

# Fassaroe Phase 1 Planning Application

Flood Risk Assessment

Cosgrave Property Group

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# Notice

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# 1. Introduction and Background

## 1.1. Proposed Scheme

This report details the Flood Risk Assessment (FRA) associated with the works as included within this application for Phase 1 of the Fassaroe Development.

The proposed Phase 1 application comprises of the construction of 650 no. residential units comprising a mix of apartments and houses along with a neighbourhood centre, a crèche, a district park, local parks, the diversion and rerouting of ESB electricity lines, a distributor road connecting to Ballyman Road, a new pedestrian / cycle route across the N11 connecting to Dargle Road, historic landfill remediation works, landscaping works, parking facilities, ancillary services and facilities and associated site development works.

The various elements of the application then include:

- Road link (2.4km) connecting N11 to Ballyman Road (with westerly connection to Ballyman Road already in place).
- Pedestrian / cycle route including bridge across the N11 to Dargle Road Upper.
- 15.3ha of District Park / Active Open Space.
- 650 no. residential units comprising 241 no. houses and 409 no. apartments.
- 3 No. pocket park areas comprising a total of 0.43ha.
- 733sq.m approx. crèche with capacity for approx. 138 no. childcare spaces
- Retail unit / kiosk (108sq.m.) in district park.
- Neighbourhood Centre Phase 1 comprising:
  - 1,035sq.m. retail
  - 360sq.m. café,
  - 480sq.m community concierge (serving entire Fassaroe community)
  - 414sq.m. residential ancillary uses for residents of the neighbourhood centre apartments (residents lounge 256sq.m., residents gym 90sq.m., and residents concierge 68sq.m.)
- Demolition of an existing dwelling at Berryfield Lane.
- Rerouting and undergrounding of overhead ESB lines (110kV and 38kV lines) across site and into existing ESB Substation.
- Site development / ground works on future development areas to ensure sustainable cut and fill balances across the lands.
- Water supply, foul and surface water drainage proposals.
- Provisions for public bus services in line with demand towards Bray (DART and Bray bus interchange) and towards the Luas at Cherrywood / Brides Glen.
- Remediation of 5 no. historic landfill sites in line with Certificates of Authorisation issued to Wicklow County Council by the EPA in 2019.

A detailed description of the development is included in Chapter 2 of the Environmental Impact Assessment Report (EIAR) included with this planning application.

The proposed application site forms part of a larger designated new development area under the Bray Municipal District Local Area Plan 2018 -2024 (LAP). These wider development lands are identified as an 'Action Area' in the LAP. The lands lie on the western side of Bray. The location of the site is shown below on Figure 1-1.

Full details of the proposed storm water drainage design are contained within Atkins Storm Water Impact Assessment Report Ref 5186693DG103.

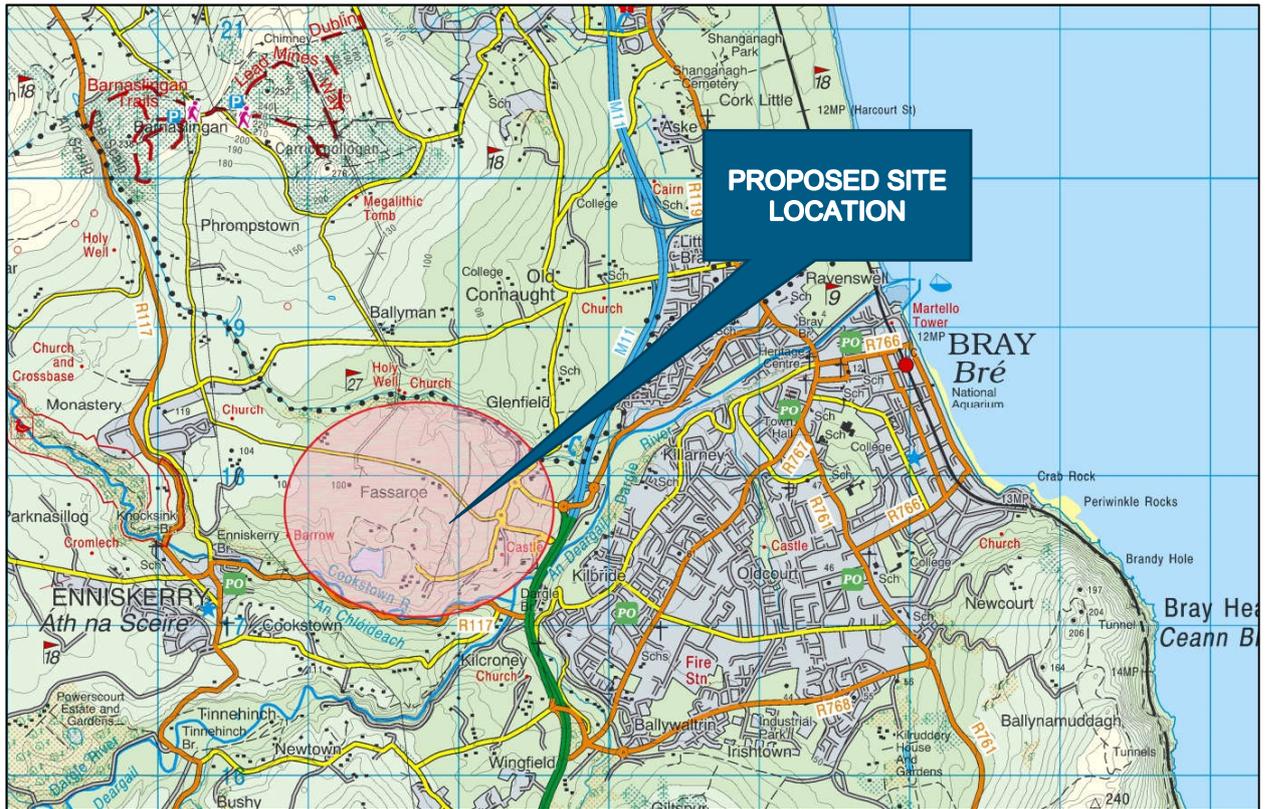


Figure 1-1 - Site Location Plan

## 1.2. Flood Risk Assessment Overview

This report has been undertaken to satisfy the requirements of ‘The Planning System and Flood Risk Management Guidelines’, here after referred to as The Guidelines, and is aimed at scoping sources of flooding, assessing whether any significant flood risk issues exist and proposing appropriate flood risk management measures as required. The flood risk assessment can be considered to satisfy the Stage 1 – Flood Risk identification requirements as set out in The Guidelines. It is considered that this level of assessment is sufficient given the nature of the development and the level of flood risk identified for the site.



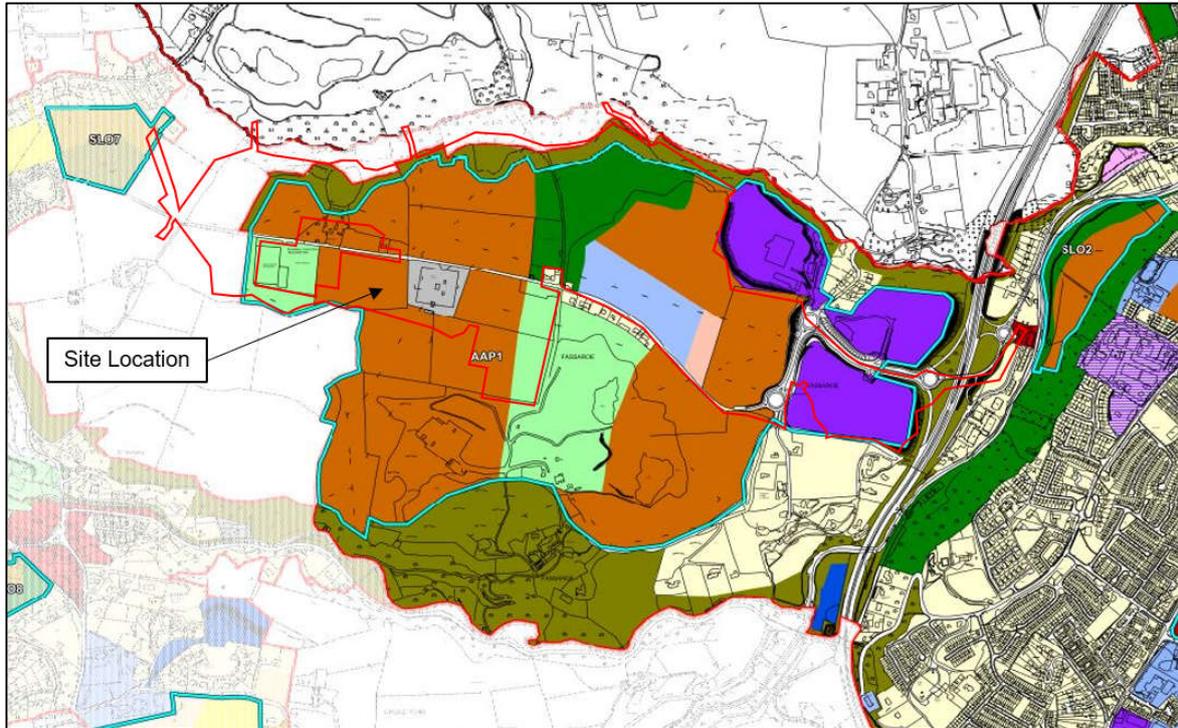
Figure 1-2 – Site Location Map

## 2. Site Description

### 2.1. Site Location

The proposed development is located in the region of Fassaroe, County Wicklow. Fassaroe is located just over two kilometres to the west of Bray town centre.

The figure below is taken from the Bray MD Local Area Plan and indicates the zoning objectives for the Fassaroe area with the extent of the current proposed application indicated in red dashed outline.



**Figure 2-1 – Zoning Objective Map from Bray Municipal District Local Area Plan 2018 (from Wicklow County Development Plan 2016-2022)**

### 2.2. Site Topography

The development site currently consists primarily of agricultural lands and is intersected in an east to west direction by the existing Berryfield Lane roadway. A dense treeline bounds the northern extent of the development site which buffers the Ballyman Glen Special Area of Conservation.

Topographical surveys have been undertaken across the site and confirm that the eastern portion of the site falls sharply to the east (from 85.0mOD to 12.0mOD) while the northern central section of the site falls towards the County Brook watercourse (from 103.0mOD to 70.0mOD). Lands in the southern central section fall away from Berryfield Lane (from 103.0mOD to 96.0mOD) and ground levels in the western section of the site rise to meet Ballyman Road to the west (from 99.0mOD to 105mOD).

## 2.3. Local Hydrology & Existing Drainage

There are several key hydrological features within the vicinity of the scheme:

- The Dargle River (east of the N11) which flows in an easterly direction prior to discharging to the Dargle Estuary in Bray, which leads to the Irish Sea
- The County Brook which flows in a steeply sided valley along the northern boundary of the proposed development and discharges into the Dargle River
- The Glencullen River located to the south of the development and flows in an easterly direction also discharging into the Dargle River



Figure 2-2 – Hydrological Features

### 2.3.1. Dargle River

The Dargle River rises in the Wicklow Mountains approximately 20km south west of Bray and falls from approximately 530mOD to sea level over its length. The Dargle River Drainage Area was included as part of the Greater Dublin Strategic Drainage Study (GSDSDS) in 2004. That study describes the Dargle River Catchment as a ‘flashy’ catchment with high runoff rates and times of concentration of around 3 hours. The ‘time of concentration’ indicates the expected time for the peak river flow to occur at the downstream end of the catchment (i.e. in Bray) following a rainfall event across the catchment.

It is also noted that the River Dargle Flood Relief Scheme has been recently completed. This scheme will serve to ensure that the River Dargle downstream of the N11 is protected against the 1 in 100year flood event as well as the 1 in 200year tidal event.

The Eastern Catchment-based Flood Risk Assessment and Management (CFRAM) Studies indicates that the 1 in 50-year to 1 in 100-year flow rate in the Dargle River would be of the order of magnitude of 200m<sup>3</sup>/s and 300m<sup>3</sup>/s respectively and that flood prevention works would provide sufficient capacity in the Dargle River to cater for the AEP 1% (1 in 100yr) event.

Images of the Dargle River East and West of the N11 are presented in Figure 2-3 below.



**Figure 2-3 – Dargle River**

### 2.3.2. Cookstown (Glencullen) River

The Cookstown (Glencullen) River rises in Glendoo Mountain approximately 12km west of Bray and falls from approximately 460mOD to its confluence with the Dargle River adjacent to the R117 Bray Road immediately west of the N11 between Kilcronoy and Fassaroe. The watercourse has a catchment area of 26km<sup>2</sup> and an average slope of approximately 3%, similar to the Dargle River catchment, and would similarly be considered ‘flashy’ with an estimated time of concentration of approximately 4hrs.

The watercourse flows beside the R117 Bray Road to the south of the application lands between Kilcronoy Cross and Enniskerry. An image of the Cookstown River are presented in Figure 2-4 below.



**Figure 2-4 – Cookstown (Glencullen) River in steep rock cutting adjacent to R117 Bray Road**

### 2.3.3. County Brook (Fassaroe Stream)

County Brook (Fassaroe Stream) is the smallest of the 3 watercourses and rises at Barnaslingan approximately 8km west of Bray and falls from approximately 120mOD to its confluence with the Dargle River in the area of Bray Town known as Bray Commons. The watercourse has a catchment area of 6km<sup>2</sup> and an average slope of approximately 2.8%, similar to the Dargle and Cookstown Rivers, and would similarly be considered ‘flashy’ with an estimated time of concentration of approximately 4hrs.

This watercourse is a small, winding brook, generally 1-2.5m wide throughout its length with 1m+ high banks at the channel edge. In its upper reaches the watercourse crosses Scalp Road and then through two large culverts under Ballyman Road. The County Brook then flows in a steeply sided valley just outside the northern boundary of the planning application site to cross under Thornhill Road and subsequently under the N11 and then through a small culvert under Hazelwood road adjacent to Upper Dargle Road. The watercourse then winds through the Bray Commons area before discharging to the Dargle River.

The majority of the proposed development is within the County Brook catchment and so this watercourse has been considered in more detail as part of this FRA. Images of the County Brook are presented in Figure 2-5 below.



**1. Dry channel d/s of Scalp Road**



**2. Crossing under Ballyman Road**



**3. Channel d/s of Ballyman Road**



**4. Between Ballyman Rd and Thornhill Rd**



5. Between Ballyman Rd and Thornhill Rd



6. Upstream of Thornhill Rd



7. One of 3nr 600 dia pipes d/s Thornhill Rd



8. 2.1m x 0.45m culvert at Hazelwood Rd

Figure 2-5 – Photographs of County Brook (Fassaroe Stream)

## 3. The Planning System and Flood Risk Management Guidelines

### 3.1. General

Flooding is a natural process that can happen at any time in a variety of locations, and which affects people indiscriminately. Flooding from the rivers and sea is probably the best-known source of flooding, however flooding can also occur from prolonged, intense, and localised rainfall leading to flooding from sewers, overland flow and groundwater flooding. Flooding can be beneficial to the environment; however, it can also lead to significant effects on people's lives and properties.

Due to climate change, it is expected that the effects of flooding will continue to increase. These increases can be exacerbated by development increasing and accelerating runoff rates, removing floodplain storage and altering watercourses.

In September 2008 the Office of Public Works (OPW) and the Department of Housing, Local Government and Heritage (DoEHLG) published a consultation document 'The Planning System and Flood Risk Management, Consultation Draft Guidelines for Planning Authorities, September 2008', which have subsequently been superseded by the final publication of The Planning System and Flood Risk Management, Guidelines for Planning Authorities in November 2009 (The Guidelines). The guidelines aim to integrate flood risk management into the planning process to assist in the delivery of sustainable development. It aims to encourage a transparent and consistent consideration of flood risk in the planning process.

The objectives of the guidelines are given as being (Paragraph 1.6):

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

### 3.2. Flood Risk Assessment Methodology

The recommended stages of flood risk assessment within the guidelines are:

- Stage 1 Flood risk identification – A desk-based study to identify whether there may be any flooding or surface water management issues related to a plan area or proposed development site that may warrant further investigation;
- Stage 2 Initial flood risk assessment – A qualitative or semi-quantitative study to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information, to provide a qualitative appraisal of the risk of flooding to development, including the scope of possible mitigation measures, and the potential impact of development on flooding elsewhere, and to determine the need for further detailed assessment.
- Stage 3 Detailed flood risk assessment – A methodology to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of flood hazard to a proposed or existing development, of its potential impact on flood elsewhere and of the effectiveness of any proposed measures.

In Appendix A of the Planning Flood Risk Management Guidelines an explanation is given on the identification of flood risk and on undertaking the Flood Risk Assessment.

### 3.3. Decision Making Planning Process

Management of flood hazard and potential risks in the planning system should be based on an interpretation of the issues of both planning and flood risk set out within the guidelines and primarily, but not solely, based around the use of:

- Sequential Approach through the use of identified flood zones (see Section 3.4 for definitions of Flood Zones);
- Justification Test for development that needs to be in flood risk areas for reasons of proper planning and sustainable development.

The Sequential Approach and the Justification Test are explained in the following sections. The key principles of making decisions on planning in relation to flood risks are:

- Avoid risk where possible;
- Substitute less vulnerable uses, where avoidance is not possible,
- Justify if development is considered for strategic reasons; and
- Mitigate and manage the risk, where avoidance and substitution are not possible.

It is important to note that the guidelines are not intended to be unnecessarily restrictive to development but are aimed at promoting sustainable development through proper consideration of flood risk issues at all stages of planning and project development. They recognise the need for development on wider economic and social grounds and the fact that flood risk can be balanced against that need. They acknowledge that a considerable part of the urban structure of many of our major towns and cities are currently at risk of flooding.

Furthermore, they acknowledge that management of flood risk through design/mitigation measures is an acceptable process and that the guidelines themselves form only one element of helping to manage flood risk issues.

The other element, which will be used to help inform decisions in the future both with respect to planning and the need to protect existing infrastructure, which is at risk from flooding, is the CFRAM Studies.

### 3.4. Flood Zones

The Planning Guidelines express the likelihood of flooding in the form of three flood zones. These flood zones each relate to geographical areas at high, moderate or low risk of flooding, depending on if they are Zone A, B or C respectively (as defined in Figure 3-1 and Table 3.1, Source: The Planning System and Flood Risk Management).

The likelihood of flooding can be defined either as a percentage, or the number of years it may, on average, happen in. For example, a 1 in 100 year event is expected, on average, to occur once every hundred years. This has a probability of occurring in any year of 1%.

**Table 3.1 – Definitions of Flood Zones**

Flood Zone	Description
A	The probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding, or 0.5% or 1 in 200 for coastal flooding)
B	The probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 years and 1% or 1 in 100 years for river flooding, and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 year for coastal flooding for coastal flooding)
C	The probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 years for both river and coastal flooding). Flood Zone C covers all areas of the plan which are non in Zones A or B

The determination of the extent of the flood zones should be based on current extreme water levels without any allowance for climate change. Specifically, The Guidelines state the following;

**“They are based on the current assessment of the 1% and the 0.1% fluvial events and the 0.5% and 0.1% tidal events, without the inclusion of climate change factors.”**

Aspects of climate change should then be addressed as part of any flood risk assessment including residual risks.

Furthermore, it is important to note that the flood zones shown in Figure 3-1 (Source: Figure 2.3, The Planning System and Flood Risk Management) are indicative of fluvial (river) and coastal flooding only, and do not include other information on the risk of flooding from sources such as groundwater or artificial drainage systems.



Figure 3-1 - Indicative Flood Zone Map Extract

### 3.5. Sequential Approach

The aim of the sequential approach is to guide development away from areas at risk from flooding. This approach, which should be applied to all stages of the planning and development management process, can be summarised by Figure 3-2, taken from The Guidelines.

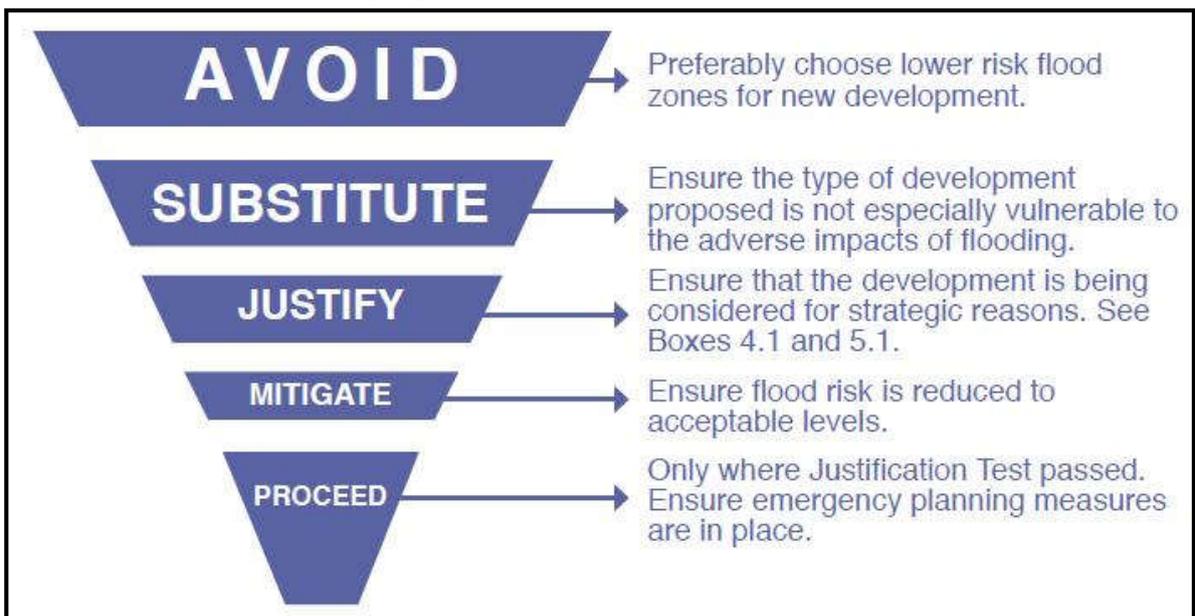
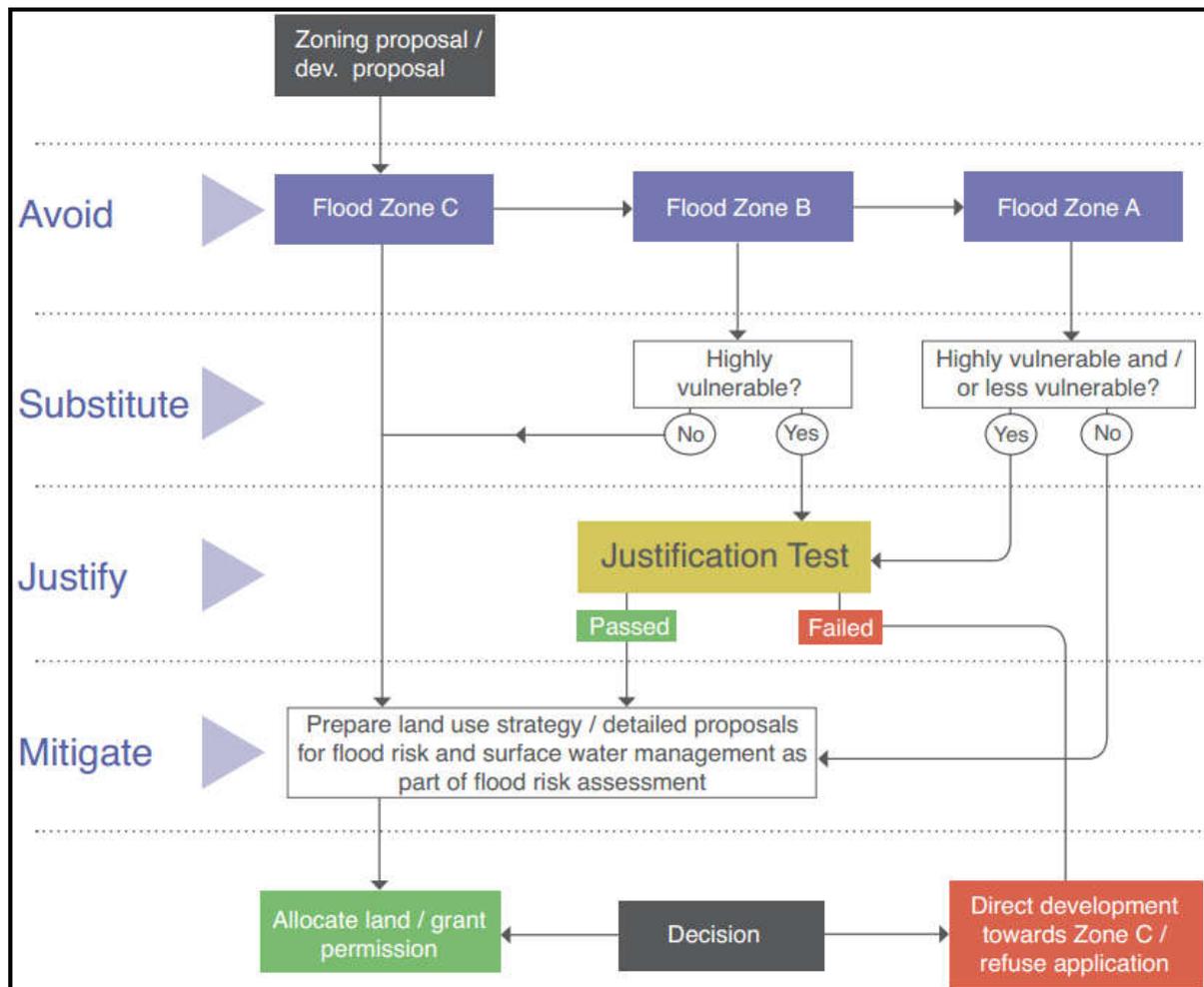


Figure 3-2 - Sequential approach principles in flood risk management

The Guidelines detail the key actions to be undertaken when considering flood risk in the planning process. The first step is to identify flood risk at an early stage of the planning process. Once flood risk has been identified, steps should be taken to avoid the flood risk, by locating development in areas with little or no flood risk where possible. Development should only be permitted in areas known to be at risk of flooding where there are no alternatives, reasonable sites available in areas of lower risk that also meet proper planning and sustainable development objectives.

A precautionary approach should then be applied, to take account of uncertainties inherent in flood datasets, flood risk assessment techniques, prediction of climate change and the performance of flood defences. Development should therefore not be proposed for areas which may be at increased risk of flooding in the future from, for example, climate change or coastal erosion.

The mechanism by which the sequential approach is applied is described in Figure 3-3 below.



**Figure 3-3 - The Sequential Approach mechanism in the planning process**

The Guidelines classify what types of development are considered highly vulnerable, less vulnerable and water compatible (Table 3.1 of the Planning Guidelines) and these are shown in Figure 3-4.

Vulnerability class	Land uses and types of development which include*:
<b>Highly vulnerable development (including essential infrastructure)</b>	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; and 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.
<b>Less vulnerable development</b>	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; and Local transport infrastructure.
<b>Water-compatible development</b>	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; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

**Figure 3-4 – Land Use Vulnerability Classifications**

The assessment of a development’s vulnerability together with the previously identified flood zones is used to determine which development types are appropriate for each of the Flood Zone categories. Figure 3-4 and Table 3.2 (Copied from The Guidelines) can be used to inform which types of development are appropriate for each flood zone and which would be required to undertake and meet the requirements of the Justification Test (see section below).

**Table 3.2 - Classification of vulnerability of different types of development and the need to meet the Justification Test**

	<b>Flood Zone A</b>	<b>Flood Zone B</b>	<b>Flood Zone C</b>
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Flood zones do not account for the effect of any defences present at that location. Whilst areas benefiting from defences have a reduced risk of flooding, there is still a residual risk. In addition, sites can be vulnerable to the increased speed of flooding caused when these defences are overtopped, breached, or subjected to another type of failure. As a result of this residual risk, the Sequential Approach, and if required, the Justification Test should still be applied to defended locations.

### 3.6. Justification Test

The Justification Test has been designed to rigorously assess the appropriateness of developments that are being considered in areas of medium or high flood risk. The glossary in the Planning Guidelines describes a justification test as: “An assessment of whether a development proposal within an area at risk of flooding meets specific criteria for proper planning and sustainable development and demonstrates that it will not be subject to unacceptable risk nor increase flood risk elsewhere. The justification test should be applied only where development is within flood risk areas that would be defined as inappropriate under the screening test of the sequential risk based approach adopted by this guidance.”

The Justification Test is comprised of two processes:

- Plan-making Justification Test
- Development management Justification Test

#### 1. Plan-making Justification Test

Is used at the plan preparation and adaptation stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding. The following criteria must be satisfied:

1. The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans as defined above or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act, 2000, as amended.
2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:
  - [ii] Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement;
  - [iii] Comprises significant previously developed and/or under-utilised lands;
  - [iv] Is within or adjoining the core of an established or designated urban settlement;
  - [v] Will be essential in achieving compact and sustainable urban growth; and
  - [vi] There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.
3. A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process,

which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere.

N.B. The acceptability or otherwise of levels of any residual risk should be made with consideration for the proposed development and the local context and should be described in the relevant flood risk assessment.

The Plan-making Justification Test is intended for use at the plan preparation and adoption stage where it is intended to zone land which is located in Zone A or B.

## 2. Development Management Justification Test

Is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding, which would generally be inappropriate for that land. The development management justification test is to be submitted by the applicant.

If the requirements of the Plan-making Justification Test are satisfied, then the following additional detailed criteria must also be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
  - [i] The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
  - [ii] The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
  - [iii] The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
  - [iv] The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: In the event that land is zoned without the benefit of the guidelines, please refer to Para 5.27 of the guidelines.

## 4. Wicklow County Development Plan 2016-2022

The Wicklow County Development Plan 2016-2022 sets out policies and objectives for the sustainable development of the County. The following extracts summarise the relevant objectives contained within the plan which focus on Flood Risk Management.

FL1 To prepare new or update existing flood risk assessments and flood zone maps for all zoned lands within the County as part of the review process for Local Area Plans, zoning variations and Town Plans, where considered necessary.

FL2 To implement the 'Guidelines on the Planning System and Flood Risk Management' (DoEHLG/OPW, 2009).

FL3 The zoning of land that has been identified as being at a high or moderate flood risk (flood zone A or B) shall be in accordance with the requirements of the Flood Risk Guidelines and in particular the 'justification test for development plans' (as set out in Section 4.23 and Box 4.1 of the guidelines).

FL4 Applications for new developments or significant alterations/extension to existing developments in a flood risk area shall comply with the following:

- Follow the 'sequential approach' as set out in the Flood Risk Guidelines.
- Flood risk assessments will be required with all planning applications proposed in areas identified as having a flood risk, to ensure that the development itself is not at risk of flooding and the development does not increase the flood risk in the relevant catchment (both up and down stream of the application site).
- Where a development is proposed in an area identified as being at low or no risk of flooding, where the planning authority is of the opinion that flood risk may arise or new information has come to light that may alter the flood designation of the land, an appropriate flood risk assessment may be required to be submitted by an applicant for planning permission.
- Restrict the types of development permitted in Flood Zone A and Flood Zone B to that are 'appropriate' to each flood zone, as set out in Table 3.2 of the guidelines for Flood Risk Management (DoEHLG/OPW, 2009).
- Developments that are an 'inappropriate' use for a flood zone area, as set out in Table 3.2 of the guidelines, will not be permitted, except where a proposal complies with the 'Justification Test for Development Management', as set out in Box 5.1 of the Guidelines.
- Flood Risk Assessments shall be in accordance with the requirements set out in the Guidelines.
- Generally, a Flood Impact Assessment will be required with all significant developments and a certificate (from a competent person stating that the development will not contribute to flooding within the relevant catchment) will be required with all small developments of areas of 1 hectare or less.

FL5 To prohibit development in river flood plains or other areas known to provide natural attenuation for floodwaters except where the development can clearly be justified with the Flood Risk Guidelines 'Justification test'.

FL6 To limit or break up large areas of hard surfacing in new developments and to require all surface car parks to integrate permeability measures such as permeable paving.

FL7 Excessive hard surfacing shall not be permitted for new, or extensions to, residential or commercial developments and all applications will be required to show that sustainable drainage techniques have been employed in the design of the development.

FL8 To require all new developments to include proposals to deal with rain and surface water collected on site and where deemed necessary, to integrate attenuation and SUDS measures.

FL9 For developments adjacent to all watercourses of a significant conveyance capacity or where it is necessary to maintain the ecological or environmental quality of the watercourse, any structures (including hard landscaping) must be set back from the edge of the watercourse to allow access for channel clearing/ maintenance / vegetation. A minimum setback of up to 10m (or other width, as determined by the Council) will be required either side depending on the width of the watercourse.

It is the intention that the application of these policies and objectives will mitigate flooding as much as is reasonably practicable.

## 5. Flood Risk Identification

In accordance with the planning guidelines, a *Stage 1 Flood risk identification* is required to be undertaken to identify if there are any flooding or surface water management issued related to the proposed development site that may warrant further investigation.

### 5.1. Historical Flooding at the Site

Reports and maps from the OPW National Flood Mapping website ([www.floodmaps.ie](http://www.floodmaps.ie)) have been examined to understand the historic record of flooding at the site.

Figure 5-1 presents an overview of the recorded flood events in the vicinity of the site.



Figure 5-1 - Historical flooding location of proposed development - [www.floodmaps.ie](http://www.floodmaps.ie)

The figure indicates that no historical or anecdotal instances of flooding were observed around the site vicinity.

### 5.2. Tidal Flood Risk

The site is well elevated and is approximately 3 kilometres inland from the nearest coastline. Therefore, the risk of tidal flooding is not considered further.

### 5.3. Fluvial Flood Risk

#### 5.3.1. OPW Flood Maps

The fluvial flood maps compiled for the CFRAM programme, available on [floodinfo.ie](http://floodinfo.ie), were reviewed to assess the flood risk to the development site. It was found that the detailed flood maps beyond the eastern boundary of the development are currently under review by the OPW and are therefore not available for review at the time of completing this FRA. Refer to Figure 5-2 below.



**Figure 5-2 - Flood map viewer available on floodinfo.ie**

However, the figure above does include the National Indicative Fluvial Mapping (NIFM) for the present-day medium probability fluvial flood event. The figure indicates fluvial flooding for the 1% AEP (1 in 100 year) event along the County Brook beyond the northern extent of the proposed development. The flooding extents are contained within the steep sided valley which is 15 - 50m lower than the proposed development area. The impacts of flood risk on the proposed development site from this closest river body are therefore below the 1% AEP (1 in 100 year) event which is the baseline national design standard for fluvial affected areas. As a result and in accordance with The Guidelines, the proposed development site would be classified as being located within Flood Zone C.

### 5.3.2. Strategic Flood Risk Assessment – Bray

The maps indicating flood zones in the Bray Strategic Flood Risk Assessment (SFRA) of the Bray Municipal District Local Area Plan 2018 were reviewed. Figure 5-3 indicates the extent of the flood zoning on the site location of the proposed development and its surrounding area. The figure does not indicate any flooding within the proposed development area.

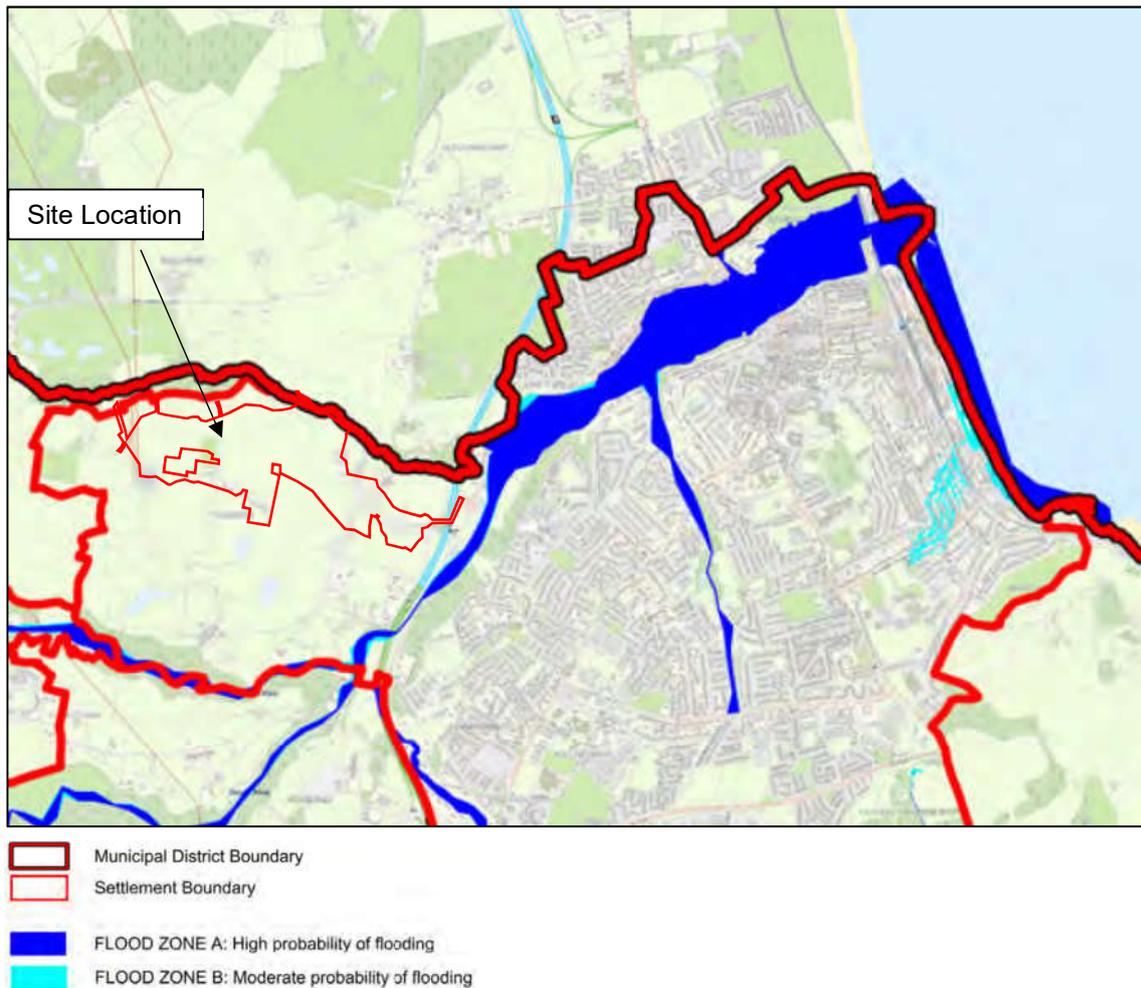


Figure 5-3 - Flood Zone Map - Bray Strategic Flood Risk Assessment

## 5.4. Pluvial Flood Risk

Pluvial flooding occurs when the capacity of the local urban drainage network is exceeded during periods of intense rainfall. At these times, water can collect at low points in the topography and cause flooding.

The proposed development will increase the impermeable area within the catchment and so has the potential to increase the volume and rate of runoff to the receiving watercourses.

Surface water runoff will therefore be managed in an appropriate way through use of SuDS techniques and systems in accordance with the Wicklow Development Plan, GDSDS and CIRIA report C753 'The SuDS Manual V-6'. To this extent runoff will be restricted to 'Greenfield Runoff' rates.

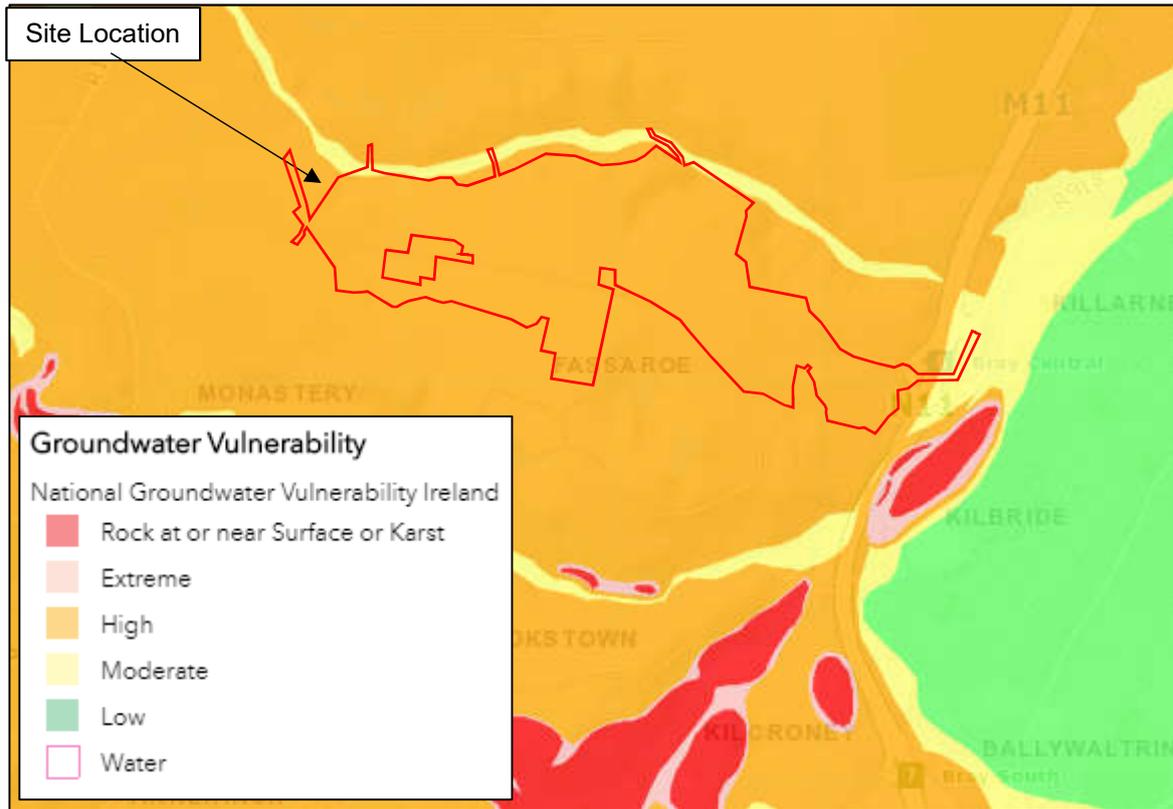
Details of the proposed surface water management system are presented in the Atkins Storm Water Impact Assessment Report Ref 5186693DG103 as summarised in the conclusions and recommendations below.

## 5.5. Groundwater Flood Risk

Groundwater Flooding can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause periods of flooding.

The groundwater vulnerability assessment is based on assembling information on the most relevant factors affecting aquifer vulnerability. These factors include soil type, geologic formation type, recharge, etc, which is then interpreted to produce a class of vulnerability.

Figure 5-4 indicates the groundwater vulnerability of the site and the surrounding areas.



**Figure 5-4 - Groundwater Vulnerability - GSI mapping**

The groundwater vulnerability is indicated as High. However, these maps indicate the groundwater vulnerability when the groundwater table may be high. This map is only indicative of groundwater vulnerability, site investigations indicate groundwater depth of between 3.3m and 14.8m across the site. Groundwater levels recorded are interpreted to represent groundwater perched on the lodgement tills that underlie the entire site. Groundwater flows are interpreted to discharge to the County Brook to the north and to the Dargle River to the east.

## 6. Application of the Planning Guidelines to the Proposed Development

### 6.1. General

This section applies the flood risk identification and assessment requirements of the Planning System and Flood Risk Management guidelines to the proposed development at the site.

### 6.2. Flood Risk Identification

The findings of the Stage 1 Flood risk identification as outlined above, including a desk-based study to identify whether there may be any flooding or surface water management issues which may warrant further investigation, concludes that the entire site falls within Zone C, low probability of flooding. Accordingly, an Stage 2 Initial Flood Risk Assessment is not required in accordance with the guidelines.

### 6.3. Sequential Approach

On the basis of the fact that the proposed development is considered to fall within Zone C and applying the principles of the sequential approach as set out in The Guidelines, as presented above, it is considered that the development is appropriate for the location subject to the completion of a FRA (i.e. this report) and the satisfaction of the wider principles of proper and sustainable development.

### 6.4. Justification Test

Given that the proposed development is considered to be located within Zone C it can be concluded that the Justification Test is not required.

## 7. Conclusions and Recommendations

### 7.1. Conclusions of Screening Assessment

The purpose of the Stage 1 Flood Risk Identification is to establish whether a flood-risk issue exists or may exist in the future. If there is a potential flood risk issue then this procedure should move to “Stage 2 – Initial Flood Risk Assessment” or if no potential flood risk is identified from the initial identification, then the overall assessment can end at Stage 1.

A Stage 1 Flood Risk Identification has been completed in accordance with The Guidelines the following conclusions can be drawn;

- There is no historic risk of flooding within the development site.
- The OPW CFRAM flood extent maps studies have not been carried out in the area of the site and therefore do not show any flood risk at the site.
- The NIFM illustrates that fluvial flooding for the 1 in 100 year event from the County Brook is contained within the steep valley of the watercourse beyond the northern boundary of the site.
- On the basis of the NIFM and the topographical surveys undertaken, the site is considered to be located within Zone C, low probability of flooding.
- Given that the proposed development site is located in Zone C, low probability of flooding, is thus appropriate from a flood risk perspective subject to the completion of this FRA which considers other sources of flood hazard than river flooding and subject to it meeting the normal range of proper planning and sustainable development requirements.
- Given that the proposed development is located in Zone C and is appropriate development, consideration of the Justification Test is not required.
- The proposed development is not at risk of flooding from the 1% AEP event.

The residual risk of pluvial flooding to the site will be addressed through the appropriate use of Sustainable Urban Drainage Systems (SuDS) proposed as part of the development which include;

- Attenuation Ponds
- Swales
- Porous / permeable paving
- Green Roofs
- Filter Drains
- Underground modular system
- Vortex Flow Control

### 7.2. Recommendations

The following recommendations should be considered;

- The proposed discharge for the storm-water outfall to the existing watercourse should be set at a maximum discharge rate of QBAR or 2 l/s/ha, whichever is the greater as per the ‘Greater Dublin Strategic Drainage Study Volume 2 – New Developments’ guidelines. Discharge rates have been agreed with Wicklow County Council prior to the planning application.
- The proposed discharge for the storm-water drainage to the watercourse required be designed in accordance with best practice including the provision of pollution interceptors and treatment of surface water prior to discharge to watercourse.
- The design for the proposed storm-water drainage is to take into consideration all other standards for drainage design, from the ‘Greater Dublin Strategic Drainage Study Volume 2 – New Developments.’

- Suitable Sustainable Urban Drainage systems (SuDs) are to be used within the proposed development to reduce surface water runoff from the site where feasible and designed in accordance with CIRIA report C753 'The SuDS Manual V-6'.
- Green roofs are to be implemented within the site for suitable apartment blocks.

Garry Hanratty  
**WS Atkins Ireland Limited**  
Atkins House  
150 Airside Business Park  
Swords  
Co. Dublin

**Tel: +353 1 810 8000**  
**Fax: +353 1 810 8001**

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