Flood Risk Assessment

Proposed LRD at Ballycullen, Dublin 16

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This document has been prepared and checked in accordance with
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Comments

Disclaimer

Content

1. Introduction

Waterman Moylan has been appointed on behalf of Lagan Homes Ballycullen Ltd to prepare this Flood Risk Assessment (FRA) on the Large Residential Development (LRD) on the lands of Ballycullen, Dublin 16. This report has been prepared as part of a planning submission to South Dublin City Council for the proposed LRD development of 502 No. residential units comprising 197 no. houses and 305 No. apartment units and a creche.

This FRA has been carried out in accordance with the Department of Housing and Local Government (DEHLG) and the Office of Public Works (OPW) document *"The Planning Process and Flood Risk Management Guidelines for Planning Authorities"* published in November 2009. This Assessment identifies and sets out possible mitigation measures against potential risks of flooding from various sources. Sources of possible flooding include coastal, fluvial, pluvial (direct heavy rain), groundwater and human/mechanical error.

In addition, a Strategic Flood Risk Assessment (SFRA) was prepared by Roughan & O'Donovan Consulting Engineers (ROD) to supplement the preparation process and review of South Dublin County Development Plan 2022-2028. This SFRA has also been consulted for the preparation of this FRA.

This report provides an assessment of the subject site for flood risk purposes only.

2. Site Description

2.1 Site Location

The site is located to the south of Stocking Avenue and west of the M50 motorway. There are existing residential developments to the North/Northeast (Stocking Wood and White Pines) and the Northwest/West (Abbots Grove). Agricultural lands are located to the south. The site location is shown in Figure 2-1 below.

Figure 2-1 Site Location

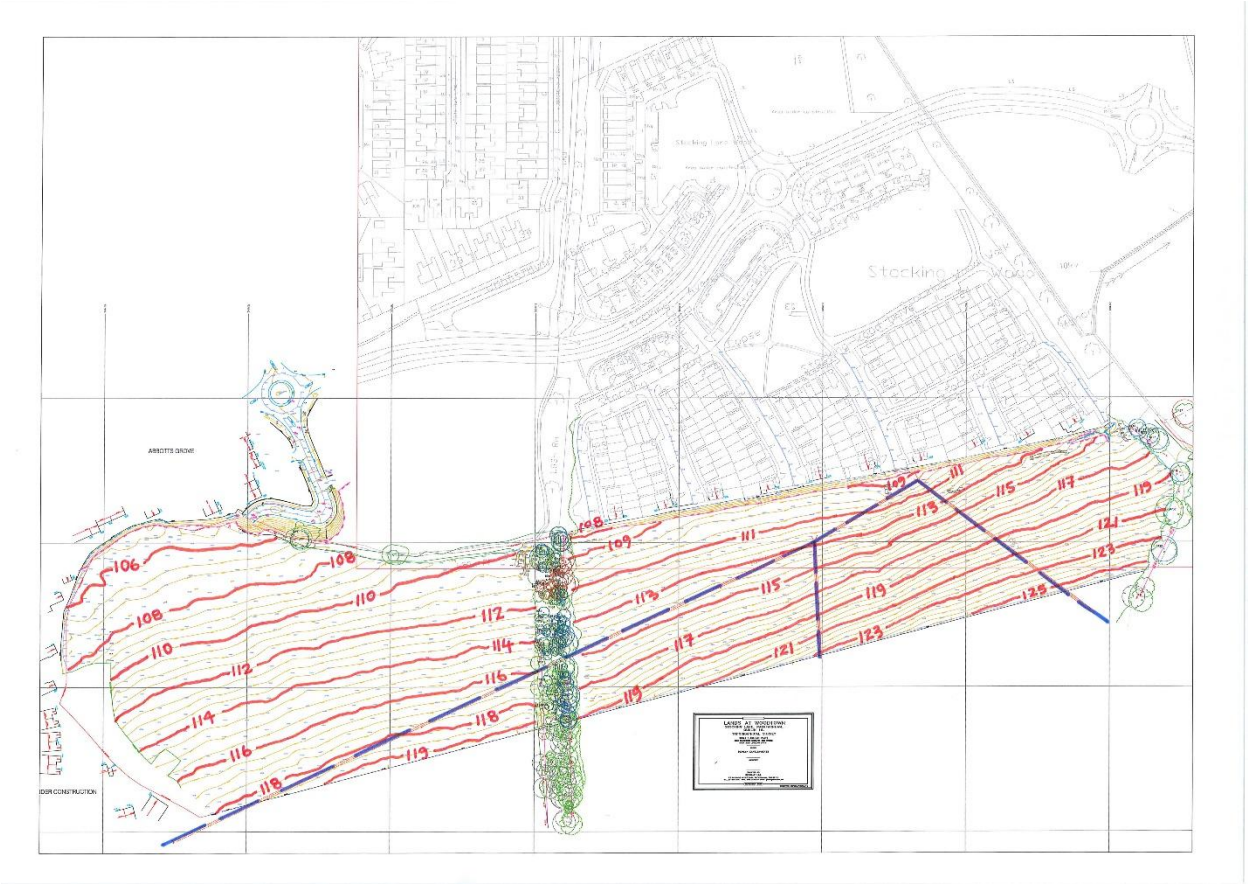
2.2 Site Description

The overall site area is approximately 10.38 ha. The site is currently greenfield as shown in Figure 2-1.

The site is very challenging in term of topography and fall steeply from south to north. It is divided by a hedgerow and watercourse which run south/north through the middle of the site.

The contours on the west side of the site fall from a high point of 119.5m to 115.5m. The east side of the site is steeper with the contours falling from a high point of 125.5m to 108m. There are also existing overhead cables crossing the site. See Figure 2-2 illustrating the existing ground contours.

Figure 2-2 Existing Ground Contours



2.3 Proposed Development

Lagan Homes Ballycullen Limited intend to make a planning application for planning permission for a Large Scale Residential Development (LRD) in the townland of Woodtown, Ballycullen, Dublin 16. The lands are located to the east of Abbots Grove Park, south-east of Abbots Grove Avenue, south of Stocking Avenue and Stocking Wood estate, and west of White Pines Park.

The proposed development will consist of 502 no. residential units (108no. 1-bed, 170no. 2-bed, 162 no. 3-bed; 62 no. 4-bed) comprising 197no. 2 storey houses (terraced/semi-detached/detached) (19no. 2-bed, 116no. 3-bed; 62no. 4-bed) and 28no. 3 and 4 storey simplex/duplex apartment blocks providing 305no. apartments (108no. 1-bed apartments, 151no. 2-bed apartments, 46no. 3-bed apartments). The proposed development also includes a crèche (c.475sq.m), public open space, car parking (surface/undercroft), bicycle parking, bicycle storage structures and lockers, bin stores, and 8no. ESB substations. Vehicular access to be provided from the existing spur road connection to Stocking Avenue to the west of the site,

and via Stocking Wood Drive to the east of the site (with relocation of existing ESB substation and associated works to the existing hammerhead). Additional pedestrian only routes will be provided into Abbot's Grove Park and Stocking Wood Copse with future connections provided for into Stocking Wood Manor, White Pines Park and the future school site to the north of the application site. The proposed development includes all associated site development works (including site reprofiling, retaining structures and downing of ESB overhead lines), landscaping, boundary treatments and services provision.

3. Flood Risk

3.1 Introduction

The components to be considered in the identification and assessment of flood risk are set out in Table A1 of the DEHLG/OPW guidelines on the Planning Process and Flood Risk Management and are summarised below:

- Tidal – flooding from high sea levels;
- Fluvial – flooding from water courses;
- Pluvial – flooding from rainfall / surface water;
- Ground Water – flooding from springs / raised ground water and
- Human/mechanical error – flooding due to human or mechanical error.

Each component will be investigated from a source, pathway and receptor perspective and the likelihood of flood occurring and the possible consequences will be assessed.

The likelihood of flooding falls into three categories; low, moderate and high, as described in the OPW Guidelines and set out in Table 1.

Table 3-1: OPW Guidelines

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

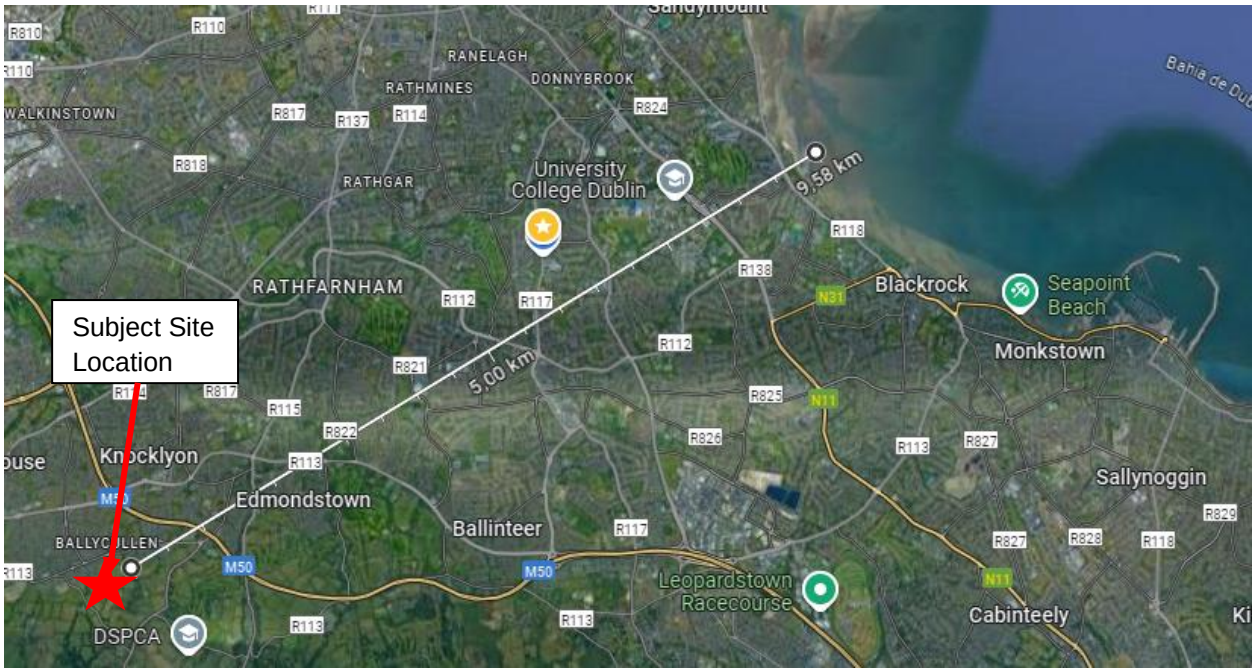
For ground water and human/mechanical error, the limits of probability are not defined and therefore professional judgment is used. However, the likelihood of flooding is still categorised as low, moderate and high for these components. The likelihood and possible consequence of each event is considered, and the risk is evaluated. Risks will be mitigated where possible and the residual risks will then be considered as part of this assessment.

This report has considered the Eastern Catchment Flood Risk Assessment & Management (CFRAM) Study and maps prepared by RPS Group Ireland for the OPW. In addition, the Strategic Flood Risk Assessment (SFRA) prepared as part of the SDCC Development Plan 2022-2028 has been considered.

3.2 Tidal – Irish Sea

Tidal Flooding is caused by elevated sea levels or overtopping by wave action. The Irish Sea is approximately 9.5km east of the subject site. The Dublin Coastal Protection Project indicated that the 2002 high tide event reached 2.95m OD Malin. The lowest level on the proposed site is 108m OD Malin. Therefore, there is no flow path from the Irish Sea to the site and the risk from tidal flooding is considered **EXTREMELY LOW** and no flood mitigation measures need to be implemented.

Figure 3-1. Subject Site Location in Relation to Irish Sea



3.3 Fluvial

Fluvial flooding is caused by rivers, watercourses or ditches overflowing. There is an existing watercourse running south to north through the middle of the site. There is also an existing watercourse running along the eastern boundary of the site adjacent to White Pines.

Figure 3-2 below gives an extract from floodinfo.ie as there are no existing PDF printable CFRAM maps that cover the subject site area. The layers activated on the website include the following:

- CFRAM River Flood Extents (Low, Medium and High Probability)
- National Indicative Fluvial Mapping (Low and Medium Probability)

Figure 3-2. Extract from floodinfo.ie

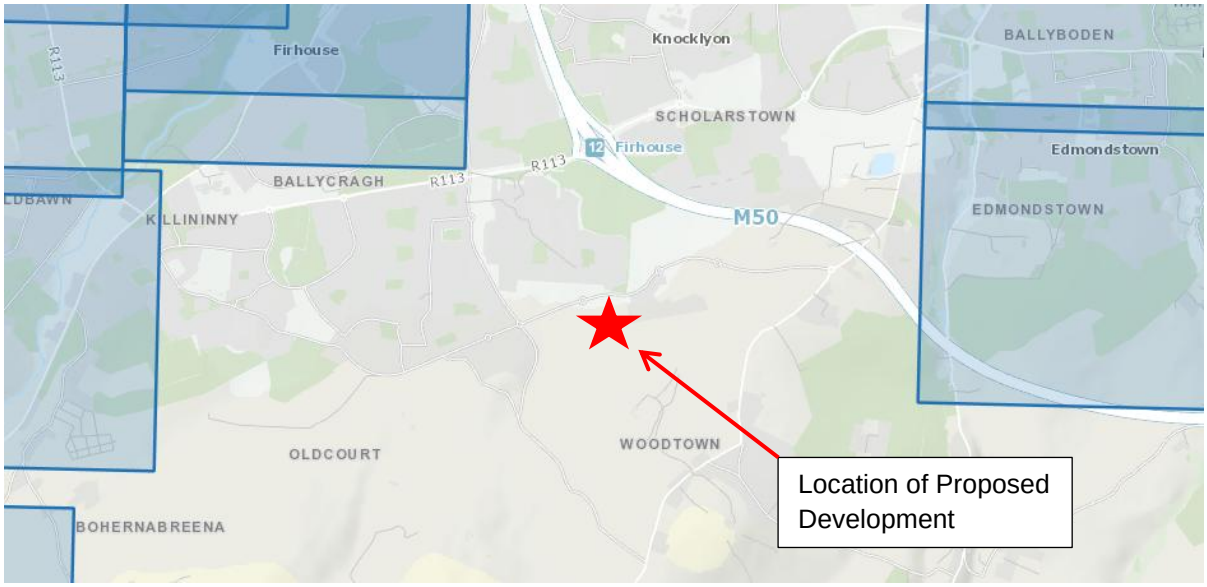
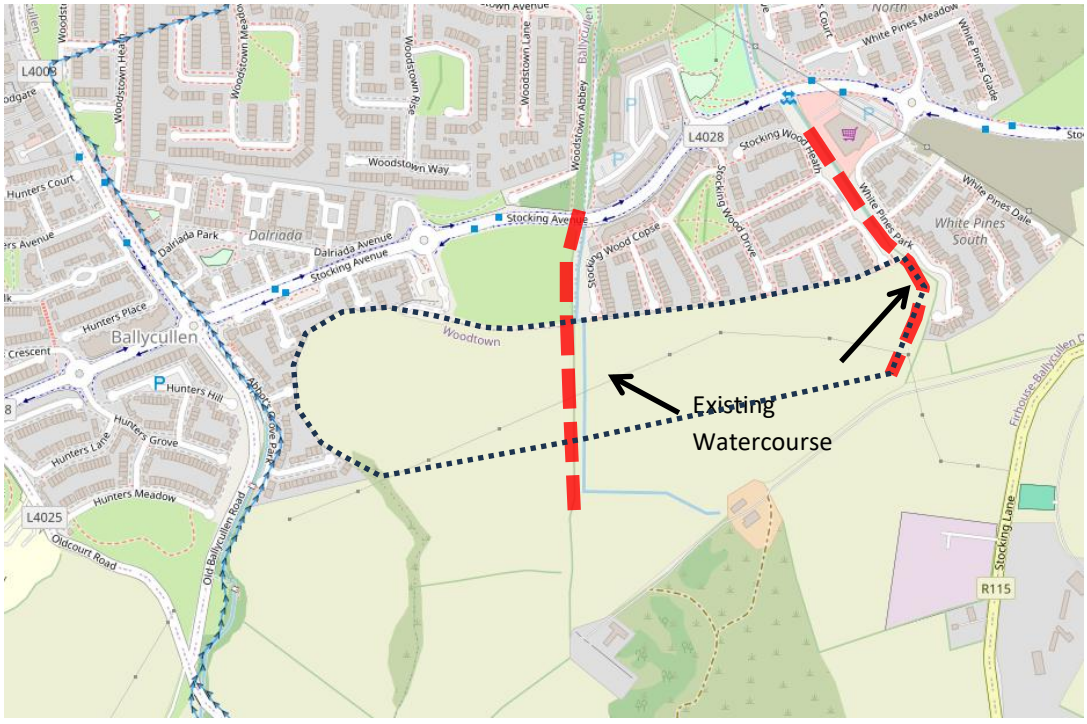


Figure 3-3 Existing minor watercourses adjacent to the site



The SPFRA (Strategic Flood Risk Assessment) prepared for the SDCC Development Plan (2022-2028) provides a detailed analysis of flood risks in the region. Section 4.2 of the assessment identifies key areas at risk of flooding, one of which is Ballycullen – Oldcourt.

This area is affected by flooding from the Dodder River and its tributaries, including the Orlagh, Ballycullen Stream, and Jobstown Stream, impacting regions south of the Tallaght Bypass, west of Balliharcorney Road/Firhouse Road, and areas both north and south of Killiney Road (west of the Southern Cross Route). Additionally, flooding from the Owenadoher River and its tributaries affects areas along Cruagh Road (south of the Southern Cross Route) and near the junction of Edmondstown Road, Ballyboden Way, and Taylors Lane. However, based on Figure 4.9 of the SFRA, the proposed lands are not be at risk of fluvial flooding and therefore the risk from fluvial flooding is considered **LOW.** See extract below.

Figure 3-4 Indicated flood risk areas and Riparian Corridors (in pink) for Ballycullen - Oldcourt

3.4 Pluvial

Pluvial flooding is from heavy rainfall and is often referred to as flooding from surface water. Surface water flooding can occur as a result of overland flow or ponding during periods of extreme prolonged rainfall. Flooding may occur through any of the pathways outlined in Table 2 and the risk associated with each pathway is outlined below.

Table 3-2: Pathways/Receptors

	Pathway	**Receptor**
1	Surcharging of the proposed internal drainage systems during heavy rainfall events leading to internal flooding	Proposed development –Buildings
2	Surcharging from the existing surrounding drainage system leading to flooding within the subject site by surcharging surface water pipes	Proposed development – Buildings
3	Surface water discharging from the subject site to the existing drainage network leading to downstream flooding	Downstream properties and roads
4	Overland flooding from surrounding areas flowing onto the subject site	Proposed development – Buildings
5	Overland flooding from the subject site flowing onto surrounding areas	Downstream properties and roads

3.4.1 On-site drainage system surcharging

The proposed on-site surface water drains have been modelled for storms up to and including its 1 in 100 year + 20% climate change storm level as demonstrated by the flow model prepared for the development. This was submitted under separate cover in the Engineering Assessment Report. There are several detention basins on-site with top water levels higher than the proposed finished floor levels (FFLs) for the units located to the north of the site. To address this, footpath levels and overland flow routes have been carefully designed to ensure that any overflow from the detention basins is diverted away from building entrances. Due to the mitigation proposed, **the residual risk is LOW**.

3.4.2 Flooding from the existing surrounding drainage system surcharging

There is no development upstream of the proposed site, and no flow path exists from the existing developments to the east, west, or north. Therefore, the likelihood of flooding is low. Considering the low likelihood and the medium to severe consequences of flooding from the existing surface water network, the overall resultant risk is **LOW**.

There have been no recorded sewer flooding events in the immediate vicinity of the site. The surface water drainage from the proposed development will be attenuated on site and will have a restricted outflow to the public surface water sewer, reducing the rate of run-off to the sewer and further reducing the risk of the sewer surcharging. Therefore, the likelihood of flooding due to surcharging the existing drainage network is considered **LOW**.

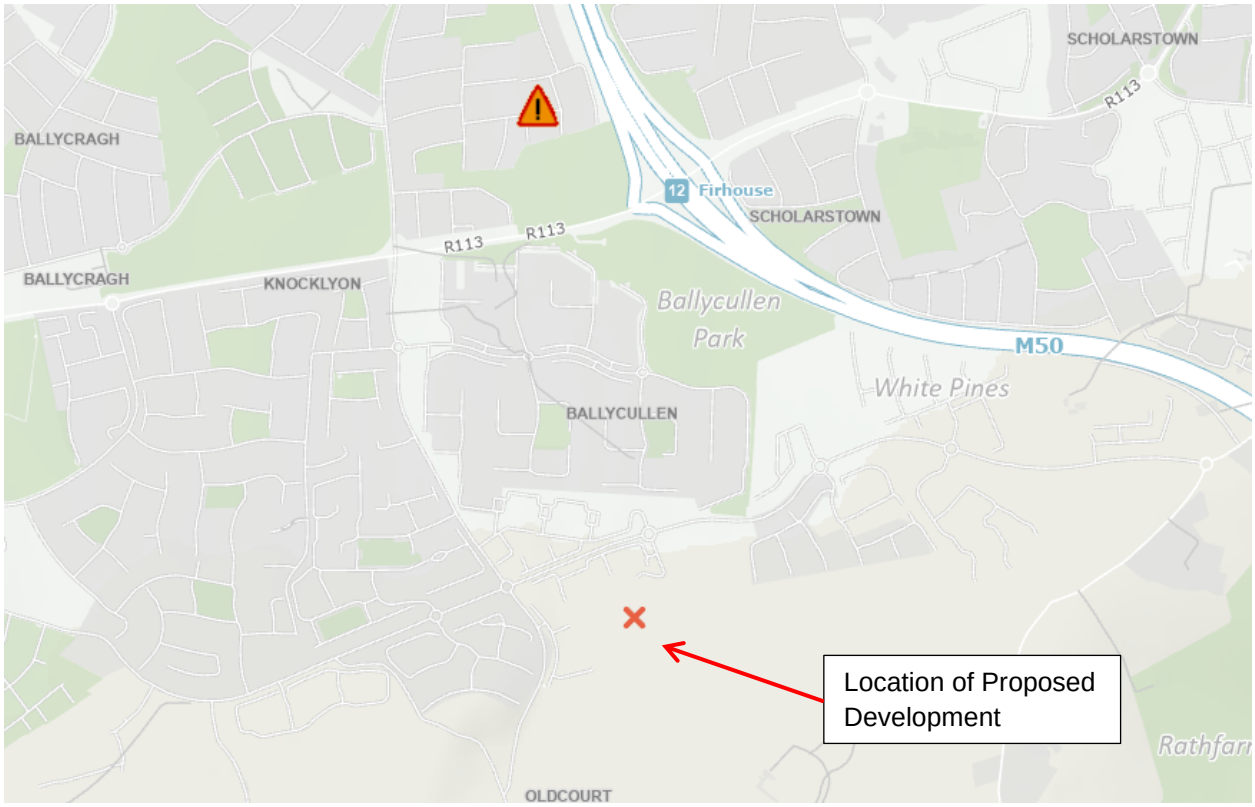
3.4.3 Surface water discharge from the subject site causing downstream flooding

The site is currently greenfield and the proposed development, as designed, will increase the impermeable area on site. The use of permeable paving, detention basins, and swales will help reduce the volume of run-off from the site during low storm events. In addition, surface water discharging from the development will be limited by Hydro-brake with a peak discharge that is equal to the greenfield runoff of the site. This will reduce the effects of the development on the local existing drainage network reducing the risk of downstream flooding. The likelihood of the proposed development resulting in pluvial flooding downstream of the site is therefore considered **LOW**.

3.4.4 Overland flooding from surrounding areas

A map showing all flood events within close proximity of the subject site is provided below in Figure 3-5. There is 1 instance of flooding on Castlefield and Glenvara to the northeast of the site. Upon investigation, these events occur due to overtopping of the Ballycullen Stream. The flooding occurred once in October 2011 only. The subject development is at a higher level than the section of Castlefield and Glenvara subject to flooding. Post development there could be a residual risk of overland flooding from the greenfield agricultural land to the south of the site during high storm events. To mitigate this risk, a filter drain with a perforated pipe will be installed to discharge overland runoff into the existing stream located at the centre of the site, preventing it from entering the development area. Consequently, the likelihood of flooding from surrounding areas is considered to be low.

Figure 3-5. Past Flood Events



3.4.5 Overland flooding from the subject site

As noted in 3.4.1, there are several detention basins on-site with top water levels higher than the proposed finished floor levels (FFLs) for the units located to the north of the site. To address this, footpath levels and overland flow routes have been carefully designed to ensure that any overflow from the detention basins as a result of blockages or storm events is excess of the/in 100 + 20% climate changes events is diverted away from building entrances. Building maintenance will be responsible for ensuring the gullies and channels are kept free of debris and landscaping within detention basin are well maintained and therefore, the risk to both the development and the surrounding areas from overland flooding from the development is considered **LOW**.

3.5 Groundwater

A site investigation for the subject site was carried out in 2006. Groundwater was not found onsite during this site investigation. Considering this and the natural topography on site, the risk of flooding from groundwater is considered **LOW**.

3.6 Human / Mechanical Errors

According to the drainage drawing, storm water outfalls to the existing stream and an existing surface water pipe within the spur road to the north west of the site. This internal surface water network is a source of possible flooding if the system were to block.

To mitigate the risk of flooding from blockages the surface water network must be regularly maintained and where required cleaned out. During the operational stage, the building management team will be expected to prepare and follow a maintenance schedule which ensures all drainage is checked and cleared at least annually and after a heavy storm event. It will also be the responsibility of the site construction team to ensure that all drainage systems are kept clear for the duration of construction.

Swales, permeable paving and catch-pit gullies and manholes will be provided to minimise the volume of debris entering the drainage system and mitigate the risk of flooding. Upon adoption of the proposed flood risk management strategies, outlined above, there is a **LOW** residual risk of overland flooding from human/mechanical error.

4. Conclusions and Recommendations

The subject site has been analysed for risks from tidal flooding from the Irish Sea, fluvial flooding from the adjacent watercourses, pluvial flooding, groundwater and drainage system failures due to human error or mechanical system failure.

Table 4-1 below presents the various residual flood risks involved. As the flood risk from all sources can be mitigated, reducing the flood risk to low or extremely low, the proposed development is considered acceptable in terms of flood risk.

Table 4-1 Summary of the Flood Risks from each flooding type.

Source	Pathway	Receptor	Likeli-hood	Consequence	Risk	Mitigation Measure	Residual Risk
Tidal	Irish Sea Coastal zone	Proposed Development	Extremely Low	High. Flooding of buildings	n/a	None required	**Extremely Low**
Fluvial	Adjacent watercourses	Proposed Development	Low	Moderate. Water ingress into the buildings	Low	Appropriate FFLs set for all buildings.	**Low**
Pluvial	Private and Public Drainage Network	Proposed Development	High	High. Flooding of the buildings	Extremely High	Appropriate drainage design, over land flood routing and setting of appropriate floor levels	**Low**
Ground Water	Groundwater seeping through ground	Proposed Development	High	Moderate. Ground water ingress into buildings	Moderate	Adequately waterproofing of structures if found necessary	**Low**
Human / Mechanical Error	Drainage network	Proposed Development	High	Moderate. Water ingress into the buildings	Moderate	Maintenance strategy	**Low**

UK and Ireland Office Locations