



**OPW** Oifig na  
nOibreacha Poiblí  
Office of Public Works

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# Civil and Structural Engineering

## Engineering Report for Planning

Trim Visitor Centre

AT

TRIM

CO. MEATH



## Document Verification

<b>Project Title:</b>	Trim Visitor Centre	<b>Project No.:</b>
		2889
<b>Report Title:</b>	Civil and Structural Engineering Report for Planning	
<b>Document No.:</b>	2889-RP-002	
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# Introduction

## General

This report forms part of the planning submission made for the proposed redevelopment and demolition of existing extension structures to Trim Market House, Co. Meath.

The redevelopment consists of the refurbishment to the existing Trim Market House building and a new two-storey structure. The two-storey extension will comprise of a new accommodation area containing public toilets, staff changing areas and plant equipment on the ground floor. An exhibition space and balcony area is proposed on the first floor of the new structure. A standalone external walkway is proposed to the “north-side” of the site connecting the new Trim Visitor Centre to Trim Castle. The redevelopment also comprises of landscaping and hard-standing areas, in addition to drainage and ancillary works.

## Purpose

The purpose of this report is to address the civil/structural engineering design items and to provide relevant calculations to support the attached drainage drawings.

The report should be read in conjunction with the relevant attached engineering drawings as noted below:

- 2889-DR-1004 Proposed Drainage Layout

## Existing Site

### Site Description

The site for the redevelopment of Trim Market House is located on the Castle Street close to Trim town centre, Co. Meath. The proposed development is located approximately 50m due northwest of Trim Castle.

The existing building and surrounding area of the site at the proposed location are currently the property of Meath County Council. The existing Trim Market House building is currently used as a tourist office for Trim town.

The site is bounded by Trim Castle boundary wall along its eastern, southern and northern boundaries that is currently a protected structure. Along the western boundary, the site is mostly bounded by the Castle Street road that connects to Trim town centre.

The site existing site slopes from an average of 56.94mOD along the northern boundary, to 56.84mOD along the southern boundary, giving a fall of approximately 1:500 across the site.

### Ground Conditions and Site Characterisation

A desktop study was carried out of the site where maps published by Táihte Éireann would indicate that bedrock is close to the surface with an overlay of alluvial type soil deposits. Previous geotechnical investigations close to the site indicate that the ground is likely to have gravelly sands and silts approximately 1.5-2.0m below ground level. The ground would also be capable of supporting bearing pressures of at least 100kPa based on previous ground investigations nearby. Some overgrown areas on the site were cleared to provide access.

## Proposed Development

Details of the civil/structural engineering considerations for the proposed development are outlined below; these are subject to detailed design.

## Site Clearance

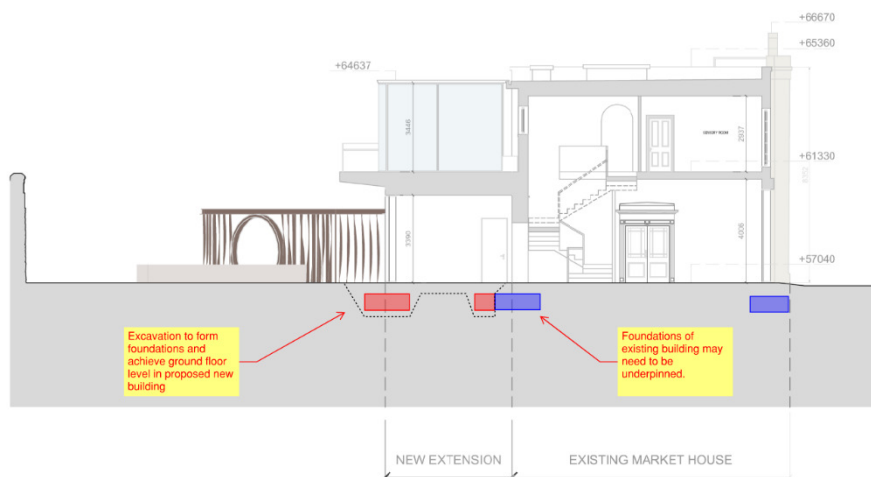
Prior to construction works beginning on site, all existing vegetation will need to be removed from the site down to the existing ground level. It is proposed to demolish a number of outbuildings and this work will be carried out by a competent. Roof sheeting containing asbestos on these buildings will be removed by a specialist contractor and disposed of appropriately. Further preparatory work will then be necessary by the contractor before works commence on site.

## Excavations and Site Works

Given the gradient across the site, except for the foundations for the new building, minimal excavation / groundwork will be required in order to achieve the proposed levels.

The ground level of the proposed new building is 57.04mOD, with the existing ground level varying from 56.8mOD to 57.2mOD. In order to achieve a proposed finished level at ground floor of approximately 57.04mOD, excavation will be minimal, if required. Where strip and pad footings are located around the perimeter of the new building, a further possible maximum excavation of 1.5-2.0m will be necessary.

In order to achieve the required levels throughout the site, it is proposed that existing excavated material from construction of the new foundations is reused as backfill for the demolition of the other buildings, where possible. In some locations, in order to minimise the excavation depth and working time for construction personnel within trenches, lean-mix concrete fill down to formation level will be provided below the foundations.



**Figure 1:** Anticipated excavations for foundation/ground floor construction

It is intended to remove the existing outbuildings, tarmacadam and overgrown vegetation so that the proposed hardstanding and green areas can be reconstructed at approximately the same level as existing on-site.

## Foundations

Based on expected ground conditions (Appendix C), it is proposed to construct the new building on conventional strip and pad footings on the gravelly sand/silt soil material at approximately 1.5-2.0m below existing ground level. Where necessary, lean-mix concrete fill will be provided below foundations to minimise construction time within trenches, whilst ensuring appropriate bearing capacities are achieved. As it is proposed to construct some of the building in the vicinity of the castle moat, ground conditions are likely to be variable across the site, so the use of piled foundations may also be considered during detailed design.

## Sub-Structure

For the new building to be constructed to the rear of the existing Trim Market House, it is proposed that the building structure is constructed on a reinforced concrete strip and pad footings, on suitable hardcore fill material.

The existing basement areas in the outbuildings located on the site will be demolished and subsequently infilled with suitable soil material.

## Superstructure

The proposed new building is a two-storey structure, with toilet and changing facilities, and plant areas at ground floor level and an exhibition area at first floor level.

It is proposed that the structure for the new building would comprise of a steel frame structure, supporting a reinforced or precast concrete slab at first floor level. A lightweight steel structure is proposed for the roof above the exhibition area.

## Irish Water Pre-Connection Enquiry

A Pre-Connection Enquiry Form showing foul drainage and water supply details will be submitted to Irish Water in tandem with this planning application.



# Proposed Drainage

## Foul Drainage

### GENERAL

The main foul runs for the building have been designed in accordance with the current Irish Water Code of Practice.

### FOUL DRAINAGE NETWORK

Refer to OPW drawing 2889-DF-1004 for proposed details of the foul drainage network to the building.

The proposed foul effluent is estimated as follows, calculated in accordance with the Irish Water Code of Practice for Wastewater Infrastructure.

There are approximately 100,000 visitors every year to Trim Castle. There will likely be a corresponding reduction in the requirement for wastewater facilities provided within Trim Castle as visitors will no longer need to use sanitary facilities at the Castle.

### Staff / Visitors

Classify Trim Visitor Centre as "Amenity Site" in accordance with CoP		
Assume 500 visitors at 10l/person/day	=	5000l/day
Assume 20 staff at 90l/person/day	=	1800l/day

### Infiltration

New commercial / industrial = 10%	=	680l/day
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**Total Dry Weather Flow = 7480l/day**

### Peak Flow

(4.5 x Total Dry Weather Flow) + Infiltration	=	33660l/day
	=	0.38l/s

### Design Flow

Peak Flow + Surface Water Allowance	=	0.52l/s
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## FOUL DRAINAGE DISCHARGE

In line with the recommendations made by Meath County Council, it is proposed that a separate wastewater network pipe from the site will be discharged to the existing public sewer.

## Storm Drainage

### GENERAL

As shown on drawing 2889-DR -1004 it is proposed that the runoff from the buildings roofs will be drained via a network of storm drains that will discharge the storm water to the existing public combined sewer network. Also, a storm water attenuation tank will be constructed on-site to limit the discharge to the public combined sewer network to 2l/s.

The storm-water attenuation tank will be designed for a 1 in 100 year flood event and will be constructed in accordance with manufacturers requirements. This will be located at least 5m from the proposed building and Trim Castle boundary wall.

It is proposed that soft landscaping areas will use setts/cobbles set into the ground this will allow water to quickly drain from the surface, emulating the existing water runoff conditions and minimising the need for additional storage. and associated pipework.

The storm drainage network was designed using the modified rational method based on the following parameters. The contributing areas were calculated and Causeway Flow software package was used to design the size and gradient of the pipes.

• Return period for network	=	5 years
• Return period for storage	=	100 years
• M5-60 (Met Éireann rainfall data)	=	15.4mm
• Standard Average Annual Rainfall (SAAR)	=	840mm
• Ratio R	=	0.28
• Additional allowance for climate change	=	20%

Details of the proposed storm drainage network are shown on OPW drawing 2889-DR-1004.

### COMPLIANCE WITH THE PRINCIPLES OF SUDS

The proposed development will be designed in accordance with the principles of Sustainable Urban Drainage Systems (SUDS).

The SUDS guidelines address the issues of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimize the impact of urbanization by replicating the run-off characteristics of the green field site. The criteria provide a consistent approach to addressing both rate and volume run off as well as ensuring the environment is protected from pollution that is washed off roads and buildings.

The use of soft landscaping to complement hard standing areas and use of an attenuation tank very much aligns within the principles of SuDS.

## Water Supply

Information obtained from Irish Water indicates the presence of a water main pipe running along the front of the site on Castle Street. It is intended that the existing connection will be utilised, which may need to be increased to allow for future growth, to serve the proposed development.

### WATER DEMAND

Trim Visitor Centre is equivalent to an Amenity Site (as outlined in the Irish Water Code of Practice for Wastewater Infrastructure)

#### Visitors

Required water demand requirements -	10 litres per use
Expected maximum number of visitors per day -	circa 500 persons per day
Water demand per day -	500 persons/day x 10 litres/use = 5500 l/day
Average water demand over 10 hour period (8a.m - 6p.m) -	5000 litres/day / (10 hrs x 60 min x 60 sec) = 0.13 l/s

#### Working Staff

Working staff are equivalent to Industrial full-time day staff (as outlined in the Irish Water Code of Practice for Wastewater Infrastructure)

Required water demand requirements -	90 litres per person per day
Expected maximum number of staff -	20 persons
Total water demand per day -	20 persons x 90 litres/person/day = 1800 l/day
Average water demand over 10 hour period (8a.m - 6p.m) -	1800 litres/day / (10 hrs x 60 min x 60 sec) = 0.05 l/sec
Total Daily Water Demand:	6800 l/day = 0.18 l/sec (over a 10 hour working period)
Total Peak Water Demand	5 x 0.18 l/sec =  0.95 l/sec (Irish Water Code of Practice for Water Infrastructure)

# Flooding Risk

## The Planning System and Flood Risk Management Guidelines

Guidelines for planning titled “The Planning System and Flood Risk Management” were published by the Department of Environment, Heritage and Local Government in 2009. This document identifies different flooding zones, appropriate development in these zones and how to conduct a flood risk assessment (FRA).

The guidelines include definitions of Flood zones A, B and C as described below. It should be noted that these do not account for flood defences as these can be breached or overtopped in extreme events, or in the case of demountable defences, not installed correctly.

**Zone A:** This is a zone where likelihood of flooding is greatest, with a risk greater than 1% (1 in 100 year) for fluvial and 0.5% (1 in 200 year) for coastal flooding.

**Zone B:** In this zone the likelihood of fluvial flooding is between 1% and 0.1% (1 in 100 year to 1 in 1000 year) and between 0.5% and 0.1% (1 in 200 year to 1 in 1000 year) for coastal flooding.

**Zone C:** In this zone the likelihood of flooding is less than 0.1% (1 in 1000 year) for both fluvial and coastal flooding. Such sites are suitable for all development from a flooding perspective.

Once a flood zone has been identified, the guidelines set out the types of development that are appropriate for each zone. Exemptions to the restrictions are provided for through the use of the justification test, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. Many towns and urban centres lie within flood risk zones and the avoidance of all future development in these areas would not be sustainable.

The guidelines set out a three stage approach to carrying out a FRA:

1. Flood Risk Identification:
2. Initial Flood Risk Assessment
3. Detailed Flood Risk Assessment

## Flood Risk Identification – Stage 1

Stage 1 identifies whether there are any flooding or surface water management issues related to the site, i.e. it identifies whether a flood risk assessment is required.

Based on information on the OPW floodinfo.ie website, the location of the proposed development is not at risk from river flooding events, in any of the low- medium- or high-probability cases. Similarly, while there have been a limited number of reported flooding

events in the local area, these are not within our site, located approximately 50m away; the most recent record which was in 2002.



**Figure 2:** Extract from floodinfo.ie showing river flooding (all probabilities) in vicinity of Trim town. Site location circled in red.



**Figure 3:** Extract from floodinfo.ie showing past flood events in vicinity of the proposed development.

The OPW CFRAM (Catchment Flood Risk Assessment and Management) maps indicate that there is a risk of river flooding in the general area; however this is at behind Trim Castle which is adjacent to the proposed development approximately 50m from the proposed site. The site topography generally slopes quite from north-west to south-east; it is assumed that the ground water follows a similar profile, making its way towards the Boyne River.

CFRAM present day flood level for the site is +53.76mOD. Allowing for climate change of +0.5m in accordance with the County Development plan and a freeboard of 0.5m gives a minimum allowable floor level for the site of +54.76mOD. Our proposed FFL is +57.04mOD

OPW CFRAM maps are included in Appendix B of this report.

On the basis of the above, the site is deemed not to be at risk of flooding, and a further detailed Flood Risk Assessment does not need to be completed.

# Construction Management Plan

## General

This section has been included to outline the intended strategy for the management of the construction works on site.

Once appointed, the contractor will prepare a more detailed Construction Management Plan in advance of the works commencing. This may be updated throughout the construction phase, as required.

## Construction Programme and Phasing

Subject to a successful grant of planning, it is intended that the works would commence in 2024. The proposed development is anticipated to be constructed over a 15-18 month period.

The anticipated construction sequence for the building is as follows:

- Clearance of existing vegetation on site
- Set up site perimeter and contractor's site compound
- Localised re-grading of the ground to facilitate access for construction machinery
- Excavations for new building foundations
- Construction of building foundations and rising walls to ground level, with back-filling below ground floor level, as required
- Construction of remainder of the new building superstructure and fit-out of existing Trim Market House
- Installation of façade and internal elements to new building
- External landscaping and construction of hard-standing areas

## Site Establishment

### EXCAVATIONS

Based on previous records from utility providers, there appears to be a considerable amount of underground services towards the northeast of the site. Prior to excavation, the Contractor shall accurately locate and verify all existing services.

It is proposed that excavations are generally battered-back to a 45 degree angle with trench boxes used for deeper excavations.

It is not proposed that any significant de-watering will be required on site. However, localised pumping from deeper excavations for foundations may be required.

## FENCING

Temporary fencing around the site will be required to maintain site security during the construction phase. It is envisaged that this will be Heras fencing or solid timber hoarding, 2m high.

## SITE ACCESS AND CONTRACTOR'S COMPOUND

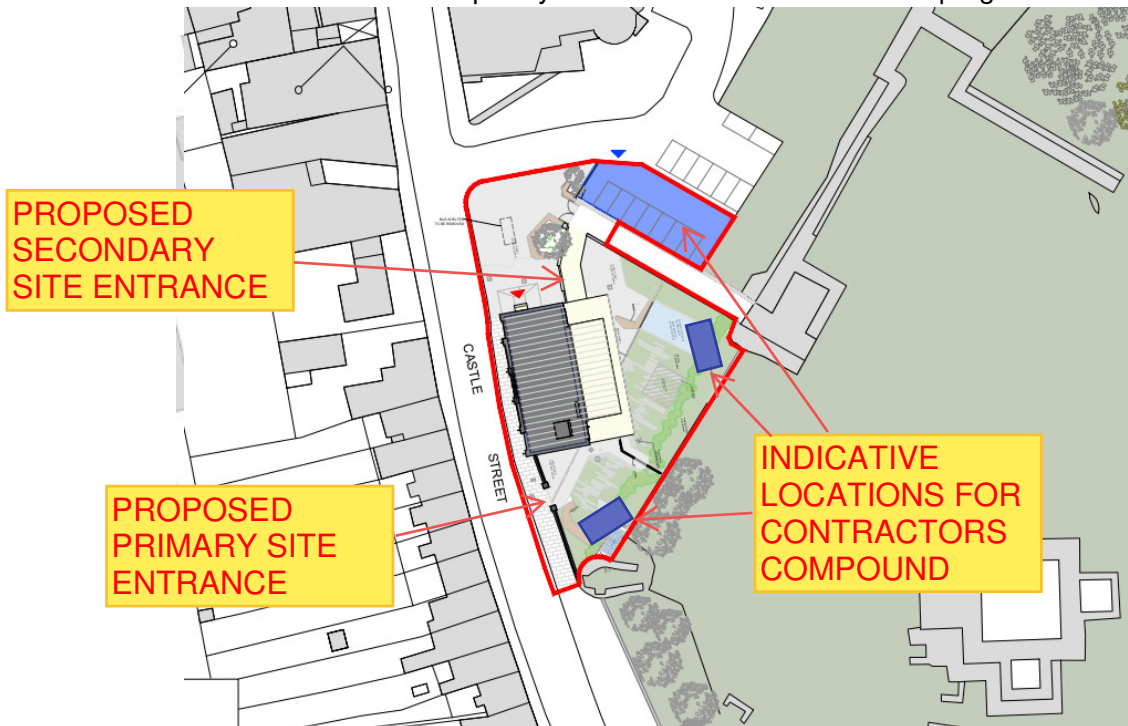
It is envisaged that a temporary entrance to the site will be made at the location of the existing vehicle entrance to the site; a secondary exit entrance at the west side of the site may also be required.

It is indicatively proposed that the contractor's compound and storage area could be located in the southern or western corners of the site. However, given the extremely restricted conditions of the site, it is likely that the site compound may need to be relocated a number of times as works progress.

It is proposed that the contractor would make a temporary connection to the Irish Water mains water supply to serve the compound during the construction works. As there is a foul sewer already within the site area, the contractor can manage the disposal of wastewater through the connection to the existing sewer line.

Temporary access routes and hard-standing areas will be required to provide trafficable routes around the site.

The appointed contractor will determine the exact location for site access points, compound location and on-site temporary roads to suit their construction programme and methodology.



**Figure 4:** Indicative locations of contractor's compound and site entrances



## Hours of Working

It is proposed that construction operations on site will generally be between the hours of 0700-1900 Monday to Friday, and 0700-1300 on Saturday. Similarly, deliveries of materials to site should generally be between the hours of 0700 to 1900 Monday to Friday, and 0700-1300 on Saturdays.

On occasion, it may be necessary for construction work and/or deliveries to take place outside of the above normal working hours.

All hours of working will comply with any planning conditions as set out.

# **Appendix A – Met Eireann Rainfall data and Storm Water Calculations**

Met Eireann  
Return Period Rainfall Depths for sliding Durations  
Irish Grid: Easting: 280187, Northing: 256741,

DURATION	Interval		Years										
	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	120,
5 mins	2.6,	3.6,	4.1,	4.9,	5.4,	5.8,	7.2,	8.7,	9.7,	11.1,	12.3,	13.3,	13.9,
10 mins	3.6,	5.0,	5.7,	6.8,	7.6,	8.1,	10.0,	12.1,	13.5,	15.5,	17.2,	18.5,	19.4,
15 mins	4.2,	5.8,	6.7,	8.0,	8.9,	9.6,	11.8,	14.3,	15.9,	18.2,	20.2,	21.8,	22.9,
30 mins	5.5,	7.6,	8.6,	10.2,	11.3,	12.1,	14.8,	17.8,	19.7,	22.4,	24.8,	26.6,	27.8,
1 hours	7.3,	9.8,	11.1,	13.1,	14.4,	15.4,	18.6,	22.1,	24.4,	27.5,	30.3,	32.4,	33.9,
2 hours	9.5,	12.7,	14.3,	16.7,	18.3,	19.5,	23.3,	27.5,	30.2,	33.9,	37.1,	39.6,	41.2,
3 hours	11.2,	14.8,	16.6,	19.3,	21.0,	22.4,	26.6,	31.2,	34.2,	38.3,	41.8,	44.5,	46.3,
4 hours	12.6,	16.5,	18.4,	21.3,	23.2,	24.7,	29.2,	34.2,	37.4,	41.7,	45.5,	48.3,	50.2,
6 hours	14.7,	19.1,	21.4,	24.6,	26.7,	28.3,	33.4,	38.8,	42.3,	47.1,	51.2,	54.3,	56.4,
9 hours	17.3,	22.3,	24.8,	28.4,	30.7,	32.5,	38.1,	44.1,	48.0,	53.2,	57.6,	61.0,	63.3,
12 hours	19.4,	24.8,	27.5,	31.4,	34.0,	35.9,	41.9,	48.3,	52.4,	57.9,	62.7,	66.3,	68.7,
18 hours	22.8,	28.9,	31.9,	36.3,	39.1,	41.2,	47.9,	54.9,	59.4,	65.4,	70.6,	74.5,	77.1,
24 hours	25.5,	32.2,	35.5,	40.2,	43.2,	45.5,	52.6,	60.2,	64.9,	71.3,	76.8,	80.9,	83.7,
2 days	31.5,	39.0,	42.7,	47.9,	51.3,	53.8,	61.6,	69.7,	74.8,	81.6,	87.4,	91.8,	94.6,
3 days	36.5,	44.8,	48.8,	54.5,	58.2,	60.9,	69.3,	78.0,	83.4,	90.7,	96.8,	101.4,	104.4,
4 days	41.0,	50.0,	54.4,	60.5,	64.4,	67.3,	76.2,	85.5,	91.2,	98.8,	105.3,	110.1,	113.3,
6 days	49.2,	59.4,	64.3,	71.1,	75.5,	78.7,	88.6,	98.8,	105.1,	113.5,	120.5,	125.7,	129.1,
8 days	56.6,	67.9,	73.3,	80.8,	85.5,	89.0,	99.8,	110.8,	117.6,	126.6,	134.2,	139.8,	143.4,
10 days	63.6,	75.8,	81.6,	89.7,	94.8,	98.6,	110.1,	121.9,	129.2,	138.8,	146.8,	152.7,	156.6,
12 days	70.2,	83.3,	89.5,	98.2,	103.6,	107.7,	119.9,	132.4,	140.1,	150.2,	158.7,	164.9,	169.0,
16 days	82.7,	97.4,	104.4,	114.1,	120.2,	124.6,	138.2,	152.0,	160.5,	171.6,	180.8,	187.7,	192.1,
20 days	94.5,	110.8,	118.5,	129.1,	135.7,	140.6,	155.4,	170.4,	179.5,	191.5,	201.5,	208.8,	213.6,
25 days	108.7,	126.7,	135.2,	146.8,	154.1,	159.5,	175.7,	192.0,	201.9,	215.0,	225.8,	233.8,	238.9,

NOTES:

These values are derived from a Depth Duration Frequency (DDF) Model update 2023

For details refer to:

'Mateus C., and Coonan, B. 2023. Estimation of point rainfall frequencies in Ireland. Technical Note No. 68. Met Eireann',

Available for download at:

<http://hdl.handle.net/2262/102417>

**Design Settings**

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	20	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	15.400	Minimum Backdrop Height (m)	0.200
Ratio-R	0.280	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

**Nodes**

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
1	0.023	5.00	56.900	1200	1.050
2	0.003	5.00	56.900	1200	1.130
3	0.035	5.00	56.900	1200	1.380
4	0.024	5.00	56.900	1200	1.520
5			56.900	1200	1.570

**Links**

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1	1	2	7.180	0.600	55.850	55.770	0.080	89.8	100	5.15	50.0
2	2	3	24.200	0.600	55.770	55.520	0.250	96.8	100	5.66	50.0
3	3	4	13.100	0.600	55.520	55.380	0.140	93.6	150	5.87	50.0
4	4	5	4.940	0.600	55.380	55.330	0.050	98.8	150	5.96	50.0






Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1	0.812	6.4	3.7	0.950	1.030	0.023	0.0	55	0.844
2	0.781	6.1	4.2	1.030	1.280	0.026	0.0	61	0.844
3	1.039	18.4	9.9	1.230	1.370	0.061	0.0	79	1.060
4	1.011	17.9	13.8	1.370	1.420	0.085	0.0	99	1.114

**Pipeline Schedule**

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1	7.180	89.8	100	Circular	56.900	55.850	0.950	56.900	55.770	1.030
2	24.200	96.8	100	Circular	56.900	55.770	1.030	56.900	55.520	1.280
3	13.100	93.6	150	Circular	56.900	55.520	1.230	56.900	55.380	1.370
4	4.940	98.8	150	Circular	56.900	55.380	1.370	56.900	55.330	1.420

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
2	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
3	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
4	4	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable

**Manhole Schedule**

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	56.900	1.050	1200				
					0 1	55.850	100
2	56.900	1.130	1200		1 1	55.770	100
					0 2	55.770	100
3	56.900	1.380	1200		1 2	55.520	100
					0 3	55.520	150
4	56.900	1.520	1200		1 3	55.380	150
					0 4	55.380	150
5	56.900	1.570	1200		1 4	55.330	150

**Simulation Settings**

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	Scotland and Ireland	Skip Steady State	x
M5-60 (mm)	15.400	Drain Down Time (mins)	240
Ratio-R	0.280	Additional Storage (m <sup>3</sup> /ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

**Storm Durations**

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	20	0	0
30	20	0	0
100	20	0	0

**Node 5 Online Hydro-Brake® Control**

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	55.330	Product Number	CTL-SHE-0063-2000-1300-2000
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

**Node 3 Depth/Area Storage Structure**

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	55.520
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	108

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	25.5	0.0	0.800	25.5	0.0	0.801	0.0	0.0

**Approval Settings**

Node Size	✓	Minimum Full Bore Velocity (m/s)	
Node Losses	✓	Maximum Full Bore Velocity (m/s)	3.000
Link Size	✓	Proportional Velocity	✓
Minimum Diameter (mm)	150	Return Period (years)	
Link Length	✓	Minimum Proportional Velocity (m/s)	0.750
Maximum Length (m)	100.000	Maximum Proportional Velocity (m/s)	3.000
Coordinates	✓	Surcharged Depth	✓
Accuracy (m)	1.000	Return Period (years)	
Crossings	✓	Maximum Surcharged Depth (m)	0.100
Cover Depth	✓	Flooding	✓
Minimum Cover Depth (m)		Return Period (years)	30
Maximum Cover Depth (m)	3.000	Time to Half Empty	x
Backdrops	✓	Discharge Rates	✓
Minimum Backdrop Height (m)		Discharge Volume	✓
Maximum Backdrop Height (m)	1.500	100 year 360 minute (m <sup>3</sup> )	
Full Bore Velocity	✓		

**Results for 1 year +20% CC Critical Storm Duration. Lowest mass balance: 99.02%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	10	55.900	0.050	2.9	0.0779	0.0000	OK
15 minute winter	2	10	55.824	0.054	3.3	0.0638	0.0000	OK
60 minute winter	3	48	55.659	0.139	5.0	3.7726	0.0000	OK
60 minute winter	4	48	55.658	0.278	4.0	0.4024	0.0000	SURCHARGED
60 minute winter	5	48	55.657	0.327	2.6	0.3703	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute summer	1	1	2	2.6	0.703	0.407	0.0265	
15 minute summer	2	2	3	3.2	0.887	0.514	0.1120	
180 minute summer	3	3	4	2.0	0.476	0.109	0.2005	
15 minute winter	4	4	5	3.4	0.475	0.193	0.0870	
60 minute winter	5	Hydro-Brake®			1.7			9.0

**Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.02%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
120 minute winter	1	114	56.005	0.155	2.4	0.2438	0.0000	SURCHARGED
120 minute winter	2	114	56.005	0.235	2.7	0.2783	0.0000	SURCHARGED
120 minute winter	3	114	56.003	0.483	6.5	13.1110	0.0000	SURCHARGED
120 minute winter	4	114	56.002	0.622	2.9	0.9008	0.0000	SURCHARGED
120 minute winter	5	114	56.002	0.672	2.9	0.7600	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute summer	1	1	2	5.6	0.823	0.882	0.0562	
15 minute winter	2	2	3	6.0	0.938	0.977	0.1893	
180 minute summer	3	3	4	1.8	0.475	0.096	0.2306	
15 minute summer	4	4	5	3.2	0.515	0.180	0.0870	
120 minute winter	5	Hydro-Brake®		1.7				25.3



**Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.02%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
120 minute winter	1	114	56.213	0.363	3.1	0.5698	0.0000	SURCHARGED
120 minute winter	2	114	56.213	0.443	3.4	0.5240	0.0000	SURCHARGED
120 minute winter	3	116	56.210	0.690	8.3	18.7383	0.0000	SURCHARGED
120 minute winter	4	116	56.210	0.830	3.2	1.2007	0.0000	SURCHARGED
120 minute winter	5	116	56.209	0.879	3.5	0.9942	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute summer	1	1	2	6.2	0.838	0.967	0.0562	
15 minute winter	2	2	3	6.2	0.952	1.013	0.1893	
180 minute winter	3	3	4	1.8	0.477	0.097	0.2306	
30 minute winter	4	4	5	3.4	0.525	0.188	0.0870	
120 minute winter	5	Hydro-Brake®		1.7				32.7

**Results for 1 year +20% CC 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute summer	1	10	55.899	0.049	2.8	0.0762	0.0000	OK
15 minute summer	2	10	55.823	0.053	3.2	0.0627	0.0000	OK
15 minute summer	3	17	55.604	0.084	7.4	2.2735	0.0000	OK
15 minute summer	4	16	55.604	0.224	5.7	0.3248	0.0000	SURCHARGED
15 minute summer	5	16	55.604	0.274	3.5	0.3097	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute summer	1	1	2	2.8	0.696	0.433	0.0287	
15 minute summer	2	2	3	3.2	0.887	0.514	0.1120	
15 minute summer	3	3	4	2.8	0.350	0.155	0.1816	
15 minute summer	4	4	5	3.5	0.448	0.194	0.0870	
15 minute summer	5	Hydro-Brake®		1.7				4.4

**Results for 1 year +20% CC 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	10	55.900	0.050	2.9	0.0779	0.0000	OK
15 minute winter	2	10	55.824	0.054	3.3	0.0638	0.0000	OK
15 minute winter	3	17	55.619	0.099	10.2	2.6862	0.0000	OK
15 minute winter	4	16	55.620	0.240	6.5	0.3469	0.0000	SURCHARGED
15 minute winter	5	16	55.619	0.289	3.4	0.3274	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1	2	2.9	0.702	0.449	0.0294	
15 minute winter	2	2	3	3.3	0.872	0.545	0.1245	
15 minute winter	3	3	4	3.4	0.350	0.184	0.1961	
15 minute winter	4	4	5	3.4	0.475	0.193	0.0870	
15 minute winter	5	Hydro-Brake®		1.7				5.0

**Results for 1 year +20% CC 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
30 minute summer	1	18	55.897	0.047	2.6	0.0733	0.0000	OK
30 minute summer	2	18	55.819	0.049	2.9	0.0579	0.0000	OK
30 minute summer	3	27	55.626	0.106	9.6	2.8792	0.0000	OK
30 minute summer	4	26	55.626	0.246	6.1	0.3563	0.0000	SURCHARGED
30 minute summer	5	26	55.626	0.296	3.6	0.3345	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute summer	1	1	2	2.6	0.703	0.407	0.0265	
30 minute summer	2	2	3	3.0	0.774	0.481	0.1260	
30 minute summer	3	3	4	3.4	0.400	0.184	0.2026	
30 minute summer	4	4	5	3.6	0.426	0.204	0.0870	
30 minute summer	5	Hydro-Brake®		1.7				6.1

**Results for 1 year +20% CC 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
30 minute winter	1	18	55.895	0.045	2.4	0.0699	0.0000	OK
30 minute winter	2	18	55.816	0.046	2.7	0.0548	0.0000	OK
30 minute winter	3	29	55.646	0.126	8.3	3.4147	0.0000	OK
30 minute winter	4	28	55.645	0.265	5.4	0.3841	0.0000	SURCHARGED
30 minute winter	5	28	55.645	0.315	2.9	0.3561	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute winter	1	1	2	2.4	0.694	0.376	0.0248	
30 minute winter	2	2	3	2.7	0.732	0.439	0.1312	
30 minute winter	3	3	4	3.1	0.378	0.169	0.2186	
30 minute winter	4	4	5	2.9	0.442	0.162	0.0870	
30 minute winter	5	Hydro-Brake®		1.7				6.8

**Results for 1 year +20% CC 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
60 minute summer	1	33	55.891	0.041	2.1	0.0646	0.0000	OK
60 minute summer	2	33	55.813	0.043	2.4	0.0512	0.0000	OK
60 minute summer	3	45	55.641	0.121	6.0	3.2802	0.0000	OK
60 minute summer	4	44	55.641	0.261	4.4	0.3771	0.0000	SURCHARGED
60 minute summer	5	44	55.640	0.310	2.8	0.3506	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
60 minute summer	1	1	2	2.1	0.669	0.329	0.0225	
60 minute summer	2	2	3	2.4	0.672	0.389	0.1268	
60 minute summer	3	3	4	2.6	0.444	0.142	0.2149	
60 minute summer	4	4	5	2.8	0.390	0.157	0.0870	
60 minute summer	5	Hydro-Brake®		1.7				8.1

**Results for 1 year +20% CC 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
60 minute winter	1	33	55.887	0.037	1.7	0.0573	0.0000	OK
60 minute winter	2	33	55.808	0.038	1.9	0.0450	0.0000	OK
60 minute winter	3	48	55.659	0.139	5.0	3.7726	0.0000	OK
60 minute winter	4	48	55.658	0.278	4.0	0.4024	0.0000	SURCHARGED
60 minute winter	5	48	55.657	0.327	2.6	0.3703	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
60 minute winter	1	1	2	1.7	0.639	0.266	0.0191	
60 minute winter	2	2	3	1.9	0.602	0.307	0.1257	
60 minute winter	3	3	4	2.5	0.446	0.137	0.2269	
60 minute winter	4	4	5	2.6	0.390	0.148	0.0870	
60 minute winter	5	Hydro-Brake®		1.7				9.0

**Results for 1 year +20% CC 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
120 minute summer	1	64	55.883	0.033	1.4	0.0515	0.0000	OK
120 minute summer	2	64	55.805	0.035	1.6	0.0412	0.0000	OK
120 minute summer	3	80	55.636	0.116	4.1	3.1402	0.0000	OK
120 minute summer	4	80	55.635	0.255	3.3	0.3690	0.0000	SURCHARGED
120 minute summer	5	80	55.634	0.304	2.4	0.3442	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
120 minute summer	1	1	2	1.4	0.602	0.220	0.0167	
120 minute summer	2	2	3	1.6	0.532	0.261	0.1177	
120 minute summer	3	3	4	2.1	0.455	0.117	0.2108	
120 minute summer	4	4	5	2.4	0.345	0.136	0.0870	
120 minute summer	5	Hydro-Brake®		1.7				10.4



**Results for 1 year +20% CC 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
120 minute winter	1	62	55.879	0.029	1.1	0.0453	0.0000	OK
120 minute winter	2	66	55.800	0.030	1.2	0.0355	0.0000	OK
120 minute winter	3	86	55.647	0.127	2.9	3.4583	0.0000	OK
120 minute winter	4	86	55.647	0.267	3.0	0.3861	0.0000	SURCHARGED
120 minute winter	5	86	55.646	0.316	2.2	0.3575	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
120 minute winter	1	1	2	1.1	0.574	0.173	0.0138	
120 minute winter	2	2	3	1.2	0.504	0.196	0.1163	
120 minute winter	3	3	4	2.0	0.460	0.110	0.2198	
120 minute winter	4	4	5	2.2	0.346	0.121	0.0870	
120 minute winter	5	Hydro-Brake®		1.7				11.8

**Results for 1 year +20% CC 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
180 minute summer	1	96	55.879	0.029	1.1	0.0453	0.0000	OK
180 minute summer	2	96	55.800	0.030	1.2	0.0355	0.0000	OK
180 minute summer	3	116	55.624	0.104	2.9	2.8177	0.0000	OK
180 minute summer	4	116	55.623	0.243	3.0	0.3519	0.0000	SURCHARGED
180 minute summer	5	116	55.623	0.293	2.2	0.3308	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
180 minute summer	1	1	2	1.1	0.574	0.172	0.0138	
180 minute summer	2	2	3	1.2	0.489	0.196	0.1118	
180 minute summer	3	3	4	2.0	0.476	0.109	0.2005	
180 minute summer	4	4	5	2.2	0.305	0.121	0.0870	
180 minute summer	5	Hydro-Brake®		1.7				12.2

**Results for 1 year +20% CC 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
180 minute winter	1	96	55.876	0.026	0.9	0.0407	0.0000	OK
180 minute winter	2	96	55.797	0.027	1.0	0.0323	0.0000	OK
180 minute winter	3	120	55.625	0.105	2.3	2.8606	0.0000	OK
180 minute winter	4	120	55.625	0.245	2.6	0.3543	0.0000	SURCHARGED
180 minute winter	5	120	55.624	0.294	2.0	0.3327	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
180 minute winter	1	1	2	0.9	0.540	0.141	0.0120	
180 minute winter	2	2	3	1.0	0.468	0.163	0.1112	
180 minute winter	3	3	4	1.8	0.467	0.100	0.2019	
180 minute winter	4	4	5	2.0	0.330	0.115	0.0870	
180 minute winter	5	Hydro-Brake®		1.7				13.8

**Results for 1 year +20% CC 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
240 minute summer	1	124	55.877	0.027	1.0	0.0428	0.0000	OK
240 minute summer	2	124	55.798	0.028	1.1	0.0335	0.0000	OK
240 minute summer	3	148	55.612	0.092	2.6	2.4883	0.0000	OK
240 minute summer	4	148	55.611	0.231	2.6	0.3344	0.0000	SURCHARGED
240 minute summer	5	148	55.610	0.280	2.4	0.3171	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
240 minute summer	1	1	2	1.0	0.558	0.155	0.0127	
240 minute summer	2	2	3	1.1	0.477	0.175	0.1058	
240 minute summer	3	3	4	1.8	0.470	0.096	0.1892	
240 minute summer	4	4	5	2.4	0.331	0.135	0.0870	
240 minute summer	5	Hydro-Brake®		1.7				13.3

**Results for 1 year +20% CC 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
240 minute winter	1	116	55.873	0.023	0.7	0.0356	0.0000	OK
240 minute winter	2	120	55.794	0.024	0.8	0.0289	0.0000	OK
240 minute winter	3	156	55.603	0.083	1.9	2.2441	0.0000	OK
240 minute winter	4	156	55.602	0.222	2.3	0.3216	0.0000	SURCHARGED
240 minute winter	5	156	55.602	0.272	3.1	0.3071	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
240 minute winter	1	1	2	0.7	0.499	0.110	0.0101	
240 minute winter	2	2	3	0.8	0.453	0.130	0.0978	
240 minute winter	3	3	4	1.6	0.451	0.088	0.1805	
240 minute winter	4	4	5	3.1	0.331	0.173	0.0870	
240 minute winter	5	Hydro-Brake®		1.7				15.0

**Results for 1 year +20% CC 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
360 minute summer	1	184	55.874	0.024	0.8	0.0381	0.0000	OK
360 minute summer	2	184	55.796	0.026	0.9	0.0304	0.0000	OK
360 minute summer	3	208	55.586	0.066	2.1	1.7964	0.0000	OK
360 minute summer	4	208	55.586	0.206	2.3	0.2977	0.0000	SURCHARGED
360 minute summer	5	208	55.585	0.255	3.9	0.2884	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
360 minute summer	1	1	2	0.8	0.520	0.124	0.0110	
360 minute summer	2	2	3	0.9	0.459	0.144	0.0796	
360 minute summer	3	3	4	1.6	0.441	0.085	0.1644	
360 minute summer	4	4	5	3.9	0.352	0.220	0.0870	
360 minute summer	5	Hydro-Brake®		1.7				15.9

**Results for 1 year +20% CC 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
360 minute winter	1	184	55.871	0.021	0.6	0.0327	0.0000	OK
360 minute winter	2	184	55.793	0.023	0.7	0.0267	0.0000	OK
360 minute winter	3	216	55.564	0.044	1.6	1.1928	0.0000	OK
360 minute winter	4	216	55.564	0.184	2.0	0.2656	0.0000	SURCHARGED
360 minute winter	5	216	55.563	0.233	3.1	0.2634	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
360 minute winter	1	1	2	0.6	0.475	0.093	0.0090	
360 minute winter	2	2	3	0.7	0.424	0.111	0.0532	
360 minute winter	3	3	4	1.4	0.459	0.076	0.1434	
360 minute winter	4	4	5	3.1	0.310	0.176	0.0870	
360 minute winter	5	Hydro-Brake®		1.7				17.6

**Results for 1 year +20% CC 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
480 minute summer	1	248	55.871	0.021	0.6	0.0329	0.0000	OK
480 minute summer	2	248	55.793	0.023	0.7	0.0270	0.0000	OK
480 minute summer	3	264	55.568	0.048	1.7	1.2940	0.0000	OK
480 minute summer	4	264	55.567	0.187	2.2	0.2710	0.0000	SURCHARGED
480 minute summer	5	264	55.567	0.237	1.8	0.2676	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
480 minute summer	1	1	2	0.6	0.475	0.094	0.0091	
480 minute summer	2	2	3	0.7	0.458	0.114	0.0591	
480 minute summer	3	3	4	1.5	0.467	0.083	0.1468	
480 minute summer	4	4	5	1.8	0.251	0.099	0.0870	
480 minute summer	5	Hydro-Brake®		1.7				18.1



**Results for 1 year +20% CC 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
480 minute winter	1	240	55.869	0.019	0.5	0.0299	0.0000	OK
480 minute winter	2	240	55.791	0.021	0.6	0.0250	0.0000	OK
480 minute winter	3	256	55.547	0.027	1.3	0.7331	0.0000	OK
480 minute winter	4	264	55.540	0.160	1.8	0.2308	0.0000	SURCHARGED
480 minute winter	5	264	55.539	0.209	3.6	0.2361	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
480 minute winter	1	1	2	0.5	0.447	0.078	0.0080	
480 minute winter	2	2	3	0.6	0.417	0.098	0.0352	
480 minute winter	3	3	4	1.3	0.464	0.071	0.1291	
480 minute winter	4	4	5	3.6	0.379	0.199	0.0870	
480 minute winter	5	Hydro-Brake®		1.7				19.6

**Results for 1 year +20% CC 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
600 minute summer	1	315	55.869	0.019	0.5	0.0299	0.0000	OK
600 minute summer	2	315	55.791	0.021	0.6	0.0250	0.0000	OK
600 minute summer	3	315	55.548	0.028	1.4	0.7588	0.0000	OK
600 minute summer	4	330	55.539	0.159	1.9	0.2302	0.0000	SURCHARGED
600 minute summer	5	330	55.538	0.208	1.6	0.2357	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
600 minute summer	1	1	2	0.5	0.447	0.078	0.0080	
600 minute summer	2	2	3	0.6	0.412	0.098	0.0362	
600 minute summer	3	3	4	1.4	0.463	0.076	0.1286	
600 minute summer	4	4	5	1.6	0.250	0.092	0.0870	
600 minute summer	5	Hydro-Brake®		1.7				19.6

**Results for 1 year +20% CC 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
600 minute winter	1	285	55.867	0.017	0.4	0.0271	0.0000	OK
600 minute winter	2	315	55.789	0.019	0.5	0.0229	0.0000	OK
600 minute winter	3	315	55.545	0.025	1.1	0.6750	0.0000	OK
600 minute winter	4	330	55.439	0.059	1.8	0.0847	0.0000	OK
600 minute winter	5	330	55.428	0.098	2.2	0.1113	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
600 minute winter	1	1	2	0.4	0.444	0.063	0.0070	
600 minute winter	2	2	3	0.5	0.393	0.081	0.0311	
600 minute winter	3	3	4	1.1	0.471	0.060	0.0539	
600 minute winter	4	4	5	2.2	0.294	0.123	0.0459	
600 minute winter	5	Hydro-Brake®		1.5				20.8

**Results for 1 year +20% CC 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
720 minute summer	1	375	55.869	0.019	0.5	0.0299	0.0000	OK
720 minute summer	2	375	55.791	0.021	0.6	0.0250	0.0000	OK
720 minute summer	3	375	55.547	0.027	1.3	0.7323	0.0000	OK
720 minute summer	4	390	55.505	0.125	1.8	0.1813	0.0000	OK
720 minute summer	5	390	55.505	0.175	3.4	0.1977	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
720 minute summer	1	1	2	0.5	0.447	0.078	0.0080	
720 minute summer	2	2	3	0.6	0.421	0.098	0.0351	
720 minute summer	3	3	4	1.3	0.463	0.071	0.1161	
720 minute summer	4	4	5	3.4	0.313	0.192	0.0823	
720 minute summer	5	Hydro-Brake®		1.6				20.2

**Results for 1 year +20% CC 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
720 minute winter	1	375	55.867	0.017	0.4	0.0271	0.0000	OK
720 minute winter	2	375	55.787	0.017	0.4	0.0205	0.0000	OK
720 minute winter	3	375	55.543	0.023	0.9	0.6118	0.0000	OK
720 minute winter	4	375	55.409	0.029	1.3	0.0415	0.0000	OK
720 minute winter	5	375	55.412	0.082	1.4	0.0930	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
720 minute winter	1	1	2	0.4	0.444	0.063	0.0065	
720 minute winter	2	2	3	0.4	0.362	0.065	0.0269	
720 minute winter	3	3	4	0.9	0.462	0.049	0.0262	
720 minute winter	4	4	5	1.4	0.249	0.077	0.0302	
720 minute winter	5	Hydro-Brake®		1.3				23.0

**Results for 1 year +20% CC 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
960 minute summer	1	510	55.867	0.017	0.4	0.0271	0.0000	OK
960 minute summer	2	495	55.789	0.019	0.5	0.0229	0.0000	OK
960 minute summer	3	495	55.545	0.025	1.1	0.6743	0.0000	OK
960 minute summer	4	510	55.432	0.052	1.8	0.0747	0.0000	OK
960 minute summer	5	495	55.435	0.105	3.4	0.1192	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
960 minute summer	1	1	2	0.4	0.444	0.063	0.0070	
960 minute summer	2	2	3	0.5	0.399	0.081	0.0311	
960 minute summer	3	3	4	1.1	0.468	0.060	0.0468	
960 minute summer	4	4	5	3.4	0.381	0.192	0.0445	
960 minute summer	5	Hydro-Brake®		1.5				22.3

**Results for 1 year +20% CC 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
960 minute winter	1	435	55.865	0.015	0.3	0.0235	0.0000	OK
960 minute winter	2	435	55.785	0.015	0.3	0.0178	0.0000	OK
960 minute winter	3	495	55.541	0.021	0.8	0.5780	0.0000	OK
960 minute winter	4	495	55.405	0.025	1.1	0.0365	0.0000	OK
960 minute winter	5	495	55.397	0.067	1.1	0.0755	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
960 minute winter	1	1	2	0.3	0.409	0.047	0.0053	
960 minute winter	2	2	3	0.3	0.328	0.049	0.0236	
960 minute winter	3	3	4	0.8	0.461	0.043	0.0227	
960 minute winter	4	4	5	1.1	0.248	0.061	0.0235	
960 minute winter	5	Hydro-Brake®		1.1				26.2

**Results for 1 year +20% CC 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
1440 minute summer	1	720	55.865	0.015	0.3	0.0235	0.0000	OK
1440 minute summer	2	720	55.785	0.015	0.3	0.0178	0.0000	OK
1440 minute summer	3	750	55.541	0.021	0.8	0.5791	0.0000	OK
1440 minute summer	4	750	55.405	0.025	1.1	0.0365	0.0000	OK
1440 minute summer	5	750	55.397	0.067	1.1	0.0758	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
1440 minute summer	1	1	2	0.3	0.409	0.047	0.0053	
1440 minute summer	2	2	3	0.3	0.331	0.049	0.0237	
1440 minute summer	3	3	4	0.8	0.462	0.044	0.0228	
1440 minute summer	4	4	5	1.1	0.247	0.062	0.0236	
1440 minute summer	5	Hydro-Brake®		1.1				22.7



**Results for 1 year +20% CC 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
1440 minute winter	1	600	55.862	0.012	0.2	0.0193	0.0000	OK
1440 minute winter	2	600	55.782	0.012	0.2	0.0147	0.0000	OK
1440 minute winter	3	750	55.539	0.019	0.6	0.5048	0.0000	OK
1440 minute winter	4	750	55.402	0.022	0.8	0.0313	0.0000	OK
1440 minute winter	5	750	55.381	0.051	0.8	0.0573	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
1440 minute winter	1	1	2	0.2	0.362	0.031	0.0040	
1440 minute winter	2	2	3	0.2	0.309	0.033	0.0188	
1440 minute winter	3	3	4	0.6	0.428	0.033	0.0184	
1440 minute winter	4	4	5	0.8	0.246	0.045	0.0168	
1440 minute winter	5	Hydro-Brake®		0.8				26.6

**Results for 30 year +20% CC 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 99.22%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute summer	1	12	55.973	0.123	6.2	0.1936	0.0000	SURCHARGED
15 minute summer	2	12	55.913	0.143	6.8	0.1693	0.0000	SURCHARGED
15 minute summer	3	18	55.774	0.254	19.4	6.9030	0.0000	SURCHARGED
15 minute summer	4	18	55.773	0.393	8.3	0.5694	0.0000	SURCHARGED
15 minute summer	5	18	55.773	0.443	3.2	0.5009	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute summer	1	1	2	6.0	0.807	0.936	0.0562	
15 minute summer	2	2	3	6.1	0.937	0.986	0.1893	
15 minute summer	3	3	4	-4.7	0.351	-0.255	0.2306	
15 minute summer	4	4	5	3.2	0.515	0.180	0.0870	
15 minute summer	5	Hydro-Brake®		1.7				9.9

**Results for 30 year +20% CC 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 99.05%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	12	56.001	0.151	6.5	0.2367	0.0000	SURCHARGED
15 minute winter	2	13	55.943	0.173	6.5	0.2042	0.0000	SURCHARGED
15 minute winter	3	18	55.813	0.293	19.8	7.9470	0.0000	SURCHARGED
15 minute winter	4	18	55.812	0.432	8.6	0.6251	0.0000	SURCHARGED
15 minute winter	5	18	55.811	0.481	4.3	0.5444	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1	2	5.7	0.812	0.890	0.0562	
15 minute winter	2	2	3	6.0	0.938	0.977	0.1893	
15 minute winter	3	3	4	-4.4	0.351	-0.239	0.2306	
15 minute winter	4	4	5	4.3	0.514	0.239	0.0870	
15 minute winter	5	Hydro-Brake®		1.7				11.2

**Results for 30 year +20% CC 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 99.17%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
30 minute summer	1	20	55.980	0.130	5.9	0.2047	0.0000	SURCHARGED
30 minute summer	2	20	55.933	0.162	6.4	0.1924	0.0000	SURCHARGED
30 minute summer	3	32	55.856	0.336	17.2	9.1130	0.0000	SURCHARGED
30 minute summer	4	33	55.855	0.475	6.1	0.6873	0.0000	SURCHARGED
30 minute summer	5	33	55.854	0.524	3.0	0.5931	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute summer	1	1	2	5.6	0.823	0.882	0.0562	
30 minute summer	2	2	3	5.8	0.764	0.946	0.1893	
30 minute summer	3	3	4	-2.9	0.379	-0.158	0.2306	
30 minute summer	4	4	5	3.0	0.488	0.170	0.0870	
30 minute summer	5	Hydro-Brake®		1.7				13.7

**Results for 30 year +20% CC 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 99.29%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
30 minute winter	1	21	55.975	0.125	5.3	0.1957	0.0000	SURCHARGED
30 minute winter	2	22	55.939	0.169	5.9	0.2004	0.0000	SURCHARGED
30 minute winter	3	32	55.907	0.387	15.8	10.4938	0.0000	SURCHARGED
30 minute winter	4	32	55.906	0.526	5.6	0.7611	0.0000	SURCHARGED
30 minute winter	5	32	55.905	0.575	2.9	0.6509	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute winter	1	1	2	5.2	0.808	0.811	0.0562	
30 minute winter	2	2	3	5.4	0.778	0.874	0.1893	
30 minute winter	3	3	4	3.0	0.356	0.161	0.2306	
30 minute winter	4	4	5	2.9	0.475	0.161	0.0870	
30 minute winter	5	Hydro-Brake®		1.7				15.3

**Results for 30 year +20% CC 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 99.52%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
60 minute summer	1	36	55.921	0.071	4.6	0.1109	0.0000	OK
60 minute summer	2	60	55.918	0.148	5.2	0.1754	0.0000	SURCHARGED
60 minute summer	3	61	55.916	0.396	13.5	10.7528	0.0000	SURCHARGED
60 minute summer	4	61	55.916	0.536	4.8	0.7749	0.0000	SURCHARGED
60 minute summer	5	61	55.915	0.585	2.5	0.6617	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
60 minute summer	1	1	2	4.6	0.794	0.721	0.0493	
60 minute summer	2	2	3	4.8	0.707	0.789	0.1893	
60 minute summer	3	3	4	2.3	0.447	0.125	0.2306	
60 minute summer	4	4	5	2.5	0.448	0.142	0.0870	
60 minute summer	5	Hydro-Brake®		1.7				17.9

**Results for 30 year +20% CC 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 99.69%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
60 minute winter	1	59	55.984	0.134	3.7	0.2095	0.0000	SURCHARGED
60 minute winter	2	59	55.983	0.213	4.2	0.2522	0.0000	SURCHARGED
60 minute winter	3	60	55.981	0.461	10.7	12.5088	0.0000	SURCHARGED
60 minute winter	4	60	55.980	0.600	4.0	0.8686	0.0000	SURCHARGED
60 minute winter	5	60	55.980	0.650	2.7	0.7349	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
60 minute winter	1	1	2	3.7	0.757	0.582	0.0562	
60 minute winter	2	2	3	4.0	0.714	0.654	0.1893	
60 minute winter	3	3	4	2.4	0.448	0.131	0.2306	
60 minute winter	4	4	5	2.7	0.442	0.152	0.0870	
60 minute winter	5	Hydro-Brake®		1.7				20.0

**Results for 30 year +20% CC 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 99.83%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
120 minute summer	1	98	55.935	0.085	3.1	0.1332	0.0000	OK
120 minute summer	2	98	55.935	0.165	3.5	0.1949	0.0000	SURCHARGED
120 minute summer	3	100	55.933	0.413	8.9	11.2071	0.0000	SURCHARGED
120 minute summer	4	100	55.932	0.552	3.2	0.7994	0.0000	SURCHARGED
120 minute summer	5	100	55.932	0.602	3.7	0.6808	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
120 minute summer	1	1	2	3.1	0.736	0.486	0.0535	
120 minute summer	2	2	3	3.5	0.588	0.570	0.1893	
120 minute summer	3	3	4	2.1	0.473	0.113	0.2306	
120 minute summer	4	4	5	3.7	0.405	0.206	0.0870	
120 minute summer	5	Hydro-Brake®		1.7				22.6



**Results for 30 year +20% CC 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 99.88%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
120 minute winter	1	114	56.005	0.155	2.4	0.2438	0.0000	SURCHARGED
120 minute winter	2	114	56.005	0.235	2.7	0.2783	0.0000	SURCHARGED
120 minute winter	3	114	56.003	0.483	6.5	13.1110	0.0000	SURCHARGED
120 minute winter	4	114	56.002	0.622	2.9	0.9008	0.0000	SURCHARGED
120 minute winter	5	114	56.002	0.672	2.9	0.7600	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
120 minute winter	1	1	2	2.4	0.694	0.376	0.0562	
120 minute winter	2	2	3	2.7	0.591	0.434	0.1893	
120 minute winter	3	3	4	1.9	0.469	0.104	0.2306	
120 minute winter	4	4	5	2.9	0.389	0.164	0.0870	
120 minute winter	5	Hydro-Brake®		1.7				25.3

**Results for 30 year +20% CC 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
180 minute summer	1	132	55.934	0.084	2.4	0.1316	0.0000	OK
180 minute summer	2	132	55.934	0.164	2.7	0.1937	0.0000	SURCHARGED
180 minute summer	3	136	55.932	0.412	6.6	11.1840	0.0000	SURCHARGED
180 minute summer	4	136	55.932	0.552	2.7	0.7981	0.0000	SURCHARGED
180 minute summer	5	136	55.931	0.601	3.6	0.6798	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
180 minute summer	1	1	2	2.4	0.694	0.376	0.0533	
180 minute summer	2	2	3	2.7	0.501	0.440	0.1893	
180 minute summer	3	3	4	1.8	0.475	0.096	0.2306	
180 minute summer	4	4	5	3.6	0.325	0.199	0.0870	
180 minute summer	5	Hydro-Brake®		1.7				25.8

**Results for 30 year +20% CC 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
180 minute winter	1	144	55.995	0.145	1.8	0.2281	0.0000	SURCHARGED
180 minute winter	2	144	55.995	0.225	2.0	0.2663	0.0000	SURCHARGED
180 minute winter	3	144	55.993	0.473	4.8	12.8383	0.0000	SURCHARGED
180 minute winter	4	144	55.992	0.612	2.8	0.8862	0.0000	SURCHARGED
180 minute winter	5	144	55.992	0.662	3.3	0.7486	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
180 minute winter	1	1	2	1.8	0.649	0.282	0.0562	
180 minute winter	2	2	3	2.0	0.507	0.326	0.1893	
180 minute winter	3	3	4	1.9	0.465	0.102	0.2306	
180 minute winter	4	4	5	3.3	0.331	0.184	0.0870	
180 minute winter	5	Hydro-Brake®		1.7				28.6

**Results for 30 year +20% CC 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
240 minute summer	1	168	55.922	0.072	2.0	0.1125	0.0000	OK
240 minute summer	2	168	55.921	0.151	2.3	0.1793	0.0000	SURCHARGED
240 minute summer	3	172	55.920	0.400	5.4	10.8460	0.0000	SURCHARGED
240 minute summer	4	172	55.919	0.539	2.8	0.7801	0.0000	SURCHARGED
240 minute summer	5	172	55.919	0.589	3.6	0.6658	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
240 minute summer	1	1	2	2.0	0.659	0.312	0.0497	
240 minute summer	2	2	3	2.3	0.512	0.370	0.1893	
240 minute summer	3	3	4	1.9	0.466	0.102	0.2306	
240 minute summer	4	4	5	3.6	0.324	0.201	0.0870	
240 minute summer	5	Hydro-Brake®		1.7				28.2

**Results for 30 year +20% CC 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
240 minute winter	1	180	55.980	0.130	1.5	0.2046	0.0000	SURCHARGED
240 minute winter	2	180	55.980	0.210	1.7	0.2487	0.0000	SURCHARGED
240 minute winter	3	180	55.978	0.458	4.0	12.4344	0.0000	SURCHARGED
240 minute winter	4	180	55.978	0.598	2.3	0.8647	0.0000	SURCHARGED
240 minute winter	5	180	55.977	0.647	3.1	0.7318	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
240 minute winter	1	1	2	1.5	0.615	0.235	0.0562	
240 minute winter	2	2	3	1.7	0.516	0.277	0.1893	
240 minute winter	3	3	4	1.6	0.474	0.090	0.2306	
240 minute winter	4	4	5	3.1	0.330	0.171	0.0870	
240 minute winter	5	Hydro-Brake®		1.7				31.8

**Results for 30 year +20% CC 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
360 minute summer	1	240	55.895	0.045	1.6	0.0708	0.0000	OK
360 minute summer	2	240	55.895	0.125	1.8	0.1479	0.0000	SURCHARGED
360 minute summer	3	240	55.894	0.374	4.2	10.1436	0.0000	SURCHARGED
360 minute summer	4	240	55.893	0.513	2.5	0.7427	0.0000	SURCHARGED
360 minute summer	5	240	55.893	0.563	2.1	0.6365	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
360 minute summer	1	1	2	1.6	0.627	0.249	0.0404	
360 minute summer	2	2	3	1.8	0.448	0.290	0.1893	
360 minute summer	3	3	4	1.7	0.459	0.093	0.2306	
360 minute summer	4	4	5	2.1	0.251	0.117	0.0870	
360 minute summer	5	Hydro-Brake®		1.7				32.0

**Results for 30 year +20% CC 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
360 minute winter	1	256	55.927	0.077	1.1	0.1202	0.0000	OK
360 minute winter	2	256	55.926	0.156	1.2	0.1851	0.0000	SURCHARGED
360 minute winter	3	256	55.925	0.404	2.9	10.9772	0.0000	SURCHARGED
360 minute winter	4	256	55.924	0.544	2.4	0.7871	0.0000	SURCHARGED
360 minute winter	5	256	55.923	0.593	1.9	0.6712	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
360 minute winter	1	1	2	1.1	0.574	0.173	0.0512	
360 minute winter	2	2	3	1.2	0.453	0.196	0.1893	
360 minute winter	3	3	4	1.7	0.464	0.090	0.2306	
360 minute winter	4	4	5	1.9	0.287	0.109	0.0870	
360 minute winter	5	Hydro-Brake®		1.7				35.9

**Results for 30 year +20% CC 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
480 minute summer	1	248	55.881	0.031	1.3	0.0494	0.0000	OK
480 minute summer	2	304	55.846	0.076	1.5	0.0905	0.0000	OK
480 minute summer	3	304	55.845	0.325	3.4	8.8184	0.0000	SURCHARGED
480 minute summer	4	304	55.844	0.464	2.4	0.6718	0.0000	SURCHARGED
480 minute summer	5	304	55.844	0.514	2.3	0.5810	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
480 minute summer	1	1	2	1.3	0.589	0.204	0.0263	
480 minute summer	2	2	3	1.5	0.448	0.244	0.1723	
480 minute summer	3	3	4	1.7	0.469	0.093	0.2306	
480 minute summer	4	4	5	2.3	0.293	0.130	0.0870	
480 minute summer	5	Hydro-Brake®		1.7				34.5



**Results for 30 year +20% CC 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
480 minute winter	1	232	55.876	0.026	0.9	0.0407	0.0000	OK
480 minute winter	2	328	55.865	0.095	1.0	0.1121	0.0000	OK
480 minute winter	3	328	55.863	0.343	2.4	9.3062	0.0000	SURCHARGED
480 minute winter	4	328	55.862	0.482	2.3	0.6979	0.0000	SURCHARGED
480 minute winter	5	328	55.862	0.532	3.2	0.6014	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
480 minute winter	1	1	2	0.9	0.540	0.141	0.0308	
480 minute winter	2	2	3	1.0	0.432	0.163	0.1875	
480 minute winter	3	3	4	1.5	0.459	0.084	0.2306	
480 minute winter	4	4	5	3.2	0.286	0.179	0.0870	
480 minute winter	5	Hydro-Brake®		1.7				39.7

**Results for 30 year +20% CC 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
600 minute summer	1	315	55.877	0.027	1.0	0.0430	0.0000	OK
600 minute summer	2	375	55.810	0.040	1.1	0.0476	0.0000	OK
600 minute summer	3	375	55.808	0.288	2.7	7.8278	0.0000	SURCHARGED
600 minute summer	4	375	55.808	0.428	1.9	0.6189	0.0000	SURCHARGED
600 minute summer	5	375	55.807	0.477	1.8	0.5396	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
600 minute summer	1	1	2	1.0	0.557	0.157	0.0137	
600 minute summer	2	2	3	1.1	0.421	0.179	0.1303	
600 minute summer	3	3	4	1.5	0.465	0.080	0.2306	
600 minute summer	4	4	5	1.8	0.249	0.099	0.0870	
600 minute summer	5	Hydro-Brake®		1.7				37.4

**Results for 30 year +20% CC 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
600 minute winter	1	300	55.874	0.024	0.8	0.0382	0.0000	OK
600 minute winter	2	405	55.805	0.035	0.9	0.0420	0.0000	OK
600 minute winter	3	405	55.804	0.284	2.1	7.6956	0.0000	SURCHARGED
600 minute winter	4	405	55.803	0.423	2.0	0.6118	0.0000	SURCHARGED
600 minute winter	5	405	55.802	0.472	3.6	0.5341	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
600 minute winter	1	1	2	0.8	0.520	0.125	0.0121	
600 minute winter	2	2	3	0.9	0.421	0.147	0.1247	
600 minute winter	3	3	4	1.5	0.463	0.080	0.2306	
600 minute winter	4	4	5	3.6	0.335	0.204	0.0870	
600 minute winter	5	Hydro-Brake®		1.7				41.8

**Results for 30 year +20% CC 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
720 minute summer	1	375	55.876	0.026	0.9	0.0407	0.0000	OK
720 minute summer	2	375	55.797	0.027	1.0	0.0323	0.0000	OK
720 minute summer	3	435	55.770	0.250	2.4	6.7723	0.0000	SURCHARGED
720 minute summer	4	435	55.769	0.389	1.9	0.5627	0.0000	SURCHARGED
720 minute summer	5	435	55.768	0.438	2.3	0.4956	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
720 minute summer	1	1	2	0.9	0.540	0.141	0.0120	
720 minute summer	2	2	3	1.0	0.408	0.163	0.1156	
720 minute summer	3	3	4	1.5	0.435	0.081	0.2306	
720 minute summer	4	4	5	2.3	0.318	0.130	0.0870	
720 minute summer	5	Hydro-Brake®		1.7				39.1

**Results for 30 year +20% CC 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
720 minute winter	1	360	55.873	0.023	0.7	0.0356	0.0000	OK
720 minute winter	2	360	55.794	0.024	0.8	0.0289	0.0000	OK
720 minute winter	3	465	55.731	0.211	1.9	5.7360	0.0000	SURCHARGED
720 minute winter	4	465	55.731	0.351	2.0	0.5072	0.0000	SURCHARGED
720 minute winter	5	465	55.730	0.400	2.9	0.4522	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
720 minute winter	1	1	2	0.7	0.499	0.110	0.0101	
720 minute winter	2	2	3	0.8	0.428	0.130	0.1125	
720 minute winter	3	3	4	1.4	0.458	0.076	0.2306	
720 minute winter	4	4	5	2.9	0.330	0.164	0.0870	
720 minute winter	5	Hydro-Brake®		1.7				43.7

**Results for 30 year +20% CC 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
960 minute summer	1	495	55.874	0.024	0.8	0.0382	0.0000	OK
960 minute summer	2	495	55.796	0.026	0.9	0.0306	0.0000	OK
960 minute summer	3	555	55.697	0.177	2.1	4.7934	0.0000	SURCHARGED
960 minute summer	4	555	55.696	0.316	1.8	0.4571	0.0000	SURCHARGED
960 minute summer	5	555	55.695	0.365	3.5	0.4130	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
960 minute summer	1	1	2	0.8	0.520	0.125	0.0110	
960 minute summer	2	2	3	0.9	0.409	0.147	0.1141	
960 minute summer	3	3	4	1.4	0.463	0.077	0.2306	
960 minute summer	4	4	5	3.5	0.349	0.197	0.0870	
960 minute summer	5	Hydro-Brake®		1.7				43.5

**Results for 30 year +20% CC 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
960 minute winter	1	480	55.871	0.021	0.6	0.0329	0.0000	OK
960 minute winter	2	480	55.793	0.023	0.7	0.0270	0.0000	OK
960 minute winter	3	570	55.635	0.115	1.6	3.1201	0.0000	OK
960 minute winter	4	570	55.634	0.254	1.9	0.3681	0.0000	SURCHARGED
960 minute winter	5	570	55.634	0.304	2.9	0.3435	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
960 minute winter	1	1	2	0.6	0.475	0.094	0.0091	
960 minute winter	2	2	3	0.7	0.420	0.114	0.1093	
960 minute winter	3	3	4	1.4	0.459	0.075	0.2102	
960 minute winter	4	4	5	2.9	0.383	0.161	0.0870	
960 minute winter	5	Hydro-Brake®		1.7				48.6

**Results for 30 year +20% CC 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
1440 minute summer	1	750	55.871	0.021	0.6	0.0329	0.0000	OK
1440 minute summer	2	750	55.793	0.023	0.7	0.0270	0.0000	OK
1440 minute summer	3	780	55.603	0.083	1.6	2.2658	0.0000	OK
1440 minute summer	4	780	55.603	0.223	1.8	0.3227	0.0000	SURCHARGED
1440 minute summer	5	780	55.602	0.272	1.7	0.3080	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
1440 minute summer	1	1	2	0.6	0.475	0.094	0.0091	
1440 minute summer	2	2	3	0.7	0.417	0.114	0.0991	
1440 minute summer	3	3	4	1.3	0.457	0.073	0.1813	
1440 minute summer	4	4	5	1.7	0.247	0.096	0.0870	
1440 minute summer	5	Hydro-Brake®		1.7				51.3



**Results for 30 year +20% CC 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
1440 minute winter	1	840	55.867	0.017	0.4	0.0271	0.0000	OK
1440 minute winter	2	690	55.789	0.019	0.5	0.0229	0.0000	OK
1440 minute winter	3	750	55.546	0.026	1.2	0.7053	0.0000	OK
1440 minute winter	4	750	55.508	0.128	1.7	0.1856	0.0000	OK
1440 minute winter	5	750	55.507	0.177	3.5	0.1997	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
1440 minute winter	1	1	2	0.4	0.444	0.063	0.0070	
1440 minute winter	2	2	3	0.5	0.392	0.081	0.0323	
1440 minute winter	3	3	4	1.2	0.471	0.065	0.1184	
1440 minute winter	4	4	5	3.5	0.402	0.194	0.0831	
1440 minute winter	5	Hydro-Brake®		1.6				54.6

**Results for 100 year +20% CC 15 minute summer. 255 minute analysis at 1 minute timestep. Mass balance: 99.02%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute summer	1	12	56.128	0.278	8.0	0.4360	0.0000	SURCHARGED
15 minute summer	2	13	56.050	0.280	7.2	0.3315	0.0000	SURCHARGED
15 minute summer	3	19	55.866	0.346	23.1	9.3995	0.0000	SURCHARGED
15 minute summer	4	19	55.865	0.485	8.4	0.7023	0.0000	SURCHARGED
15 minute summer	5	19	55.865	0.535	4.5	0.6049	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute summer	1	1	2	6.2	0.825	0.975	0.0562	
15 minute summer	2	2	3	6.3	0.946	1.034	0.1893	
15 minute summer	3	3	4	-5.1	0.351	-0.278	0.2306	
15 minute summer	4	4	5	4.5	0.516	0.252	0.0870	
15 minute summer	5	Hydro-Brake®		1.7				12.9

**Results for 100 year +20% CC 15 minute winter. 255 minute analysis at 1 minute timestep. Mass balance: 99.12%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	1	12	56.172	0.322	8.5	0.5056	0.0000	SURCHARGED
15 minute winter	2	13	56.098	0.328	7.4	0.3885	0.0000	SURCHARGED
15 minute winter	3	19	55.914	0.394	23.7	10.6903	0.0000	SURCHARGED
15 minute winter	4	19	55.913	0.533	8.8	0.7710	0.0000	SURCHARGED
15 minute winter	5	19	55.912	0.582	3.9	0.6586	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	1	1	2	6.4	0.820	1.003	0.0562	
15 minute winter	2	2	3	6.2	0.952	1.013	0.1893	
15 minute winter	3	3	4	-5.5	-0.367	-0.299	0.2306	
15 minute winter	4	4	5	3.9	0.520	0.216	0.0870	
15 minute winter	5	Hydro-Brake®		1.7				14.4

**Results for 100 year +20% CC 30 minute summer. 270 minute analysis at 1 minute timestep. Mass balance: 99.30%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
30 minute summer	1	20	56.154	0.304	7.6	0.4777	0.0000	SURCHARGED
30 minute summer	2	21	56.089	0.319	7.1	0.3777	0.0000	SURCHARGED
30 minute summer	3	33	55.982	0.462	21.5	12.5374	0.0000	SURCHARGED
30 minute summer	4	33	55.981	0.601	8.0	0.8699	0.0000	SURCHARGED
30 minute summer	5	33	55.981	0.651	3.0	0.7359	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute summer	1	1	2	6.2	0.838	0.967	0.0562	
30 minute summer	2	2	3	5.7	0.794	0.931	0.1893	
30 minute summer	3	3	4	-4.3	0.373	-0.236	0.2306	
30 minute summer	4	4	5	3.0	0.500	0.168	0.0870	
30 minute summer	5	Hydro-Brake®		1.7				17.8

**Results for 100 year +20% CC 30 minute winter. 270 minute analysis at 1 minute timestep. Mass balance: 99.41%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
30 minute winter	1	21	56.169	0.319	6.9	0.5012	0.0000	SURCHARGED
30 minute winter	2	22	56.117	0.347	6.3	0.4109	0.0000	SURCHARGED
30 minute winter	3	33	56.047	0.527	19.5	14.3134	0.0000	SURCHARGED
30 minute winter	4	32	56.047	0.667	7.2	0.9646	0.0000	SURCHARGED
30 minute winter	5	32	56.046	0.716	3.4	0.8098	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
30 minute winter	1	1	2	5.5	0.822	0.867	0.0562	
30 minute winter	2	2	3	5.7	0.836	0.921	0.1893	
30 minute winter	3	3	4	-3.7	0.351	-0.204	0.2306	
30 minute winter	4	4	5	3.4	0.525	0.188	0.0870	
30 minute winter	5	Hydro-Brake®		1.7				19.9

**Results for 100 year +20% CC 60 minute summer. 300 minute analysis at 1 minute timestep. Mass balance: 99.58%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
60 minute summer	1	37	56.097	0.247	5.9	0.3879	0.0000	SURCHARGED
60 minute summer	2	61	56.073	0.303	6.1	0.3588	0.0000	SURCHARGED
60 minute summer	3	62	56.071	0.551	16.6	14.9413	0.0000	SURCHARGED
60 minute summer	4	62	56.070	0.690	6.2	0.9981	0.0000	SURCHARGED
60 minute summer	5	62	56.069	0.739	2.5	0.8360	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
60 minute summer	1	1	2	5.4	0.802	0.842	0.0562	
60 minute summer	2	2	3	4.9	0.733	0.801	0.1893	
60 minute summer	3	3	4	-3.0	0.445	-0.165	0.2306	
60 minute summer	4	4	5	2.5	0.475	0.140	0.0870	
60 minute summer	5	Hydro-Brake®		1.7				23.2

**Results for 100 year +20% CC 60 minute winter. 300 minute analysis at 1 minute timestep. Mass balance: 99.70%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
60 minute winter	1	59	56.157	0.307	4.8	0.4812	0.0000	SURCHARGED
60 minute winter	2	59	56.156	0.386	5.1	0.4566	0.0000	SURCHARGED
60 minute winter	3	61	56.153	0.633	13.4	17.1788	0.0000	SURCHARGED
60 minute winter	4	60	56.152	0.772	5.0	1.1171	0.0000	SURCHARGED
60 minute winter	5	60	56.151	0.821	2.7	0.9290	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
60 minute winter	1	1	2	4.5	0.778	0.703	0.0562	
60 minute winter	2	2	3	4.3	0.751	0.703	0.1893	
60 minute winter	3	3	4	2.4	0.416	0.131	0.2306	
60 minute winter	4	4	5	2.7	0.469	0.152	0.0870	
60 minute winter	5	Hydro-Brake®		1.7				25.8

**Results for 100 year +20% CC 120 minute summer. 360 minute analysis at 2 minute timestep. Mass balance: 99.80%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
120 minute summer	1	108	56.109	0.259	4.0	0.4061	0.0000	SURCHARGED
120 minute summer	2	108	56.108	0.338	4.6	0.4006	0.0000	SURCHARGED
120 minute summer	3	108	56.106	0.586	11.0	15.9110	0.0000	SURCHARGED
120 minute summer	4	106	56.106	0.726	4.2	1.0500	0.0000	SURCHARGED
120 minute summer	5	106	56.105	0.775	3.8	0.8765	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
120 minute summer	1	1	2	4.1	0.753	0.637	0.0562	
120 minute summer	2	2	3	3.7	0.609	0.610	0.1893	
120 minute summer	3	3	4	1.7	0.456	0.094	0.2306	
120 minute summer	4	4	5	3.8	0.448	0.211	0.0870	
120 minute summer	5	Hydro-Brake®		1.7				29.4



**Results for 100 year +20% CC 120 minute winter. 360 minute analysis at 2 minute timestep. Mass balance: 99.87%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
120 minute winter	1	114	56.213	0.363	3.1	0.5698	0.0000	SURCHARGED
120 minute winter	2	114	56.213	0.443	3.4	0.5240	0.0000	SURCHARGED
120 minute winter	3	116	56.210	0.690	8.3	18.7383	0.0000	SURCHARGED
120 minute winter	4	116	56.210	0.830	3.2	1.2007	0.0000	SURCHARGED
120 minute winter	5	116	56.209	0.879	3.5	0.9942	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
120 minute winter	1	1	2	3.0	0.710	0.471	0.0562	
120 minute winter	2	2	3	3.0	0.634	0.495	0.1893	
120 minute winter	3	3	4	1.8	0.448	0.097	0.2306	
120 minute winter	4	4	5	3.5	0.390	0.197	0.0870	
120 minute winter	5	Hydro-Brake®		1.7				32.7

**Results for 100 year +20% CC 180 minute summer. 420 minute analysis at 4 minute timestep. Mass balance: 99.87%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
180 minute summer	1	144	56.108	0.258	3.0	0.4044	0.0000	SURCHARGED
180 minute summer	2	144	56.107	0.337	3.4	0.3994	0.0000	SURCHARGED
180 minute summer	3	144	56.105	0.585	8.3	15.8856	0.0000	SURCHARGED
180 minute summer	4	140	56.105	0.725	3.2	1.0485	0.0000	SURCHARGED
180 minute summer	5	140	56.104	0.774	2.2	0.8754	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
180 minute summer	1	1	2	3.0	0.710	0.464	0.0562	
180 minute summer	2	2	3	2.9	0.552	0.474	0.1893	
180 minute summer	3	3	4	1.6	0.468	0.087	0.2306	
180 minute summer	4	4	5	2.2	0.331	0.125	0.0870	
180 minute summer	5	Hydro-Brake®		1.7				33.1

**Results for 100 year +20% CC 180 minute winter. 420 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
180 minute winter	1	148	56.204	0.354	2.3	0.5562	0.0000	SURCHARGED
180 minute winter	2	148	56.204	0.434	2.6	0.5137	0.0000	SURCHARGED
180 minute winter	3	152	56.202	0.682	5.9	18.4953	0.0000	SURCHARGED
180 minute winter	4	152	56.201	0.821	2.6	1.1875	0.0000	SURCHARGED
180 minute winter	5	152	56.200	0.870	3.9	0.9839	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
180 minute winter	1	1	2	2.3	0.669	0.359	0.0562	
180 minute winter	2	2	3	2.3	0.550	0.383	0.1893	
180 minute winter	3	3	4	1.8	0.477	0.097	0.2306	
180 minute winter	4	4	5	3.9	0.390	0.221	0.0870	
180 minute winter	5	Hydro-Brake®		1.7				37.1

**Results for 100 year +20% CC 240 minute summer. 480 minute analysis at 4 minute timestep. Mass balance: 99.91%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
240 minute summer	1	172	56.100	0.250	2.6	0.3923	0.0000	SURCHARGED
240 minute summer	2	172	56.099	0.329	2.9	0.3900	0.0000	SURCHARGED
240 minute summer	3	176	56.097	0.577	6.7	15.6707	0.0000	SURCHARGED
240 minute summer	4	176	56.097	0.717	2.7	1.0371	0.0000	SURCHARGED
240 minute summer	5	176	56.096	0.766	2.0	0.8664	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
240 minute summer	1	1	2	2.6	0.694	0.413	0.0562	
240 minute summer	2	2	3	2.6	0.491	0.430	0.1893	
240 minute summer	3	3	4	1.8	0.473	0.097	0.2306	
240 minute summer	4	4	5	2.0	0.325	0.114	0.0870	
240 minute summer	5	Hydro-Brake®		1.7				36.3

**Results for 100 year +20% CC 240 minute winter. 480 minute analysis at 4 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
240 minute winter	1	184	56.185	0.335	1.9	0.5263	0.0000	SURCHARGED
240 minute winter	2	184	56.185	0.415	2.1	0.4912	0.0000	SURCHARGED
240 minute winter	3	188	56.183	0.663	4.8	17.9823	0.0000	SURCHARGED
240 minute winter	4	188	56.182	0.802	2.6	1.1602	0.0000	SURCHARGED
240 minute winter	5	188	56.181	0.851	1.9	0.9626	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
240 minute winter	1	1	2	1.9	0.649	0.297	0.0562	
240 minute winter	2	2	3	2.0	0.516	0.322	0.1893	
240 minute winter	3	3	4	1.6	0.465	0.087	0.2306	
240 minute winter	4	4	5	1.9	0.330	0.109	0.0870	
240 minute winter	5	Hydro-Brake®		1.7				40.3

**Results for 100 year +20% CC 360 minute summer. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
360 minute summer	1	248	56.075	0.225	2.0	0.3532	0.0000	SURCHARGED
360 minute summer	2	248	56.075	0.305	2.3	0.3608	0.0000	SURCHARGED
360 minute summer	3	248	56.073	0.553	5.0	15.0023	0.0000	SURCHARGED
360 minute summer	4	248	56.072	0.692	2.5	1.0015	0.0000	SURCHARGED
360 minute summer	5	248	56.072	0.741	2.2	0.8386	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
360 minute summer	1	1	2	2.0	0.638	0.312	0.0562	
360 minute summer	2	2	3	1.9	0.487	0.312	0.1893	
360 minute summer	3	3	4	1.7	0.472	0.093	0.2306	
360 minute summer	4	4	5	2.2	0.279	0.122	0.0870	
360 minute summer	5	Hydro-Brake®		1.7				40.8

**Results for 100 year +20% CC 360 minute winter. 600 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
360 minute winter	1	264	56.148	0.298	1.5	0.4676	0.0000	SURCHARGED
360 minute winter	2	264	56.148	0.378	1.7	0.4472	0.0000	SURCHARGED
360 minute winter	3	264	56.146	0.626	3.8	16.9842	0.0000	SURCHARGED
360 minute winter	4	264	56.145	0.765	2.2	1.1072	0.0000	SURCHARGED
360 minute winter	5	264	56.145	0.814	2.1	0.9212	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
360 minute winter	1	1	2	1.5	0.602	0.234	0.0562	
360 minute winter	2	2	3	1.6	0.432	0.259	0.1893	
360 minute winter	3	3	4	1.5	0.461	0.084	0.2306	
360 minute winter	4	4	5	2.1	0.251	0.115	0.0870	
360 minute winter	5	Hydro-Brake®		1.7				46.1

**Results for 100 year +20% CC 480 minute summer. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
480 minute summer	1	320	56.036	0.186	1.6	0.2917	0.0000	SURCHARGED
480 minute summer	2	312	56.035	0.265	1.8	0.3143	0.0000	SURCHARGED
480 minute summer	3	320	56.034	0.514	4.2	13.9551	0.0000	SURCHARGED
480 minute summer	4	320	56.034	0.654	2.2	0.9457	0.0000	SURCHARGED
480 minute summer	5	320	56.033	0.703	2.7	0.7951	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
480 minute summer	1	1	2	1.6	0.627	0.255	0.0562	
480 minute summer	2	2	3	1.8	0.433	0.290	0.1893	
480 minute summer	3	3	4	1.5	0.461	0.084	0.2306	
480 minute summer	4	4	5	2.7	0.250	0.154	0.0870	
480 minute summer	5	Hydro-Brake®		1.7				44.1



**Results for 100 year +20% CC 480 minute winter. 720 minute analysis at 8 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
480 minute winter	1	344	56.099	0.249	1.2	0.3901	0.0000	SURCHARGED
480 minute winter	2	344	56.098	0.328	1.4	0.3886	0.0000	SURCHARGED
480 minute winter	3	344	56.096	0.576	3.2	15.6404	0.0000	SURCHARGED
480 minute winter	4	344	56.096	0.716	2.1	1.0355	0.0000	SURCHARGED
480 minute winter	5	344	56.095	0.765	2.4	0.8652	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
480 minute winter	1	1	2	1.2	0.575	0.188	0.0562	
480 minute winter	2	2	3	1.4	0.432	0.228	0.1893	
480 minute winter	3	3	4	1.5	0.464	0.084	0.2306	
480 minute winter	4	4	5	2.4	0.286	0.135	0.0870	
480 minute winter	5	Hydro-Brake®		1.7				49.4

**Results for 100 year +20% CC 600 minute summer. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
600 minute summer	1	390	56.013	0.163	1.3	0.2564	0.0000	SURCHARGED
600 minute summer	2	390	56.013	0.243	1.5	0.2877	0.0000	SURCHARGED
600 minute summer	3	390	56.011	0.491	3.5	13.3277	0.0000	SURCHARGED
600 minute summer	4	390	56.010	0.630	1.9	0.9123	0.0000	SURCHARGED
600 minute summer	5	390	56.010	0.680	1.8	0.7690	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
600 minute summer	1	1	2	1.3	0.589	0.204	0.0562	
600 minute summer	2	2	3	1.5	0.439	0.242	0.1893	
600 minute summer	3	3	4	1.5	0.463	0.084	0.2306	
600 minute summer	4	4	5	1.8	0.250	0.100	0.0870	
600 minute summer	5	Hydro-Brake®		1.7				47.2

**Results for 100 year +20% CC 600 minute winter. 840 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
600 minute winter	1	420	56.032	0.182	1.0	0.2849	0.0000	SURCHARGED
600 minute winter	2	420	56.031	0.261	1.1	0.3093	0.0000	SURCHARGED
600 minute winter	3	420	56.029	0.509	2.6	13.8217	0.0000	SURCHARGED
600 minute winter	4	420	56.029	0.649	2.1	0.9386	0.0000	SURCHARGED
600 minute winter	5	420	56.028	0.698	3.4	0.7895	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
600 minute winter	1	1	2	1.0	0.557	0.158	0.0562	
600 minute winter	2	2	3	1.1	0.433	0.179	0.1893	
600 minute winter	3	3	4	1.5	0.463	0.084	0.2306	
600 minute winter	4	4	5	3.4	0.312	0.191	0.0870	
600 minute winter	5	Hydro-Brake®		1.7				52.8

**Results for 100 year +20% CC 720 minute summer. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
720 minute summer	1	450	55.968	0.118	1.2	0.1845	0.0000	SURCHARGED
720 minute summer	2	450	55.967	0.197	1.4	0.2335	0.0000	SURCHARGED
720 minute summer	3	465	55.966	0.446	3.2	12.0909	0.0000	SURCHARGED
720 minute summer	4	450	55.965	0.585	1.9	0.8465	0.0000	SURCHARGED
720 minute summer	5	465	55.964	0.634	2.0	0.7176	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
720 minute summer	1	1	2	1.2	0.574	0.188	0.0562	
720 minute summer	2	2	3	1.4	0.408	0.228	0.1893	
720 minute summer	3	3	4	1.5	0.436	0.080	0.2306	
720 minute summer	4	4	5	2.0	0.276	0.114	0.0870	
720 minute summer	5	Hydro-Brake®		1.7				49.5

**Results for 100 year +20% CC 720 minute winter. 960 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
720 minute winter	1	495	55.984	0.134	0.9	0.2105	0.0000	SURCHARGED
720 minute winter	2	495	55.984	0.214	1.0	0.2531	0.0000	SURCHARGED
720 minute winter	3	495	55.982	0.462	2.4	12.5343	0.0000	SURCHARGED
720 minute winter	4	495	55.981	0.601	1.9	0.8700	0.0000	SURCHARGED
720 minute winter	5	495	55.981	0.651	3.4	0.7360	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
720 minute winter	1	1	2	0.9	0.540	0.141	0.0562	
720 minute winter	2	2	3	1.0	0.428	0.163	0.1893	
720 minute winter	3	3	4	1.5	0.463	0.084	0.2306	
720 minute winter	4	4	5	3.4	0.309	0.190	0.0870	
720 minute winter	5	Hydro-Brake®		1.7				56.4

**Results for 100 year +20% CC 960 minute summer. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
960 minute summer	1	585	55.897	0.047	1.0	0.0733	0.0000	OK
960 minute summer	2	585	55.897	0.127	1.1	0.1498	0.0000	SURCHARGED
960 minute summer	3	585	55.895	0.375	2.6	10.1690	0.0000	SURCHARGED
960 minute summer	4	585	55.894	0.514	2.1	0.7440	0.0000	SURCHARGED
960 minute summer	5	585	55.894	0.564	3.5	0.6375	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
960 minute summer	1	1	2	1.0	0.557	0.157	0.0410	
960 minute summer	2	2	3	1.1	0.433	0.179	0.1893	
960 minute summer	3	3	4	1.5	0.444	0.082	0.2306	
960 minute summer	4	4	5	3.5	0.331	0.198	0.0870	
960 minute summer	5	Hydro-Brake®		1.7				53.3

**Results for 100 year +20% CC 960 minute winter. 1200 minute analysis at 15 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
960 minute winter	1	465	55.873	0.023	0.7	0.0356	0.0000	OK
960 minute winter	2	630	55.839	0.069	0.8	0.0816	0.0000	OK
960 minute winter	3	630	55.837	0.317	1.9	8.6146	0.0000	SURCHARGED
960 minute winter	4	630	55.837	0.457	2.0	0.6609	0.0000	SURCHARGED
960 minute winter	5	630	55.836	0.506	1.7	0.5725	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
960 minute winter	1	1	2	0.7	0.499	0.110	0.0238	
960 minute winter	2	2	3	0.8	0.428	0.130	0.1643	
960 minute winter	3	3	4	1.5	0.451	0.080	0.2306	
960 minute winter	4	4	5	1.7	0.249	0.097	0.0870	
960 minute winter	5	Hydro-Brake®		1.7				60.2

**Results for 100 year +20% CC 1440 minute summer. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
1440 minute summer	1	750	55.873	0.023	0.7	0.0356	0.0000	OK
1440 minute summer	2	750	55.794	0.024	0.8	0.0289	0.0000	OK
1440 minute summer	3	840	55.735	0.215	1.9	5.8310	0.0000	SURCHARGED
1440 minute summer	4	840	55.734	0.354	1.8	0.5123	0.0000	SURCHARGED
1440 minute summer	5	840	55.733	0.403	1.9	0.4562	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
1440 minute summer	1	1	2	0.7	0.499	0.110	0.0101	
1440 minute summer	2	2	3	0.8	0.407	0.130	0.1125	
1440 minute summer	3	3	4	1.4	0.457	0.076	0.2306	
1440 minute summer	4	4	5	1.9	0.247	0.108	0.0870	
1440 minute summer	5	Hydro-Brake®		1.7				61.0

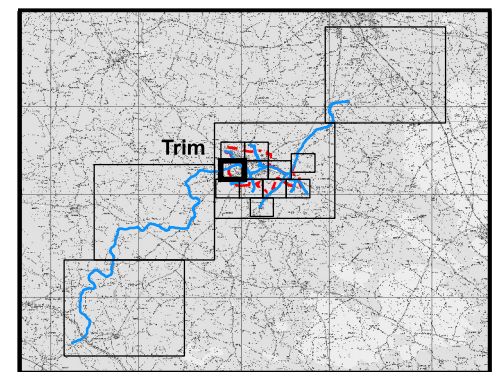
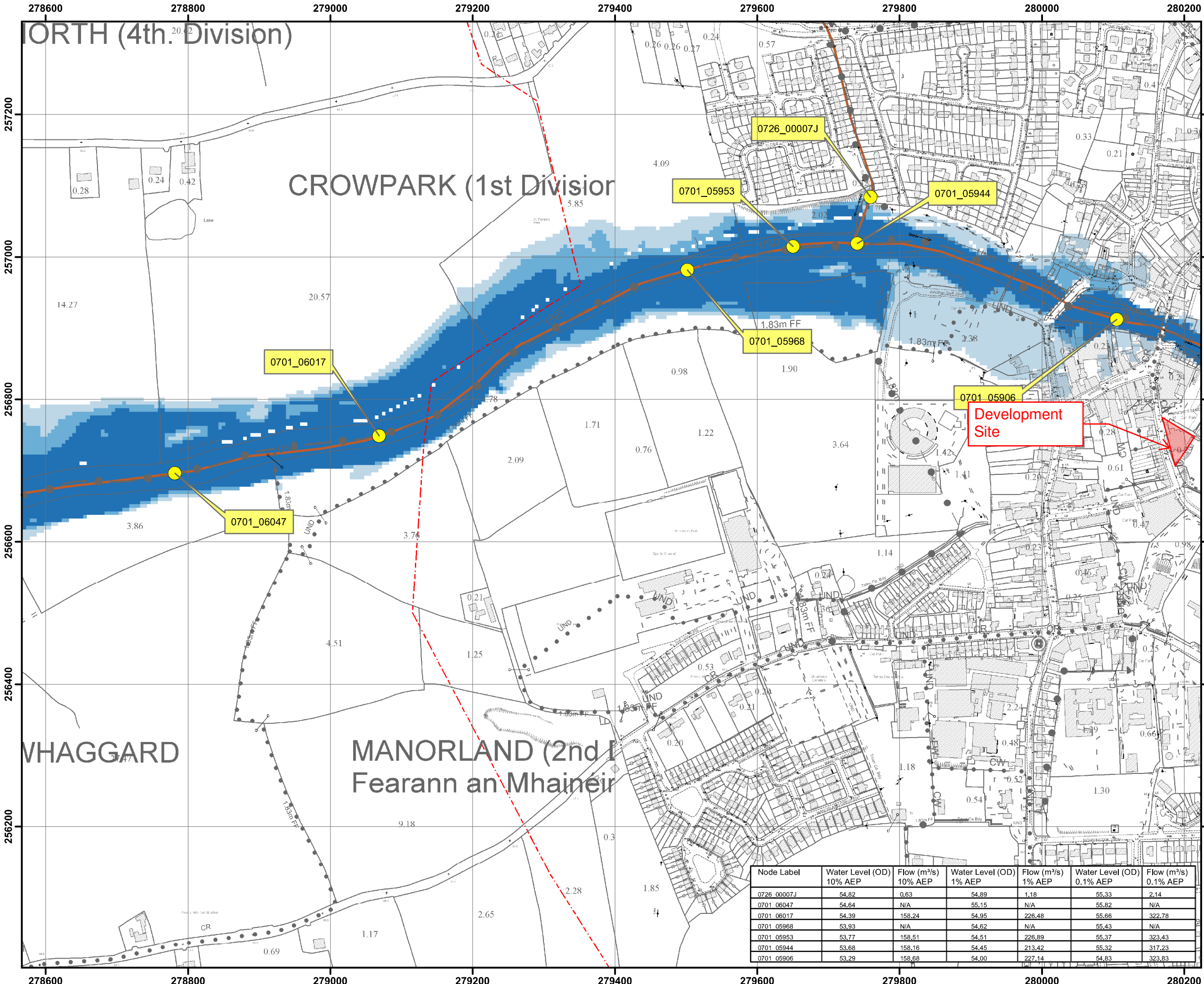


**Results for 100 year +20% CC 1440 minute winter. 1680 minute analysis at 30 minute timestep. Mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
1440 minute winter	1	660	55.869	0.019	0.5	0.0299	0.0000	OK
1440 minute winter	2	660	55.791	0.021	0.6	0.0250	0.0000	OK
1440 minute winter	3	840	55.618	0.098	1.4	2.6488	0.0000	OK
1440 minute winter	4	840	55.617	0.237	1.8	0.3431	0.0000	SURCHARGED
1440 minute winter	5	840	55.616	0.286	3.5	0.3239	0.0000	OK

Link Event	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
1440 minute winter	1	1	2	0.5	0.447	0.078	0.0080	
1440 minute winter	2	2	3	0.6	0.417	0.098	0.1086	
1440 minute winter	3	3	4	1.3	0.457	0.073	0.1948	
1440 minute winter	4	4	5	3.5	0.398	0.193	0.0870	
1440 minute winter	5	Hydro-Brake®		1.7				67.6

## **Appendix B – OPW Floodinfo.ie Maps and Reports**



**IMPORTANT USER NOTE:**  
 THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

- Legend**
- 10% Fluvial AEP Event
  - 1% Fluvial AEP Event
  - 0.1% Fluvial AEP Event
  - Modelled River Centreline
  - AFA Extents
  - Node Point
  - Node ID

FINAL

REV:	NOTE:	DATE:
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Node Label	Water Level (OD)		Flow (m <sup>3</sup> /s)		Water Level (OD)		Flow (m <sup>3</sup> /s)	
	10% AEP	1% AEP	10% AEP	1% AEP	0.1% AEP	0.1% AEP	10% AEP	1% AEP
0726_00007J	54.82	54.89	0.63	1.18	55.33	55.33	2.14	2.14
0701_06047	54.64	55.15	N/A	N/A	55.82	55.82	N/A	N/A
0701_06017	54.39	54.95	158.24	226.48	55.66	55.66	322.78	322.78
0701_05968	53.93	54.62	N/A	N/A	55.43	55.43	N/A	N/A
0701_05953	53.77	54.51	158.51	226.89	55.37	55.37	323.43	323.43
0701_05944	53.68	54.45	158.16	213.42	55.32	55.32	317.23	317.23
0701_05906	53.29	54.00	158.68	227.14	54.83	54.83	323.83	323.83

**Map:**  
 Trim Fluvial Flood Extents

**Map Type:** EXTENT

**Source:** FLUVIAL

**Map Area:** HPW

**Scenario:** CURRENT

**Drawn By:** F.M.C. **Date:** 15 July 2016

**Checked By:** M.N. **Date:** 15 July 2016

**Approved By:** S.P. **Date:** 15 July 2016

**Drawing No.:**  
 E07TRI\_EXFCD\_F0\_05

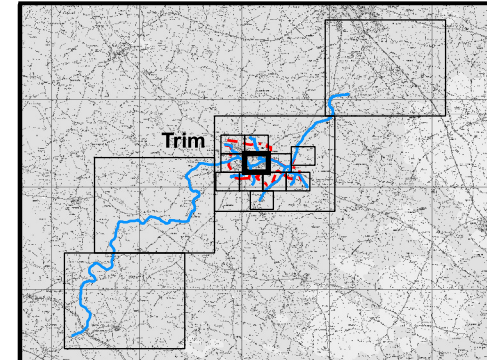
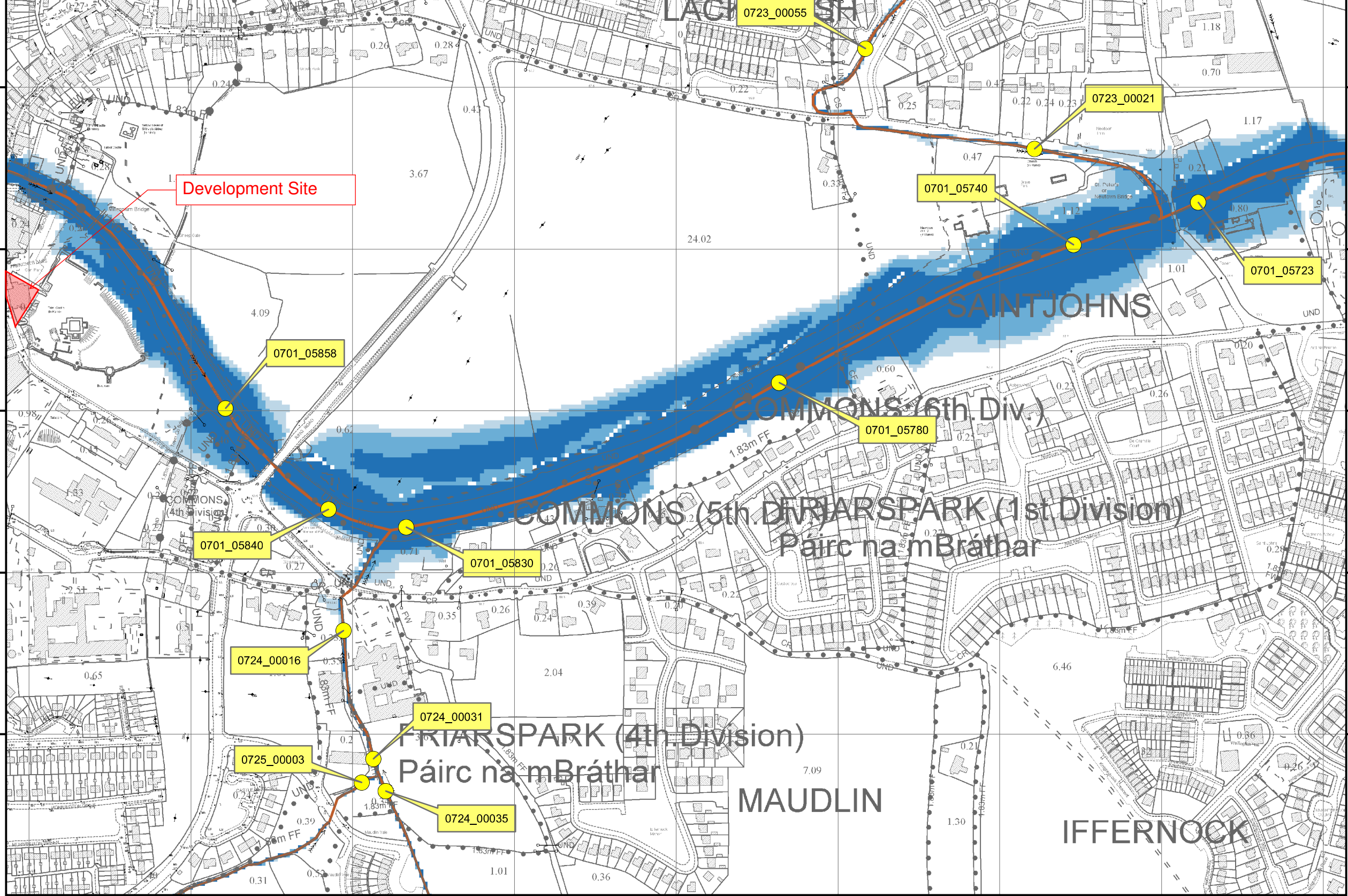
**Map Series:** Page 5 of 15

**Drawing Scale:** 1:5,000 @ A3



280200 280400 280600 280800 281000 281200 281400 281600 281800

Node Label	Water Level (OD) 10% AEP	Flow (m <sup>3</sup> /s) 10% AEP	Water Level (OD) 1% AEP	Flow (m <sup>3</sup> /s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m <sup>3</sup> /s) 0.1% AEP
0723_00055	55.72	N/A	55.95	N/A	56.28	N/A
0723_00021	52.95	1.48	53.15	2.78	53.38	5.05
0724_00035	54.39	0.66	54.60	1.23	54.88	2.13
0724_00031	54.23	1.25	54.43	2.35	54.73	4.15
0724_00016	52.92	1.31	53.25	2.46	54.22	4.35
0725_00003	54.46	0.59	54.66	1.10	54.93	1.99
0701_05858	52.64	N/A	53.17	N/A	53.76	N/A
0701_05840	52.48	159.52	52.99	227.03	53.53	323.52
0701_05830	52.37	159.48	52.91	227.66	53.48	325.28
0701_05780	52.03	NA	52.60	NA	53.17	NA
0701_05740	51.69	159.52	52.31	228.85	52.91	327.92
0701_05723	51.43	159.64	51.97	228.70	52.48	327.54



**IMPORTANT USER NOTE:**  
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

- Legend**
- 10% Fluvial AEP Event
  - 1% Fluvial AEP Event
  - 0.1% Fluvial AEP Event
  - Modelled River Centreline
  - AFA Extents
  - Node Point
  - Node ID Node Label

**FINAL**

REV:	NOTE:	DATE:
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The Office of Public Works  
Jonathan Swift Street  
Trim  
Co Meath

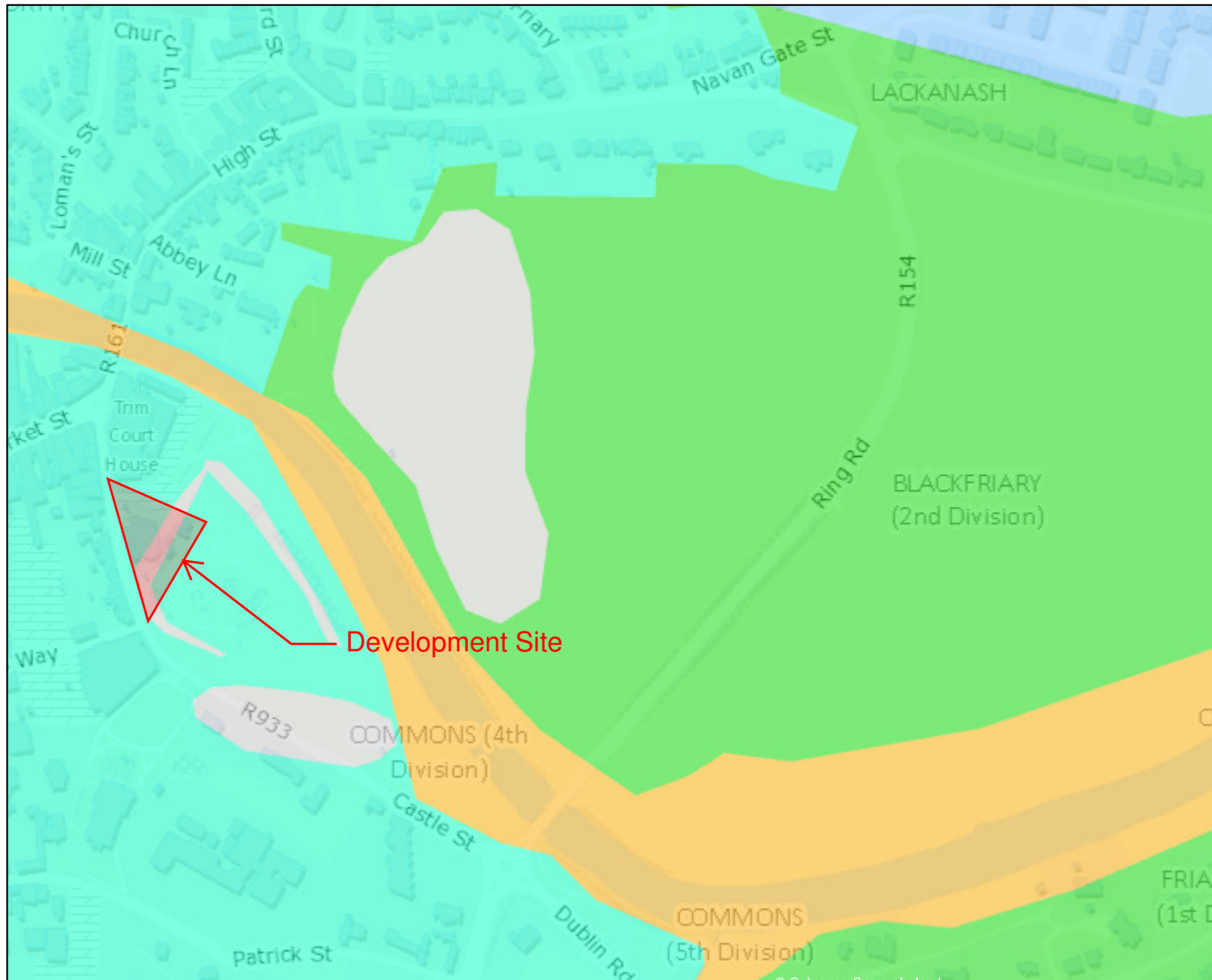
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<b>Map:</b> Trim Fluvial Flood Extents
<b>Map Type:</b> EXTENT
<b>Source:</b> FLUVIAL
<b>Map Area:</b> HPW
<b>Scenario:</b> CURRENT
<b>Drawn By:</b> F.M.C. <b>Date:</b> 14 July 2016
<b>Checked By:</b> M.N. <b>Date:</b> 14 July 2016
<b>Approved By:</b> S.P. <b>Date:</b> 14 July 2016
<b>Drawing No.:</b> E07TRI_EXFCD_F0_07
<b>Map Series:</b> Page 7 of 15
<b>Drawing Scale:</b> 1:5,000 @ A3



## **Appendix C - GSI Geotechnical Maps**



Scale: 1:5,000

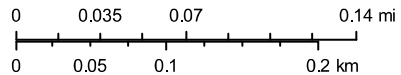
Geological Survey Ireland

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Map Centre Coordinates (ITM) 680,485 756,798

9/28/2023, 2:33:58 PM

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