

Belgard Gardens, Tallaght

**SITE-SPECIFIC FLOOD RISK ASSESSMENT REPORT
for ATLAS GP LIMITED**

PROJECT NO. A557

19th DECEMBER 2018



OCSC

O'CONNOR | SUTTON | CRONIN

Multidisciplinary
Consulting Engineers



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**Belgard Gardens, Belgard Square,
Tallaght, Dublin 24.**



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SITE-SPECIFIC FLOOD RISK ASSESSMENT

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SITE-SPECIFIC FLOOD RISK ASSESSMENT

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1 INTRODUCTION

1.1 Appointment

O'Connor Sutton Cronin & Associates (OCSC) have been appointed by *Atlas GP Limited*; to carry out a Site-Specific Flood Risk Assessment Report for the new-build planning application of a proposed mixed-use, regeneration development, located west of Belgard Road, Tallaght, Dublin 24.

1.2 Administrative Jurisdiction

The proposed development is located in the jurisdiction of South Dublin County Council (SDCC), and therefore the Site-Specific Flood Risk Assessment Report was carried out with reference to the following:

- South Dublin County Council Development Plan 2016 – 2022;
- Strategic Flood Risk Assessment for South Dublin County Council Development Plan, 2016 – 2022;
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government and the Office of Public Works);
- Greater Dublin Strategic Drainage Study;
- Tallaght Local Area Plan 2008 (South Dublin County Council)
 - Now expired.

1.3 Site Location

The subject site is located west of Belgard Road, Tallaght, Dublin 24; less than 500m north of The Square, Tallaght, as shown in *Figure 1.1 - Site Location*, and is immediately bound by:

- Airton Road and Belgard Retail Park, to the north;
- R113, Belgard Road, to the east;
- SDCC St. Maelruans Site, to the west;
- Belgard Square North road, to the south.

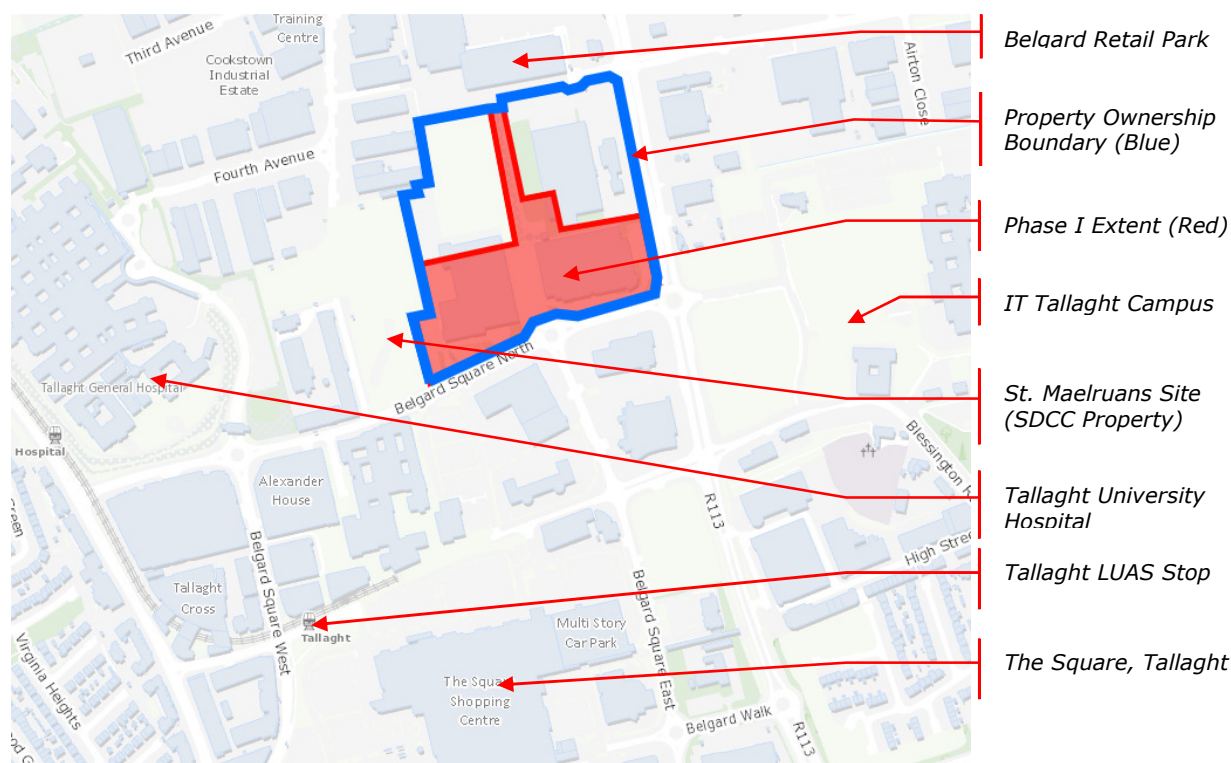


Figure 1.1 - Site Location

1.4 Information Consulted

The Flood Risk Assessment was based on the following available information:

- C624 Development and Flood Risk (Construction Industry Research and Information Association, CIRIA);
- OPW website www.floodmaps.ie;
- DECLG website www.myplan.ie;
- OPW website www.floodinfo.ie;
- OPW National Preliminary Flood Risk Assessment;
- OPW Dublin Pluvial Study. Flood Resilient City;
- OPW Irish Coastal Protection Strategy Study;
- SDCC and Irish Water Drainage Records;
- Public utility services records;
- DCC GSDS System Performance Records;
- Geological Survey of Ireland (GSI) Maps;
- Architectural floor plan drawing provided by the client and;
- Topographical and Ground Penetrating Radar Surveys of the site and adjacent roads.

2 SITE CONTEXT

2.1 Site Area

The subject site, 6.64 hectares in area (property ownership), is located west of Belgard Road, Tallaght Dublin 24; less than 500m north of The Square, Tallaght, as shown in *Figure 1.1 - Site Location*, and is immediately bound by:

- Airton Road and Belgard Retail Park, to the north;
- R113, Belgard Road, to the east;
- SDCC-owned St. Maelruans Site, to the west;
- Belgard Square North road, to the south.

Additional works are also to be carried out in the public area, in order to facilitate upgrades to the adjoining Belgrade Square North road, resulting in a total development area of c7.2 hectares.

2.2 Site Overview and Topography

The overall site area is approximately 6.64-hectares, with approximately 3.15-hectares, in the southern part of the site, which is to be developed as part of the Phase I application, as denoted by the red-line boundary in *Figure 1.1 - Site Location*. This Site-Specific Flood Risk Assessment Report assesses the context of the overall site area.

The existing site comprises three former commercial / industrial properties, which had been previously occupied by Kerry Group, Cuisine de France and UniPhar, along with associated hardstanding, landscaping and infrastructure.

The existing building's footprints and hardstanding area cover approximately 75% of the overall site area, with approximately 1.5-hectare of existing green open space in the north-west area of the site.

The existing ground levels across the overall site are typically graded in an east to north-east direction, with a local high-point of approximately +102.50m near the mid-west of the site.

Adjacent to the site, the existing road levels are as follows:

- Airton Road, along the northern boundary, is graded from +98.8m to +97.3m AOD from the west;

- Belgard Square North Rd, along the southern boundary, is graded from +101.3m AOD to +99.1m AOD from the west;
- The R113 Belgard Road, along the eastern boundary, is graded from +99.1m AOD to +97.3m AOD from the south.

The above illustrates that the existing site is currently at a raised level relative to the adjacent public roads. It is intended that the new development will retain a similar profile to the existing.

2.3 Site Access

The existing site is currently accessed, at ground level, from 3nr. separate access locations that serve the existing buildings i.e. 2nr. from Belgard Square North Road, at the south, and 1nr. from Airton Road, to the north.

2.4 Site Zoning

The subject site is zoned by South Dublin County Council for **regeneration**, with a General Zone Type classification scheme of **M1: Mixed Use, general development, opportunity / proposal site in the South Dublin County Development Plan 2016 – 2022**. This zoning seeks to 'To facilitate enterprise and / or residential led regeneration'.

2.5 Proposed Development Context

The proposed development will consist of the demolition of all existing buildings on the site ranging from one to three storeys in height and the removal of hardstanding throughout. The development itself is to consist of the construction of:

- 5 no. blocks ranging from 4 – 10 storeys comprising a new urban quarter and streets to provide 438 no. apartment units consisting of 158 no. 1 beds, 230 no. 2 beds and 50 no. 3 beds (total apartment units include 8 no. live/work units);
- 403nr. bed-space student accommodation and associated student amenity space and staff facilities;
- Childcare facility and external playing area;
- 6nr. retail / commercial units;
- Security Room;

- 107nr. below podium car parking spaces (a temporary car park at grade will be provided until such time as the completion of the permanent below podium car park);
- 22nr. surface level car parking spaces;
- 1,227nr. bicycle parking spaces located below podium and at surface level;
- Civic Plaza and associated public realm & landscaping.

The proposed development will include the provision of a new north – south street bisecting the site (to later connect to the planned Airtion Road Extension), a shared surface street running west east from Belgard Road (no vehicular connection to Belgard Road) to later connect to lands in ownership of SDCC if required, and works to public realm and public roads to include upgraded signalised junction to Belgard Square North and Belgard Square East, cycle track on Belgard Square North and new pedestrian crossing at Belgard Road.

The proposed development will also include boundary treatments, green roofs, solar panels, ESB substations and switch rooms, CHP plant, commercial and residential waste facilities and all ancillary works and services necessary to facilitate construction and operation. The proposed development will also include provision of site boundary protection where required to facilitate development phasing.

3 LEVEL OF SERVICE

3.1 Flood Risk & Service Level

The risk of a flood event is a function of the probability of occurrence in any given year. Traditionally, this has been expressed as a return period (e.g. 1-in-100-year return period). However, this has led to misconceptions about the likelihood of repeat occurrences. A less ambiguous expression of probability is the *Annual Exceedance Probability (AEP)*, which may be defined as the probability of a flood event being exceeded in any given year. A 1-in-100-year return period flood event is therefore expressed as a 1% AEP flood event. Likewise, a 1-in-1year return period flood event is expressed as a 100% AEP flood event.

The *Greater Dublin Strategic Drainage Study (GSDSDS)*, published by the Local Authorities in the Greater Dublin Region, and The *Planning System and Flood Risk Management Guidelines for Planning Authorities (PSFRM)* set out the best practice standards for flood risk in Ireland. These are summarised in *Table 1 - Summary Level of Service*, below.

Flooding Source	Drainage	River	Tidal/Coastal
Residential	1% AEP	0.1% AEP	0.1% AEP
Commercial	1% AEP	1% AEP	0.5% AEP
Water-compatible	–	>1% AEP	>0.5% AEP

Table 1 - Summary Level of Service

In addition, the *GSDSDS* requires that ground floor levels of houses be provided with a 500mm freeboard over the 1% AEP fluvial flood level.

3.2 Climate Change

Both the *GSDSDS* and *PSFRM* Guidelines require that account be taken of the effects of climate change over the design life of a development, typically 100 years. Design parameters to take account of climate change were established in the *GSDSDS* and revised following later studies (as advised by Dublin City Council). These parameters are set out in *Table 2 - Climate Change - Impact on Design Parameters*, below.

Design Category	Impact of Climate Change
Drainage	10% increase in rainfall
Fluvial (River)	20% increase in flood flow
Tidal/Coastal	Min FFL of 4.0m

Table 2 - Climate Change - Impact on Design Parameters

3.3 Flood Risk Zones

The *PSFRM Guidelines* adopt a sequential approach to managing flood risk by reducing exposure to flooding through land-use planning. The approach adopted by the *PSFRM Guidelines* establishes three zones (*PSFRM Guidelines paragraph 2.23*) on a sliding scale of flood risk – refer to *Table 3 - Flood Risk Zones*, below.

Zone A	<p>High Probability of Flooding</p> <p>Where the annual probability of flooding is: greater than 1% for fluvial flooding or greater than 0.5% for coastal flooding</p>
Zone B	<p>Moderate Probability of Flooding</p> <p>Where the annual probability of flooding is: between 0.1% and 1% for fluvial flooding or between 0.1% and 0.5% for coastal flooding</p>
Zone C	<p>Low Probability of Flooding</p> <p>Where the annual probability of flooding is: less than 0.1% for fluvial flooding and less than 0.1% for coastal flooding</p>

Table 3 - Flood Risk Zones

Flood risk zones are determined on the basis of the probability of river and coastal flooding only (*PSFRM Guidelines paragraph 2.24*). Other sources of flooding (such as groundwater, infrastructure and pluvial) do not affect the delineation of flood risk zones. These other sources of flooding should be

considered and mitigated in design. Flood risk zones are determined on the basis of the current flood risk, i.e. without the inclusion of climate change factors (*PSFRM Guidelines paragraph 2.24*).

3.4 Development Vulnerability

The *PSFRM Guidelines* classify potential development in terms of its vulnerability to flooding. The types of development falling within each vulnerability class are described in *Table 3.1* of the *PSFRM Guidelines*, which is reproduced in *Table 4 - Development Vulnerability Class*, below.

Vulnerability Class	Land uses and types of development which include:
<p>Highly vulnerable development (including essential infrastructure)</p>	<p>Garda, ambulance and fire stations and command centres required to be operational during flooding;</p> <p>Hospitals;</p> <p>Emergency access and egress points;</p> <p>Schools;</p> <p>Dwelling houses, student halls of residence and hostels;</p> <p>Residential institutions such as residential care homes, children’s homes and social services homes;</p> <p>Caravans and mobile home parks;</p> <p>Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and</p> <p>Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.</p>
<p>Less vulnerable development</p>	<p>Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions;</p> <p>Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans;</p> <p>Land and buildings used for agriculture and forestry;</p> <p>Waste treatment (except landfill and hazardous waste);</p> <p>Mineral working and processing; and</p> <p>Local transport infrastructure.</p>

Water-compatible development	<p>Flood control infrastructure;</p> <p>Docks, marinas and wharves;</p> <p>Navigation facilities;</p> <p>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location;</p> <p>Water-based recreation and tourism (excluding sleeping accommodation);</p> <p>Lifeguard and coastguard stations;</p> <p>Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).</p>
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Table 4 - Development Vulnerability Class

Therefore, the proposed development is considered **Highly Vulnerable**.

3.5 Development 'Appropriateness'

The *PSFRM Guidelines* define the zones in which each class of development is appropriate – this is summarised in *Table 5 - "Appropriateness" Matrix*, below. The *PSFRM Guidelines* recognises that flood risks should not be the only deciding factor in zoning for development. They also recognise that circumstances will exist where development of a site within a floodplain is desirable; in order to achieve compact and sustainable development of the core of urban settlements. In order to allow consideration of such development, the *PSFRM Guidelines* provide a **Justification Test**, which establishes the criteria under which desirable development of a site in a floodplain may be warranted.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable Development	Justification Test	Justification Test	Appropriate
Less Vulnerable Development	Justification Test	Appropriate	Appropriate
Water-compatible Development	Appropriate	Appropriate	Appropriate

Table 5 - "Appropriateness" Matrix

3.6 Proposed Development

The proposed development is to consist of the demolition of existing buildings followed by the construction of a mixed-use development, over partial basement. The proposed development is a mix of residential and commercial and retail uses and therefore is classed as a **'Highly Vulnerable Development'** in accordance with *Table 3.1 of the PSFRM Guidelines* and as per *Section 3.4*.

The information outlaid in the following chapters also illustrate that the proposed development is located within **'Flood Zone C'**; therefore indicating that the proposed development is **appropriate** for purpose.

4 FLOOD RISK AND MITIGATION MEASURES

4.1 Historical Flooding

4.1.1 OPW's Historical Flood Mapping

The Office of Public Works (OPW) collates available reports on flooding from all sources (e.g. fluvial, pluvial, coastal, infrastructure) on a nationwide basis. The OPW's *floodmaps.ie* website was consulted to obtain reports of historical flooding within the vicinity of the subject site; refer to *Figure 4.1*, below. The Flood Map Report Summary, included in **Appendix A**, lists reports of historical flooding within 2.5km of the subject site, none of which caused impact to the subject site or adjacent roads.

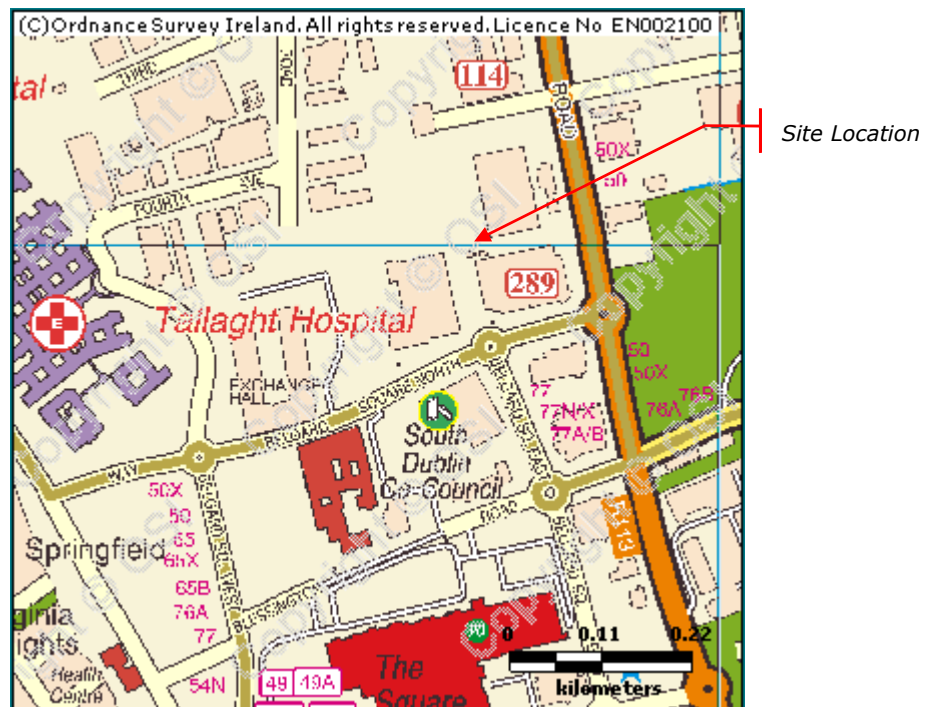


Figure 4.1 - OPW floodmaps.ie Reports

4.2 Fluvial Flooding

4.2.1 Site Location

The site is located approximately 750m north from a branch of the River Dodder, which is bound on its northern bank (i.e. the side closest to the proposed development) by the N81. The Tymon River, which rises at Cookstown, discharges its upper reaches, via a 1050mm diameter pipe from the northerly direction (Refer to the SDCC and IW public records in **Appendix E**), approximately 200m to the east of the proposed

development, within the grounds of the Institute of Technology, Tallaght. Refer to *Figure 4.2*, below, for context.

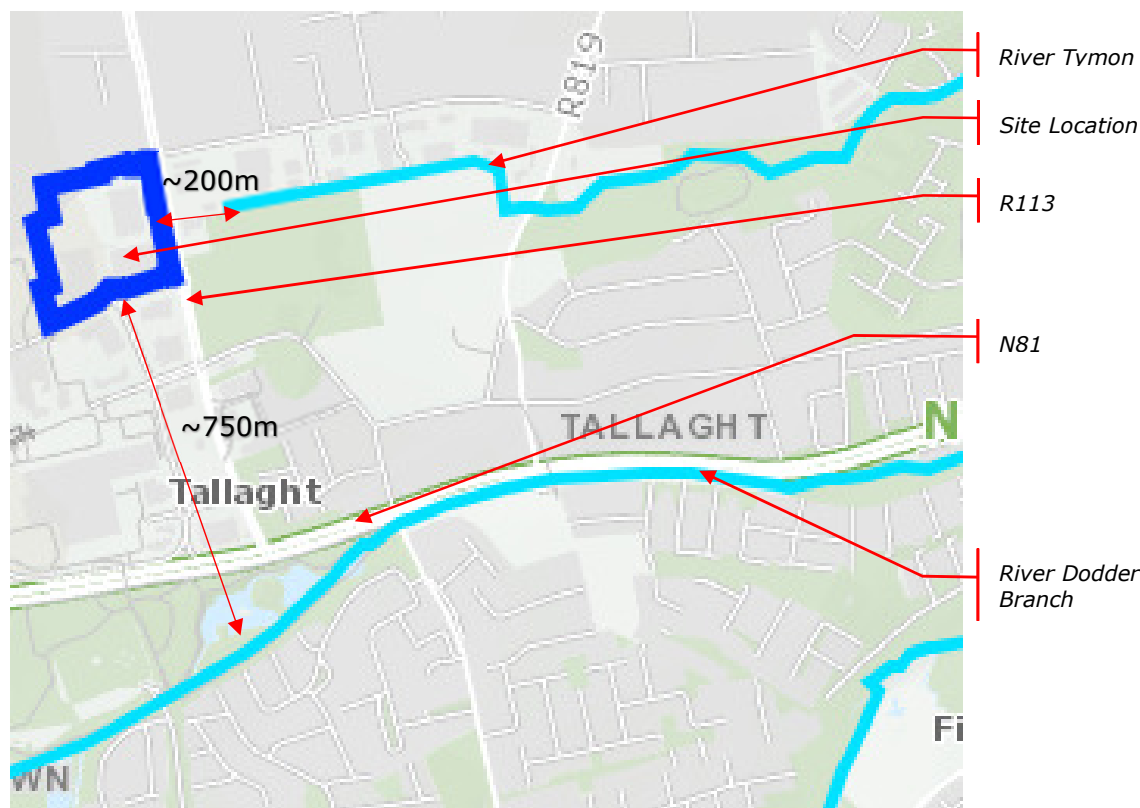


Figure 4.2 - Site Proximity to Rivers

The River Tymon is the origin of the River Poddle, which discharges to the River Liffey at Dublin City Centre.

4.2.2 Catchment Flood Risk Assessment and Management

The OPW, in conjunction with South Dublin County Council, Dublin City Council and other Local Authorities have developed the '*Final Flood Hazard and Risk Maps (Volume II)*' as part of the '*Catchment Flood Risk Assessment and Management*' (CFRAM) programme. More specifically, fluvial-flood extent mapping for the both the River Poddle and the River Dodder's catchment is available through the OPW's CFRAM website and within the *Strategic Flood Risk Assessment (SFRA) for Dublin City Development Plan 2016-2022*. The excerpt below, refer *Figure 4.3*, is taken from the online mapviewer www.floodinfo.ie and clearly demonstrates that the subject site is not at risk of fluvial flooding from the predicted 1.0% and 0.1% flood extents of the adjacent rivers.

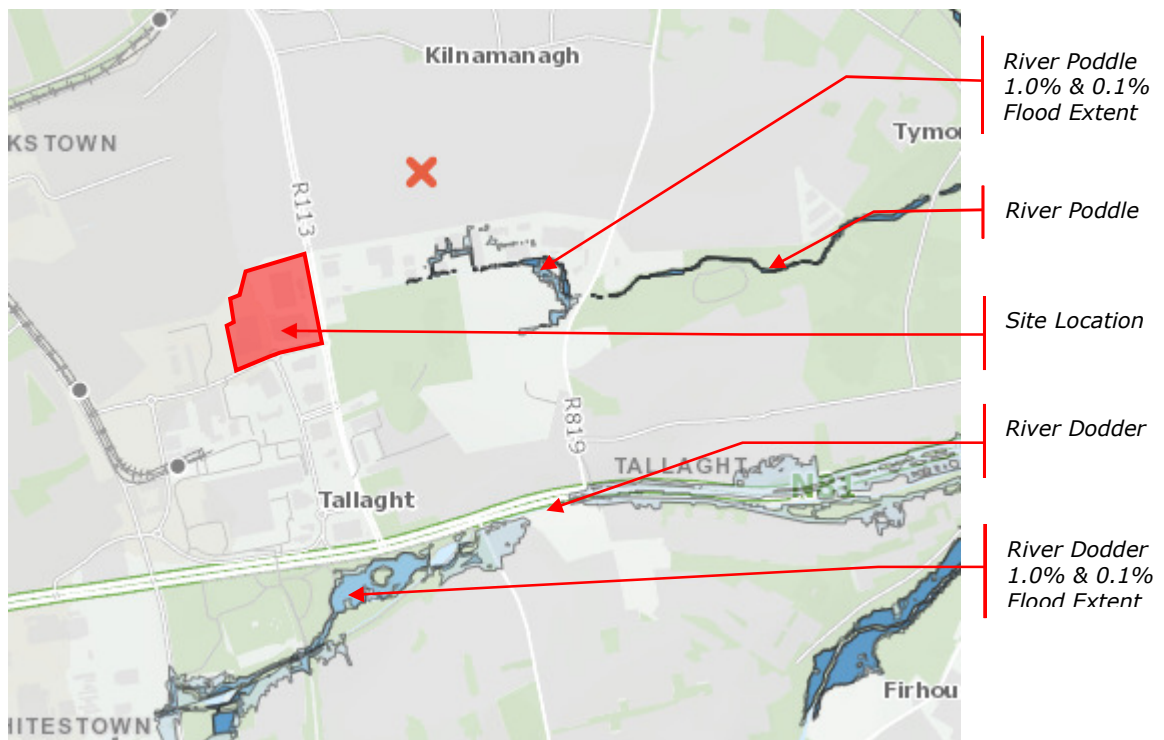


Figure 4.3 - Fluvial Flood Extents (from www.floodinfo.ie)

Figure 4.3, above, indicates that the proposed site is located outside of the predicted fluvial flood extent for both the 1% AEP and 0.1% AEP events for the River Liffey, the River Camac and the River Poddle. Refer to OPW's CFRAM Fluvial Flood Extent Maps **E09POD_EXFCD_F0_0** and **TS/EXT/UA/CURS/102**, for the River Poddle and River Dodder respectively, in **Appendix C** for full details.

4.2.3 Proposed Development Context

Based on the above, it is concluded that the site of the proposed 'Highly Vulnerable Development' is **not** located within either **Flood Zones A and B** (i.e. is in **Flood Zone C**) for fluvial flooding, in accordance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities* and there is therefore no significant risk of fluvial flooding.

4.3 Tidal Flooding

4.3.1 Site Location

The proposed development is located approximately 11-kilometers west of the eastern-coastline. Refer to *Figure 4.4*, below, for context. This also

shows that the site is not in the vicinity of the tidally influenced areas of the rivers that are described above in *Section 4.2 Fluvial Flooding*.



Figure 4.4 - Site Proximity to Coastline

4.3.2 Catchment Flood Risk and Assessment Mapping

The OPW's *Preliminary Flood Risk Assessment* (PFRA) mapping for Coastal flooding is available on the Department of Environment, Community and Local Government's (DECLG) website www.myplan.ie. Refer to *Figure 4.5* for further details.

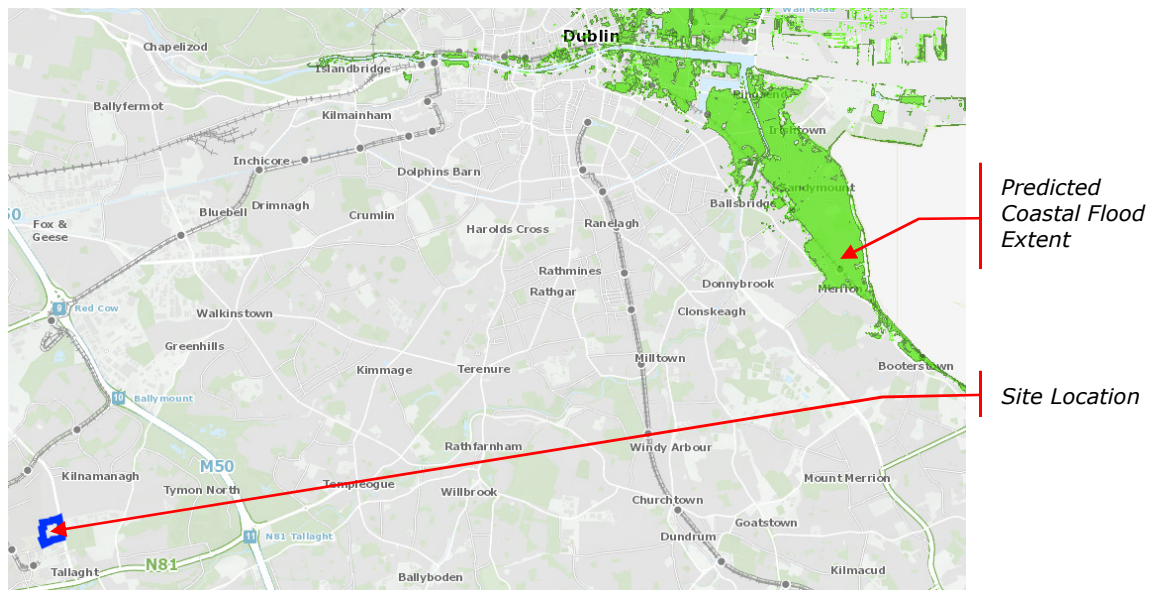


Figure 4.5 - Coastal Flooding Extent (www.myplan.ie)

4.3.3 Proposed Development Context

From *Section 4.3.2*, the subject site is **not** located within the predicted tidal flood extent for up to, and including, a 0.1% AEP event. Furthermore, the proposed development site has a typical existing level of approximately +100.0mAOD to +101.5mAOD, which is considerably above the tidal flood risk zone.

Therefore, in accordance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities*, the subject site is located within **Flood Zone C** for tidal flooding and there is no significant risk of tidal flooding.

4.4 Pluvial Flooding

4.4.1 Preliminary Flood Risk Assessment

Indicative localised pluvial flood extent mapping for the South Dublin area is available for viewing, in **Appendix D** of the Strategic Flood Risk Assessment for South Dublin County Council Development Plan, 2016 – 2022. *Figure 4.6 - Indicative Pluvial Flood Extent*, indicates the indicative flood risk areas for the predicted pluvial flood extent from 1% AEP and extreme rainfall events over the vicinity of the proposed development.

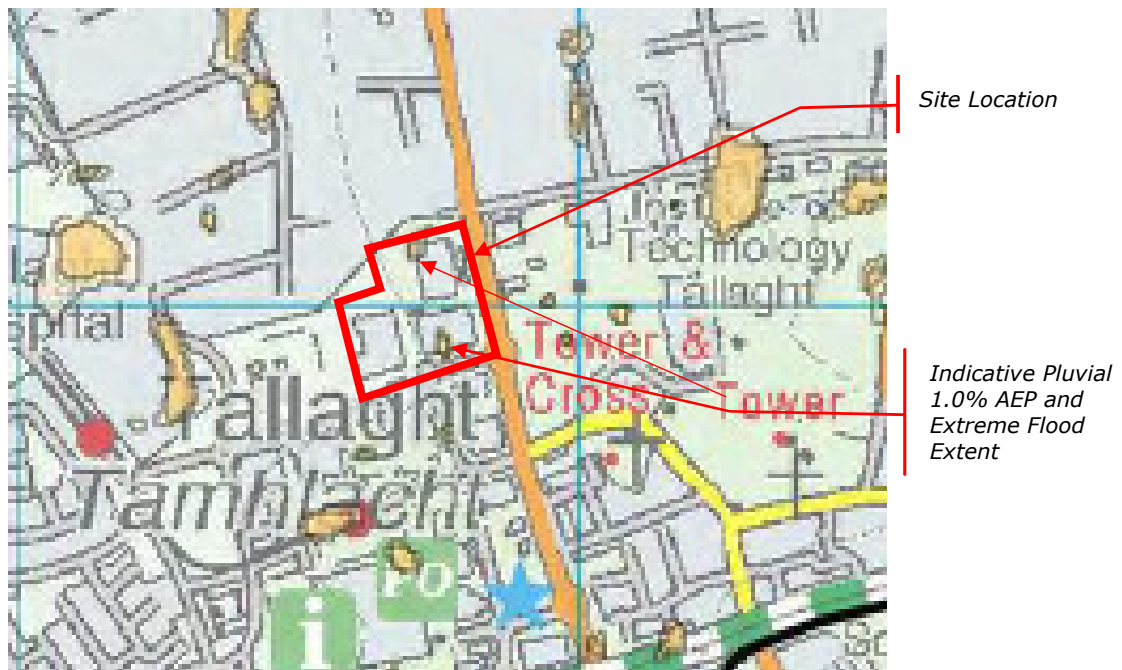


Figure 4.6 - Indicative Pluvial Flood Extent

The above figure illustrates that there is indicative pluvial flood extent within the existing site boundary. However, these indicative locations appear to be situated on the existing buildings. The proposed development comprises the demolition of the existing buildings and existing infrastructure, with the construction of an entire new development and surface water network across the entire site area, which will be designed to accommodate up to, and including, the 1% AEP rainfall event including a 10% allowance for climate change. This is detailed further in *Section 4.6* of this report.

4.4.2 Proposed Development Context

The proposed development is to contain a private surface water network that is to discharge an attenuated flow, designed to restrict outflows to a maximum $Q_{BAR_{URBAN}}$ flow rate of 10.27 l/s/ha (68.2 l/s total) with attenuation to account for a design rainfall event up to , and including, the 1% AEP (including 10% allowance for climate change). Refer *Section 3.4* and the Engineering Services Report, **A557-OCSC-XX-XX-RP-C-0001**, which is submitted under separate cover as part of this application, for further details of the proposed surface water drainage strategy.

Subsequently, and further to *Section 4.4.1* of this report, it can be seen that the proposed development is **not** at risk from flooding due to the predicted 1% AEP and extreme rainfall events, based on the Dublin Pluvial Study. Refer to the OPW's Pluvial Flood Map **MDW0657_00028** in **Appendix D** for further details.

Therefore, in accordance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities*, there is no significant risk of pluvial flooding within the subject site.

4.5 Existing Public Drainage Infrastructure

There is significant existing public surface water sewer networks in the immediate vicinity of the site. Refer to South Dublin County Council and Irish Water records in **Appendix E** for further details. **Appendix E** also contains details of the GSDS Sewer Performance Assessment mapping for both the current scenario (Map Nr. **GSDS/NE02057/S1005/P3-002/TILE 1**) and

the year-2031 future scenario (Map Nr. **GSDSDS/NE02057/S1005/P3-003/TILE 1**).

Further topographical and ground penetrating radar surveys were also carried out to confirm the existing drainage infrastructure.

The existing site is currently served by its own internal surface water drainage networks that discharge to the public surface water network at 5nr. locations i.e. 2nr. at the northern end of the site to an existing 600mm diameter sewer and 3nr. at the southern end of the site to an existing 600mm diameter sewer.

The 600mm diameter concrete sewer, to the south of the site, augments to a 1050mm diameter pipe downstream prior to discharging to the branch of the River Dodder, to the south of the N81.

The 600mm diameter concrete sewer, to the north of the site, augments to a 1050mm diameter pipe downstream prior to discharging to the River Tymon, within the grounds of the Institute of Technology, Tallaght.

As described in *Section 2.2*, the site is at a relatively higher level than the adjacent roads, which appear to be graded away from the site, towards the north-east. Therefore, any potential flooding of adjacent public surface water manholes (due to possible blockages), would be directed away from the site by overland flow. Therefore flood risk from the existing public drainage infrastructure is considered negligible, with no further mitigation required.

4.6 Proposed Drainage Infrastructure

It is proposed to separate the surface water and wastewater drainage networks, which will serve the proposed development, and provide independent connections to the adjacent public surface water and combined sewer networks respectively.

At roof level, within the development, the rainfall runoff is to be collected by a series of downpipes, as part of an extensive & intensive green roof system that serves the development's roofs, where practicable, prior to discharging to the proposed surface water network within the developments road carriageways.

All road and associated hardstanding areas are to discharge to the proposed surface water network via an aligned bio-retention strip that has a filter trench underneath.

The proposed surface water drainage network will then discharge attenuated flows to the public surface water network at Airton Road, to the north of the site through the provision of flow control chambers and attenuation storage structures.

The proposed surface water drainage network has been designed to cater for the rainfall runoff resulting from a 1% AEP rainfall event (Including 10% increase for climate change). Refer to the Engineering Services Report, **A557-OCSC-XX-XX-RP-C-0001**, and associated drawings, which have been submitted under separate cover as part of this application for further details.

Provided that the proposed drainage system is to be constructed as designed (in accordance with the relevant standards and regulations), the flood risks arising from the proposed drainage infrastructure will be negligible and no further mitigation is required.

4.7 Groundwater Flooding

As outlined in the Strategic Flood Risk Assessment for South Dublin County Council Development Plan, 2016 – 2022, *'the OPW Preliminary Flood Risk Assessments Groundwater Flooding Report concludes that ground water flooding is largely confined to the West Coast of Ireland due to the hydrogeology of the area'*, and that *'ground water flooding is not at risk for South Dublin Council'*.

The OPW's *Draft Preliminary Flood Risk Assessment (DPFRA)* includes an assessment of groundwater flood risk. The *DPFRA* flood risk map included in **Appendix B** indicates no groundwater flood risk to the site or to the surrounding area.

There is no anecdotal record of groundwater flooding for the subject site. According to data obtained from the *Geological Survey of Ireland* mapviewer (<http://www.gsi.ie>), the subject site is located on made ground subsoil on top of till that was derived from limestones, with a bedrock of Lucan Formation - Dark Limestone and Shale (calp). It is located on a locally important aquifer

with bedrock, which is moderately productive only in local zones. The groundwater vulnerability assessment of the site indicates a moderately to poor productive bedrock aquifer in the locality.

The probability of groundwater rising above ground levels is considered extremely low. In any such event, water would follow overland flow routes (Refer to *Section 4.4*) and not collect at or near proposed buildings.

It is therefore concluded that the potential flood risk represented by ground water is negligible and no further mitigation is required.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Flood Risk Assessment Overview

As detailed within *Section 4* of this report, the proposed development is clearly located within Flood Zone C for both fluvial and tidal flooding and is not at risk from pluvial flooding nor groundwater. Therefore, in accordance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities*, **there is no significant risk of flooding within the subject site.**

5.2 Proposed Development Infrastructure

All rainfall runoff within the proposed site development area is to discharge an attenuated flow of 10.3 l/s/ha (68.2 l/s total) to the existing public surface water network at Airtan Road, to the north of the proposed development. The on-site attenuation is to be designed for rainfall events up to, and including the 1% AEP (including 10% increase for climate change). Refer to the Engineering Services Report **A557-OCSC-XX-XX-RP-C-0001** and associated civil engineering drawings, which have been submitted under separate cover as part of this application, for further details.

5.3 Recommendations

It is recommended that the proposed drainage system, to serve the development, is designed in accordance with the relevant standards (Refer *Section 1.4*) and as outlined in the Engineering Services Report, **A557-OCSC-XX-XX-RP-C-0001**, and associated civil engineering drawings that form part of this submission; in order to ensure that potential flood risks arising from the proposed development are negligible and no further mitigation measures are required.

MARK KILLIAN

MSc BE CEng MIEI

For OCSC MULTIDISCIPLINARY CONSULTING ENGINEERS



APPENDIX A. FLOODMAPS.IE REPORT

Appendix A

Floodmaps.ie Report

Summary Local Area Report

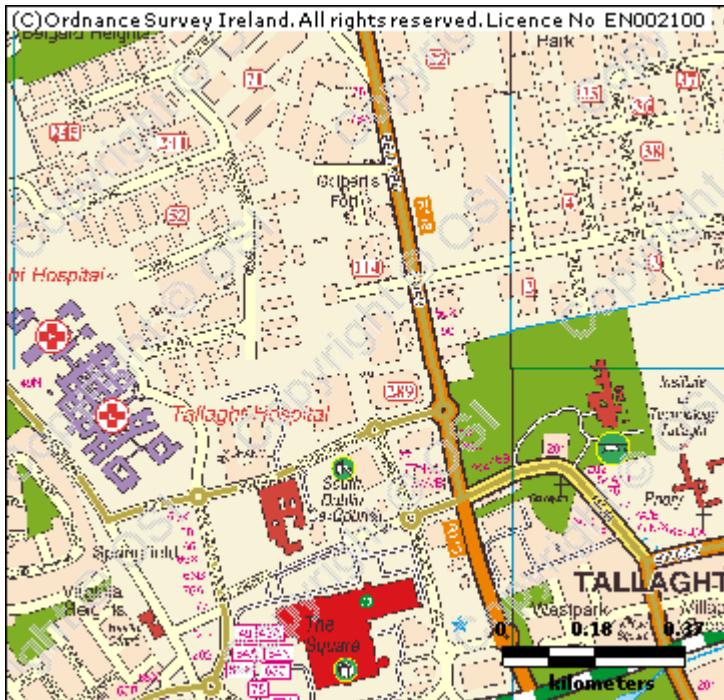
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: O 087 280

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained in the Glossary.

9 Results

	1. Flooding at Knockmore, Tallaght, Co. Dublin on 24th Oct 2011 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 24/Oct/2011 Flood Quality Code:3
	2. Flooding at Tallaght Pass, N81, Dublin 24 on 24th Oct 2011 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 24/Oct/2011 Flood Quality Code:2
	3. Dodder Avonmore Park Nov 2000 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 05/Nov/2000 Flood Quality Code:3
	4. Flooding at Blessington Road, Tallaght, Dublin 24 on 1st May 2012 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 05/Jan/2012 Flood Quality Code:2
	5. Flooding at Bawnlea Crescent and Avenue, Tallaght, Co. Dublin on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2

Additional Information: [Reports \(1\)](#) [More Mapped Information](#)



6. Flooding at Whitestown Way, Tallaght, Dublin 24 on 24th Oct 2011
County: Dublin

Start Date: 24/Oct/2011

Flood Quality Code:2

Additional Information: [Reports \(1\)](#) [More Mapped Information](#)



7. Dodder Kiltipper Road Nov 2000

County: Dublin

Start Date: 05/Nov/2000

Flood Quality Code:3

Additional Information: [Reports \(1\)](#) [More Mapped Information](#)



8. Killinarden Stream Jobstown recurring

County: Dublin

Start Date:

Flood Quality Code:4

Additional Information: [Reports \(1\)](#) [Press Archive \(1\)](#) [More Mapped Information](#)



9. Killinarden Stream N81 Jobstown Recurring

County: Dublin

Start Date:

Flood Quality Code:4

Additional Information: [Reports \(1\)](#) [Press Archive \(1\)](#) [More Mapped Information](#)

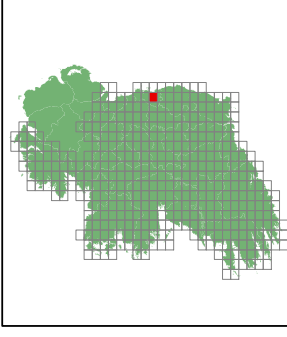


APPENDIX B. OPW PFRA INDICATIVE EXTENTS & OUTCOMES MAP

Appendix B

OPW PFRA Indicative Extents and Outcomes Map

Location Plan :



Legend:

- Flood Extents**
- Fluvial - Indicative 1% AEP (100-yr) Event
 - Fluvial - Extreme Event
 - Coastal - Indicative 0.5% AEP (200-yr) Event
 - Coastal - Extreme Event
 - Pluvial - Indicative 1% AEP (100-yr) Event
 - Pluvial - Extreme Event
 - Groundwater Flood Extents
- Lakes / Turf Lagoons**
- Lakes / Turf Lagoons
- PFRA Outcomes**
- ✳ Probable Area for Further Assessment
 - ✳ Possible Area for Further Assessment

Important User Note:

The flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location. The maps are intended to provide a general indication of the areas at risk of flooding. Users should seek professional advice if they intend to rely on the maps in any way.

If you believe that the maps are inaccurate in some way please forward full details by contacting the OPW (refer to PFRA information leaflets or 'Have Your Say' on www.dcfra.ie).



Project: PRELIMINARY FLOOD RISK ASSESSMENT (PFRA)

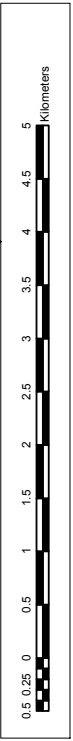
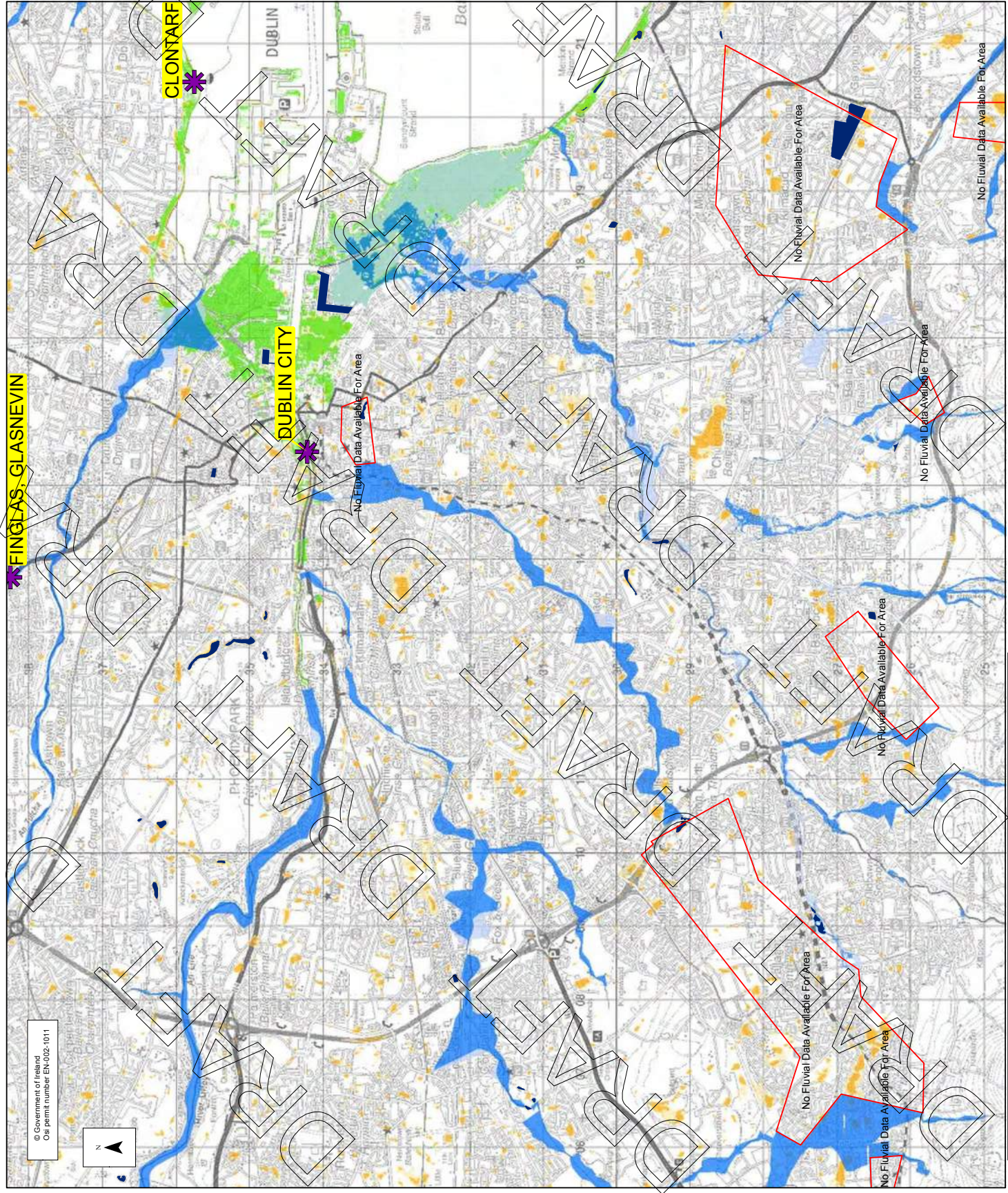
Map: PFRA Indicative extents and outcomes - Draft for Consultation

Figure By: PJW Date: July 2011

Checked By: MA Date: July 2011

Figure No.: 2019 / MAP / 238 / A Revision: 0

Drawing Scale: 1:50,000 Plot Scale: 1:1 @ A3



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OSI permit number EN-002-1011

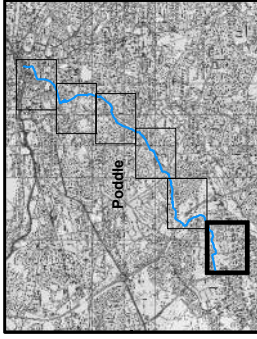


APPENDIX C. CFRAM FLUVIAL FLOOD EXTENT MAPS

- **River Poddle**
- **River Dodder**

Appendix C

CFRAM Fluvial Flood Extent Maps



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

Legend

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

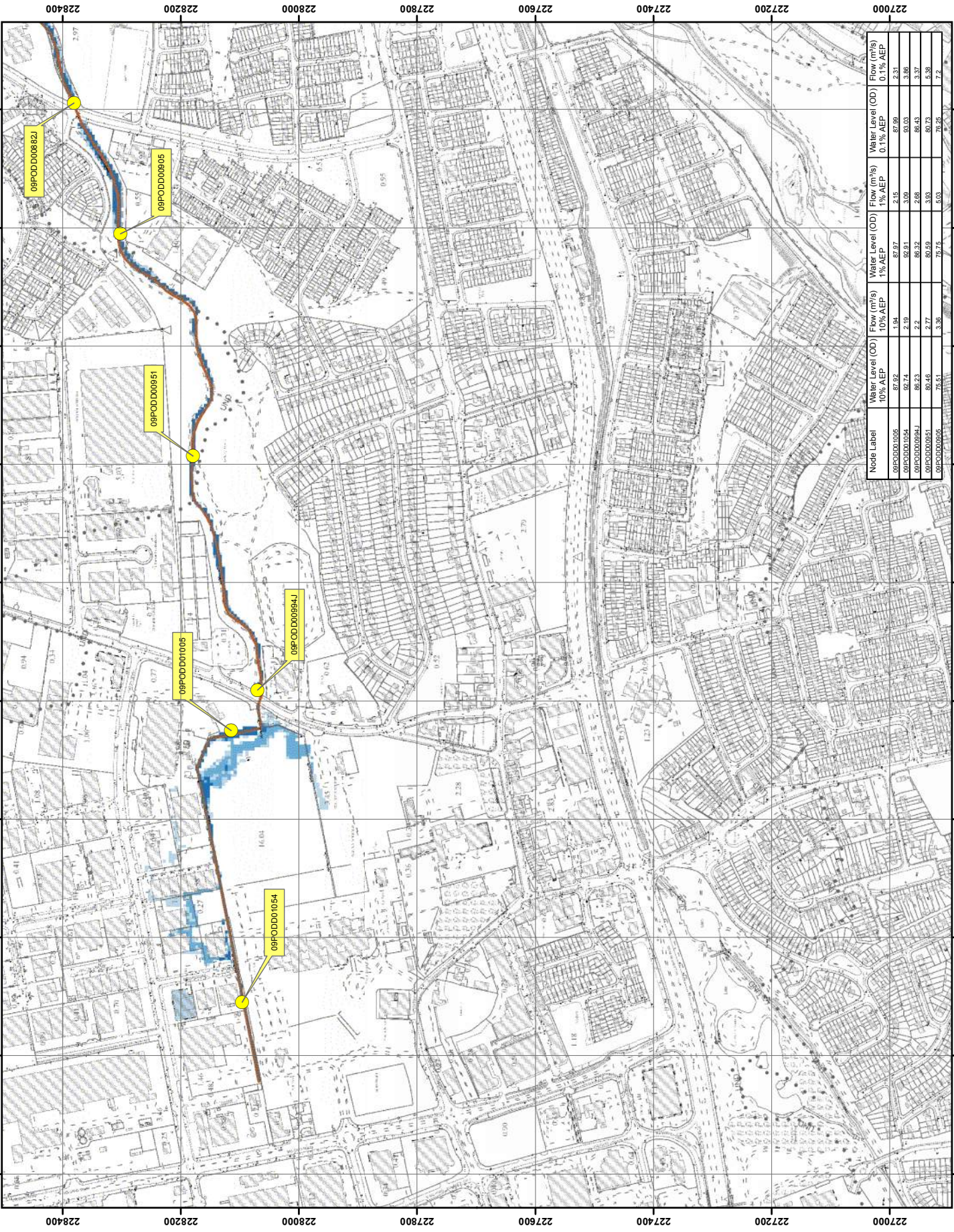
FINAL

REV.	NOTE:	DATE:

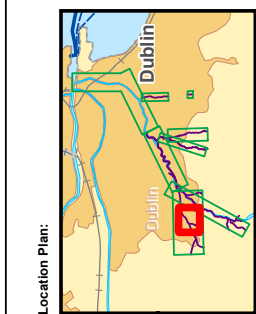


RPS
 The Office of Public Works
 Jonathan Swift Street
 Co. Meath
 B12 6RZ
 E: rps@rpsgroup.com

Map:	
Poddle River Fluvial Flood Extents	
Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By:	F.M.C. Date: 11 August 2016
Checked By:	A.S. Date: 11 August 2016
Approved By:	S.P. Date: 11 August 2016
Drawing No.:	E09POD_EXFCD_F0_01
Map Series : Page 1 of 6	
Drawing Scale : 1:6,050 @A3	



Node Label	Water Level (OD)		Flow (m³/s)	
	10% AEP	0.1% AEP	10% AEP	0.1% AEP
09POD00082J	87.92	87.97	2.15	2.31
09POD00095I	87.74	87.81	3.09	3.36
09POD01005	86.74	86.81	2.2	2.37
09POD00994J	89.46	89.59	3.03	3.36
09POD01054	79.51	79.74	3.36	3.72



- 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)
 - River Centreline
 - Node Point
 - Node Label (refer to table)
 - Flow reporting location
 - Peak flow during design flood extent

USER NOTE:
 USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION. LIMITATIONS IN THE DATA AND INFORMATION PROVIDED ARE THE USER'S RESPONSIBILITY. THIS MAP DOES NOT FORM PART OF BOUND VOLUME. IT SHOULD NOT BE USED FOR ANY PURPOSE.

Client: South Dublin County Council, Dublin City Council, DPW

Project: DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map: PRESENT DAY TALLAGHT STREAM

Map Type: FLOOD EXTENT

Source: FLUVIAL FLOODING

Map Area: URBAN AREA

Scenario: CURRENT

Drawn By: A.A.B. Date: 26 November 2010

Checked By: A.J. Date: 26 November 2010

Approved By: A.G.B. Date: 26 November 2010

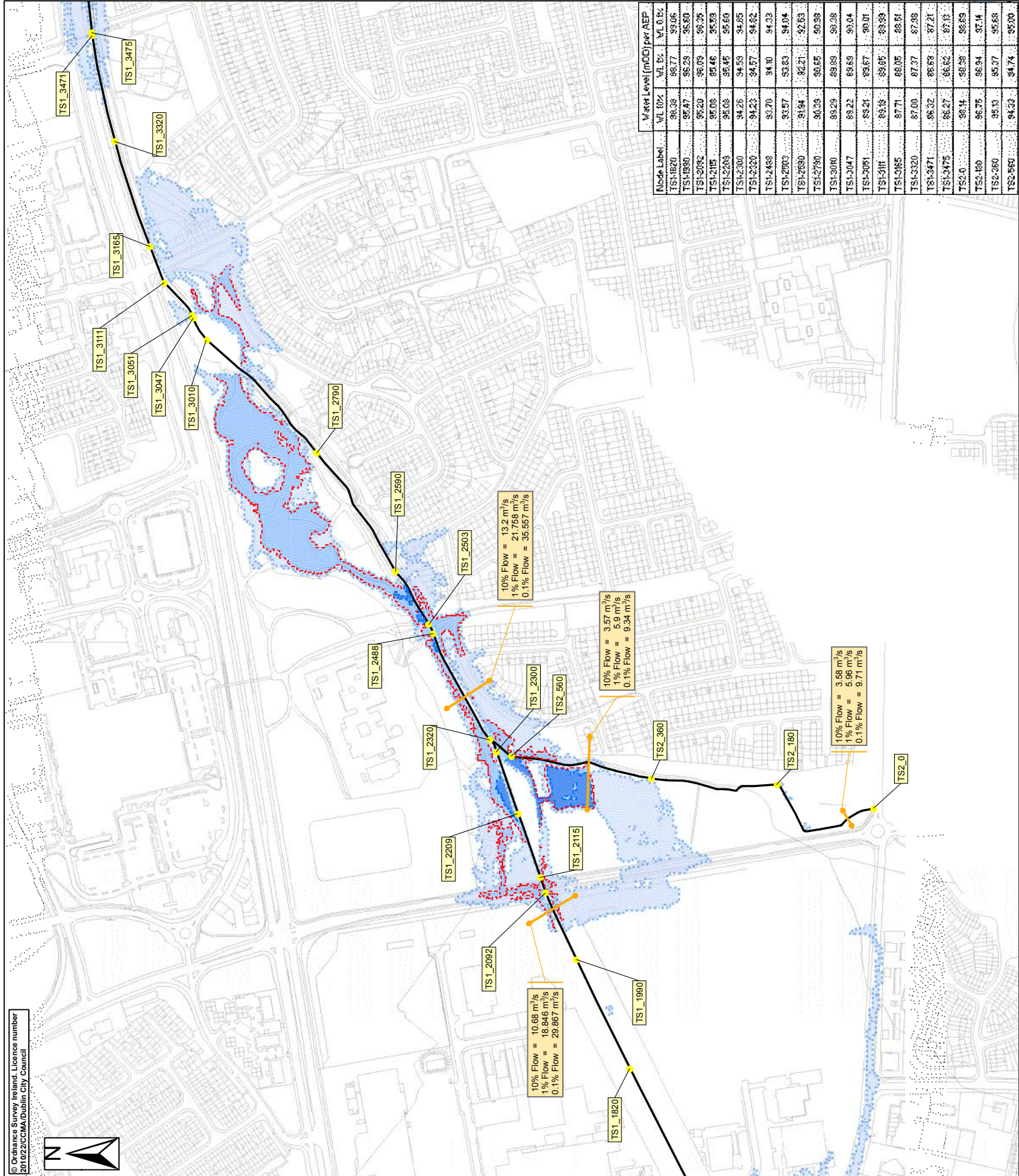
Figure No.: TS1/EXT/UA/CURS/102

Map Series: Page 2 of 3

Drawing Scale: 1:5,000

Plot Scale: 1:1 @ A3

RPS Consulting Engineers
 ELMWOOD HOUSE TEL: 028 9066 7914
 74 BOUCHER ROAD FAX: 028 9066 8286
 BELFAST BT11 2 ERZ www.rpsgroup.com/ireland



Water Level (mOD) per AEP			
Node Label	10%	1%	0.1%
TSS1820	86.38	86.77	87.06
TSS1830	87.47	86.29	86.60
TSS12092	86.20	86.09	86.35
TSS1215	86.08	85.46	85.59
TSS12208	85.08	85.45	85.60
TSS12300	84.26	84.59	84.65
TSS12320	84.23	84.57	84.82
TSS12438	83.70	84.10	84.33
TSS12603	83.57	83.83	84.04
TSS12630	81.94	82.21	82.63
TSS2790	80.39	80.65	80.98
TSS13000	80.29	80.89	80.38
TSS13047	80.22	80.69	80.04
TSS13051	80.21	80.67	80.01
TSS1311	80.19	80.65	80.39
TSS13165	87.71	88.05	88.51
TSS13320	87.00	87.37	87.95
TSS13471	86.32	86.68	87.21
TSS13475	86.27	86.62	87.18
TSS2180	86.14	86.58	86.69
TSS2189	86.75	86.94	87.14
TSS2360	85.13	85.07	85.68
TSS2560	84.33	84.74	85.00

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APPENDIX D. INDICATIVE PLUVIAL FLOOD EXTENT MAPPING

Appendix D

Indicative Pluvial Flood Risk Map

Legend

- Pluvial - 1% AEP Flood Extent (1 in 100 chance in any given year)
- Pluvial - 0.1% AEP Flood Extent (1 in 1000 chance in any given year)
- Watercourses
- County Boundary



Cornhairle Contae Atha Cliath Theas
South Dublin County Council

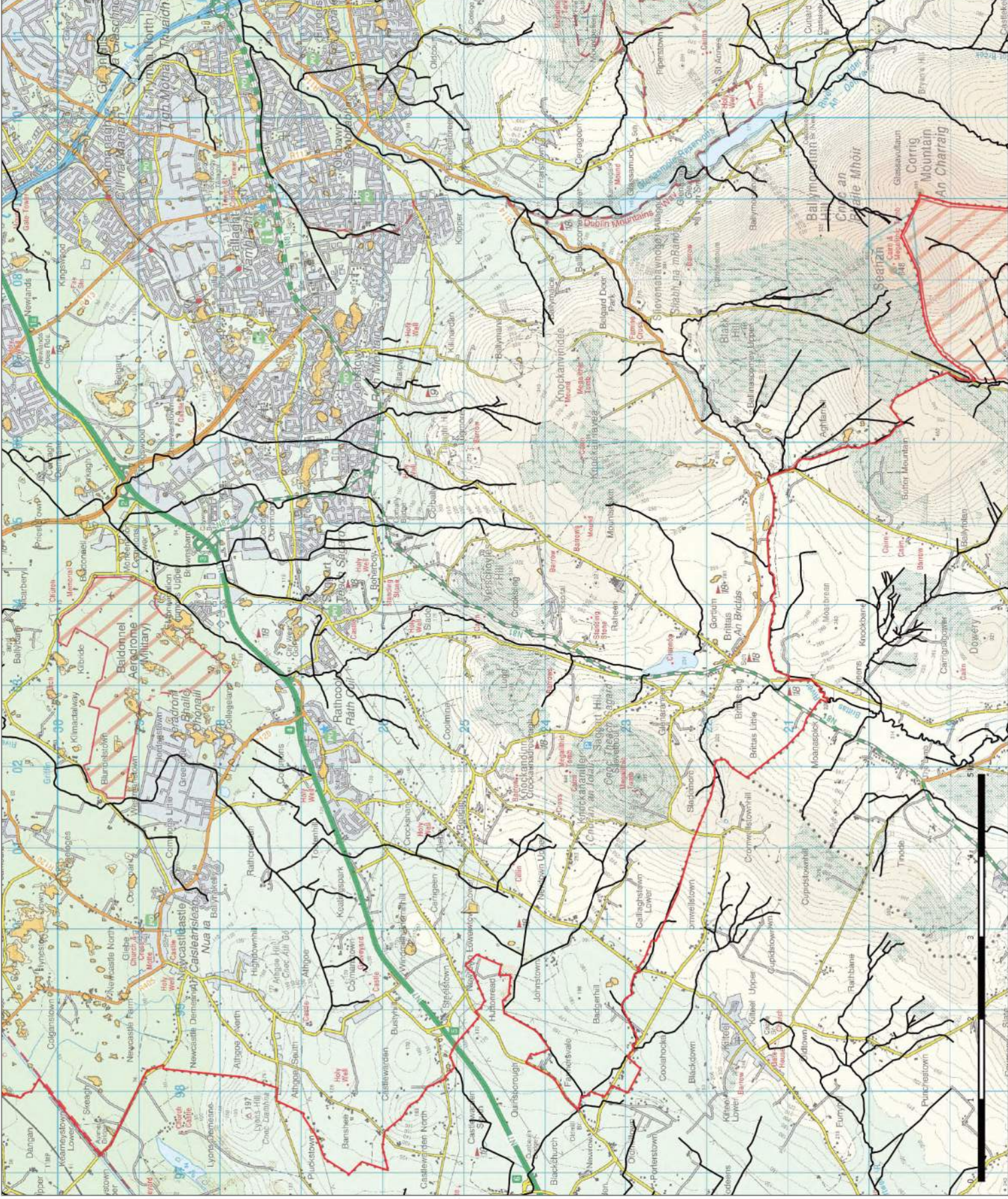
Project: Strategic Flood Risk Assessment

Title: PFRA Indicative Pluvial Flood Zone Mapping
Figure: MDW0657_00028

RPS Consulting Engineers
Renaissance Campus
Co. Dublin
Tel: +353 1 488 2990
Fax: +353 1 462 0814

Issue Details	
Drawn:	BT
Checked:	JH
Approved:	JH
Scale:	1:20000
Date:	14/01/2016
Project No.:	MDW0657
File Ref:	MDW0657Q001262
Drawing No.:	Projection
	2 of 4
	IG

1. The viewer of this map should refer to the SP0, Report and Disclaimer
2. Ordnance Survey Ireland Licence No. EN 9000195
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APPENDIX E. SOUTH DUBLIN COUNTY COUNCIL DRAINAGE MAPS

- **Irish Water Public Drainage Maps**
- **GDSDS 2011 System Performance Assessment Map**
- **GDSDS 2031 System Performance Assessment Map**

Appendix E

South Dublin County Council Drainage Maps

Irish Water Webmap



June 20, 2017

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Legend		
Stormwater Gravity Mains (Irish Water Owned)	Storm Fittings	Sewer Gravity Mains (Non-Irish Water owned)
— Surface	— Vent/Col	— Combined
Stormwater Gravity Mains (Non-Irish Water Owned)	— Other; Unknown	— Foul
— Surface	Storm Discharge Points	— Overflow
Storm Manholes	— Outfall	— Unknown
— Cascade	— Overflow	Sewer Pressurized Mains (Irish Water owned)
— Catchpit	— Soakaway	— Combined
— Hatchbox	— Other; Unknown	— Overflow
— Lamphole	— Storm Culverts	— Unknown
— Standard	— Storm Clean Outs	Sewer Pressurized Mains (Non-Irish Water owned)
— Other; Unknown	Sewer Gravity Mains (Irish Water owned)	— Combined
Storm Inlets	— Combined	— Foul
— Gully	— Foul	— Overflow
— Standard	— Overflow	— Unknown
— Other; Unknown	— Unknown	

Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be anticipated.



"Gas Networks Ireland (GNI), their affiliates and assigns, accept no responsibility for any information contained in this document concerning location and technical designation of the gas distribution and transmission network ("the Information"). Any representations and warranties express or implied, are excluded to the fullest extent permitted by law. No liability shall be accepted for any loss or damage including, without limitation, direct, indirect, special, incidental, punitive or consequential loss including loss of profits, arising out of or in connection with the use of the Information (including maps or mapping data). NOTE: DIAL BEFORE YOU DIG Phone 1850 427 747 or e-mail dig@gasnetworks.ie – The actual position of the gas/electricity distribution and transmission network must be verified on site before any mechanical excavating takes place. If any mechanical excavation is proposed, hard copy maps must be requested from GNI re gas. All work in the vicinity of the gas distribution and transmission network must be completed in accordance with the current edition of the Health & Safety Authority publication, 'Code of Practice For Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (1890 28 93 89) or can be downloaded free of charge at www.hsa.ie."

Legend

- Wastewater Treatment Works
- County Council Boundaries
- Rising Main (Coloured as sewer)
- Location of Flood (on sewer line)
- Covered River Watercourse
- 1:1000 OS Grid Line Boundaries
- 1:5000 OS Grid Line Boundaries
- Combined Sewer Overflow
- Foul Combined Pumping Station
- Foul Combined Blaration
- Foul Combined Apex Manhole
- Storm Water Overflow to Foul/Combined
- Storm Water Pumping Station
- Storm Water Apex Manhole
- Storm Water Flow Management Chamber

Flooding Performance Key

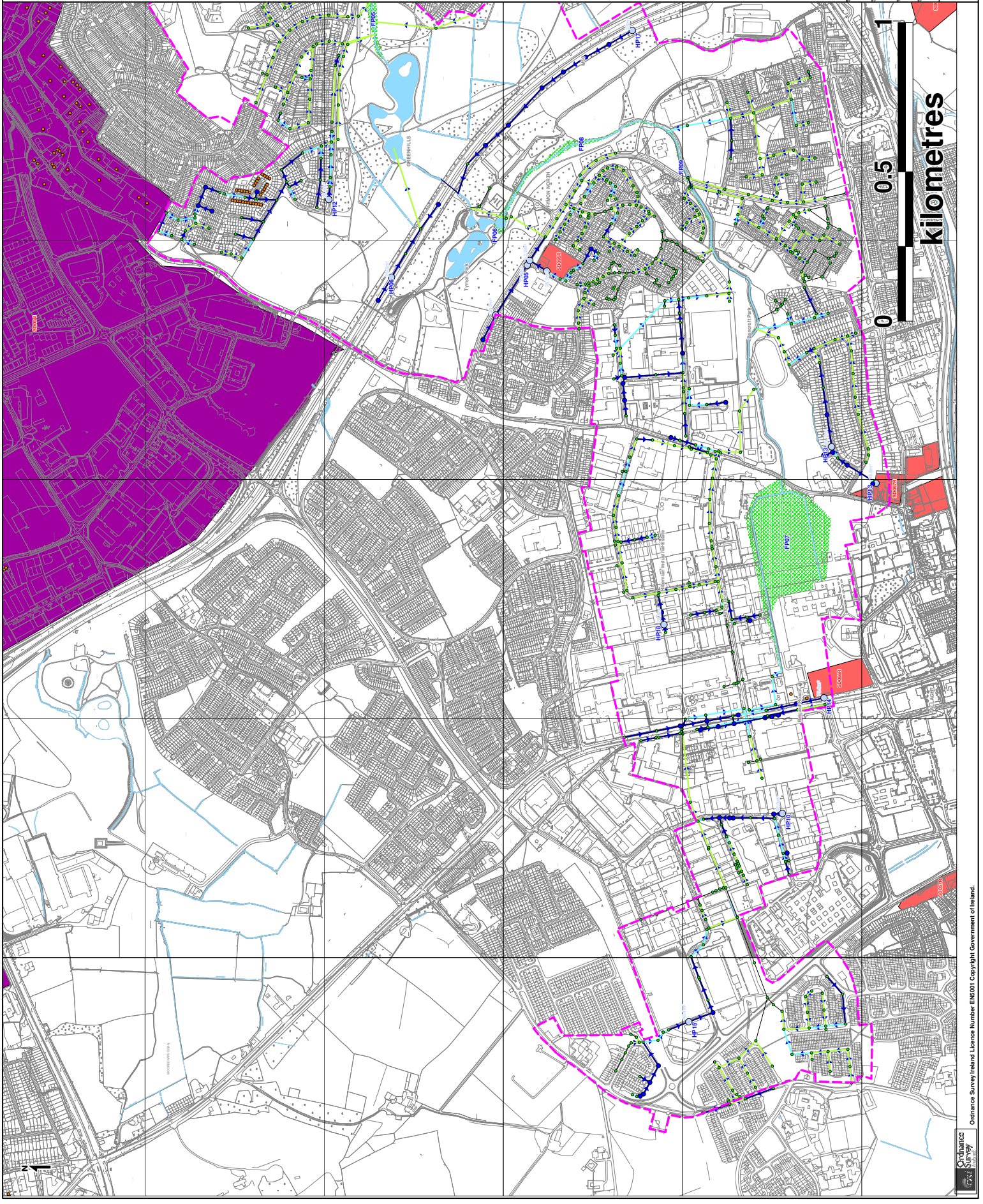
- Reported flooding incidents (in terms of return period) for 1 year return period
- Reported flooding incidents (in terms of return period) for 5 year return period
- Modelled flooding does not flood for 5 year return period event
- All historically reported flooding incidents caused by hydraulic overloading
- Foul/Combined Hydraulic Performance Key
- Foul/Combined Sewer surcharges for 1 or 2 year return period events
- Foul/Combined Sewer floods for 30 year return period or less
- Foul/Combined Sewer does not surcharge does not flood for a 30 year return period event or below (eg 12.5, 10.20)

Storm System Hydraulic Performance Key

- Storm Sewer surcharges for 1 or 2 year return period events
- Storm Sewer floods for 30 year return period or less
- Storm Sewer does not surcharge does not flood for a 30 year return period event or below (eg 12.5, 10.20)
- Important Hydraulic Considerations
- Location of Known Basements
- Assumed Location of Basements
- Structural Condition Assessment (Previously Reported Grated Defects)
- Structural Condition - Grade 5
- Structural Condition - Grade 4
- Catchment Deficiency Reference Key
- HP 1 Hydraulic Deficiency Reference No.
- SCD 1 Structural Deficiency Reference No. (Hydraulics or Environment)
- OP 1 Operational Deficiency Reference No.
- GEN 1 General Deficiency Reference No. (in relation to the channel)
- 2011 Future Development Key
- Zone of Residential Land
- Zone Science Technology Parks Land
- Zone Industrial Land
- Zone Commercial Land
- Zone Land for Mixed Development
- Recently Completed Developments
- 2011 Development Reference
- 2011 100 Year ARI Flood Extent
- NO108

Notes

- Results are based on assessment of sewer system under 1, 2.5, 5, 10, 20, 30 and 100 year return period
- For colour coding, flooding takes priority over surcharging
- Results are based on the 2011 100 Year ARI Flood Extent
- Levels referenced in notes to Ordnance Survey Co. Download 1970 Adjustment
- All dimensions shown in metric units.



Legend

- Wastewater Treatment Works
- County Council Boundaries
- County Council Boundaries
- Rising Main (Coloured as sewer)
- Sewer not included in hydraulic model
- Position of Flood (on sewer line)
- Covered River Watercourse
- 1:1000 OS Grid Line Boundaries
- Combined Sewer Overflow
- Foul Combined Pumping Station
- Foul Combined Blaration
- Foul Combined Apex Manhole
- Storm Water Overflow to Foul Combined
- Storm Water Pumping Station
- Storm Water Apex Manhole
- Storm Water Flow Management Chamber

Flooding Performance Key

- Forecasting period from 2015 to 2035 (Years for which the hydraulic model was run)
- Return Period of Event
- Modelled Manhole does not flood for 5 year Return Period Event
- All Historically Reported Flooding Incidents caused by Hydraulic Overloading
- Foul Combined Hydraulic Performance Key
- Foul Combined Sewer surcharges for 1 or 2 year return period events
- Foul Combined Sewer floods for 30 year return period or less
- Foul Combined Sewer does not surcharge does not flood for a 30 year return period event or below (eg 1:25, 1:50)

Storm System Hydraulic Performance Key

- Storm Sewer does not surcharge for 1 or 2 year return period events
- Storm Sewer does not surcharge for 30 year return period or less
- Storm Sewer does not surcharge does not flood for a 30 year return period event or below (eg 1:25, 1:50)
- Location of Known Basements
- Assumed Location of Basements

Structural Condition Assessment (Previously Reported Graded Defects)

- Structural Condition - Grade 5
- Structural Condition - Grade 4
- Structural Condition - Grade 3
- Structural Condition - Grade 2
- Structural Condition - Grade 1

Catchment Deficiency Reference Key

- HP 1 Hydraulic Deficiency Reference No.
- SCD 1 Structural Deficiency Reference No. (Hydraulics or Environment)
- OP 1 Operational Deficiency Reference No.
- GEN 1 General Deficiency Reference No. (in relation to the channel)

Future Development Key

- 2011 Zoned Residential Land
- 2011 Zoned Science Technology Parks Land
- 2011 Zoned Industrial Land
- 2011 Zoned Commercial Land
- 2011 Zoned Land for Mixed Development
- Recently Completed Developments

STATUS

- 2011 Development Reference
- 2011 10 Year All Flood Extent

NOTES

- Results are based on assessment of sewer system under events of 10, 20, 50 and 100 year return period.
- For colour coding, loading takes priority over surcharging.
- For colour coding, loading takes priority over surcharging.
- Levels referenced in metres in Ordnance Survey Co. Coverage (1974 Adjustment).
- All dimensions given in metric units.

