

INFRASTRUCTURE

Project

The Grove SHD – Student Accommodation Scheme

Report Title

Site Specific Flood Risk Assessment Report

Client

Colbeam Limited



DBFL CONSULTING ENGINEERS

February 2021

Job Title: **The Grove SHD – Student Accommodation Scheme****Job Number:** **200012****Report Title:** **Site Specific Flood Risk Assessment Report****Report Reference:** **200012-Rep-002/A****Author:** **Aoife O'Sullivan****Approved by:** **Deirdre Walsh****Date:** **February 2021****DBFL Consulting Engineers****Dublin Office**

Ormond House
Ormond Quay
Dublin 7

Tel 01 4004000
Email info@dbfl.ie
Web www.dbfl.ie

Waterford Office

Suite 8b, The Atrium,
Maritana Gate, Canada
Street,
Waterford. X91W028

Tel 051 309500
Email info@dbfl.ie
Web www.dbfl.ie

Cork Office

Phoenix House
Monahan Road
Cork

Tel 021 202 4538
Email info@dbfl.ie
Web www.dbfl.ie

Revision	Issue Date	Description	Prepared	Reviewed	Approved
Draft	24.02.2020	S247 Planning	AO'S	DMW	DMW
Draft	27.03.2020	S247 Planning	AO'S	DMW	DMW
Draft	16.06.2020	Stage 2 Planning	AO'S	DMW	DMW
Final	25.06.2020	Stage 2 Planning	AO'S	DMW	DMW
Draft A	08.01.2021	Planning Stage 3 SHD	AO'S	DMW	DMW
Draft A	22.01.2021	Planning Stage 3 SHD	AO'S	DMW	DMW
Draft A	27.01.2021	Planning Stage 3 SHD	AO'S	DMW	DMW
FINAL	11.02.2021	Planning Stage 3 SHD	AO'S	DMW	DMW

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1.0 INTRODUCTION

1.1 Background

DBFL were commissioned to undertake a Site-Specific Flood Risk Assessment to accompany a planning submission for a proposed student accommodation development of circa 698 No. bedspaces at a site at Our Lady's Grove (which includes an existing childcare facility 'The Grove After School Care', Our Lady's Grove Goatstown Dublin 14, D14 V290 and D14 N8C2), Goatstown Road, Goatstown, Dublin 14. Refer to Figure 1 below for site location map. The subject site comprises circa 2.12ha and it is within the jurisdiction of Dún Laoghaire-Rathdown County Council.

1.2 Objectives

The objective of this report is to inform the planning authority regarding flood risk for the proposed residential development. This report assesses the lands and zoning proposals in accordance with the requirements of "*The Planning System and Flood Risk Management Guidelines for Planning Authorities*". This report clarifies the lands flood zone category and presents information which would facilitate an informed decision of the planning application in the context of flood risk.

1.3 Development Proposals

The development will principally consist of: the construction of a Student Accommodation development containing 698 No. bedspaces with associated facilities located in 8 No blocks, which range in height from part 3 No. storeys to part 6 No. storeys over part lower ground floor level (7 No. storeys as viewed from an internal courtyard). Some 679 No. bedspaces are provided in 99 No. clusters ranging in size from 5 No. bedspaces to 8 No. bedspaces, each with a communal Living/Kitchen/Dining room. The remaining 19 No. bedspaces are accessible studios. The includes the provision of communal residential amenity space at lower ground floor level (349 sq m) including the provision of a movie room (108 sq m), a music room (42 sq m) and a laundry (37 sq m); communal residential amenity space (1,356 sq m) at ground floor level including the provision of a gym (228 sq m), reception desk and seating area (173 sq m), a common room (338 sq m), a study space (104 sq m), a library (64 sq m), a yoga studio (74 sq m), a prayer room (33 sq m) and group dining (33 sq m).

The development also includes staff and administrative facilities (195 sq m); 9 No. car parking spaces; 4 No. motorcycle parking spaces; 860 No. cycle parking spaces; refuse stores; signage; an ESB substation and switchroom; boundary treatments; green roofs; PV panels; hard and soft landscaping; plant; lighting; and all other associated site works above and below ground. The development includes the demolition of part of the Goatstown Afterschool building (558 sq m) and the construction of a new external wall to the remaining ope, in addition to the demolition of a prefabricated structure adjacent to the Afterschool building (161 sq m).

1.4 Site Characteristics

The subject is bounded to the south and west by existing dwellings on Larchfield Road and Friarsland Road and to the north and north-east by "Jesus and Mary College" Secondary School and associated hockey pitch and by "Our Lady's Grove" Primary School is located to the north east. "The Grove" residential development and Goatstown Road are located to the east. The hockey pitch to the north, was recently constructed under DLR planning reference D18A/0387. The site falls from south to north towards the hockey pitch.

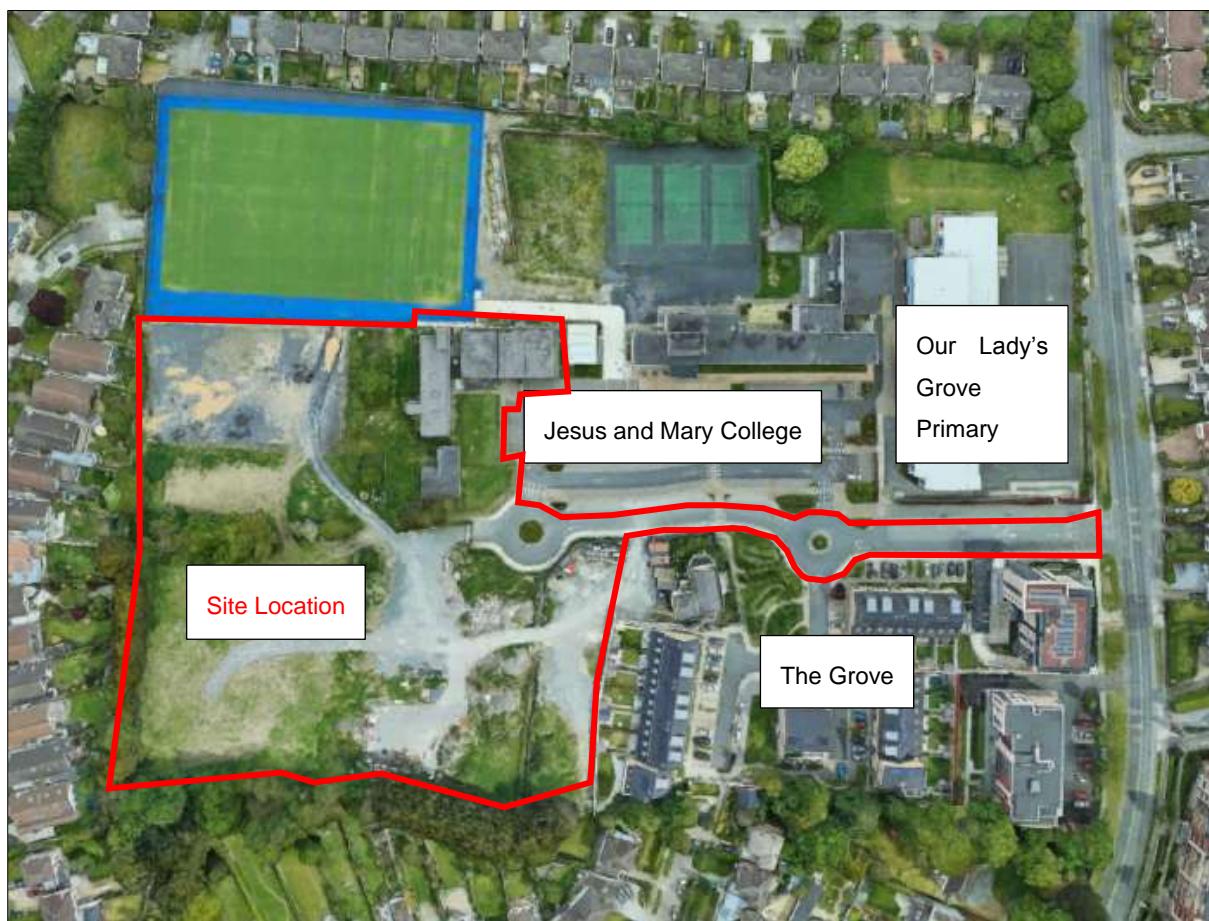


Figure 1 Location of Subject Site (Google Earth)

1.5 Existing Ditch along the South Boundary of the Proposed Development

A historic ditch is indicated on historical OS mapping along the southern boundary of the subject site, but it is no longer evident on the ground. Following the urbanisation of the area to the south of the subject site, the only surface water runoff to the ditch was from a pipe on Friarsland Avenue which collected surface water runoff from part of the road via gullies. The section of pipe from Friarsland

Avenue to the ditch had blockages and consequently occasional flooding occurred on part of Friarlands Avenue. Drainage works were carried out in 2018 to divert this pipe into the new surface water network of the residential development (“The Grove”) to the east of the subject site, as agreed with the Local Authority. Following these works, flooding has not occurred again and as surface water runoff now drains to the piped network in the existing “The Grove” residential development, it is not anticipated to flood again.

1.6 Site Geology

A review of the Geological Survey of Ireland (GSI) maps indicate that the main underlying bedrock indicated on the Geological Survey Ireland geology map are dark limestone and shale('calp'), refer to Figure 2 below.

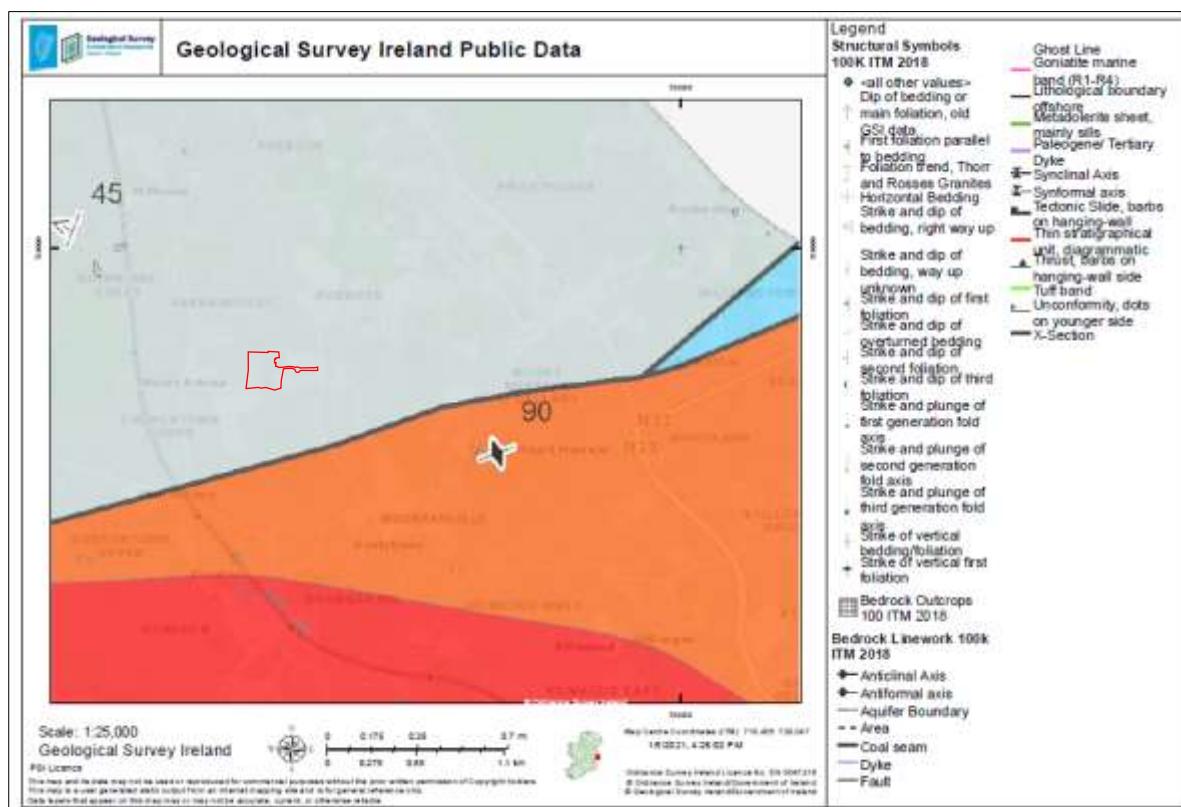


Figure 2 Geological Survey Ireland Bedrock Data (GSI Maps)

The associated groundwater vulnerability, which indicates the risk to the underlying waterbody for the site is classified as low (Figure 3).

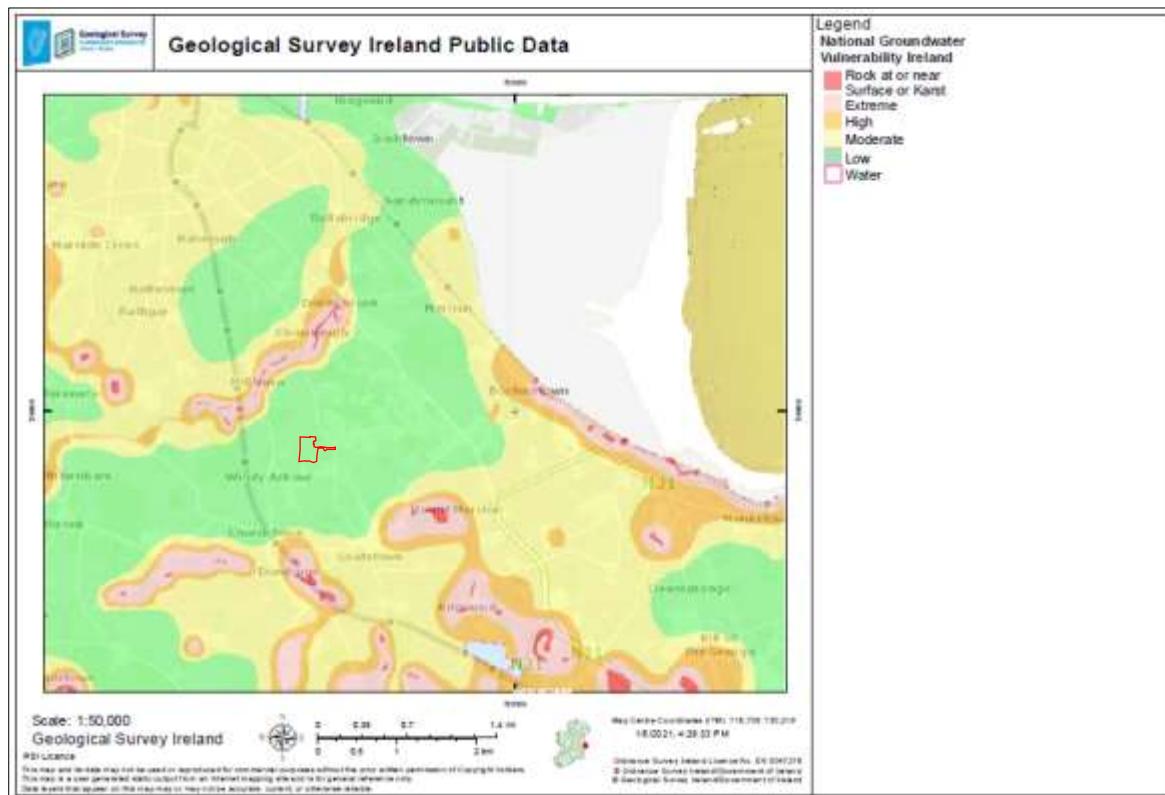


Figure 3 Groundwater Vulnerability Mapping (GSI Maps)

The GSI mapping for aquifers in the area indicates that it is a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones. (Figure 4).

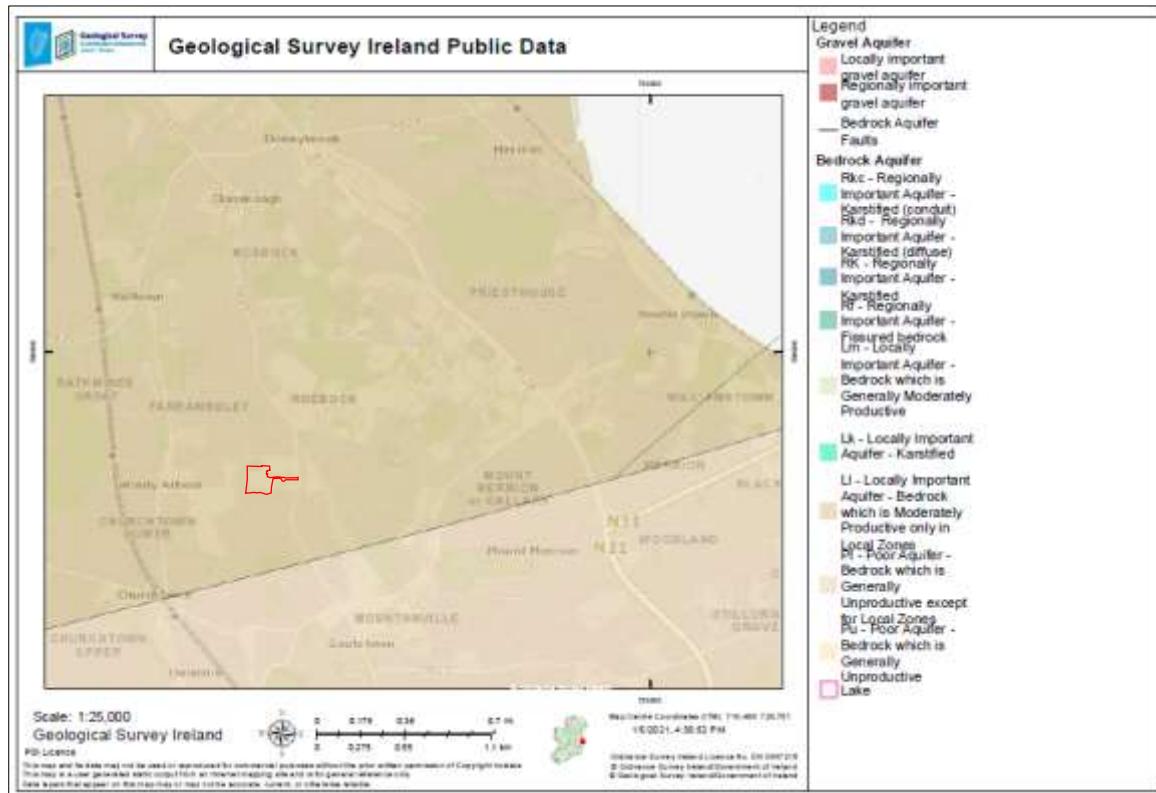


Figure 4 Aquifer Mapping (GSI Maps)

2.0 PLANNING GUIDELINES & FLOOD RISK ASSESSMENT

2.1 The Planning System and Flood Risk Management, Guidelines for Planning Authorities

The FRM Guidelines provide “mechanisms for the incorporation of flood risk identification, assessment and management into the planning process....”. They ensure a consistent approach throughout the country requiring identification of flood risk and flood risk assessment to be key considerations when preparing development plans, local area plans and planned development.

“The core objectives of The FRM Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure the requirements of EU and national law in relation to the natural environment and nature conservation are complied with for flood risk management.”

The FRM Guidelines outlines the key principles that should be adopted by regional and local authorities, developers and their agents as follows

- Avoid the risk, where possible;
- Substitute less vulnerable uses, where avoidance is not possible, and
- Mitigate and manage the risk, where avoidance and substitution are not possible.”

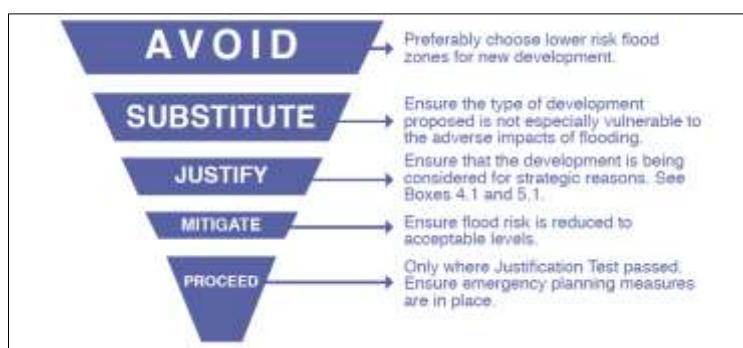


Figure 5 Sequential Approach Principles in Flood Risk Management (Extracted from FRM Guidelines)

The Sequential Approach in the Management of Flood Risk is included in Figure 5. Where the avoid and substitute principles of the sequential approach are not appropriate, then the Guidelines allow application of a Justification Test to assess the appropriateness or otherwise, of developments under consideration in areas of moderate or high flood risk.

2.2 Flood Risk Appraisal & Assessment

2.2.1 General

The assessment of flood risk requires an understanding of where water comes from (the source), how and where it flows (the pathways) and the people and assets affected by it (the receptors).

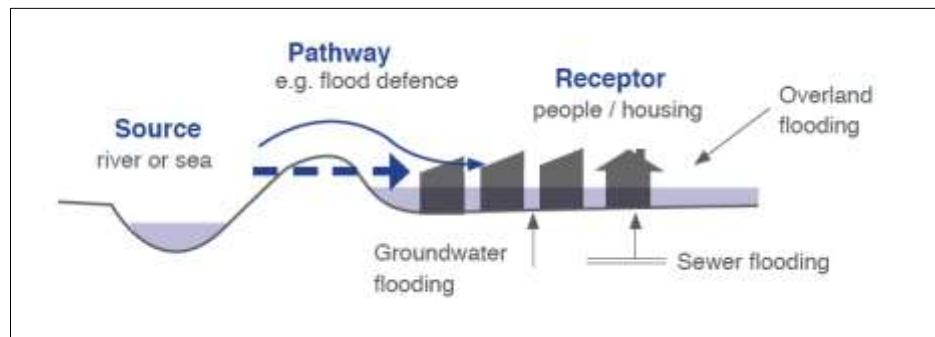


Figure 6 Source-Pathway-Receptor Model (Extracted from FRM Guidelines)

The principal sources are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. The receptors can include people, their property and the environment.

The Guidelines further state that “*A staged approach should be adopted, carrying out only such appraisal and or assessment as is needed for the purposes of decision-making at the regional, development and local area plan levels, and also at the site-specific level. The stages of appraisal and assessment are*”:

Stage 1 Flood risk identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;

Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

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 or land to be zoned,

of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

This SSFRA includes Stages 1, 2 and 3 Flood Risk Appraisal and Assessments related to the planned development.

2.2.2 Flood Zones

The FRM Guidelines use flood zones to determine the likelihood of flooding and for flood risk management within the planning process. The three flood zones levels are:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest 1% AEP (Annual Exceedance Probability) for rivers and 0.5% AEP for coastal;
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 and 1% AEP or 1 in 100 for river 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 Zone C covers all areas outside zones A and B.

The FRM Guidelines categorises all types of development as either;

- Highly Vulnerable e.g. dwellings, hospitals, fire stations, essential infrastructure,
- Vulnerable e.g. retail, commercial or industrial buildings, local transport infrastructure,
- Water Compatible e.g. flood infrastructure, docks, amenity open space.

2.3 Vulnerability v Flood Zone

The FRM Guidelines states that “*a sequential approach to planning is a key tool in ensuring that development, particularly new development, is first and foremost directed towards land that is at low risk of flooding*”.

The Sequential Approach restricts development types to occur within the flood zone appropriate to their vulnerability class, as outlined below in Table 1. Alternatively, a Justification Test can be completed to justify development in higher risk areas, (refer to Figure 7 below).

	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 1 Matrix of Vulnerability versus Flood Zone to illustrate where development appropriate for flood zone or where justification test required (Extract from FRM Guidelines)

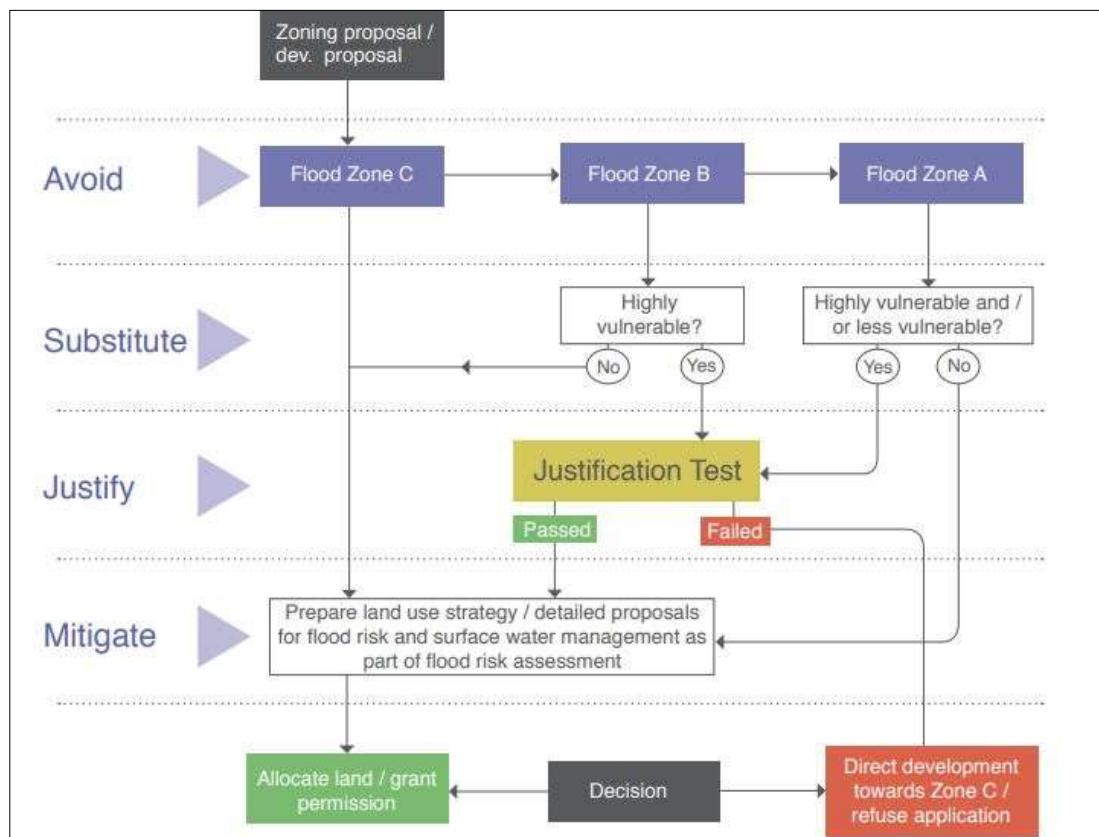


Figure 7 Sequential Approach & Justification Test Mechanism in the Planning Process (FRM Guidelines)

The proposed development is classified as a highly vulnerable development (residential and essential infrastructure) in the Guidelines. This class is appropriate to flood zone 'C'.

3.0 FLOOD RISK IDENTIFICATION

The initial flood risk identification stage uses predictive and historical information to identify and confirm whether there may be flooding or surface water management issues for the site in question which may warrant further investigation. Findings from the flood risk identification stage are outlined below:

3.1 Predictive Flood Data

3.1.1 OPW ECFRAMS Flood Extent Mapping 2017

The OPW's ECFRAM Study assessed fluvial and coastal flood risk. Flood maps indicate that fluvial flooding associated with the River Dodder for 10% and 1% AEP return periods do not impact the site and it is not at risk of flooding from the 0.1% AEP flood event.



Figure 8 ECFRAM Flood Extents Map

Figure 8 indicates the location of the site within Flood Zone C away from the flooding area caused by overland flows originating from the River Dodder to the north-west.

3.1.2 County Development Plan 2016-2022 Strategic Flood Risk Assessment

No flooding identified within the site.

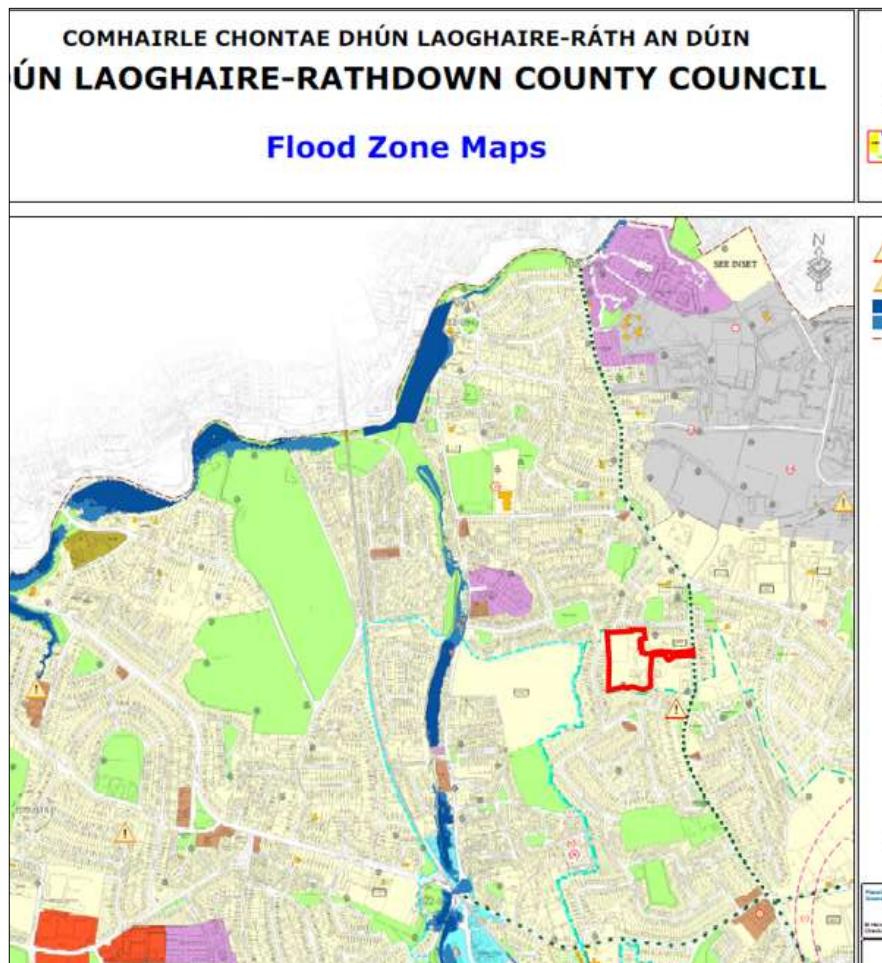


Figure 9 Extract DLR SFRA Flood Zone Maps

3.1.3 Draft County Development Plan 2022-2028 – Flood Risk Assessment

No flooding identified within the site.

3.2 Flood History

3.2.1 OPW Historic Flood Records & Benefitting Lands

No records of flooding on the lands. No benefitting lands indicated.

3.2.2 Historical and Recorded Flood Events

A search for recorded flood events near the subject site was carried out using the OPW's *floodinfo.ie* website and using a general internet search. The *floodinfo.ie* website provides information on recorded flood events nationwide. There are no historical flood incidences recorded for the subject site or in the immediate vicinity of the site. The nearest recorded flood event was at the junction of Goatstown Road and Roebuck Road on the 10th of June 1963 and at Larchfield Road recurring.

From a review of the OPW historic flood events in the general area it was concluded that there were no records of flooding within the site (refer to www.floodmaps.ie report in **Appendix B**). The nearest historic incidents recorded were at junction between Goatstown Road and Roebuck Road in 1963 and recurring flooding event at the junction of Larchfield Road and Farmhill Road. These events did not affect the site.

4.0 INITIAL FLOOD RISK ASSESSMENT

4.1 Sources of Flooding

4.1.1 Fluvial

Available mapping indicates that the site is not at risk of fluvial flooding and the site is within flood zone "C" as defined by the "Guidelines".

4.1.2 Pluvial

Pluvial or surface water flooding is the result of rainfall-generated flows that arise before run-off can enter a watercourse or sewer.

The proposed development may be subject to pluvial flood risk from the developments proposed surface water drainage system. The comprehensive and detailed design of the surface water system, design of road, ground levels, finished floor levels, and SuDS measures will mitigate pluvial flood risk to a site.

4.1.3 Coastal

The site is located approximately 3km west of the coast and therefore, coastal flooding is not considered a source of flood risk to the site.

4.1.4 Groundwater

The OPW PFRA mapping does not indicate any groundwater flooding at the site or surrounding area. The GSI groundwater vulnerability for the site is classified as low. Furthermore, there are no karst features in the area which would indicate areas at risk of groundwater flooding. There is no known risk of groundwater flooding in the area.

The areas within the development most at risk of groundwater flooding are the lower ground floor units of the Northern and Middle Blocks and the Northern Courtyard. However, this risk is eliminated by tanking the lower ground floor units and the external Northern Courtyard. A concrete slab will extend under the Northern Courtyard between the Middle Block and the Northern Block and this along tanked courtyard along with tanking of the lower ground floor units will be further detailed at detailed design stage. Refer to DBFL drawing no. 200012-DBFL-RD-SP-DR-C-5003 for a preliminary section through the Northern Courtyard indicating the slab arrangement.

Therefore, groundwater is not considered as a likely source of flood risk to the site.

4.2 Source-Pathway-Receptor Model

A source-pathway-receptor model has been produced to summarize the possible sources of floodwater, the receptors and the pathways by which floodwater could reach the receptors.

Table 2 Source- Pathway- Receptor- Analysis

Source		Pathway	Receptor	Likelihood	Consequence	Risk
Tidal	T1	Tidal flooding from coast, circa 3km away.	Entire Site	Remote	Medium	Low
Fluvial	F1	From the River Dodder	Residents / buildings / vehicles	Remote	Medium	Low
Surface Water Drainage (Pluvial)	P1	Flooding from the surcharging and blockage of the development's drainage systems	Residents - people / buildings / vehicles;	Possible	Medium	<u>Moderate</u> Injury to people and damage to vehicles and property
Groundwater Flooding	G1	Rising GWL on the site	- Residents - people / buildings / vehicles;	Remote	Medium	Low
Human or Mechanical Error (Pluvial)	H1	New drainage network blocks	Areas of development draining to the drainage network. Residents – people / buildings/ vehicles	Possible	Medium	<u>Moderate</u> Injury to people and damage to vehicles and property

The above table indicates that there is a:

- Low risk of tidal flooding;
- Low risk of fluvial flooding;
- Moderate risk of pluvial flooding on site from the potential surcharging and blockage of the new drainage network;
- Low risk of groundwater flooding;
- Moderate risk of pluvial flooding due to blockage of the surface water system because of human / mechanical error;

The information sources identified in Section 3 are considered adequate for the purpose of an Initial Flood Risk Assessment for the site and no further technical studies are proposed.

4.2.1 Initial Tidal Flood Risk

The coast is circa 3km to the east and the site is therefore not at risk of flooding from the coast.

4.2.2 Initial Fluvial Flood Risk

The site is outside the extents of the fluvial flood extents including the overland flow associated with the River Dodder and is therefore not at risk of fluvial flooding.

4.2.3 Initial Pluvial Flood Risk

The Source-Pathway-Receptor model identified a medium risk of pluvial flooding relating to the proposed surface water drainage network (blockage or surcharging) and human / mechanical error.

This risk can be mitigated by designing the surface water network in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) including attenuation of the 1% AEP storm event plus climate change and implementation of SuDS drainage systems.

The facility will be managed and given the scale of development there will be a maintenance person on standby who will monitor the drainage elements in particular the foul and surface water pumping stations.

4.2.4 Initial Groundwater Flood Risk Assessment

The areas within the development most at risk of groundwater flooding are the lower ground floor units of the Northern and Middle Blocks and the Northern Courtyard. This risk is eliminated by tanking the lower ground floor units and the external Northern Courtyard. A concrete slab will extend under the Northern Courtyard between the Middle Block and the Northern Block and this tanked courtyard along with tanking of the lower ground floor units will be further detailed at detailed design stage. Refer to DBFL drawing no. 200012-DBFL-RD-SP-DR-C-5003 for a preliminary section through the Northern Courtyard indicating the slab arrangement.

5.0 MANAGEMENT OF FLOOD RISK AND FLOOD RISK MITIGATION

Flood risk to the proposed development will be managed using different strategies as outlined below.

5.1 Drainage Design

5.1.1 Surface Water Sewer & SuDS

A new surface water drainage system will be constructed to accommodate surface water runoff from the proposed development. The drainage system will be designed in accordance with the recommendations of the GDSDS (Greater Dublin Strategic Drainage Study) and EN752 and will include traditional drainage features and SuDS features, including the attenuation of surface water runoff and storage of runoff from a 1% AEP event (exceeding the allowable outflow rate), plus climate change.

The surface water drainage network is designed for a 20%AEP (1 in 5-year return period) storm event and is “flood checked” for a 1%AEP (1 in 100-year return period) event plus climate change, i.e. it is designed to accommodate runoff from a 1%AEP rainfall event under surcharged conditions. The surface water drainage system was modelled using the ‘NETWORK’ module of ‘Microdrainage’, for a range of storms with returns periods of 1 in 1, 1 in 30 and 1 in 100 years. For a 1 in 100-year return period storm (1% AEP event), while the surface water drainage system surcharges there is no ‘out of system / pipe’ flooding on site.

SuDS features proposed for the development include extensive Green Roofs, permeable paving, permeable surfacing, synthetic grass, raingardens, swales and tree pits.

Due to the levels of the lower northern courtyard it is not possible to drain surface water runoff to the courtyard by gravity and it is therefore proposed to pump surface water runoff from the lower courtyard between the Northern Block and the Middle Block to the surface water drainage system adjacent to the Northern Block.

The following measures are proposed to specifically mitigate flood risk to the lower ground floor units.

- A three pump arrangement is proposed (Duty / Duty-Assist / Standby).
- The surface water pump sump has a minimum storage capacity of 20m³, with a pumping rate of 6l/s chosen to accommodate a 1% AEP storm event.
- A standby generator is proposed for the development in the event of a power failure.
- A minimum of 20m³ of storage is provided within the pump wet well.

- Operation of the pumps will be monitored via the building management system.
- The facility will be managed 24 hours a day, seven days a week and during all holiday periods.
- Low points are introduced in the lower courtyard to direct water away from doorways in the event of pump failure or a blockage on the drainage system.
- Hard surfacing of the Northern Courtyard will comprise permeable paving on a minimum of 300mm of drainage stone (at the lowest point) on a drainage board on a 200mm thk RC concrete slab. The drainage layer above the slab has a minimum storage capacity of circa 85m³ based on a minimum 300mm of drainage stone (30% porosity) over the courtyard area of circa 954m². Other surfaces for the Northern Courtyard include synthetic grass and planted areas all of which will drain to drainage stone underneath. Refer to DBFL drawing no. 200012-DBFL-RD-SP-DR-C-5003 for a section through the courtyard.
- A robust maintenance and monitoring regime will be implemented will particular emphasis on the drainage system including the foul and surface water pumps. The duty / standby arrangement for the foul pumps and duty / duty assist / standby pump arrangement for the surface water pumps to be kept in place at all times.
- A specialist maintenance arrangement with the pump supplier to be put in place to ensure regular maintenance of the pumps.
- An emergency plan to be put in place in the event of pump failure during a severe rainfall event.

5.1.2 Surface Water Attenuation & Storage

Surface water runoff from the proposed development is managed using both traditional drainage (standard gully and pipe-work collection system) and Sustainable Urban Drainage Systems (SuDS) where appropriate.

Surface water runoff from the development is attenuated to “Greenfield Runoff”, Qbar with runoff exceeding this stored on site for up to a 1% AEP (Annual Exceedance Probability).

Surface water storage will be provided in ‘Stormbloc’ underground storage units. In accordance with the recommendations of the GDSDS, a minimum 500mm buffer is provided between the top water level in the storage system and the lowest floor level within the development. (Except for the lower ground floor units which will be fully tanked and are drained via a surface water pump arrangement).

5.1.3 Climate Change

The potential impact of climate change has been allowed for in the design of the surface water drainage network and storage system, with an allowance for a 10% increase in rainfall intensities.

5.1.4 Foul Drainage

A new foul drainage system will be constructed to collect flows from the proposed development. Foul flows from the lower ground floor units will be collected and drained via a foul pump sump which will pump foul flows to the adjacent foul gravity system within the development. The following measures are proposed to specifically mitigate flood risk to the lower ground floor units from the foul drainage system:

- A Duty / Standby pump arrangement is proposed.
- 24-hour storage is provided in the pump sump.
- A standby generator is proposed for the development in the event of a power failure.
- Operation of the pumps will be monitored via the building management system.
- The facility will be managed 24 hours a day, seven days a week and during all holiday periods.
- A specialist maintenance arrangement with the pump supplier to be put in place to ensure regular maintenance of the pumps.

5.1.5 Flood Exceedance

For storms greater than the 1%AEP pluvial event, the development's drainage network design may be exceeded and overland flow may occur. Refer to DBFL Overland Flow Route Map (drawing number 200012-DBFL-SW-SP-DR-C-1006 with overland flow directed towards open space / grassed / landscaped areas and away from buildings.

5.1.6 Access and Egress During Flood Events

The proposed development (including essential infrastructure such as roads), is in flood zone 'C'. Where the capacity of the drainage system is exceeded for storm events exceeding a 1%AEP event, excess runoff is directed towards open space areas, as demonstrated in the overland flow map.

Access and egress from the lower ground floor units will be maintained via the stairs and lifts to ground floor and via the gently sloped access (ramp).

An emergency plan will be put in the event of pump failure during a severe rainfall event.

5.2 Maintenance

The proposed drainage system (including the foul and surface water pumped arrangements) to be monitored and maintained on a regular basis by the inhouse facilities management team.

A specialist maintenance arrangement with the pump supplier to be put in place to ensure regular maintenance of the pumps.

Maintenance of SuDS features should also be carried out in accordance with the recommendations of "The SuDS Manual" (CIRIA).

5.3 Site Layout

Finished floor levels of proposed buildings are minimum 500mm above the estimated top water level in the surface water storage system. (Except for the lower ground floor units which will be fully tanked and are drained via a surface water pump arrangement).

The lower ground floor courtyard of the northern block will drain to a surface water pump which will pump these flows to the adjacent surface water gravity system. Low points are introduced in the lower courtyard to direct water away from entrances.

5.4 Residual Risks

Remaining residual flood risks, following the detailed assessment include the following;

1. Pluvial flooding from the drainage system related to a pipe blockage or from flood exceedance.
2. Pluvial flooding from the development's drainage system for storms exceeding the design capacity.
3. Pluvial flooding due to breakdown in the surface water pump collecting surface water from the courtyard of the northern block.

Proposed mitigation measures to address residual flood risks are as follows:

1.0 Pluvial flooding from the drainage system related to a pipe blockage or from flood exceedance:

- **Mitigating Measures:**
- The proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage. The inhouse facilities management team will monitor the operation of the drainage system including the foul and surface water pumps via the building management system.
- Regular maintenance of the permeable paving and porous surfacing to ensure they are operating effectively.
- Regular maintenance of soft SuDS features – raingarden, swale, tree pit, in accordance with CIRIA SuDS Guidance.
- Storage is provided in the stone layer between the concrete slab and the finished surfacing for the Northern Courtyard.

2.0 Pluvial flooding from the development's drainage system for storms exceeding the design capacity:

Mitigating Measures:

- The drainage network is designed in accordance with the recommendations of the GDSDS and provides attenuated outlets and associated storage up to the 1% AEP event, plus 10% climate change. The drainage network for the site has been designed to ensure that it can accommodate the 1% AEP rainfall event in surcharged conditions.

Mitigating Measures:

- Refer to DBFL drawing no. 200012-DBFL-SW-SP-DR-C-1006 for Overland Flow Routes. Ensure flow paths are maintained to direct runoff away from buildings. In the case of excessive overland flows an overland flood route around the perimeter of the development is also identified to the hockey pitch to the north of the subject site.
- Low spots are introduced at the lower ground floor northern courtyard to direct water away from doorways.

3.0 Pluvial flooding due to breakdown in the surface water pump collecting surface water from the courtyard of the northern block.

Mitigating Measures:

- Duty / Duty Assist and Standby pumps are proposed for the surface water pumping station at the lower ground floor courtyard and this arrangement is to be kept in place.
- The development will be a fully managed facility, with the operation of the pumps monitored from the building management system.
- The facility will be managed 24 hours a day, 7 days a week and during holiday periods.
- Low points are proposed within the lower courtyard to accommodate excessive flows or flows in the event of pump failure or a blockage on the drainage system.

- It is estimated that the stone drainage layer above the slab at the lower ground floor courtyard has a minimum storage capacity of circa 85m³ based a minimum 300mm of drainage stone (30% porosity) over the courtyard area of circa 954m².
- The surface water pump sump has a storage capacity of 20m³, with a pumping rate of 6l/s chosen to accommodate a 1% AEP storm event.
- A robust maintenance plan to be put in place which specifically addresses maintenance of the surface water pumps and ensures the duty, standby and duty assist pump arrangement is maintained.
- A specialist maintenance arrangement with the pump supplier to be put in place to ensure regular maintenance of the pumps.
- An emergency plan for the development will be put in place in the event of pump failure during severe rainfall events.

6.0 Response to ABP Opinion

An Bord Pleanala raised a number of issues following the pre-application planning process for case reference ABP—307440-20, which must be addressed to facilitate an application for strategic housing development. These items are outlined in their opinion document dated July 2020, with Appendix B of their opinion relating to water services outlined below.

1. It is acknowledged that the applicant has commented on the proposed surface water drainage system in the event of blockage or partial blockage of the system. However, the applicant is requested to submit a drawing identifying and showing details of safe overland flow routes both within and without the site. The overland flow route plan should identify drop kerbs or ramps required for channelling the flow, should address low point areas in the site and should detail how properties, both within the development and on adjacent lands, will be protected in the event of excessive overland flows.

Refer to DBFL drawing no. 200012-DBFL-SW-SP-DR-C-1006 for Surface Water Overland Flow Layout. In the case of excessive overland flows an overland flood route around the perimeter of the development is also identified to the hockey pitch to the north of the subject site.

2. The applicant is requested to address the existing ditch to the rear of the houses on Larchfield Road along the south border of the site in the SSFRA.

As outlined in Section 1.5 of this report, a historic ditch is indicated on historical OS mapping along the southern boundary of the subject site, but it is no longer evident on the ground. Following the urbanisation of the area to the south of the subject site, the only surface water runoff to the ditch was from a pipe on Friarsland Avenue which collected surface water runoff from part of the road via gullies. The section of pipe from Friarsland Avenue to the ditch had blockages and consequently occasional flooding occurred on part of Friarlands Avenue. Drainage works were carried out in 2018 to divert this pipe into the new surface water network of the residential development (“The Grove”) to the east of the subject site, as agreed with the Local Authority. Following these works, flooding has not occurred again and as surface water runoff now drains to the piped network in the existing “The Grove” residential development, it is not anticipated to flood again.

7.0 CONCLUSION

We consider that the proposed development, can be delivered on the site in the context of flood risk to same and that the implementation of mitigation measures, as outlined in this report, can be accommodated by the site's detailed design and the surface water drainage design.

The OPW document "The Planning System and Flood Risk Management Guidelines (November 2009)" requires that the proposed development be compatible with flood risk for the site. In accordance with these guidelines, the subject site is located within Flood Zone 'C'. Flood Zone "C" lands are suitable for all types of land use, including residential developments which are classified as "highly vulnerable" in the "Guidelines". Therefore, the proposed development is suitable for the subject site and the Planning Guidelines Sequential Approach is passed.

The proposed development layout was assessed and it is concluded that it can be delivered on the Site in the context of flood risk to same. The implementation of the proposed mitigation measures outlined in Section 5.4 of this report and the developments detailed design will address the remaining residual risks.

Taking into consideration the management of surface water runoff from extant neighbouring permissions their discharge rates are all limited to greenfield runoff and they would not increase flood risk elsewhere. The developments surface water runoff will be limited to Qbar (greenfield runoff rate). Therefore, the development complies with the requirements of the GDSDS and does not increase the risk of flooding elsewhere and does not result in displaced waters.

It is concluded that the development meets the requirements of The FRA Guidelines and that the proposed development is appropriate to this flood zoning and a justification test is not required.

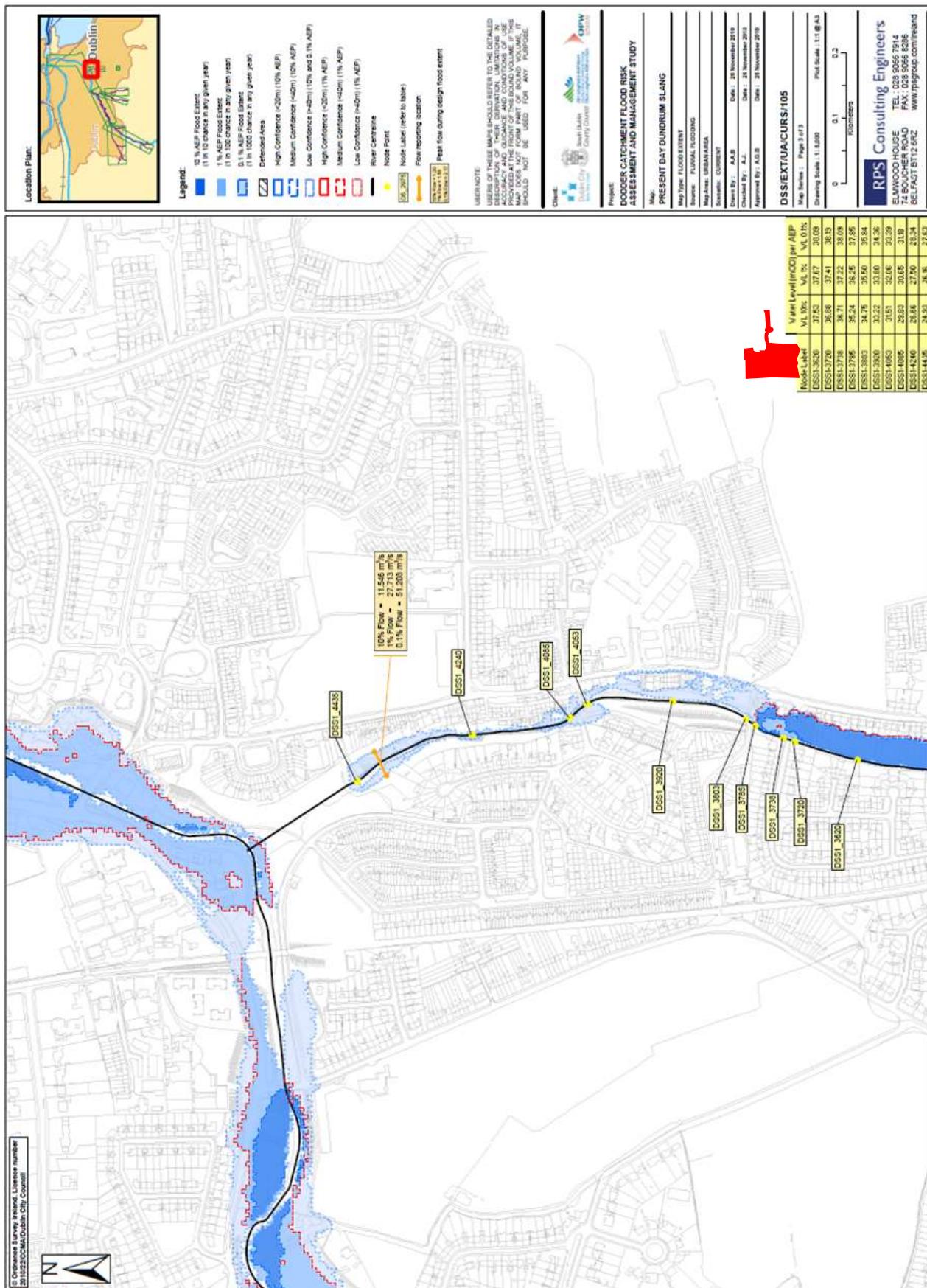
APPENDIX A

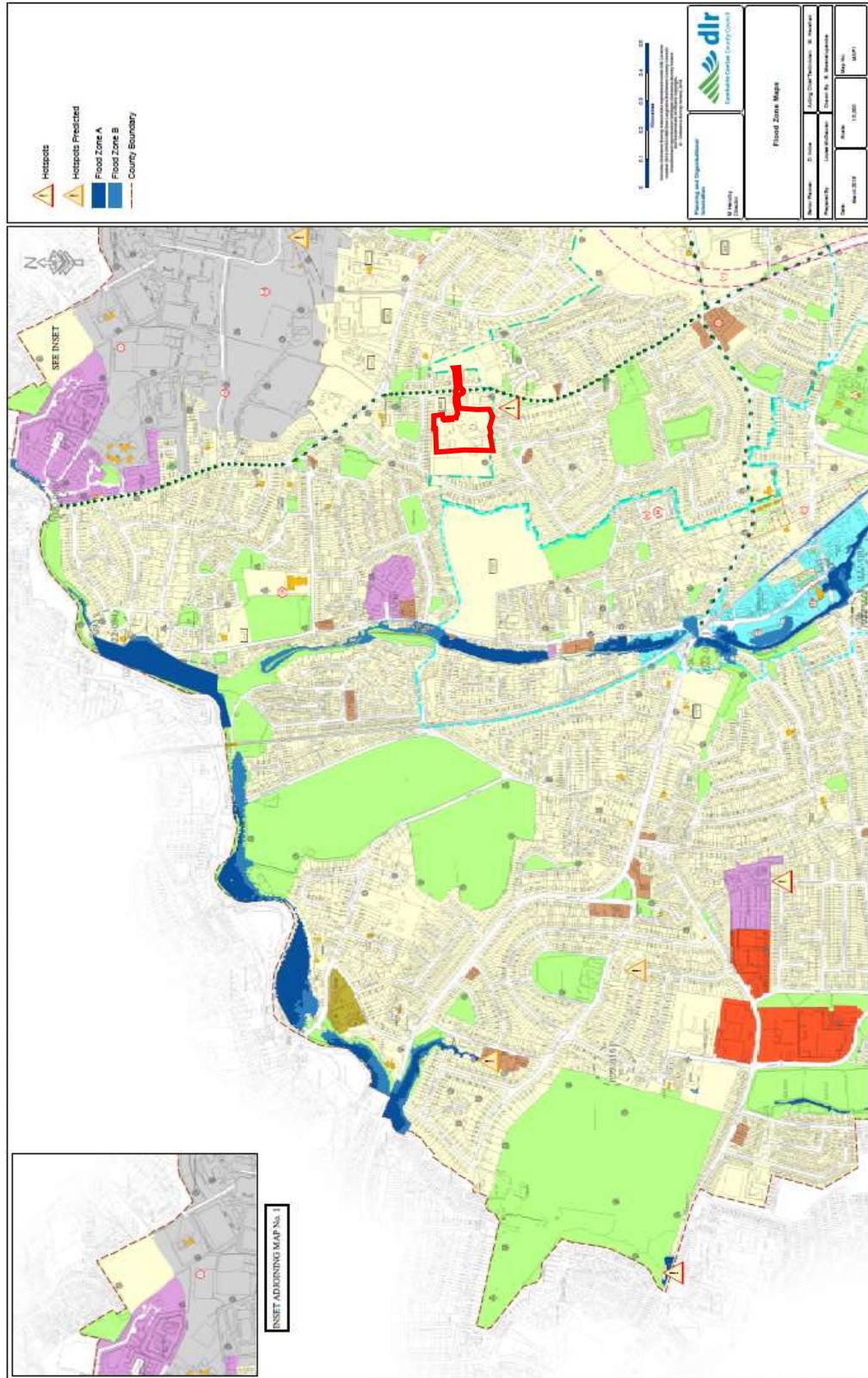
FLOOD EXTENT MAPPING

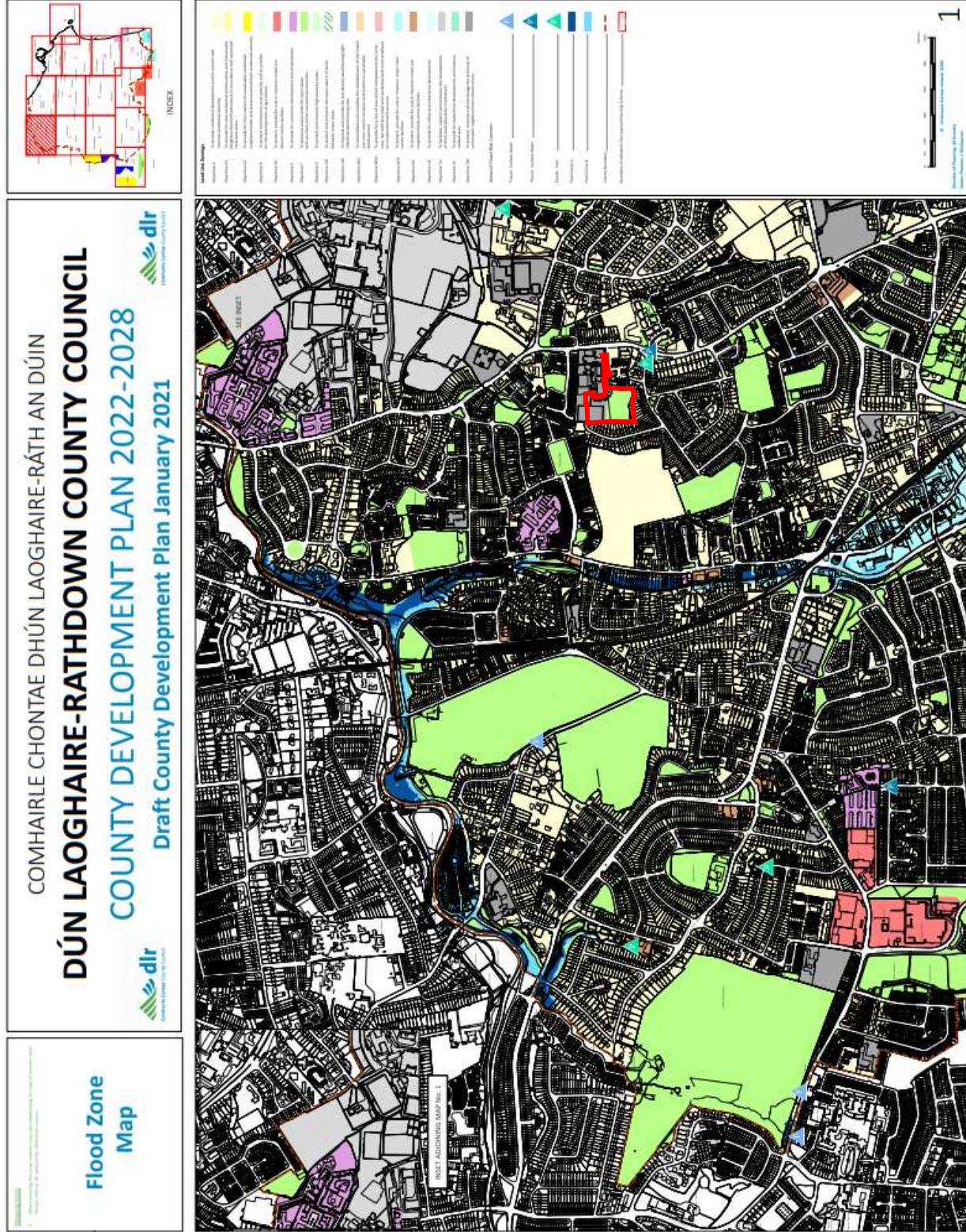
ECFRAM Fluvial Flood Extent Map

Dun Laoghaire Rathdown County Council Flood Zone Map (SFRA)

**Draft Dun Laoghaire Rathdown County Council (County Development Plan 2022 –
2028) Flood Zone Map (SFRA)**







APPENDIX B

OPW FLOOD HAZARD REPORT

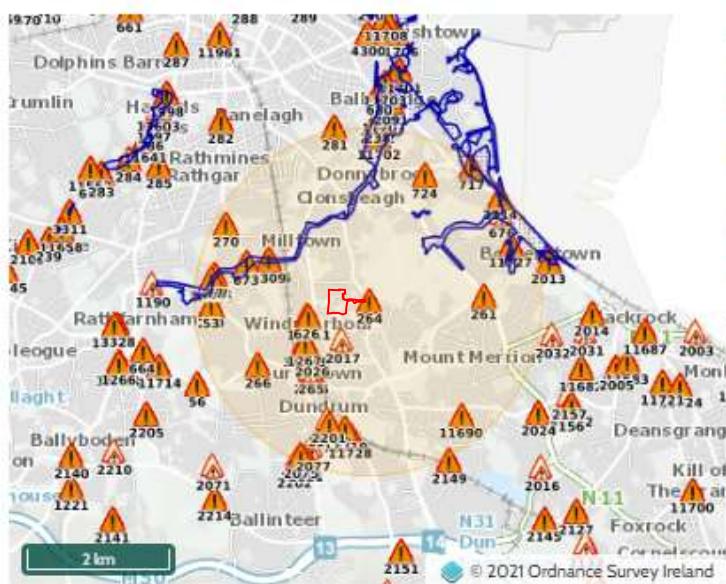
Past Flood Event Local Area Summary Report



Report Produced: 11/2/2021 8:54

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.

54 Results

Name (Flood_ID)	Start Date	Event Location
1. ⚠ Rosemount Dundrum Road Recurring (ID-2026)	n/a	Exact Point
Additional Information: Reports (3) Press Archive (0)		
2. ⚠ Slang Old Ballinter Road Recurring (ID-2077)	n/a	Exact Point
Additional Information: Reports (4) Press Archive (0)		
3. █████ Dodder August 1986 (ID-1)	25/08/1986	Area
Additional Information: Reports (21) Press Archive (18)		
4. █████ Nutley Elm Park Streams June 1963 (ID-118)	11/06/1963	Area
Additional Information: Reports (14) Press Archive (20)		
5. █████ Dublin City Tidal Feb 2002 (ID-456)	01/02/2002	Area
Additional Information: Reports (45) Press Archive (27)		
6. ⚠ Little Dargle Sept 1931 (ID-53)	03/09/1931	Approximate Point
Additional Information: Reports (4) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Little Dargle Feb 1958 (ID-60) Additional Information: Reports (2) Press Archive (0)	10/02/1958	Approximate Point
8.	Dodder Lr Dodder Road Orwell Gardens Dec 1958 (ID-77) Additional Information: Reports (7) Press Archive (0)	18/12/1958	Approximate Point
9.	Dodder Sept 1931 (ID-237) Additional Information: Reports (9) Press Archive (3)	03/09/1931	Approximate Point
10.	Little Dargle Dec 1956 (ID-259) Additional Information: Reports (3) Press Archive (0)	25/12/1956	Approximate Point
11.	Foster Ave Belfield June 1963 (ID-261) Additional Information: Reports (4) Press Archive (20)	11/06/1963	Exact Point
12.	Roebuck June 1963 (ID-264) Additional Information: Reports (4) Press Archive (2)	11/06/1963	Exact Point
13.	Dundrum June 1963 (ID-265) Additional Information: Reports (4) Press Archive (8)	11/06/1963	Exact Point
14.	Churchtown June 1963 (ID-266) Additional Information: Reports (4) Press Archive (2)	11/06/1963	Exact Point
15.	Rathgar June 1963 (ID-270) Additional Information: Reports (4) Press Archive (2)	11/06/1963	Exact Point
16.	Dodder Dec 2003 (ID-349) Additional Information: Reports (1) Press Archive (0)	02/12/2003	Approximate Point
17.	Dundrum River Sept 1957 (ID-626) Additional Information: Reports (1) Press Archive (0)	24/09/1957	Exact Point
18.	Dodder August 1905 (ID-657) Additional Information: Reports (5) Press Archive (4)	24/08/1905	Approximate Point
19.	Dodder August 1946 (ID-658) Additional Information: Reports (7) Press Archive (2)	11/08/1946	Approximate Point
20.	Dodder October 1886 (ID-659) Additional Information: Reports (4) Press Archive (2)	16/10/1886	Approximate Point
21.	Dodder August 1912 (ID-660) Additional Information: Reports (5) Press Archive (0)	26/08/1912	Approximate Point
22.	Dodder Dartry Cottages Nov 2000 (ID-673) Additional Information: Reports (3) Press Archive (0)	05/11/2000	Approximate Point
23.	Elm Park St Mary's Home recurring (ID-676) Additional Information: Reports (1) Press Archive (0)	n/a	Approximate Point
24.	Booterstown/Ailesbury Park November 1965 (ID-717) Additional Information: Reports (1) Press Archive (0)	17/11/1965	Approximate Point
	Nutley Stream June 1989 (ID-724) Additional Information: Reports (1) Press Archive (0)	14/06/1989	Exact Point

25.	 Nutley Stream June 1989 (ID-724) Additional Information: Reports (1) Press Archive (0)	14/06/1989	Exact Point
26.	 Dodder Sept 1957 (ID-731) Additional Information: Reports (5) Press Archive (0)	24/09/1957	Approximate Point
27.	 Dodder November 1968 (ID-1231) Additional Information: Reports (2) Press Archive (0)	02/11/1968	Approximate Point
28.	 Dodder Oct 1880 (ID-1228) Additional Information: Reports (2) Press Archive (0)	27/10/1880	Approximate Point
29.	 Dodder October 1891 (ID-1229) Additional Information: Reports (3) Press Archive (0)	19/10/1891	Approximate Point
30.	 Dodder November 1898 (ID-1230) Additional Information: Reports (2) Press Archive (0)	23/11/1898	Approximate Point
31.	 Dodder November 1901 (ID-1232) Additional Information: Reports (2) Press Archive (0)	10/11/1901	Approximate Point
32.	 Dodder November 1915 (ID-1233) Additional Information: Reports (3) Press Archive (0)	11/11/1915	Approximate Point
33.	 Dodder September 1883 (ID-1234) Additional Information: Reports (2) Press Archive (0)	03/09/1883	Approximate Point
34.	 Dodder December 1956 (ID-1235) Additional Information: Reports (2) Press Archive (0)	29/12/1956	Approximate Point
35.	 Slang Frankfort August 1986 (ID-1267) Additional Information: Reports (1) Press Archive (0)	25/08/1986	Approximate Point
36.	 Old Railway line Dundrum recurring (ID-2025) Additional Information: Reports (5) Press Archive (0)	n/a	Exact Point
37.	 Pine Cope Willow Road Recurring (ID-2075) Additional Information: Reports (2) Press Archive (0)	n/a	Exact Point
38.	 Ashlawn Ballinter Road June 1993 (ID-2111) Additional Information: Reports (1) Press Archive (0)	11/06/1993	Approximate Point
39.	 Slang Pyelands Dundrum recurring1 (ID-2201) Additional Information: Reports (1) Press Archive (0)	n/a	Approximate Point
40.	 Dodder Classon's Bridge Nov 2000 (ID-3309) Additional Information: Reports (1) Press Archive (0)	05/11/2000	Approximate Point
41.	 Rock Road Merrion Gates Nov 2000 (ID-3314) Additional Information: Reports (1) Press Archive (2)	05/11/2000	Approximate Point
42.	 Dodder Orwell Gardens Nov 1965 (ID-3342) Additional Information: Reports (10) Press Archive (0)	17/11/1965	Approximate Point
43.	 Flooding at Trimleston Gardens, Booterstown, Co. Dublin on 24th Oct 2011 (ID-11727) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Exact Point
44.	 Flooding at Willow Bank Apartments, Sandyford Rd, Dublin 14 on 24th Oct 2011 (ID-11728) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Exact Point
	 Flooding at Riverdale, Dundrum, Dublin 14 on 24th Oct 2011 (ID-11719) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Exact Point

44.	 Flooding at Willow Bank Apartments, Sandyford Rd, Dublin 14 on 24th Oct 2011 (ID-11728)	24/10/2011	Exact Point
Additional Information: Reports (1) Press Archive (0)			
45.	 Flooding at Riverdale, Dundrum, Dublin 14 on 24th Oct 2011 (ID-11719)	24/10/2011	Exact Point
Additional Information: Reports (1) Press Archive (0)			
46.	 Flooding at Dundrum Shopping Centre and Taney Cross, Co. Dublin on 24th Oct 2011 (ID-11720)	24/10/2011	Exact Point
Additional Information: Reports (1) Press Archive (0)			
47.	 Larchfield Estate Recurring (ID-2017)	n/a	Exact Point
Additional Information: Reports (5) Press Archive (0)			
48.	 Pine Copse Road Ballinteer Nov 1982 (ID-2137)	05/11/1982	Exact Point
Additional Information: Reports (1) Press Archive (0)			
49.	 Dodder 24th Oct 2011 Waldron's Br (ID-11482)	24/10/2011	Approximate Point
Additional Information: Reports (1) Press Archive (0)			
50.	 Slang River 24th Oct 2011 Frankfort (ID-11483)	24/10/2011	Approximate Point
Additional Information: Reports (1) Press Archive (0)			
51.	 Flooding at Dale Drive, Stillorgan, Co. Dublin on 24th Oct 2011 (ID-11690)	24/10/2011	Exact Point
Additional Information: Reports (2) Press Archive (0)			
52.	 Flooding at Anglesea Road, Ballsbridge, Dublin 4 on 24th Oct 2011 (ID-11702)	24/10/2011	Exact Point
Additional Information: Reports (1) Press Archive (0)			
53.	 Flooding at Milltown, Dublin 6 on 24th Oct 2011 (ID-11705)	24/10/2011	Exact Point
Additional Information: Reports (1) Press Archive (0)			
	 Flooding at Dundrum, Dublin 14 on 24th Oct 2011 (ID-11711)	24/10/2011	Exact Point
Additional Information: Reports (1) Press Archive (0)			



Summary Local Area Report

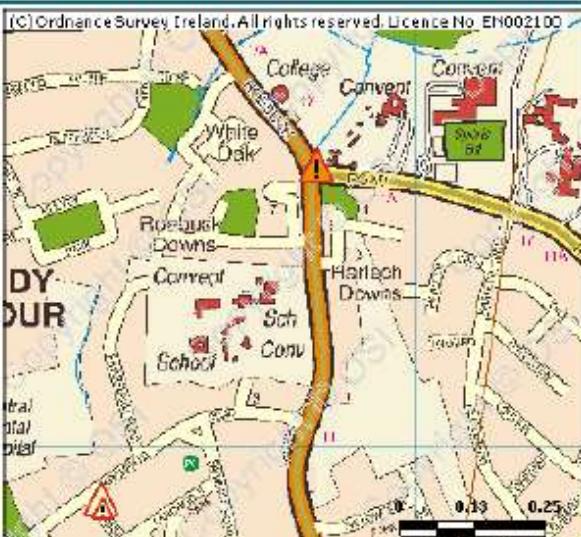
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: O 177 292

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 Scale 1:10,458

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.

51 Results



1. Dodder 24th Oct 2011 Waldron's Br

County: Dublin

Start Date: 24/Oct/2011

Flood Quality Code:2

Additional Information: Reports (1) More Mapped Information



2. Slan River 24th Oct 2011 Frankfort

County: Dublin

Start Date: 24/Oct/2011

Flood Quality Code:2

Additional Information: Reports (1) More Mapped Information



3. Dodder Dartry Cottages Nov 2000

County: Dublin

Start Date: 05/Nov/2000

Flood Quality Code:3

Additional Information: Reports (3) More Mapped Information



4. Dodder Classon's Bridge Nov 2000

County: Dublin

Start Date: 05/Nov/2000

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information



5. Dodder August 1905

County: Dublin

Start Date: 24/Aug/1905

Flood Quality Code:3

[Additional Information: Reports](#) [\(4\) Press Archive](#) [\(4\) More Mapped Information](#)

 6. Dodder November 1901 County:Dublin	Start Date: 10/Nov/1901 Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information	
 7. Dodder Sept 1931 County:Dublin	Start Date: 03/Sep/1931 Flood Quality Code:3
Additional Information: Reports (7) Press Archive (3) More Mapped Information	
 8. Dodder November 1915 County:Dublin	Start Date: 11/Nov/1915 Flood Quality Code:3
Additional Information: Reports (3) More Mapped Information	
 9. Dodder Oct 1880 County:Dublin	Start Date: 27/Oct/1880 Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information	
 10. Dodder October 1891 County:Dublin	Start Date: 19/Oct/1891 Flood Quality Code:3
Additional Information: Reports (3) More Mapped Information	
 11. Dodder September 1883 County:Dublin	Start Date: 03/Sep/1883 Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information	
 12. Dodder Lr Dodder Road Orwell Gardens Dec 1958 County:Dublin	Start Date: 18/Dec/1958 Flood Quality Code:3
Additional Information: Reports (7) More Mapped Information	
 13. Dodder December 1956 County:Dublin	Start Date: 28/Dec/1956 Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information	
 14. Dodder November 1898 County:Dublin	Start Date: 23/Nov/1898 Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information	
 15. Dodder August 1946 County:Dublin	Start Date: 11/Aug/1946 Flood Quality Code:3
Additional Information: Reports (6) Press Archive (2) More Mapped Information	
 16. Dodder November 1968 County:Dublin	Start Date: 02/Nov/1968 Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information	
 17. Dodder August 1912 County:Dublin	Start Date: 26/Aug/1912 Flood Quality Code:3
Additional Information: Reports (4) More Mapped Information	
 18. Dodder October 1886 County:Dublin	Start Date: 16/Oct/1886 Flood Quality Code:3
Additional Information: Reports (3) Press Archive (2) More Mapped Information	

	19. Dodder Sept 1957 County: Dublin	Start Date: 24/Sep/1957 Flood Quality Code:3 Additional Information: Reports (5) More Mapped Information
	20. Slang Frankfort August 1986 County: Dublin	Start Date: 25/Aug/1986 Flood Quality Code:3 Additional Information: Reports (1) More Mapped Information
	21. Little Dargle Feb 1958 County: Dublin	Start Date: 10/Feb/1958 Flood Quality Code:3 Additional Information: Reports (2) More Mapped Information
	22. Little Dargle Dec 1956 County: Dublin	Start Date: 25/Dec/1956 Flood Quality Code:3 Additional Information: Reports (3) More Mapped Information
	23. Little Dargle Sept 1931 County: Dublin	Start Date: 03/Sep/1931 Flood Quality Code:3 Additional Information: Reports (3) More Mapped Information
	24. Nutley Elm Park Streams June 1963 County: Dublin	Start Date: 11/Jun/1963 Flood Quality Code:2 Additional Information: Photos (7) Reports (6) Press Archive (20) More Mapped Information
	25. Rathgar June 1963 County: Dublin	Start Date: 11/Jun/1963 Flood Quality Code:3 Additional Information: Reports (3) Press Archive (2) More Mapped Information
	26. Churchtown June 1963 County: Dublin	Start Date: 11/Jun/1963 Flood Quality Code:3 Additional Information: Reports (3) Press Archive (2) More Mapped Information
	27. Dundrum June 1963 County: Dublin	Start Date: 11/Jun/1963 Flood Quality Code:3 Additional Information: Reports (3) Press Archive (8) More Mapped Information
	28. Foster Ave Belfield June 1963 County: Dublin	Start Date: 11/Jun/1963 Flood Quality Code:3 Additional Information: Reports (3) Press Archive (20) More Mapped Information
	29. Roebuck June 1963 County: Dublin	Start Date: 11/Jun/1963 Flood Quality Code:3 Additional Information: Reports (3) Press Archive (2) More Mapped Information
	30. Flooding at Dundrum Shopping Centre and Taney Cross, Co. Dublin on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2 Additional Information: Reports (1) More Mapped Information
	31. Flooding at Dundrum, Dublin 14 on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2 Additional Information: Reports (1) More Mapped Information
	32. Flooding at Trimleston Gardens, Booterstown, Co. Dublin on	Start Date: 24/Oct/2011

	24th Oct 2011 County: Dublin	Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	33. Flooding at Riverdale, Dundrum, Dublin 14 on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	34. Flooding at Milltown, Dublin 6 on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	35. Flooding at Willow Bank Apartments, Sandyford Rd, Dublin 14 on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	36. Flooding at Dale Drive, Stillorgan, Co. Dublin on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information		
	37. Dodder Dec 2003 County: Dublin	Start Date: 02/Dec/2003 Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information		
	38. Ashlawn Ballinteer Road June 1993 County: Dublin	Start Date: 11/Jun/1993 Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information		
	39. Nutley Stream June 1989 County: Dublin	Start Date: 14/Jun/1989 Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information		
	40. Pine Copse Road Ballinteer Nov 1982 County: Dublin	Start Date: 05/Nov/1982 Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	41. Lakelands Close Stillorgan Jan 1980 County: Dublin	Start Date: 21/Jan/1980 Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information		
	42. Dodder Orwell Gardens Nov 1965 County: Dublin	Start Date: 17/Nov/1965 Flood Quality Code:2
Additional Information: Photos (2) Reports (7) More Mapped Information		
	43. Dundrum River Sept 1957 County: Dublin	Start Date: 24/Sep/1957 Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	44. Larchfield Estate Recurring County: Dublin	Start Date: Flood Quality Code:3
Additional Information: Reports (5) More Mapped Information		

	45. Slang Old Ballinteer Road Recurring County:Dublin	Start Date: Flood Quality Code:3
Additional Information: Reports (3) More Mapped Information		
	46. Elm Park St Mary's Home recurring County:Dublin	Start Date: Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	47. Ludford Area Ballinteer Recurring County:Dublin	Start Date: Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	48. Slang Pyelands Dundrum recurring1 County:Dublin	Start Date: Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	49. Old Railway line Dundrum recurring County:Dublin	Start Date: Flood Quality Code:3
Additional Information: Reports (5) More Mapped Information		
	50. Rosemount Dundrum Road Recurring County:Dublin	Start Date: Flood Quality Code:4
Additional Information: Reports (3) More Mapped Information		
	51. Pine Copse Willow Road Recurring County:Dublin	Start Date: Flood Quality Code:4
Additional Information: Reports (2) More Mapped Information		
