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Housing Development at the Boylan Centre

Flood Risk Assessment

Curtins Ref: 088035-CUR-00-XX-RP-C-00002

Revision: P01

Issue Date: 23 February 2026

Client Name: Dun Laoghaire Rathdown County Council

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Control Sheet

Rev	Description	Checked	Issued	Date
P01	First Issue	KF	PB	23/02/2026

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1.0 Introduction

This Flood Risk Assessment has been prepared by Curtins as part of the Part 8 Planning application for the Proposed Community Facility & Housing Development at Sussex Street & Eblana Avenue, Dun Laoghaire, Co. Dublin

The development will comprise:

Proposed demolition of community building at 10 Eblana Avenue and demolition of community and commercial building and removal of on-street parking at 10 Sussex Street. Construction of a new community facility and housing development comprising of 39nr. 1-bed apartments, 16nr. 2-bed apartments and 4nr. 3-bedroom houses and provision of 1nr. accessible parking space, an accessible drop-off area, 66nr. cycle parking spaces and all associated site works on Sussex Street and Eblana Avenue, Dún Laoghaire, Co. Dublin

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 System and Flood Risk Management Guidelines for Planning Authorities”, published in November 2009. This Flood Risk Assessment references the Hydrology Report Eastern CFRAM UoM09. This Assessment identifies and sets out possible mitigation measures against potential risks of flooding from various sources. Sources of possible flooding includes coastal, fluvial, pluvial (direct heavy rain), groundwater and human/mechanical error.

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

2.0 Site Description

2.1 Site Location

The proposed development site is at Eblana Avenue and Sussex Street in Dun Laoghaire, Co. Dublin. This location is less than 100 meters from George's Street Lower and Marine Road, two busy main streets in Dun Laoghaire that are well-served by public transport and bus routes. The surrounding area is primarily a mix of residential and retail spaces.

The boundary of the proposed development site is shown below.

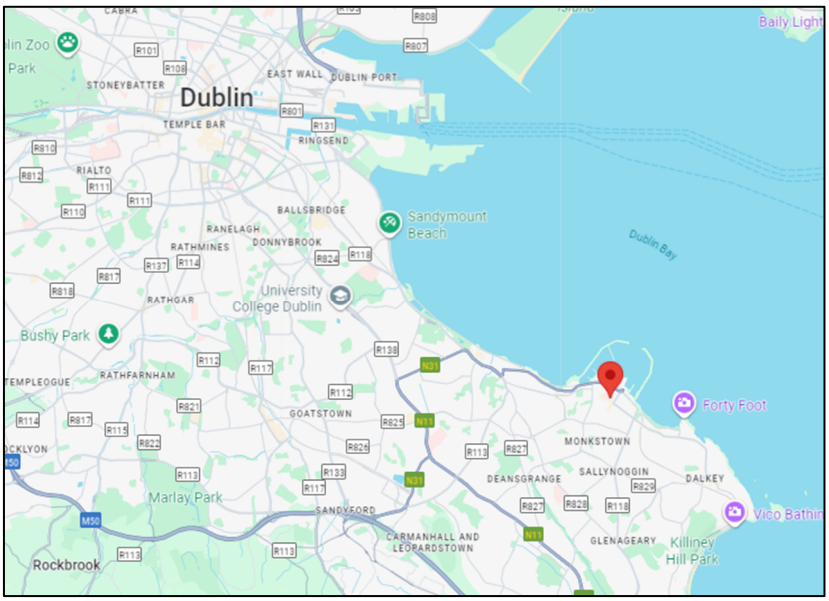

Figure 2.1 – Site Location (Source: Google Maps)

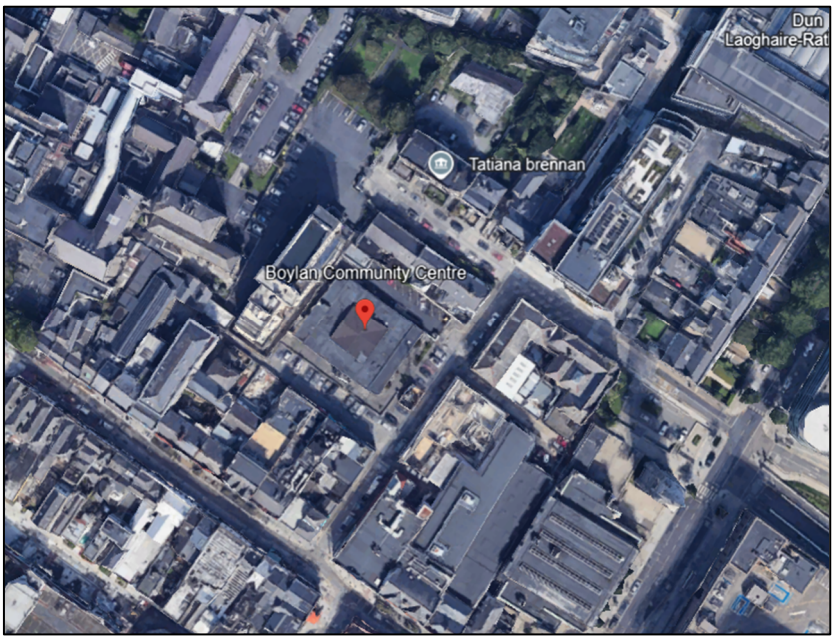

Figure 2.2 – Site Location (Source: Google Earth)

3.0 Proposed Development

The project site is located off Sussex Street and Eblana Avenue, Dún Laoghaire, with an approximate area of 0.25 hectares. It is bounded by:

- Sussex Street to the east.
- Eblana Avenue and neighbouring residential units to the north.
- St. Michael's Hospital grounds to the west.
- An access road to the south.

The site currently provides 25 Surface car parking spaces with vehicular access from Sussex Street

3.1 Proposed Works Summary.

Proposed demolition of community building at 10 Eblana Avenue and demolition of community and commercial building and removal of on-street parking at 10 Sussex Street. Construction of a new community facility and housing development comprising of 39nr. 1-bed apartments, 16nr. 2-bed apartments and 4nr. 3-bedroom houses and provision of 1nr. accessible parking space, an accessible drop-off area, 66nr. cycle parking spaces and all associated site works on Sussex Street and Eblana Avenue, Dún Laoghaire, Co. Dublin

An initial phase of enabling works will be undertaken by Dún Laoghaire–Rathdown County Council (DLRCC) to reduce contractual risks for the main construction. These enabling works will involve the demolition of community building at 10 Eblana Avenue and demolition of community and commercial building and removal of on-street parking at 10 Sussex Street.

The developed scheme is designed to integrate with the existing urban fabric, help activate the town centre and provide a range of housing options in a sustainable location. It is consistent with the County Development Plan objectives (including SLO 73) and DLRCC's strategy for town-centre densification and compact growth.

4.0 Flood Risk

4.1 Introduction

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

- Tidal – flooding from high sea levels.
- Fluvial – flooding from watercourses.
- Pluvial – flooding from rainfall / surface water.
- Ground Water – flooding from springs / raised ground water.
- 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.

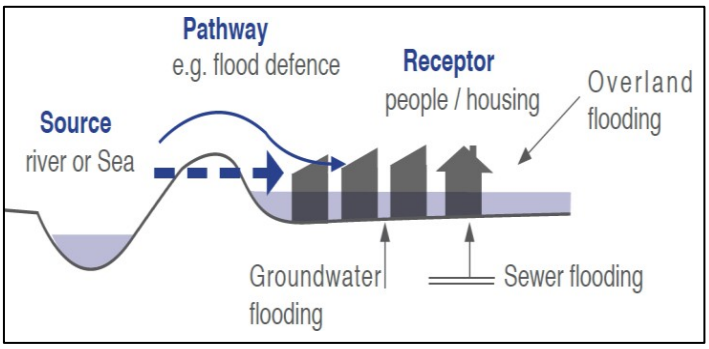

Figure 4.1 – Source-Pathway-Receptor S-P-R Model

The likelihood of flooding falls into three categories; low, moderate and high, as described in the OPW Guidelines and set out in Figure 4-1.

Table 4.2 – 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

Note: Probability denotes likelihood of occurrence in a given 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 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 System and Flood Risk Management Guidelines for Planning Authorities" published in November 2009.

4.2 Assessing consequence

There is not a defined method used to quantify a value for the consequences of a flooding event. Therefore, in order to determine a value for the consequences of a flooding event, the elements likely to be adversely affected by such flooding will be assessed, with the likely damage being stated, and professional judgement will be used in order to determine a value for consequences. Consequences will also be categorised as low, moderate, and high.

4.3 Assessing Risk

Based on the determined 'likelihood' and 'consequences' values of a flood event, the following 3x3 Risk Matrix will then be referenced to determine the overall risk of a flood event.

Table 4.3 – Risk Matrix

		CONSEQUENCES		
		LOW	MODERATE	HIGH
LIKELIHOOD	LOW	Extremely Low Risk	Low Risk	Moderate Risk
	MODERATE	Low Risk	Moderate Risk	High Risk
	HIGH	Moderate Risk	High Risk	Extremely High Risk

4.4 Dun Laoghaire Rathdown Strategic Flood Risk Assessment (2022-2028)

The Dun Laoghaire Rathdown County Development Plan 2022 – 2028 [iii] includes a Strategic Flood Risk Assessment report and maps prepared by Dun Laoghaire Rathdown. Figure 4.1 extracted from the report, shows that the subject site is located in Flood Zone C [iv] which indicates a low probability of flooding from fluvial or tidal sources.

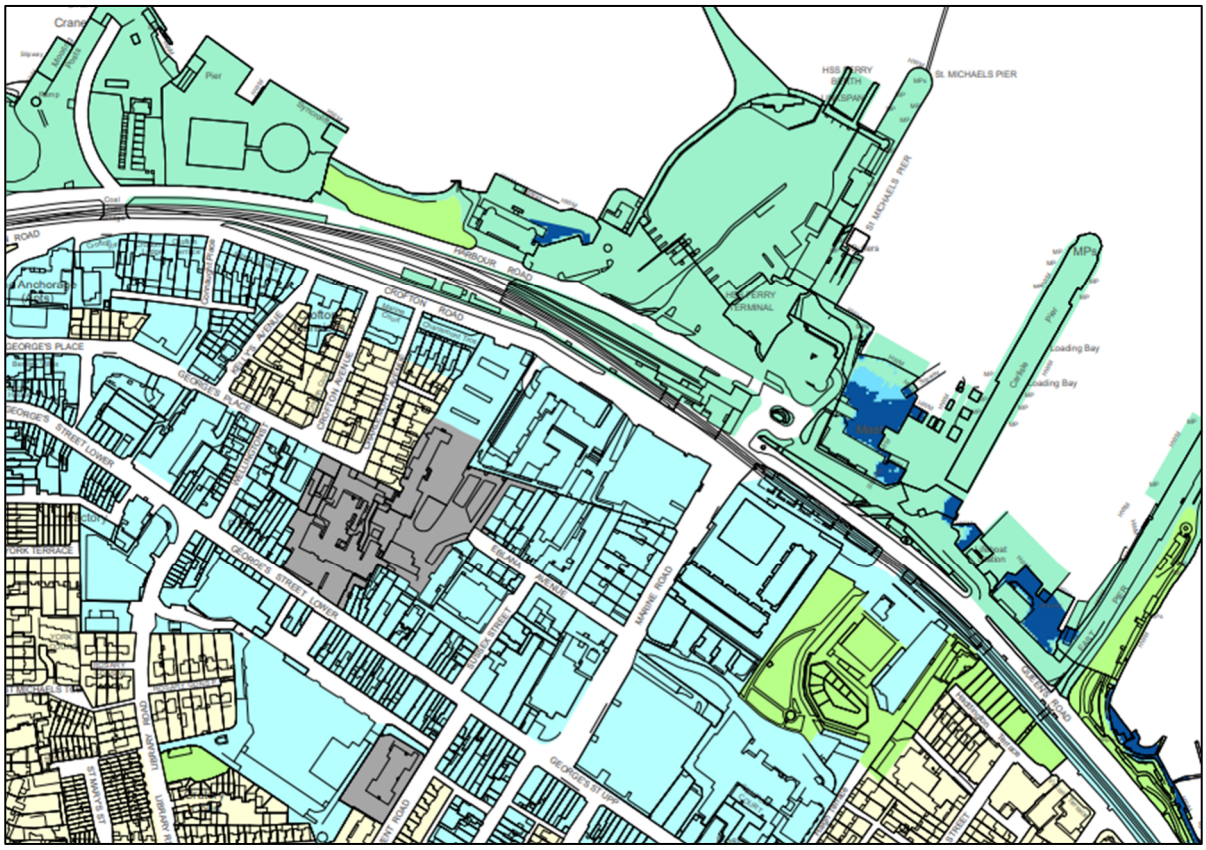

Figure 4.4 – Flood Zone Map Page 3 (Source: Dun Laoghaire Rathdown County Development Plan (2022 – 2028)

Table 4.3 below shows Table 1-2 of The Planning System and Flood Risk Management Guidelines for Planning (2009) which provide three vulnerability categories based on the type of development. As the proposed is located in Flood Zone C, it is considered an appropriate development and is not required to meet the Justification Test.

Table 4.5 – Matrix of Vulnerability (Dublin County Council Strategic Flood Risk Assessment (2022-2028)

	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

4.5 Tidal – Irish Sea

Tidal flooding is caused by elevated sea levels or overtopping by wave action. The Irish Sea is approximately 835 metres north-east of the subject site.

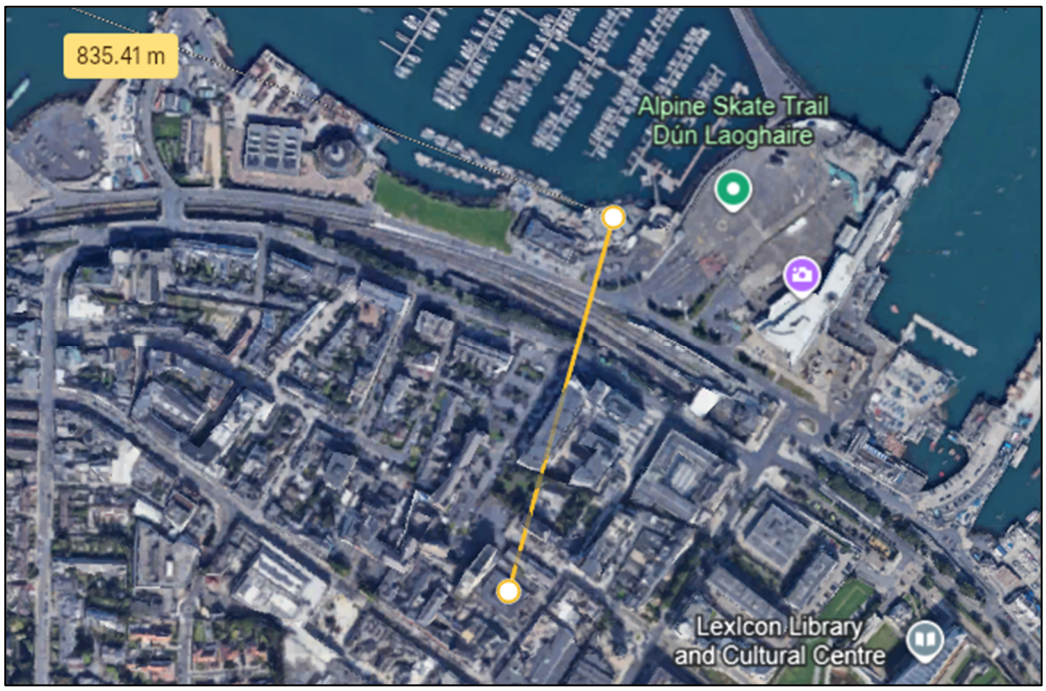

Figure 4.6 – Distance from the site to the Irish Sea Bank Source (Google Earth)

The Dublin Coastal Protection Project indicated that the 2002 high tide event reached 2.95 OD Malin. The existing and proposed site levels for the subject site are between 17.15 m and 18.50 m, with the lowest proposed FFL set out at 17.20 m OD Malin. The lowest site level is thus 17.15m above the highest tide recorded in the Dublin Coastal area.

The site is located c. 300 m inland from the Irish Sea and the site levels exceed the highest ever recorded or projected tide in the area. In addition, there is no coastal flooding indicated on the OPW map; therefore, the risk from tidal flooding is considered extremely low and no flood mitigation measures need to be implemented.

4.6 Fluvial

Fluvial flooding is caused by rivers, watercourses or ditches overflowing. Upon review of the Environmental Protection Agency (EPA) online maps there is no rivers or watercourses in the vicinity of the development site.

Figure 4.7 – Proposed Development Location (Source: Environmental Protection Agency (EPA) Online GIS Map)

The subject site has no available OPW CFRAM fluvial maps and has not been identified as an “Area for Further Assessment”.

However, as noted in Chapter 3.2 of this report, the Strategic Flood Risk Assessment indicates that the subject site is located in Flood Zone C and therefore has a low probability of fluvial flooding.

Figure 4.8 – OPW CFRAM Fluvial, Coastal, Fluvial & Coastal Maps (Source: Floodinfo.ie)

4.7 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 4.4 and the risk associated with each pathway is outlined below.

Table 4.9 – Pathways/Receptors

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

The consequence of surface water flooding arising from the 5 pathway types would result in medium to severe damage to roads and properties.

4.8 On-site drainage system surcharging

The proposed on-site surface water drainage system will be designed and modelled to accommodate storm events up to and including a 1 in 100-year storm with a 20% allowance for climate change. One underground attenuation tank is proposed, providing storage capacity for 100-year storm events + 20% climate change allowance, which are 500mm lower than the proposed finished floor levels (FFLs) of the units. With these mitigation measures in place, the residual risk of flooding is assessed to be LOW.

4.9 Flooding from the existing surrounding drainage system surcharging

A review of the available OPW Flood maps was completed to review any sources of Pluvial flooding in the vicinity of the development site. Based on this review as can be seen in Figure 4.4 below there is no recorded instances of pluvial flooding in the area, therefore the risk is considered low.

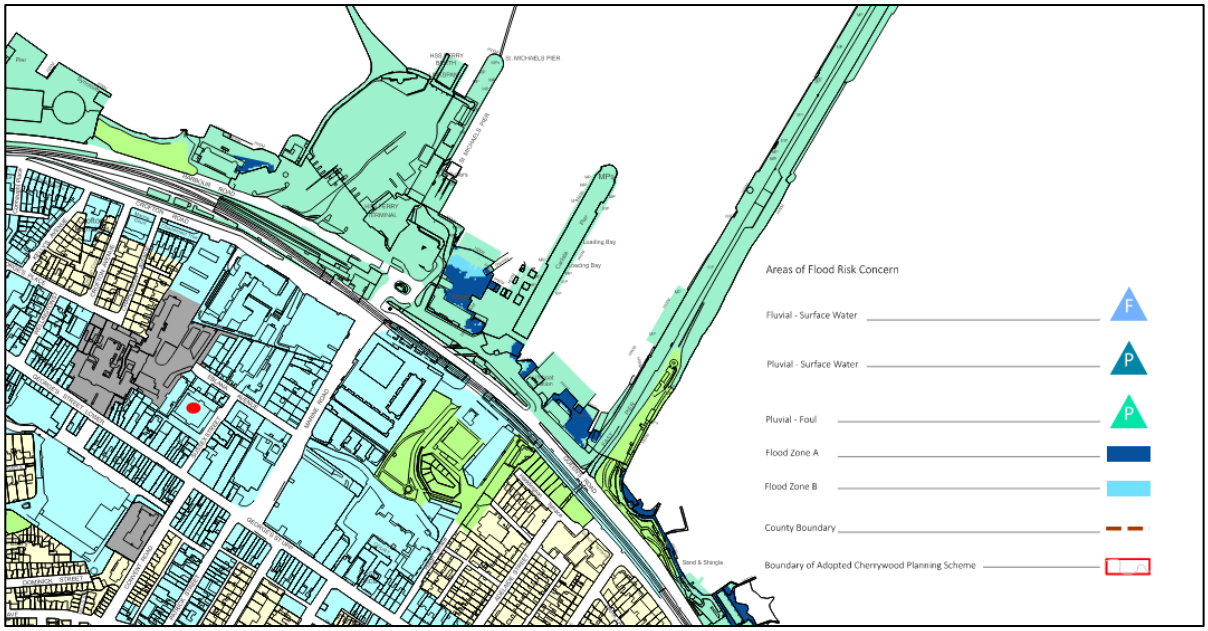

Figure 4.10 – Flood Zone Map Page 3 (Source: Dun Laoghaire Rathdown County Development Plan (2022 – 2028)

4.10 Surface water discharge from the subject site causing downstream flooding

The proposed site is a brownfield site with a number of existing services and backfill material beneath the sites. The proposed development will decrease the hardstanding area in the site, and the proposed surface water and SUDS design shall restrict the post-development runoff rates to the greenfield runoff rate.

The proposed SUDS strategy includes green roofs, permeable paving in the car parking, filter drains and an attenuation tank. Surface water discharge from the development will be restricted by a hydrobrake to a peak discharge equal to or less than the greenfield rate before discharging to the public surface water sewer. This will reduce the effects of the development on developments downstream of the site.

Considering the ongoing survey works to assess the condition of the existing drainage, the commitment to carrying out upgrade and enabling works, where necessary, and the proposed SuDS

Strategy for the development, the likelihood of the proposed development resulting in pluvial flooding downstream of the site is therefore considered LOW.

4.11 Overland flooding from surrounding areas

The OPW Past Flood Event Local Area Summary Report identifies all flood events within the immediate vicinity of the subject site, refer to Figure 4.6 for an extract of this information.

There are several past flood events within a 2.5 km radius of the subject site, however, none of these events encroach on the proposed development site. It is therefore considered that there is a low likelihood of flooding from surrounding areas.

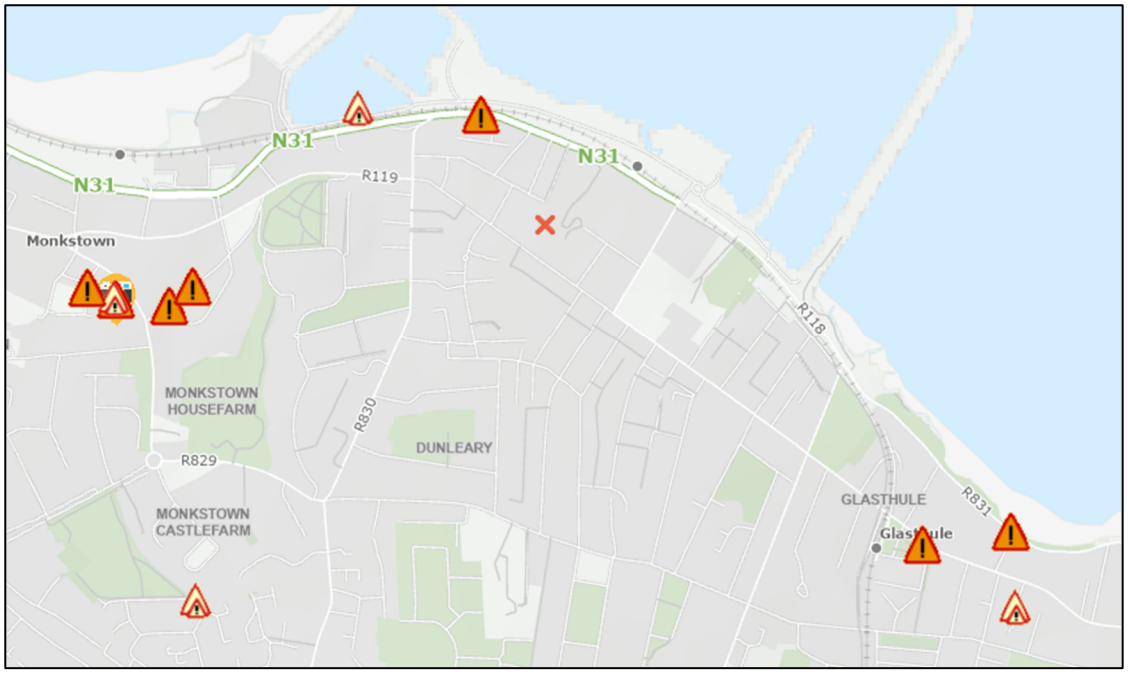

Figure 4.11 – Flood events in the surroundings of the proposed development

4.12 Overland flooding from the subject site

Appropriate drainage will be provided to collect rainwater and discharge to the SUDS system before finally discharging into the existing combined water sewer network at the greenfield runoff rate. The levels on site will be designed to ensure any overland flooding which occurs as a result of poor maintenance will be directed along the hardstand areas and will not enter the properties. Therefore, the risk to the development of overland flooding is considered low.

4.13 Groundwater

There is no known history of ground water / springs seeping through the ground in this area. Details can be found in Figure 4.7 as below:

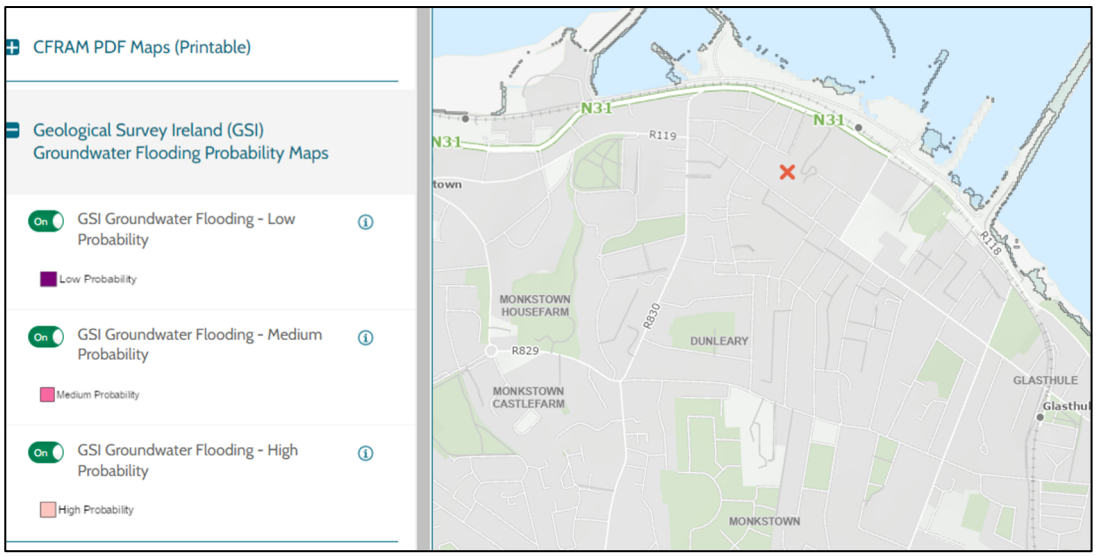

Figure 4.12 – Groundwater Flooding Probability Maps

As can be seen, no incidents of groundwater flooding have been recorded at the subject site. However, groundwater can rise and cause potential flooding on site during prolonged wet periods. The consequence of groundwater flooding would be some minor temporary seepage of groundwater through the ground around the proposed buildings and landscaped areas. There is a low risk of groundwater flooding.

Any SUDS features being installed to within 1m depth recorded groundwater levels will be lined with an impermeable membrane. This will prevent the ingress of groundwater into SUDS features which would cause SUDS features to flood and surcharge the surface water drainage network. Upon implementing the above measures, there is an extremely low residual risk of flooding from groundwater.

4.14 Human / Mechanical Errors

The subject lands will be drained by an internal private stormwater drainage system which discharges into the existing combined water network via flow control devices. This internal surface water network is the source of possible flooding from the system if it were to block.

If the proposed private drainage system blocks this could lead to possible flooding within the private areas, with the dwellings and roads as receptors.

Levels on site have been designed such that in the event of the surface water system surcharging, surface water can still escape from the site by overland flood routing without damaging properties. The surface water network would need to be unblocked and maintained should a blockage occur. The surface water network must also be regularly maintained and where required cleaned out. The development management company 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. In addition, all of the on- site SUDS features must be maintained to prevent excessive overgrowth resulting in a loss of storage volume within the SUDS components.

As a result of the flood risk management outlined above, there is a low residual risk of overland flooding from human / mechanical error.

5.0 Conclusions and Recommendations

The subject site has been analysed for risks from tidal and fluvial flooding, pluvial flooding, groundwater, and drainage system failures due to human error or mechanical system failure. Table 5.1 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 very low, the proposed development is considered acceptable in terms of flood risk.

Table 5.1 – Summary of the Flood Risks from each flooding type

Source	Pathway	Receptor	Likelihood	Consequence	Risk	Mitigation Measure	Residual Risk
Tidal	None	Proposed Development	Low	None	Negligible	None	**Negligible**
Fluvial	None	Proposed Development	Low	None	Negligible	None	**Negligible**
Pluvial	None	Proposed Development	Low	None	Negligible	None	Negligible
Ground Water	Ground	Proposed Development	Low	Medium. Saturation of the surrounding grounds during long rainfall periods	Low risk of minor saturation of the area around the development	Appropriate drainage design, overland flood routing and setting of floor levels	**Negligible**
Human / Mechanical Error	Drainage network	Proposed Development	High	Medium. Surcharging of surface water network resulting in flooding of the property	Medium risk of minor damage to dwellings	Appropriate drainage design, overland flood routing and setting of floor levels	**Low**

6.0 References

[i] The Planning System and Flood Risk Management.pdf

[ii] The Planning System and Flood Risk Management Guidelines for Planning Authorities.pdf

[iii] County Development Plan 2022-2028.pdf

[iv] Flood zones are defined in accordance with paragraph 2.23 of The Planning System and Flood Risk Management.