Cosgrave Developments

Blackwood Square, Northwood, Santry Demense, Dublin 9

Planning Application to An Bord Pleanala

Flood Risk Assessment

November 2019

BARRY & PARTNERS
consulting engineers
CIVIL • STRUCTURAL • ENVIRONMENTAL • TRANSPORTATION

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04/11/19	P06	S4	DMcG	GF	GF	GF	
12/11/19	P07	S4	DMcG	GF	GF	GF	

Table of Contents

List of Figures

SECTION 1: Introduction

1.1 General

J.B. Barry and Partners Limited were commissioned by the Cosgrave Developments to undertake a Site Specific Flood Risk Assessment (FRA) at Northwood, Santry, Dublin 9 to inform a Planning Application for a proposed residential development. The aim of the FRA is to identify, quantify and communicate to decision makers and other stakeholders the risk of flooding associated with the proposed development.

The FRA has been carried out in accordance with 'The Planning System and Flood Risk Management Guidelines' (hereafter referred to as the FRM Guidelines) published in November 2009 jointly by the then Department of the Environment, Heritage and Local Government, DEHLG, (now the Department of the Environment, Community and Local Government, DECLG) and the Office of Public Works (OPW).

The proposed development site is located near Northwood Avenue, Santry, Dublin 9 as shown in *Figure 1-1* below.

Figure 1-1: Location of Proposed Development *(Source: Google Maps, annotation by J.B. Barry & Partners)*

1.2 Proposed Development

The proposed development will consist the construction of 4 No. 7-storey plus penthouse apartment blocks containing 331 No. apartment units; a multi-function area (c.133sq.m), a gym (c.140sq.m), a childcare facility (c.224sq.m); a Concierge (c.81.5sq.m) in Block A; 5 No. ground floor mixed use commercial units with a total area of c. 939sq.m; associated car parking (including 334 resident spaces at basement level), 760 No. bicycle storage spaces, 5 No. motorbike spaces, refuse storage, substation, landscaped public open space; network of pedestrian and cycle paths tying in with existing pedestrian and cycle paths on Northwood Avenue with access points along the south, north east and west boundaries of the site; and associated drainage arrangements, landscaping and site development works, all on a site of c. 2.119ha.

SECTION 2: Flood Risk Assessment Methodology

2.1 Methodology

The methodology used for the flood risk assessment for the proposed development is based on 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (2009)'. The FRM Guidelines require the planning system at national, regional and local levels to:

- Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and then mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

The sequential approach (see Figure 3.1 of the FRM Guidelines below) in flood risk management requires the following three steps to identify the necessity for the justification test for a development:

- Step 1: Identification of the Flood Zone at the proposed development site (Section 2.23 of the FRM Guidelines);
- Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines); and
- Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development.

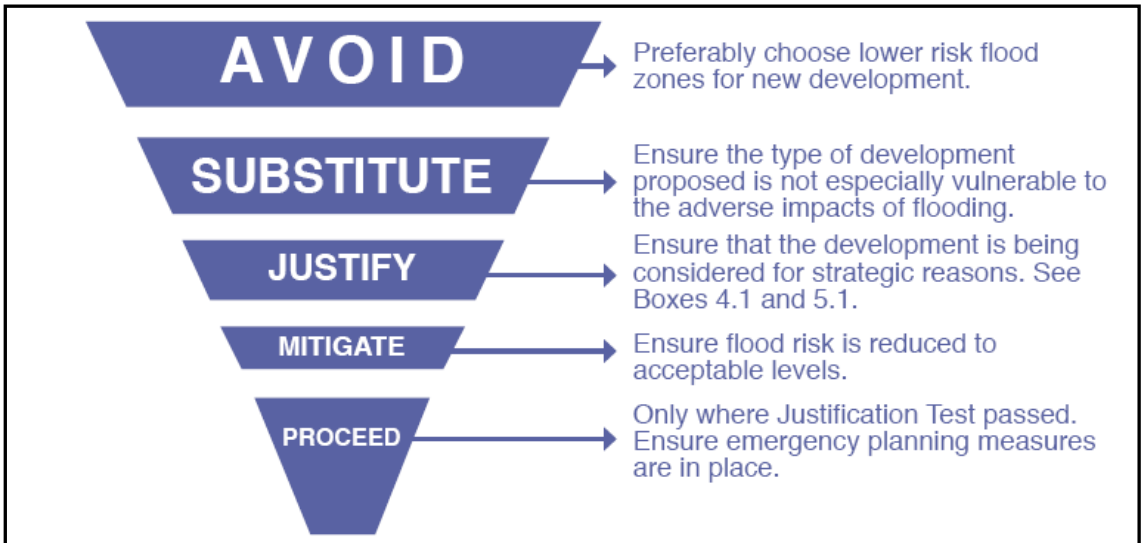


Fig. 3.1: Sequential approach principles in flood risk management

While Figure 3.1 of The FRM Guidelines sets out the broad philosophy underpinning the sequential approach in the flood risk management, Figure 3.2 of the Guidelines (shown below) describes the mechanism of the sequential approach for use in the planning process.

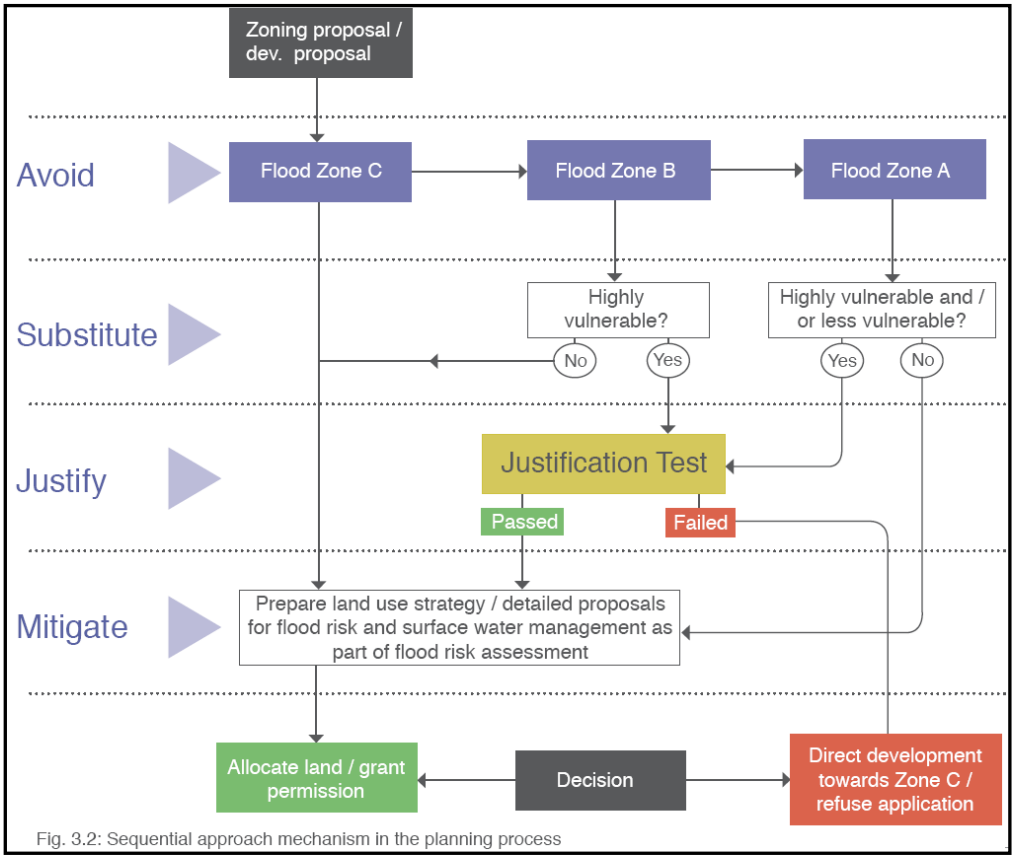


Fig. 3.2: Sequential approach mechanism in the planning process

According to the FRM Guidelines, Flood Zones are graphical areas within which the likelihood of flooding is in a particular range. They are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three Flood Zones, namely,

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

Flood Zones A, B and C are based on the current assessment of the 1% AEP and the 0.1% AEP fluvial events and the 0.5% AEP and 0.1% AEP tidal events, without the inclusion of climate change factors. Table 3.1 of the FRM Guidelines (see below) shows the classification of the vulnerability to flooding of different types of development.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and 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.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

*Uses not listed here should be considered on their own merits

Table 3.1 Classification of vulnerability of different types of development

Table 3.2 of the FRM Guidelines (shown below) identifies the types of development that would be appropriate for each Flood Zone and those that would be required to meet the Justification Test. Since hotels are classified as 'Highly vulnerable development' the section highlighted in Table 3.2 presents the required actions for each flood zone.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

The FRM Guidelines (Chapter 2) outlines the following three stages of flood risk assessment:

Stage 1: Flood risk identification – to identify whether there may be any flooding or surface water management issues relating to the proposed development site that may warrant further investigations.

Stage 2: Initial flood risk assessment – to confirm sources of flooding that may affect the proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. This stage involves the review of existing studies and hydraulic modelling to assess flood risk and to assist with the development of FRM measures.

Stage 3: Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impacts on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model across a wide enough area to appreciate the catchment wide impacts and hydrological process involved.

2.2 Data Collection

Data required for the flood risk assessment was obtained from various sources, as described below.

- The historic flood data was obtained from the National Flood Hazard Mapping website www.floodmaps.ie
- The Subsoil and Aquifer vulnerability data was obtained from the Geological Survey of Ireland website www.gsi.ie
- The Preliminary Flood Risk Assessment (PFRA) map was obtained from the Catchment Flood Risk Assessment and Management study website www.cfram.ie
- Draft Flood Risk Management Plans were obtained from the CFRAM Study undertaken by the OPW
- Fingal County Council Strategic Flood Risk Assessment 2017-2023
- Greater Dublin Strategic Drainage Study (GDSDS)

SECTION 3: Existing Hydrological Environment

3.1 Salient Hydrological Features

The main hydrological feature of the area is the Santry River. The Santry River, which is approximately 250m north of the proposed development site, rises in a rural area in north west Dublin and flows in a south- easterly direction where it discharges to Dublin Bay near Raheny. Approximately 1km downstream from the site, at Santry Demesne, is an attenuation pond in order to provide online storage to reduce peak flow passing downstream. The flow entering the attenuation pond is regulated by a sluice gate. *Figure 3-1* below illustrates the main hydrological features associated with the site.

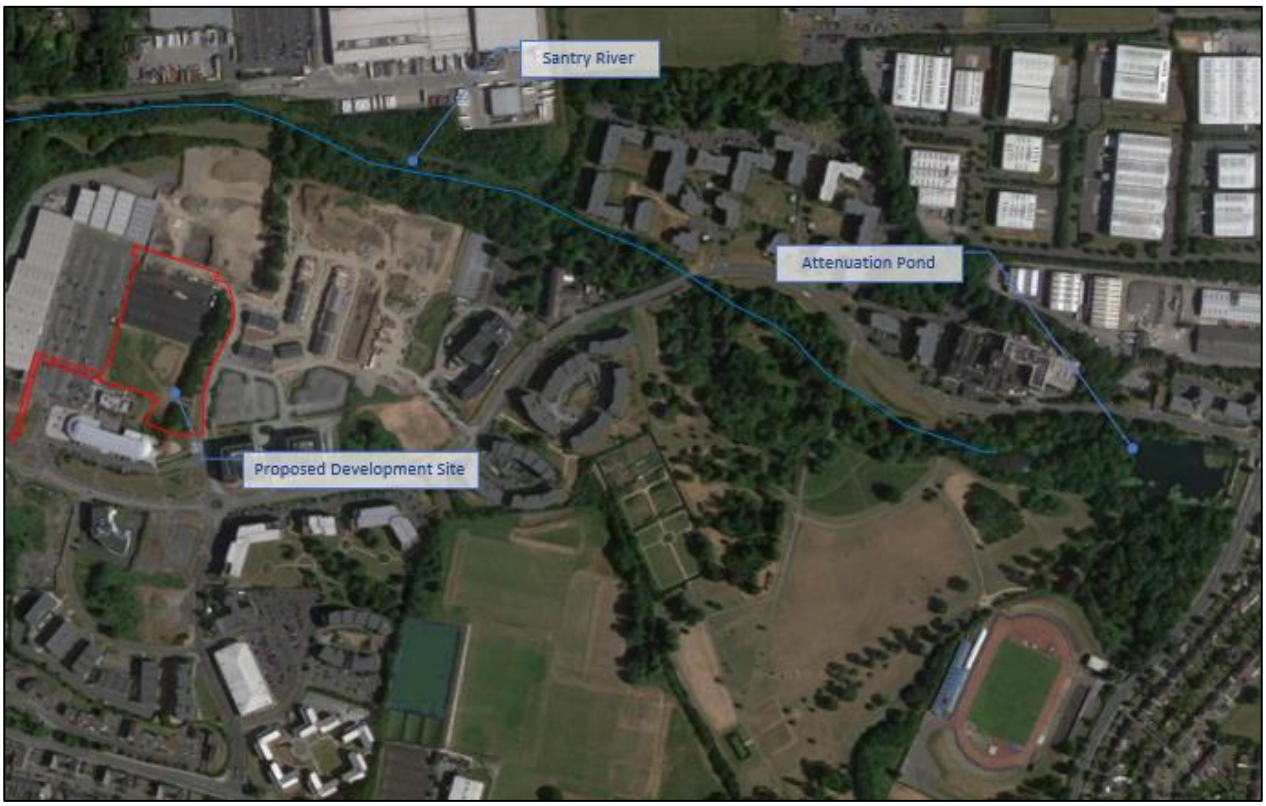


Figure 3-1: Hydrological Features of the Area (Source: Google Maps, annotation by J.B. Barry & Partners)

3.2 Existing Geology and Hydrogeology of the Area

The Geological Survey of Ireland (GSI) website provides information on their public online mapping service at www.gsi.ie on subsoil type and aquifer vulnerability. The maps presented in *Figure 3-2* and *Figure 3-3* depict the subsoil type and aquifer vulnerability for the proposed development site. The GSI subsoil mapping (*Figure 3-2*) indicates that a deep well drained mineral is the dominant ground condition within the environs of the proposed development site.

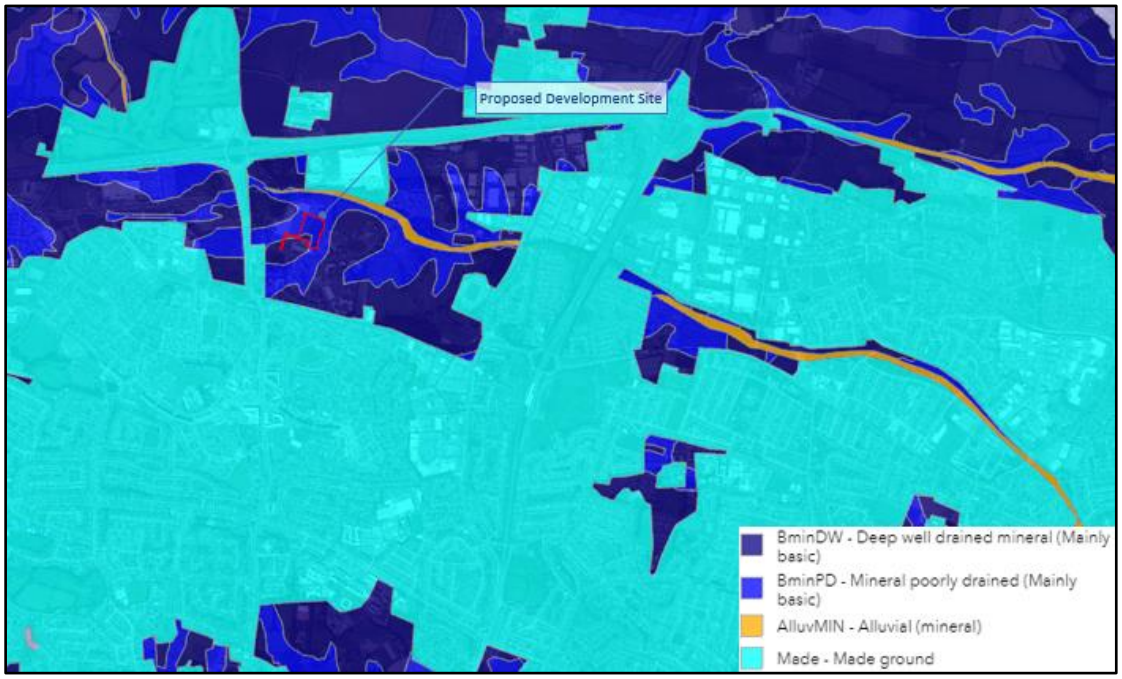


Figure 3-2: GSI Subsoil Mapping (Source: www.gsi.ie, annotation by J.B. Barry & Partners)

Furthermore, the interactive web-mapping site classifies the aquifer vulnerability in this region as having a low vulnerability rating (*Figure 3-3*). The GSI state that "Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities". The GSI further describes that the vulnerability of groundwater depends on:

- The time of travel of infiltrating water (and contaminants);
- The relative quantity of contaminants that can reach the groundwater; and
- The contaminant attenuation capacity of the geological materials through which the water and contaminants infiltrate

Figure 3-3: GSI Aquifer Vulnerability Mapping (Source: www.gsi.ie, annotation by J.B. Barry & Partners)

3.3 Flood Regime of the Area

The National Flood Hazard Mapping Website www.floodmaps.ie does not show any records of historic flooding occurring at the proposed development site. The nearest historic flood to the proposed site occurred at Santry Close approximately 1.25km downstream from the site in 2002 and 2004. The 2002 flood at this location was caused by an under capacity culvert which was unable to take the quantity of water, resulting in the river overflowing.

A Summary Local Area Report (SLAR) was generated for the site, which identifies all flooding events, which occurred within 2.5km of the proposed development site (included in Appendix 1).

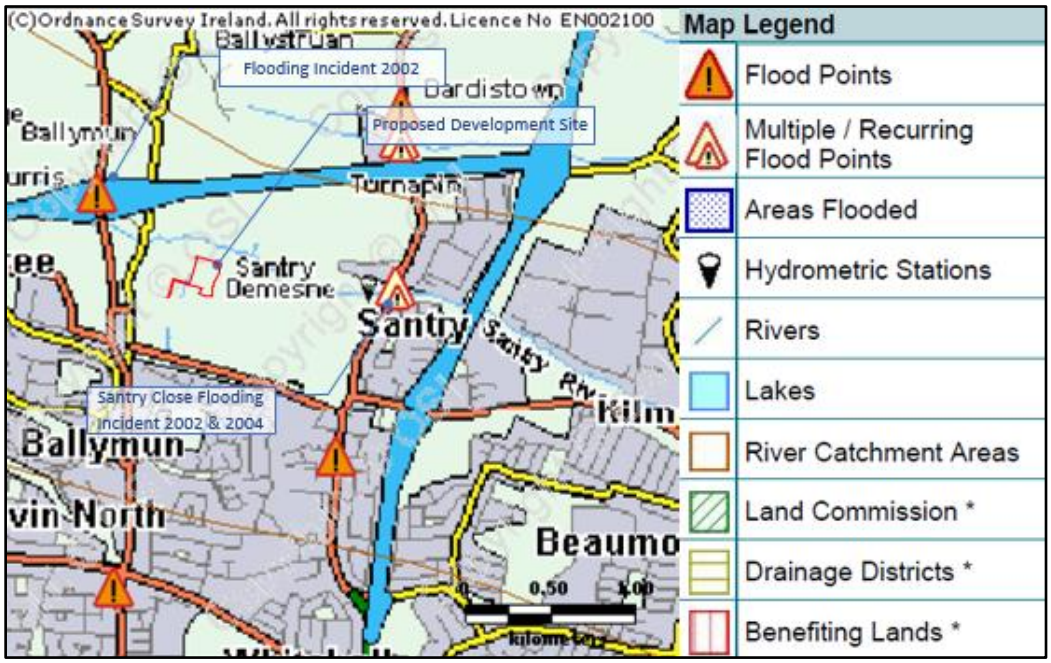


Figure 3-4: Location of historic flooding in the vicinity of the proposed site *(Source: www.floodmaps.ie annotation by J.B. Barry & Partners)*

3.4 Existing Flood Studies

3.4.1 Preliminary Flood Risk Assessment (PFRA) Maps

The OPW have published the Preliminary Flood Risk Assessment (PFRA) maps, in the form of 420 maps covering the country. According to the explanatory leaflet published for public consultation on PFRA stage, the PFRA is only a preliminary assessment, based on available or readily derivable information. It also states that areas where an on-site inspection is required to investigate the issues more closely, then those inspections will be carried out as part of the CFRAM Studies.

The PFRA map (extract) is shown in *Figure 3-5* below indicating the fluvial flood extent and coastal flood extent for the proposed development site location. Observation of the PFRA flood map extract indicates that the proposed development site is located outside the extent of the fluvial – indicative 1% Annual Exceedance Probability (100-yr) event and fluvial extreme events. It is also outside of the 0.5% AEP event and extreme coastal events. Consequently, the proposed development site is situated within **Flood Zone C** where the probability of fluvial flooding is lowest, as stipulated by the FRM Guidelines. The PFRA map indicates that no groundwater flood risk exists near the proposed development site.

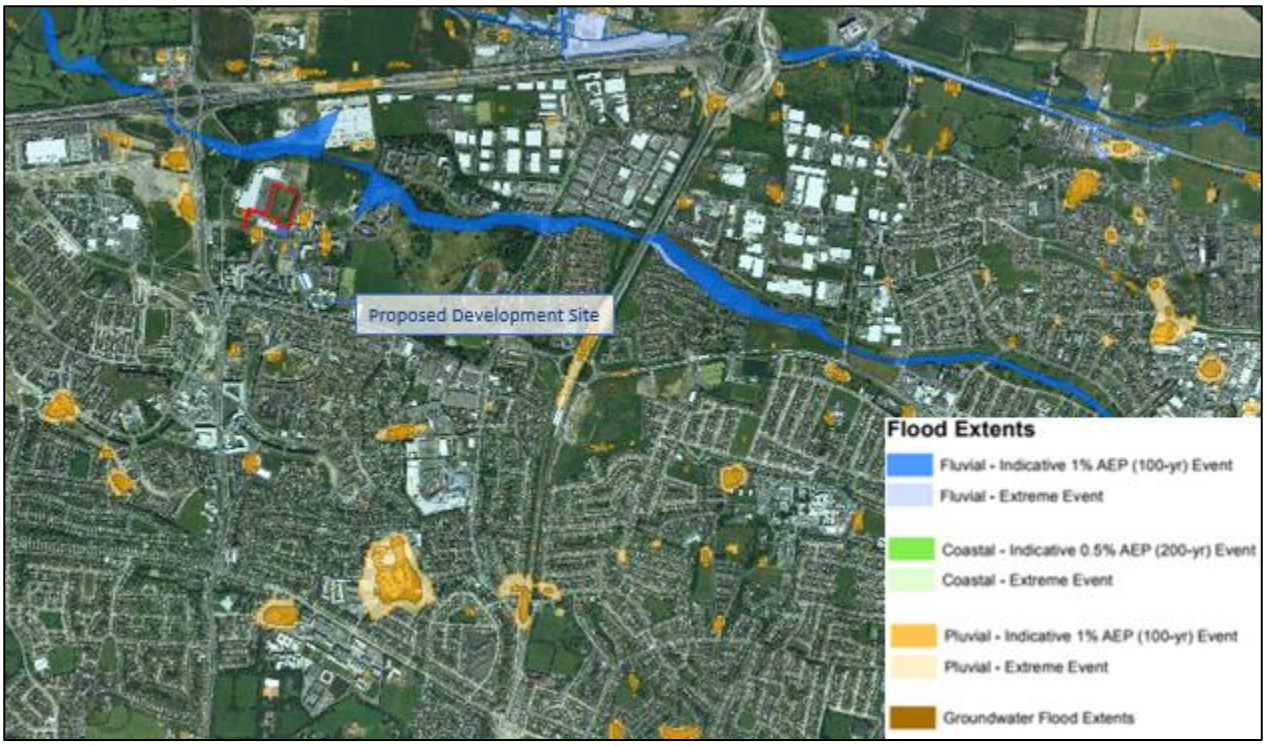


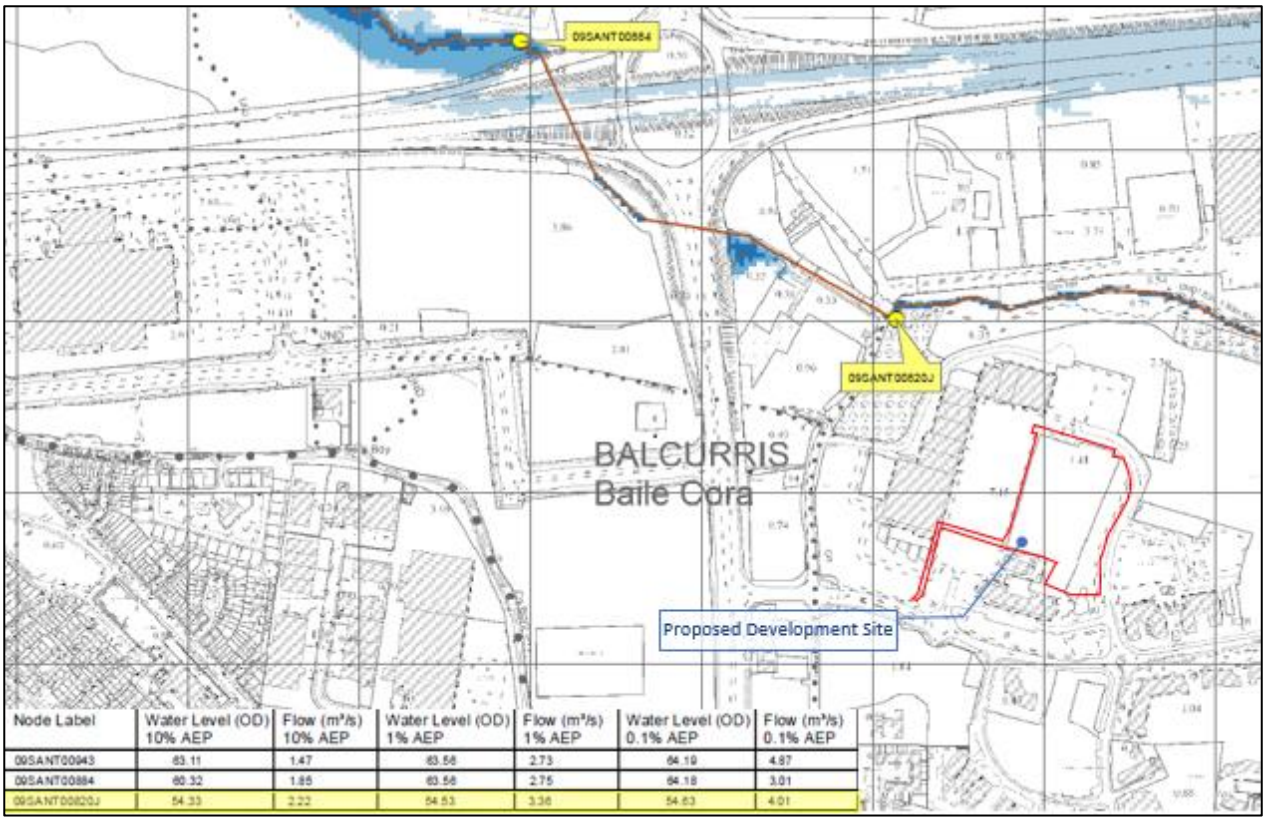
Figure 3-5: Extract of the PFRA map in the vicinity of proposed development site (Source: www.cfram.ie, annotation by J.B. Barry & Partners)

3.4.2 CFRAM Study

The OPW, as lead agency for flood risk management in Ireland, is producing Flood Risk Management Plans (FRMP), in line with National Flood Policy and the requirements of the EU Floods Directive. Draft FRMP's are currently being produced by the OPW under the CFRAM Study. The Draft FRMP's make use of the information provided through the flood maps that have previously been produced under the CFRAM Programme and previous parallel projects. The Draft FRMP's set out a range of proposed measures and actions to manage and reduce flood risk within the catchments and coastal reaches covered by each Draft Plan, focusing on the 300 areas of potentially significant flood risk around Ireland that were identified under the PFRA. The Flood Maps associated with the FRMP's are currently being finalised and will be made available online to view when the Draft Plans are published for consultation.

Figure 3-5 below is an extract from the Fluvial Flood Extent Map concerning the proposed development site. This map is included in Appendix 2. Observation of *Figure 3.7* demonstrates that the site lies outside of the 0.1% Fluvial AEP event and is therefore located within **Flood Zone C.**

This extract also provides the flood level of the Santry River at the vicinity of the proposed development site during the 1% and 0.1% AEP fluvial Events. To the north west of the site, water levels in the river at Node 09SANT00820J are +54.53mOD and +54.63mOD for the 1% and 0.1% AEP flood events respectively.



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09SANT00943	63.11	1.47	63.56	2.73	64.19	4.87
09SANT00884	60.32	1.85	63.56	2.75	64.18	3.01
09SANT00820J	54.33	2.22	54.53	3.36	54.63	4.01

Figure 3-6: Extract from the Eastern CFRAMS Current Scenario Fluvial Flood Extent Map

3.4.3 Fingal County Council Strategic Flood Risk Assessment 2017 – 2023

The Fingal County Council (FCC) Strategic Flood Risk Assessment (SFRA) was developed as part of the Fingal County Council Strategic Development Plan 2017-2023. The SFRA provides an area-wide assessment of all types of significant flood risk to inform strategic land use planning decisions. The SFRA enables FCC to allocate appropriate sites for development and identify how flood risk can be reduced as part of the development plan process.

As part of the SFRA flood zone maps were generated for Fingal. Figure 3-7 below shows an extract from the Flood Zone Map in the vicinity of the proposed development. The full map is included in Appendix 3. From this figure it can be seen that the proposed development site lies outside of Flood Zones A, and B and can therefore be considered to lie within Flood Zone C.

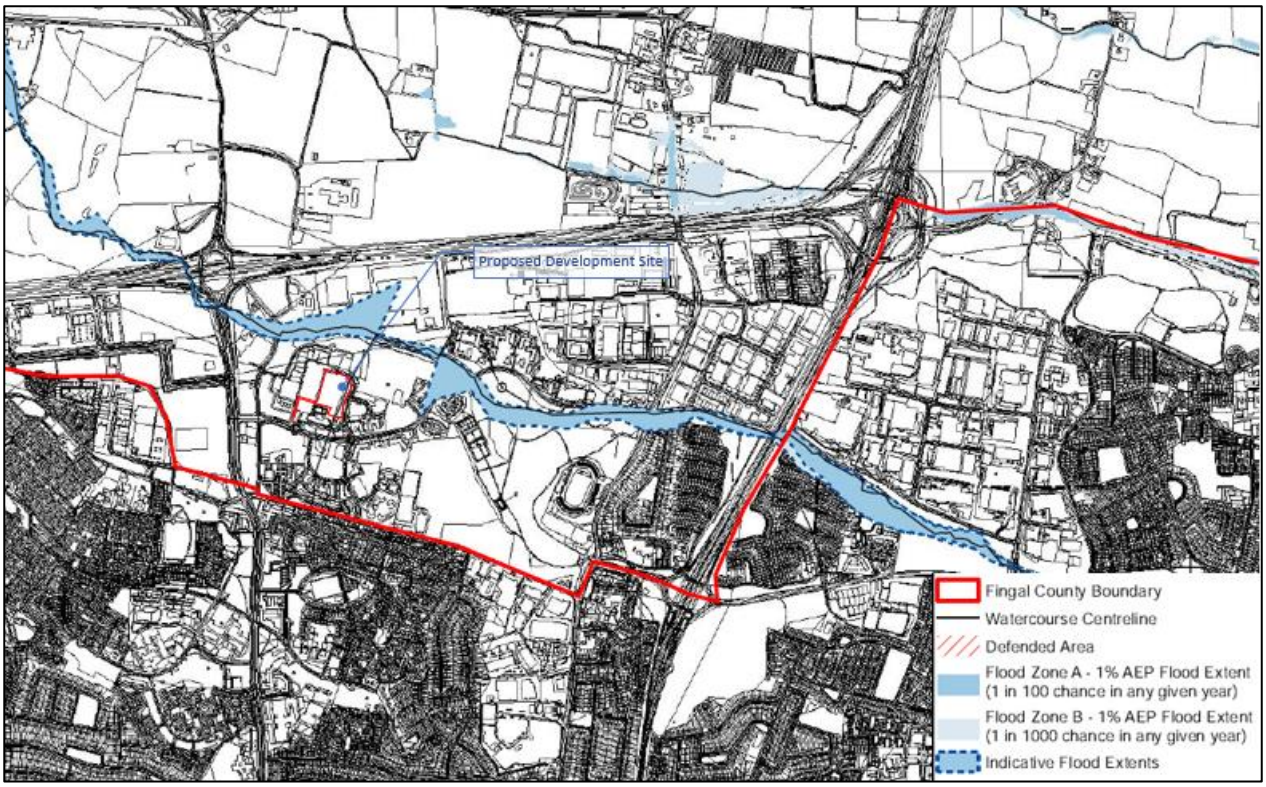


Figure 3-7: Extract from the Fingal County Council SFRA Flood Zone Map

SECTION 4: Flood Risk Assessment

4.1 Introduction

As outlined in Section 2 of this report the FRM guidelines identifies three stages of Flood Risk Assessment namely;

- Stage 1: Flood Risk Identification
- Stage 2: Initial Flood Risk Assessment
- Stage 3: Detailed Flood Risk Assessment

4.2 Flood Risk Identification

According to the FRM Guidelines, flood risk identification is the process for deciding whether a plan or project requires further investigation. This is a desk based exercise based on existing information. All the existing information is described in Section 3 and the identification of flood risk from each of the five sources of flooding (coastal, fluvial (river), groundwater, pluvial (rainfall) and from artificial drainage systems) is considered.

Coastal Flood Risk

The PFRA map in *Figure 3-5*, CFRAMS map in Appendix 2, and FCC SFRA Map in Appendix 3 all indicate that the proposed development site lies outside of the 0.1% AEP coastal flood event and hence is located within **Flood Zone C** for Coastal flood risk, where the risk of flooding is low.

Fluvial Flood Risk

The PFRA map in *Figure 3-5*, and FCC SFRA Map in Appendix 3 all indicate that the proposed development site lies outside of the 1% AEP fluvial flood extent. The more detailed CFRAMS map in Appendix 2 also shows that the site lies outside of the 0.1% AEP fluvial flood event. Therefore, the proposed development site lies within Fluvial **Flood Zone C** – low flood risk. The OPW Summary Local Area Report shows no indication of previous fluvial related flooding at the proposed site.

Groundwater Flood Risk

The aquifer vulnerability map (refer to *Figure 3.3*) classifies the site as having 'low vulnerability' which indicates a low water table and hence a risk of groundwater related flooding. There is no historical evidence of groundwater flooding at the site and the PFRA Map (*Figure 3-5*) indicates a low risk of groundwater related flooding. There is no indication on the maps of any springs or wells on this site. Groundwater risk is therefore not considered to be significant.

Pluvial Flood Risk

The PFRA Map (*Figure 3-5*) of the area does not show any pluvial flood risk at the site and the OPW Summary Local Area Report also shows no indication of previous pluvial related flooding at the site. Pluvial flood risk is therefore not considered to be significant. Notwithstanding this, it is important to consider appropriate mitigation measures. During extreme rainfall events the application of SuDS principles will ensure surface water is managed sufficiently and sustainably discharged to the drainage network.

Artificial Drainage Systems Flood Risk

No artificial drainage systems have been identified at the proposed site, and consequently artificial drainage systems flood risk is not relevant.

4.3 Initial Flood Risk Assessment

The Flood Risk Assessment has identified that there is a low flood risk to the site. Under the sequential approach identified in the FRM Guidelines a three step approach is required to confirm the appropriateness of the development in terms of flood risk.

Step 1: Identification of the Flood Zone at the proposed development site

Using the Flood Zone criteria from the FRM Guidelines and as defined in Section 2 previously, the flood zones for each of the sites were determined.

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

As discussed in Section 4.2 above, the proposed development site lies within **Flood Zone C** – where risk of flooding is lowest.

Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines)

The different types of proposed infrastructure are then assigned a vulnerability classification according to the definitions in 'Table 3.1 – Classification of vulnerability of different types of development' of the FRM Guidelines.

As described in Section 1.2 above, the proposed development consists of a residential development. This is classified as 'highly vulnerable development'.

Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development

The proposed development site is located in Flood Zone C and is categorised as Highly Vulnerable Development. Table 3.2 of the FRM guidelines and Figure 3.2 – Sequential approach mechanism in the planning process (FRM guidelines) stipulate that a justification test is not required for such a development and is deemed appropriate development for the flood zone categories. *Figure 4-1* below highlights the matrix of vulnerability versus flood zone.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

Figure 4-1: Matrix of Vulnerability versus Flood Zone to illustrate appropriate development

4.4 Detailed Flood Risk Assessment

Following from Stage 2 – Initial Flood Risk Assessment, it was determined that there is no requirement to undertake a detailed flood risk assessment on the proposed development. The vulnerability matrix as shown in *Figure 4-1* identifies that there is no need for a Justification Test to be undertaken.

SECTION 5: Conclusions and Recommendations

5.1 Summary of Results

A flood risk assessment for the proposed residential development at Northwood, Santry, Dublin 9 has been undertaken in accordance with the methodology recommended in the FRM Guidelines. The following is the summary of the flood risk assessment:

- The proposed development consists of 331 apartments in four blocks, mixed use commercial units, a childcare facility and associated site development works. The Santry River is located to the north of the site.
- The PFRA flood extent map and FCC SFRA Flood Map indicates that the existing site lies within Flood Zone C. The national flooding website www.floodmaps.ie does not have any record of historic flooding at the site.
- The CFRAMS fluvial flood extent maps indicates that the site lies within Flood Zone C, and hence is at low risk of flooding. The map indicates that the 1% AEP and 0.1% AEP fluvial flood levels adjacent the site is are **+54.53mOD** and **+54.63mOD** respectively.
- The type of development is defined as 'Highly Vulnerable Development'. Using the sequential approach mechanism, it is assessed that a justification test is not required for the proposed development.

5.2 Recommendations

To protect the proposed development against flooding it is recommended that the development be constructed with a finished floor level (FFL) above the 1% AEP fluvial flood event. The FFL should include a 0.5m freeboard as recommended in the Greater Dublin Strategic Drainage Study (GDSDS) and Fingal County Strategic Flood Risk Assessment.

As discussed in Section 3.4.3, the 1% AEP fluvial flood level is +54.53mOD, therefore the minimum FFL should be (+54.53mOD + 0.5m) **+55.03mOD**. The proposed FFL's of the development range from +57.52mOD to +58.00mOD thus ensuring that the FFL is not only above the minimum recommended FFL but also significantly above the 0.1% AEP fluvial flood level of +54.63mOD.

5.3 Impact of the proposed development on the existing flood regime of the area

To prevent flooding caused from excess runoff from the proposed development, it is proposed to implement SuDS measures in order to limit the discharge from the site to the greenfield discharge rates. The implementation of these SuDS measures will not increase the risk of flooding elsewhere. It is considered that the proposed development will have a negligible impact on the existing flood regime of the area.

5.4 Vulnerability of the Proposed Development to Flooding

It is recommended in the Fingal Strategic Flood Risk Assessment that the FFL of essential infrastructure is located above the 1% AEP fluvial flood level with an allowance for freeboard and climate change. The 1% AEP fluvial flood level at the site location is **+54.53mOD**. The proposed FFL of the development is greater than this level, thus ensuring that the FFL is above both the 1% and 0.1% AEP fluvial flood levels at the proposed development site. Therefore, it is envisaged that the proposed development will not be vulnerable to flooding.

Appendix 1:

OPW Summary Local Area Reports

OPW National Flood Hazard Mapping

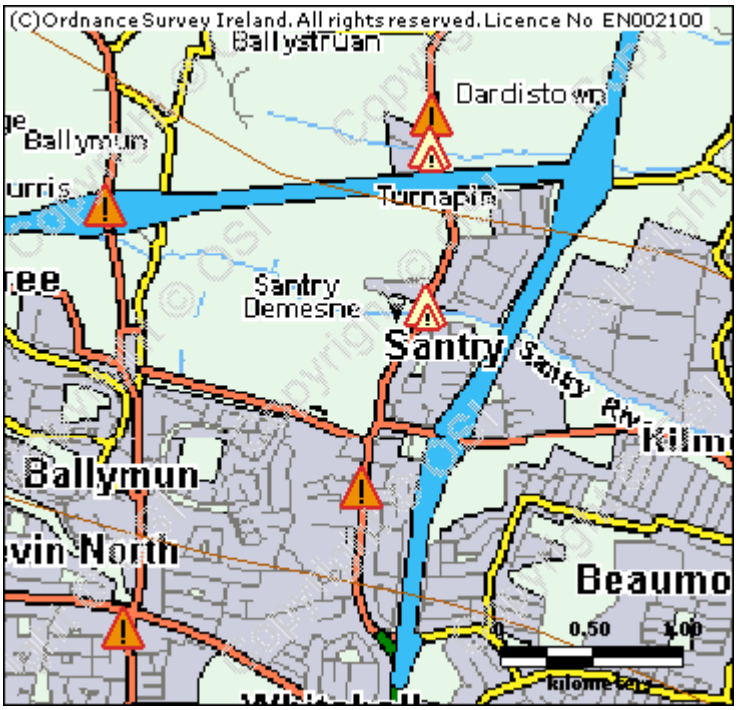
Summary Local Area Report

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

The map centre is in:

County: Dublin

NGR: O 168 404



Map Scale 1:41,363

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. Thier purpose and scope is explained in the Glossary.

8 Results

1. Santry Oct 2004
Start Date: 20/Oct/2004
County: Dublin
Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information

2. North of M50 (N1 road) old Airport Road Nov 2002
Start Date: 13/Nov/2002
County: Dublin
Flood Quality Code:3
Additional Information: Reports (4) More Mapped Information

3. M50 at Ballymun Exit Nov 2002
Start Date: 13/Nov/2002
County: Dublin
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

4. Santry Nov 2002
Start Date: 12/Nov/2002
County: Dublin
Flood Quality Code:3
Additional Information: Reports (4) Press Archive (2) More Mapped Information

5. Mayne M50 flyover old Airport Road Nov 2000
Start Date: 05/Nov/2000
County: Dublin
Flood Quality Code:3

Additional Information: Reports (4) More Mapped Information

6. Wad River Santry Jan 1965

Start Date: 20/Jan/1965

County: Dublin

Flood Quality Code: 4

Additional Information: Reports (1) More Mapped Information

7. Wad River Ballymun Dec 1954

Start Date: 08/Dec/1954

County: Dublin

Flood Quality Code: 3

Additional Information: Reports (1) More Mapped Information

8. Mayne M50 flyover old Airport Road Recurring

Start Date:

County: Dublin

Flood Quality Code: 4

Additional Information: Reports (4) More Mapped Information

Flooding in the Santry Catchment 14 November 2002, 20-21 October 2002 & 28 October 2004

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Environmental Protection Agency
Richview, Dublin 14
Tel: (01) 268 0138
Fax: (01) 268 0199

January 2005

SELECTED FLOODS IN THE SANTRY CATCHMENT

Introduction

Dublin City Council maintains a hydrometric station in the Santry Catchment at Station 09102 Cadbury's on the Santry River.

The Environmental Protection Agency (EPA) assists Dublin City Council with its hydrometric Programme through site selection, undertakes calibration flow measurements at hydrometric stations, downloads the data logger values, edits the data and processes the water level records into flow data, where there is a rating available for the station.

Available Data

Hydrometric data has been collected at Station 09102 Cadbury's on the Santry River since 22 August 2001 when an OTT Thalimedes data logger was installed. by Dublin City Council

Flow Measurements

Calibration flow measurements were taken by the EPA Dublin regional hydrometric team of the flow in the Santry River. A channel control was also constructed to assist with station calibration.

Station details

The catchment area to Station 09102 Cadbury's on the Santry River is estimated at 9.9 km^2. The national grid reference of the location of the station is O 198 397.

Flood Records

The data for the period 22 August 2001- 19 January 2005 is presented in Appendix 1. The first graph is the hydrograph of the water level record at Station 09102 Cadbury's and the second graph is the hydrograph of flow for the same period at the same station.

The hydrographs of (1) water level and (2) flow for the flood of 14 November 2002 are presented in Appendix 2.

Flood of 14 November 2002

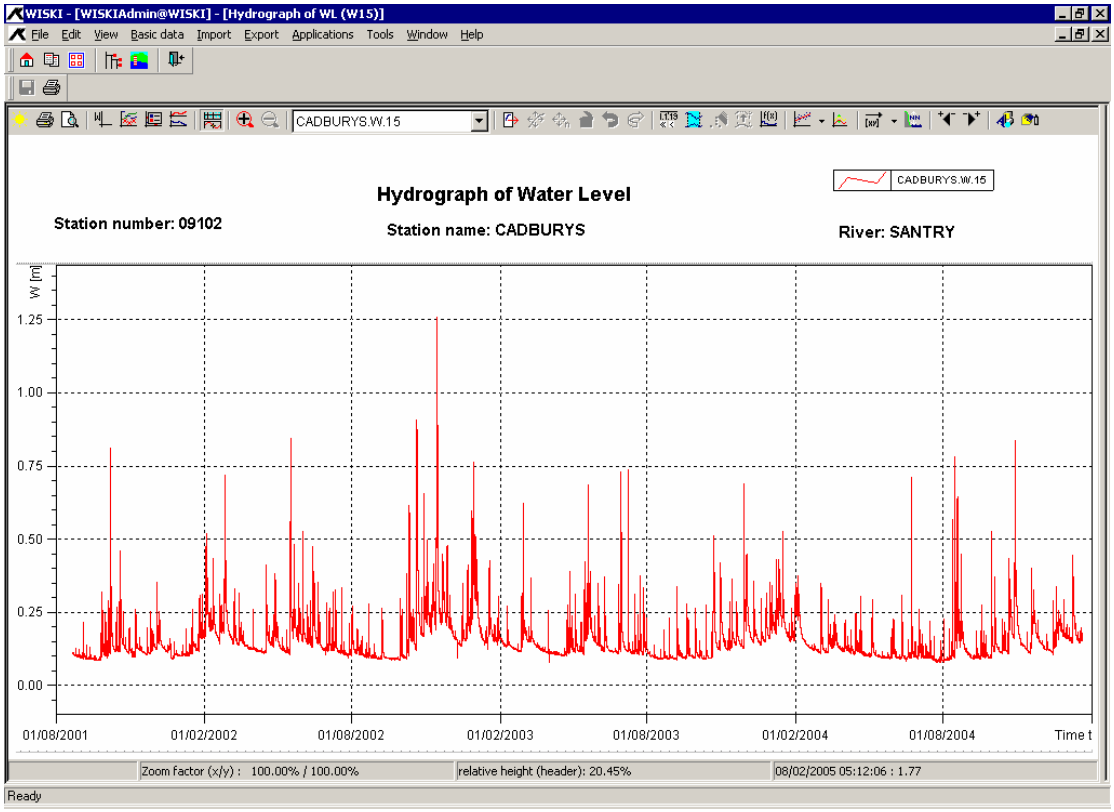
At 20:00 hrs on Wednesday 13 November 2002 the water level in the Santry River started to rise at Station 09102 Cadbury's. The water level rose in jumps until 11:30 hrs on 14 November 2002. The water level eased off temporarily and then rose rapid until it peaked at a water level of 1.26 m at 15:00 hrs (GMT) on 14 November 2002. Water levels then declined to a level of 1.10 m at 16:45 hrs and then rose to a level of 1.15 m at 17:45 hrs on 14 November 2002. Then there began a general decline until pre-flood water levels of 0.25 m were recorded at 23:30 hrs on 17 November 2002.

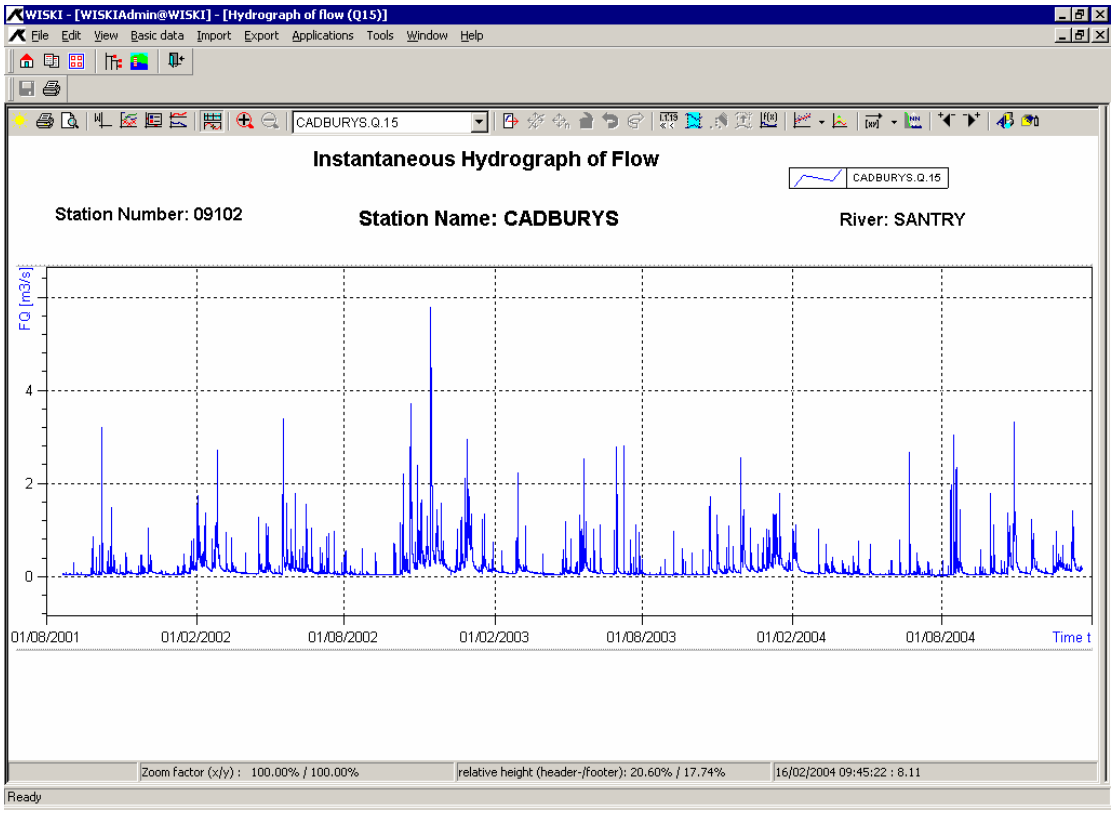
The highest measured flow at Station 09102 Cadbury's on the Santry River was a flow of 0.15 m^3/s measured on 30 January 2002. However with the channel control and good confinement at the station, we would have confidence in our extrapolation of the rating curve for this station.

Using the rating curve at Station 09102 Cadbury's, the peak flowrate, corresponding to a staff gauge reading of 1.26 m recorded at 15:00 hrs on 14 November 2002, was estimated at a flowrate of 5.8 m^3/s. The flowrate corresponding to a level of 1.15 m is estimated at 5.2 m^3/s.

Appendix 1

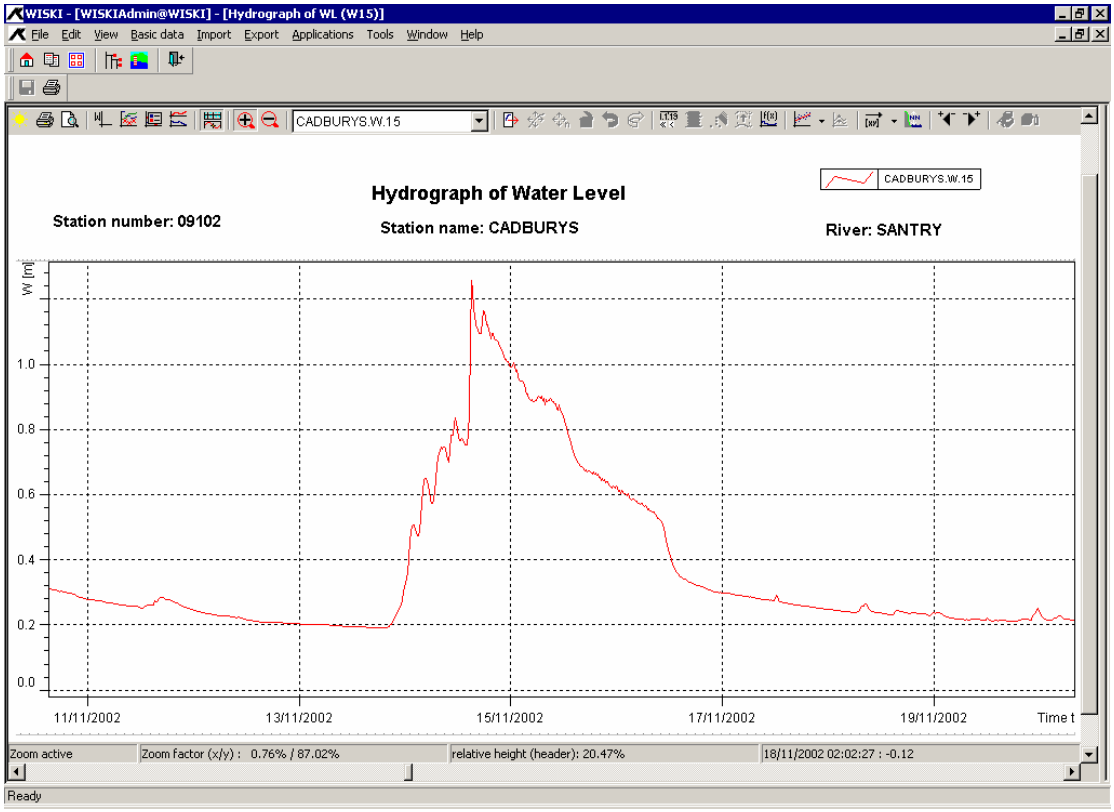
Hydrograph of water level and flow at Station 09102 Cadbury's on the Santry River

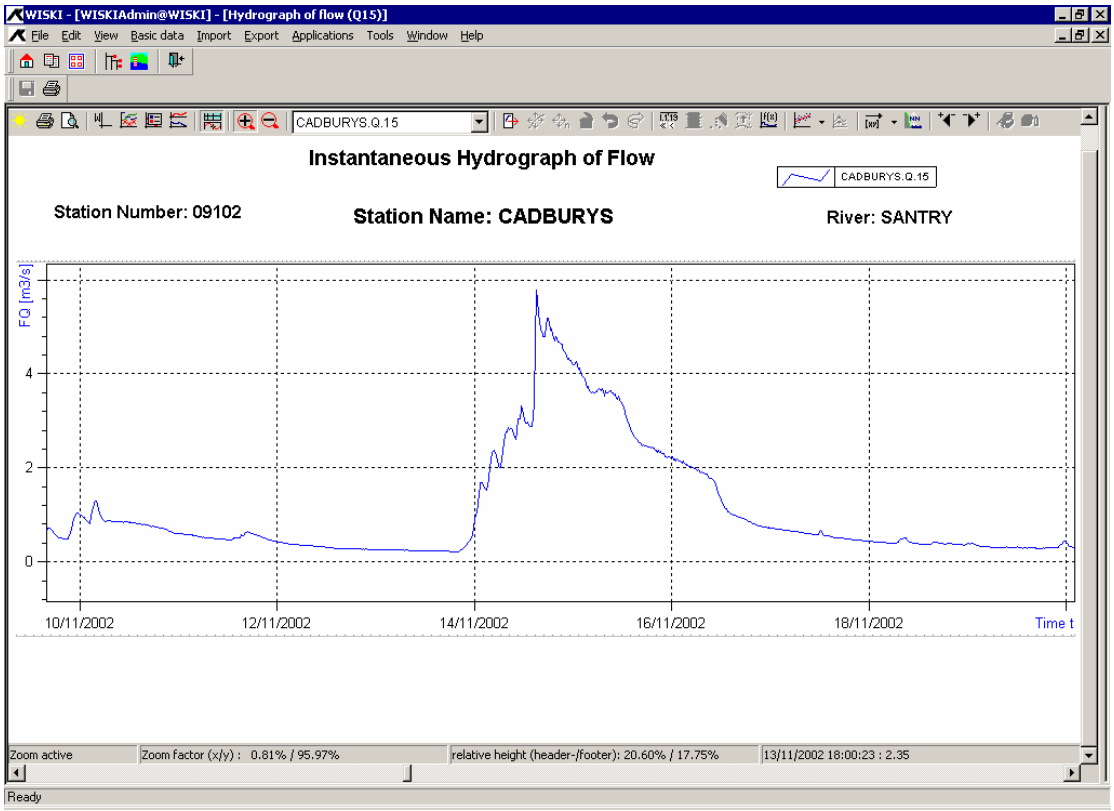

WISKI - [WISKIAdmin@WISKI] - [Hydrograph of WL (W1S)]
File Edit View Basic data Import Export Applications Tools Window Help
CADBURYS.W.15
Hydrograph of Water Level
CADBURYS.W.15
Station number: 09102
Station name: CADBURYS
River: SANTRY
W [m]
1.25
1.00
0.75
0.50
0.25
0.00
01/08/2001
01/02/2002
01/08/2002
01/02/2003
01/08/2003
01/02/2004
01/08/2004
Time t
Zoom factor (x/y) : 100.00% / 100.00%
relative height (header): 20.45%
08/02/2005 05:12:06 : 1.77
Ready

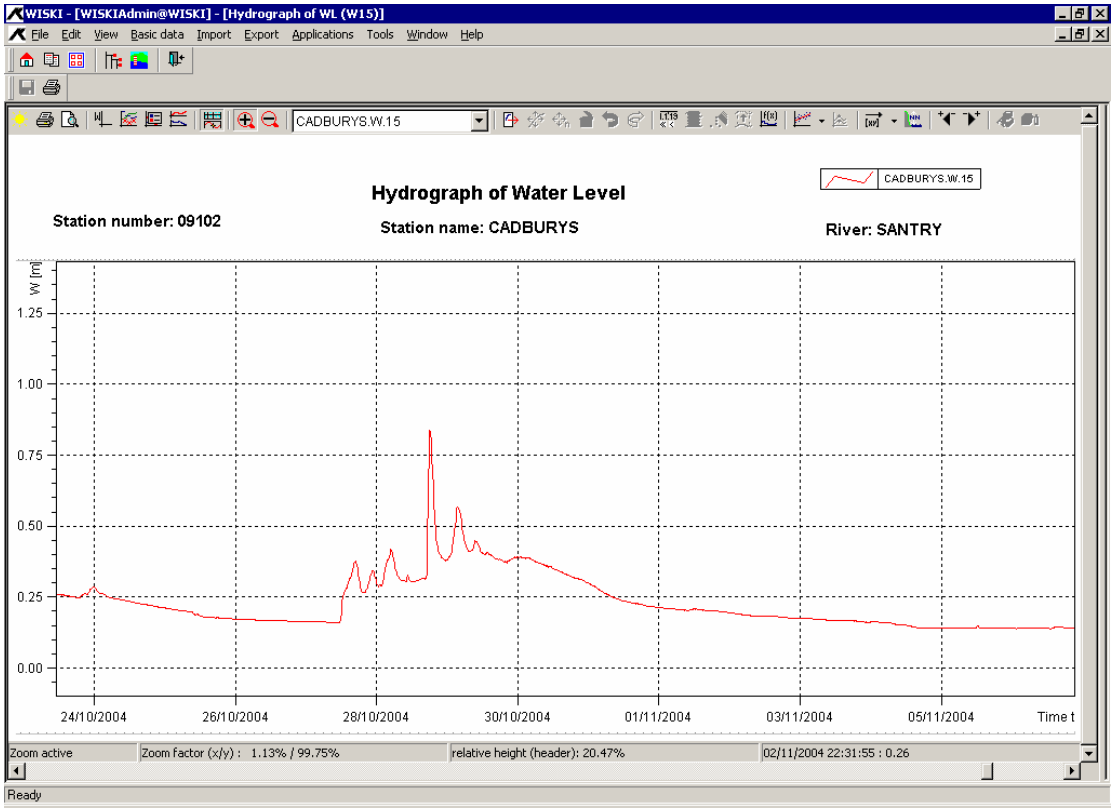

WISKI - [WISKIAdmin@WISKI] - [Hydrograph of flow (Q15)]
File Edit View Basic data Import Export Applications Tools Window Help
CADBURYS.Q.15
Instantaneous Hydrograph of Flow
CADBURYS.Q.15
Station Number: 09102
Station Name: CADBURYS
River: SANTRY
FQ [m3/s]
4
2
0
01/08/2001
01/02/2002
01/08/2002
01/02/2003
01/08/2003
01/02/2004
01/08/2004
Time t
Zoom factor (x/y) : 100.00% / 100.00%
relative height (header-/footer): 20.60% / 17.74%
16/02/2004 09:45:22 : 8.11
Ready

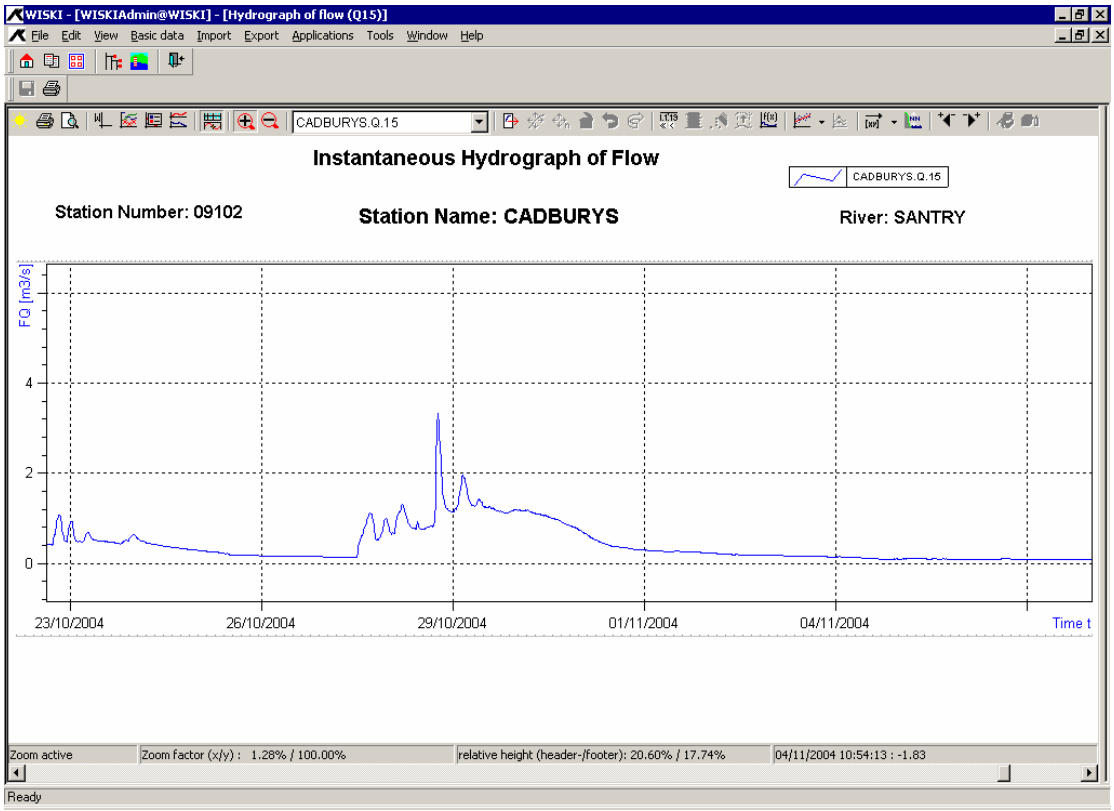
Appendix 2

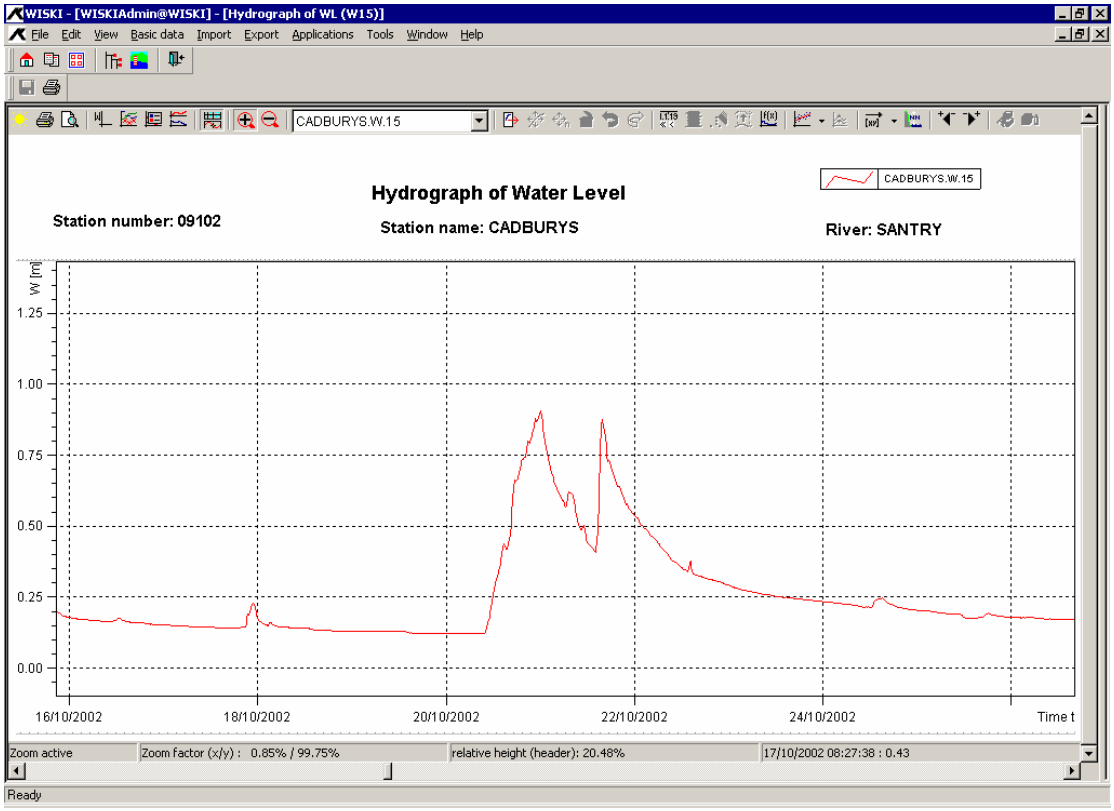
Hydrograph of water level and flow at Station 09102 Cadbury's on the Santry River for the floods of 14 November 2002 and 20-21 October 2004

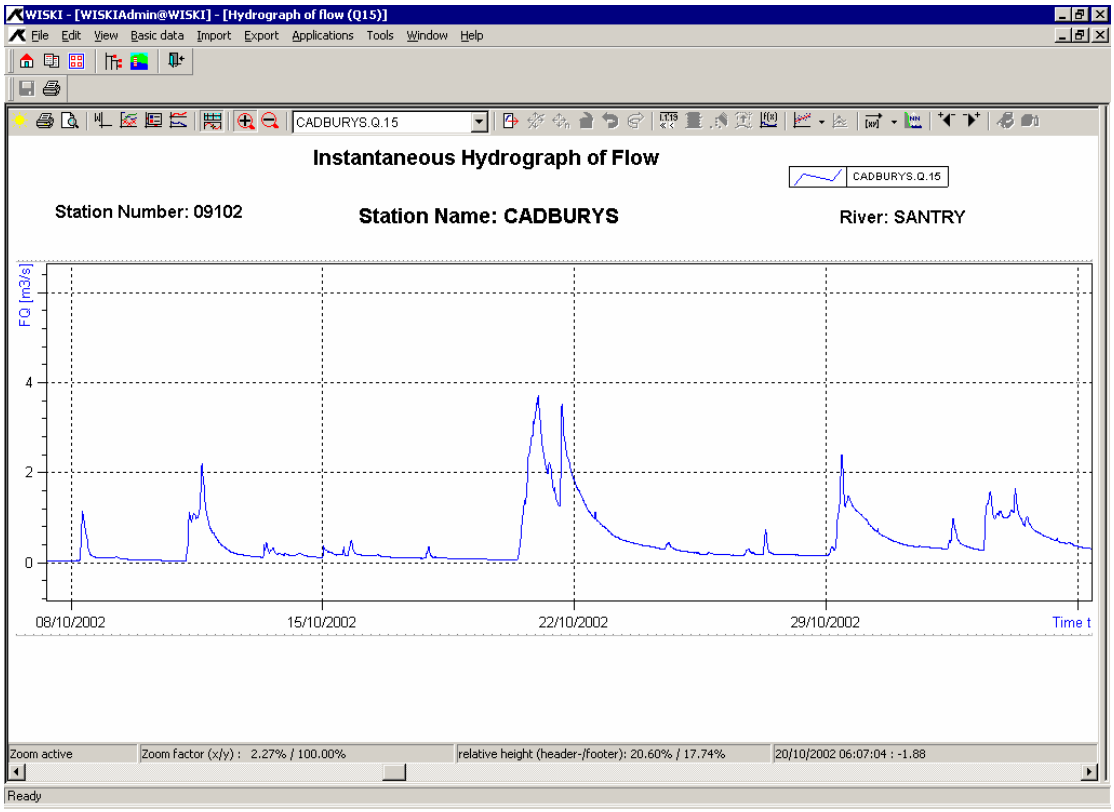

WISKI - [WISKIAdmin@WISKI] - [Hydrograph of WL (W15)]
File Edit View Basic data Import Export Applications Tools Window Help
CADBURYS.W.15
Hydrograph of Water Level
CADBURYS.W.15
Station number: 09102
Station name: CADBURYS
River: SANTRY
W [m]
1.0
0.8
0.6
0.4
0.2
0.0
11/11/2002
13/11/2002
15/11/2002
17/11/2002
19/11/2002
Time t
Zoom active
Zoom factor (x/y) : 0.76% / 87.02%
relative height (header): 20.47%
18/11/2002 02:02:27 : -0.12
Ready


WISKI - [WISKIAdmin@WISKI] - [Hydrograph of flow (Q15)]
File Edit View Basic data Import Export Applications Tools Window Help
CADBURYS.Q.15
Instantaneous Hydrograph of Flow
CADBURYS.Q.15
Station Number: 09102
Station Name: CADBURYS
River: SANTRY
FQ [m3/s]
4
2
0
10/11/2002
12/11/2002
14/11/2002
16/11/2002
18/11/2002
Time t
Zoom active
Zoom factor (x/y) : 0.81% / 95.97%
relative height (header-/footer): 20.60% / 17.75%
13/11/2002 18:00:23 : 2.35
Ready


WISKI - [WISKIAdmin@WISKI] - [Hydrograph of WL (W15)]
File Edit View Basic data Import Export Applications Tools Window Help
CADBURYS.W.15
Hydrograph of Water Level
CADBURYS.W.15
Station number: 09102
Station name: CADBURYS
River: SANTRY
W [m]
1.25
1.00
0.75
0.50
0.25
0.00
24/10/2004
26/10/2004
28/10/2004
30/10/2004
01/11/2004
03/11/2004
05/11/2004
Time t
Zoom active
Zoom factor (x/y) : 1.13% / 99.75%
relative height (header): 20.47%
02/11/2004 22:31:55 : 0.26
Ready


WISKI - [WISKIAdmin@WISKI] - [Hydrograph of flow (Q15)]
File Edit View Basic data Import Export Applications Tools Window Help
CADBURYS.Q.15
Instantaneous Hydrograph of Flow
CADBURYS.Q.15
Station Number: 09102
Station Name: CADBURYS
River: SANTRY
FQ [m3/s]
4
2
0
23/10/2004
26/10/2004
29/10/2004
01/11/2004
04/11/2004
Time t
Zoom active
Zoom factor (x/y) : 1.28% / 100.00%
relative height (header-/footer): 20.60% / 17.74%
04/11/2004 10:54:13 : -1.83
Ready


WISKI - [WISKIAdmin@WISKI] - [Hydrograph of WL (W15)]
File Edit View Basic data Import Export Applications Tools Window Help
CADBURYS.W.15
Hydrograph of Water Level
CADBURYS.W.15
Station number: 09102
Station name: CADBURYS
River: SANTRY
W [m]
1.25
1.00
0.75
0.50
0.25
0.00
16/10/2002
18/10/2002
20/10/2002
22/10/2002
24/10/2002
Time t
Zoom active
Zoom factor (x/y) : 0.85% / 99.75%
relative height (header): 20.48%
17/10/2002 08:27:38 : 0.43
Ready


WISKI - [WISKIAdmin@WISKI] - [Hydrograph of flow (Q15)]
File Edit View Basic data Import Export Applications Tools Window Help
CADBURYS.Q.15
Instantaneous Hydrograph of Flow
CADBURYS.Q.15
Station Number: 09102
Station Name: CADBURYS
River: SANTRY
FQ [m3/s]
4
2
0
08/10/2002
15/10/2002
22/10/2002
29/10/2002
Time t
Zoom active
Zoom factor (x/y) : 2.27% / 100.00%
relative height (header-/footer): 20.60% / 17.74%
20/10/2002 06:07:04 : -1.88
Ready

Report on Flooding in North County Dublin
November 14th & 15th, 2002

Weather Conditions:

Met Eireann issued a weather warning with the following:

- Up to 50mm of rainfall from Thurs 14th – Fri 15th Nov, 2002.

Drainage Areas Affected by Surface Water:

Swords Area

1) North Street:
   At approximately 11:30pm on Thursday night The Ward River overflowed into the park adjacent to North Street and flooded the Road between North St. and Watery Lane.

   The flooding of the premises occurred instantly and although the Drainage Section were present on Thursday night, but could not prevent the flooding occurring. On Friday morning a crew pumped the water from the road to the river and unblocked the road gullies.

Flooding in Estuary Pub & two other premises.

Flooding at North Street/Watery Lane, Swords.

2) Pinnock Hill:
The surface water screens in property are unable to take the volume of surface water and overflowed (see Area Engineer report 10/2/01), this in turn floods the Little Chef. In order to prevent flooding of Little Chef the surface water was diverted on to Dublin/Belfast Road.

3) Santry Close:
The culvert on the Santry River at the Old Swords Road was unable to take the quantity of water in the river and overflowed. It flowed from the Old Swords Road into Santry Close, which was under one and a half feet of water.

The Drainage Section provided a 6" Whispa pump and hoses to Santry Close at approximately 8:30pm on Thursday. The Roads Section provided a crew to man the pump.

1No. house flooded internally, flooding in grounds of several houses.

4) Ballyboughal Road:
A stream runs through a new Golf course adjacent to the Ballyboughil Road. The culvert under the road was unable to cater for the volumes of water and flooded the main road, which in turn caused flooded around 1No. house.

5) Dubber Cross, Meakestown:
The ditch adjacent to the pump station overflowed into the station. The volume of water in the ditch was unable to flow through the pipes under the road. The Drainage Section had a gully sucker to reduce the level in the ditch.

Donabate/Portrane/Rush Areas

1) Portrane Treatment Plant:
The Treatment Plant in Portrane was unable to take the large quantities of material from Donabate/Portrane catchment. Pumping Station No.4, which comes from the hospital was shut off and put into overflow.

S.W. flooding at Railway in Ballisk.

2) Ballisk, Donabate:
Surface water floods the road under the main Dublin-Belfast railway line. The S.W. is overflowing from ditch onto the road and also causes the foul sewer to surcharge. The Drainage Section cut an open channel from the road to a dry ditch, with a J.C.B, which solved the problem. The drives of a number of houses were flooded and the use of toilets was not possible.

3) Hearst Road, Donabate:
There was major flooding on the Hearst Road.

4No. houses on Hearst Road, flooded.

4) Beaverstown:
A large number of fields in the Beaverstown Area were flooded due to the heavy rains.

5) Rush:
Road Flooding

- Spout Road:	Very bad flooding; Impassible.
Whitestown Road at Graveyard:	Very bad flooding.
- Skerries Road:	Very bad flooding; Impassible.
Lusk-Rush Road:	Very bad flooding;Impassible.
Ministers Lane/Killhedge Lane	Very bad flooding;Impassible.

Malahide Area

1) Coast Road:
   The foul sewer on St. James Terrace and Coast Road was surcharged, which caused F.S. flooding around shop & a number of houses in Seabank Court. The Drainage Section provided a 4" pump at St. James Terrace to pump F.S. from system to sea, to reduce pressure on system. A clean-up was carried out at Seabank Court.

Howth Area

1) The Bloody Stream:
   The surface water culvert at the Bloody Stream Pub was surcharged and was in danger of flooding the pub. The Drainage Section provided a 6" pump to keep the level in the culvert down.

Balbriggan Area

1) Covetown:
   The foul sewer on Droheda Street became surcharged and caused F.S. flooding on the roads and drives of Covetown. The overflow on the foul sewer at the Stream at St. Moliga's National School was in full operation. The F.S. was close to overflowing in the toilet of house opposite National School.

2) Bath Road:
   There was surface water flooding in the vicinity of the Railway bridge on Bath Road. The S.W. drainage was unable to take the water away.

Skerries Area

1) Millers Lane:
   Millers Lane was closed due to surface water flooding. The foul sewer became surcharged, but it is not known if this is as a direct result of the road flooding. In the past No.2 Millers Lane was flooded with F.S. when the main sewer became surcharged, but it did not occur on this occasion as a result of network improvements by the Drainage Section. The Drainage Section had a J.C.B. removing pond weed from the Mill Stream and clearing the outfall on the beach.

Drainage Operations on Thursday 14th November

Staff:

8:30am – 5:00pm	8No. Drainage Maintenance crew
8:30am – 12:00am	4No. Drainage Maintenance Crew 7No. Direct Labour Crew
8:30am – 3:00am	2No. Drainage Maintenance Crew
8:30am – 4:00am	3No. Drainage Maintenance Crew

Works:

1.	Sewer Crew		Clearing blockages & chokes
2.	Crew		Delivering sandbags & clearing screens
3.	Crew		Delivering sandbags & clearing screens
4.	Crew		With 6" pump at The Bloody Stream, Howth
5.	Crew		Filling Sandbags
6.	Gullysucker		Dubber Cross Pumping Station
7.	Jetter		Forest Road, Swords; Portrane
8.	J.C.B.'s	No.1	North County clearing outfalls, culverts.
		No.2	South County clearing outfalls, culverts & screens.
		No.3	Filling sandbags in Depot.

Drainage Operations on Friday 15th November

Staff:

Not at work (worked late Thursday)	5No. Drainage Maintenance
8:30am – 3:00pm	6No. Drainage Maintenance crew
4:00am – 4:00pm	2No. Drainage Maintenance crew
8:30am – 12:00pm	5No. Drainage Maintenance crew
8:30am – 6:00pm	6No. Direct Labour Crew
8:30am – 12:00am	1No. Direct Labour Crew
3:00pm – 12:00am	2No. Environment Section

Work:

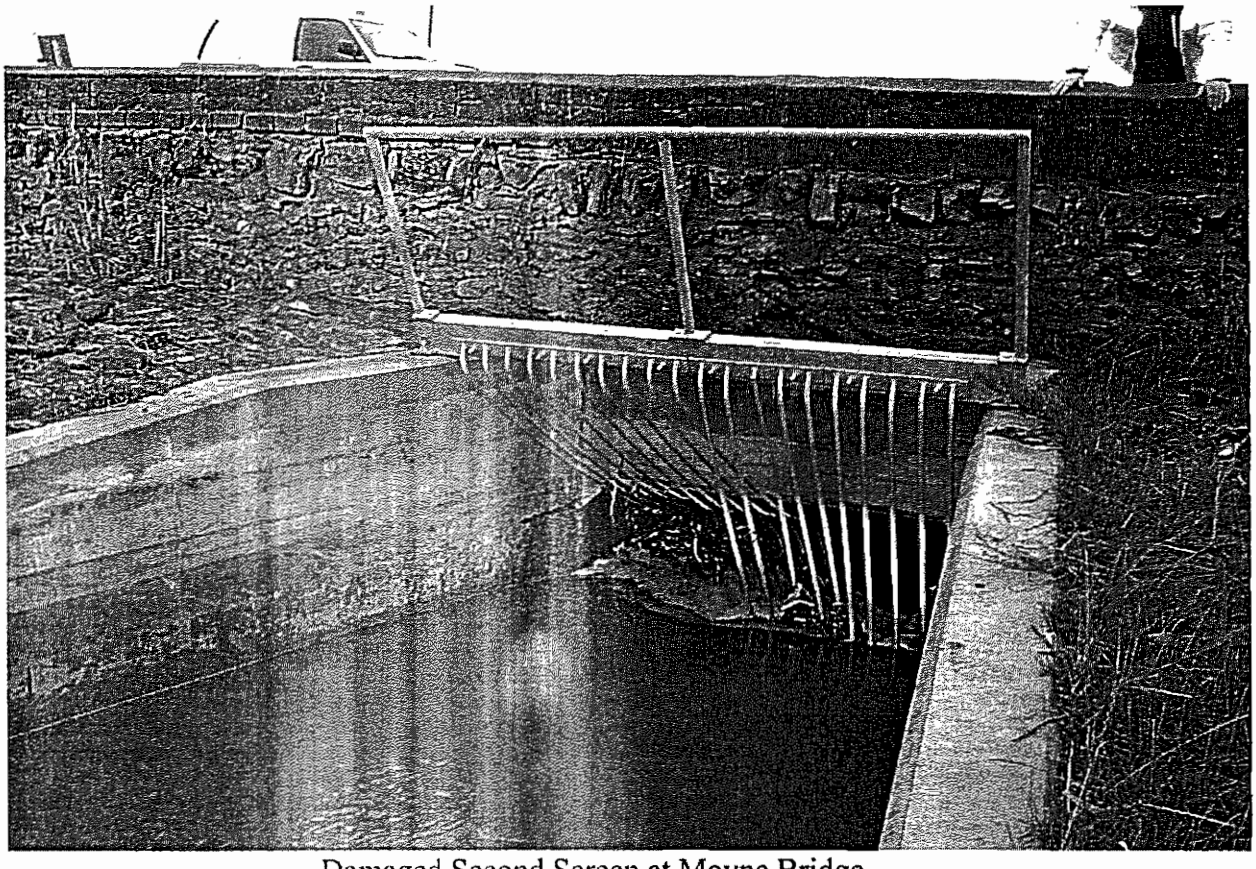
1.	Sewer Crew		Clearing blockages & chokes
2.	Crew		Clearing screens & clean-ups
3.	Crew		With 6" pump at The Bloody Stream, Howth
4.	Crew		4" pump at Estuary Pub, North Street.
5.	Crew		Delivering sandbags
6.	Crew		Filling sandbags
7.	Jetter		Main sewer chokes
8.	J.C.B.	No.1	Portmarnock Bridge Sluice Gates
		No.2	Clearing outfalls

Photographs of Flooding Areas

Sluice Gates at Portmarnock Bridge

Flooding of Ditch in Portrane Treatment Plant

Surcharging of Foul Sewer on Kinsaley Lane



Damaged Second Screen at Moyne Bridge

MEETING OF COUNTY COUNCIL 9/12/2002

Item No. 22

Report on Flooding in Fingal Area

In 2000 and 2002

A report was presented to the Council meeting on 29th January 2001 on flooding which occurred in the Fingal area over the period 5th - 7th November 2000 and 7 - 8th November 2000. The report identified 12 key areas for attention and the up to date position is set out hereunder:-

1. N1 at Blakes Cross and Turvey Avenue - both flooded

2. N2 at Coolquay/Ward Road - road and property flooding

3. Balbriggan/Boranstown - property flooding.

   Note: remedial work has been carried out at all three locations and flooding did not re-occur over the period 13th - 15th November 2002.

4. Newcourt, Swords - property flooded. Work on the new treatment works in Swords has now solved this issue and no flooding occurred over the period 13th - 15th November 2002.

5. Bremore Court - property flooded. A contract to construct new surface water culvert under the N1 is to commence in early 2003. Some flooding occurred at this location over the period 13th - 15th November 2002 but it is not considered as extensive as that which occurred in 2000.

6. R132 - Cloghran, Old Airport Road. This road flooded at 2 locations within 300 metres of the M50 in 2000. At the first location close to the M50 the section of culvert underneath the Old Airport Road was fully cleared out by Fingal County Council after events in 2000 however it is considered that additional work is necessary on sections of this culvert downstream of the location on land in private ownership.

   The other section of road 300m approximately to the North of the M50 contains 300mm diameter culvert which requires regular maintenance. Replacement of this culvert at the larger size is severely hampered by the extent of services for other utilities already present in the road. Both locations referred to flooded over the period 13th - 15th November 2002.

7. Portersgate, Clonsilla - (property) houses and gardens. The problem at this location is being considered as part of the Greater Dublin Strategic Drainage Study being undertaken at present. The results of this study are expected in May 2003. Fingal County Council in consultation with the Consultant on this study are proposing a series of interim measures to alleviate the situation. These measures are expected to be installed early in 2003 and address the issue of the possible effects of surcharging in the foul sewerage system in the area on low lying properties in the Portersgate area.

No properties were flooded 13th - 15th November 2002 as a result of the prompt action of Drainage Maintenance, Fingal County Council.

The estate has been threatened with flooding on a previous occasion since the events in 2000.

8. Pinebrook/Hartstown - flooding (property) houses and gardens.

Flooding occurred again at this location in 2000 and again in the period 13th - 15th November 2002. Action has been taken to clean the culvert since and a detailed assessment of the capacity of the culvert is underway at present.

9. R109 - Lucan (Strawberry Beds) - road and houses flooded. This problem relates to the Liffey. The Greater Drainage Strategic Study is considering issues in relation to the Liffey at present and the Consultants will be asked to address specifically the problems of flooding which are occurring in this location with a view to identifying interim measures which can be undertaken to alleviate the issue. The road was flooded at this location over the period 13th - 15th November 2002.

10. N3 - Near Blanchardstown Town Centre - road flooding. Flooding related directly to the level of flows in the Tolka. Consultants on the Greater Dublin Drainage Study have been asked to consider this issue specifically with a view to recommending interim measures that may be provided pending completion of their report in May 2003. Road flooded again at this location over the period 13th - 15th November 2002.

11. R128 - Lusk/Rush - road flooding. A full cleaning of the downstream channel was undertaken in early 2000 in addition to full cleaning of the road culverts at the location. The road was subject to severe flooding at this location over the period 13th - 15th November 2002 and was impassable to cars. A nearby location at Whitestown was also flooded but remained passable to vehicular traffic. Fingal County Council as an urgent interim measure are arranging for the replacement of the existing culverts at the Spout Road location with a larger capacity culvert. This work is expected to commence in early January 2003 and more careful consideration will be given to the possibility of phasing the levels of the road to help avoid extreme ponding at that location.

12. Rush/Loughshinny - road flooded. The problem here relates to the capacity of the existing culvert under the road where flooding has taken place. It is exacerbated by the presence of a foul sewer on the down stream outlet of the culvert which further constricts flows. Measures to relocate the foul sewer and improve the road crossing at that location are identified as an objective in the Area Action Plan for Rush which is presently before the members for consideration.

Areas flooded in November 2002 (not previously flooded)

A total rainfall of 86.8mm fell in the 3 day period 13th - 15th November 2002. An interim report on these events has been presented to the members of each Area Committee and a report is attached - Appendix A.

The principal areas affected severely which had not been flooded in 2002 were:

Littlepace, Castaheany	-	Houses flooded
Castlecurragh	-	Houses flooded

The Consultants on the Greater Dublin Drainage Study, MC O'Sullivan Consulting Engineers have been requested to examine these locations specifically to identify interim measures that may be possible to alleviate the risk of future flooding.

Severe flooding also occurred on this occasion on

(i) M50 at the N3 Interchange
(ii) M50 at Ballymun Exit

Remedial measures to road drainage have been undertaken at these locations.

(iii) N2 at Kilshane Cross

Preliminary investigations indicate that flooding on the N2 arose from surface water run off from adjacent grasslands.

Landowners are required to undertake necessary steps to prevent run off onto roads. In this instance the matter is being taken up with the landowners concerned.

(iv) N1 at Roundabout at Fingallions

Flooding occurred due to the high water level in the Ward River. A temporary contraflow emergency measure operated successfully and ensured that the N1 remained open to traffic.

(v) Swords/Ashbourne Road

Flooding occurred at Rathbeale Cross and Rowlestown. A new culvert is being installed at present at Rathbeale Cross and drainage alleviation works are underway at Rowlestown.

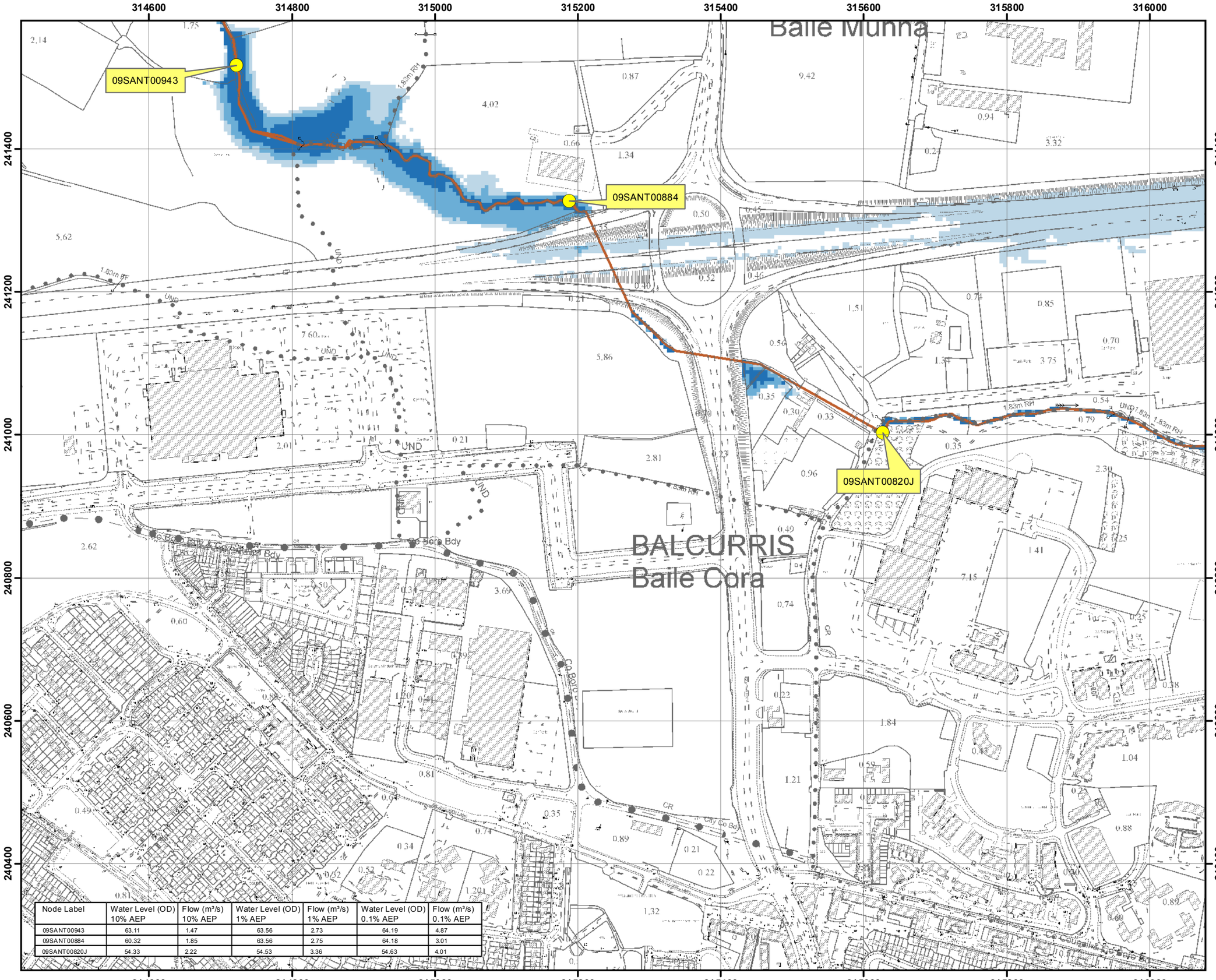
(vi) Santry Close

Flooding occurred on the Old Airport Road at this location arising from high water levels in the Santry River. Interim alleviation measures are being undertaken by the developer at Santry Demesne to prevent a recurrence.

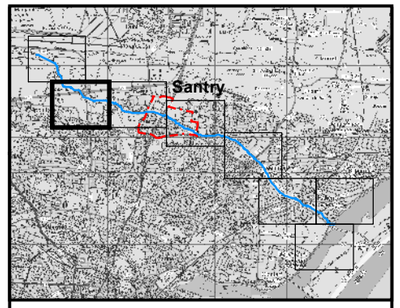
Other locations where flooding occurred are listed in Appendix B.

Appendix 2:

CFRAMS Map



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09SANT00943	63.11	1.47	63.56	2.73	64.19	4.87
09SANT00884	60.32	1.85	63.56	2.75	64.18	3.01
09SANT00820J	54.33	2.22	54.53	3.36	54.63	4.01



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:
01	Amendment to flood zones to include Raheny AFA	15/12/17

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

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Belfast
BT12 6RZ
T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Santry Fluvial Flood Extents

Map Type:	EXTENT	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn By :	C.C.	Date : 15 December 2017
Checked By :	A.S.	Date : 15 December 2017
Approved By :	S.P.	Date : 15 December 2017

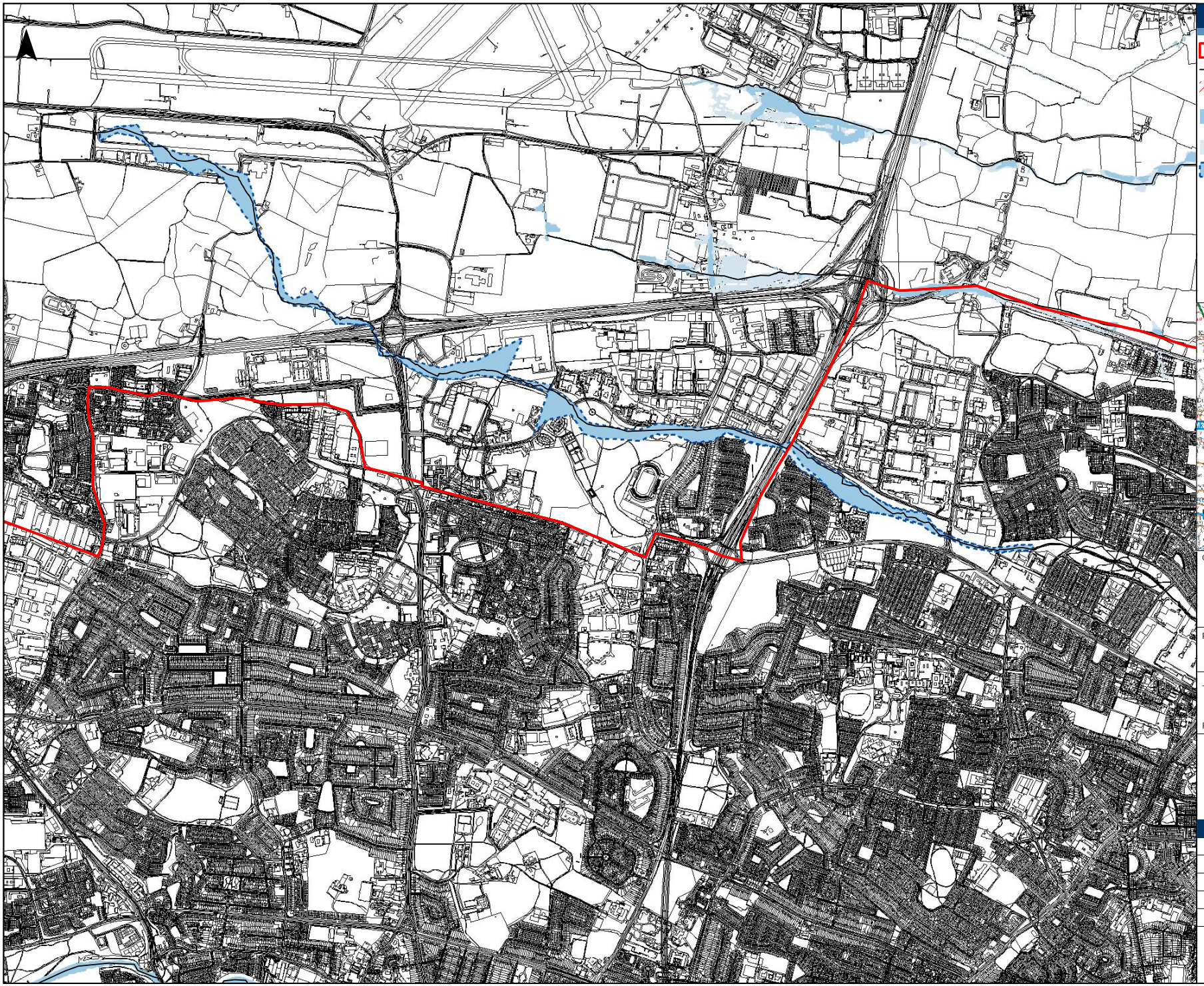
Drawing No. :
E09SAY_EXFCD_F1_02

Map Series : Page 2 of 8

Drawing Scale : 1:5,000 @ A3

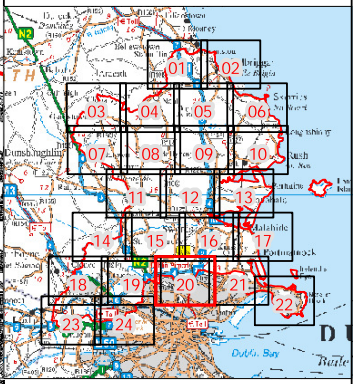
Appendix 3:

Fingal County Council Strategic Flood Risk Assessment Map



Legend

- Fingal County Boundary
- Watercourse Centreline
- Defended Area
- 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)
- Indicative Flood Extents



Client

Comhairle Contae Fhine Gall
Fingal County Council

Project

Strategic Flood Risk Assessment

Title

Fluvial Flood Zone Mapping

Figure

Map 20 of 24

RPS

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Issue Details

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