THE McKENNA PEARCE
PRACTICE
CONSULTING STRUCTURAL + CIVIL ENGINEERS

Unit 30, Spruce Avenue, Stillorgan Industrial Park, Stillorgan, Co. Dublin A94 R251. Tel: 01 2897260 email: mail@mckennapearce.com

PLANNING SUBMISSION ENGINEERING REPORT

FOR THE PROPOSED EXTENSION TO

LUCAN SHOPPING CENTRE,

NEWCASTLE ROAD,

LUCAN,

CO. DUBLIN

Reference 17/097

28th May 2021

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South Dublin County Council
County Hall
Tallaght,
Dublin 24,
D24 A3XC

Re: Proposed Extension to Lucan Shopping Centre, Newcastle Road, Lucan, Co. Dublin
Ref: 19/097

28th May 2021

Planning Application Engineering Submission

The Site:

The development will consist of the construction of two storey retail extension to the existing Lucan Shopping Centre. The extension is located within the existing car park to the north of the existing shopping centre. The proposed development includes all associated on and off-site development works, bin store, cycle and car parking, landscaping and boundary treatments.

Proposed Foul Water:

Providing new foul drains for approx. four toilets in the new building. Foul drainage is collected via 100mm diameter pipe to foul manholes and 150mm diameter pipe to saddle connection to the existing foul sewer on the site to the rear of the new building.

The existing public foul sewer is 225mm diameter, see drawing 17097 C01 Site Services attached.

The proposed 100mm diameter pipe at 1:60 gradient and 150mm diameter pipe at 1:100 gradient have adequate capacity for a single property, see calculation attached.

Proposed Surface Water:

In accordance with SUDS guidelines and the "Greater Dublin Regional Code of Practice for Drainage Works" we propose to mitigate roof discharge by maximising the green roof and attenuating discharge from the site.

The new surface water pipework 150mm at 1:150 drains from the roof to 33m^3 aquacell attenuation tank with 2l/s hydrobrake manhole connected to existing site manhole on the 1350mm public surface water sewer, see drawing 17097 C01 Site Services attached.

Existing car park drainage system retained in place apart from two gullies within footprint of building to be removed and filled. The proposed turning bay area will drain to the existing car park drainage.

The SuDS site evaluation report and OPW Flood Report are also attached.

Water Services:

The water supply will connect to the existing 100mm watermain on the site, see attached plan 17097 C01 for details

All water services will be constructed in accordance with the requirements of the following Irish Water standards;

- Code of Practice for Water Infrastructure,
- Water Infrastructure Standard Details.

Flood Risk Assessment:

Reference has been made to the flood maps on the OPW flood maps floodinfo.ie website and in the Strategic Flood Risk Assessment for South Dublin County Council Development Plan 2016-2022.

The site is sufficiently remote from the River Liffey and Griffeen River not to be subject to any fluvial flood events. The SDCC fluvial flood zoning map indicates no risk of fluvial flooding.

The site is situated inland and is not subject to any possibility of coastal flooding.

There are adequate perimeter landscaping areas on site and the introduction of green roof to replace existing hardstanding alleviates the risk of any pluvial flooding. The SDCC pluvial flood zoning map indicates a background low risk of 0.1% AEP pluvial flood extent for the site.

The OPW past flood event local area summary report attached shows that there is no history of flooding in the vicinity of Newcaste Road.

The nearest flooding occurred on the River Liffey and Griffeen River north of the N4 and upstream to the Griffeen River in excess of 1km away from proposed development.

Due to this, the risk of flooding is minimal.

Note:

All proposed drainage works to be carried out in accordance with Irish Water and South Dublin County Council's latest guidelines and current drainage recommendations.

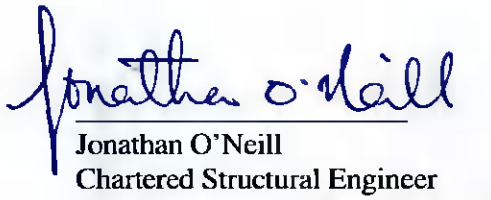
Background:

The proposed drainage systems have been designed and calculated in accordance with the following:

- The current "Building Regulations", particularly Part H – Drainage and Wastewater Disposal – Department of the Environment.
- Irish Water requirements for Wastewater & Water Infrastructure, including Standard Details 2017.
- "Specifications for Drinking Water Services" – Water Services Section, Dun Laoghaire-Rathdown County Council, Jan 2014
- "The Planning System and Flood Risk Management Guidelines 2009" – DoEHLG & OPW 2008
- "Greater Dublin Regional Code of Practice for Drainage Works" – Version 6.0 May 2006.
- "Greater Dublin Strategic Drainage Study Regional Drainage Policies, Technical Documents"- March 2005
- "Sustainable Urban Drainage Systems – Design Manual for Scotland and Northern Ireland" - CIRIA UK (ref. C521).
- "Stormwater Management Policy for Developers" - Dublin Corporation Drainage Division, Jan 1999.
- BS 8301 "Building Drainage"- British Standards, 1985.

Should you have any queries relating to any of the above, please do hesitate to contact us.

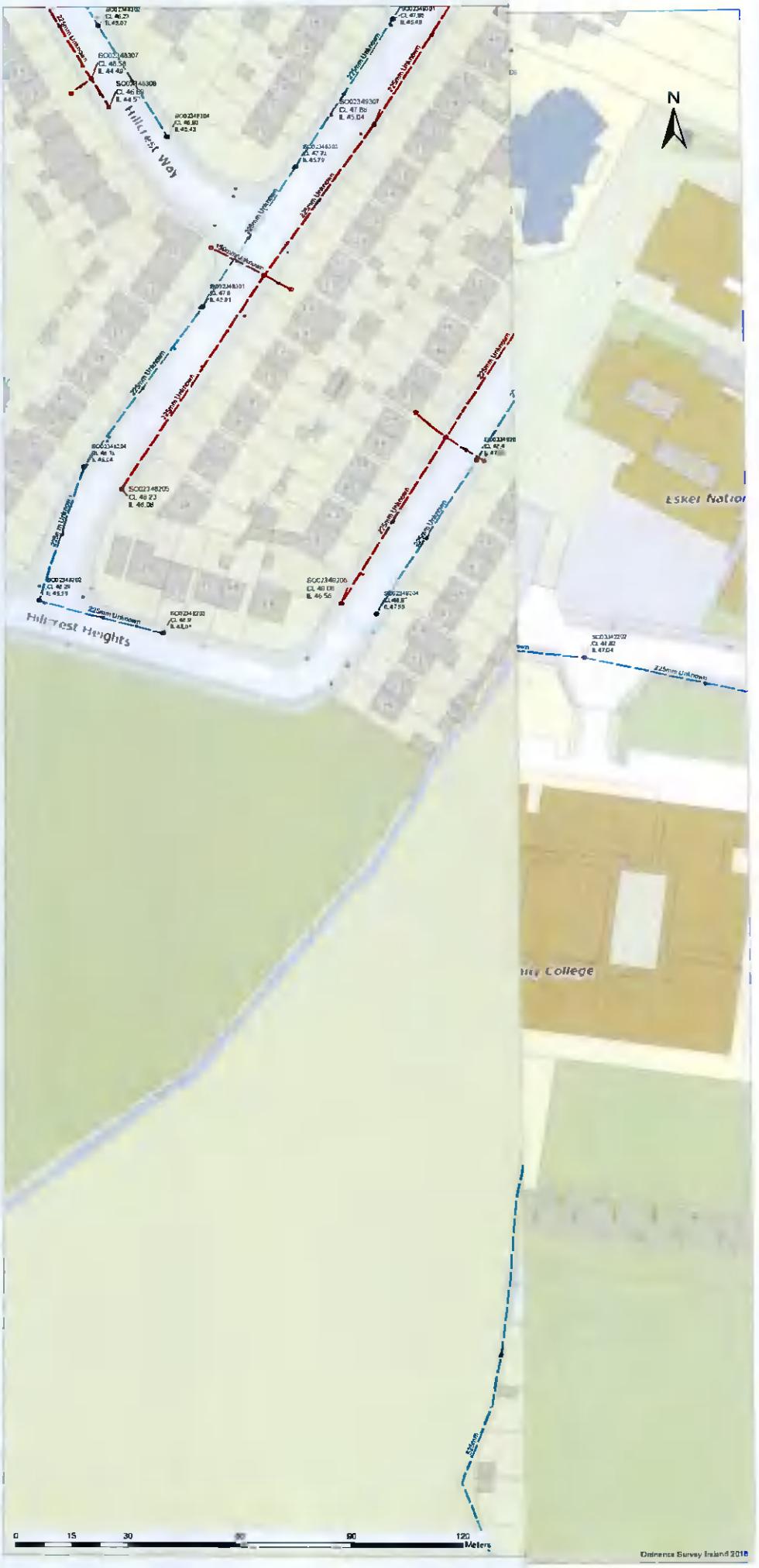
On behalf of The McKenna Pearce Practice



Jonathan O'Neill
Chartered Structural Engineer
BSc(Eng), PDipProjMan, CEng, MIEI, MIStructE, FConsEI

Encls

- Drawings 17097 C01 & C02
- Irish Water Public Drainage Records
- Foul Drainage Calculations
- Surface Water Drainage Calculations
- SuDS Site Evaluation
- South Dublin County Council Development Plan 2016-2022 Fluvial Flood Zone Mapping
- South Dublin County Council Development Plan 2016-2022 Pluvial Flood Zone Mapping
- OPW Flood Report



UISCE ÉIREANN : IRISH WATER

Legend

- Gravity - Combined
- Gravity - Foul
- Gravity - Overflow
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Overflow
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Syphon - Overflow
- Overflow
- Gravity - Combined
- Gravity - Foul
- Gravity - Overflow
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Overflow
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Syphon - Overflow
- Overflow
- Surface Gravity Mains
- Surface Gravity Mains Private
- Surface Water Pressurised Mains
- Surface Water Pressurised Mains Private

UISCE ÉIREANN : IRISH WATER

Legend

- Pump Stations
- Irish Water
- Private
- Irish Water
- Non IW

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Job Title:	Lucan Shopping Centre Extension	**Job Number:**	17097
Calculation by:	JON	**Date:**	21/04/2021
Checked by:	JON		

PROPOSED FOUL DRAINAGE: BS 8301 1985

RETAIL

Total Number of Shops = 2

Gross Floor Area = n/a m^2

Assume No. of Appliances = 2 wc/shop
2 washbasin/shop

DESIGN FOR PEAK FOUL FLOW

USE: Building Drainage; BS 8301
Sanitary Installation; BS 6465

Assume Commercial Use, T = 600 s

	No. of Appliances	No. of DU	Total DU
WC	4	14	56
Washbasin	4	3	12
Gross Total			68

PEAK FLOW = 3.881 l/s - Fig.2 BS 8301

COLEBROOK - WHITE FORMULA

Q = 3.88 l/s

ks = 1.5 mm

Kinematic viscosity @ 15 degrees Celsius = 1.141 x 10^{-6} m^2/s

Self Cleansing Velocity= 0.75 m/s

Use 150 mm Pipe
@ 1 in 100 Gradient

Q = 15.47 l/s

v = 0.875 m/s

DETERMINE AVERAGE DAILY FLOW

Assume retail typically open 9 hours

	Capacity l/usage	No. of Daily Uses
WC	9	54
Washbasin	6	54
Bath	23	0
Urinal	4.5	0

- Table 4 BS 8301

Total Average Daily Flow = 810 litres/day

Average Retail Daily Flow = 0.025 l/s

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SURFACE WATER STORAGE CALCULATIONS

Storm Return Period =	100	Years		
Total Site Area =	0.0837	Hectares (ha)		
Existing Open Space =	0	ha		
Proposed Impermeable Area				
Roof Area =	0.0837	ha	.....@	95%
Hard Standing /Road Area =	0.0000	ha	.....@	95%
Open Area =	0.0000	ha	.....@	0%
Allowable Outflow =	23.89	Litres/sec/ha		
Permissible Outflow Hydrobrake	2.000	Litres/sec		

Permissible Outflow: $QBAR = 0.00108(AREA)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$

QBAR = 0.322623687 L/s

SAAR	728
SOIL	0.3

Specific hydrobrake design for 2 litre/sec

1 hectare = 10,000m²

Rainfall Intensity as recorded for Dublin for				Casement	100 year Return Period		
Duration (min)	Rainfall (mm)	Rainfall + 10%	Intensity (mm/hr)	Rainfall (m^3/ha)	Total Runoff (m^3)	Allowable Outflow (m^3)	Storage Req'd (m^3)
2		0.0	0.00	0	0	0.24	-0.2
5	16.8	18.5	201.60	185	15	0.60	14.1
10	23.4	25.7	140.40	257	20	1.20	19.3
15	27.5	30.3	110.00	303	24	1.80	22.3
30	34	37.4	68.00	374	30	3.60	26.1
60	42	46.2	42.00	462	37	7.20	29.5
120	52	57.2	26.00	572	45	14.40	31.1
240	64.3	70.7	16.08	707	56	28.80	27.4
360	72.7	80.0	12.12	800	64	43.20	20.4
720	89.9	98.9	7.49	989	79	86.40	-7.8
1440	111.2	122.3	4.63	1223	97	172.80	-75.5
2820	121.9	134.1	2.59	1341	107	338.40	-231.8

Maximum value of storage required = **31.1** m^3

Surface Water Tank size based on 100 year storm attenuation

Provide storage for :
SW Tank = 31.1 m^3

Minimum tank of 1 m deep x 16.5 m long x 2 m wide -

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PROPOSED SURFACE WATER DRAINAGE

Roof drainage only

Proposed Impermeable Area				
Roof Area =	837.0	m^2	.....@	100%
Hard Standing /Road Area =		m^2	.....@	95%
Open Area =		m^2	.....@	0%

TOTAL IMPERMEABLE AREA (A) =	837	m^2

FLOW RATE

Intensity (i) = 26 mm/hr Note: Generally the intensity is taken as a 30 min, 5 year storm.

Flow Rate (Q) = 6.0 l/s Q = 2.78Ai

COLEBROOK - WHITE FORMULA

Surface Roughness (ks) = 0.6 mm

Kinematic viscosity @ 15 degrees Celsius = 1.141×10^{-6} m^2/s

Self cleansing velocity = 0.75 m/s

Use 150 **mm Pipe @ 1 in** 150 **Gradient**

Q_{act} = 14 l/s

v = 0.82 m/s

Site Drainage Evaluation

Site name: Lucan Shopping Centre
Site location: Newcastle Road

Report Reference: 1622542649955
Date: 1/6/2021

1. INTRODUCTION

This is a bespoke report providing initial guidance on potential implementation of SuDS for the development site in line with current best practice.

The use of this tool should be supplemented by more detailed guidance on SuDS best practice provided in a number of sources, principally the CIRIA SUDS Manual (2007), other CIRIA documents; the Use of SUDS in High Density Developments, HR Wallingford, (2005) and other HR Wallingford documents.

The objective is to provide some early guidance on the numbers and types of components that might be suitable for consideration within the site design. This may facilitate pre-application discussions with planners and other relevant authorities.

This guidance has been provided prior to the completion of the SUDS standards and the supporting guidance. However the principles of this tool are unlikely to be very different to the aims of the SUDS standards. HR Wallingford is not liable for the use of any output from the use of this tool and the performance of the drainage system. It is recommended that detailed design using appropriately experienced engineers professionals and tools is undertaken before finalising any drainage scheme arrangement for a site.

THE CONTENT OF THE REPORT

This report is split into 8 sections as follows:

2. Generic SuDS Best Practice Principles
3. Runoff Destination
4. Hydraulic Design Criteria
5. Water Quality Design Criteria
6. Site-Specific Drainage Design Considerations
7. SuDS Construction
8. SuDS Components Performance
9. Guidance on The Use of Individual Components

2. GENERIC SuDS BEST PRACTICE PRINCIPLES

To comply with current best practice, the drainage system should:

(i) manage runoff at or close to its source;
(ii) manage runoff at the surface;
(iii) be integrated with public open space areas and contribute towards meeting the objectives of the urban plan;
(iv) be cost-effective to operate and maintain.

The drainage system should endeavour to ensure that, for any particular site:

(i) natural hydrological processes are protected through maintaining Interception of an initial depth of rainfall and prioritising infiltration, where appropriate;
(ii) flood risk is managed through the control of runoff peak flow rates and volumes discharged from the site;
(iii) stormwater runoff is treated to prevent detrimental impacts to the receiving water body as a result of urban contaminants.

In addition, it is desirable to maximise the amenity and ecological benefits associated with the drainage system where there are appropriate opportunities. SuDS are green infrastructure components and can provide health benefits, and reduce the vulnerability of developments to the impacts of climate change.

3. RUNOFF DESTINATION

Introduction

Infiltration should be prioritised as the method of controlling surface water runoff from the development site, unless it can be demonstrated that the use of infiltration would have a detrimental environmental impact.

Groundwater (via Infiltration)
No constraints to the use of infiltration have been identified at this stage. Infiltration systems should therefore be used to manage surface water wherever practicable. Detailed site investigation and design work should be undertaken to confirm assumptions and apropriate system design characteristics.

The groundwater beneath the site is designated as *Principal Aquifer*, and this designation will define the treatment requirement for any infiltrated water (See Water Quality Design Criteria).

Surface water body
All runoff that cannot be discharged to groundwater will be managed on site and discharged to a surface water body.

The receiving surface water body for runoff from the site is: the *River Liffey*. The riparian owner is: .

4. HYDRAULIC DESIGN CRITERIA

Introduction
Best practice criteria for hydraulic control require Interception, runoff and volume control.

Interception
To fulfill the requirements for Interception, there should normally be no runoff from the site for an initial depth of rainfall - usually 5mm. This is achieved through the use of infiltration, evapotranspiration, or rainwater harvesting.

If practicable, infiltration systems should be used to meet the Interception requirements for the site.

Flow and Volume Control
The site has been previously developed. It is likely that there will be a requirement for the runoff to be constrained to levels as close to the equivalent greenfield rates and volumes as possible. Discharges that exceed equivalent pre-development rates and volumes will not, generally, be acceptable.

Infiltration and rainwater harvesting, or the use of Long Term Storage provide the means to achieve greenfield runoff volume control. Where volume control is not practicable, flows discharged from the site will need to be constrained to 2 l/s/ha.

5. WATER QUALITY DESIGN CRITERIA

Introduction
Current best practice takes a risk-based approach to managing discharges of surface runoff to the receiving environment. The following text provides guidance on the extent of water quality management likely to be appropriate for the site.

Hazard Classification
Runoff from clean roof surfaces (ie not metal roofs, roofs close to polluted atmospheric discharges, or roofs close to populations of flocking birds) is classified as Low in terms of hazard status.

Runoff from roof surfaces that may be contaminated with metals or other pollutants (resulting from roof materials); deposited pollutants from atmospheric discharges (eg factory chimneys); or faeces from flocking birds (eg seagulls) is classified as Medium in terms of hazard.

Runoff from roads, parking and other areas of residential, commercial and industrial sites (that are not contaminated with waste, high levels of hydrocarbons, or other chemicals) is classified as Medium in terms of hazard status.

Treatment requirements for disposal to groundwater systems
Runoff from roofs will need one effective treatment stage prior to disposal to groundwater. Where sediment and other litter is prevented from entering the infiltration device, and the underlying subsoils can be demonstrated to provide effective treatment, then the process of infiltration will usually be sufficient.

Runoff from roads, parking and other areas of the site will need 2 effective treatment stages prior to disposal to groundwater. Where sediment and litter is prevented from entering the infiltration device, and the underlying subsoils can be demonstrated to provide effective treatment, then the process of infiltration will usually be deemed to constitute one treatment stage. One further upstream treatment stage will also be required.

Treatment requirements for disposal to surface water systems
Roof runoff will not require treatment prior to discharge.

Runoff from other parts of this site such as roads, parking and other areas will require at least 2 treatment stages prior to discharge.

6. SITE-SPECIFIC DRAINAGE DESIGN CONSIDERATIONS

The design of SuDS with access to temporary or permanent water should consider public health and safety as well as issues associated with construction and operational management of the structures. Health and safety issues and risk mitigation features are presented in the CIRIA SuDS Manual.

Individual SuDS components should not be treated in isolation, but should be seen together as providing a suite of drainage features which are appropriate in different combinations for varying scales. It is always desirable to have a mix of SuDS components across the site as different components have different capacities for treatment of individual pollutants.

7. SuDS CONSTRUCTION

SuDS are a combination of civil engineering structures and landscaping practice. Due to the limited experience of building SuDS in the water industry, there are a number of key issues which need to be particularly considered as their construction requires a change in approach to some standard construction practices.

- SuDS components should be constructed in line with either the manufacturer's guidelines or best practice methods.
- The construction of SuDS usually only requires the use of fairly standard civil engineering construction and landscaping operations, such as excavation, filling, grading, top-soiling, seeding, planting etc. These operations are specified in various standard construction documents, such as the Civil Engineering Specification for the Water Industry (CESWI).
- Construction of soakaways is regulated by the Buildings Regulations part H (Drainage and waste disposal) which sets out the requirements for drainage of rainwater from the roofs of buildings.
- During construction, any surfaces which are intended to enable infiltration must be protected from compaction. This includes protecting from heavy traffic or storage of materials.
- Water contaminated with silt must not be allowed to enter a watercourse or drain as it can cause pollution. All parts of the drainage system must be protected from construction runoff to prevent silt clogging the system and causing pollution downstream. Measures to prevent this include soil stabilisation, early construction of sediment management basins, channelling run-off away from watercourses and surface water drains, and erosion prevention measures.
- After the end of the construction period and prior to handover to the site owner/operator:
  - Subsoil that has been compacted during construction activities should be broken up prior to the re-application of topsoil to garden areas and other areas of public open space to reinstate the natural infiltration performance of the ground;
  - Any areas of the SuDs that have been compacted during construction but are intended to permit infiltration must be completely refurbished;
  - Checks must be made for blockages or partial blockages of orifices or pipe systems;
  - Any silt deposited during the construction must be completely removed;
  - Soils must be stabilised and protected from erosion whilst planting becomes established.

Detailed guidance on the construction related issues for SuDS is available in the SuDS Manual and the associated Construction Site handbook (CIRIA, 2007).

8. SuDS COMPONENTS PERFORMANCE

	Interception	Peak flow control: Low	Peak flow control: High	Volume reduction	Volume control	Gross sediments	Fine sediments	Hydrocarbons/ PAHs	Metals	Nutrients
Rainwater Harvesting	Y	Y	S	Y	N	N	N	N	N	N
Pervious Pavement	Y	Y	Y	Y	Y	Y	Y	Y	Y	Var
Filter Strips	Y	N	N	N	N	Y	N	Y	Y	Var
Swales	Y	Y	S	Y(*)	N	Y	Y(+)	Y	Y	Y(-)
Trenches	Y	Y	S	Y(*)	N	N	N	Y	Y	Y(-)
Detention Basins	Y	Y	Y	N	Y	Y	Y(+)	Y	Y	Var
Ponds	N	Y	Y	N	Y	N(~)	Y	Limited	Y	Var
Wetlands	N	Y	S	N	Y	N(~)	Y	Limited	Y	Y
Soakaways	Y	Y	S	Y	N	N(~)	N(~)	Y(")	Y(")	N
Infiltration Basins	Y	Y	S	Y	N	N(~)	N(~)	Y(")	Y(")	N
Green Roofs	Y	Y	N	N	N	N	N	Y	N	N
Bioretention Systems	Y	Y	S	Y(*)	N	N(~)	Y	Y	Y	Y
Proprietary Treatment	N	N	N	N	N	Y	Y	Y(!)	Y(!)	Y(!)

Systems										
Subsurface Storage	N	Y	Y	N	Y	N(~)	N	N	N	N
Subsurface Conveyance Pipes	N	N	N	N	Y	N(~)	N	N	N	N

Notes:
S: Not normally with standard designs, but possible where space is available and designs mitigate impact of high flow rates.
Y(*): Where infiltration is facilitated by the design.
N(~): Gross sediment retention is possible, but not recommended due to negative maintenance and performance implications.
Y(+): Where designs minimise the risk of fine sediment mobilisation during larger events.
Y(!): Where designs specifically promote the trapping and breakdown of oils and PAH based constitutents.
Y("): Where subsurface soil structure facilitates the trapping and breakdown of oils and PAH based constituents.
Var: The nutrient removal performance is variable, and can be negative in some situations.
Y(-): Good nutrient removal performance where subsurface biofiltration systems with a permanently saturated zone included within the design.

9. GUIDANCE ON THE USE OF INDIVIDUAL COMPONENTS

Rainwater Harvesting

• *Roofs*
Rainwater harvesting systems can be used to effectively drain roofs and provide both water supply and stormwater management benefits.

Pervious Pavement

• *Roofs*
Roof water can be drained into pervious pavement areas using diffusers to dissipate the point inflows. Detailed design of the pavement will need to take account of the additional impermeable roof area.

• *Roads*
Some types of pervious pavement can be used for relatively highly trafficked roads and pavement manufacturers should be consulted on the appropriate specification.

• *Car parks/other impermable surfaces*
Pervious pavements provide effective drainage, storage and treatment of car park surfacing,

Filter Strips

• *Roads*
Filter strips can provide treatment for road runoff, upstream of swales or trench components. They can reduce the need for kerbing and runoff collection systems.

• *Car parks/other impermable surfaces*
Filter strips can provide treatment for runoff from impermeable surfaces, upstream of swales or trench components. They can reduce the need for kerbing and runoff collection systems.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Swales

• *Roofs*
Swales can be used to convey roof water to other parts of the site.

• *Roads*
Swales provide treatment and conveyance of road runoff. There are a range of swale types - standard grass channels, underdrained swales, and wetland swales - depending on drainage requirements.

• *Car parks/other impermable surfaces*
Swales provide treatment and conveyance of runoff from impermeable areas. There are a range of swale types - standard grass channels, underdrained swales, and wetland swales - depending on drainage requirements.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Trenches

• *Roofs*
Trenches can be used to convey roof water to other parts of the site.

• *Roads*
Trenches can provide treatment and conveyance of road runoff. They require effective pretreatment to minimise the risk of blockage.

• *Car parks/other impermable surfaces*
Trenches can provide treatment and conveyance of runoff for impermeable areas.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Detention Basins

• *Roofs*
Detention basins can be used to attenuate and treat runoff.

• *Roads*
Detention basins can be used to attenuate and treat runoff.

• *Car parks/other impermable surfaces*
Detention basins can be used to attenuate and treat runoff.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria. A risk assessment should be used to determine the maximum appropriate depth of stored water in the basin.

Ponds

• *Roofs*
Ponds can be used to attenuate and treat roof runoff.

• *Roads*
Ponds can be used to attenuate and treat runoff. However, they are best implemented at the lower end of the treatment train as a 'polishing' component. They should not be used as sediment management devices, as sediment and wet vegetation is relatively costly to extract and dispose of. If poor quality water remains in ponds for extended periods, nutrient concentrations can rise - particularly in the summer months, and the pond can become unattractive with poor amenity and biodiversity potential.

• *Car parks/other impermable surfaces*
Ponds can be used to attenuate and treat runoff. However, they are best implemented at the lower end of the treatment train as a 'polishing' component. They should not be used as sediment management devices, as sediment and wet vegetation is relatively costly to extract and dispose of. If poor quality water remains in ponds for extended periods, nutrient concentrations can rise - particularly in the summer months, and the pond can become unattractive with poor amenity and biodiversity potential.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

• *Other*
Ponds built in permeable soils will require lining to maintain the water level of the permanent pool. The lining may be finished 100 or 200 mm lower than the outlet invert to encourage some infiltration to take place to contribute to interception.

Wetlands

• *Roofs*
Wetlands can be used to attenuate and treat roof runoff.

• *Roads*

Wetlands can be used to attenuate and treat runoff. However, they are best implemented at the lower end of the treatment train as a 'polishing' component. They should not be used as sediment management devices, as sediment and wet vegetation is relatively costly to extract and dispose of. If poor quality water remains in wetlands for extended periods, nutrient concentrations can rise - particularly in the summer months, and the wetland can become unattractive with poor amenity and biodiversity potential.

• *Car parks/other impermable surfaces*
Wetlands can be used to attenuate and treat runoff. However, they are best implemented at the lower end of the treatment train as a 'polishing' component. They should not be used as sediment management devices, as sediment and wet vegetation is relatively costly to extract and dispose of. If poor quality water remains in wetlands for extended periods, nutrient concentrations can rise - particularly in the summer months, and the wetland can become unattractive with poor amenity and biodiversity potential.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Soakaways

• *Roofs*
Soakaways can be used to store, treat, and dispose roof runoff.

• *Roads*
Upstream treatment is normally required if soakaways are used to manage road runoff directly. Sediments and litter should be prevented from entering the soakaway.

• *Car parks/other impermable surfaces*
Upstream treatment is normally required if soakaways are used to manage road runoff directly. Sediments and litter should be prevented from entering the soakaway.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Infiltration Basins

• *Roofs*
Infiltration basins can be used to attenuate and treat roof runoff.

• *Roads*
Upstream treatment is normally required if infiltration basins are used to manage road runoff. Sediments should be prevented from entering the system.

• *Car parks/other impermable surfaces*
Upstream treatment is normally required if infiltration basins are used to manage runoff from trafficked surfaces. Sediments should be prevented from entering the system.

• *Site size > 50 ha*
The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria. A risk assessment should be used to determine the maximum depth of stored water in the basin.

Green Roofs

• *Roofs*
Green roofs can be designed to provide interception, management and treatment of rainfall up to specified rainfall depths.

Bioretention Systems

• *Roofs*
Bioretention systems can be used to attenuate and treat roof runoff.

• *Roads*
Linear bioretention systems (ie biofiltration swales) can be used to attenuate and treat road runoff.

• *Car parks/other impermable surfaces*
Bioretention systems canbe used for car park drainage.

• *Site size > 50 ha*
Bioretention systems will tend to be suitable for managing small areas only.The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

Proprietary Treatment Systems

• *Roads*
Proprietary treatment systems can be used where surface vegetated systems are impracticable. However, regular monitoring needs to be ensured so that they are maintained so that they continue to function effectively.

• *Car parks/other impermable surfaces*
Proprietary treatment systems could be used where surface vegetated systems are impracticable. However, regular monitoring needs to be ensured so that they are maintained so that they continue to function effectively.

• *Site size > 50 ha*
Proprietary treatment systems will tend to be suitable for managing small areas only. The size of area that can be drained will be limited by meeting the hydraulic and water quality criteria.

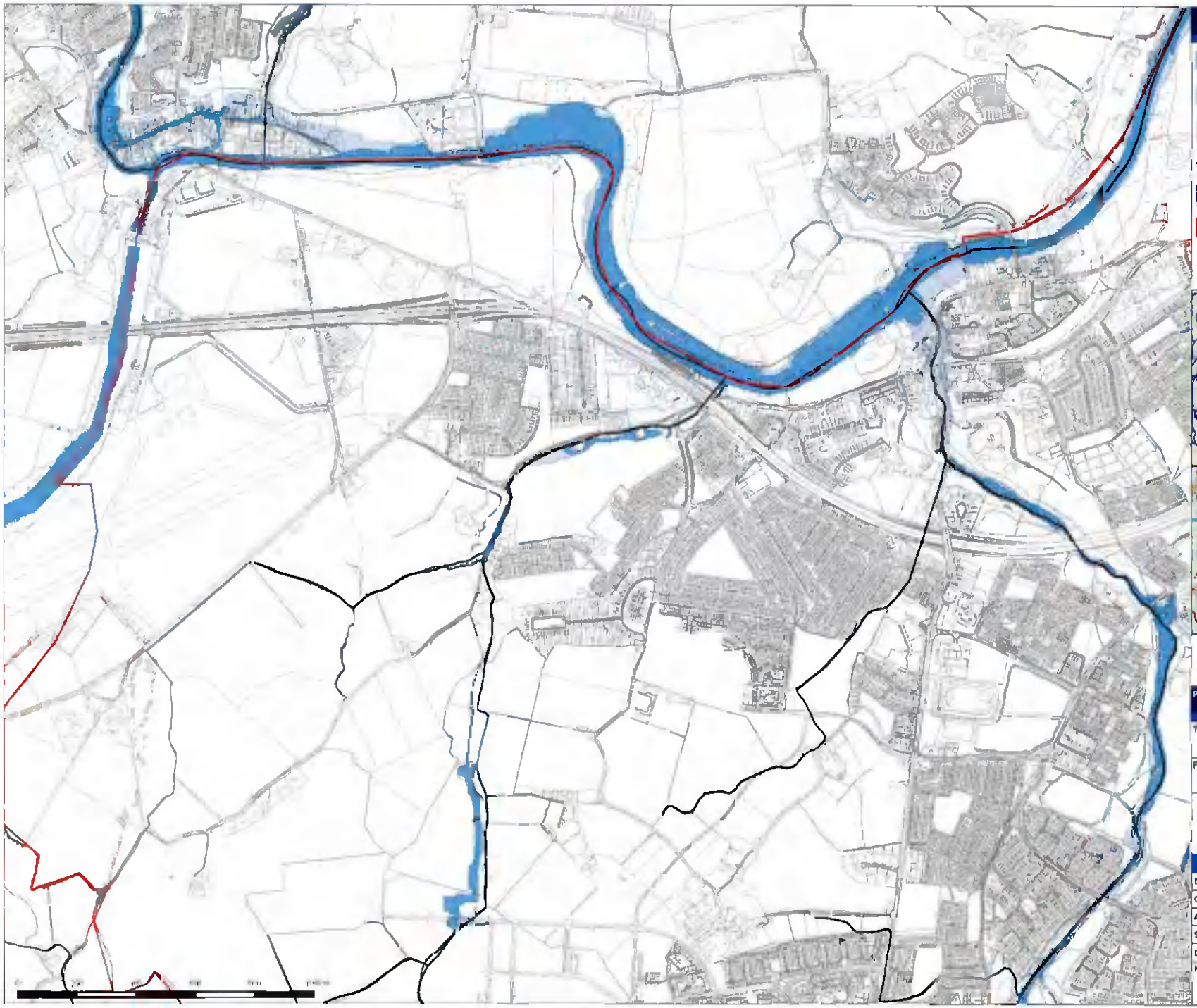
Subsurface Storage

• *Roofs*
Subsurface storage can be used to attenuate roof runoff.

• *Roads*
Subsurface storage can be used to attenuate road runoff.

• *Car parks/other impermable surfaces*
Subsurface storage can be used to attenuate car park runoff.

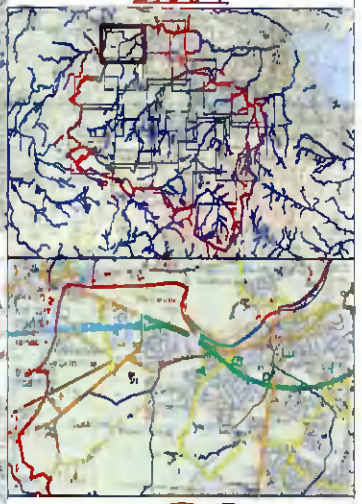
Subsurface Conveyance Pipes



Legend

- Flood Zone A - 1% AEP Flood Extent (1 in 100 chance in any given year)
- Flood Zone B - 1% AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- Watercourse Centreline
- Indicative Flood Extents
- County Boundary

DRAFT



South Dublin County Council

Project: Strategic Flood Risk Assessment

Title: Fluvial Flood Zone Mapping

Figure: MDW657_0001

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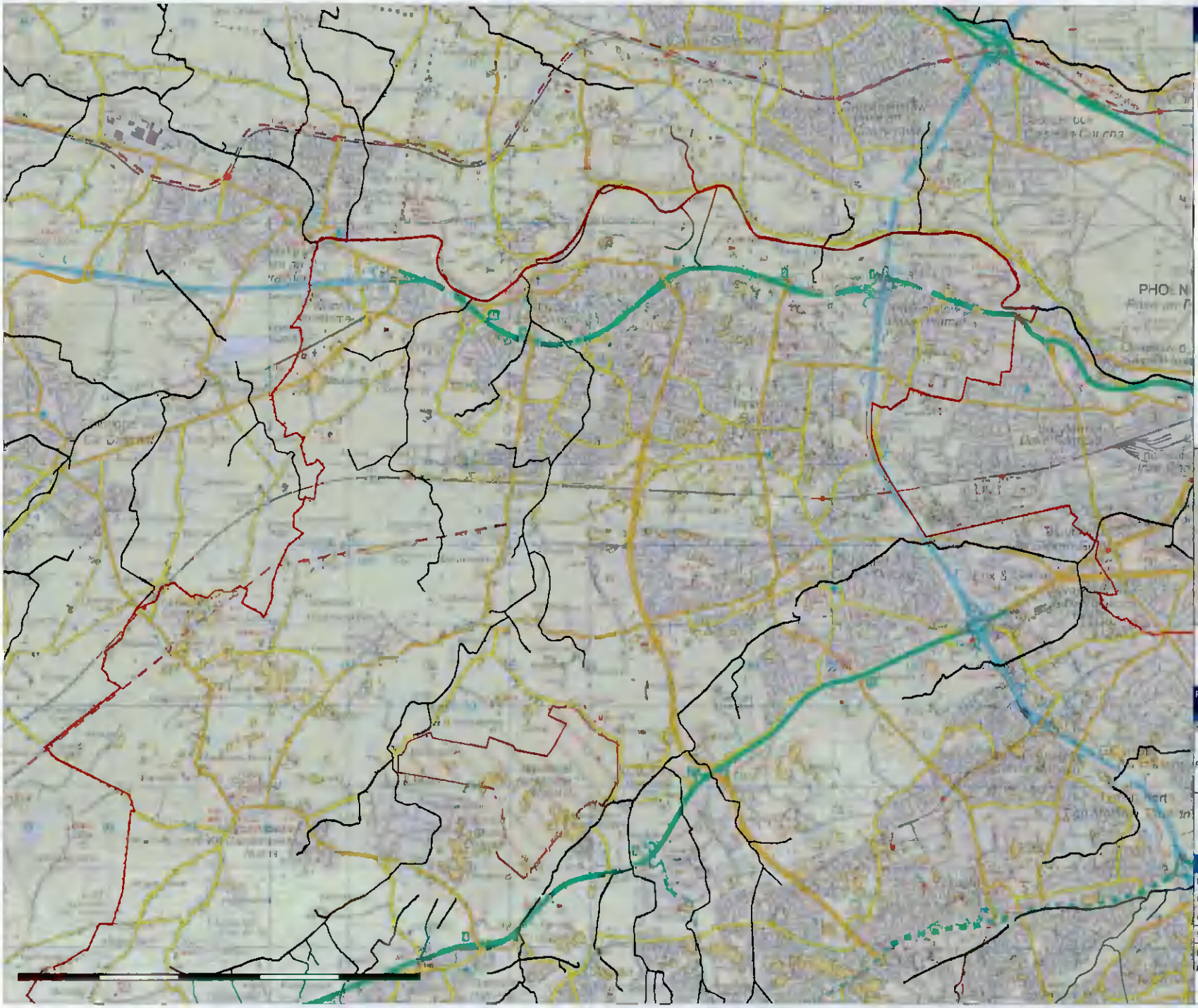
Drawn:	ST	Project No.	MDW0657
Checked:	JH	File Ref	MDW0657QG0010F02
Approved:	JH		
Scale:	1:6000 @ A1	Drawing No.	Projection
Date:	14/01/2016	1 of 26	n/a

Notes: 1. The viewer of this map should refer to the SFRA Report and Disclaimer


Legend
Pluvial - 1% AEP Flood Extent
(1 in100 chance in any given year)
Pluvial - 0.1% AEP Flood Extent
(1 in1000 chance in any given year)
Watercourses
County Boundary
DRAFT
South Dublin County Council
Project
Strategic Flood Risk Assessment
PFRA Indicative Pluvial Flood Zone Mapping
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Scale: 1:20000
Date: 14/01/2016
Project No. MDW0657
File Ref MDW0657QC0132R02
Drawing No 1 of 4
Projection
Notes
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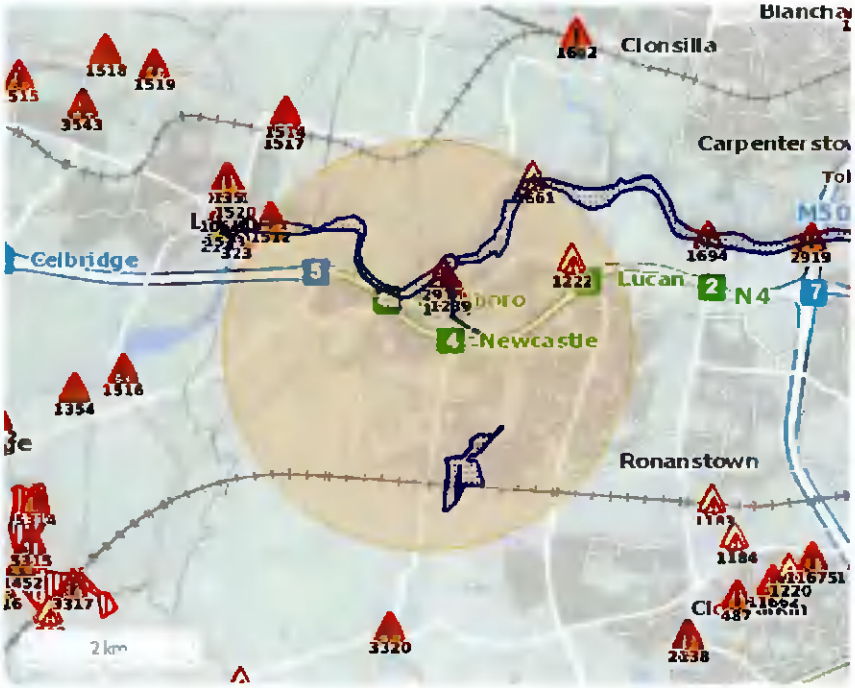
Past Flood Event Local Area Summary Report

Report Produced: 1/6/2021 10:10

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

11 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Griffeen November 2000 (ID-1237)	05/11/2000	Area
	Additional Information: Reports (16) Press Archive (6)		
2.	Griffeen Aug 1986 (ID-1239)	25/08/1986	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
3.	Griffeen June 1993 (ID-1240)	11/06/1993	Approximate Point
	Additional Information: Reports (7) Press Archive (0)		
4.	Griffeen Nov 2002 (ID-350)	15/11/2002	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
5.	Lucan St Edmonsbury Road Recurring (ID-1222)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
6.	Silleachain Mill Lane Leixlip Nov 2002 (ID-1512)	14/11/2002	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Liffey Lr Lucan Rd R109 Strawberry Beds Recurring (ID-1661)	n/a	Exact Point
	Additional Information: Reports (2) Press Archive (0)		
8.	Silleachain Mill Lane Leixlip Nov 2000 (ID-1778)	05/11/2000	Approximate Point
	Additional Information: Reports (1) Press Archive (1)		
9.	Liffey Lower - Dec 1954 (ID-241)	08/12/1954	Area
	Additional Information: Reports (5) Press Archive (2)		
10.	Liffey Lucan June 1993 (ID-2918)	10/06/1993	Approximate Point
	Additional Information: Reports (3) Press Archive (2)		
11.	Griffeen River 24th Oct 2011 Lucan (ID-11487)	24/10/2011	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		