SITE-SPECIFIC FLOOD RISK ASSESSMENT

Ratoath South SHD

For Beo Properties Limited

PROJECT NO. L308

20 May 2022

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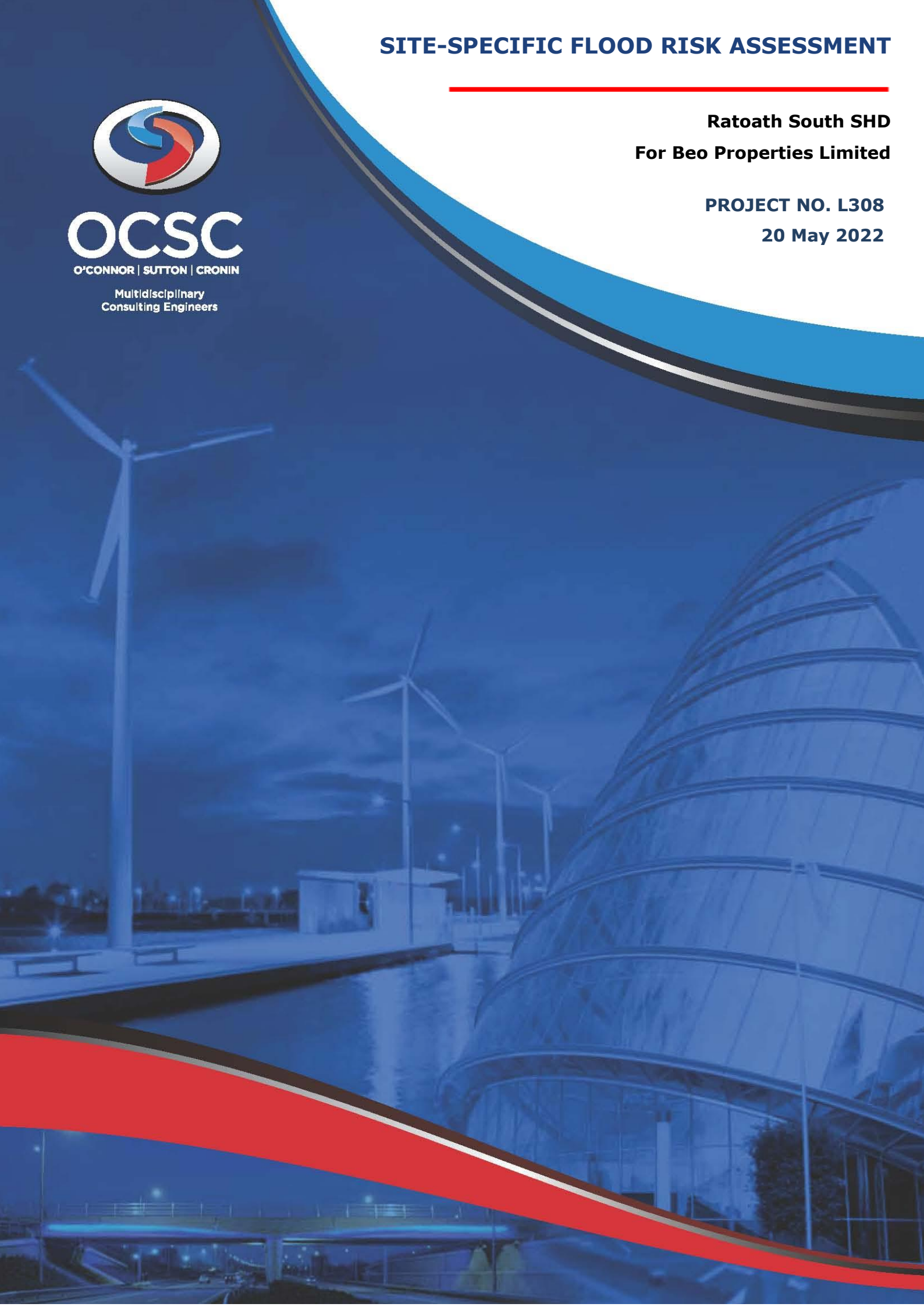

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Ratoath South SHD,

at Ratoath,

Co. Meath

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NOTICE

DOCUMENT CONTROL & HISTORY

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SITE-SPECIFIC FLOOD RISK ASSESSMENT

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SITE-SPECIFIC FLOOD RISK ASSESSMENT

1 INTRODUCTION

1.1 Appointment

O'Connor Sutton Cronin & Associates (OCSC) have been appointed by *Beo Properties Limited* to carry out Site-Specific Flood Risk Assessment (SSFRA) for the proposed Residential Development, located in the south-eastern environs of the town of Ratoath, Co. Meath.

1.2 Administrative Jurisdiction

The proposed development is located in the jurisdiction of Meath County Council (MCC), and therefore the engineering services design was carried out with reference to the following:

- Meath County Development Plan;
- Ratoath Local Area Plan;
- Greater Dublin Strategic Drainage Study (GDSDS);
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government and the Office of Public Works);

1.3 Site Location

An irregularly shaped site of approximately c.14.166 ha, located immediately to the south of the existing built area of Ratoath in County Meath. The site, as shown in Error! Reference source not found., is generally bound as follows:

- to the north by Glascarn Lane and the rear of houses at Glascarn Lane;
- to the east and south by existing agricultural fields and by Glascarn Lane;
- and to the west by Fairyhouse Road (R155), the rear of houses at Fairyhouse Road, the Carraig Na Gabhna and Cairn Court developments, and existing agricultural fields.
-

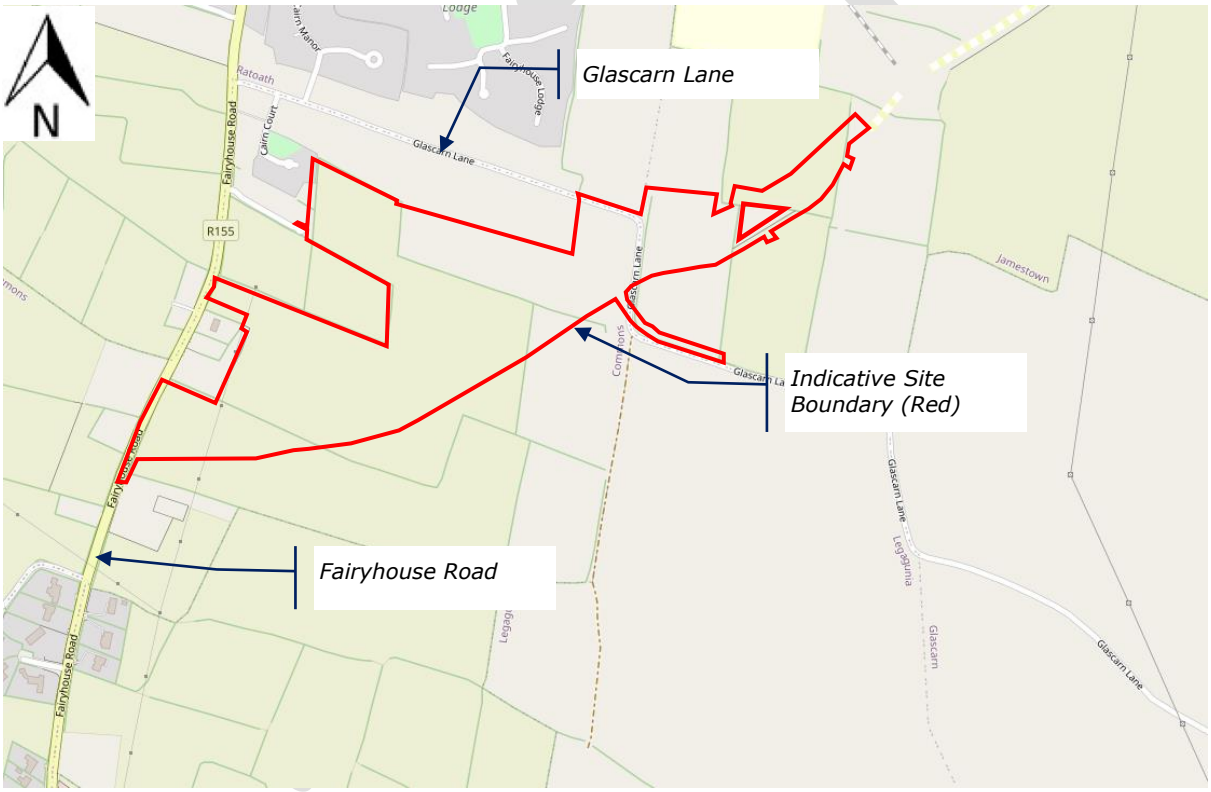

Figure 1-1: Site Location

1.4 Consultation

This flood risk assessment has been prepared on the information available from the following sources:

- OPW website www.floodinfo.ie;
- MCC and Irish Water records;
- Geological Survey of Ireland Maps (GSI);
- Architectural drawings;
- Topographical survey of the proposed site.

2 SITE CONTEXT

2.1 Existing Site Overview

The site is currently greenfield and used for agricultural purposes and can be accessed from Glascarn Lane to the east and Fairyhouse Road to the west of the site.

Ground levels across the site fall generally from south-west to north-east towards Glascarn Lane. Levels along the public road forming the south-western boundary of the site are approximately 93.5 mAOD and these fall to approximately 90.5 mAOD along the north-eastern boundaries of the site. There are two local high points of 92.8 mAOD in a small area in the centre of the site surrounded by a plateau area at 92.8 mAOD. Refer to Error! Reference source not found. for context of existing site levels.

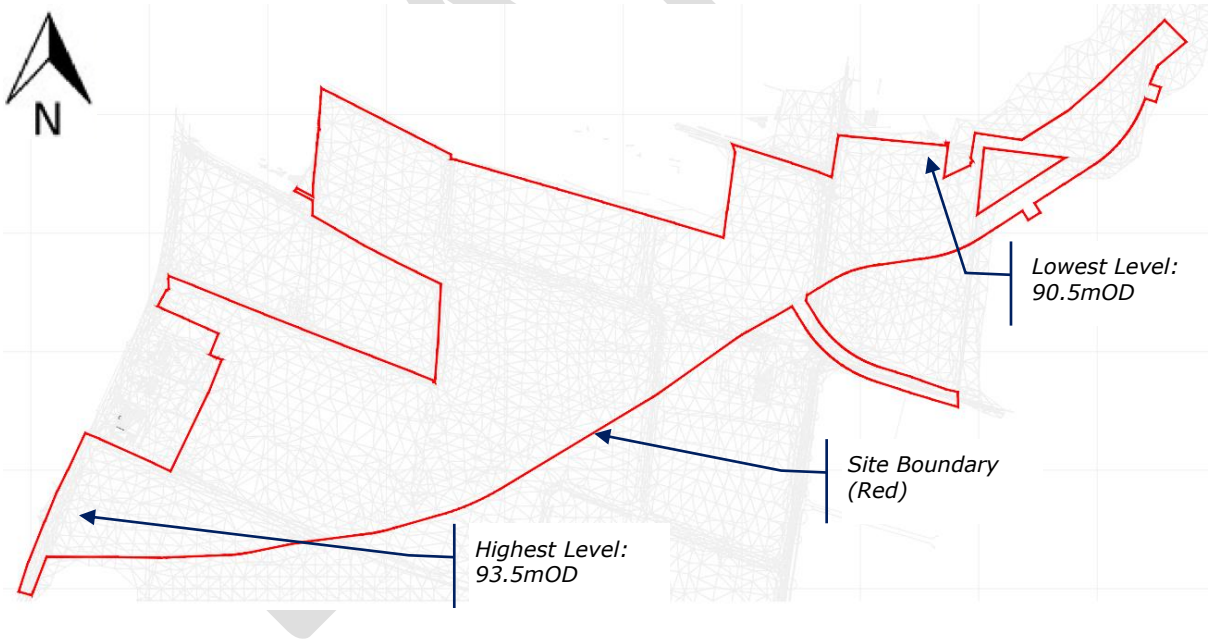

Figure2-1: Existing Site Levels

2.2 Proposed Development Context

The development will principally consist of the construction of 452 no. residential units which are located in 12 neighbourhoods. Building heights ranging from 2-3 storey terraced houses and 3-4-storey duplex buildings (1 storey ground floor units and 2 storey first and second floor units; 2 storey ground and first floor units and 2 storey second and third floor units) and 6-storey apartment blocks. Private open space associated with the residential units is provided in the form of rear gardens, balconies, terraces and winter gardens. The development includes a crèche with associated outdoor play areas at ground floor and at roof level; 4 no. commercial/retail units; a landscaped public open space which includes a civic plaza; communal open space in the form of communal courtyards for each neighbourhood; associated car and cycle parking serving the full development and uses therein; solar PV panels; a second phase of the Ratoath Outer Relief Road (RORR), that will run along the southern boundary of the application site join up to the existing constructed section of the RORR, with two priority controlled junctions; a series of pedestrian and cycle connections from the Fairyhouse Road (R155), Cairn Court, Glascarn Lane and the new RORR; internal road and shared surface networks including pedestrian and cycle paths; public lighting and all associated site development and infrastructural works, services provision, ESB substations, foul and surface water drainage, extension to the foul network, access roads/footpaths, lighting, landscaping and boundary treatment works and all ancillary works necessary to facilitate the development.

Please refer to the development description within the statutory notices for a complete description of the proposed development.

The proposed site layout is shown in Error! Reference source not found. below, and in Appendix A.

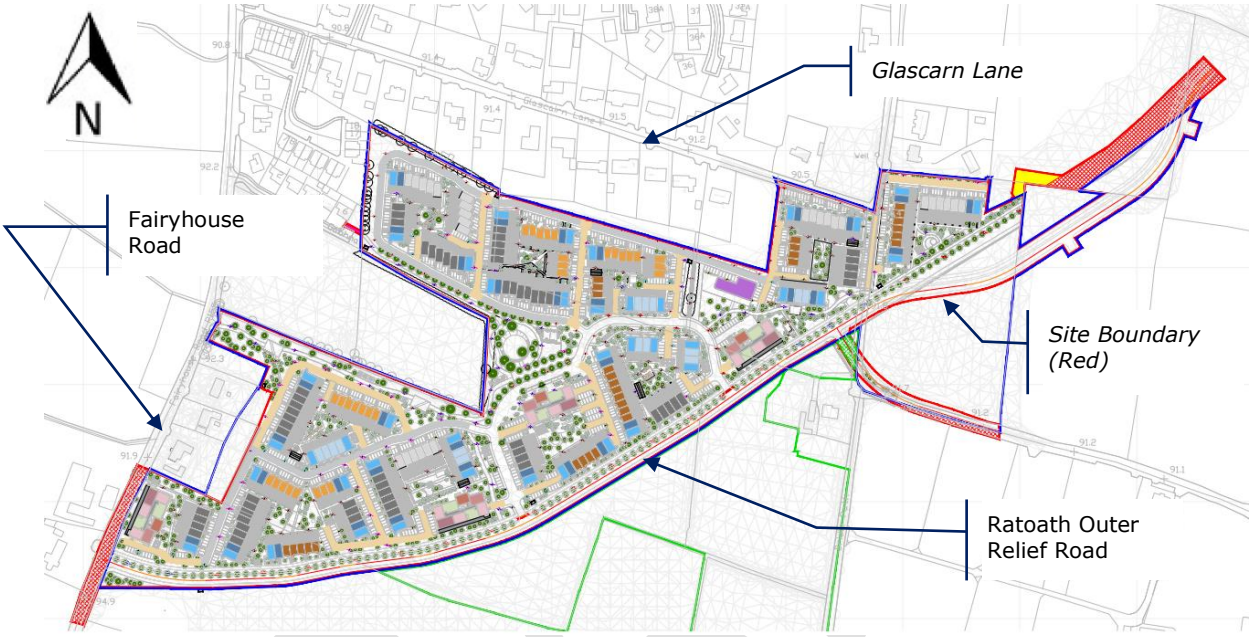

Figure2-2: Existing Site Levels

3 SCOPE OF THE REPORT

3.1 The Planning System and Flood Risk Management Guidelines

In September 2008, "The Planning System and Flood Risk Management" (PSFRM) Guidelines were published by the Department of the Environment, Heritage and Local Government in Draft Format. In November 2009, the adopted version of the document was published.

The Flood Risk Management Guidelines give guidance on flood risk and development. The guidelines recommend a precautionary approach when considering flood risk management in the planning system.

The core principle of the guidelines is to adopt a flood risk sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding. The guidelines include definitions of Flood Zones A, B and C. It should be noted that these do not consider the presence of flood defences, as there remain risks of overtopping and breach of the defences.

Table 3-1: Flood Risk Zones

Zone A	**High Probability of Flooding** Where the annual probability of flooding is: greater than 1% for fluvial flooding or greater than 0.5% for coastal flooding
Zone B	**Moderate Probability of Flooding** Where the annual probability of flooding is: between 0.1% and 1% for fluvial flooding or between 0.1% and 0.5% for coastal flooding
Zone C	**Low Probability of Flooding** Where the annual probability of flooding is: less than 0.1% for fluvial flooding and less than 0.1% for coastal flooding

The guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for with the Justification Test, where the planning need and the

sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable.

A three staged approach to undertaking an FRA is recommended:

- Stage 1: Flood Risk Identification – Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment;
- Stage 2: Initial Flood Risk Assessment – Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measure;
- Stage 3: Detailed Flood Risk Assessment – Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

3.2 Meath County Development Plan & Strategic Flood Risk Assessment

The Meath County Development Plan 2021-2027 identifies a number of policies relating to flooding, some are outlined below:

"INF POL 19 To implement the findings and recommendations of the Strategic Flood Risk Assessment prepared in conjunction with the County Development Plan review, ensuring climate change is taken into account."

"INF POL 20 To require that a Flood Risk Assessment is carried out for any development proposal, where flood risk may be an issue in accordance with the "Planning System and Flood Risk Management – Guidelines for Planning Authorities" (DoECLG OPW, 2009). This assessment shall be appropriate to the scale and nature of risk to and from the potential development and shall consider the impact of climate change."

As part of the Development Plan, a Strategic Flood Risk Assessment was prepared by JBA which includes justification tests for zoned land which falls within the extents of Flood Zone A and Flood Zone B.

The Strategic Flood Risk Assessment states in section 4.9 the following:

"*finished floor levels to be set above the 1% AEP fluvial (0.5% AEP tide) level, with an allowance for climate change plus a freeboard of at least 300mm. The freeboard allowance should be assessed, and the choice justified".*

3.3 Climate Change

Both the Greater Dublin Strategic Drainage Study (GDSDS) and PSFRM Guidelines require that account be taken of the effects of climate change over the design life of a development, typically 100 years. Design parameters to take account of climate change were established in the *GDSDS* and revised following later studies and Climate Change Sectorial Adaptation Plan Flood Risk Management (2015-2019) Development published by the OPW. These parameters are set out in Table 3-2, below.

Table 3-2: Climate Change - Impact on Design Parameters

Design Category	Impact of Climate Change
Drainage	10% increase in rainfall
Fluvial (River)	20% increase in flood flow
Tidal/Coastal	Sea level rise of 500 mm[1]

[1] Taken from Climate Change Sectorial Adaptation Plan Flood Risk Management (2015-2019) Development

4 FLOOD RISK IDENTIFICATION

4.1 Existing Hydrological Environment

The Fairyhouse Stream is location to the south and the Bradystown Stream which is part of the Nanny-Delvin Catchment area to the east. There is no watercourse adjacent to the site boundary.

While there is an existing drainage ditch onsite, the site is not located in an area which benefits from an OPW Arterial Scheme.

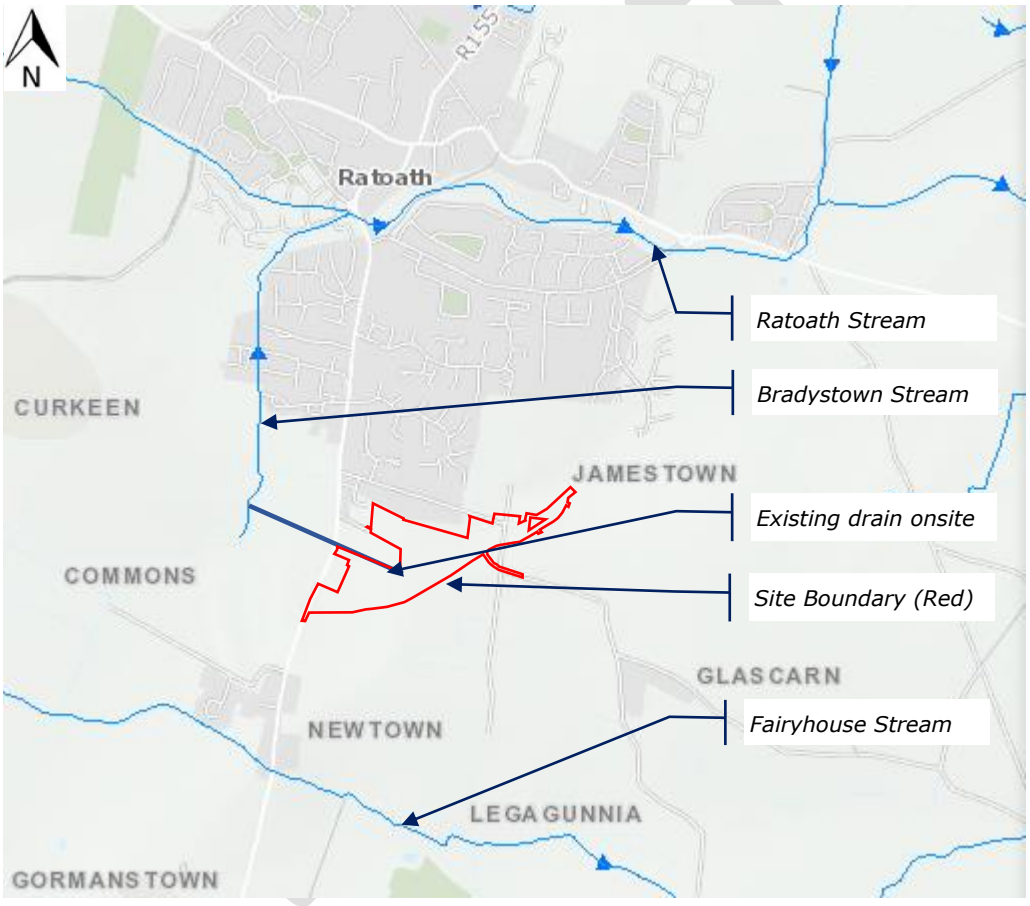

Figure 4-1: EPA Surface Water Map Viewer

The drainage ditch travels under the Fairyhouse Road where it then travels in a westerly direction towards the Bradystown Stream.

4.2 Existing Surface Water Drainage

There is no existing surface water infrastructure on the site.

There is an existing drain onsite. This were identified in the topographical survey and during the site visit and are discussed above.

4.3 Historical Maps

The historical 6" (1837 – 1842) and the 25" (1888 – 1913) mapping have been examined. Historical mapping is often a very useful source of information for assessing the flood history of an area. The historical maps examined do not indicate flooding in the area proposed for this development.

4.4 Historical Flooding

The Office of Public Works (OPW) gathers and collates data from reported flood events throughout the country. From a review of the OPW's National Flood Hazard Mapping database (www.floodmaps.ie), there are no reported incidents of flooding in the vicinity of the site.

There are no reports of flooding occurring within the proposed site or in the vicinity of the proposed site.

4.5 Groundwater Flooding

The OPW's Preliminary Flood Risk Assessment (PFRA) does not include an assessment of the flood risk posed by ground water. This information is currently generated by Geological Survey Ireland (GSI) and will be openly available information when published. There are no reported incidents of ground water flooding in the vicinity of the site.

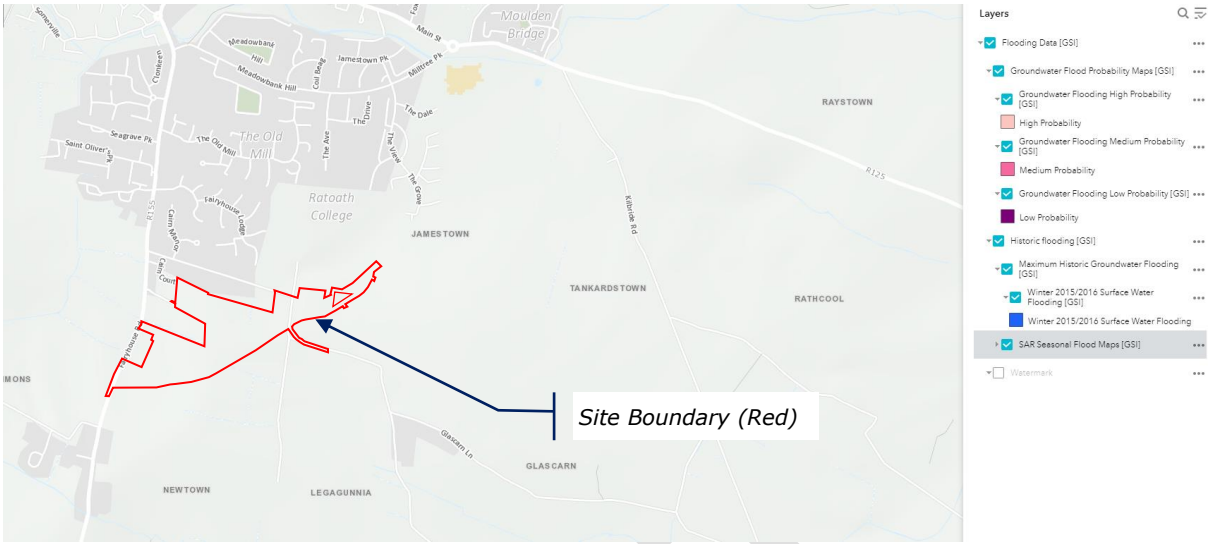

Figure 4-2: Groundwater Flooding

4.6 Preliminary Flood Risk Assessment

The Catchment Flood Risk Assessment and Management Study (CFRAMS) is a national programme which to date has produced both a series of Preliminary Flood Risk Assessments (PFRA) which cover the entire country, as well as more detailed flood maps in certain catchments across the country.

Prior to the publication of the detailed CFRAMS flood mapping, a series of Preliminary Flood Risk Assessment (PFRA) maps were published. These maps indicated preliminary tidal and fluvial flood zones along with pluvial and groundwater risks.

Ratoath was included in the PFRA database, see extract in Figure 4-1.

As can be seen, there is a pluvial flood risk identified onsite. As part of the proposed development, a new surface water network is to be constructed and will manage the pluvial flood risk onsite.

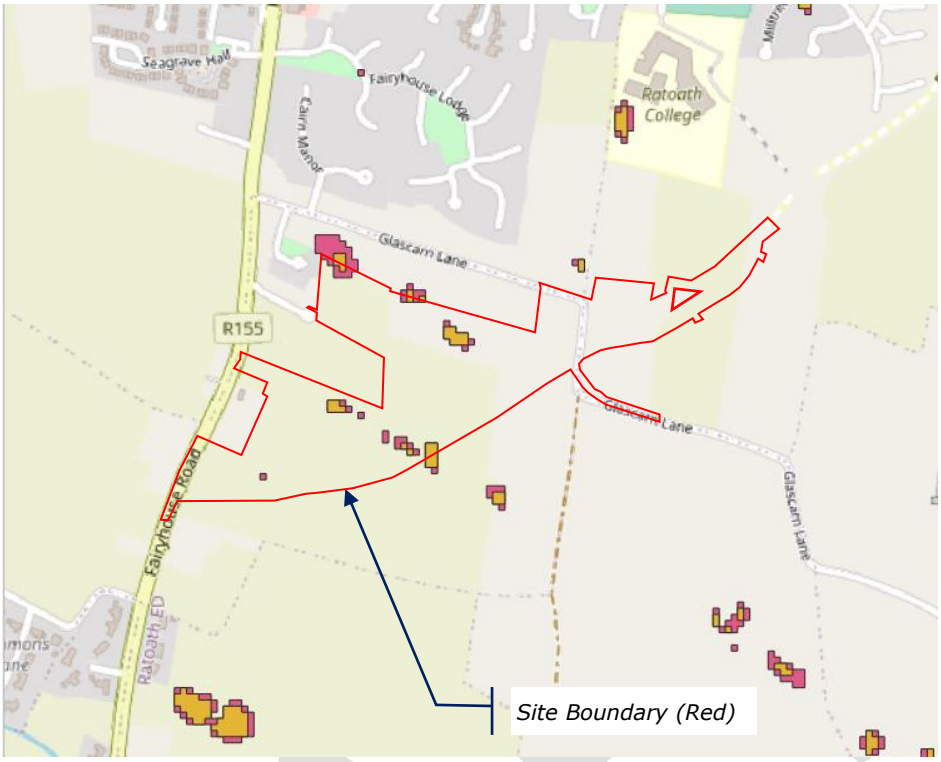

Figure 4-1: Extract from the preliminary flood risk assessment maps which was carried out as part of the CFRAMS programme

4.7 Catchment Flood Assessment and Management

The OPW in conjunction with Meath County Council have developed the Flood Risk and Hazard maps as part of the CFRAMS programme.

Given the elevation and location of the site of the proposed development, we consider that tidal flooding does not pose a flood risk in the area.

OPW flood maps are currently under review in the Ratoath area. However, according to the flood maps that were available in October 2021, the site of the proposed development is not located in the modelled fluvial flood extents, see Figure 4-2.

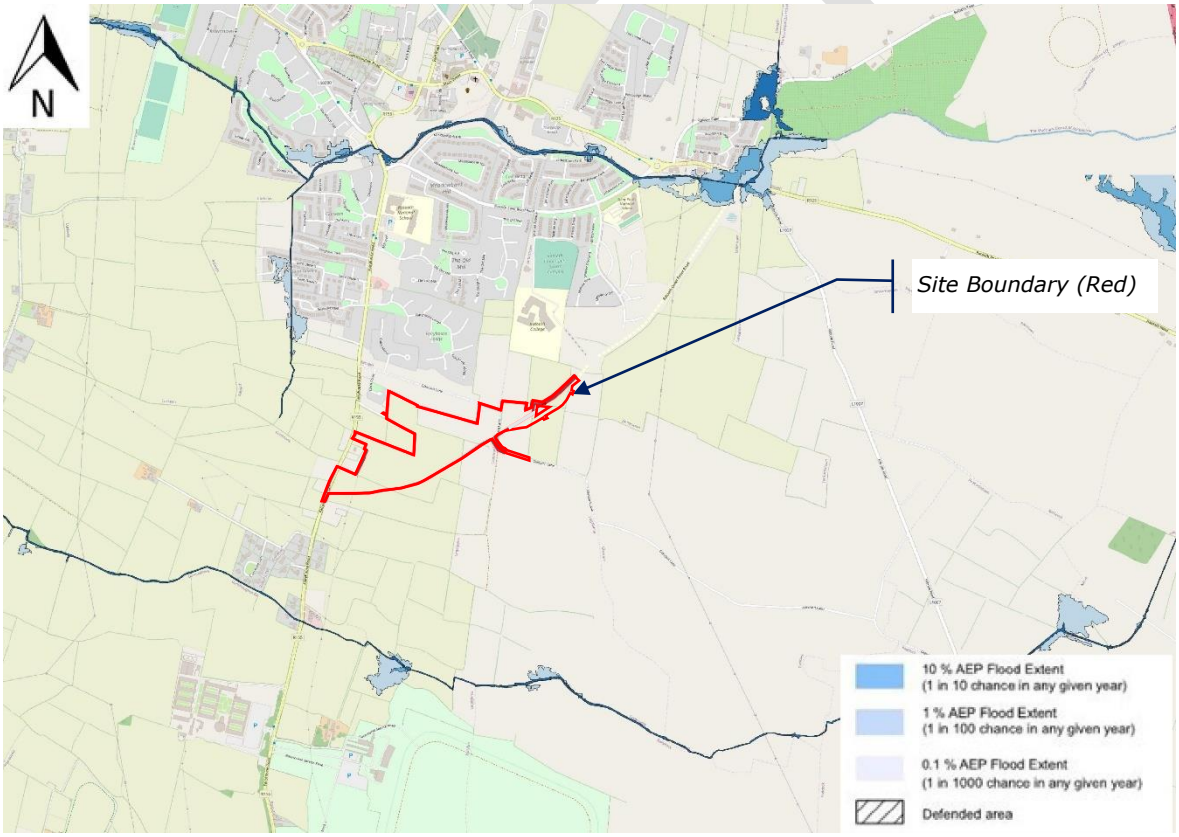

Figure 4-2: OPW Fluvial Flood Extent Map

The highest predicted flood level in the node nearest the site is 89.03 mAOD (1 in 1000-year event). The low-lying lands to the northeast of the site are 90.50 mAOD at the lowest level. For context, it is also noted that the minimum proposed finished floor level is to be set approximately.

4.8 Meath County Development Plan Strategic Flood Risk Assessment

A Strategic Flood Risk Assessment (SFRA) was prepared as part of the Meath County Development Plan by JBA. As part of the SFRA, a review of flooding in Ratoath was undertaken. Ratoath was previously covered by PFRA mapping which has been updated by a recent FRA using a more detailed approach see.

The site is not located in Flood Zone A or B as identified in the Meath County Development Plan, see Figure 4-3, and is therefore considered to be within Flood Zone C.

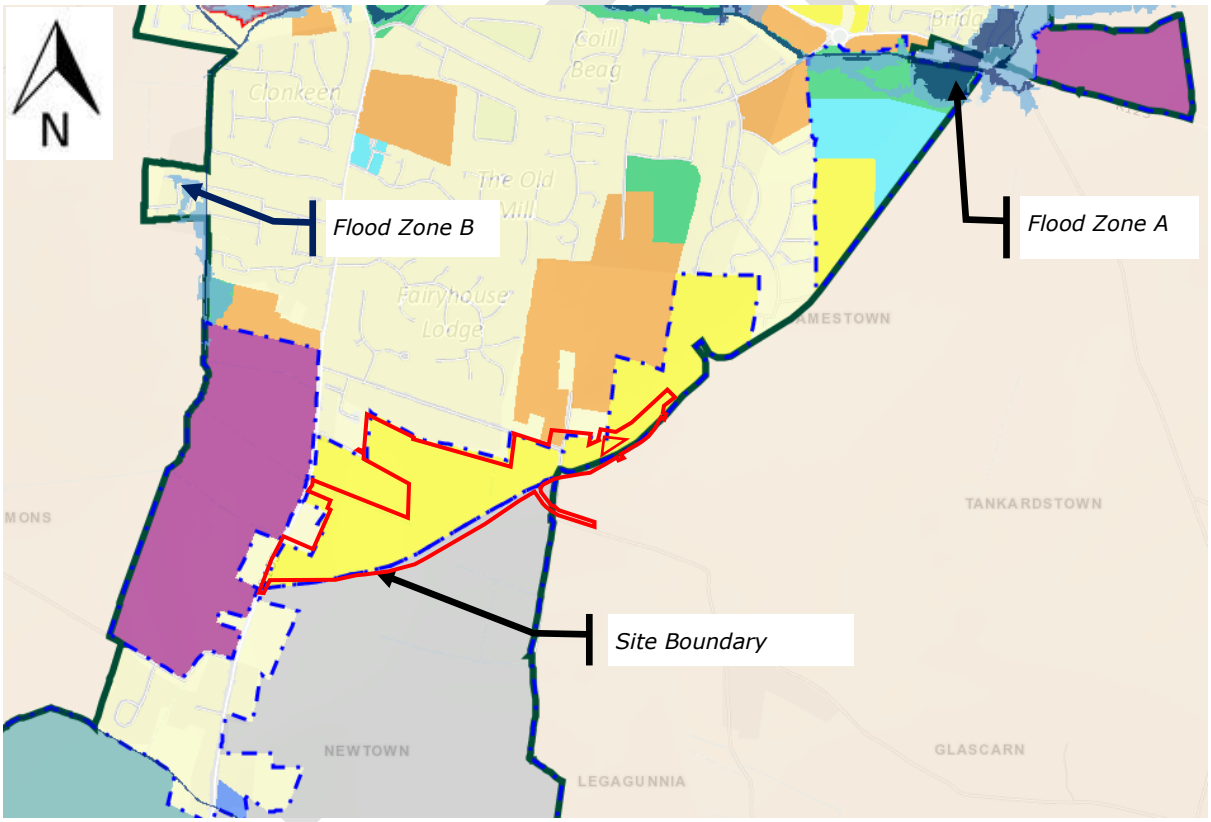

Figure 4-3: MCC Development Plan

4.9 Estimate of Flood Zone and Levels

From the available information, it can be concluded that the site is located outside the 1 in 100 and 1 in 100-year fluvial flood extents and is considered to be within Flood Zone C.

A portion of the site is shown to be at risk of pluvial flooding. A new surface water network is proposed as part of the development and will manage all surface water onsite the site and minimise the impact of pluvial flooding elsewhere as a result of the proposed development.

The site is not at risk of groundwater or coastal flooding.

5 FLOOD RISK ASSESSMENT

5.1 Sources of Flooding

Fluvial Flooding

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain.

There is no stream or river adjacent to or within the site boundary. From a review of the publicly available information, there is no fluvial flood risk to the site.

Pluvial Flooding

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high-intensity rainfall.

The PFRA maps for the area identified a pluvial risk to an area within the site boundary.

There is no existing surface water network onsite. The proposed development includes the construction of a new surface water network which will manage surface water runoff onsite.

Coastal Flooding

Coastal flooding is the result of sea levels which are higher than normal and result in sea water overflowing onto the land during high tides or storm surges. Given the elevation and location of the site of the proposed development, we consider that tidal flooding does not pose a flood risk in the area.

Groundwater Flooding

Groundwater flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. From a review of the available information, there is no risk of groundwater flooding at the site. There are no basements proposed as part of the development.

5.2 Development Vulnerability

The *PSFRM Guidelines* classify potential development in terms of its vulnerability to flooding. The types of development falling within each vulnerability class are described in *Table 3.1* of the *PSFRM Guidelines*, which is reproduced in Table 5-1.

Table 5-1: Development Vulnerability Class

Vulnerability Class	Land uses and types of development which include:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; **Dwelling houses, student halls of residence and hostels;** Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; 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
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation);

	Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

The proposed development comprises of residential dwelling houses and therefore, is considered to be ***Highly vulnerable development***.

The *PSFRM Guidelines* define the zones in which each class of development is appropriate – this is summarised in Table 5-2. The *PSFRM Guidelines* recognises that flood risks should not be the only deciding factor in zoning for development. They also recognise that circumstances will exist where development of a site within a floodplain is desirable; in order to achieve compact and sustainable development of the core of urban settlements. In order to allow consideration of such development, the *PSFRM Guidelines* provide a **Justification Test**, which establishes the criteria under which desirable development of a site in a floodplain may be warranted.

Table 5-2: "Appropriateness" Matrix

	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

The proposed development is considered less-vulnerable and from the flood maps reviewed, there is no development within the 1 in 1000-year flood extent.

As a portion of the site is shown to be within Flood Zone C in the Meath County Development Plan, a Justification Test is not required as the development is considered appropriate.

5.3 Flood Mitigation Measures

A review of flood maps produced as part of the flood model prepared for this application indicate that the site is not at risk of fluvial, coastal or groundwater flooding. All buildings will be constructed in Flood Zone C.

A new surface water network will manage all surface water arising from the proposed development and will not increase the risk of flooding elsewhere.

5.3.1 Emergency Access & Egress

It is necessary to ensure that access and egress will remain possible to the development in the event of an emergency during an extreme flood event. It is proposed to provide access to the development through a new entrance to the Ratoath Outer Relief Road.

The surrounding road network to the south will be located in Flood Zone C, and access will be maintained in the event of an emergency.

5.3.2 Flood Storage

There is no proposed development within the 1 in 100-year flood extent and as such, there is no requirement for flood compensation for the development.

5.3.3 Infrastructure

The proposed development includes the construction of a surface water network which consists of SuDS measures which will minimize the impact to the receiving environment. Please refer to Engineering Services Report for details. All works adjacent to the existing drain onsite will be carried using the Inland Fisheries Ireland "Guidelines on Protection of Fisheries During Construction Works In And Adjacent To Waters".

5.3.4 Finished Floor Levels

The highest predicted flood level in the node nearest the site is 89.03 mAOD (1 in 1000-year event).

The minimum Finished Flood Level (FFL) of all buildings will be set above the 1 in 100-year fluvial flood level with a freeboard of 300 mm and allowance for climate change as recommended by the Meath CDP SFRA. For context, it is noted that the minimum proposed finished floor level is 90.59 mAOD.

5.4 Flood Risk Management

Flood risk management under the EU Floods Directive aims to minimise the risks arising from flooding to people, property and the environment. Minimising risk can be achieved through structural measures that block or restrict the pathways of floodwaters, such as river defences or non-structural measures that are often aimed at reducing the vulnerability of people and communities such as flood warning, effective emergency response, or resilience measures for communities or individual properties.

6 CONCLUSION

The assessment is carried out in full compliance with the requirements of "The Planning System & Flood Risk Management Guidelines" published by the Department of the Environment, Heritage and Local Government in November 2009.

From the information reviewed, it is considered that the site of the proposed development is not within the 1 in 100 and 1 in 1000-year flood extents.

The site is located in Flood Zone C as outlined in the Meath County Development plan and, as such, the proposed residential development is considered appropriate.

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APPENDIX A. PROPOSED SITE LAYOUT

Appendix A

Proposed Site Layout

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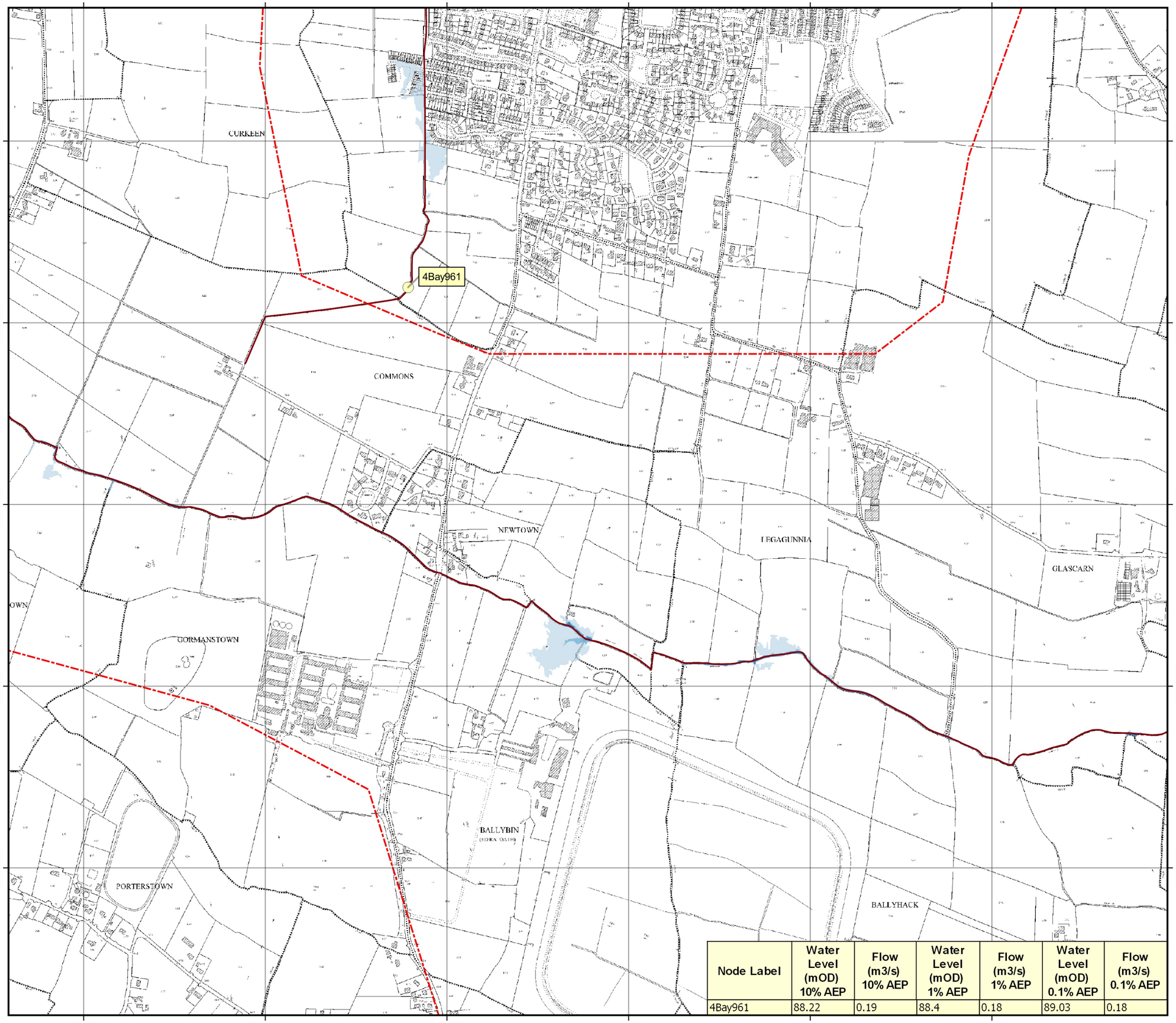
APPENDIX B. CFRAMS MAPS

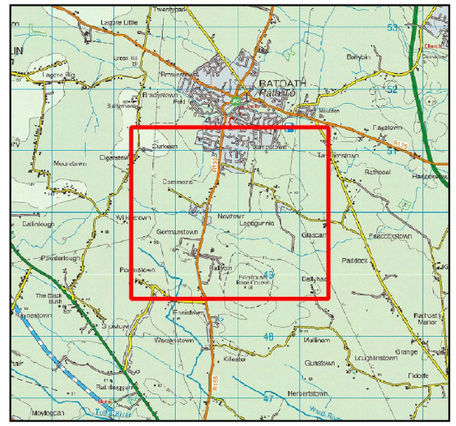
Appendix B

CFRAMS Maps



Node Label	Water Level (mOD) 10% AEP	Flow (m3/s) 10% AEP	Water Level (mOD) 1% AEP	Flow (m3/s) 1% AEP	Water Level (mOD) 0.1% AEP	Flow (m3/s) 0.1% AEP
4Bay961	88.22	0.19	88.4	0.18	89.03	0.18

Location Plan:



LEGEND

- AFA Boundary
- Defended Area
- Modelled River Centreline
- Node Point
- 10% AEP Fluvial Extent (High Risk)
- 1% AEP Fluvial Extent (Medium Risk)
- 0.1% AEP Fluvial Extent (Low Risk)
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- NODE123 — Node Label
- x.x% AEP — Standard of Protection of Flood Defence

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:
FINGAL EAST MEATH FRAM STUDY

Map: **Broad Meadow Model**
FLUVIAL FLOOD EXTENT MAP

Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	HPW		
Scenario:	CURRENT		
Drawn by:	IH	Date:	Sep - 2016
Checked by:	MC	Date:	Sep - 2016
Approved by:	JM	Date:	Sep - 2016

Map No.: BRO/HPW/EXT/CURS/003
Revision: F0
Map Scale: 1:10,000 Plot Scale: 1:1 @ A3

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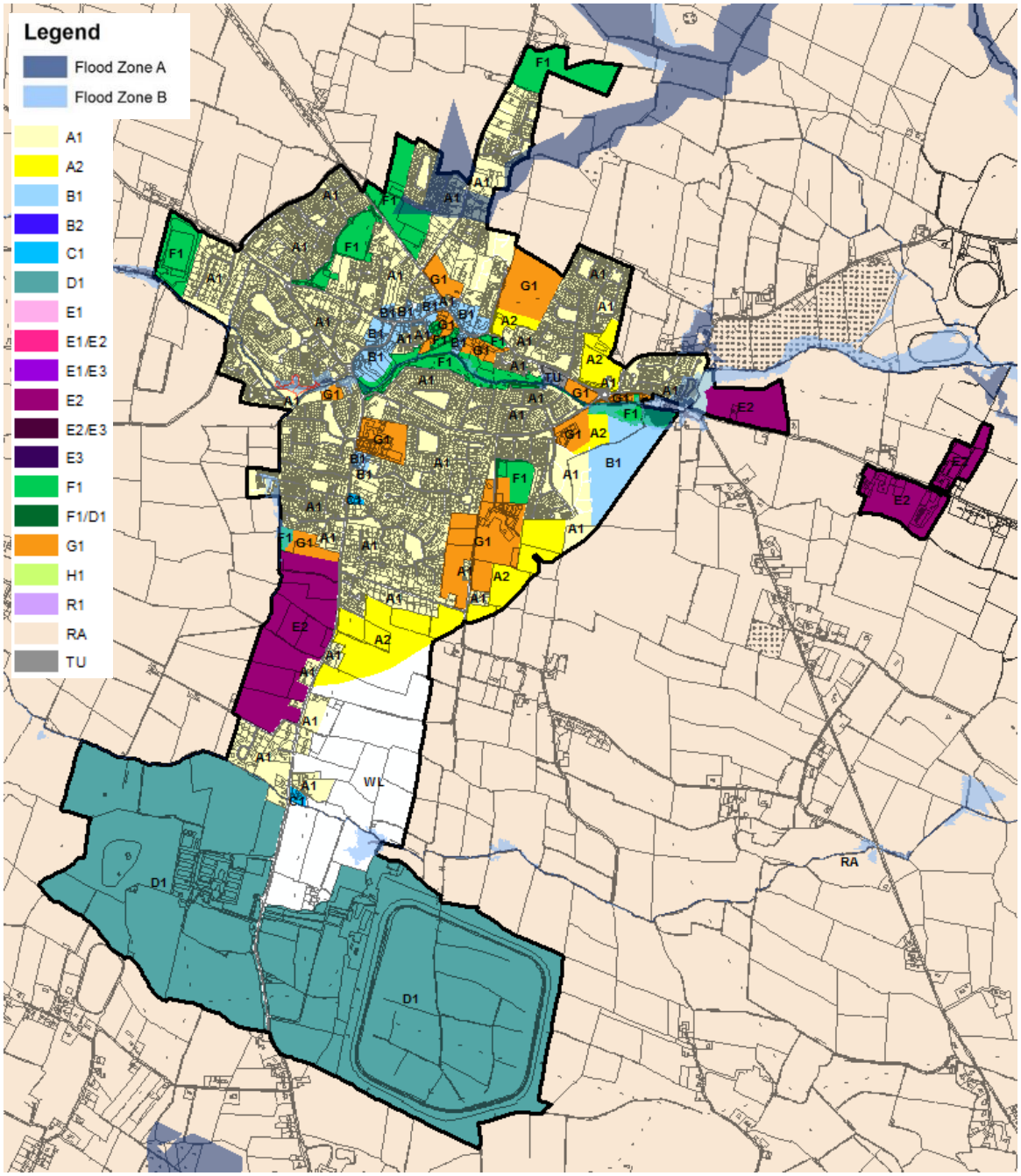
APPENDIX C. MEATH COUNTY DEVELOPMENT PLAN STRATEGIC FLOOD RISK ASSESSMENT MAP

Appendix C

Meath County Development Plan Strategic Flood Risk Assessment Map

5.35 Ratoath

Hierarchy	SELF-SUSTAINING TOWN
Area for Further Assessment under CFRAM programme?	FEM FRAMS published 2011



The Flood Zone mapping has been produced in accordance with the Planning Guidelines and therefore ignores the impact of flood protection structures. Areas protected by flood defences still carry a residual risk of flooding due to overtopping or breach, there may also be no guarantee of maintenance in perpetuity. Areas that benefit from defences are annotated separately. Flood Zone A – Fluvial: 1 in 100 year or 1% AEP, Tidal: 1 in 200 year or 0.5% AEP. Flood Zone B – 1 in 1000 year or 0.1% AEP.

Flood Zone Data	FEM FRAMS, OPW PFRA and JBA site visit.
Historic Flooding	No historic records of flooding were found.

Comment:

Ratoath is exposed to fluvial flooding from the Broadmeadow River. Flood Zone A mainly affects agricultural lands and a small number of properties on the eastern side of Ratoath in the Moulden Bridge Area. Defences in the Somerville Estate in Ratoath provide protection up to the 1% AEP event (Flood Zone A). For return periods above this standard of protection the area is still at risk (Flood Zone B is unchanged).

The flood extents impact on existing development for Residential (A1), Open Space (F1), Community Infrastructure (G1). Transport & Utilities (TU) and Town Centre (B1) lands. Risk to existing A1, B1, TU and G1 development should be managed in line with the policies (INF POL 14-29) of the MCDP. Within areas of existing development, proposals for extensions and minor works should be considered under Section 5.28 of the Planning System and Flood Risk Management Guidelines and with due regard to the aforementioned policies.

Potential risk to new development to east of town for, G1 and B1. Any new development under the proposed G1 land use zoning bordering the Broadmeadow River should be subject to appropriately detailed FRA at the development management stage in line with the MCDP policies.

Risk to development in the defended area of Somerville estate should be managed in line with the current policies and objectives. Any development is likely to be limited by the Justification Test to extensions and residual risk should be considered under the associated FRA.

Significant lands to the south of Ratoath (Fairyhouse and Tattersalls) are zoned for tourism (D1) and incorporate equine uses. A small watercourse passes alongside the northern boundary of the site and does not significantly impact the zoned land. Flood risk should be managed by the application of the sequential approach and appropriately detailed FRA at development management stage, as required.

The FEM FRAMS highlighted possible risk from conveyance/blockage from the R125 bridge and a culvert on the tributary of the Broadmeadow River. Any FRAs undertaken in this area at development management stage should include consideration of the residual flood risk related to blockage.

FEM FRAMS mitigation options identified the improvement of channel conveyance by replacing a bridge on the Broadmeadow River at the R125 Ashbourne Road and replacing a culvert on a tributary of the Broadmeadow River. However, the benefit cost ratio was not greater than 1 and unless additional analysis can increase this value above 1 then a scheme will not be progressed. The bridge on the Broadmeadow River at the R125 Ashbourne Road has now been upgraded. Proactive maintenance of the existing flood defence in Ratoath was recommended and this is not subject to further review.

Pedestrian walkways may require FRA during planning application stage but the Justification Text is not required.

Climate Change	The impact of Climate change on increased river flows results in a large increase in flood risk in Ratoath, particularly around the R125 bridge.
Conclusion	Manage flood risk and development in line with approved policies and objectives. At development management stage any FRAs should include consideration of culvert blockage when assessing risk and recommending design details. Pedestrian walkways may require FRA during planning application stage but the Justification Text is not required.