McCloy Consulting

Drainage Design Statement

Martin Savage Park All Weather Pitch

M02154-03_DG01 | November 2023

WATER & ENVIRONMENTAL CONSULTANTS

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CLIENT	Dublin City Council
CLIENT CONTACT	Eddie O'Gara
PROJECT MANAGER	Philip Duffy
AUTHOR(S)	Iain Black
BRANCH	BELFAST Mossley Mill, Lower Ground (West), Carnmoney Road North, Newtownabbey BT36 5QA T: +44 (0) 28 9084 8694 | W: www.mccloyconsulting.com

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02	06/10/2023	IB	PD	PD	Outfall details Amended on M02154-03_DWG100	For Planning
03	19/10/2023	IB	PD	PD	Update to Appendix	For Planning
04	10/11/2023	IB	PS	PD	Updated per DCC comments	For Planning
05	13/11/2023	IB	PS	PD	Site Boundary updated	For Planning

DISTRIBUTION

Recipient	Revision						
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1 INTRODUCTION

1.1 Terms of Reference

This drainage design statement was commissioned by Dublin City Council (DCC) to support a planning application for a site located at Martin Savage Park, Dublin.

The objective of this report is to summarise the approach taken for the preliminary design of the site drainage, attenuation, flow control and discharge locations in order to comply with the requirements of DCC.

This report and the preliminary design referred to is developed for planning and informative purposes only and the level of detail presented reflects this. It is therefore important to note that layouts and details provided, unless noted otherwise, will be subject to detailed design at a later stage prior to commencement of any works.

1.2 Statement of Authority

McCloy Consulting is an independent environmental and water engineering consultancy specialising in drainage and SuDS design, drainage and hydrological assessments, river modelling and flood risk assessment. The practice has extensive experience in design and implementation of surface water management across the UK and Ireland.

This report and assessment has been prepared and reviewed by qualified professional civil engineers specialising in the fields of hydrology, drainage, and flood risk. The key staff members involved in the drainage design and drafting of this report are as follows:

- Iain Black MSc BEng (Hons) – Graduate Engineer
- Philip Duffy BEng (Hons) CEng MIEI – Associate and Senior Engineer

1.3 Introduction

This report details the design philosophy and methodology behind the surface water and attenuation design for the proposed all weather pitch at Martin Savage Park, Dublin. The drainage design adopts a SuDS approach for the permanent site drainage strategy.

The primary objective of this report is to demonstrate that the surface water drainage design provided meets the requirements of DCC Planning department and demonstrate the following:

- That permanent surface water drainage at the development is designed to a sufficient hydraulic capacity to transport or contain pre-determined return period rainfall events.
- That storm drainage design has been undertaken in accordance with the requirements stipulated by DCC planning department.
- That site run-off rates have been limited to the greenfield rate taken as either Qbar or 2 l/s/ha as stipulated by DCC and also demonstrate how Qbar was calculated.
- To outline the maintenance requirements in relation to drainage features.

2 DESIGN PARAMETERS

2.1 Project Drivers

The key requirements of the project design are as follows:

- The requirement to limit the rate of discharge into the existing surface water networks from all impermeable surfaces to that of greenfield run-off rates as stipulated by DCC.
- Demonstrating the feasibility of compliance with the requirements of DCC.
- Consider flood risk to downstream receptors and minimise / reduce pluvial risk as far as possible.

2.2 Software

Innovyze MicroDrainage software has been utilised in the design process to provide the best estimation of flows and surcharge levels from specific critical rainfall events on the site.

MicroDrainage calculation results are included in Appendix B.

2.3 Design Criteria

The design adopts the following in conformity with the required drainage standards:

- Demonstrate no flooding during a 100-year return period / 1% AEP event plus climate change allowance.
- Demonstrate that the design can facilitate the reduction of surface water run-off to the greenfield rate, discussed subsequently.

The design includes a 20% allowance for climate change at all return periods with the assumption that the drained pitch area is 100% impermeable. Application of urban creep (typically 10% increase in private residential impermeable areas) is not applicable to this site.

2.4 Outlet Condition

The effectiveness of the drainage design has been tested by simulating storms up to the 100-year plus climate change rainfall event. Outflow from the proposed drainage system discharges at a restricted rate to an existing storm sewer network that runs below the existing detention basin within the site boundary.

2.5 Approach

The drainage of the proposed site is expected to comprise of pitch drainage. Drainage to be collected via drainage collection features within the pitch. The pitch subbase is to be utilised as the storm attenuation storage with flows discharging from the pitch to be controlled by a flow control orifice, described subsequently.

The proposed storm drainage layout is included in Appendix A.

2.6 Peak Discharge

Peak discharge from the site has been set at the greenfield equivalent for the site as per DCC requirements. Greenfield rate is taken as either Qbar or 2 l/s/ha, whichever is greatest. In this instance, there is known flooding issues downstream therefore the stricter rate (2 l/s/ha) was adopted as greenfield rate, calculated as 1.8 l/s.

Attenuation is to be provided within the pitch subbase as shown on the proposed storm drainage layout drawing M02154-03_DWG100 included in Appendix A. Flows are to be restricted by an orifice manhole type unit at outflow point of attenuation. Run-off rate calculations have been provided in Appendix C.

Orifices have been sized by hydraulic modelling to limit flows to greenfield rate. An orifice size of 27 mm was calculated to provide the required storage and restrict flows to 1.8 l/s. The maximum simulated flowrate was 1.5 l/s which is lower than the calculated allowable greenfield rate and as such, further reducing the risk of flooding elsewhere.

2.7 Additional Basin Volume

While attenuation storage will provide volume for the 1% AEP + CC event, and discharge from the proposals will be limited to less than the allowable greenfield rate, in the context of local flood risk issues Dublin CC has requested through consultation that the existing surface water drainage basin in the east of the site be expanded.

The additional volume has been calculated based on the designed restricted outflow rate of 1.5 l/s being unable to drain away from the basin for a 6-hour period, giving a volume of c. 32.4 m^3. Maintaining a max. depth of 600 mm, consistent with the existing basin depth, requires an additional areal extent within the basin of 54 m^2 as shown on drawings included in Appendix A.

2.8 Maintenance Requirements

The developer is to ensure that maintenance of the drainage system is provided for as part of the overall management plan for the site.

Maintenance plans for drainage features are detailed on the following table. The final / adopted maintenance plan for the proposed pitch will be agreed as part of the detailed design in conjunction with the designers,

Table 2-1: Drainage System Maintenance Requirements

Inlets, Outlets, Controls, and Inspection Chambers		
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly
	Remove debris and sediment from chambers	Monthly for first six months, then quarterly or after significant storm
Remedial actions	Repair/rehabilitate where required	As required
	Routine rodding/ jetting of pitch subbase drainage as required	Annual/ after significant storm
Monitoring	Check all structures to ensure all is in good condition and operating as designed.	Annually
	(Flow controls) check for evidence of blockage	Monthly or after significant storm.
	(Flow controls) check for damage to components	Annually or after significant storm.

2.9 Summary / Further Work

The proposed development is resilient to surface water flooding. Site drainage design shall ensure the site is drained and flood resilient. Drainage design shall be as per the requirements of DCC. Runoff shall be limited to less than the greenfield equivalent rate of 2 l/s/ha and as such, not increase flood risk elsewhere.

Attenuation for surface run off will be provided by within the pitch subbase. The flow control has been sized by hydraulic modelling to limit flows to lower than greenfield rate, an orifice size of 27 mm will be required to restrict flows to a maximum of 1.5 l/s.

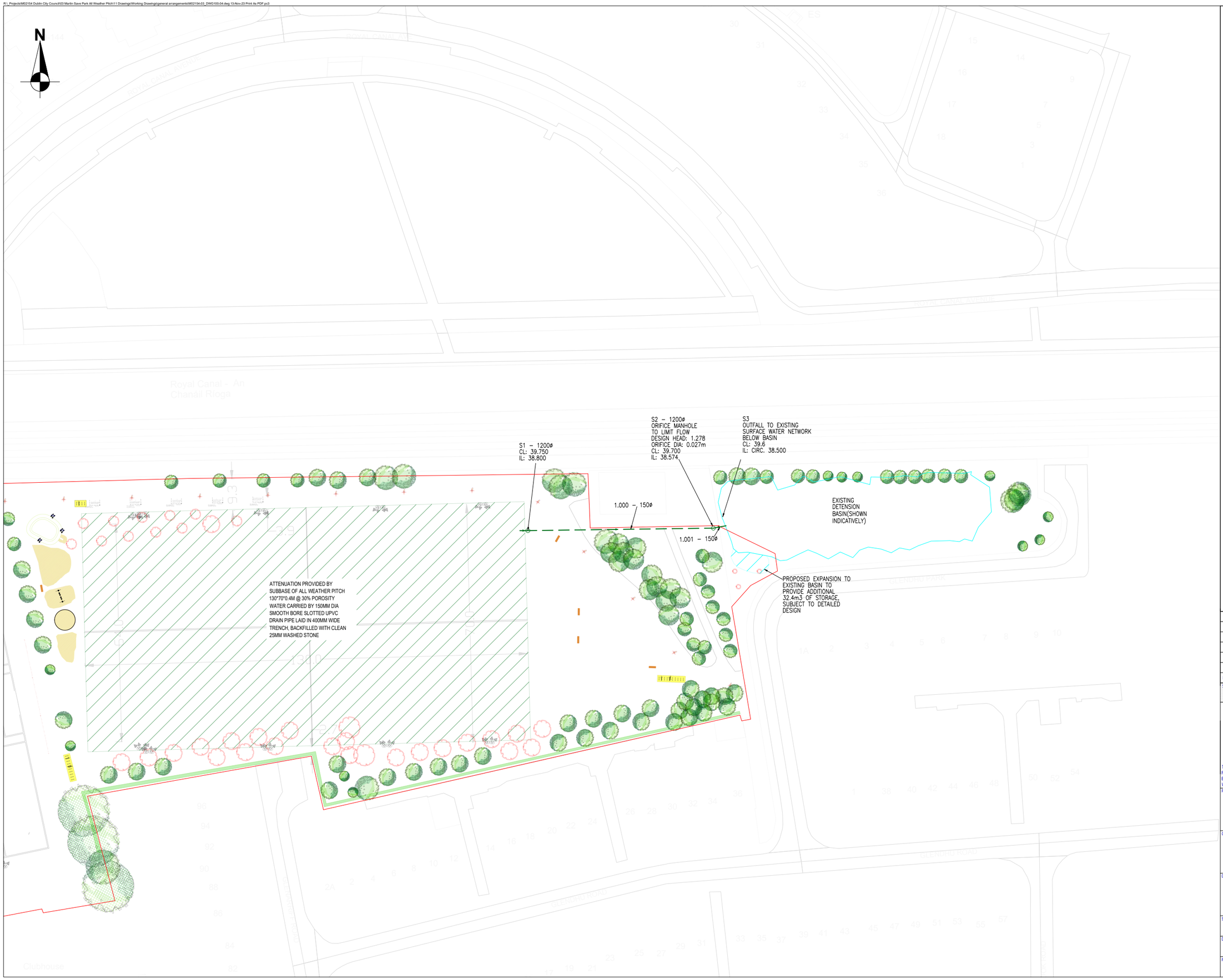
Prior to the commencement of construction, infiltration rates and groundwater levels under the all-weather pitch shall be verified on site and confirmed with the DPPDC section. The detailed design for the surface water management proposals shall comply with the Greater Dublin Regional Code of Practice for Drainage Works Version 6.0 and be submitted for agreement with the DPPDC section.

Records of public surface water infrastructure are indicative and must be verified on site. The developer must carry out a comprehensive site survey to establish all public surface water sewers that may be on the site. If surface water infrastructure is found that is not on public records the developer must immediately contact the DPPDC section to ascertain their requirements. Detailed “as-constructed” drainage layouts for all diversions, extensions and abandonment of public surface water sewers; in an approved format are to be submitted by the developer to the DPPDC Section for written approval.

Appendix A

Proposed Surface Water Drainage Layout

R:_Projects\M02154 Dublin City Council\03 Martin Save Park All Weather Pitch\11 Drawings\Working Drawings\general arrangements\M02154-03_DWG100-04.dwg 13-Nov-23 Print As PDF.pc3



NOTES

GENERAL
1. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

2. THIS DRAWING SHALL BE REVIEWED IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS.

3. THIS DRAWING IS NOT TO BE SCALED FROM.

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 WORK

LEGEND

SITE BOUNDARY

PROPOSED ALL WEATHER PTICH

PROPOSE DRAINAGE ASSET

ISSUE	DRN	APP	DATE	NOTES / DESCRIPTION
5	IB	PS	13/11/23	REVISED RED BOUNDARY LINE
4	IB	PD	10/11/23	REVISED DISCHARGE STRATEGY
3	IB	PD	05/10/23	OUTFALL AMENDED
2	IB	PD	21/09/23	FOR PLANNING
1	IB	PD	07/09/23	FOR REVIEW

STATUS

FOR REVIEW

McCloy Consulting
T: 028 9084 8694
F: 028 9084 1525
E: info@mccloyconsulting.com
W: www.mccloyconsulting.com
Mossley Mill, Lower Ground (West)
Carnmoney Road North
Newtownabbey
Co. Antrim, BT36 5QA

PROJECT

ALL WEATHER PITCH
MARTIN SAVAGE PARK

CLIENT

DUBLIN CITY COUNCIL

DRAWING TITLE

PROPOSED DRAINAGE LAYOUT
GENERAL ARRANGEMENT

SCALE	ORIGINAL SIZE
1:500	A1

DRAWN	CHECKED	DATE
IB	PD	13/11/2023

PROJECT No.	DRAWING No.	ISSUE NO.
M02154-03	DWG_100	4

Appendix B

Storm Network Hydraulic Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	2	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	17.000	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	56.828	0.227	250.0	0.911	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	3.160	0.174	18.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	48.09	6.50	38.801	0.911	0.0	0.0	0.0	0.63	11.2«	118.6
1.001	48.02	6.52	38.574	0.911	0.0	0.0	0.0	2.37	41.9«	118.6

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Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	39.750	0.949	Open Manhole	1200	1.000	38.801	150				
S2	39.700	1.127	Open Manhole	1200	1.001	38.574	150	1.000	38.574	150	
S3	39.600	1.200	Open Manhole	1350		OUTFALL		1.001	38.400	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	311701.035	237398.873	311701.035	237398.873	Required	
S2	311757.858	237399.601	311757.858	237399.601	Required	
S3	311761.001	237399.935			No Entry	

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	S1	39.750	38.801	0.799	Open Manhole	1200
1.001	o	150	S2	39.700	38.574	0.977	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	56.828	250.0	S2	39.700	38.574	0.977	Open Manhole	1200
1.001	3.160	18.2	S3	39.600	38.400	1.050	Open Manhole	1350

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	0.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 1	Number of Storage Structures 1	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	17.000	Cv (Summer)	0.750
Return Period (years)	2	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

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Online Controls for Surface Network 1

Orifice Manhole: S2, DS/PN: 1.001, Volume (m³): 2.3

Diameter (m) 0.027 Discharge Coefficient 0.600 Invert Level (m) 38.574

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Storage Structures for Surface Network 1

Tank or Pond Manhole: S1, DS/PN: 1.000

Invert Level (m) 39.350

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2730.0	0.400	2730.0	0.401	0.0

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.000 Cv (Summer) 0.750
Region Scotland and Ireland Ratio R 0.300 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status ON
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	2880 Winter	100	+20%	100/15 Summer				39.597	0.646	0.000	0.15		1.6	FLOOD RISK	
1.001	S2	2880 Winter	100	+20%	100/15 Summer				39.584	0.861	0.000	0.06		1.5	FLOOD RISK	

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Appendix C

Greenfield Run-off Rate Calculations

Project Ref: M02154-03
Project Name: [Martin Savage Park, Dublin]

Purpose: To cacluate the greenfield runoff rate for the site.

Total Site Area	9100	m2(0.91Ha)
QBAR (Dublin CC)	2	**L/s/Ha**

Proposed Area			
Impermeable	m^2	Ha	Greenfield runoff rate (L/s)
Proposed Pitch	9100	0.91	1.82
Total	9100	0.91	**1.82**

By	Checked	Revision	Reason for Change	Date
IB	MR	Original		10/11/2023