SONAS Refuge Centre, Kilcross,
Sandyford, Dublin 18.

Flood Risk Assessment

February 2024

REPORT CONTROL

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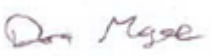
Primary Author:	Dara Magee	Signed:	
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1 Introduction

AOCA Engineering Consultants were appointed by SONAS to undertake a Flood Risk Assessment (FRA) for their lands proposed for a domestic violence refuge centre at Kilcross, Sandyford, Dublin 18. The development is proposed by SONAS and Dun Laoghaire - Rathdown County Council (DLRCC) under a section 179A planning process.

The proposed development will comprise of 12 short-medium term accommodation units (within 2 blocks) and a separate communal building. Figure 1 shows the site location. The nearest water course to the site is the Carysfort Maretimo Stream, which is mostly culverted in the area.

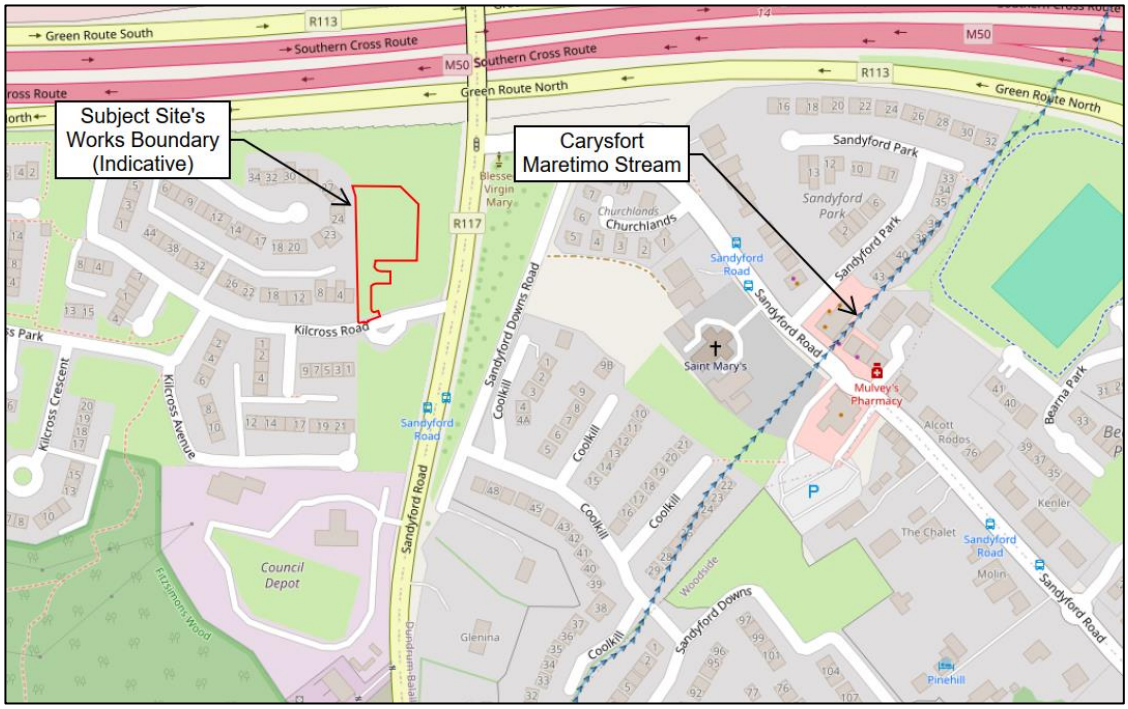


Figure 1 – Site Location

The Flood Risk Assessment conducted adheres to the guidelines on Planning System and Flood Risk Management (PSFRM), published by the Department of Environment, Heritage and Local Government and the Office of Public Works (DEHLG/OPW) in November 2009. The assessment encompasses different potential sources of flooding, including tidal, fluvial, pluvial (resulting from direct heavy rain), and groundwater. It identifies and recommends possible mitigation measures against these risks. Please note that this report solely provides a flood risk evaluation of the subject site.

2 Site Description

The 0.25 ha site (0.2 ha site ownership with a 0.05 ha grant of wayleave from DLRCC) is currently greenfield park and bounded to the west by an existing housing development, to the south by Kilcross Road where the proposed access is from, and by greenfield park to the north and east. The site falls from east to west and site levels range from 107.2 mOD (southeast) to 105.7 mOD (northwest).

Refer to RDF architects' drawing '24-001 - C - 010 Site Layout Plan' for the proposed site layout.

3 Flood Risk Management Guidelines

This FRA was carried out in accordance with all relevant management guidance documents, including:

- The Planning System and Flood Risk Management Guidelines
- Flood Risk Management Climate Change Sectoral Adaption Plan
- Dun Laoghaire - Rathdown County Development Plan 2022-2028

The Planning System and Flood Risk Management guidelines for Planning Authorities Technical Appendices were published in 2009 by the OPW and DEHLG to ensure that flood risk is a key consideration in development proposals and the assessment of planning applications.

3.1 Flood Risk Management Guidelines

The components to be considered in the identification and assessment of flood risk is as per Table A1 of the DEHLG/OPW guidelines:

- Tidal – flooding from high sea levels
- Fluvial – flooding from watercourses
- Pluvial – flooding from rainfall/surface water
- Ground Water – flooding from springs / raised groundwater
- Human/mechanical error – flooding due to human or mechanical error

Each component will be investigated from a Source, Pathway and Receptor perspective, followed by an assessment of the likelihood of a flood occurring, and the possible consequences.

The PSFRM guidelines define flood risk using the following criteria:

Flood Risk = Likelihood of Flooding x Consequence of Flooding

This formula is beneficial in assessing flood risk to a development in a qualitative manner, especially in situations where hydraulic modelling is unnecessary because there is no adjacent river system.

3.1.1 Likelihood of Flooding

The likelihood or probability of a specific flood event occurring is determined by its annual exceedance probability (AEP) or return period, expressed in years. A 1% AEP flood means that the flood event is expected to occur or be surpassed once every 100 years, with a 1 in 100 chance of happening in any given year.

Likelihood	Low	Moderate	High
Tidal	Where AEP < 0.1 % chance of occurring in a year	0.5 % chance of occurring in a year > AEP > 0.1 % chance of occurring in a year	Where AEP > 0.5 % chance of occurring in a year
Fluvial	Where AEP < 0.1 % chance of occurring in a year	1 % chance of occurring in a year > AEP > 0.1 % chance of occurring in a year	Where probability > 1 % chance of occurring in a year
Pluvial	Where AEP < 0.1 % chance of occurring in a year	1 % chance of occurring in a year > AEP > 0.1 % chance of occurring in a year 0.1 % chance of occurring in a year	Where AEP > 1 % chance of occurring in a year

Table 1 – Likelihood of Flooding

3.1.2 Consequences of Flooding

The consequences of flooding depend on the hazards associated with it, such as the depth of water, speed of flow, rate of onset, duration, wave-action effects, and water quality, as well as the vulnerability of the receptors affected by it. Vulnerability is influenced by several factors, including the type of development, the characteristics of the population (e.g., age-structure), and the presence and effectiveness of mitigation measures.

The Planning System and Flood Risk Management guidelines provide three vulnerability categories, based on the type of development, which are detailed in Table 3.1 of the Guidelines, and are summarised as:

Vulnerability	Development Type
Highly Vulnerable	Residential properties, essential infrastructure, emergency services facilities
Less Vulnerable	Retail and commercial and local transport infrastructure
Water compatible	Open space, outdoor recreation and associated essential infrastructure, such as changing rooms

Table 2 – Vulnerability Categories

In order to assess flood risk, an understanding of the sources of flooding, the pathways taken by floodwater, and the people and property that may be affected is required. The Source-Pathway-Receptor model, depicted in Figure 2 below, is a widely used environmental model that helps to evaluate and manage flood risk.

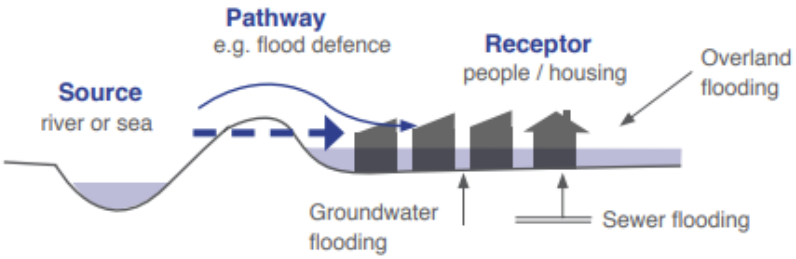


Figure 2 – Source-Pathway-Receptor Model

The primary causes of flooding are high rainfall or sea levels, while the most common pathways are rivers, drains, sewers, overland flow, and river and coastal floodplains, along with their defence systems. The receptors vulnerable to flooding include people, their property, and the environment. All three components must be present for flood risk to exist.

Mitigation measures, such as flood resilient construction or defences, do not directly affect the sources of flooding, but they can obstruct or hinder pathways or remove receptors. During the planning process, the focus is mainly on the placement of receptors, considering the potential sources and pathways that may pose a risk to those receptors.

3.1.3 Flood Zones and Vulnerability

In the Planning System and Flood Risk Management guidelines, Flood Zones are used to indicate the likelihood of a flood occurring. These zones indicate a high, moderate or low probability of flooding from fluvial or tidal sources and are defined below in Table 3.

Zone	Description
Zone A High probability of flooding	This zone defines areas with the highest risk of flooding from rivers (i.e., more than 1% probability or more than 1 in 100) and the coast (i.e., more than 0.5% probability or more than 1 in 200).
Zone B Moderate probability of flooding	This zone defines areas with a moderate risk of flooding from rivers (i.e., 0.1% to 1% probability or between 1 in 100 and 1 in 1000) and the coast (i.e., 0.1% to 0.5% probability or between 1 in 200 and 1 in 1000).
Zone C Low probability of flooding	This zone defines areas with a minimal risk of flooding from rivers and the coast (i.e., less than 0.1% probability or less than 1 in 1000).

Table 3 – Flood Zones

Combining Flood Zones, Vulnerability Classes, and AEPs into a single decision matrix, helps guide which type of development is appropriate and when the Justification Test (explained in Table 4) must be satisfied.

Flood Zone (Probability)	Annual Exceedance Probability	Development Appropriateness		
		Highly Vulnerable	Less Vulnerable	Water Compatible
A (High)	Fluvial & Pluvial Flooding More frequent than 1% AEP	Justification Test	Justification Test	Appropriate
B (Medium)	*Fluvial & Pluvial Flooding* 0.1% to 1% AEP	Justification Test	Appropriate	Appropriate
C (Low)	Fluvial & Pluvial Flooding Less frequent than 0.1% AEP	Appropriate	Appropriate	Appropriate

Table 4 – Decision matrix for Flood Zone Appropriates

Note: As this proposed development is not at risk of tidal flooding, figures for Tidal flooding have been omitted.

The planned residential development is identified as being in the "Highly Vulnerable" category and therefore requires the Flood Zone AEP of the development to be Low (0.1% AEP or not susceptible to flooding during a 1-in-1000-year event) for the development to be appropriate without a Justification Test.

3.1.4 The Justification Test

If any proposed development is being assessed within a flood zone that is deemed unsuitable based on the guidelines (as set out above in Table 4), it must fulfil the requirements of the Justification Test as outlined in Figure 3 (excerpted from the PSFRM Guidelines).

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
   - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
   - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
   - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Figure 3 – The Justification Test for Development

3.2 The Flood Risk Management Climate and Adaption Plan

The Flood Risk Management Climate Change Sectoral Adaptation Plan was released in 2019 as part of the National Adaptation Framework and Climate Action Plan. It lays out the OPW's strategy for adapting to climate change with regards to managing flood risks.

The approach is based on current knowledge about how climate change could affect flooding and flood risk. Studies have shown that climate change will probably make flooding worse by causing more intense rainfall, higher river flows, and rising sea levels. To prepare for these changes, the Adaptation Plan proposes two potential flood risk scenarios to consider when evaluating flood risk: the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). Table 5 shows the adjustments that should be made to extreme rainfall depths, peak flood flows, and mean sea levels estimates for each future scenario.

Parameter	Mid-Range Future Scenario	High End Future Scenario
Extreme Rainfall Depths	+ 20%	+30%
Peak River Flood Flows	+ 20%	+30%
Mean Sea Level Rise	+ 0.5m	+1m

Table 5 – The Climate Adaption Plan Flood Risk Scenarios

The MRFS has been considered as part of this assessment as it represents a ‘likely’ future scenario for the proposed site.

3.3 Dun Laoghaire - Rathdown County Development Plan 2022-2028

The current Development Plan for 2022 to 2028 aims to further develop and improve the County in a sustainable manner. A Strategic Flood Risk Assessment (SFRA) was undertaken to inform the Development Plan.

Figure 4 shows the flood zone map 5 produced by the SFRA undertaken as part of the Dun Laoghaire - Rathdown County Development Plan. The SFRA flood mapping indicates that the proposed development is outside of Flood Zone A and B.

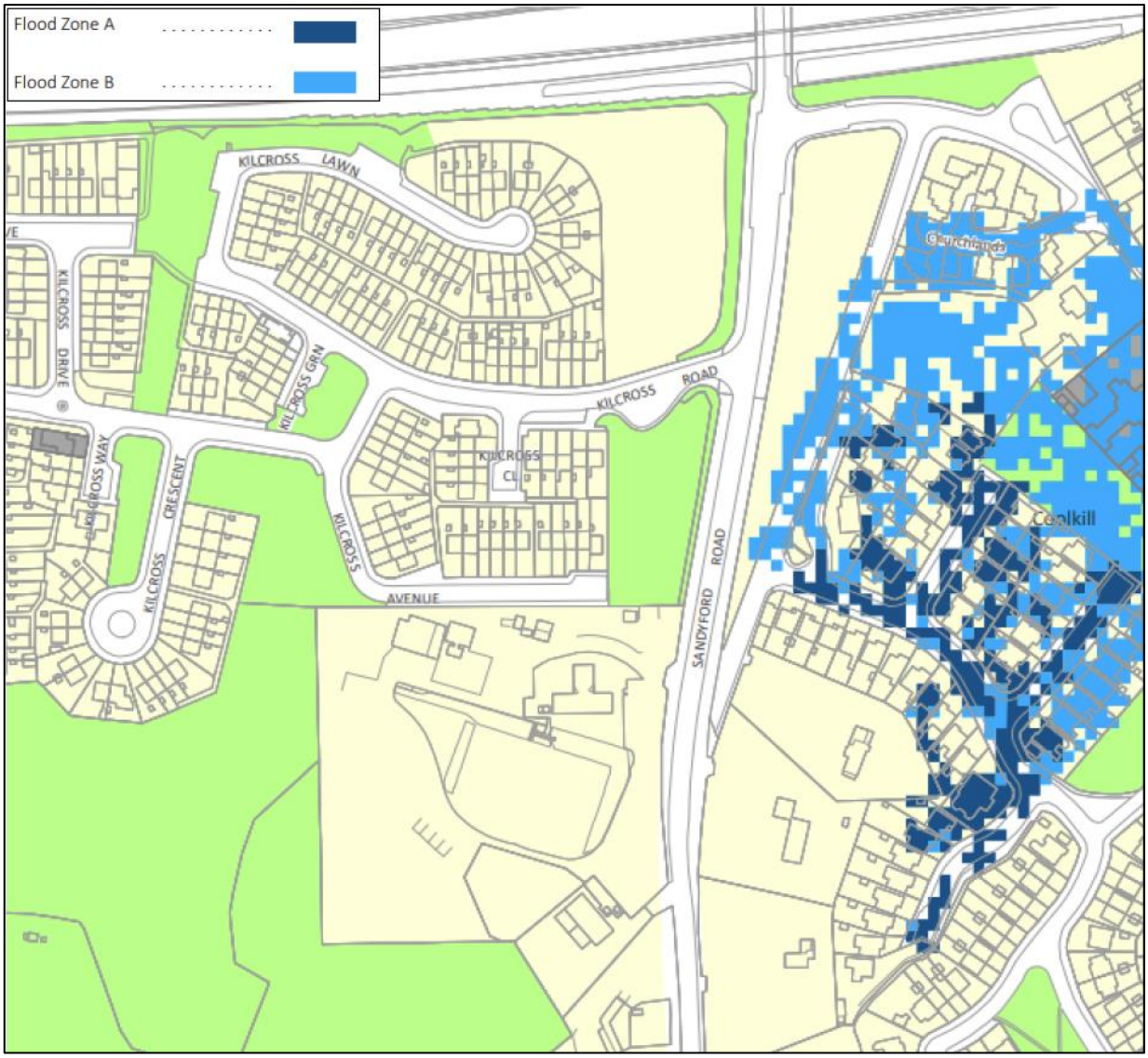


Figure 4 – DLR SFRA flood map 5 for the proposed site and surrounding areas

4 Flood Risk Identification and Initial Assessment

4.1 Past Flood Events

The OPW's national flood information portal shows the nearest recorded flood was a single event in 1980, over 150 m from the site, at Sandyford Church. The flood report notes a builder had blocked the stream with construction material which led overflow into the church.

The recurring flood event is described in the 2001 flood report for the Lamb's cross area, where "in flood conditions, overflows have been experienced from the Sandyford/Brewery Stream on the Lamb's Cross area to the Ballyogan Stream, resulting in flooding of houses in this catchment).

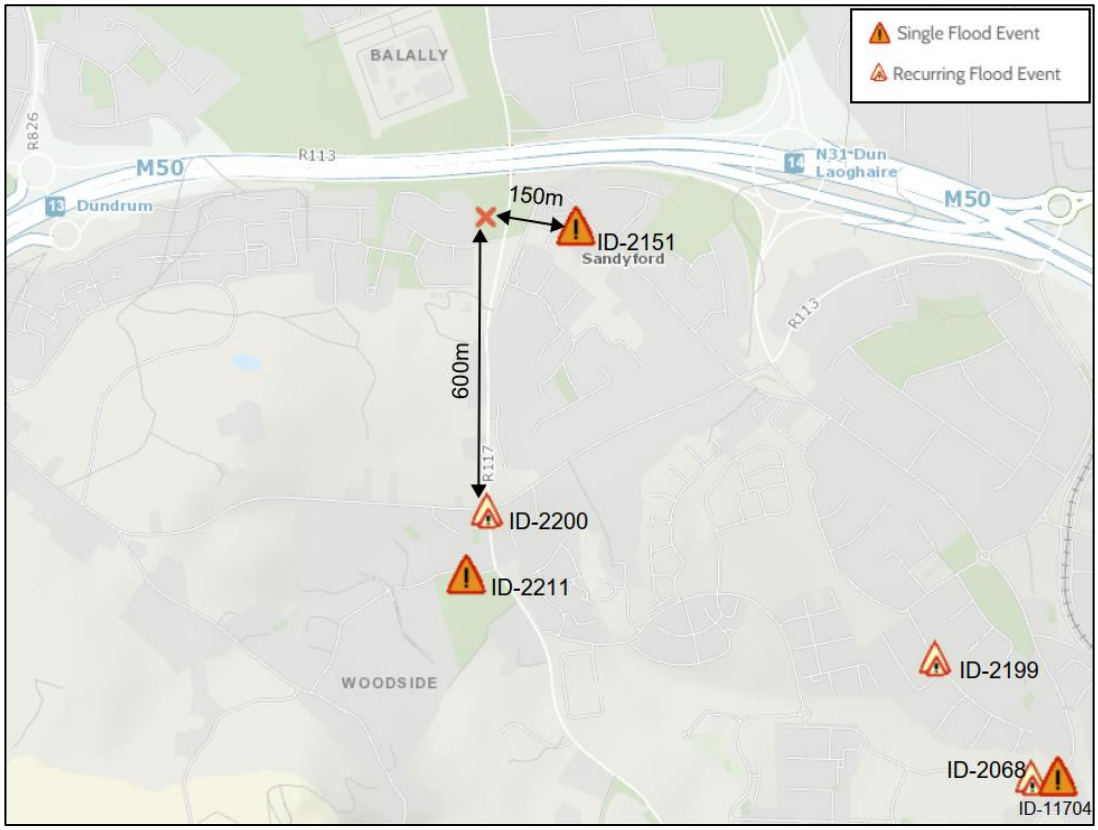


Figure 5 – Past Food events in the area of the site

The historic flood summary report for recorded floods within 2km of the site is included in Appendix A (with hyperlinks to local area engineer's flood reports).

4.2 Catchment Flood Risk Assessment and Management Study

Fluvial CFRAM mapping is available on floodinfo.ie for this area, which shows predicted flood extents of the Carysfort Maretimo Stream. An extract of the CFRAM mapping is shown below in Figure 6 (the full map is available in Appendix B), the flood extents shown is greater than 70m from the site boundary. The upstream node, '1061M00639J', predicts a 0.1% AEP water level of 115.69 mOD. The downstream node, 'MH2', predicts a 0.1% AEP water level of 99.6 mOD. Site levels range from 107.2 mOD (southeast) to 105.7 mOD (northwest).

Figure 6 – CFRAM Extract (Refer to Full Map in Appendix B)

4.3 Geological Survey Mapping Ireland

Mapping with data pertaining to Ireland's subsurface is provided by the Geological Survey Ireland (GSI), providing some indication of likelihood of groundwater flooding. There are no karst topographies (e.g. caves, springs, turloughs) in the immediate vicinity of the subject location. Karst topography would indicate highly permeable flowpaths for groundwater and would pose a greater risk of groundwater flooding risk where present.

An indication of groundwater flooding risk is groundwater vulnerability on the GSI Map viewer. Subsoil depth, type and permeability maps are combined to work out the groundwater vulnerability. Subsoil permeability is also shown on the GSI Map Viewer. Both layers are shown below in Figure 7. The site does not appear to be at risk of groundwater flooding.

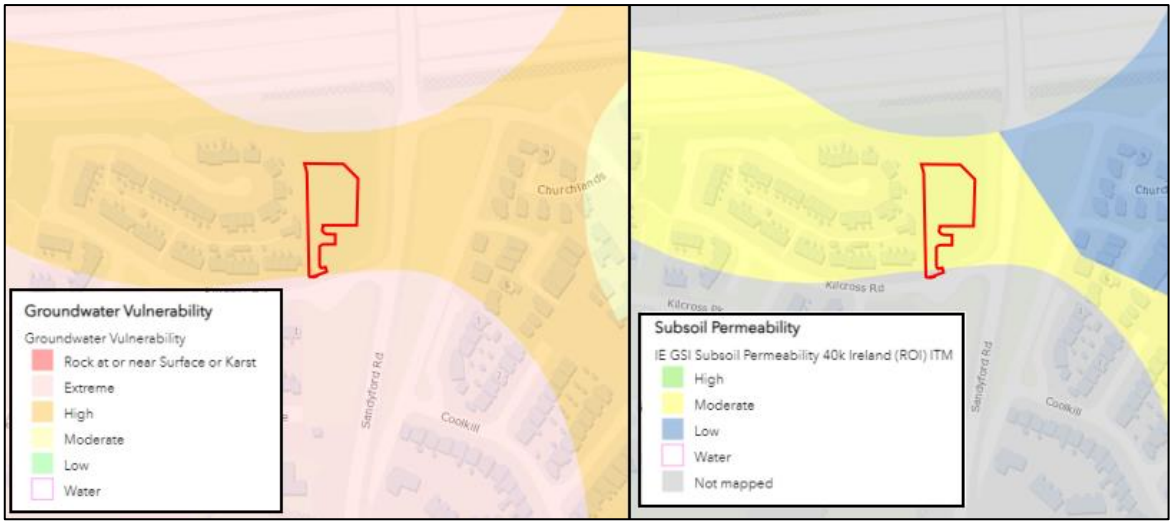


Figure 7 – GSI Map Viewer: Groundwater Vulnerability (Left) & Subsoil Permeability (Right)

5 Detailed Flood Risk Assessment

As per the Planning System and Flood Risk Management (PSFRM) Guidelines (OPW/DoEHLG, 2009), the proposed residential development has been classified as "highly vulnerable" due to the impact of possible fluvial flooding on this type of development. Therefore, to mitigate the risk, the guidelines recommend that such developments should only be constructed in flood zone C. This zone is characterized by an Annual Exceedance Probability (AEP) of less than 0.1% for pluvial and fluvial flooding, with added allowances for a MRFS to account for the probable effects of climate change on extreme rainfall depths and peak flood flows.

5.1 Tidal

Given the site is approx. 5 km from the coastline, and the site levels range from 107.2 mOD (southeast) to 105.7 mOD (northwest).

5.2 Fluvial

The closest watercourse/stream to the subject site is the Carysfort Maretimo Stream. CFRAM flood mapping and the DLR SFRA flood maps shows the site is approx. 70 m from the flood extents, hence the site is within Flood Zone C.

5.3 Pluvial

Pluvial flooding is from heavy rainfall and is often referred to as flooding from surface water. Surface water flooding can occur because of overland flow or ponding during periods of extreme prolonged rainfall. Flooding may occur through any of the pathways outlined in Table 6 and the risk associated with each pathway is outlined below.

There is no record of historical pluvial flooding or predicted pluvial flooding shown at the site.

A specialised stormwater drainage system designed in accordance with Sustainable Drainage Systems (SuDS) principles will be employed to manage any surface water generated on the developed site.

The system will be designed to restrict discharge from the site to greenfield runoff rates. The site's topography and landscaping will also offer secure exceedance flow paths and reduce

surface water ponding to minimise the residual hazards related to an extreme flood event or a circumstance where the stormwater drainage system becomes blocked.

Given these measures, the likelihood of pluvial flooding to the proposed residential development is deemed to be low.

5.4 Groundwater

Based on Geological Survey Ireland (GSI) subsurface mapping, there are no karst features (caves, springs, turloughs, etc.) in the vicinity of the subject site. Furthermore, groundwater flooding is not shown on the historic or probability maps on the GSI mapping. Therefore, it is estimated that the likelihood of the subject site being impacted by groundwater flooding is low.

5.5 Human/Mechanical

Considering the possibility of the existing drainage network blocking in the area, exceedance flow paths should be considered. There is a low point in the surrounding road network at the site entrance, with a gully each side of the road at this location. The kerb would contain any flooding within the roadway before exceeding the kerb level. This kerb would be removed for the site entrance. Therefore, the access road's levels should be managed and provided with gullies where necessary to mitigate risks from potential flow paths.

5.6 Climate Change

Floodinfo.ie displays flood extents for future scenarios (the MRFS and HEFS, as described in Section 3.2) which include climate change. The HEFS (+ 30% in river flows) for the lowest probability (highest flood extent) presents no greater visible risk when comparing to the present day scenario, see comparison below.

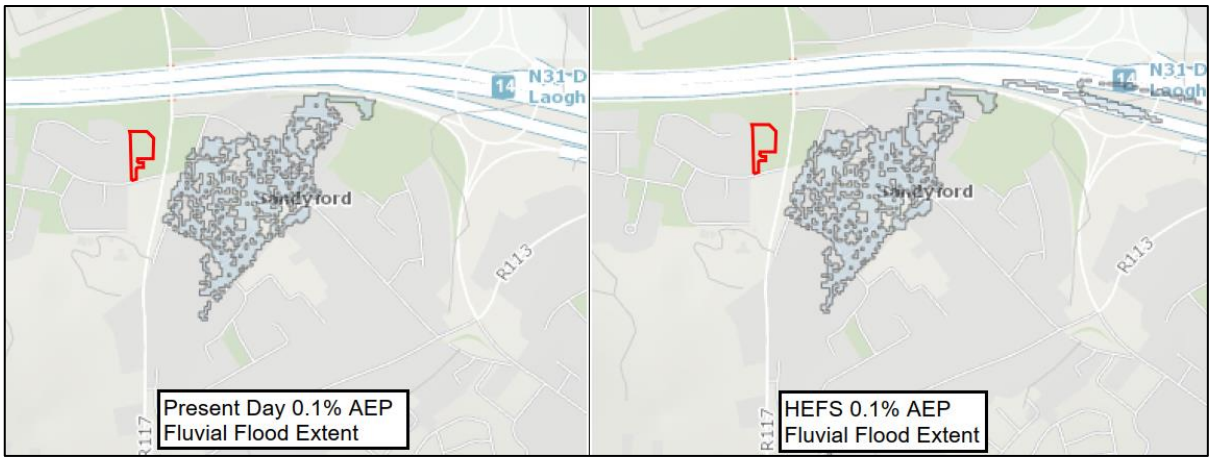


Figure 8 – Present Day Scenario vs HEFS for the 0.1% AEP flood event

5.7 Results and the Justification Test

Based on this assessment, the proposed development is in Flood Zone C, i.e., it is not predicted to be at risk of fluvial flooding during a 0.1% AEP event.

With reference to the PSFRM guidelines and the sequential approach as shown in Figure 9, new residential development is considered appropriate in this flood zone and the sequential Justification Test does not apply, given the site is classified as Flood Zone C.

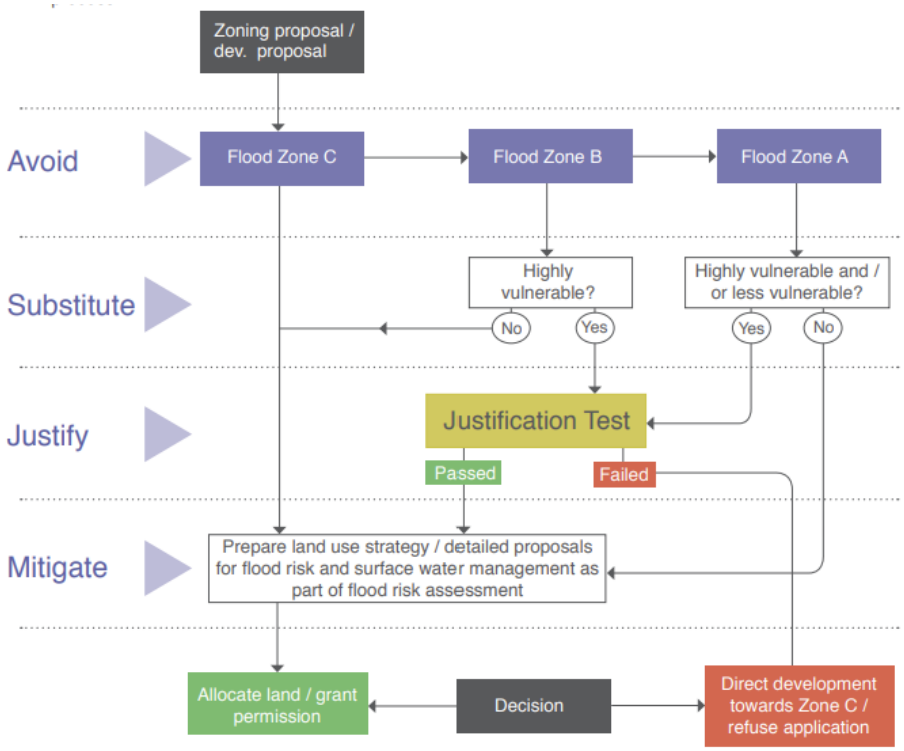


Figure 9 – Sequential Approach and Justification Test

6 Drainage Impact Assessment

The Strategic Flood Risk Assessment (SFRA), Appendix 15 of the DLRCC Development Plan, outlines a requirement that all proposed developments, including those in Flood Zone C, must undertake a drainage impact assessment. As discussed in Section 4.1.3, it is proposed to attenuate run-off from the site by restricting discharge from the site at Qbar rate. The proposed drainage network also includes a 20% allowance for an increase in rainfall depths due to climate change. Therefore, the proposed development would cause no additional flood risk to the surrounding area.

The proposed SuDS measures, as shown in drawing no. 23-OCF-023-P-202. (Refer to AOCA's accompanying Civil Works Design Report for further detail), will help to reduce the rate of run-off from the site by allowing longer retention times on site and reducing the amount of run-off overall by providing interception through evapotranspiration from the green roofs, soft landscaping and permeable paving. The proposed SuDS measures also provide a better water quality discharging from the site as the proposed SuDS measures remove pollutants and suspended solids at source.

A surcharge analysis has been carried out for the critical storm and corresponding maximum water levels. In summary, the maximum water level in the proposed drainage network is 106.03 m. This is approximately 200 mm below the Finished Ground Floor Level of the building. Approximately 13 m^3 of flooding occurs for a 50% blockage during the 1:100 year return period event, including climate change and urban creep allowances of 20% and 10% respectively.

7 Conclusions and Recommendations

AOCA Consulting Engineers were appointed by Sonas to carry out a Site-Specific Flood Risk Assessment as part of their planning application for the proposed residential development of a greenfield site at the on Kilcross Road, Sandyford, Dublin 18.

An analysis of the subject lands has been conducted to evaluate the potential risks associated with flooding from tidal flooding, fluvial flooding, pluvial flooding, groundwater, and mechanical system failures. The analysis reveals the site is within Flood Zone C.

By means of detailed planning and the implementation of suitable mitigation measures, the risks and consequences of flooding have been alleviated throughout the development. Furthermore, the surface water runoff from the site is confined to Greenfield runoff and has no adverse effect on developments located upstream or downstream of the subject site.

Source	Pathway	Receptor	Likelihood	Consequences	Risk	Mitigation Measure	Residual Risk
Tidal	None	Proposed Development	Very Low	Water Ingress in Buildings/Parking area	Very low	None required	Very low
Fluvial	None	Proposed Development	Low	Flooding of the proposed buildings and roads	Low	Design levels high enough to account for fluvial flooding.	Low
Pluvial	Private and Public Drainage Network	Proposed Development	Low	Flooding of the proposed buildings and roads	Low	Appropriate drainage design, overland flood routing and setting of floor levels	Low
Ground Water	Ground	Proposed Development	Low	Temporary seepage of the surrounding grounds during long rainfall periods	Low risk of minor saturation of area around the development	Appropriate drainage design, overland flood routing and setting of floor levels	Very Low
Human/ Mechanical Error	Drainage Network	Proposed Development	Moderate	Medium to Severe Surcharging of surface water network resulting in flooding of the properties	Medium risk of minor damage to properties	Appropriate drainage design, maintenance, overland flood routing and setting of floor levels	Low

Table 6 – Summary of Flooding Risk at Proposed Site

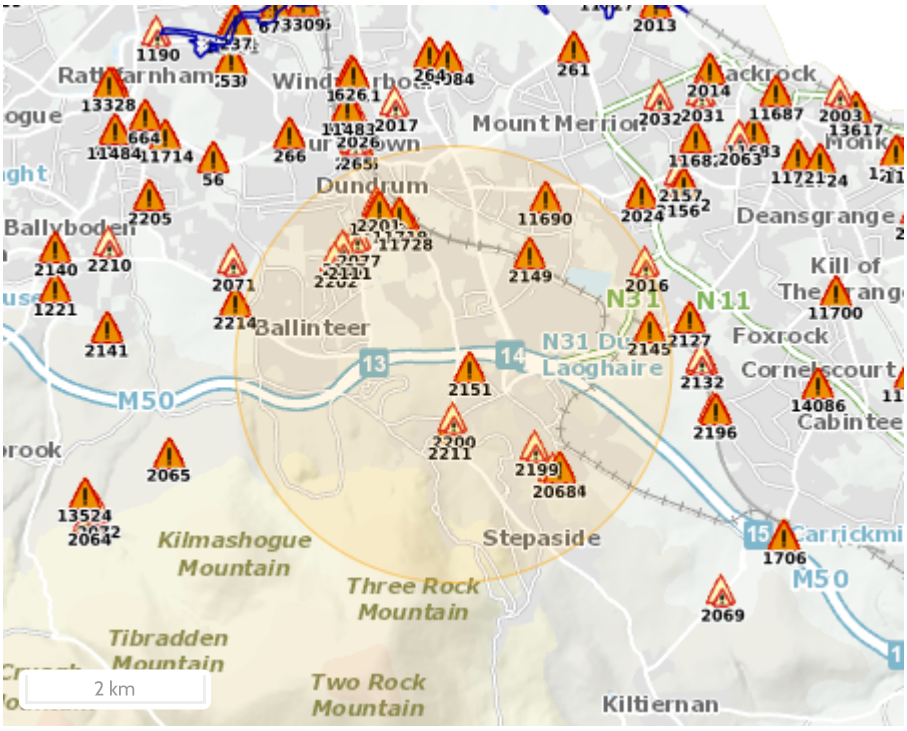
Appendix A – OPW Recorded Historic Flooding Summary Report

Past Flood Event Local Area Summary Report

Report Produced: **23/1/2024 9:21**

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

This report has been downloaded from www.floodinfo.ie (the "**Website**"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

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

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

21 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Ashlawn Ballinteer Road June 1993 (ID-2111)	10/06/1993	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
2.	Leopardstown Road Dec 1979 (ID-2145)	14/12/1979	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
3.	Lakelands Close Stillorgan Jan 1980 (ID-2149)	21/01/1980	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
4.	Sandyford Church Jan 1980 (ID-2151)	21/01/1980	Exact Point
	Additional Information: Reports (1) Press Archive (0)		
5.	School House Lane Sandyford Nov 1982 (ID-2211)	26/11/1982	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
6.	Pine Copse Road Ballinteer Nov 1982 (ID-2137)	05/11/1982	Exact Point
	Additional Information: Reports (1) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Flooding at Willow Bank Apartments, Sandyford Rd, Dublin 14 on 24th Oct 2011 (ID-11728) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
8.	Flooding at Riverdale, Dundrum, Dublin 14 on 24th Oct 2011 (ID-11719) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
9.	Brewery Road Recurring (ID-2016) **Additional Information:** Reports (3) Press Archive (0)	n/a	Exact Point
10.	Slang Old Ballinteer Road Recurring (ID-2077) **Additional Information:** Reports (4) Press Archive (0)	n/a	Exact Point
11.	Kilgobbin Road Recurring (ID-2068) **Additional Information:** Reports (2) Press Archive (0)	n/a	Exact Point
12.	Pine Copse Willow Road Recurring (ID-2075) **Additional Information:** Reports (2) Press Archive (0)	n/a	Exact Point
13.	Carrickmines River Sandyford Hall Recurring (ID-2199) **Additional Information:** Reports (1) Press Archive (0)	n/a	Exact Point
14.	Ballyogan Stream Lambs Cross Recurring (ID-2200) **Additional Information:** Reports (1) Press Archive (0)	n/a	Exact Point
15.	Slang Pyelands Dundrum recurring1 (ID-2201) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate Point
16.	Ludford Area Ballinteer Recurring (ID-2202) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate Point
17.	Flooding at Dundrum Town Centre on 21/08/2021 (ID-14085) **Additional Information:** Reports (0) Press Archive (0)	21/08/2021	Approximate Point
18.	Flooding at Dundrum Shopping Centre and Taney Cross, Co. Dublin on 24th Oct 2011 (ID-11720) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
19.	Flooding at Dale Drive, Stillorgan, Co. Dublin on 24th Oct 2011 (ID-11690) **Additional Information:** Reports (2) Press Archive (0)	23/10/2011	Exact Point
20.	Flooding at Clonskeagh Road, Dublin 6 on 24th Oct 2011 (ID-11704) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point
21.	Flooding at Kilgobbin Road, Stepaside, Co. Dublin on 24th Oct 2011 (ID-11712) **Additional Information:** Reports (1) Press Archive (0)	23/10/2011	Exact Point

Appendix B – CFRAM 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
SO18252401	118.78	N/A	118.87	N/A	119.45	N/A
1061M00639J	115.67	N/A	115.68	N/A	115.69	N/A
MH2	98.19	N/A	98.3	N/A	99.6	N/A
MH6	96.44	N/A	96.67	N/A	98.08	N/A
SO19262304	90.36	N/A	90.71	N/A	91.55	N/A

317800 318000 318200 318400 318600 318800 319000 319200

226600 226400 226200 226000 225800 225600 225400

MH6

SO19262304

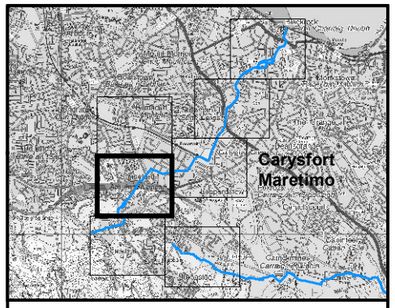
MH2

1061M00639J

SO18252401

M50 MOTORWAY

0 50 100 200 300 400 500 Metres



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
- Embankment
- Wall
- Defended Area
- 1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

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Map:
Carysfort Maretimo Fluvial Flood Extents

Map Type:	**EXTENT**	
Source:	**FLUVIAL**	
Map Area:	**HPW**	
Scenario:	**CURRENT**	
Drawn By :	**C.C.**	**Date : 27 October 2017**
Checked By :	**A.S.**	**Date : 27 October 2017**
Approved By :	**S.P.**	**Date : 27 October 2017**

Drawing No. :
E09CAR_EXFCD_F2_04

Map Series : Page 4 of 7

Drawing Scale : 1:5,000 @ A3

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