000 0001
2963	F	92.4	90.74	1.660000000 0001
2964 2965	F	92.0999 92.0999	90.34 90.505	1.7599 1.5949000000
3000	F		0	0001
3001 3002	F	94.05	90.83 0	3.22 0
3003	F	89.9	87.44	2.4600000000 0001
3101 3104	F	97.5899	95.78 0	1.8099
3105	F		0	0
3108 3202	F	95.8499	υ 93.55	U 2.2999000000
3204	F	94.1999	91.47	2.7299
3206	F	93.19	90.43	2.7599999999 9999
S∠U9 3302	F	v∠.41	03.31 93 56	3.039999 9999 1.9699
3303 2422	F	99.9299 94.3899	93.00 91.58	2.8099
3403 3404	F	97.8099	95.19	∠.8199 2.6199
3501 3503	F F	98.4599	0 95.96	0 2.4999000000
3700	F		0	0001 0
3701	F	95.0699	94.2	0.8699000000 00001
3704 3705	F F	97.15 95.8199	93.76 93.21	3.39 2.6099000000
3707	F	94.8199	92.64	0001 2.1799
3801 3803	F	90.41 91.6299	86.5 89.25	3.91 2.3799000000
3902	F	88.69	86.22	0001 2.47
4101 4103	F	88.8 87.43	87.39 85.66	1.41
4202	F	89.9499	87.87	0001 2.0799
4205	F	90.5999	87.62 86.22	2.9799
4301	F	94 18	91 78	2.4000000000
4302	F	92.8799	90.54	2.3399
4304	F	93.18	90.89	2.2900000000 0001
4305	F	91.8099	89.57	2.2399000000 0001

Ianhole Reference	E Liquid Type	Cover Level	Invert Level	Depth to Invert	Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Inver
	C		0	0	5201	F	89.8499	87.4	2.4499
	F		0	0	5204	F	89.2799	86.05	3.2299
	F		0	0	5302 5304	F	91.0699 89.22	88.56	2.20999999999
	F		0	0	5306	F	88.3199	86.61	9999
	F		0	0	5307	F		0	0
	F		0	0	5501 5503	F	93.12	86.38 0	0
	F		0	0	5506	F		0	0
	F		0	0	5701 5702	F		76.12	
	F		0	0	5703	F		76.59	
	F		0	0	5703 5802	F	83.65	0	0
002	F	112.5	0 110.15	0 2.34999999999	5805	F	84.611	0	0
003	F	109.3199	106.73	9999 2.5899	5808 5811	F	83.6679 83.3069	0	0
004	F	104	102.85	1.1500000000	5814	F	83.234	0	0
0008	F	103.9	100.53	0001 3.37	5815	F	83.3369	82.837	0.4998999999 99997
102	F	102.9899	101.92	1.0699	5816	F	83.382	83.002	0.380000000
104	F	103.30	0	0	5901	F		83.27	
401	F	117 1100	0	0	6601 6602	F		71.59 68.96	
701	F	117.4199	115.9	1.51989999999 9999	6701	F		75.17	
1702 1801	F	118 66	0	0	6800 6801	F		0	0
2002	- -		0	9999	6802	F		0	0
1803	F	116.65	114.33	2.3200000000	0051	S	110.55	109.69	0.8599999999 99999
)804	F		0	0001 0	0055	S	105.01	103.39	1.62
1805	F		0	0	0000	0	100.00	107.20	9999
/901)905	F	113.4499 112.3099	111.42 108.95	2.0299 3.3599	0057 0151	S S	103.75 104.8	101.05	2.7
907	F	110.41	106.75	3.66	0153	S	105.4199	104.19	1.2299
1959	F	106.66	104.84	1.8199999999 9999	0155	S	103.2399	101.3	1.939900000 0001
001	F	101.4	98.82	2.5800000000 0001	0251	S	114.5	113.35	1.1500000000
003	F	98.7799	97.01	1.7698999999	0252	S	106.5699	104.94	1.629900000
104	F	97.9	95.17	9999 2.73	0253	S	106.1399	104.29	1.8498999999
106	F	101.9499	100.13	1.8199	0752	S	117.11	115.02	9999 2.09
200 202	F	105.8	0 104.38	0 1.42	0852	S	116.62	114.87	1.75
207	F	102.8499	100.48	2.3699	0950 0952	S S	115.1399	112.94 0	2.1999 0
∠∪ၓ 301	F	104.7239 111.2399	103.53 108.78	1.1939 2.4599	0953	- S	114.5199	112.92	1.5999000000
303	F	110.8799	109.71	1.1699000000	0956	S	112.05	109.55	2.5
304	F	108.6699	107.21	1.4599	0958	S	110.16	107.33	2.83
403	F	111.5199	110.46	1.0599000000 0001	1052 1054	ง S	101.2799 98.7399	99.28 97.32	1.9999
701	F	112.4899	110.26	2.2299	1055	S	QQ /17	97.24	0001
703 901	F	107.48 107.98	106.17 105.75	1.31 2.23	1055 1056	S S	99.47 96.15	93.89	2.23
902	F	106.25	104.23	2.02	1151	S	103.08	101.8	0001
903	F	105.01	102.72	2.2900000000 0001	1152	S	100.76	99.14	1.62
904	F	100.5	97.29	3.20999999999	1153 1155	s s	97 72	0 95.68	0
905	F	103.3499	100.38	2.9699000000	1054	<u> </u>	407 5400	405.04	9999
906	F	97.47	94.02	0001 3.45	1251	5	107.5199	105.91	1.609900000
001	F	94.7099	91.95	2.7599	1253 1254	S	104.8099	103.33	1.4799
.005 2006	F	93.76 91.3499	91.23 89.23	2.53 2.1199	1255	S	104.55	103.02	1.53
008	F	91.2799	88.32	2.9599	1256 1352	S	102.97 110.8799	101.58	1.39
101	F	96.0699 95.2799	93.7 92.66	2.3699 2.6199	1352	0	110.07.99	103.71	0001
103	F	99.47	97.44	2.03	1454 1455	S S	112.5999 107.4	111.09	1.5099 2.17
104	F	100.37 99.4899	98.56 97.68	1.81	1456	S	107.29	106.14	1.150000000
106	F	97.93	95.99	1.940000000	1651	S		0	0
107	F	97.94	95.89	2.05	1752	S	112.83	111.14	1.69
201	F	100.87	98.95	1.92	1754	3	107.44	100.34	9999
204 2205	F	99.41 99.3899	97.78 97.43	1.63	1755 1756	s s	108.54	105.93	2.61
206	F	100 37	97 99	9999 2 3800000000	1800	S		0	0
200		400.00	400.40	0001	1851	S	107.15	105.64	1.510000000 0001
.208	F	103.68	102.19	0001	1951	S	107.0999	104.61	2.4899000000
:304	F	102.3799	101.62	0.7599000000 00002	1952	S	108.01	105.72	2.290000000
:306	F	100.19	98.06	2.13	1953	S	107.97	104.98	2.9899999999
.308 2402	F	99.44 104.4199	102.35	2.0699	1954	S	97,7099	95.3	9999
403	F	101.36	98.83	2.53	1055	<u> </u>	101 5900	00.07	0001
.504 2602	F	105.9499	104.31	1.6399 2.4098999999	2052	S S	94.5199	99.27	2.0999000000
2605		105 2400	102.22	9999	2053	۹	9/ 1200	02.00	0001
CU0.		105.3499	103.33	0001	2054	S	93.79	90.89	2.9000000000
702	F	108.7399	105.49	3.2499000000 0001	2057	S	91.3399	89.32	0001 2.0199000000
802	F	97.55	95.25	2.3	2050	۹		0	0001
:901	F	94.23	91.35	2.880000000	2151	S	95.3399	93.38	1.9599
903	F	91.7799	90.11	0001 1.6699	2152	S	100.3799	96.63	3.7499000000 0001
904	F	91.43	89.84	1.59	2153	S	98.3099	96.32	1.989900000
909	F	91.9599	ช9.57	2.3899000000 0001	2154	S	98.6399	96.62	2.0198999999
963	F	92.4	90.74	1.6600000000 0001	2155	S	98.0999	96.32	ອອອອ 1.7799000000
964	F	92.0999	90.34	1.7599	2252	S	100 87	99.33	0001
COC	Г	ອ ∠.0999	ອບ.ວ ປວ	1.5949000000 0001		۹	00 F	Q7 15	0001
000 001	F	94 05	0 90.83	0 3.22	2253 2257	S	99.0 100.01	98.22	1.790000000
002	F	57.00	0	0	2351	S	101 1200	99.49	0001
003	F	89.9	87.44	2.460000000 0001		<u>د</u>	00.04	09.40	0001
101	F	97.5899	95.78 0	1.8099	2352 2353	S	100.19	98.06	2.13
104	F		0	0	2355	S	102.7799	101.19	1.5899
108	F	05.0105	0	0	2357 2451	S S	105.0699	0 102.53	0 2.5399
202	F	ອ ວ.8499	93.55	∠.∠ 999 000000 0001	2454	S	110.15	108.6	1.550000000 0001
204 206	F	94.1999 93.19	91.47 90.43	2.7299 2.7599999999	2454	S	100.5999	98.19	2.409900000
200		00.47	00.07	9999	2551	S	110.9199	108.8	2.1199
209	Г	92.47	09.37	9999 2.04444899999	2552	S	107.87	105.92	1.95
302 303	F	95.5299 94 <u>3899</u>	93.56 91.58	1.9699 2.8099	2000	0	100.0099	100.02	0001
403	F	99.7699	96.95	2.8199	2555 2651	s S	105.55 107.72	104.08	1.47 2.069 <u>999</u> 9999
404	F	97.8099	95.19 0	2.6199	0050	C	105.07	100 70	9999
503	F	98.4599	95.96	2.4999000000	2053 2751	S	105.37 100.5	99.1	1.38 1.400000000
700	F		0	0001 0	2851	S	101 04	98 85	0001
701	F	95.0699	94.2	0.8699000000	2001	~	101.04		0001
704	F	97.15	93.76	00001 3.39	2854	S	92.76	90.61	2.150000000 0001
705	F	95.8199	93.21	2.6099000000 0001	2855	S	02.04	0	0
707	F	94.8199	92.64	2.1799	2902	0	JJ.J4	31.73	2.14999999999999999999999999999999999
801	F	90.41	86.5 89.25	3.91	2957 2958	S S	96.3799 92.55	93.84 90.958	2.5399 1.592
	 	JI.UZ99	03.20	2.37 99000000	2959	S	91.9899	90.027	1.9629
902 101	F	88.69 88.8	86.22 87.39	2.47 1.41	2960	S	91.7799 92.25	89.42	2.3599
103	F	87.43	85.66	1.7700000000	2961 2962	S S	<i>э∠.∠</i> Э 0	90.949 0	0
202	F	89.9499	87.87	0001 2.0799	3052	S	93.9899	91.34	2.6499
205	F	90.5999	87.62	2.9799	3054 3152	ง S	ช9.83 97.7799	88.03 96.16	1.8 1.6199
206	F	88.5199	86.22	2.2999000000 0001	3153	S		0	0
301	F	94.18	91.78	2.4000000000 0001	3156 3157	S S		0	0
302	F	92.8799	90.54	2.3399	3159	S	92.9	90.69	2.210000000
304	F	93.18	90.89	2.290000000 0001	3251	S	95.9499	94.01	1.9398999999
305	F	91.8099	89.57	2.2399000000	3753	S	94 1000	92 11	9999
401	F	94.8799	92.76	2.1199	3255	S	93.3899	91.22	2.1699

	100000100000100000100000 <td><t< td=""></t<></td>	<t< td=""></t<>
6307.0600.0.271.44906664600.510.44000.0666860.350.361.4900732S80.4487.91.53000652S67.3684.161.300863S60.873.5365.271.3100864S80.59066.371.4100867S80.59066.371.4100868S80.59066.371.4100873S80.59066.371.2000873S87.3680.59066.371.2000873S80.59066.381.20002.2000874S91.7586.471.289874S91.7586.471.289874S91.7586.471.289874S91.7586.471.299875S91.7786.471.299876S91.7586.471.299877S94.7986.471.299878S91.7886.471.299879S94.7986.471.299879S94.7986.471.299879S94.7986.471.299879S94.7986.471.299879S94.7986.471.299879S94.7986.471.299879S94.7994.7994.79879 <t< td=""><td></td><td></td></t<>		
		sbalS0000550S000550S001.50000550S001.50000550S0001.50000550S0000550S0000550S0000550S0000550S0000550S0000551S0000553S0000554S0000555S0000556S0000557S0000558S0000559S0000550S0000551S0000551S0000551S0000551S0000551S0000551S0000551S0000551S0000551S000
		S30S03.4407.301.76S30S03.442.03S35S08.44.4301.34S45S87.3005.271.34S50S08.3005.271.34S52S08.404.672.02S53S08.404.672.02S54S08.40.41.50S55S0.40.61.630S56S0.1001.630S56S0.40.51.630S56S0.40.50.00S56S0.40.50.00S56S0.4.000.000.00S57S0.4.100.000.00S56S0.4.100.000.00S57S0.4.100.000.00S57S0.4.100.000.00S57S0.4.100.000.00S57S0.4.100.000.00S57S0.4.100.000.00S57S0.4.100.000.00S57S0.4.100.000.00S57S0.4.100.000.00S57S0.4.100.000.00S58S0.4.100.000.00S59S0.000.000.00S50S0.000.0
xxxxyyyyyyyyyyBCDS00.00000.071.3100BCD00.500.020.020.02S00.000.050.020.02S00.000.050.020.02S01.00.051.00000.02SCD01.00.010.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.00.020.020.02SCD01.001.00.020.02SCD<	xxxxxyyyyyySS3BBABA1.841.84SS6B7.30B.5371.319SS7SB.5371.319SS7SB.512S.22SB.738B.74S.23SC4SB.739B.741.82SC5SP.145B.971.2000SC5SB.1479B.741.78SC6SB.1479B.741.78SC7SB.1479B.741.78SC6SB.1479B.741.78SC7SB.4129B.741.78SC7SB.4129B.741.78SC7SB.4129B.741.78SC7SB.4129B.741.78SC8B.3009S1.381.970SC8SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9SS.3009S1.381.970SC9S	scale
SecSecDeageDeageDeageDeageDeageDeageDeageS7SB0.0D0.0D.150D.200001255SSS0.0D.00D.0001256SSS0.0D.00D.0001256SSS0.0D.00D.0001256SSS0.0D.00D.0001256SSS0.0D.00D.0001357SSS0.0D.00D.0001358SSS0.0D.0001D.0001358SSS.00D.0001D.0001358SSS.00D.0001D.0001358SSS.00D.0001D.0001359SSS.00D.0001D.0001359SSS.00D.0001D.0001350SSSSD.0001351SSSSD.0001353SSSSD.0001353SSSSD.0001353SSSSD.0001353SSSSD.0001354SSSSD.0001355SSSSD.0001356SSSSD.0001357SSSSD.0001358SSSSD.00	SGSGDR.809DR.8711901197SBR.8B4.501.19127SBR.8B4.501.29252SBR.8B4.501.29253SBR.9B4.501.29254SBR.9B4.701.29255SBR.9B7.411.78256SBR.9B7.411.78257SBR.8T.441.78358SBR.9B7.411.78358SBR.9B7.411.78358SBR.9B7.411.78359SBR.9B7.411.78350SBR.9B7.411.78351SB.9B7.411.78353SB.9B1.381.79751SB.9B1.381.79751SB.9B1.381.79751SB.9B1.381.79751SB.9B1.381.79751SB.9B1.381.79751SB.9B1.381.79751SB.9B1.381.79751SB.9B1.381.79751SB.9B1.381.79752SB.9B1.411.78754SSB1.411.78754SSB1.411.78755SSB1.411.78 <td>Sin of the set of</td>	Sin of the set of
902917.3087.3085.221.413787.8086.422.11.9000012808.985.202.0200000.0212809.986.438.98.641.6800030389.1986.431.78030389.1987.411.7830389.1987.411.7830389.1987.411.7830389.1987.411.7830389.1987.411.7830489.191.381.7999130589.191.381.7999130589.091.381.7999130589.041.59991.3830589.041.59991.3830589.041.59991.3830589.041.59991.3930589.041.59991.3930589.041.59991.3930589.041.59991.3930589.041.59991.3930589.041.59991.3930589.041.59991.3930589.041.59991.3930589.041.59991.3930589.041.59991.3930589.041.59991.499930589.041.4999 <tr< td=""><td>90297.3380.21.4.4.8.8 A.8.8.02.1.4.50000 S.9.2157888.080.20.1.5000 S.020.070.070.070.0725388.08.08.00.00.070.070.070.070.0725889.199.198.00.00.070.00010.00010.000135389.09.09.09.00.00.00010.000135389.09.09.00.00.00010.000135389.09.09.00.00010.00010.000135489.09.09.00.00010.00010.000135589.09.09.00.00010.00010.000135689.09.09.00.00010.00010.000135789.09.09.00.00010.00010.000135889.09.09.00.00010.00010.000135989.09.09.00.00010.00010.000135189.09.09.09.00.00010.000135189.09.09.09.00.00010.000135189.09.09.09.00.00010.000135189.09.09.09.00.00010.000135189.09.09.0<td>NACP.7.30<</td></td></tr<>	90297.3380.21.4.4.8.8 A.8.8.02.1.4.50000 S.9.2157888.080.20.1.5000 S.020.070.070.070.0725388.08.08.00.00.070.070.070.070.0725889.199.198.00.00.070.00010.00010.000135389.09.09.09.00.00.00010.000135389.09.09.00.00.00010.000135389.09.09.00.00010.00010.000135489.09.09.00.00010.00010.000135589.09.09.00.00010.00010.000135689.09.09.00.00010.00010.000135789.09.09.00.00010.00010.000135889.09.09.00.00010.00010.000135989.09.09.00.00010.00010.000135189.09.09.09.00.00010.000135189.09.09.09.00.00010.000135189.09.09.09.00.00010.000135189.09.09.09.00.00010.000135189.09.09.0 <td>NACP.7.30<</td>	NACP.7.30<
1107B8088148081.50081.2082.50080		167S86.894.888.18.152088.08.01.00280S8.08.01.00281S8.108.0.41.00281S8.108.0.41.00280S8.107.411.78380S8.288.632.05000381S8.288.632.2759380S9.47980.422.36000381S9.47980.422.379382S9.47980.422.379383S9.47980.421.58393S9.47980.421.58394S9.47980.421.58395S9.47980.421.58395S9.47980.421.59395S9.47980.421.59395S9.47980.421.59395S9.47980.421.59395S9.412982.421.59395S9.412982.421.59395S9.412982.421.59395S9.412982.421.59395S9.412982.421.59395S9.412982.421.59395S9.412982.421.59395S9.412982.421.59395S9.412982.421.59
32523808085.203525808885.203.9225818880.501.9300003253891001.0203263891001.723263891001.723263891001.723263891001.7232789985.401.93328891002.333289980.4085.401.2332989985.401.2332989985.401.243298991.2493298991.2493298991.2493298991.249329991.2491.24329991.2491.24329991.2491.24329999993299999932999999329999993299999932999999329999993299	32.2038080.2085.201.500000223.30S81.4085.201.5000035.31S91.1680.711.5000035.31S91.1680.711.5000035.33S81.4080.711.5000035.34S81.4080.711.500035.35S81.4080.711.500035.36S91.6090.711.500035.36S91.6090.711.500035.36S91.6090.711.500035.37S91.6091.7291.7235.38S94.0085.421.509035.39S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.4091.4035.41S91.4091.40 </td <td>Same and set in the set in</td>	Same and set in the set in
2635.080.1280.28.028.028.038.0		83380.1280.228.328
NameNomeNomeNomeNomeNomeNomeS3518991.1589.071.000010.0001S353SS88.3587.141.78S354S996.062.47.191.7839826S355S996.062.2.31.59S355S99.60.6985.422.33S356S99.61.402.331.0399S357S99.41.2085.422.33S358S9.41.2085.422.331.0399S357S99.41.2085.421.0399S357SS9.41.2085.421.0399S357SS9.41.2085.421.0399S358SS9.41.2085.421.0399S359SS9.41.208.1.211.0399S359SS8.1.211.03991.0399S351SSS8.1.211.0399S351SSSS1.0399S351SSSS1.0399S351SSSS1.0399S351SSSS1.0399S351SSSS1.0399S351SSSS1.0399S351SSSSS1.0399S351SSSSS1.0399 <td>ActionO yeakO yeakBod yeakBod yeakBod yeak3381S89.1081.411.7810.8903385S89.1080.5010.30010.300358S91.9780.642.331.83356S01.9780.642.331.83356S01.9780.642.331.97356S01.9780.642.331.97357S86.4085.500.0001358S01.9780.641.971.97357S86.4085.500.0001358S91.9780.641.971.97351S86.4085.500.0001353S81.4081.401.971.97354S81.4081.401.971.97354S81.4081.401.971.97354SS81.401.971.97354SS81.401.971.97354SS81.401.971.97354SSS81.401.97355SSS81.401.97354SSS81.401.97355SSSS81.40355SSSS81.40356SSSSS357SSSSS<td>control r.se r.se control control control 151 S 81.15 80.77 1.0800 153 S 80.19 87.41 1.78 154 S 80.090 66.28 2.47.09 153 91.07 80.42 2.33 154 S 91.07 80.42 2.33 154 S 91.07 80.42 2.33 154 S 91.07 80.42 2.33 157 S 92.42 80.42 1.0399 151 S 94.128 81.35 1.0399 151 S 94.128 81.35 1.0399 151 S 94.128 1.0399 1.0399 151 S 94.128 1.0399<</td></td>	ActionO yeakO yeakBod yeakBod yeakBod yeak3381S89.1081.411.7810.8903385S89.1080.5010.30010.300358S91.9780.642.331.83356S01.9780.642.331.83356S01.9780.642.331.97356S01.9780.642.331.97357S86.4085.500.0001358S01.9780.641.971.97357S86.4085.500.0001358S91.9780.641.971.97351S86.4085.500.0001353S81.4081.401.971.97354S81.4081.401.971.97354S81.4081.401.971.97354SS81.401.971.97354SS81.401.971.97354SS81.401.971.97354SSS81.401.97355SSS81.401.97354SSS81.401.97355SSSS81.40355SSSS81.40356SSSSS357SSSSS <td>control r.se r.se control control control 151 S 81.15 80.77 1.0800 153 S 80.19 87.41 1.78 154 S 80.090 66.28 2.47.09 153 91.07 80.42 2.33 154 S 91.07 80.42 2.33 154 S 91.07 80.42 2.33 154 S 91.07 80.42 2.33 157 S 92.42 80.42 1.0399 151 S 94.128 81.35 1.0399 151 S 94.128 81.35 1.0399 151 S 94.128 1.0399 1.0399 151 S 94.128 1.0399<</td>	control r.se r.se control control control 151 S 81.15 80.77 1.0800 153 S 80.19 87.41 1.78 154 S 80.090 66.28 2.47.09 153 91.07 80.42 2.33 154 S 91.07 80.42 2.33 154 S 91.07 80.42 2.33 154 S 91.07 80.42 2.33 157 S 92.42 80.42 1.0399 151 S 94.128 81.35 1.0399 151 S 94.128 81.35 1.0399 151 S 94.128 1.0399 1.0399 151 S 94.128 1.0399<
Sea 881229 86.30 16300 2000000 3353 S 01.15 80.73 2.080000 3353 S 00.90 0.50 2.50 3364 S 00.90 0.50 2.790 3354 S 00.90 0.50 2.790 5354 S 01.97 80.40 2.50 5354 S 04.120 80.40 2.50 572 S 04.120 82.30 1.79000 5854 S 60.4 85.50 0.70000 572 S 04.120 82.30 1.7900 5854 S 60.4 85.50 0.70000 5854 S 60.4 85.50 0.70000 5854 S 60.4 85.50 0.7000 5854 S S 85.50 0.7000 5854 S S 0.7000 0.7000 5855 S	S258S88.12966.4016303531S91.5080.0720000003530S90.0592354S90.0592S54S01.7080.042.39555S01.6780.641.39555S01.6780.641.39555S01.6780.641.39555S01.6780.641.39555S01.6780.641.39555S01.6780.641.39555S01.6780.641.39555S01.6780.641.39555S01.6780.641.39555S01.6781.391.57890555S01.5781.391.57890555S01.3081.391.57890555S01.3081.391.57890555S01.3081.391.57890555S01.3081.391.57890555S01.3081.391.57890555S01.3081.391.57890555S01.3081.391.57890555S01.3081.391.57890555S01.3081.391.57890555S01.3081.491.57890555S01.301.57890555S01.301.57890555 <td>Bab is a bar i</td>	Bab is a bar i
S331 S 9115 8077 20000 333 S 8030 97.41 179004 334 S 8030 97.41 179004 335 S 80200 90.63 24700 335 S 9177 80.64 230 335 S 9177 80.40 2.5 155 55 S 9177 80.40 2.30 1.020000 555 S 9177 80.4129 82.30 1.02000 563 S 84.129 82.30 1.02000 0001 580 S 85.059 81.38 1.0709 1001 580 S 85.059 81.38 1.0709 1001 580 S 85.059 81.38 1.0709 1001 590 S S 80.059 81.38 1.0749 591 S S 80.059 81.38 1.0749 591 S	S351S91.1590.700.0000001365S98.8367.041.791365S90.0500554S94.0887.421.85555SS94.0885.421.85556S84.4985.421.03571S84.4985.421.03752S84.4985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.2985.421.03754S84.291.041.04754S84.291.041.04754S84.291.041.04754S84.291.041.04754S84.291.041.04754S84.291.041.04754S84.291.041.04754S84.291.041.04754	351 5 91.15 80.70 0.000000 363 5 88.83 67.04 1.79 365 5 80.05 6.0 0 564 5 9.050 80.63 1.89 554 5 9.07 80.44 2.30 1.97 554 5 9.07 80.44 2.30 1.97 555 5 8.0509 85.42 1.030 0.020000 554 5 8.3.0509 81.38 0.02000 0.021 563 5 8.3.0509 81.38 0.02000 0.021 564 5 8.3.0509 81.38 0.02000 0.021 563 5 8.3.0509 81.38 0.0200 0.021 564 5 8.3.0509 81.38 0.0200 0.021 564 5 5 8.4129 0.021 0.021 571 5 5 5 5 5 5 5
3333880.108.7.4.1.17.7.5000003866S88.3087.0.41.7.500005652S91.4082.501.3.805654S91.47980.4.21.3.805754S94.4082.381.3.807754S84.12982.381.3.9807754S84.12982.381.7.800073853S91.4081.341.5.903854S91.4081.341.5.903853S91.3091.341.5.903854S91.4091.4491.443854S91.4491.4491.443855S91.4491.4491.443856S91.4491.4491.443857S91.4491.4491.443858S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.443859S91.4491.4491.4438	S33S80187.4117.8000. 17.8000. 17.8000. 17.8000. 55256.887.987.99552S10.0780.42.31.58554S01.0780.41.381.58576S01.0780.42.31.39772S80.42.31.391.74772S80.42.31.391.74772S80.42.31.391.74772S83.0591.381.741.39851S83.05981.361.741.39857S83.05981.361.741.39858S83.05981.361.741.39859SS83.05981.361.74851SS83.05981.361.74852SSS83.05981.361.74853SSSS83.05981.36854SSSS83.0591.35855SSSSS83.059855SSSSSS855SSSSSS855SSSSSS855SSSSSS855SSSSSS855SSSSSS855S <t< td=""><td>333S9997111<t< td=""></t<></td></t<>	333S9997111 <t< td=""></t<>
S335 S B080 87.4 17.89909 S358 S 90.009 80.64 2.470 S358 S 94.08 2.65 1.55 S50 S 94.08 2.35 1.55 S51 S 96.409 82.64 1.0390 S52 S 94.08 82.60 0.0000 S65 S 94.08 82.60 0.0000 S851 S 94.08 82.60 0.0000 S863 S 81.029 2.35 1.5790 S863 S S 9.4 81.38 1.5790 S863 S S 9.4 9.4 9.4 9.4 S863 S S S 5.5 5.5 5.5 5.5 S863 S S S S 5.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5 5.5 <td< td=""><td>3335SBA8.0RT.441.7389093588.090.002.470554S94.002.501.58555S84.008.531.38751S84.408.530.302000881S01.301.5793881S30.59911.361.5793893S30.59911.361.5793894S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.57941.5794895S30.59911.57941.5794895S30.59911.57941.5794895S30.59911.57941.5794895S30.59911.57941.5794895S30.599<!--</td--><td>355SB.8.3ST.4.41.736909363S0.0000364S0.4002.33364S84.498.5.690.32000761S84.1298.2.300.32000813S81.3298.2.300.320008412982.3661.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000814S81.389.320081.381.4719814SS81.399.32009.3200813SS81.399.32009.3200814SSS9.32009.3200814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS<</td></td></td<>	3335SBA8.0RT.441.7389093588.090.002.470554S94.002.501.58555S84.008.531.38751S84.408.530.302000881S01.301.5793881S30.59911.361.5793893S30.59911.361.5793894S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5793895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.361.5794895S30.59911.57941.5794895S30.59911.57941.5794895S30.59911.57941.5794895S30.59911.57941.5794895S30.59911.57941.5794895S30.599 </td <td>355SB.8.3ST.4.41.736909363S0.0000364S0.4002.33364S84.498.5.690.32000761S84.1298.2.300.32000813S81.3298.2.300.320008412982.3661.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000814S81.389.320081.381.4719814SS81.399.32009.3200813SS81.399.32009.3200814SSS9.32009.3200814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS<</td>	355SB.8.3ST.4.41.736909363S0.0000364S0.4002.33364S84.498.5.690.32000761S84.1298.2.300.32000813S81.3298.2.300.320008412982.3661.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000813S81.32981.380.32000814S81.389.320081.381.4719814SS81.399.32009.3200813SS81.399.32009.3200814SSS9.32009.3200814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS81.499.440814SSS<
3290 S 00.059 00.12 0 5562 S 01.37 00.58 0.58 0.58 5563 S 01.37 00.59 00.42 1.039 5757 S 05.49 05.28 0.59 0.52 0.59 5757 S 05.49 05.58 0.59 0.52 0.59 5757 S 01.30 0.799 0.799 5853 S 01.30 0.799 0.799 5853 S 01.30 0.799 0.799 5853 S 01.30 0.799 5854 S 0.799 0.799 5853 S 0.799 0.799 5853 S 0.790 0.799 5853 S 0.790 0.799 5853 S 0.790 0.790 5853 S 0.790 0.	3358S808080243564S91.9780.412.333565S91.9780.442.33772S86.485.821.0391373S84.12885.421.0391374S84.12885.421.03913751S84.12885.421.0391383S91.9780.5281.38382S81.058981.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391383SS91.381.0391384SS91.381.0391384SS91.381.0391385SS81.381.0391385SS81.381.0391385SS81.381.0391385SSS1.0391385SSS1.0391385SSS	SecondSecon
5522 9 9 0	552SS00000556S019780.642.31.585556S019780.642.31.0395771S008.40.500070.000075781S81.0082.381.72000.000075851S83.050081.381.07505851S83.050081.381.07505853S83.050081.381.07505854S83.050081.381.07505854S83.050081.381.07505854S83.050081.381.07505854S83.050081.381.07505854S83.050081.381.07505854SS83.050081.381.07505854SS83.050081.381.07505854SSS83.050081.381.07505854SSSS83.050081.381.07505854SSSS83.050081.381.07505854SSSSS83.050081.385854SSSSS83.050081.385854SSSSS81.481.07505854SSSSS81.481.07505854SSSSS81.481.0	532S0000554S916780.642.38555S916780.642.38572S90.485.501.380573S83.05991.381.799563S83.05991.381.799563S83.05991.381.799563S83.05991.381.799563S83.05991.381.799563S83.05991.381.799564SS91.381.799564SS91.381.799564SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799574SS91.381.799
5554 S 91.77 90.76 1.60 555 S 86.4.599 85.80 1.7029000 571 S 86.4.599 81.38 1.709901 583 S 81.29 82.30 1.701901 583 S 83.0599 81.38 1.74991 583 S 83.0599 81.38 1.74991 584 S 83.0599 81.38 1.74991 583 S 83.0599 81.38 1.74991 584 S 83.0599 81.38 1.74991 584 S S 83.0599 81.38 1.74991 584 S S S S 1.74991 584 S <t< td=""><td>5554S91.7892.541.585555S86.42.330.820000752S86.485.800.820000651S81.412982.381.7499000653S81.059081.381.6799000654S81.059081.381.6799000655S81.059081.381.6799000656S81.059081.381.6799000657S81.059081.381.6799000658S81.059081.381.6799000659S81.059081.381.6799000650S81.059081.381.6799000651S81.059081.381.6799000653S81.059081.381.6799000654S81.059081.381.6799000655S81.059081.381.6799000656S81.059081.381.6799000657S81.059081.381.6799000658S81.059081.059081.381.679900659S81.059081.059081.059081.0590659S81.059081.059081.059081.0590659S81.059081.059081.059081.0590659S81.059081.059081.059081.0590659S81.059081.059081.059081.0590659S81.059081.0590<td< td=""><td>554S94.0892.51.53550S91.2982.381.0369751S85.45985.4292.330.0007753S81.29982.381.074900363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491364S81.491.074911.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749365S81.491.07491.0749364S81.491.07491.0749365S81.491.0749<td< td=""></td<></td></td<></td></t<>	5554S91.7892.541.585555S86.42.330.820000752S86.485.800.820000651S81.412982.381.7499000653S81.059081.381.6799000654S81.059081.381.6799000655S81.059081.381.6799000656S81.059081.381.6799000657S81.059081.381.6799000658S81.059081.381.6799000659S81.059081.381.6799000650S81.059081.381.6799000651S81.059081.381.6799000653S81.059081.381.6799000654S81.059081.381.6799000655S81.059081.381.6799000656S81.059081.381.6799000657S81.059081.381.6799000658S81.059081.059081.381.679900659S81.059081.059081.059081.0590659S81.059081.059081.059081.0590659S81.059081.059081.059081.0590659S81.059081.059081.059081.0590659S81.059081.059081.059081.0590659S81.059081.0590 <td< td=""><td>554S94.0892.51.53550S91.2982.381.0369751S85.45985.4292.330.0007753S81.29982.381.074900363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491364S81.491.074911.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749365S81.491.07491.0749364S81.491.07491.0749365S81.491.0749<td< td=""></td<></td></td<>	554S94.0892.51.53550S91.2982.381.0369751S85.45985.4292.330.0007753S81.29982.381.074900363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491363S81.200981.381.07491364S81.491.074911.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.07491364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749364S81.491.07491.0749365S81.491.07491.0749364S81.491.07491.0749365S81.491.0749 <td< td=""></td<>
SS55 S 91477 88.64 2.3.2 1.0399 5721 S 86.439 85.74 1.0399 5821 S 81.20000 0007 5821 S 83.0589 81.38 1.6799 5823 S 83.0589 81.38 1.6799 5833 S 83.0589 81.38 1.6799 5843 S 83.0589 81.38 1.6799 5843 S 83.0589 81.38 1.6799 5843 S 81.38 1.6799 1.6799 5843 S S 81.38 1.6799 5843 S S S S S 5944 S S	555 S B B1-57 B B C D 752 S B B S B D	553S191.4798.442.38754S84.4085.581.02000754S84.129982.281.77920086.3S83.059961.381.679985.3S83.059961.381.679985.4SS83.059961.381.679985.4SSS83.059961.381.679985.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS85.4SSSSSS
SystemSB8.429B3.42T. 1.039900SystemS64.1298B2.38C. 2.039000SSS1S64.1298B1.381.57990SSS3S91.05981B1.381.57990SSS4S91.05981B1.381.5799SSS4S91.05981B1.381.5799SSS4S91.05981B1.381.5799SSS4S91.0591.0591.05SSS4S91.0591.0591.05SSS4S91.0591.0591.05SSS4S91.0591.0591.05SSS4S91.0591.0591.05SSS4S91.0591.0591.05SSS4S91.0591.0591.05SSS4S91.0591.0591.05SSS4S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05SSS5S91.0591.0591.05	YanSoB5.40B5.40B5.40C. Support C. Support Sup	So Bat. Non-set Bat. 2 Non-set S 84.1290 82.38 0.300000000000000000000000000000000000
NormOutsoeOutsoeOutsoeOutsoeOutsoeOutsoeSB51S81.28081.381.6799SB53S83.069081.381.6799SB54S81.381.6799SB54S81.381.6799SB54S81.381.6799SB54SS9.1409.140SB54SS9.1409.1409.140SB54SS9.1409.1409.140SB54SS9.1409.1409.140SB54SS9.1409.1409.140SB54SS9.1409.1409.140SB54SS9.1409.1409.140SB54SS9.1409.1409.140SB55SSS9.1409.1409.140SB56SSS9.1409.1409.140SB56SSS9.1409.1409.140SB56SSSS9.1409.140SB56SSSS9.1409.140SB57SSSS9.1409.140SB57SSSS9.1409.140SB57SSSS9.1409.140SB57SSSS9.1409.140SB57SSSS9.1409.140SB57 <td< td=""><td>NoneConstructC</td><td>NormOutput bitsO</td></td<>	NoneConstructC	NormOutput bitsO
S851S84.129982.381,74990005853S83.059981.381,67395854S83.059981.381,67395854SS81.381,6739597SS81.381,6739597SSS81.381,6739597SSS81.381,6739597SSSS81.381,6739597SSSS81.381,6739597SSSS5,7345,744597SSSS5,7445,744597SSSS5,7445,744597SSSS5,7445,744597SSSSS5,744597SSSSS5,744597SSSSS5,744597SSSSS5,744597SSSSSS597SSSSSS597SSSSSS597SSSSSS597SSSSSS597SSSSSS597SSSSSS597SSSS	3851S84.122982.381.67.99653S83.059981.381.67.99653S83.059981.381.67.99666 <td>S51S84.129982.381.799000553S83.058981.381.6799554S83.058981.381.6799557S81.381.6799558S81.381.6799559SS9.1381.6799551SS9.1381.6799551SS9.1381.6799553SS9.1381.6799553SS9.1381.6799554SS9.1381.6799554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS8.1491.649554SS8.1491.649555SSS8.149555SSS8.149555SSS8.149555SSSS555SSSS555SSSS555SSSS555SSSS5</td>	S51S84.129982.381.799000553S83.058981.381.6799554S83.058981.381.6799557S81.381.6799558S81.381.6799559SS9.1381.6799551SS9.1381.6799551SS9.1381.6799553SS9.1381.6799553SS9.1381.6799554SS9.1381.6799554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS9.1491.649554SS8.1491.649554SS8.1491.649555SSS8.149555SSS8.149555SSS8.149555SSSS555SSSS555SSSS555SSSS555SSSS5
Decomponent Decomponent 5833 S 33.0599 81.30 1.6779 I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I <tdi< td=""> I I</tdi<>	B B	
		Note
	Image <td< td=""><td>II<td< td=""></td<></td></td<>	II <td< td=""></td<>
	III<	
NoteNo	Normal boxNormal box	
NNNNII <td< td=""><td>II<t< td=""><td>NN</td></t<></td></td<>	II <t< td=""><td>NN</td></t<>	NN
III <tdi< td="">IIIIII<tdi< td="">IIIII<tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td="">IIII<tdi< td=""><tdi< td=""><tdi< td="">IIII<tdi< td=""><tdi< td=""><tdi< td="">III<tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td="">III<tdi< td=""><tdi< td=""><tdi< td=""><tdi< td="" td<=""><td>II<t< td=""><td></td></t<></td></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<>	II <t< td=""><td></td></t<>	
NNN<	NoteNo	
National <td>NoteNo</td> <td>Note</td>	NoteNo	Note
Image: style interpress:Image: style interpres		Image <td< td=""></td<>
Image </td <td>NN</td> <td></td>	NN	
ImageI	III<	Note </td
Image <td< td=""><td>NNN<</td><td>NoteN</td></td<>	NNN<	NoteN
Image: stateImage: state </td <td>NN<</td> <td>NN<!--</td--></td>	NN<	NN </td
Image <td< td=""><td>III<tdi< td=""><tdi< td="">IIIIIII<tdi< td=""><tdi< td="">IIIIII<tdi< td=""><tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td="">IIII<tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td="">III<tdi< td=""><tdi< td="" td<=""><td>III<</td></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></td></td<>	III <tdi< td=""><tdi< td="">IIIIIII<tdi< td=""><tdi< td="">IIIIII<tdi< td=""><tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td="">IIII<tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td=""><tdi< td="">III<tdi< td=""><tdi< td="" td<=""><td>III<</td></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<>	III<
Image: body set is a se	III <tdi< td=""><tdi< td="">IIIIII<tdi< td=""><tdi< td=""><tdi< td="">IIIIII<td></td></tdi<></tdi<></tdi<></tdi<></tdi<>	
ImageI	III <tdi< td="">IIIII<tdi< td="">IIII<tdi< td=""><tdi< td="">IIII<tdi< td=""><tdi< td="">III<tdi< td=""><tdi< td=""><tdi< td="">I<</tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<>	NNN
Note	NoteNo	Note
Image <td< td=""><td>NNN<!--</td--><td>Image: style is a style is a</td></td></td<>	NNN </td <td>Image: style is a style is a</td>	Image: style is a
	NNN </td <td>Image<t< td=""></t<></td>	Image <t< td=""></t<>
Image <td< td=""><td>Note</td><td>ImageI</td></td<>	Note	ImageI
ImageI	Note	ImageI
Image <td< td=""><td>And Antice</td><td>Name</td></td<>	And Antice	Name
Image <td< td=""><td>111</td><td>Image<td< td=""></td<></td></td<>	111	Image <td< td=""></td<>
Image <t< td=""><td>NNN</td></t<> <td>ImageI</td>	NNN	ImageI
ImageI	NNN	ImageI
Note	Note	Note
NameNam	Name </td <td>Name<!--</td--></td>	Name </td
Image: style is a	Image: style is a	ImageI
Image <td< td=""><td>Image<td< td=""><td>Image<td< td=""></td<></td></td<></td></td<>	Image <td< td=""><td>Image<td< td=""></td<></td></td<>	Image <td< td=""></td<>
Image: state of the state of	ImageI	Image <td< td=""></td<>
Image <t< td=""><td>Image: state of the state of</td><td>Image<td< td=""></td<></td></t<>	Image: state of the state of	Image <td< td=""></td<>
II <tdi< td="">I<</tdi<>	II <td>Image: state of the state of</td>	Image: state of the state of
Note </td <td>NNN</td> <td>NoteN</td>	NNN	NoteN
Image: state interpresent of the state interpresent of	N N<	Image: state interpresent of the state interpresent of
Image: style interpresent of the style interpresent of	Image: style interpresent of the style interpresent of	Image: state interpresent of the state interpresent of
III	II <tdi< td="">IIIIII<tdi< td=""><tdi< td="">IIIIII<tdi< td=""><tdi< td="">IIIIII<tdi< td=""><tdi< td="">IIIIII<tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td=""><td>II<tdi< td="">IIIIIII<tdi< td="">IIIIII<tdi< td=""><tdi< td="">IIIIII<tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td="">IIII<tdi< td=""><tdi< td="">I<</tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></td></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<>	II <tdi< td="">IIIIIII<tdi< td="">IIIIII<tdi< td=""><tdi< td="">IIIIII<tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td="">IIIII<tdi< td=""><tdi< td=""><tdi< td="">IIII<tdi< td=""><tdi< td="">I<</tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<></tdi<>
Image: state of the state of	Image: state of the state of	Note
Image: state intermediate in	Image: state intermediate in	Image: state intermediate in
Image: state interpresent of the state interpresent of	III <td>II</td>	II
Image: state of the state of	II <td>III</td>	III
Image: state intermediate in	Image: state intermediate in	Image: state intermediate in
Image: state of the state of	III <td>II<td< td=""></td<></td>	II <td< td=""></td<>
Image: state of the state of	Image: state interpresent of the state interpresent of	Image: state interpresent of the state interpresent of
Image: state of the state of	Image: state intermediate in	Image: state intermediate in
Image: state of the state of	Image: state interpresent of the state interpresent of	Image: state interpretain state int
Image: state interpretain state int	Image: state interpresent of the state interpresent of	Image: state interpretain state int
Image: state intermediation of the state i	Image: state of the state of	
Image: state intermediate in	Image: state intermediate in	Image: birth of the section of the
Image: style s	Image: section of the section of th	Image: book book book book book book book boo
Image: state of the state of	Image: set of the	Image: state interpresent of the state interpresent of
Image: set of the	Image: section of the section of th	Image: section of the section of th
Image: style s	Image: set of the	Image: style s
Image: set of the		
Image: set of the	Image: set of the	Image: set of the
Image: set of the	Image: set of the	Image: style s
Image: state of the state of	Image: set of the	Image: style s
Image: series of the series	Image: section of the section of th	
Image: set of the	Image: set of the	Image: set of the
Image: set of the	Image: set of the	Image: state intermediate in
Image: set of the	Image: set of the	Image: set of the
Image: series of the series		
Image: set of the	Image: set of the	Image: series of the series
Image: set of the	Image: set of the	Image: set of the
Image: state in the state	Image: state interpretation of the state i	Image: state interfact interfactImage: state interfact
Image: Section of the section of th	Image: Constraint of the second se	Image: Constraint of the second se
Image: selection of the	Image: set of the	Image: series of the series
Image: selection of the	Image: selection of the	Image: selection of the
Image: selection of the se	Image: selection of the se	Image: set of the
Image: Constraint of the second se	Image: state of the state	Image: state in the state in
Image: sector		
Image: Constraint of the second se	Image: Sector	Image: state of the state
Image: select	Image: select	Image: selection of the
	Image: set of the set of th	Image: state of the state o

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Inver

	vert Level Depth to Inve
Image: select	
Image: select	
Image: set of the set of th	
Image: selection of the	
Image: select	
Image: set of the	
Image: set of the	
Image: set of the	
Image: set of the	
Image: set of the	
Image: state s	
Image: state of the state of	
Image: state of the state of	
Image: set of the	
Image: state of the state of	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

4403	F	90.6399	89.4	1.2398999999 9999
4501	F	96.4029	93.913	2.4899000000 0001
4504	F	95.51	93.73	1.78
4505	F	94.3499	92.84	1.5099
4601	F		77.05	
4601	F	98.0699	96.22	1.8499000000 0001
4603	F	96.98	95.22	1.7600000000 0001
4605	F		0	0
4607	F	91.9499	90.63	1.3199
4701	F		0	0
4701	F	93.23	91.67	1.56
4702	F		0	0
4704	F	89.5599	88.44	1.1199
4801	F		81.06	
4801	F	88.98	87.31	1.67
4802	F		82.69	
4805	F	87.22	84.6	2.62
4807	F	86.9599	84.95	2.0099
4813	F	83.5139	0	0
4816	F	83.1269	0	0
4901	F		83.02	
4901	F	87.3099	85.1	2.2099
5001	F		85.33	
5101	F	87.9199	85.46	2.4599
5105	F	87.4199	85.66	1.7599
5106	F		0	0

3257	S	93.18	90.83	2.350000000 0001	
3258	S	92.48	89.86	2.62	
3351	S	95.9199	94.29	1.6298999999 9999	
3354	S	94.4	92.3	2.100000000 0001	
3451	S	100.44	99.47	0.9699999999 99999	
3452	S	99.7699	97.27	2.4999000000 0001	
3455	S	97.75	95.61	2.14	
3552	S	100.7099	98.33	2.3799000000 0001	
3554	S	98.4899	96.24	2.2499000000 0001	
3651	S	100.5999	98.91	1.6899000000 0001	
3752	S	95.0899	93.9	1.1898999999 9999	
3753	S		0	0	
3756	S	95.33	93.29	2.0399999999 9999	
3758	S		0	0	
3852	S	90.2799	88.16	2.1199	
3951	S	88.9	88.24	0.6600000000 00011	
3953	S	89.0999	87.09	2.0099	
3954	S	88.54	87.73	0.8100000000000000000000000000000000000	
3955	S	88.1299	87.18	0.9499	
4151	S	89	87.5	1.5	
4152	S	87.9499	86.18	1.7698999999 9999	
4153	S	87.8	85.86	1.94	
4251	S	90.2699	88.09	2.1799	
4253	S	89.8399	87.39	2.4499	
4254	S	90.2399	87.96	2.2799000000 0001	
4257	S	88.5999	86.79	1.8099	
4353	S	92.91	91.32	1.59	
4356	S	90.0299	89.23	0.7998999999 99994	
4452	S	94.3099	92.48	1.8298999999	



Public Fool Cravity Lawsal Orain	++++	Highuay Orain	¥	Harhole Fox	
Public Combined GravityLateral Drain	+++	Overflow Fipe		Hannole Surface (C
Public Surface Water Gravity Cateral Drain	*-*-	Disposal Pipe	+-+-	Abandoned Pipe	
Pressure Foul	S	Calverted Water Course		Scolars HC savery the close Congress Private severs are about to respects	
Pressure Combined	<u> </u>	Pumping Station			
Pressure Surface Hater	4	Fitting			

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on: 0800 783 4444 (24 hours)

- b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.
- d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.
- e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations). f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts). 3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated. 4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented. 5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings. 7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus. 8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side for larger sized pipes and 6 metres either side for larger sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus. 9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected. 10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you. 11. It may be necessary to adjust the finished level of any surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works. 12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus. 15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below. 16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose. Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

a) These general conditions and precautions. Such apparatus is referred to as ets described at conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW apparatus" in these general conditions and precautions. Such apparatus is referred to as "STW apparatus" in these general conditions and precautions.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014


Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0002	F	112.5	110.15	2.34999999999 9999
0003	F	109.3199	106.73	2.5899
0602 0701	F F	120.413 117.65	u 115.39	U 2.2600000000
0704	F		0	0001 0
4802 4901	F		82.69 83.02	
5001	F		85.33	
6800	F		0	0
6801 6802	F F		78.5 0	0
0056	S	109.33	107.29	2.0399999999 9999
0153	S	105.4199	104.19	1.2299
0252	0	100.3099	104.94	0001
0004	5	122.70	121.01	0001

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Inver

Manhole Reference	Liquia Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Secker, Phoebe

From:	Net Dev West <net.dev.west@severntrent.co.uk></net.dev.west@severntrent.co.uk>
Sent:	10 December 2019 12:24
To:	Secker, Phoebe
Cc:	Jeyanayagam, Piriyasha
Subject:	Lanswood Road DY7 5AW OUR REF: 2019112524098
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Phoebe,

Thank you for your email dated 25th November, regarding the named site. Having reviewed our records, I can confirm we have recorded flooding incidents within the area. However, due to the sensitivity of the data, we are not in a position to share specifics or location of the incidents.

Regards, Matthew Evans

Asset Protection (wastewater) Severn Trent Water Ltd

Tel: 0345 266 7930

From: Secker, Phoebe [mailto:Phoebe.Secker@wsp.com]
Sent: 25 November 2019 09:48
To: Net Dev West <net.dev.west@severntrent.co.uk>
Cc: Jeyanayagam, Piriyasha <piriyasha.jeyanayagam@wsp.com>
Subject: Lawnswood Road

Dear Sir/Madam,

WSP has been appointed to undertake a flood risk assessment (FRA) and drainage strategy for a site at Lawnswood Road, an approximate postcode is DY7 5AW (site co-ordinates 387309, 287480).

Please find the following site location plan for reference.



We would like to request any records of flooding for the site or local area that you hold.

Many thanks, Phoebe Phoebe Secker BSc (Hons) MCIWEM Assistant Engineer

vsp

T +44 (0) 121 352 4926 F +44 (0) 121 352 4701

WSP, The Mailbox Level 2 100 Wharfside Street Birmingham B1 1RT

wsp.com

Confidential

This message, including any document or file attached, is intended only for the addressee and may contain privileged and/or confidential information. Any other person is strictly prohibited from reading, using, disclosing or copying this message. If you have received this message in error, please notify the sender and delete the message. Thank you.

WSP UK Limited, a limited company registered in England & Wales with registered number 01383511. Registered office: WSP House, 70 Chancery Lane, London, WC2A 1AF.

NOTICE: This communication and any attachments ("this message") may contain information which is privileged, confidential, proprietary or otherwise subject to restricted disclosure under applicable law. This message is for the sole use of the intended recipient(s). Any unauthorized use, disclosure, viewing, copying, alteration, dissemination or distribution of, or reliance on, this message is strictly prohibited. If you have received this message in error, or you are not an authorized or intended recipient, please notify the sender immediately by replying to this message, delete this message and all copies from your e-

wsp

The Mailbox Level 2 100 Wharfside Street Birmingham B1 1RT

wsp.com