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LRD, Old Fort Road, Ballincollig

Flood Risk Assessment

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1. Introduction

JODA Engineering Consultants were commissioned to prepare a Flood Risk Assessment (FRA) for a development at Old Fort Road, Ballincollig, Cork. This report should be read in conjunction with the JODA Engineering Report for details of the proposed surface water storm design strategy.

1.1. Relevant Guidance

This FRA has been undertaken in consideration with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG November 2009, which is the latest guidance document. The guidance has been issued to ensure that flood risk is a key consideration for developers, planning & regional authorities and the public in preparing and submitting development proposals. The principles of the guidance are as follows:

- Avoid the risk, where possible
- Substitute less vulnerable users, where avoidance is not possible, and
- Mitigate and manage the risk, where avoidance and substitution are not possible

1.2. Flood Risk

Flood risk can be quantified by relating the probability of the flood event occurring to the consequence of the flood. Probability, in flood event terms, is gauged by potential annual occurrence/return period and flood consequence is dependent on the nature of the flood hazard and the vulnerability of the inundated area. The source-pathway-receptor model considers the components of flood risk.

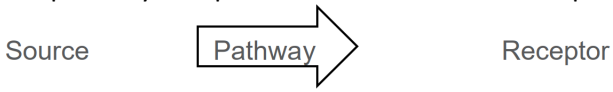


Figure 1: Flood Risk Components

The source is the hazard with the potential to cause harm through flooding (e.g., rainfall, high sea levels). The pathway is the mechanism by which the source can affect the receptor (e.g., inadequate drainage, overtopping of coastal defences) and finally, the receptor is anything which is affected by the flood event (e.g., people, infrastructure, property).

1.3. Causes of Flooding

The Planning System and Flood Risk Management Guidelines requires an FRA to consider all potential causes of flooding including the following:

- Coastal flooding
- Inland flooding
    - o Overland flow
    - o River flooding
    - o Flooding from artificial drainage systems
    - o Groundwater flooding
    - o Estuarial flooding
- Failure of infrastructure

1.4. Assessing Flood Risk

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' three flood zones are designated in the consideration of flood risk to a particular site. The three flood zones are described in Table 1 below.

Flood Zone	Description
Flood 'Zone A'	where the probability of flooding from watercourses is the highest (greater than 1% or 1 in 100 year for watercourse flooding or 0.5% or 1 in 200 for coastal flooding).
Flood 'Zone B'	where the probability of flooding from watercourses is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 year for watercourse flooding, and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
Flood 'Zone C'	where the probability of flooding from watercourses and the sea is low or negligible (less than 0.1% or 1 in 1000 year for both watercourse and coastal flooding). Flood Zone 'C' covers all areas which are not in Zones 'A' or 'B'.

Table 1: Flood Zones

The planning implications for each of the flood zones are:

Zone A - High probability of flooding. Most types of development would be considered inappropriate in this zone. Development in this zone should be avoided and/or only considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the Justification Test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation, would be considered appropriate in this zone.

Zone B - Moderate probability of flooding. Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would generally be considered inappropriate in this zone, unless the requirements of the Justification Test can be met. Less vulnerable development, such as retail, commercial and industrial uses, sites used for short-let for caravans and camping and secondary strategic transport and utilities infrastructure, and water-compatible development might be considered appropriate in this zone. In general, however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone C and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to and from the development can or will adequately be managed.

Zone C - Low probability of flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

1.5 Vulnerability Class

The Guidelines classify potential development in terms of its vulnerability to flooding. The types of development falling within each vulnerability class are described in Table 3.1 of the Guidelines, which is reproduced in Table 2

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. • 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. • 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. • Essential ancillary sleeping or residential accommodation for staff required • By uses in this category (subject to a specific warning and evacuation plan).

Table 2: Vulnerability Class

The Guidelines define the zones in which each class of development is appropriate – this is summarised in Table 3

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

Table 3: "Appropriateness" Matrix

The proposed development consists of predominantly residential with a crèche and therefore, the development can be classed as a "highly vulnerable development" in accordance with the guidelines.

2. Site Description

2.1. General Description

The site is north of Ballincollig Town Centre Development and is adjacent to Old Fort Road. Ballincollig Wastewater Treatment plant is north of the site and Ballincollig Community Nursing unit to the east. The site is a green space made up of filled material with some flora located within the site boundary, existing tree line to the south of the site along the site boundary, small shrubs and trees are over grown to the northeast of the site.

2.2. Topography

The site generally falls from a high point (+25mOD) at the south, falling to the north to a low point on the northern boundary of (+17mOD). A storm sewer that services Ballincollig town centre runs through the site from south-east to north-west, a foul sewer is present at the east side of the site and flows from south to north.

3.0 Flood Risk Identification

Flood risk identification is required to be undertaken to identify if there are any flooding or surface water management issues related to the proposed development site

Sources/Pathway	Investigation Required?	Comment/Reason
Fluvial - River Flooding	YES	The site is located 500m south from the River Lee
Tidal - Estuarine flooding	No	The site is not within the Cork Harbour tidal reach of the River Lee
Pluvial - Overland Flow	YES	The surrounding topography consists largely of developed lands for residential estates hardstanding areas. The predominant route for any overland flow needs investigating
Hydraulic Infrastructure Influence	YES	Typical hydraulic infrastructure exists in the existing estates
Groundwater flooding	NO	There are no significant springs or groundwater discharges recorded in the immediate vicinity of the site

Table 4: Possible Flooding Mechanisms

Table 4 above demonstrates that the site needs to be investigated with respect to fluvial, pluvial and the influence of hydraulic infrastructure.

3.1. Flood Risk Investigation

3.1.1 Historical Flood Events

The site is located approximately 500m from the River Lee posing a potential flooding risk to the site. A review of the Office of Public Works National Flood Hazard Mapping portal (www.floodmaps.ie) has not identified a recurring flood within 500m of the site. A full output from this portal is included in Appendix A of this report.

3.1.2. Office of Public Works Flood Maps

The national indicative flood mapping, a catchment-based flood risk assessment and management study which includes of the entire Lee Catchment, including the River Lee, its tributaries and Cork Harbour, has being undertaken by The OPW and Cork City and County Council.

The Office of Public Works (OPW) interactive map viewer (http://www.floodinfo.ie/map/floodmaps/) which displays the predicted flood extents for both rivers and coastal areas over various return periods. The viewer was consulted in relation to the proposed site and the adjacent waterbodies. Detailed flood maps are available for the area and the maps specific to the site, for both fluvial and Estuarine flooding events, are included in Appendix B of this report.

The Subject site is not indicated as flooded for both the 1 in 100-year Fluvial Flooding Mid-Range Future Scenario or the 1/200 Tidal Flooding Mid-Range Future Scenario.

Consequently, the site is classified as **Flood Zone C and considered appropriate in accordance with the guidelines.**

4. Network Flooding

4.1. Pluvial Flooding Mitigation (Existing and Proposed Drainage)

The Ballincollig Town Centre water drainage system including the proposed development were checked by storm water simulations in accordance with the design guidance of the GDSDS. This simulation included varying storm intensity, duration and frequencies to simulate a combination of rain fall events in accordance with the GDSDS to determine if the proposed development will cause downstream flooding.

The simulation uses the FSR method (Flood Studies Report) for different periods of return, including the 1, 30, and 100 years plus 20% due to the climate change. The simulation results confirmed that for all return periods up to and including the 100 years +20% CC there's no flooding risk associated with the proposed development, the downstream network and the outflow pipe to the estuary.

The site generally falls from a high point (+25mOD) at the south, falling to the north to a low point on the northern boundary of +17mOD. The risk of pluvial flooding is determined to be low due to the high elevation change within the site and its location relative to the River Lee being approximately 5m below the sites low point and being 500m away from the site boundary.

4.2. Flooding Risk from Local Drainage System Failure

The local network was designed to capture, infiltrate and discharge run-off at a controlled rate. The network was designed to manage rainfall events up to a 1-100 year event with +20% climate change. The Ballincollig Town Centre storm sewer is located within the site, flowing from a south-east to north-west direction then to the River Lee, it is proposed to be diverted for apartment blocks B&C with the local network connecting near the northern boundary. Percolation areas and blue roofs are designed with an overflow to prevent local flooding from occurring. It is determined that there is a low risk of flooding from the local network.

5.0 Justification Test

Planning guidelines on The Planning System and Flood Risk Management were published by the Department of the Environment, Heritage and Local Government (DOEHLG) in November 2009.

Given the Flood Zone (C) of the site and the proposed development, being primarily residential in nature, is classed as a highly vulnerable development in accordance with Table 3.1 of the Guidelines. Given the Sloping nature and high elevation of the site the pluvial assessment determines that risk of pluvial flooding is low, this development is considered appropriate in the flood zone C

6.0 Conclusion and Recommendations

This report has been prepared to provide a site-specific flood risk assessment for a proposed develop at Old Fort Road, Ballincollig, Cork.

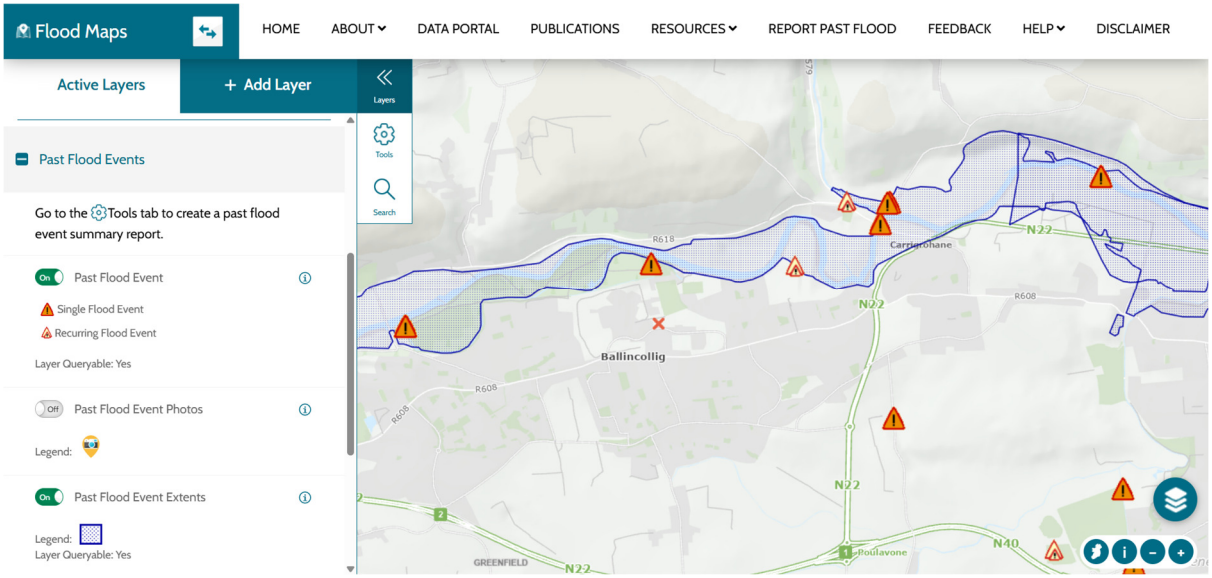
The proposed residence is classified as a highly vulnerable development in accordance with *the Planning System and Flood Risk Management Guidelines for Planning Authorities.*

The site is deemed to be within Flood Zone C for both Fluvial and Tidal Flooding,

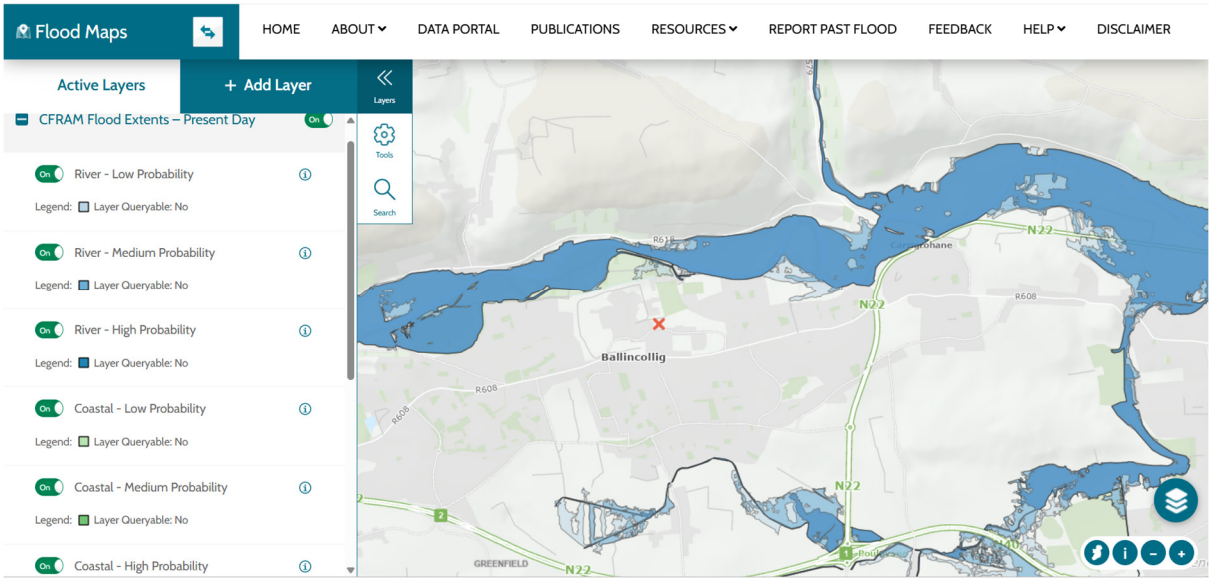
It is determined that the risk of pluvial flooding is low based on the sloping nature, the high elevation of the site and the storm water design which demonstrates no stormwater infrastructure flooding in the 1 in 100 year events with +20% climate change. This development is considered appropriate in the flood zone C.

The available data shows that the site is within Flood Zone C for Fluvial and Tidal Flooding. Given that the proposed development is classified as highly vulnerable, a justification Test has been carried out in accordance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities.* The results show that the subject development passes the Justification Test. This development is considered appropriate in flood zone C

APPENDIX A- REPORT FROM OPW NATIONAL FLOOD HAZARD MAPPING

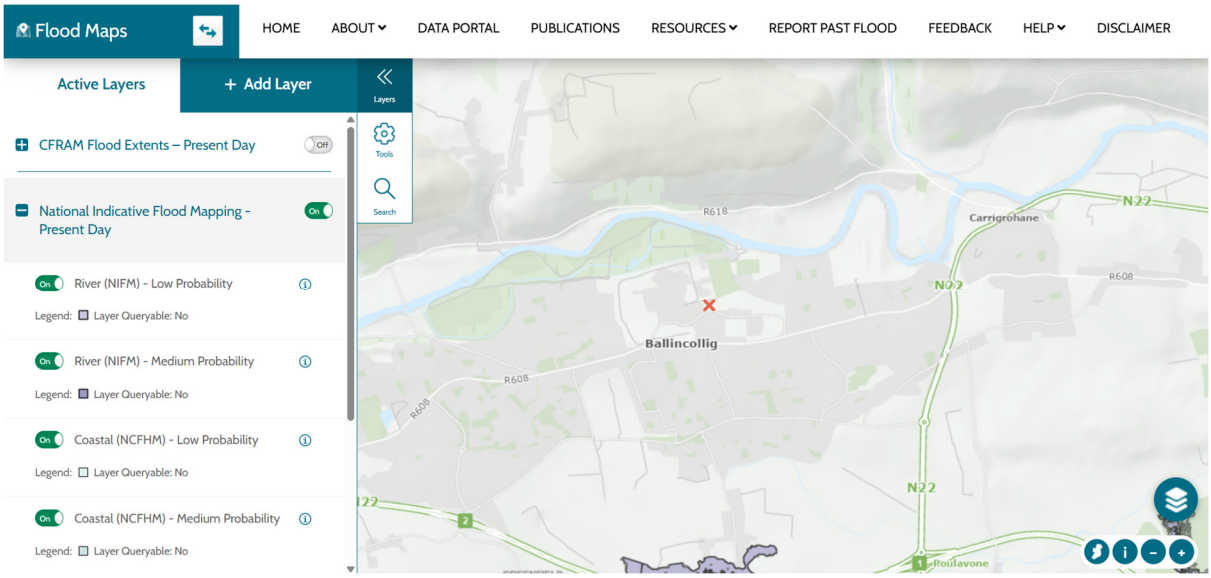


Past Flood Events & Extents



CFRAM Flood Extents

APPENDIX B- National indicative flood mapping



National Indicative Flood Mapping – Present Day