

Flood Risk Assessment

Rathmore Hub, Lusk, Co. Dublin

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1 INTRODUCTION

1.1 Terms of Reference

This Flood Risk Assessment (FRA) was commissioned by Fingal County Council to assess the potential risk of flooding at Rathmore Hub, Lusk, Co. Dublin (hereafter referred to as 'the site').

1.2 Statement of Authority

This assessment has been completed and reviewed by qualified professionals with appropriate experience in flood risk, drainage, wastewater, and hydraulic modelling studies. The key staff members involved in this project are as follows:

- Duncan Hartwick *BEng (Hons) BSc (Hons) MIEI* – Project Engineer with experience in flood risk assessment, hydrology, and hydraulic modelling.
- Paul Singleton *BEng (Hons) MSc CEng MIEI* – Associate Director and Chartered Engineer specialising in flood risk assessment, hydrology, drainage design and Sustainable Drainage Systems (SuDS); a recognised industry professional providing training courses on these topics to the public and private sectors in Ireland and the UK.

1.3 Purpose

This report is intended to produce a detailed site-specific (Stage 3) assessment that identifies potential sources of flooding at the site and determines the suitability of the proposed development in relation to 'Flood Zones' as defined in the relevant flood risk management planning policy. It is also intended to assess the adequacy of existing flood risk data, present any analysis undertaken to supplement the existing data, and recommend design and mitigation measures to be considered as part of the proposed development, including outline SuDS measures.

1.4 Approach to the Assessment

1.4.1 Method of Assessment

The method of assessment complies with the Source-Pathway-Receptor model and provides a spatial assessment of flood risk to people, property, and the environment at the site. Consideration has been given to the source and extent of all potential flood mechanisms at the site, including fluvial, coastal, pluvial, and urban drainage flooding.

For the purposes of this assessment, the primary stakeholders are the Office of Public Works (OPW) and Fingal County Council (CC). OPW and Fingal CC data has been used to form the basis of this assessment and is presented in line with the relevant guidance and requirements.

1.4.2 Hydraulic Model Status

As part of the pilot Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS), areas in Fingal and East Meath that were identified as being prone to flooding were modelled in detail. The site and surrounding area are covered by the detailed FEM FRAMS fluvial and coastal flood maps titled 'Jone's Model Flood Extent Map', as presented in Section 3.3.1 of this report.

1.4.3 Planning Guidelines

The requirements for flood risk assessments are generally as set out in the 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities', published by the OPW and Department of the Environment, Heritage and Local Government in November 2009 (hereafter referred to as 'the OPW Guidelines'). The OPW Guidelines are supplemented by Departmental Circular PL 2/2014 issued by the Department of Environment, Community and Local Government on 13th August 2014, which relates to use of OPW flood mapping in assessing planning applications and clarifications of advice contained within the OPW Guidelines. Further guidance is also provided in the CIRIA Research Project 624 'Development and Flood Risk: Guidance for the Construction Industry'.

Planning guidelines applicable to the site are set out in the Fingal County Development Plan 2023-2029, specifically through the Strategic Flood Risk Assessment (SFRA) published to inform the plan.

The SFRA was prepared in accordance with the requirements of the OPW Guidelines and adopts an identical Flood Zone standard. Flood Zones are the extents of design flood events that determine whether development is appropriate from a flood risk point of view. They are defined in the OPW Guidelines and Development Plan as follows:

- **Flood Zone A** - where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
- **Flood Zone B** - where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 and 0.5% or 1 in 200 for coastal flooding).
- **Flood Zone C** - where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding).

The OPW Guidelines clarify that Flood Zones are to be used to determine the suitability of proposed developments and are to be derived from 'present day' hydrological estimates. The OPW Guidelines also state that Flood Zones are generated without the inclusion of climate change and that, in addition to flood zoning, developments should be designed to be resilient to the effects of climate change.

2 SITE AND PROPOSAL DETAILS

2.1 Site Location

The application site is located at Rathmore Hub, Lusk, Co. Dublin, approximately 550 m north of Lusk town centre. The site location and context are shown in Figure 2.1 and Figure 2.2, respectively.

Figure 2.1: Site Location

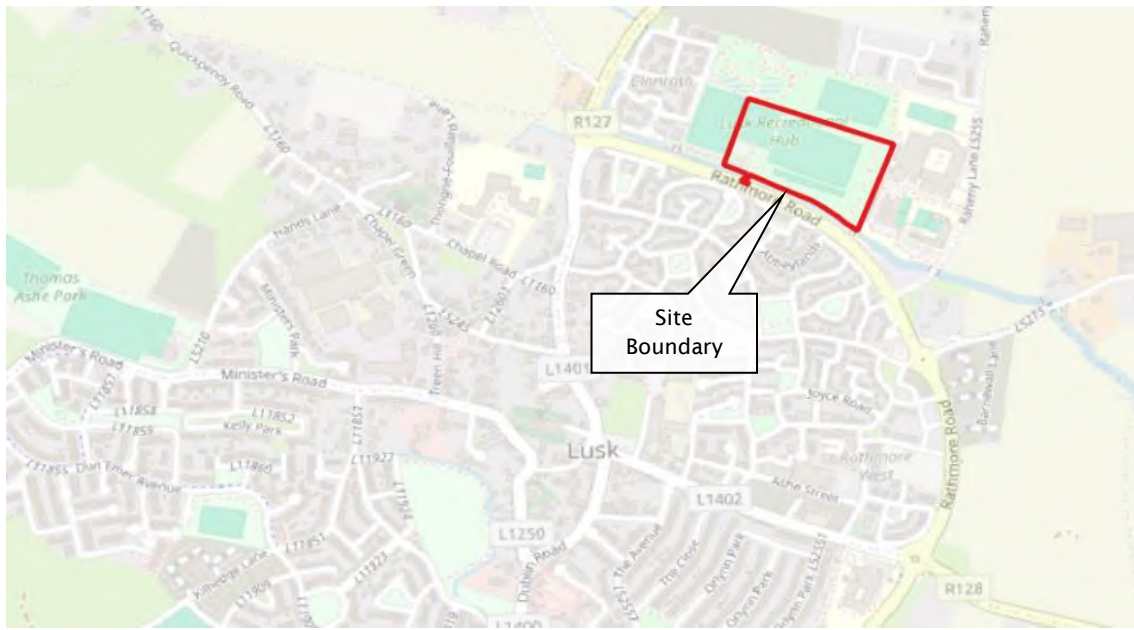


Figure 2.2: Site Context



2.2 Site Description

Relevant information related to the site is as follows:

- The site currently comprises undeveloped land with access from Rathmore Road.
- A watercourse titled 'Rathmooney Stream' on the EPA watercourse dataset and known locally as the 'Bride Stream' flows in a generally eastward direction to the south of the site.
- The topography of the site slopes gradually towards the south.

2.3 Development Proposals

The development proposals described in the planning application that this assessment is intended to support are as follows:

- *A new all-weather GAA training area measuring 74m x 28m with a ball-wall measuring 20 x 5m at the northern end, enclosed with a 4m high weld mesh fencing and 2no. ball stop nets 20m x 6m at the south of the training area and 1m x 20m on top of the ball wall at the northern end finishing at 6m height.*
- *A new All-Weather soccer pitch measuring 100m x 64m with flood lighting and All Weather 8 lane athletics running track with flood lighting, enclosed with a 1.2m high weld mesh fence finished black in colour at 1.2m from the edge of the running track and located on a permeable tarmac footpath surrounding the track 2.7m width from the edge of the track and finished with a pin-kerb at both edges of the tarmac.*
- *Proposed extension to the existing car park of approximately 30no. additional spaces including disabled & EV ready parking bays. Car park to consist of asphalt road and permeable surface (grass & concrete paving or similar) to parking bays.*
- *A new storage container for sports equipment measuring approximately 12m x 2.4m x 2.5m located near proposed car park.*
- *Landscaping works including soil grading, mounding, tree planting and boundary treatments.*
- *Covered Bicycle parking – 30no. bicycle parking spaces to include adapted bicycles.*
- *A teenage space to include a half size basketball court, and hang-out zone with teen appropriate play features.*
- *All other ancillary Site Works including re-location of existing play equipment and new signage, footpaths, drinking fountain and electrical & drainage connections.*

Relevant proposal drawings are included in Appendix A.

2.4 Vulnerability Classification

Based on the classification criteria set out in the OPW Guidelines, the proposal comprises development with the vulnerability classification shown in Table 2.1.

Table 2.1: Proposed Development Vulnerability Classification

Part	Use	Classification
Car Park	Local Transport Infrastructure	Less Vulnerable
Recreational Facilities	Open Amenity Space	Water Compatible Development

3 BACKGROUND INFORMATION REVIEW

A background information review based on existing flood risk data was carried out to build an understanding of the potential sources of flooding at the site. This section outlines the key findings of a background information review.

3.1 Initial Background Search

Based on an initial internet / media background search, there is no evidence of flooding at the site from any source.

3.2 Fingal County Council

3.2.1 [Fingal County Development Plan 2023-2029](#)

The Fingal County Development Plan 2023 – 2029 has been reviewed as part of this assessment with the following policies and objectives being the most relevant to this flood risk assessment:

- CAP11: Development proposals should demonstrate sustainable design principles for new buildings/services/site. The Council will promote and support development which is resilient to climate change. This would include “D: Reducing flood risk, damage to property from extreme events– residential, public and commercial”.
- CAP29: Encourage the use of natural flood risk mitigation or nature-based solutions including integrated wetlands, green infrastructure, and Sustainable Drainage Systems (SuDS) as part of wider adaptation and mitigation responses to achieve flood resilience.
- IUO16: Have regard to the OPW Flood Risk Management Guidelines (2009), as revised by Circular PL 2/2014, when assessing planning applications and in the preparation of statutory and non-statutory plans and to require site specific flood risk assessments are to be considered for all new developments within the County. All development must prepare a Stage 1 Flood Risk Analysis and if the flooding risk is not screened out, they must prepare a Site-Specific Flood Risk Assessment (SSFRA) for the development, where appropriate.
- IUO18: All Flood Risk Assessments must comply with the recommendations from the SFRA report.

3.2.2 [SFRA for Fingal Development Plan 2023-2029](#)

The Fingal Development Plan SFRA 2023-2029 includes the following guidance which is considered pertinent to the FRA:

- Flood Zones represent flood extents for the existing, undefended present-day scenario.
- Climate change projections are to be applied depending on the receptor vulnerability; HEFS is to be considered for ‘highly vulnerable’ development and MRFS is to be considered for ‘less vulnerable’ development.
- A key mechanism for providing flood protection and resilience is the setting of Finished Floor Levels (FFLs), Finished Ground Levels (FGLs).
- In accordance with the OPW Guidelines, access to and egress from any development should be within Flood Zone C (i.e., outside the 0.1% AEP fluvial / coastal floodplain). Where this is not achievable due to on-site or off-site flood risk, a Flood Management Plan for the development will be required.

Flood Zone Mapping for the site and surrounding area included in the SFRA is based on the FEM FRAMS flood extents as presented in the following section.

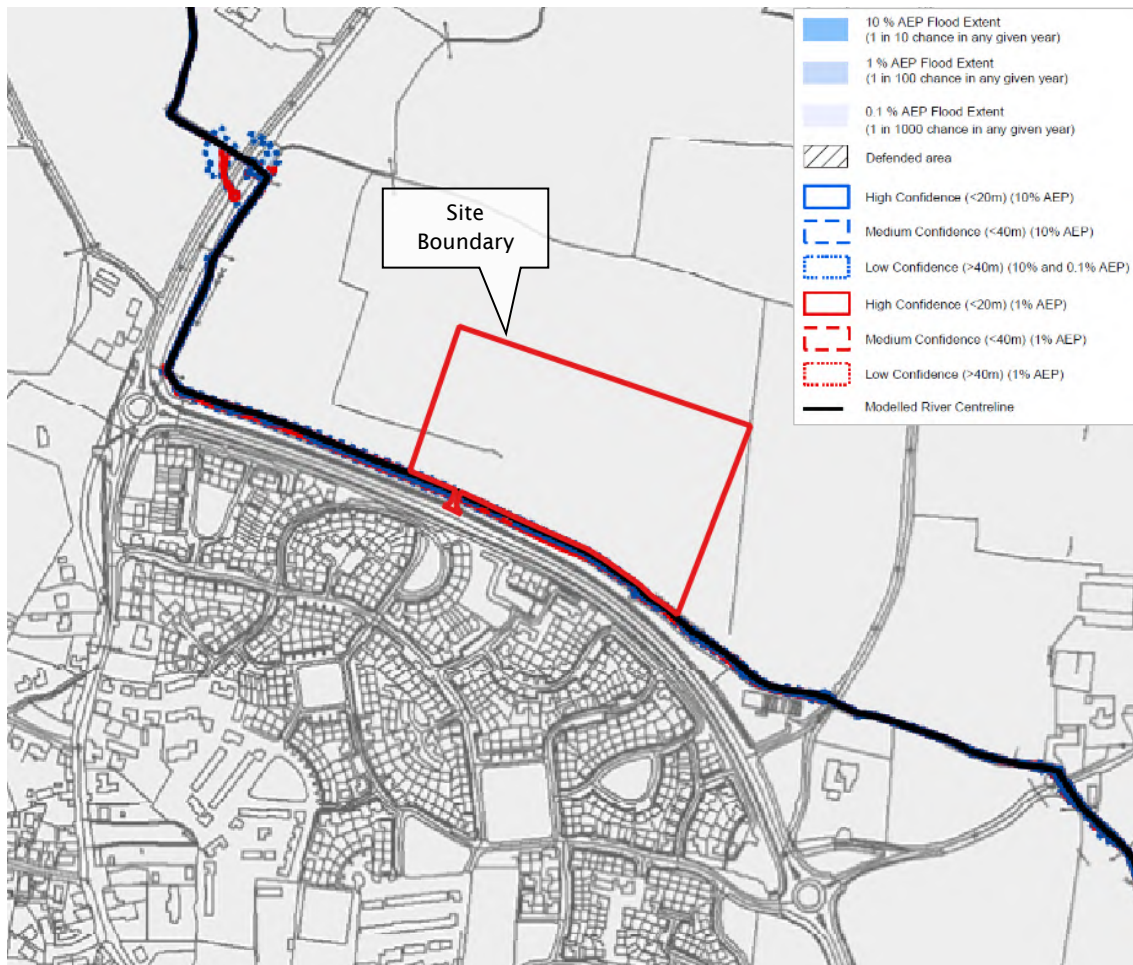
3.3 OPW Data

3.3.1 FEM FRAMS

An extract from the Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS) detailed fluvial flood map is shown in Figure 3.1. The full flood map is included in Appendix C.

The site is shown to be marginally affected by flooding confined to the watercourse that flows along the southern boundary. It is noted that no nodes containing flood level / flow data are provided for the vicinity of the site.

Figure 3.1: Extract from OPW FEM FRAMS Fluvial Flood Map



3.3.2 Past Flood Events

Based on OPW 'Past Flood Event' mapping, there is no record of past flooding at or in the vicinity of the site.

4 ASSESSMENT OF FLOOD MECHANISMS

4.1 Preamble

Development control procedures aim to avoid 'inappropriate' development, as defined in the OPW Guidelines, in areas that are at risk of flooding. They also aim to prevent new development that would increase flood risk elsewhere. This section aims to determine the suitability of the site for the proposed development in accordance with development control procedures by assessing all possible sources of flooding at the site and their associated risk people, property, and the environment.

4.2 Initial Assessment

Table 4.1 presents a screening assessment of the site for potential flooding mechanisms requiring further detailed assessment. It is based on the background information review and consultations.

Flooding mechanisms screened as being significant or possibly significant and requiring further assessment have been assessed further in the following sections. Mitigation of flood hazards, where required, is detailed in Section 5.2.

Table 4.1: Potential Flooding Mechanisms at the Site

Source / Pathway	Significant?	Reason
Fluvial Flooding	Possible	OPW FEM FRAMS flood mapping indicate that a modelled watercourse flows along the southern boundary of the site for which flooding is shown to be confined to the channel.
Coastal Flooding	No	The site is not in a coastal area.
Urban Drainage Flooding	No	No indication of urban drainage flooding / sewer incapacity within the site boundary was identified in an initial background search. Limited existing development is situated at a higher elevation than the site.
Surface Water Flooding	Possible	Surface water runoff could potentially flow towards the site from adjacent areas that lie at higher elevations.
Groundwater Flooding	No	Due to the site topography, there are no areas that would cause impoundment of groundwater.
Artificial Sources of Flooding	No	There are no impoundments or reservoirs in close proximity to or that drain towards the site.

4.3 Fluvial Flooding

As shown in Figure 2.2 and Figure 3.1, a watercourse flows along the southern boundary of the site. The OPW FEM FRAMS mapping shows that flooding within the site boundary is confined to the watercourse channel, i.e. does not flood out-of-bank and form a floodplain.

There is no development within the watercourse corridor and no proposal to change the existing watercourse crossing at the site entrance. All proposed development is outside the floodplain in Flood Zone C and the proposal has no potential to impact flood risk elsewhere. Therefore, the proposed development is not at risk of flooding and is considered appropriate in the context of the OPW Guidelines and Fingal County Development Plan SFRA.

4.4 Surface Water (Pluvial) Flooding

4.4.1 [Pluvial Flooding onto the Site](#)

Lands to the south, east and west of the site are at similar or lower elevations. Surface water runoff from these areas would therefore not be directed towards the site.

Surface water originating from the north, if not intercepted by local drainage, would flow in the direction of the site. However, there is limited development to the north of the site, and overland flow would tend to follow preferential flow paths provided by the public roads and spread over a relatively large area.

Therefore, the site is not considered to be at significant risk of pluvial flooding originating from surrounding lands.

4.4.2 [Pluvial Flooding from the Site](#)

Development proposals have the potential to increase the impermeable footprint of the site and increase the rate and volume of surface water runoff accordingly.

The proposed development shall include SuDS to mitigate surface water runoff from the site, as discussed in Section 5.2.4.

5 SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.1 Summary of Findings

In relation to Flood Zones as defined by the OPW Guidelines, this assessment demonstrates that the site is located in Flood Zone C as flooding from the watercourse along the southern site boundary is shown to be confined to the channel. Therefore, all proposed development is located in Flood Zone C and can have no impact on flood risk elsewhere.

No other significant flood mechanisms are anticipated at the site.

5.2 Design Requirements

The following section outlines measures incorporated into proposals submitted in support of the planning application and to be further considered / developed in any detailed design or variation post-determination of the planning application.

5.2.1 [Land Use](#)

This assessment demonstrates that proposed development lies wholly in Flood Zone C, meaning it is considered appropriate in the content of the OPW Guidelines and development will not cause an increase in flood risk elsewhere.

5.2.2 [Design Levels](#)

Given the nature of the proposed development as well as being sited in Flood Zone C, there is no required minimum design level.

5.2.3 [Site Access](#)

Given that the site lies wholly in Flood Zone C, safe access to and egress from the proposed development will be possible during an extreme flood event.

5.2.4 [Drainage Design](#)

Surface water drainage design should be per the requirements of the Fingal Development Plan 2023-2029 and to the standards of the Fingal County Council Water Services Department. The Fingal Development Plan 2023-2029 states that it is an objective to incorporate and promote the use of SuDS and that these are to be designed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

The requirements around the application / use of SuDS in Fingal is set out in the 'Green / Blue Infrastructure for Development Guidance Note' published in December 2020. The Guidance Note includes template documents / checklists as follows:

- Surface Water Management Design Statement
- Fingal SuDS Selection Hierarchy Sheet

These elements of the initial SuDS strategy have been completed in consultation with the Client and are included in Appendix B.

SuDS components have been considered in relation to the nature and character of the site and proposed development. The proposed development will include Permeable Pavement (PP) type sub-base beneath the pitches and car park as well as a Filter Drain to drain the athletics track. It is noted that, in keeping with a 'best practice' SuDS approach, no pipes, gullies or storage tanks are proposed.

Initial / concept surface water drainage design drawings and calculations have been carried out and included in Appendix D. The design incorporates collector pipes beneath the pitches and required inspection chambers / connections to attenuation storage. Permeable pavement sub-base storage is sized to accommodate the 1% AEP plus 20% climate change rainfall event.

Outflow from the proposed development will be limited to Qbar which has been calculated to be approximately 10 l/s within connection to the adjacent watercourse (infiltration subject to detailed design). Further details on sizing / location of components are shown on drainage plan drawings with associated typical detail drawings. Hydraulic modelling of the proposals has been undertaken using Causeway Flow software and is included in Appendix D.

The SuDS design will be subject to detailed design at which stage discharge via infiltration and / or attenuation will be confirmed.

Appendix A

Site Drawings

Rathmore Rd, Lusk Recreational Hub

Summary of Proposed Works

- 8 Lane, 400 Metre All-Weather Running Track & Sports Pitch
- All-Weather GAA Games Area with 4m High Weldmesh perimeter fence & 6m High Ball stop netting
- Ball Wall
- Car Park- 21 Spaces (including 6 No Blue Badge Spaces, 7 EV Spaces) & 5 Motorbike Spaces
- Covered Cycle parking
- 14 No. Floodlights
- 1.5m High Fence around All-Weather Track
- Associated Path Network

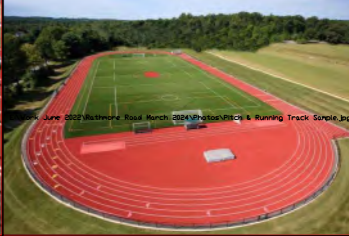
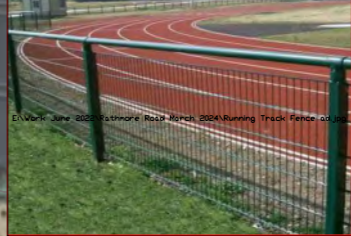
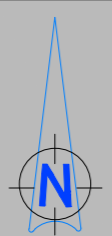
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Senior Parks Superintendent

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Comhairle Contae
Fhine Gall
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1.5m HIGH FENCE AROUND ALL WEATHER RUNNING TRACK

ALL - WEATHER SPORTS PITCH & 8 LANE ALL WEATHER RUNNING TRACK

FLOODLIGHTING FOR SPORTS PITCH & ALL-WEATHER RUNNING TRACK

3m wide Shared Path

Ball Wall 15m(W)x5m(H)

All Weather GAA Games Area with 4m(H) Weld Mesh Perimeter Fence & 6m(H) Ball Stop Netting at Both Ends of Pitch

AREA SUBJECT TO PART 8 APPLICATION

Covered Cycle Parking

Water Foundation

Proposed All Weather Soccer Pitch 100mx64m

Car Park Extension with Permeable Surface

8 Lane 400m All Weather Athletics Track

Screen Planting

AREA SUBJECT TO PART 8 APPLICATION

Athletics Storage Container

Covered cycle parking

Teen Space - Semi Basketball Court & Hang Out Zone

Set-Down Area

RATHMORE ROAD

Forge Lane
Lána an Ghabha



Cearnóg an Mhuilleora

Sports Surface Multiple Use

Sports Surface Multiple Use

Rush and Educate TC National S

Appendix B

SuDS / Green Infrastructure Checklists

Surface Water Management Design Statement

Existing Scenario	
<p><i>Description of existing subject site outlining the drainage characteristics - topography, ground conditions, suitability for infiltration, natural directions and paths for water movement, existing surface water flood risk.</i></p>	<p>The site currently comprises 'Lusk Recreational Hub' including grass sports pitches, car parking and undeveloped open space. As such, there is currently limited formal surface water drainage and rainfall in the vicinity of the site is naturally 'discharged' via infiltration, evaporation and transpiration as well as flowing into (overland or via baseflow) to the watercourse that runs parallel to the southern boundary of the site.</p> <p>The site lies at a higher or similar elevation than lands to the south, east and west. Lands at a higher elevation, which are currently undeveloped, are situated to the north of the site but there is no identified pluvial flood risk.</p>
Proposed Scenario	
<p><i>This shall be a clear concise summary of the surface water design proposal.</i></p> <p><i>Applicants shall provide a brief explanation of how they have responded to the principles of Sustainable Drainage Systems (SuDS) Design contained in this policy. This could include implications of SuDS on design of other aspects of the development and price comparisons. We encourage that proposals are mindful of future implications from the beginning and present outline designs based on realistic options including maintenance activities and how they are resourced.</i></p> <p><i>Applicants shall be required to clearly demonstrate how the design makes a significant and positive contribution to the amenity value of the open space provision and shall state how the usability of these areas by the public has been addressed. Reference shall also be made on how the design considered the access and use of maintenance machinery in terms of slopes and any hard structures (e.g. head walls) located within the open space areas.</i></p>	<p>There are a number of parts to the proposed development:</p> <ul style="list-style-type: none"> • Sports Pitches • Athletics Track • Car Parking <p>The car parking areas are to be designed as Permeable Pavement (PP). The sub-base would be designed to store the 1% AEP + CC rainfall event and the grit and stone layers would provide more than sufficient treatment to meet Water Quality requirements.</p> <p>The pitches would also benefit from being underlain by a drainage sub-base layer. As well as providing drainage of the playing surface, storage and treatment of water would also be achieved. The pitches would provide amenity and the slow flow of clean water from the clean graded stone would contribute to and support biodiversity.</p> <p>The athletics track will be impermeable and camber towards the pitch at the centre. Therefore, a perimeter Filter Drain around the pitch would collect runoff from the impermeable areas, provide treatment, and connect into the drainage layer sub-base.</p> <p>SuDS components should be designed to infiltrate as much as possible, subject to detailed design, but discharge of 'clean' water to the watercourse at pre-development (greenfield) rate would also be possible.</p> <p>Maintenance of PP would consist of an annual visual check and surface sweep when required.</p>

SuDS Selection Hierarchy Sheet

SuDS Measures	Measures to be used on this Site	Rationale	Area of Feature (m ²)	Attenuation Volume of Feature (m ³)
Source Control				
Swales	-			
Integrated constructed Tree Pits	-			
Rainwater Butts	-			
Downpipe Planters	-			
Soakaways	-			
Infiltration Trenches	-			
Permeable Pavement	Yes	See Design Statement	6,760 (pitches total) 330 (car park)	3191
Green Roofs	-			
Green Wall	-			
Filter Strips	-			
Bio-Retention Systems / Raingardens	-			
Blue Roofs	-			
Filter Drain	Yes	See Design Statement	c. 98	c. 44
Site Control				
Detention Basins	-			
Retention Basins	-			
Regional Control				
Ponds	-			
Wetlands	-			
Other				
Petrol / Oil Interceptor	-			
Attenuation Tank	-			
Oversized Pipes	-			

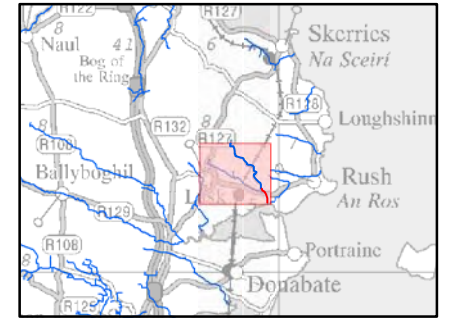
Appendix C

OPW / Fingal CC Flood Maps



Tidal flooding may also occur within the area shown on this map. Please refer to the tidal flood extent map. Figure No. JON/HPW/EXT/CURS/T/001

Location Plan :



EXTENT MAP

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
 - 1 % AEP Flood Extent (1 in 100 chance in any given year)
 - 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
 - Defended area
 - High Confidence (<20m) (10% AEP)
 - Medium Confidence (<40m) (10% AEP)
 - Low Confidence (>40m) (10% and 0.1% AEP)
 - High Confidence (<20m) (1% AEP)
 - Medium Confidence (<40m) (1% AEP)
 - Low Confidence (>40m) (1% AEP)
 - Modelled River Centreline
 - Node Point
 - Node label with level data (refer to table)
 - Node level with flow & level data (refer to table)
- High confidence

Medium confidence

Low confidence

} refer to table

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Project :

FEM FRAMS

Map :

JONE'S MODEL FLOOD EXTENT MAP

Map Type : FLOOD EXTENT

Source : FLUVIAL FLOODING

Map area : HIGH PRIORITY WATERCOURSE

Scenario : CURRENT

Figure By : Mara Ruiz Date : 8 August 2010

Checked By : Sergio Herbón Date : 8 August 2010

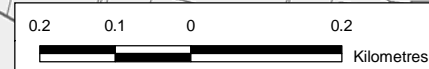
Approved By : Clare Dewar Date : 8 August 2010

Figure No. : JON/HPW/EXT/CURS/001

Revision 0

Drawing Scale : 1:10,000 Plot Scale : 1:1 @ A3

Node Label	10% AEP Event		1% AEP Event		0.1% AEP Event	
	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)
10Ta3490	33.71	0.70	33.97	1.38	34.30	2.52
10Ta3082	30.39		30.67		30.87	
10Ta2658	28.05		28.27		28.47	
10Ta2236D	25.91		26.35		27.13	
10Ta1857	21.90		22.13		22.38	
10Ta1548	17.87		18.06		18.25	
10Ta909D	12.57		12.82		13.08	
10Ta613	10.32		10.59		10.85	
10Ta245	6.84		7.00		7.18	
10La628	5.03	2.41	5.33	4.83	5.64	8.75



Appendix D

Surface Water Drainage Design



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	5.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	Scotland and Ireland	Connection Type	Level Soffits
M5-60 (mm)	14.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.300	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)	Easting (m)	Northing (m)	Depth (m)
S1		5.00	24.068	50	722103.049	754981.142	0.908
S2			23.017	50	721963.510	755031.706	0.787
S3			22.916	50	721959.249	755019.946	0.766
S9			22.871	50	721940.943	755008.236	0.871
S4			22.757	50	721928.923	754988.631	0.897
S5			22.695	50	721926.863	754966.629	0.965
S6			22.565	50	721932.931	754948.555	0.965
S12		5.00	23.632	50	722098.895	754969.206	0.902
S21			23.380	50	722105.294	754949.310	0.840
S19			22.880	50	722103.031	754928.568	0.520
S20			22.490	50	722091.959	754910.090	0.320
S13			22.244	50	722072.750	754897.509	0.264
S14	0.014	5.00	22.101	450	722068.489	754885.749	0.231
S15		5.00	22.183	50	722079.765	754876.186	0.523
S16			22.402	50	722031.523	754893.807	0.912
S18			22.430	450	722031.516	754898.914	0.950
PS1		5.00	23.361	180	722084.151	754975.016	0.791
PS2			23.117	180	722069.928	754983.699	0.637
PS3			22.840	180	721990.587	755012.449	0.740
PS4			22.870	180	721957.168	755010.617	0.910
PS5			22.774	180	721938.882	754991.759	0.934
PS7			22.660	180	721934.537	754967.545	0.940
PS16		5.00	23.381	180	722085.315	754973.936	0.901
PS23			23.363	180	722093.105	754963.103	0.943
PS17			23.287	180	722097.114	754950.152	0.917
PS18			22.935	180	722095.521	754931.427	0.645
PS19			22.546	180	722085.420	754915.188	0.336
PS22			22.301	180	722070.916	754905.362	0.161
PS20			22.356	180	722052.476	754902.523	0.296
PS21			22.219	180	721962.071	754933.757	0.549
PS24		5.00	23.153	180	722078.287	754972.844	0.903
PS25			23.198	180	722087.796	754961.364	1.000
PS26			23.181	180	722091.839	754948.691	1.021
PS27			22.860	180	722090.028	754932.446	0.760
PS28			22.610	180	722081.795	754919.178	0.550
PS29			22.371	180	722069.022	754910.498	0.381
PS30			22.446	180	722054.108	754908.086	0.506
PS8		5.00	23.147	180	722077.656	754973.247	0.897
PS9			23.091	180	722069.786	754977.958	0.871
PS10			22.792	180	721988.713	755007.278	0.862
PS11			22.810	180	721977.752	755009.425	0.920



Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
PS12			22.757	180	721943.916	754989.838	1.000
PS13			22.647	180	721940.324	754968.283	0.947
PS15		5.00	22.808	180	721977.631	755008.975	0.898
PS14			22.375	180	721954.153	754944.301	0.745
PS6			22.397	180	721947.987	754942.332	0.797
S10		5.00	23.036	50	721934.466	755042.490	1.350
S22	0.009	5.00	22.759	50	721912.845	754983.317	1.395
S11	0.044	5.00	22.521	50	721899.836	754947.712	1.350
S7	0.032	5.00	22.416	1500	721928.135	754935.724	1.326
S8			21.500	50	721919.148	754911.169	0.541

Links (Input)

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)
1.000	S1	S2	148.417	0.600	23.160	22.230	0.930	159.6	150	5.00	44.0
1.001	S2	S3	12.508	0.600	22.230	22.150	0.080	156.4	150	5.00	44.0
1.002	S3	S9	21.731	0.600	22.150	22.000	0.150	144.9	150	5.00	44.0
1.003	S9	S4	22.997	0.600	22.000	21.860	0.140	164.3	150	5.00	44.0
1.004	S4	S5	22.098	0.600	21.860	21.730	0.130	170.0	150	5.00	44.0
1.005	S5	S6	19.066	0.600	21.730	21.600	0.130	146.7	150	5.00	44.0
1.006	S6	S7	13.697	0.600	21.600	21.090	0.510	26.9	150	5.00	44.0
2.000	S12	S21	20.899	0.600	22.730	22.540	0.190	110.0	150	5.00	44.0
2.001	S21	S19	20.865	0.600	22.540	22.360	0.180	115.9	150	5.00	44.0
2.002	S19	S20	21.541	0.600	22.360	22.170	0.190	113.4	150	5.00	44.0
2.003	S20	S13	22.962	0.600	22.170	21.980	0.190	120.9	150	5.00	44.0
2.004	S13	S14	12.508	0.600	21.980	21.870	0.110	113.7	150	5.00	44.0
2.005	S14	S18	39.247	0.600	21.870	21.480	0.390	100.6	150	5.00	44.0
3.000	S15	S16	51.359	0.600	21.660	21.490	0.170	302.1	150	5.00	44.0
3.001	S16	S18	5.107	0.600	21.490	21.480	0.010	510.7	150	5.00	44.0
2.006	S18	S7	109.739	0.600	21.480	21.090	0.390	281.4	225	5.00	44.0
4.000	PS1	PS2	16.664	0.600	22.570	22.480	0.090	185.2	100	5.00	44.0
4.001	PS2	PS3	84.390	0.600	22.480	22.100	0.380	222.1	150	5.00	44.0
4.002	PS3	PS4	33.469	0.600	22.100	21.960	0.140	239.1	150	5.00	44.0
4.003	PS4	PS5	26.268	0.600	21.960	21.840	0.120	218.9	150	5.00	44.0
4.004	PS5	PS7	24.601	0.600	21.840	21.720	0.120	205.0	150	5.00	44.0
4.005	PS7	PS6	28.576	0.600	21.720	21.600	0.120	238.1	150	5.00	44.0
5.000	PS16	PS23	13.342	0.600	22.480	22.420	0.060	222.4	100	5.00	44.0
5.001	PS23	PS17	13.557	0.600	22.420	22.370	0.050	271.1	100	5.00	44.0
5.002	PS17	PS18	18.793	0.600	22.370	22.290	0.080	234.9	100	5.00	44.0
5.003	PS18	PS19	19.124	0.600	22.290	22.210	0.080	239.1	100	5.00	44.0
5.004	PS19	PS22	17.520	0.600	22.210	22.140	0.070	250.3	100	5.00	44.0
5.005	PS22	PS20	18.657	0.600	22.140	22.060	0.080	233.2	100	5.00	44.0
5.006	PS20	PS21	95.648	0.600	22.060	21.670	0.390	245.3	150	5.00	44.0
5.007	PS21	PS6	16.490	0.600	21.670	21.600	0.070	235.6	150	5.00	44.0
6.000	PS24	PS25	14.907	0.600	22.250	22.198	0.052	286.7	100	5.00	44.0
6.001	PS25	PS26	13.302	0.600	22.198	22.160	0.038	350.1	100	5.00	44.0
6.002	PS26	PS27	16.345	0.600	22.160	22.100	0.060	272.4	100	5.00	44.0
6.003	PS27	PS28	15.615	0.600	22.100	22.060	0.040	390.4	100	5.00	44.0
6.004	PS28	PS29	15.443	0.600	22.060	21.990	0.070	220.6	100	5.00	44.0
6.005	PS29	PS30	15.108	0.600	21.990	21.940	0.050	302.2	100	5.00	44.0
6.006	PS30	PS14	106.313	0.600	21.940	21.630	0.310	342.9	225	5.00	44.0



Links (Input)

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)
7.000	PS8	PS9	9.172	0.600	22.250	22.220	0.030	305.7	100	5.00	44.0
7.001	PS9	PS10	86.212	0.600	22.220	21.930	0.290	297.3	225	5.00	44.0
7.002	PS10	PS11	11.169	0.600	21.930	21.890	0.040	279.2	225	5.00	44.0
7.003	PS11	PS12	39.096	0.600	21.890	21.757	0.133	294.0	225	5.00	44.0
7.004	PS12	PS13	21.853	0.600	21.757	21.700	0.057	383.4	225	5.00	44.0
7.005	PS13	PS14	27.684	0.600	21.700	21.630	0.070	395.5	225	5.00	44.0
8.000	PS15	PS14	68.803	0.600	21.910	21.630	0.280	245.7	300	5.00	44.0
6.007	PS14	PS6	6.473	0.600	21.630	21.600	0.030	215.8	300	5.00	44.0
4.006	PS6	S7	20.923	0.600	21.600	21.140	0.460	45.5	300	5.00	44.0
9.000	S10	S22	63.000	0.600	21.686	21.364	0.322	195.7	150	5.00	44.0
9.001	S22	S11	37.906	0.600	21.364	21.171	0.193	196.4	150	5.00	44.0
9.002	S11	S7	30.733	0.600	21.171	21.090	0.081	379.4	225	5.00	44.0
1.007	S7	S8	26.148	0.600	21.090	20.959	0.131	199.6	150	5.00	44.0

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	Scotland and Ireland	Skip Steady State	x
M5-60 (mm)	14.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/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
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	20	0	0
30	20	0	0
100	20	0	0

Node S7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	21.090	Product Number	CTL-SHE-0131-1000-2000-1000
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	10.0	Min Node Diameter (mm)	1500

Node S18 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.480	Slope (1:X)	300.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	50.000		

Node S14 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.870	Slope (1:X)	300.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	96	Depth (m)	0.450
Safety Factor	2.0	Width (m)	20.000	Inf Depth (m)	
Porosity	0.30	Length (m)	50.000		



Node S15 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.660	Slope (1:X)	300.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	50.000		

Node PS21 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.670	Slope (1:X)	300.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	224	Depth (m)	0.450
Safety Factor	2.0	Width (m)	20.000	Inf Depth (m)	
Porosity	0.30	Length (m)	50.000		

Node PS14 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.630	Slope (1:X)	300.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	197	Depth (m)	0.450
Safety Factor	2.0	Width (m)	20.000	Inf Depth (m)	
Porosity	0.30	Length (m)	36.000		



Results for 2 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S1	1	23.160	0.000	0.0	0.0000	0.0000	OK
15 minute winter	1.000:50%	11	22.786	0.091	10.1	0.0000	0.0000	OK
15 minute winter	S2	12	22.324	0.094	9.5	0.0002	0.0000	OK
15 minute winter	S3	12	22.239	0.089	9.2	0.0002	0.0000	OK
15 minute winter	S9	13	22.092	0.092	9.2	0.0002	0.0000	OK
15 minute winter	S4	13	21.951	0.091	9.1	0.0002	0.0000	OK
15 minute winter	S5	15	21.867	0.137	9.3	0.0003	0.0000	OK
30 minute winter	S6	24	21.839	0.239	7.6	0.0005	0.0000	SURCHARGED
15 minute summer	S12	1	22.730	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S21	1	22.540	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S19	1	22.360	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S20	1	22.170	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S13	1	21.980	0.000	0.0	0.0000	0.0000	OK
30 minute winter	S14	22	21.894	0.024	1.6	0.5344	0.0000	OK
180 minute winter	S15	156	21.804	0.144	3.6	9.2831	0.0000	OK
180 minute winter	3.000:50%	156	21.803	0.228	3.7	0.0000	0.0000	SURCHARGED
180 minute winter	S16	148	21.803	0.313	2.8	0.0006	0.0000	SURCHARGED
180 minute winter	S18	148	21.803	0.323	15.8	36.0305	0.0000	SURCHARGED
180 minute winter	2.006:50%	144	21.803	0.518	14.8	0.0000	0.0000	SURCHARGED
15 minute summer	PS1	1	22.570	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS2	1	22.480	0.000	0.0	0.0000	0.0000	OK
15 minute winter	4.001:50%	11	22.391	0.101	9.8	0.0000	0.0000	OK
15 minute winter	PS3	12	22.205	0.105	9.5	0.0026	0.0000	OK
15 minute winter	PS4	12	22.062	0.102	9.2	0.0025	0.0000	OK
15 minute winter	PS5	13	21.938	0.098	9.0	0.0024	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S1	1.000	1.000:50%	0.0	0.000	0.000	0.4014	
15 minute winter	S1	1.000	S2	9.5	0.856	0.681	0.8302	
15 minute winter	S2	1.001	S3	9.2	0.821	0.652	0.1406	
15 minute winter	S3	1.002	S9	9.2	0.831	0.623	0.2397	
15 minute winter	S9	1.003	S4	9.1	0.812	0.661	0.2584	
15 minute winter	S4	1.004	S5	9.3	0.770	0.683	0.2978	
15 minute winter	S5	1.005	S6	8.5	0.940	0.583	0.3287	
15 minute winter	S6	1.006	S7	8.4	0.475	0.243	0.2411	
15 minute summer	S12	2.000	S21	0.0	0.000	0.000	0.0000	
15 minute summer	S21	2.001	S19	0.0	0.000	0.000	0.0000	
15 minute summer	S19	2.002	S20	0.0	0.000	0.000	0.0000	
15 minute summer	S20	2.003	S13	0.0	0.000	0.000	0.0000	
15 minute summer	S13	2.004	S14	0.0	0.000	0.000	0.0098	
30 minute winter	S14	2.005	S18	0.9	0.257	0.054	0.3794	
120 minute winter	S15	3.000	3.000:50%	-4.0	-0.259	-0.391	0.4484	
15 minute winter	S15	3.000	S16	5.6	0.605	0.552	0.4491	
15 minute winter	S16	3.001	S18	5.6	0.922	0.719	0.0899	
30 minute winter	S18	2.006	2.006:50%	-22.6	-0.669	-0.735	2.1822	
15 minute summer	S18	2.006	S7	-21.6	-0.544	-0.702	2.1822	
15 minute summer	PS1	4.000	PS2	0.0	0.000	0.000	0.0000	
15 minute summer	PS2	4.001	4.001:50%	0.0	0.000	0.000	0.2575	
15 minute winter	PS2	4.001	PS3	9.5	0.743	0.803	0.5444	
15 minute winter	PS3	4.002	PS4	9.2	0.719	0.807	0.4328	
15 minute winter	PS4	4.003	PS5	9.0	0.734	0.756	0.3231	
15 minute winter	PS5	4.004	PS7	9.1	0.744	0.739	0.3258	



Results for 2 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
30 minute winter	PS7	23	21.849	0.129	7.6	0.0032	0.0000	OK
15 minute summer	PS16	1	22.480	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS23	1	22.420	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS17	1	22.370	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS18	1	22.290	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS19	1	22.210	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS22	1	22.140	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS20	1	22.060	0.000	0.0	0.0000	0.0000	OK
15 minute winter	5.006:50%	12	21.967	0.102	9.8	0.6202	0.0000	OK
120 minute winter	PS21	96	21.810	0.140	9.5	17.6205	0.0000	OK
15 minute summer	PS24	1	22.250	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS25	1	22.198	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS26	1	22.160	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS27	1	22.100	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS28	1	22.060	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS29	1	21.990	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS30	1	21.940	0.000	0.0	0.0000	0.0000	OK
15 minute winter	6.006:50%	11	21.913	0.128	17.5	0.0000	0.0000	OK
15 minute summer	PS8	1	22.250	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS9	1	22.220	0.000	0.0	0.0000	0.0000	OK
15 minute winter	7.001:50%	11	22.195	0.120	17.5	0.4127	0.0000	OK
15 minute winter	PS10	12	22.056	0.126	16.7	0.0031	0.0000	OK
15 minute winter	PS11	12	22.009	0.119	16.3	0.0030	0.0000	OK
15 minute winter	PS12	13	21.890	0.133	16.4	0.0033	0.0000	OK
60 minute winter	PS13	44	21.835	0.135	9.6	0.0034	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	PS7	4.005	PS6	8.1	0.595	0.712	0.4722	
15 minute summer	PS16	5.000	PS23	0.0	0.000	0.000	0.0000	
15 minute summer	PS23	5.001	PS17	0.0	0.000	0.000	0.0000	
15 minute summer	PS17	5.002	PS18	0.0	0.000	0.000	0.0000	
15 minute summer	PS18	5.003	PS19	0.0	0.000	0.000	0.0000	
15 minute summer	PS19	5.004	PS22	0.0	0.000	0.000	0.0000	
15 minute summer	PS22	5.005	PS20	0.0	0.000	0.000	0.0000	
15 minute summer	PS20	5.006	5.006:50%	0.0	0.000	0.000	0.2966	
15 minute winter	PS20	5.006	PS21	8.3	0.998	0.738	0.4216	
30 minute winter	PS21	5.007	PS6	-9.1	-0.572	-0.793	0.2709	
15 minute summer	PS24	6.000	PS25	0.0	0.000	0.000	0.0000	
15 minute summer	PS25	6.001	PS26	0.0	0.000	0.000	0.0000	
15 minute summer	PS26	6.002	PS27	0.0	0.000	0.000	0.0000	
15 minute summer	PS27	6.003	PS28	0.0	0.000	0.000	0.0000	
15 minute summer	PS28	6.004	PS29	0.0	0.000	0.000	0.0000	
15 minute summer	PS29	6.005	PS30	0.0	0.000	0.000	0.0000	
15 minute summer	PS30	6.006	6.006:50%	0.0	0.000	0.000	0.5992	
15 minute winter	PS30	6.006	PS14	17.0	0.782	0.609	1.2473	
15 minute summer	PS8	7.000	PS9	0.0	0.000	0.000	0.0000	
15 minute summer	PS9	7.001	7.001:50%	0.0	0.000	0.000	0.4467	
15 minute winter	PS9	7.001	PS10	16.7	0.758	0.556	0.9473	
15 minute winter	PS10	7.002	PS11	16.3	0.741	0.527	0.2468	
15 minute winter	PS11	7.003	PS12	16.4	0.726	0.545	0.8835	
15 minute winter	PS12	7.004	PS13	16.0	0.671	0.609	0.5301	
15 minute winter	PS13	7.005	PS14	15.6	0.599	0.604	0.7633	



Results for 2 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	PS15	10	21.963	0.053	2.6	0.0013	0.0000	OK
15 minute winter	8.000:50%	11	21.961	0.191	55.2	1.1095	0.0000	OK
60 minute winter	PS14	45	21.833	0.203	48.7	30.8704	0.0000	OK
60 minute winter	PS6	45	21.828	0.228	24.4	0.0057	0.0000	OK
30 minute winter	S10	24	21.866	0.180	4.4	0.0004	0.0000	SURCHARGED
60 minute winter	9.000:50%	41	21.857	0.332	7.3	2.0016	0.0000	SURCHARGED
60 minute winter	S22	42	21.843	0.479	6.0	0.0628	0.0000	SURCHARGED
60 minute winter	S11	44	21.826	0.655	7.3	0.4285	0.0000	SURCHARGED
60 minute winter	S7	45	21.824	0.734	27.0	1.6504	0.0000	SURCHARGED
15 minute summer	S8	1	20.959	0.000	9.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	PS15	8.000	8.000:50%	-2.6	-0.126	-0.037	0.9522	
15 minute winter	PS15	8.000	PS14	53.3	1.493	0.756	1.2856	
15 minute winter	PS14	6.007	PS6	25.5	1.134	0.339	0.3042	
15 minute winter	PS6	4.006	S7	29.8	0.766	0.181	1.2629	
30 minute winter	S10	9.000	9.000:50%	-4.4	-0.275	-0.346	0.5546	
15 minute winter	S10	9.000	S22	10.3	0.769	0.813	0.5546	
15 minute winter	S22	9.001	S11	8.4	0.627	0.663	0.6673	
15 minute summer	S11	9.002	S7	9.5	0.379	0.358	1.2223	
15 minute summer	S7	Hydro-Brake®	S8	9.8				65.7



Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S1	1	23.160	0.000	0.0	0.0000	0.0000	OK
15 minute winter	1.000:50%	12	22.900	0.205	18.4	0.0000	0.0000	SURCHARGED
15 minute winter	S2	15	22.454	0.224	15.1	0.0004	0.0000	SURCHARGED
15 minute winter	S3	15	22.389	0.239	14.5	0.0005	0.0000	SURCHARGED
15 minute winter	S9	15	22.280	0.280	14.0	0.0006	0.0000	SURCHARGED
30 minute winter	S4	24	22.180	0.320	12.4	0.0006	0.0000	SURCHARGED
30 minute winter	S5	24	22.099	0.369	10.3	0.0007	0.0000	SURCHARGED
30 minute winter	S6	26	22.034	0.434	10.6	0.0009	0.0000	SURCHARGED
15 minute summer	S12	1	22.730	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S21	1	22.540	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S19	1	22.360	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S20	1	22.170	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S13	1	21.980	0.000	0.0	0.0000	0.0000	OK
240 minute winter	S14	232	21.958	0.087	3.3	7.0027	0.0000	OK
240 minute winter	S15	232	21.958	0.298	6.4	32.1496	0.0000	SURCHARGED
240 minute winter	3.000:50%	232	21.958	0.383	6.4	0.0000	0.0000	SURCHARGED
240 minute winter	S16	232	21.957	0.467	5.1	0.0009	0.0000	SURCHARGED
240 minute winter	S18	232	21.957	0.477	14.7	55.1342	0.0000	SURCHARGED
180 minute winter	2.006:50%	132	21.970	0.685	16.6	0.0000	0.0000	SURCHARGED
15 minute summer	PS1	1	22.570	0.000	0.0	0.0000	0.0000	OK
15 minute winter	PS2	12	22.557	0.077	3.4	0.0019	0.0000	OK
15 minute winter	4.001:50%	11	22.551	0.261	17.8	0.0000	0.0000	SURCHARGED
15 minute winter	PS3	14	22.356	0.256	13.7	0.0064	0.0000	SURCHARGED
30 minute winter	PS4	23	22.225	0.265	12.3	0.0066	0.0000	SURCHARGED
30 minute winter	PS5	25	22.140	0.300	12.0	0.0075	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	S1	1.000	1.000:50%	0.0	0.000	0.000	0.6532	
15 minute summer	S1	1.000	S2	15.2	0.928	1.086	1.2911	
15 minute winter	S2	1.001	S3	14.5	0.879	1.025	0.2202	
15 minute summer	S3	1.002	S9	14.4	0.893	0.979	0.3826	
15 minute winter	S9	1.003	S4	13.3	0.850	0.967	0.4049	
15 minute winter	S4	1.004	S5	11.0	0.780	0.813	0.3890	
15 minute winter	S5	1.005	S6	10.8	0.908	0.739	0.3357	
15 minute winter	S6	1.006	S7	10.7	0.609	0.311	0.2411	
15 minute summer	S12	2.000	S21	0.0	0.000	0.000	0.0000	
15 minute summer	S21	2.001	S19	0.0	0.000	0.000	0.0000	
15 minute summer	S19	2.002	S20	0.0	0.000	0.000	0.0000	
15 minute summer	S20	2.003	S13	0.0	0.000	0.000	0.0000	
15 minute summer	S13	2.004	S14	0.0	0.000	0.000	0.0153	
180 minute winter	S14	2.005	S18	-3.4	-0.247	-0.194	0.5509	
120 minute winter	S15	3.000	3.000:50%	-7.4	-0.422	-0.727	0.4521	
15 minute winter	S15	3.000	S16	9.2	0.685	0.904	0.4521	
15 minute winter	S16	3.001	S18	8.5	1.069	1.104	0.0899	
30 minute winter	S18	2.006	2.006:50%	-30.5	-0.792	-0.992	2.1822	
15 minute winter	S18	2.006	S7	-24.6	-0.619	-0.799	2.1822	
15 minute summer	PS1	4.000	PS2	0.0	0.000	0.000	0.0363	
15 minute winter	PS2	4.001	4.001:50%	-3.4	-0.263	-0.289	0.5649	
15 minute winter	PS2	4.001	PS3	13.7	0.781	1.161	0.7428	
15 minute winter	PS3	4.002	PS4	12.9	0.754	1.130	0.5892	
15 minute winter	PS4	4.003	PS5	12.6	0.772	1.053	0.4624	
15 minute summer	PS5	4.004	PS7	11.5	0.780	0.935	0.4331	



Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
30 minute winter	PS7	25	22.069	0.349	10.4	0.0087	0.0000	SURCHARGED
15 minute summer	PS16	1	22.480	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS23	1	22.420	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS17	1	22.370	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS18	1	22.290	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS19	1	22.210	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS22	1	22.140	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS20	1	22.060	0.000	0.0	0.0000	0.0000	OK
15 minute winter	5.006:50%	12	22.031	0.166	17.9	1.6255	0.0000	SURCHARGED
180 minute winter	PS21	176	21.959	0.289	16.7	61.8080	0.0000	SURCHARGED
15 minute summer	PS24	1	22.250	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS25	1	22.198	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS26	1	22.160	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS27	1	22.100	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS28	1	22.060	0.000	0.0	0.0000	0.0000	OK
60 minute winter	PS29	45	22.031	0.041	0.5	0.0010	0.0000	OK
60 minute winter	PS30	46	22.031	0.091	2.1	0.0023	0.0000	OK
60 minute winter	6.006:50%	46	22.031	0.246	17.8	0.0000	0.0000	SURCHARGED
15 minute winter	PS8	13	22.254	0.004	0.1	0.0001	0.0000	OK
15 minute winter	PS9	12	22.256	0.036	1.6	0.0009	0.0000	OK
15 minute winter	7.001:50%	11	22.249	0.174	31.9	0.8761	0.0000	OK
15 minute winter	PS10	12	22.117	0.187	28.1	0.0047	0.0000	OK
30 minute winter	PS11	22	22.079	0.189	24.4	0.0047	0.0000	OK
30 minute winter	PS12	23	22.038	0.281	24.2	0.0070	0.0000	SURCHARGED
60 minute winter	PS13	46	22.031	0.331	15.5	0.0083	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	PS7	4.005	PS6	9.8	0.560	0.860	0.5031	
15 minute summer	PS16	5.000	PS23	0.0	0.000	0.000	0.0000	
15 minute summer	PS23	5.001	PS17	0.0	0.000	0.000	0.0000	
15 minute summer	PS17	5.002	PS18	0.0	0.000	0.000	0.0000	
15 minute summer	PS18	5.003	PS19	0.0	0.000	0.000	0.0000	
15 minute summer	PS19	5.004	PS22	0.0	0.000	0.000	0.0000	
15 minute summer	PS22	5.005	PS20	0.0	0.000	0.000	0.0000	
15 minute summer	PS20	5.006	5.006:50%	0.0	0.000	0.000	0.4210	
15 minute winter	PS20	5.006	PS21	12.3	1.051	1.096	0.6987	
30 minute winter	PS21	5.007	PS6	-17.8	-1.019	-1.549	0.2903	
15 minute summer	PS24	6.000	PS25	0.0	0.000	0.000	0.0000	
15 minute summer	PS25	6.001	PS26	0.0	0.000	0.000	0.0000	
15 minute summer	PS26	6.002	PS27	0.0	0.000	0.000	0.0000	
15 minute summer	PS27	6.003	PS28	0.0	0.000	0.000	0.0000	
15 minute summer	PS28	6.004	PS29	0.0	0.000	0.000	0.0000	
60 minute winter	PS29	6.005	PS30	-0.5	-0.126	-0.139	0.0795	
15 minute winter	PS30	6.006	6.006:50%	-2.3	-0.129	-0.081	1.0601	
15 minute winter	PS30	6.006	PS14	28.8	0.902	1.033	1.9579	
15 minute winter	PS8	7.000	PS9	-0.1	-0.069	-0.022	0.0121	
15 minute winter	PS9	7.001	7.001:50%	-1.6	-0.104	-0.052	0.7879	
15 minute winter	PS9	7.001	PS10	28.1	0.843	0.940	1.4580	
15 minute winter	PS10	7.002	PS11	27.7	0.820	0.896	0.3829	
15 minute winter	PS11	7.003	PS12	27.4	0.801	0.911	1.4685	
15 minute winter	PS12	7.004	PS13	25.6	0.731	0.972	0.8691	
15 minute winter	PS13	7.005	PS14	23.0	0.630	0.888	1.1010	



Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	PS15	12	22.079	0.169	4.9	0.0042	0.0000	OK
15 minute winter	8.000:50%	12	22.073	0.303	100.9	2.7887	0.0000	SURCHARGED
60 minute winter	PS14	47	22.026	0.396	84.6	72.6636	0.0000	SURCHARGED
60 minute winter	PS6	47	22.019	0.419	32.4	0.0105	0.0000	SURCHARGED
60 minute winter	S10	43	22.081	0.395	2.5	0.0008	0.0000	SURCHARGED
60 minute winter	9.000:50%	44	22.081	0.556	11.1	5.6324	0.0000	SURCHARGED
60 minute winter	S22	45	22.056	0.692	6.1	0.0907	0.0000	SURCHARGED
60 minute winter	S11	45	22.020	0.849	12.1	0.5550	0.0000	SURCHARGED
60 minute winter	S7	46	22.013	0.923	29.2	2.0770	0.0000	SURCHARGED
15 minute summer	S8	1	20.959	0.000	9.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	PS15	8.000	8.000:50%	-5.4	-0.208	-0.077	1.7766	
15 minute summer	PS15	8.000	PS14	88.2	1.687	1.250	2.0578	
15 minute winter	PS14	6.007	PS6	33.8	1.151	0.449	0.4558	
15 minute winter	PS6	4.006	S7	28.2	0.749	0.171	1.4734	
15 minute summer	S10	9.000	9.000:50%	-6.1	-0.346	-0.481	0.5546	
15 minute winter	S10	9.000	S22	11.9	0.800	0.943	0.5546	
15 minute summer	S22	9.001	S11	9.3	0.618	0.736	0.6673	
30 minute summer	S11	9.002	S7	15.1	0.381	0.573	1.2223	
15 minute summer	S7	Hydro-Brake®	S8	9.8				120.4



Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	S1	14	23.169	0.009	0.7	0.0000	0.0000	OK
15 minute winter	1.000:50%	12	23.170	0.475	23.8	0.0000	0.0000	SURCHARGED
30 minute winter	S2	23	22.630	0.400	14.9	0.0008	0.0000	SURCHARGED
30 minute winter	S3	24	22.559	0.409	14.3	0.0008	0.0000	SURCHARGED
30 minute winter	S9	27	22.467	0.467	14.1	0.0009	0.0000	SURCHARGED
30 minute winter	S4	28	22.384	0.524	11.9	0.0010	0.0000	SURCHARGED
60 minute winter	S5	44	22.336	0.606	10.0	0.0012	0.0000	SURCHARGED
60 minute winter	S6	45	22.298	0.698	9.6	0.0014	0.0000	SURCHARGED
15 minute summer	S12	1	22.730	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S21	1	22.540	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S19	1	22.360	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S20	1	22.170	0.000	0.0	0.0000	0.0000	OK
360 minute winter	S13	352	22.060	0.080	0.1	0.0002	0.0000	OK
360 minute winter	S14	352	22.060	0.190	6.1	32.1408	0.0000	SURCHARGED
240 minute winter	S15	240	22.060	0.400	9.9	47.4507	0.0000	SURCHARGED
360 minute winter	3.000:50%	344	22.060	0.485	7.7	0.0000	0.0000	SURCHARGED
120 minute winter	S16	80	22.082	0.592	10.4	0.0012	0.0000	SURCHARGED
120 minute winter	S18	80	22.110	0.630	27.8	55.1585	0.0000	SURCHARGED
120 minute winter	2.006:50%	84	22.197	0.912	27.8	0.0000	0.0000	SURCHARGED
15 minute winter	PS1	13	22.794	0.224	2.5	0.0056	0.0000	SURCHARGED
15 minute winter	PS2	13	22.788	0.308	6.7	0.0077	0.0000	SURCHARGED
15 minute winter	4.001:50%	13	22.775	0.485	23.0	0.0000	0.0000	SURCHARGED
30 minute winter	PS3	23	22.538	0.438	13.5	0.0109	0.0000	SURCHARGED
60 minute winter	PS4	44	22.407	0.447	11.6	0.0112	0.0000	SURCHARGED
60 minute winter	PS5	44	22.364	0.524	10.5	0.0131	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	S1	1.000	1.000:50%	-0.7	-0.068	-0.051	0.6699	
15 minute winter	S1	1.000	S2	16.2	0.928	1.157	1.3064	
15 minute summer	S2	1.001	S3	15.1	0.880	1.070	0.2202	
15 minute summer	S3	1.002	S9	14.9	0.902	1.013	0.3826	
15 minute winter	S9	1.003	S4	13.3	0.847	0.965	0.4049	
15 minute winter	S4	1.004	S5	12.0	0.846	0.881	0.3890	
15 minute winter	S5	1.005	S6	11.7	0.828	0.797	0.3357	
15 minute winter	S6	1.006	S7	11.5	0.653	0.334	0.2411	
15 minute summer	S12	2.000	S21	0.0	0.000	0.000	0.0000	
15 minute summer	S21	2.001	S19	0.0	0.000	0.000	0.0000	
15 minute summer	S19	2.002	S20	0.0	0.000	0.000	0.0000	
15 minute summer	S20	2.003	S13	0.0	0.000	0.000	0.0000	
180 minute winter	S13	2.004	S14	-0.1	-0.018	-0.007	0.1566	
120 minute winter	S14	2.005	S18	-10.0	-0.684	-0.565	0.6909	
120 minute winter	S15	3.000	3.000:50%	-13.1	-0.746	-1.297	0.4521	
60 minute winter	S15	3.000	S16	-11.1	-0.632	-1.098	0.4521	
60 minute winter	S16	3.001	S18	-12.9	-0.733	-1.667	0.0899	
30 minute winter	S18	2.006	2.006:50%	-34.2	-0.873	-1.112	2.1822	
30 minute winter	S18	2.006	S7	-28.3	-0.712	-0.920	2.1822	
15 minute summer	PS1	4.000	PS2	-2.8	-0.365	-0.642	0.1304	
15 minute winter	PS2	4.001	4.001:50%	-6.7	-0.449	-0.568	0.7428	
15 minute summer	PS2	4.001	PS3	14.6	0.829	1.232	0.7428	
15 minute winter	PS3	4.002	PS4	13.7	0.776	1.198	0.5892	
15 minute winter	PS4	4.003	PS5	12.8	0.776	1.074	0.4624	
15 minute winter	PS5	4.004	PS7	11.3	0.787	0.920	0.4331	



Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
60 minute winter	PS7	45	22.325	0.605	9.2	0.0151	0.0000	SURCHARGED
15 minute summer	PS16	1	22.480	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS23	1	22.420	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS17	1	22.370	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS18	1	22.290	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS19	1	22.210	0.000	0.0	0.0000	0.0000	OK
15 minute summer	PS22	1	22.140	0.000	0.0	0.0000	0.0000	OK
15 minute winter	PS20	14	22.086	0.026	1.0	0.0006	0.0000	OK
15 minute winter	5.006:50%	13	22.080	0.215	23.1	2.7367	0.0000	SURCHARGED
180 minute winter	PS21	176	22.065	0.395	23.4	93.3611	0.0000	SURCHARGED
60 minute winter	PS24	49	22.294	0.044	0.5	0.0011	0.0000	OK
60 minute winter	PS25	49	22.293	0.095	1.1	0.0024	0.0000	OK
60 minute winter	PS26	49	22.291	0.131	1.5	0.0033	0.0000	SURCHARGED
60 minute winter	PS27	49	22.289	0.189	2.2	0.0047	0.0000	SURCHARGED
60 minute winter	PS28	47	22.290	0.230	3.0	0.0057	0.0000	SURCHARGED
60 minute winter	PS29	47	22.294	0.304	3.7	0.0076	0.0000	SURCHARGED
60 minute winter	PS30	45	22.305	0.365	6.3	0.0091	0.0000	SURCHARGED
60 minute winter	6.006:50%	44	22.305	0.520	23.2	0.0000	0.0000	SURCHARGED
60 minute winter	PS8	47	22.332	0.082	0.9	0.0021	0.0000	OK
60 minute winter	PS9	47	22.332	0.112	2.7	0.0028	0.0000	OK
60 minute winter	7.001:50%	46	22.330	0.255	23.2	1.8734	0.0000	SURCHARGED
60 minute winter	PS10	46	22.321	0.391	23.1	0.0098	0.0000	SURCHARGED
60 minute winter	PS11	46	22.318	0.428	21.6	0.0107	0.0000	SURCHARGED
60 minute winter	PS12	46	22.308	0.551	20.4	0.0138	0.0000	SURCHARGED
60 minute winter	PS13	46	22.302	0.602	18.8	0.0151	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	PS7	4.005	PS6	10.9	0.620	0.955	0.5031	
15 minute summer	PS16	5.000	PS23	0.0	0.000	0.000	0.0000	
15 minute summer	PS23	5.001	PS17	0.0	0.000	0.000	0.0000	
15 minute summer	PS17	5.002	PS18	0.0	0.000	0.000	0.0000	
15 minute summer	PS18	5.003	PS19	0.0	0.000	0.000	0.0000	
15 minute summer	PS19	5.004	PS22	0.0	0.000	0.000	0.0000	
15 minute summer	PS22	5.005	PS20	0.0	0.000	0.000	0.0034	
15 minute winter	PS20	5.006	5.006:50%	-1.0	-0.084	-0.085	0.4692	
30 minute winter	PS20	5.006	PS21	13.9	0.960	1.236	0.8418	
60 minute winter	PS21	5.007	PS6	-25.3	-1.436	-2.200	0.2903	
60 minute winter	PS24	6.000	PS25	-0.5	-0.131	-0.152	0.0816	
60 minute winter	PS25	6.001	PS26	-1.1	-0.237	-0.333	0.1030	
60 minute winter	PS26	6.002	PS27	-1.5	-0.256	-0.419	0.1279	
60 minute winter	PS27	6.003	PS28	-2.2	-0.293	-0.732	0.1222	
60 minute winter	PS28	6.004	PS29	-3.0	-0.387	-0.751	0.1208	
60 minute winter	PS29	6.005	PS30	-3.7	-0.477	-1.087	0.1182	
30 minute winter	PS30	6.006	6.006:50%	-6.6	-0.194	-0.237	2.1141	
15 minute winter	PS30	6.006	PS14	33.4	0.928	1.198	2.1141	
15 minute winter	PS8	7.000	PS9	-1.0	-0.244	-0.287	0.0579	
15 minute winter	PS9	7.001	7.001:50%	-3.6	-0.159	-0.121	1.1824	
15 minute winter	PS9	7.001	PS10	32.4	0.861	1.082	1.7144	
15 minute winter	PS10	7.002	PS11	31.6	0.843	1.023	0.4442	
15 minute winter	PS11	7.003	PS12	30.3	0.821	1.006	1.5549	
15 minute winter	PS12	7.004	PS13	27.6	0.749	1.050	0.8691	
15 minute winter	PS13	7.005	PS14	24.6	0.642	0.951	1.1010	



Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 98.33%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
60 minute winter	PS15	44	22.332	0.422	3.9	0.0105	0.0000	SURCHARGED
60 minute winter	8.000:50%	44	22.323	0.553	73.3	9.2896	0.0000	SURCHARGED
60 minute winter	PS14	45	22.297	0.667	100.4	84.3707	0.0000	SURCHARGED
60 minute winter	PS6	45	22.280	0.680	47.8	0.0170	0.0000	SURCHARGED
60 minute winter	S10	49	22.301	0.615	2.4	0.0012	0.0000	SURCHARGED
60 minute winter	9.000:50%	48	22.301	0.776	14.5	10.9676	0.0000	SURCHARGED
60 minute winter	S22	47	22.288	0.924	7.0	0.1211	0.0000	SURCHARGED
60 minute winter	S11	45	22.275	1.104	14.7	0.7220	0.0000	SURCHARGED
60 minute winter	S7	45	22.270	1.180	36.1	2.6554	0.0000	SURCHARGED
15 minute summer	S8	1	20.959	0.000	9.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	PS15	8.000	8.000:50%	-7.8	-0.215	-0.111	2.3661	
15 minute winter	PS15	8.000	PS14	105.9	1.702	1.501	2.4226	
60 minute winter	PS14	6.007	PS6	41.2	1.051	0.546	0.4558	
30 minute winter	PS6	4.006	S7	24.8	0.809	0.150	1.4734	
15 minute summer	S10	9.000	9.000:50%	-7.5	-0.438	-0.593	0.5546	
15 minute summer	S10	9.000	S22	13.1	0.798	1.036	0.5546	
15 minute winter	S22	9.001	S11	10.1	0.645	0.804	0.6673	
30 minute summer	S11	9.002	S7	19.3	0.486	0.730	1.2223	
15 minute summer	S7	Hydro-Brake®	S8	9.8				146.0



- NOTES**
1. ALL DIMENSIONS IN MILLIMETRES (UNLESS SHOWN OTHERWISE) AND ALL LEVELS IN METRES TO ORDNANCE SURVEY BENCH MARK.
 2. DRAWINGS TO BE READ IN CONJUNCTION WITH CIVIL SPECIFICATION AND IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS.
 3. THE CONTRACTOR IS TO CONFIRM THE ACCURACY OF EXISTING SURVEY AND LINES AND LEVELS OF EXISTING SERVICES INDICATED ON THE CONTRACT DRAWINGS.
 4. THE CONTRACTOR IS TO LIAISE WITH ALL STATUTORY UNDERTAKERS IN REGARD TO LOCATING ALL EXISTING SERVICES WITHIN AND ADJACENT TO THE SITE OF THE WORKS. NO EXCAVATION IS TO COMMENCE UNTIL ALL EXISTING SERVICES HAVE BEEN LOCATED, MARKED ON SITE AND PROTECTED TO THE SATISFACTION OF THE RELEVANT AUTHORITY.
 5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS PERTAINING TO THE WORKS.

LEGEND

- ▬▬▬▬▬ PROPOSED DRAINAGE
- ||||| PROPOSED SLIT DRAIN
- PROPOSED PERMEABLE PAVING
- PROPOSED MANHOLE
- PROPOSED VORTEX FLOW CONTROL MANHOLE
- SURFACE FLOW DIRECTION
- PROPOSED ACCESS ROAD
- PROPOSED PITCH
- PROPOSED ATHLETICS TRACK
- PROPOSED PATH
- PROPOSED HANGOUT SPACE

NOTE

PERMEABLE PAVEMENT MAKEUP SUBJECT TO DETAILED DESIGN. SUB-BASE TO ACT AS ATTENUATION VOID. SUB-BASE TO HAVE IMPERMEABLE LINER TO PREVENT DISCHARGE TO CONTAMINATED SUBSTRATE

ISSUE	DRN	APP	DATE	NOTES / DESCRIPTION
1	VB	PDD	25/04/24	PROPOSED DRAINAGE LAYOUT PLAN

PLANNING

McCloy Consulting

T: 028 9084 8694
 F: 028 9084 1525
 E: info@mccloyconsulting.com
 W: www.mccloyconsulting.com

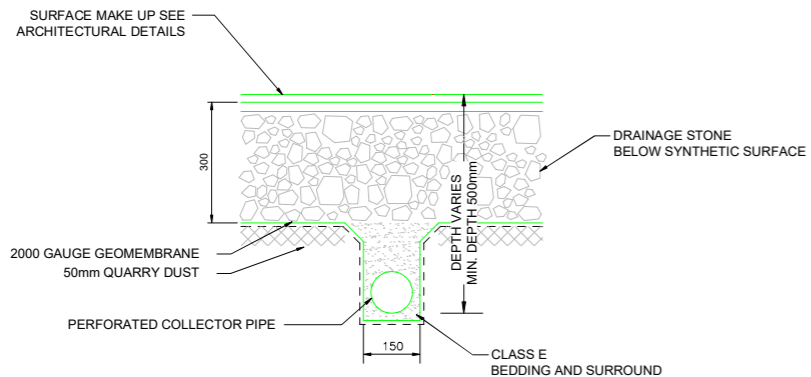
Mossley Mill, Lower Ground (West)
 Cammeroy Road North
 Newtownabbey
 Co. Antrim, BT36 5QA

RATHMORE ROAD, LUSK RECREATIONAL HUB

Comhairle Contae Fhine Gall Fingal County Council

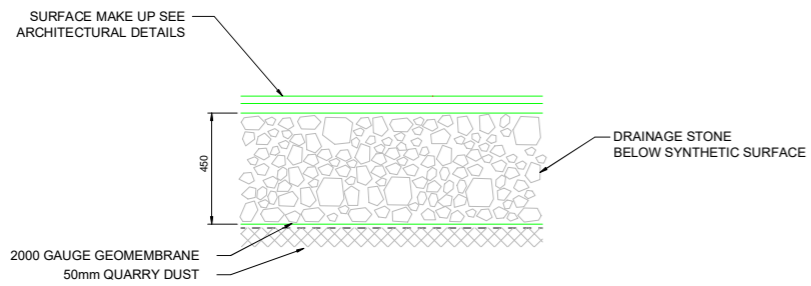
PROPOSED DRAINAGE LAYOUT PLAN

SCALE	ORIGINAL SIZE
AS SHOWN @ A1	A1
DRAWN	CHECKED
VB	PDD
DATE	25/04/2024
PROJECT No.	DRAWING No.
M02127-09	DWG_101
ISSUE No.	1



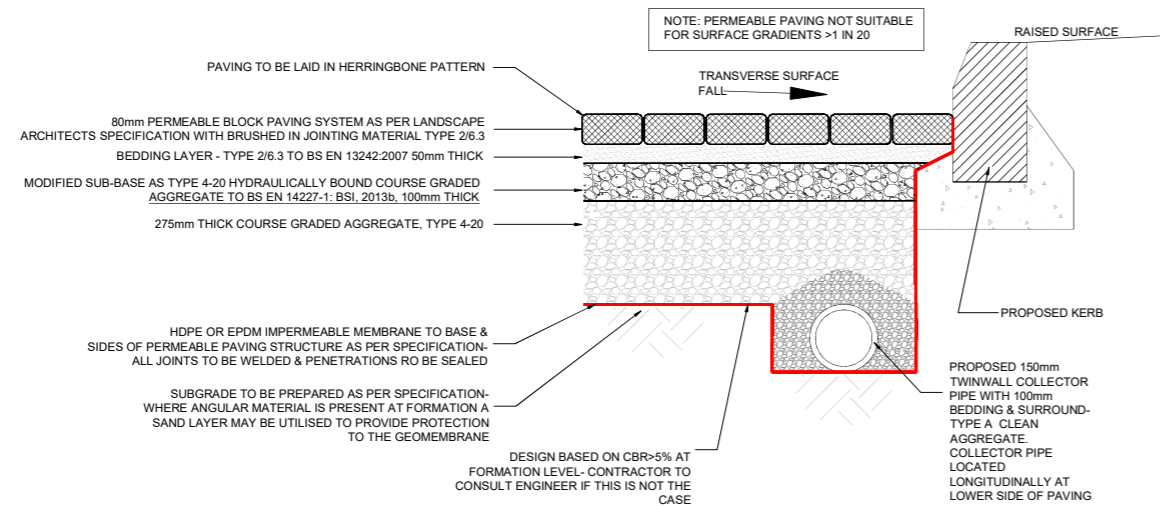
TYPICAL DETAIL - PERFORATED DRAINAGE PIPE TO SPORTS SURFACE

SCALE 1:10



TYPICAL DETAIL - STORM ATTENUATION BENEATH ATHLETICS TRACK

NTS



TYPICAL DETAIL PAVING STRUCTURE WITH STORAGE

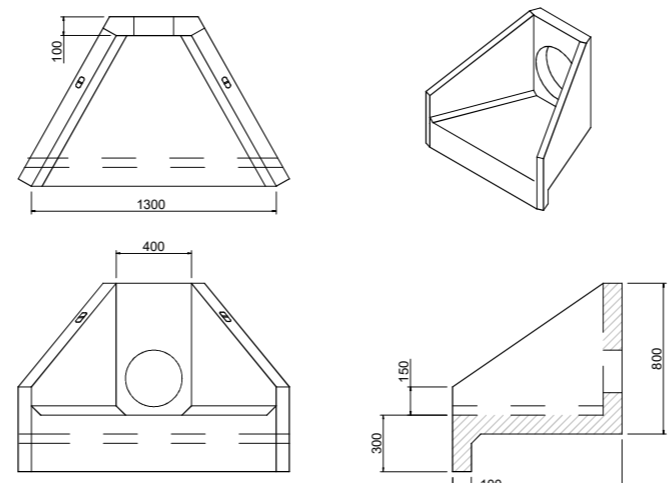
SCALE 1:10

NOTES

- This SUDS design is covered by copyright and may not be reproduced or transmitted in any form without prior consent from McCloy Consulting Limited. Any changes to the specification without prior consent from the Engineer will invalidate the design.
- Impermeable geomembrane to be high density polyethylene (HDPE), propylene or ethylene diene monomer rubber (EPDM) in line with guidance provided in CIRIA Report C748
- Bedding laying course to AG Xflo permeable block paving system shall be 50mm depth of Type 2/6.3 clean crushed stone to BS EN 13242:2007.
- Permeable pavement construction work to be phased at the completion of general site work.
- Any soft areas or pockets of soft material in the subgrade shall be removed and filled with a suitable permeable material (such as modified Class 6F2 capping material) and compacted.
- The permeable pavement design has been based upon the subgrade achieving a CBR value of >5%.
- All dimensions are in millimetres unless otherwise stated.
- All paving should be installed in accordance with BS 7533: Part 3 2005 by a competent paving contractor.
- All aggregates should be installed in accordance with the material specifications table.

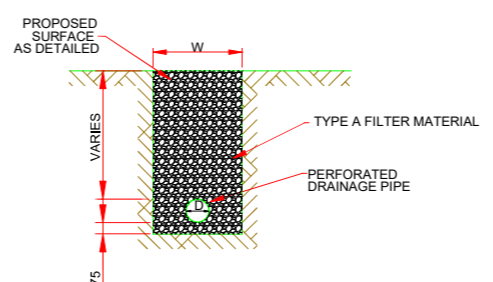
H3C SPECIFICATION INFORMATION

- OPENING IN BACK ALL CAST TO SUIT OUTSIDE DIAMETER OF THE PIPEWORK
- INVERT LEVEL OF PIPE CAN BE SET TO YOUR SPECIFICATION
- H3C SUITABLE FOR PIPEWORK UP TO 300mm ID TWIN WALL OR CLAY / 225mm ID CONCRETE



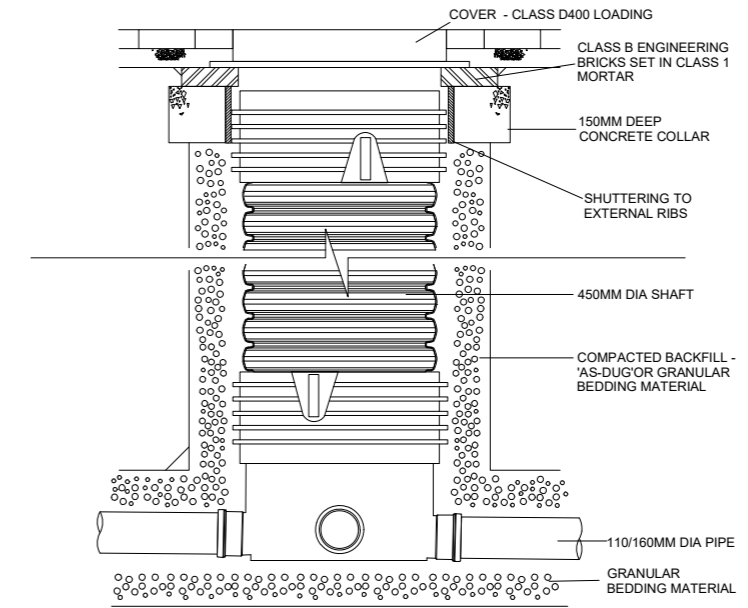
TYPICAL HEADWALL DETAIL

SCALE: NTS

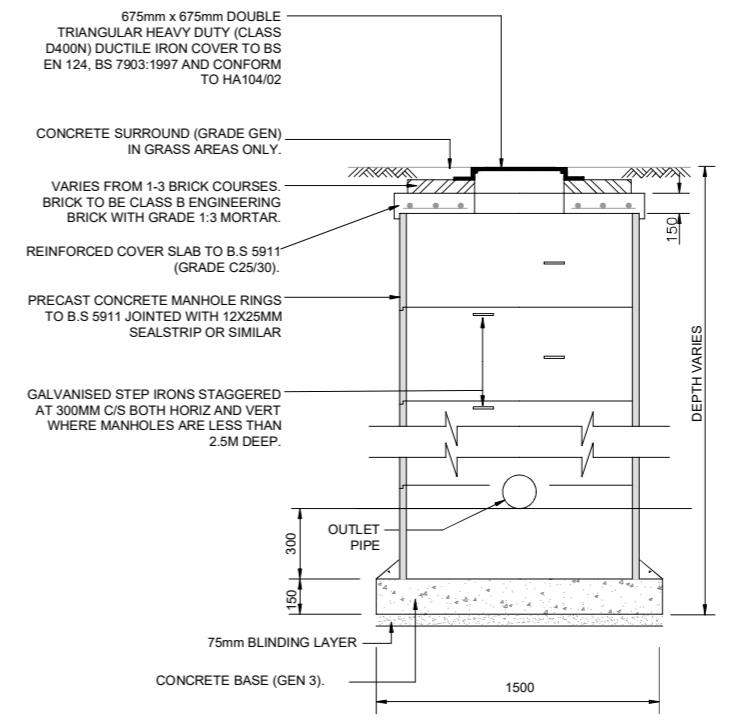


PERIMETER FILTER DRAIN

NTS



450mm Ø POLYPROPYLENE MANHOLE CHAMBER



SILT PIT MANHOLE CHAMBER

MATERIAL SPECIFICATION	
Material	Specification
80mm Acheson Glover Xflo Concrete Block	BS1338:2003
50mm laying course of graded 6.3-2.0mm grit	BS13242:2007
Hydraulically Bound Aggregate	BS EN 14227:2013
Coarse Graded Aggregate	BS13242:2007
Impermeable geomembrane to base and sides	CIRIA REPORT C748

1	VB	PDD	25/04/24	PROPOSED DRAINAGE LAYOUT PLAN
STATUS				
PLANNING				
T: 028 9084 8594 F: 028 9084 1525 E: info@mcclayconsulting.com W: www.mcclayconsulting.com				
Mossley Mill, Lower Ground (West) Carnmoney Road North Newtownabbey Co. Antrim, BT36 5QA				
PROJECT				
RATHMORE ROAD, LUSK RECREATIONAL HUB				
CLIENT				
Comhairle Contae Fhine Gall Fingal County Council				
DRAWING TITLE				
PROPOSED DRAINAGE DETAILS				
SCALE		ORIGINAL SIZE		
AS SHOWN @ A1		A1		
DRAWN	CHECKED	DATE		
VB	PDD	25/04/2024		
PROJECT NO.	DRAWING NO.	ISSUE NO.		
M02127-09	DWG_201	1		