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Flood Risk Assessment

Phase 2 Proposed Development at Tandy's Lane Village, Adamstown, Co. Dublin

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1. Introduction

This Flood Risk Assessment (FRA) has been prepared by Waterman Moylan Consulting Engineers, on behalf of Quintain Developments Ireland Ltd., in support of a planning application to South Dublin County Council for a Phase 2 proposed residential development at Tandy's Lane Village, located within the Adamstown Strategic Development Zone (**ASDZ**), Co. Dublin.

This report has been prepared as part of a planning application for the development that comprises of 352 No. dwellings in a mixture of terraced and detached houses that are distributed between two sites, namely the western site (8.06 hectares) and the eastern site (2.18 hectares).

The subject site covers the second phase of a larger residential development scheme by the client, where the first phase includes residential units currently under construction between the western and eastern sites under planning Reg Ref SDZ19A/0011.

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 Flood Risk Assessment references the Eastern CFRAM Study Catchment Analysis. 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.

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

2. Site Description

2.1 Site Location

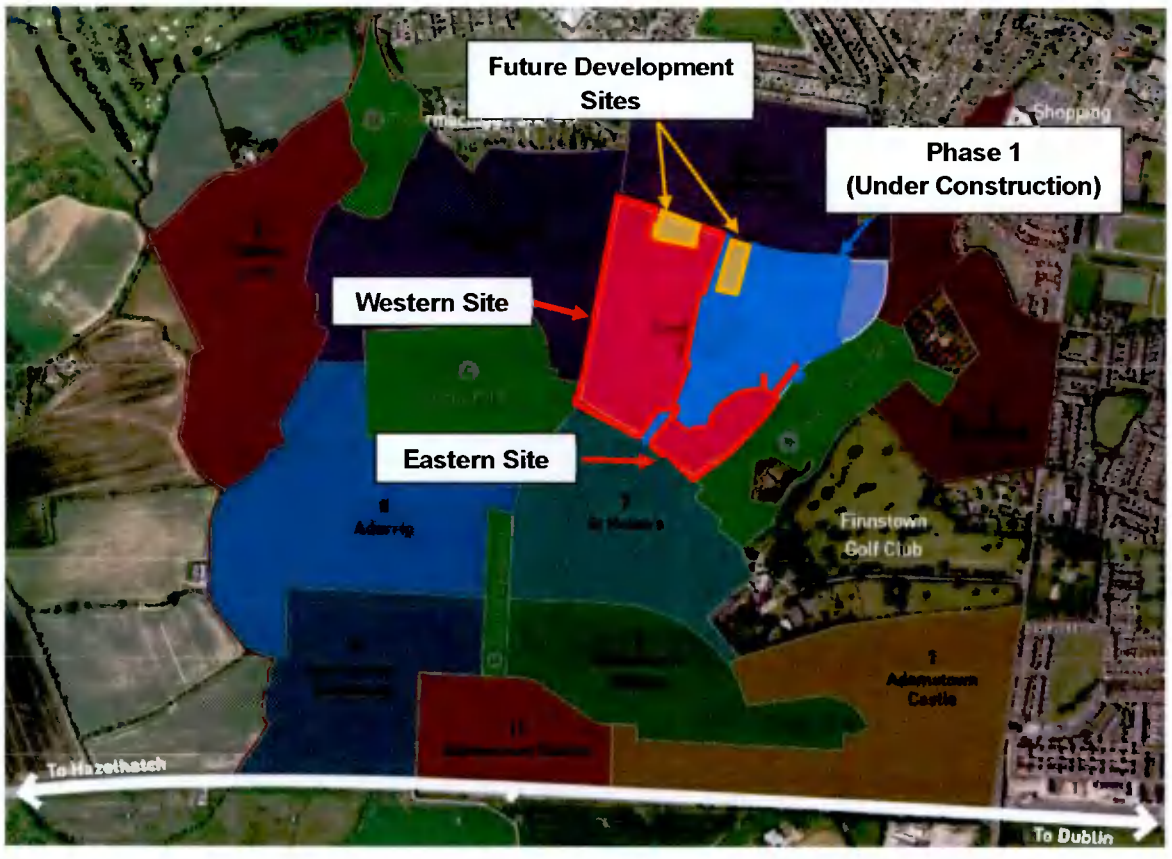
The development lands are located within the Tandy's Lane Village Development Area 6 of the Adamstown Strategic Development Zone (ASDZ) and is situated 2 No. sites separated by the permitted Tandy's Lane Phase 1 Development (SDCC Reg. Ref. SDZ19A/0011) with a total site area of c. 10.24 hectares at Tandy's Lane, in the townlands of Doddsborough and Finnstown, Adamstown, Lucan, Co. Dublin.

The western site (8.06 hectares) is generally bounded to the west by Adamstown Boulevard, to the north by Adamstown Drive (L1030), to the east by the Tandy's Lane Phase 1 Development which is currently under construction (SDCC Reg. Ref. SDZ19A/0011) and undeveloped lands, and to the south by Tandy's Lane which links Adamstown Boulevard with Adamstown Park Road.

The eastern site (2.18 hectares) is generally bounded to the west / north-west by the permitted Tandy's Lane Phase 1 Development, to the east by Adamstown Park Road and to the south by Tandy's Lane.

Figure 2-1 below shows the Tandy's Lane Village Development Area 6 and subsequent phases. For the exact site location please refer to the accompanying architects' drawings.

Figure 2-1: Site Location



2.2 Existing Development

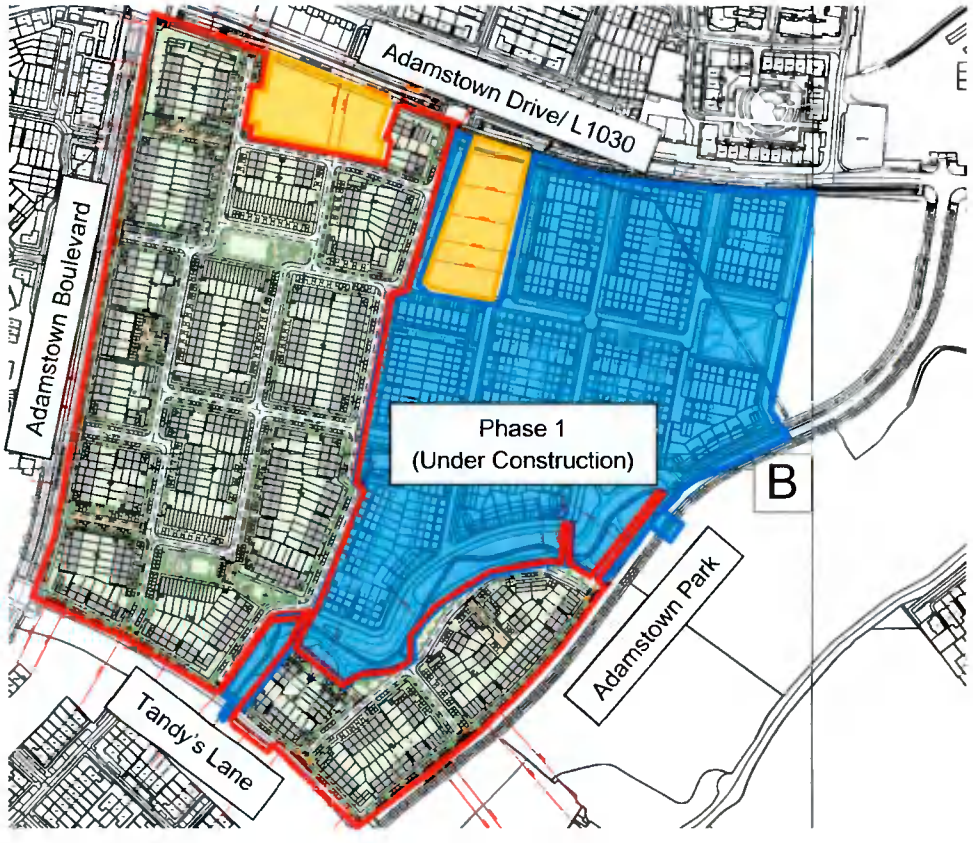
The total surfaced area of the proposed development, including roads, roofs, and other paved areas is approximately 10.24 Ha. The site is currently green field with a site compound located in the northwest corner that was used during the construction of the surrounding roads. The lands generally slope from south to northwest with ground levels of between +48.00 m and +55.50 m OD Malin.

2.3 Proposed Development

The development will principally consist of: the construction of 352 No. residential units (terraced, semi-detached and detached) comprising 253 No. two storey houses (15 No. two bed units and 238 No. three bed units ranging in size from c. 87 sq m to c. 118 sq m) and 99 No. three storey houses (18 No. three bed units and 81 No. four bed units and ranging in size from c. 147 sq m to c. 171 sq m). The total gross floor area of the development is c. 43,272 sq m.

The development will also comprise the provision of 2 No. vehicular accesses from Adamstown Boulevard, 1 No. vehicular access from Adamstown Drive (L1030), 2 No. vehicular accesses from Adamstown Park Road and 2 No. vehicular accesses from Tandy's Lane; vehicular connections will also be provided to permitted roads in Tandy's Lane Phase 1; internal routes; 535 No. car parking spaces including on-curtilage and off-curtilage spaces; bicycle parking; bin storage; plant; ESB Substations; boundary treatments; lighting; hard and soft landscaping; and all other associated site works.

Figure 2-2: Development Layout



3. Flood Risk

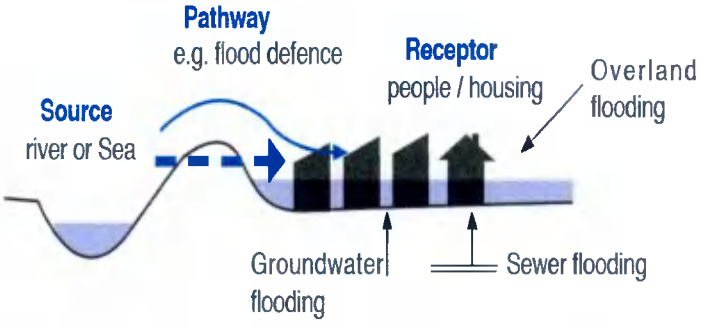
3.1 Introduction

The components to be considered in the identification and assessment of flood risk are as per Table A1 of the above guidelines:

- 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
- 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 3-1: Source-Pathway-Receptor S-P-R Model



The ultimate aim of a flood risk assessment is to combine these components and map or describe the risks on a spatial scale, so that the consequences can then be analysed.

The likelihood of flooding falls into three categories of low, moderate and high, which are described in the OPW Guidelines as follows:

Table 1: Table A1 of *DEHLG/OPW Guidelines on the Planning Process and Flood Management*

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 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 report has taken into account the OPW Eastern CFRAM maps with regard to flood risk.

3.1.1 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.

3.1.2 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.

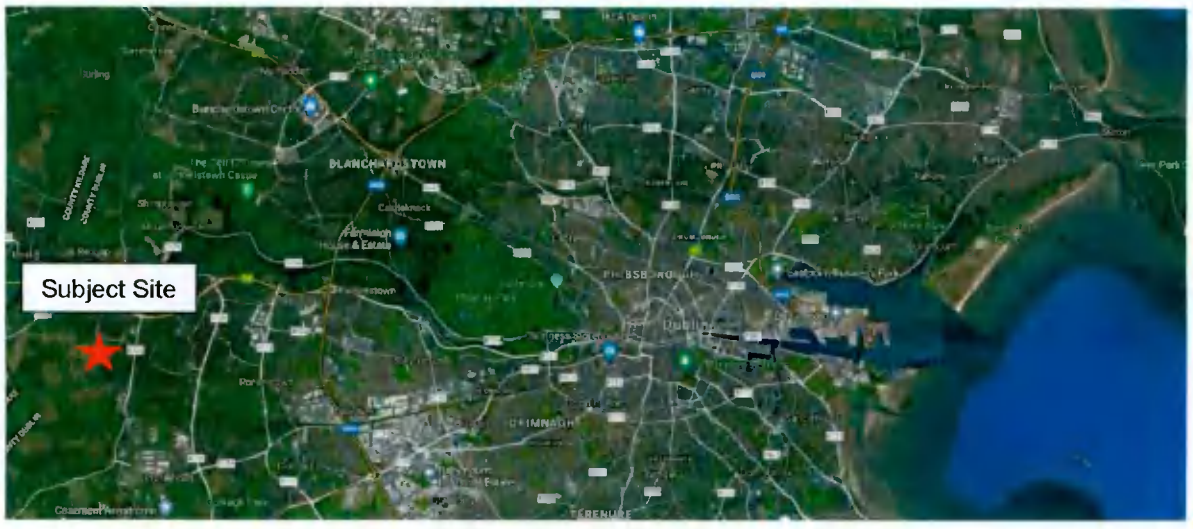
Table 2: 3x3 Risk Matrix

		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

3.2 Tidal – Irish Sea

The Irish Sea is approximately 17 kilometres east of the subject site as shown in Figure 3-2.

Figure 3-2: Site Location in relation to the Irish Sea



The proposed estate road levels around the site range from +49.0m to +53.64m OD Malin and the proposed finished floor levels range between +49.25m to +53.80m OD Malin.

The Dublin Coastal Protection Project indicated that the 2002 high tide event reached 2.95m OD Malin.

Given that the site is located 17 kilometres inland from the Irish Sea and that there is at least a 46.05m level difference between the subject lands and the high tide it is evident that a pathway does not exist between the source and the receptor.

The risk from tidal flooding is therefore **VERY LOW** and no flood mitigation measures need to be implemented.

3.3 Fluvial

Fluvial flooding is caused by rivers, watercourses or ditches overflowing. The subject site is located c. 650m east of the Tobermaclugg Stream.

The Lucan to Chapelizod Fluvial Flood Extents CFRAM website indicates that the subject site is located in Flood Zone C and is therefore at **LOW** risk of flooding.

Figure 3-3 below, an extract from the CFRAMS website shows that there are no flood extents adjacent the site.

Figure 3-3: CFRAM Map – Lucan to Chapelizod Fluvial Flood Extents

As there is no indication of existing flood levels in the vicinity of the Adamstown Strategic Development Zone, the Fluvial risk for the development is considered **VERY LOW**.

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 3 and the risk associated with each pathway is outlined below.

Table 3: Pluvial Flooding Pathways

	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

3.4.1 On-site drainage system surcharging

The proposed on-site surface water drainage sewers have been designed to accommodate flows from a 5-year return event which indicates that the site-wide drainage system may surcharge during rainfall events with a return period in excess of five years. Therefore, the likelihood of surcharging of the on-site drainage system is considered high over the lifetime of the development. However, the risk of flooding is mitigated by providing SUDS for the development which can store water for the 1 in 100-year storm event plus a 20% allowance for climate change as part of the ASDZ drainage strategy located at the Lucan golf course . In addition, the designed levels fall away from the buildings so as to route any surcharged surface water away from buildings. Therefore, the residual risk is **LOW**.

3.4.2 Flooding from the existing surrounding drainage system surcharging

Runoff from the proposed site currently drains via the existing drainage channels/ditches located within and around the site and to the surface water drainage provided under the ADSZ Strategic Drainage, St Helen's Phase 1 (**SDZ 17A/0002**) and the Adamstown Park (Loop Road 1) (June 2006 **SDZ 06A/5).**

The surface water drainage infrastructure constructed as part of the ADSZ Strategic Drainage plan was designed to maintain the surface water runoff of the entire Adamstown SDZ. Due to the surrounding system's design the flood risk is **LOW**.

3.4.3 Surface water discharge from the subject site causing downstream flooding

The proposed development site is mostly greenfield with recently demolished areas on site. The hardstanding areas included buildings that were demolished and the rubble removed. The development, as designed, will increase the impermeable area on site. As a result, the volume of run-off from the site will increase. However, in order to mitigate against this, swales will be used to reduce the volume of run-off from site during low storm events. The majority of the surface water discharged from the development will be limited by a hydrobrake constructed during the Phase 1 before discharging to the existing drainage system in Adamstown Drive to the north with only a portion of the western discharging into the Phase 1

sewers down stream of the hudrobrake. 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

The Office of Public Works (OPW) records for predictive and historic flood maps and benefiting land maps have been consulted with regard to recorded flood events in the vicinity of the subject site. A map showing all flood events within proximity of the subject site is provided below in Figure 3-4.

No flood events have been recorded along or near the site. It is therefore considered that there is a **LOW** likelihood of flooding from surrounding areas.

Figure 3-4: OPW Land Benefiting Maps and Historic Flood Maps

3.4.5 Overland flooding from the subject site

Appropriate drainage will be provided to collect rainwater and discharge to the sitewide SUDS system before finally discharging to the existing surface water system. The levels on site have been designed to ensure any overland flooding which occurs as a result of poor maintenance will be directed along the roads and will not enter the properties. Therefore, the risk to the development from overland flooding is considered **LOW**.

3.5 Groundwater

During periods with prolonged rainfall the groundwater can seep to above ground level. This could result in ground water seeping to the ground surface. Although this might be the case, there is no known history of ground water / springs seeping through the ground in this area. However, it is possible for ground water to rise and cause potential flooding on site during prolonged wet periods.

Finished floor levels have been set above the road levels and surrounding garden levels to ensure any seepage of ground water onto the development does not flood into the houses. A site investigation was conducted during the Phase 1 development where groundwater was detected at multiple locations throughout the site. It is proposed that any SUDS features being installed within 1m depth of groundwater levels will be lined with an impermeable membrane. This will prevent ingress of groundwater into SUDS features which would cause them to flood and surcharge the surface water drainage network. As a result of the measures detailed above, there is a **LOW** residual risk of overland flooding from the subject site.

3.6 Human / Mechanical Errors

The subject lands will be drained by an internal private storm water drainage system which discharges to the surrounding surface drainage networks.

In order to mitigate against the risk of flooding from blockages in the surface water network it must be regularly maintained and, where required, cleaned out. South Dublin County Council, once the system has been taken in charge, 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.

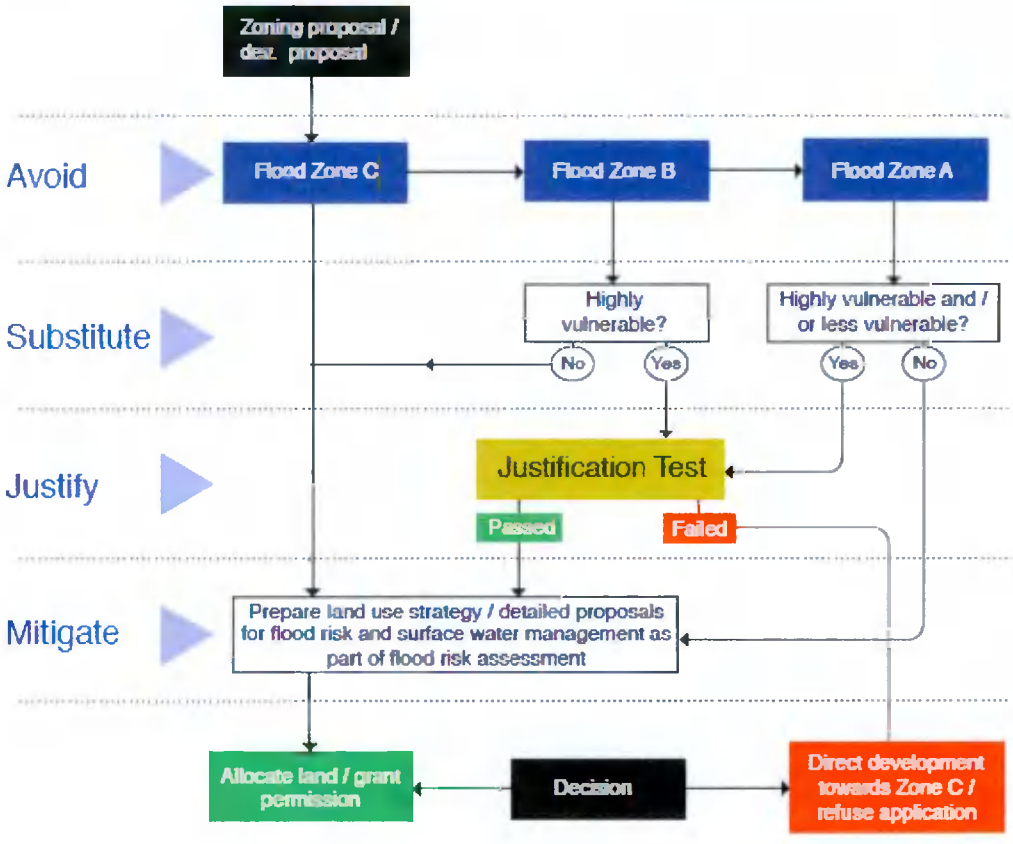
Upon adoption of the proposed flood risk management strategies, outlined above, there is a **LOW** residual risk of overland flooding from human / mechanical error.

4. Sequential Test

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 is set out in *"The Planning System and Flood Risk Management Guidelines for Planning Authorities, 2009"* and shown in Figure 4-1 below.

All of the lands that are proposed to be developed on site are within Flood Zone C as they are at a low risk of flooding from all sources. Therefore, the proposed development is deemed an appropriate use of the site, following the sequential approach.

Figure 4-1: Sequential Approach (extract from Dublin City Council Development Plan 2016-2022 SFRA)



5. Conclusions and Recommendations

The subject lands have been analysed for risks from flooding from the Irish Sea, fluvial flooding, pluvial flooding, ground water and failures of mechanical systems. Through careful design and appropriate mitigation measures the risks and consequences of flooding have been mitigated across the development.

Table 4: Summary of the Flood Risks from the Various Components

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

UK and Ireland Office Locations