



APPENDIX 8-2

SITE SPECIFIC FLOOD RISK ASSESSMENTS

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OCSC

O'CONNOR | SUTTON | CRONIN

Multidisciplinary
Consulting Engineers

**Strategic Employment Zone (Biotechnology
& Life Sciences Campus) Development**

For Sky Castle Ltd

PROJECT NO. S665

24 August 2022



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for

**Strategic Employment Zone Development,
(Biotechnology & Life Sciences Campus)**

at Moygaddy,

Co. Meath.



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SITE-SPECIFIC FLOOD RISK ASSESSMENT

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1 INTRODUCTION

1.1 Appointment

O'Connor Sutton Cronin & Associates (OCSC) have been appointed by *Sky Castle Ltd* to carry out A Site-Specific Flood Risk Assessment for the proposed, 3nr. Unit, phase 1 of a new Strategic Employment Zone office campus, at Moygaddy, Co. Meath.

1.2 Administrative Jurisdiction

The proposed development is located in the jurisdiction of Meath County Council (MCC), and therefore the site-specific assessment on flood risk was assessed with reference to the following:

- Meath County Development Plan 2021 - 2027;
- Maynooth Environs Local Area Plan;
- Greater Dublin Strategic Drainage Study (GSDSDS);
- 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

The subject site is located adjacent to the Dunboyne Road (R157) at Moygaddy, along the Co. Meath/ Co. Kildare border, as shown in **Figure 1.1**. The proposed development site is immediately bound by:

- Dunboyne Road (R157), to the east; and
- Agricultural Lands, to the north, west and south.

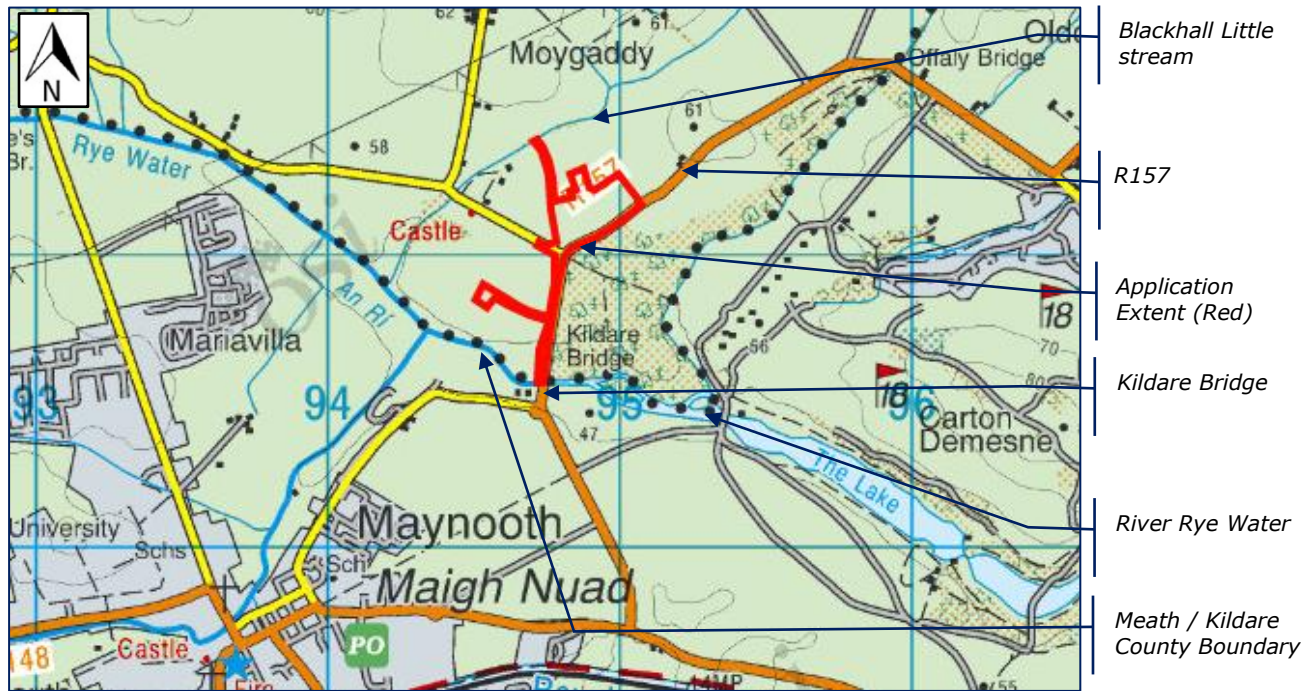


Figure 1.1 - Site Location (www.myplan.ie)

2 SITE CONTEXT

2.1 Existing Site Overview

The overall total application site area is **c. 6.9-hectares**, with approximately 4-hectares of this being zoned by Meath County Council for Enterprise and Employment in the Draft Meath County Development Plan 2021 – 2027. The total area also includes areas outside of the proposed office park, where further works are to be carried out e.g., realignment and upgrading of existing road; installation of new infrastructure, including new wastewater, surface water and watermain services, along existing road; new wastewater pumping station; and the provision of new pedestrian and cycle bridge structure adjacent to the Kildare Bridge, to its west.

The site is currently greenfield and used for agricultural purposes, and can be accessed from the R157, Maynooth to Dunboyne Road, which aligns the southern boundary of the subject site.

There is a localised high-point of 60.18mAOD near the centre of the site, with levels gently graded, from here, towards the Dunboyne Road (R157) at the southern boundary of the site with levels of 56.22mAOD.

2.2 Proposed Development Context

The Applicant– Sky Castle Limited – is applying for planning permission for Phase 1 of a proposed Strategic Employment Zone Office Campus Development at Moygaddy, Co. Meath.

The proposed development comprises 3 no. office blocks and all associated site development works (GFA: 20,633.26 sq.m) as follows:

- Block A: 5 storey office building providing offices, stair and lift cores and plant rooms (GFA: 10,260.42 sq.m)
- Block B: 3 storey office building providing offices, stair and lift cores and plant rooms (GFA: 5,186.54 sq.m)
- Block C: 3 storey office building providing offices, stair and lift cores and plant rooms (GFA: 5,186.30 sq.m)

- The development includes a surface car park which includes 323 no. car parking spaces and 320 no. bicycle car parking spaces (including 16 no. accessible car parking spaces and 12 no. EV charging spaces)
- Undertaking of road upgrade works including the provision of a signalised junction on the R157 Dunboyne Road and the construction of a section of the Maynooth Outer Orbital Route and provision of associated pedestrian and cycle infrastructure, as well as a realignment of a section of the R157. The works to the R157 adjoin the Carton Demense Wall which is a Protected Structure (RPS Ref 91556).
- Vehicular access to the site will be provided via the R157 Dunboyne Road and provision is made for a secondary vehicular access via the proposed section of the Maynooth Outer Orbital Route.
- Provision of water, foul and surface water drainage infrastructure including pumping station.
- Provision of a new pedestrian & cycle bridge structure at the River Rye Water adjacent to the existing Kildare Bridge.
- Provision of roof mounted solar PV panels on Office Blocks A, B & C.
- Provision of 3 no. ESB Kiosks.
- Provision of bin stores, bike stands, landscaping, boundary treatments and public lighting and all other site development works and services ancillary to the proposed development.

The proposed site layout is shown in **Figure 2.1**.



Figure 2.1 - Proposed Development Layout

3 SCOPE OF SITE-SPECIFIC FLOOD RISK ASSESSMENT

This Site-Specific Flood Risk Assessment Report was prepared by reviewing the available data from the Local Authority sources and national bodies *i.e.*, Meath County Council, Irish Water, The OPW, and the wider Design Team.

A detailed assessment of the proposed engineering infrastructure services associated with the proposed development is provided under separate cover, as part of this application. Refer to document **S665-OCSC-1A-XX-RP-C-0002** for details.

An additional detailed flood risk assessment report on the river Ryewater was carried out by JBA Consulting, for assessment of impact of the proposed development, along with the entire Maynooth Environs and its associated development, infrastructure and new bridge structures; this has been submitted under separate cover, as part of this application, and has been considered as part of this SSFRA report.

The flood risk assessment was prepared based on a comprehensive review of the information available from the following sources:

- The Office of Public Works, the Planning System and Flood Risk Management;
- Meath County Council Development Plan;
- Meath County Council Development Plan (2021-2027);
- Kildare County Development Plan (2017 – 2023);
- Greater Dublin Strategic Drainage Study (GDSDS);
- OPW website www.floodinfo.ie;
- DECLG website www.myplan.ie;
- OPW website www.floodmaps.ie;
- Meath County Council's and Irish Water's Drainage and Watermain Records;
- Geological Survey of Ireland Maps;
- Architectural drawings;
- Topographical survey of the proposed site.

4 FLOOD RISK ASSESSMENT

4.1 Design Guidelines Overview

Any planning permission sought on the subject lands are required to adhere to the Local Authority requirements *i.e.*, the Meath County Council Development Plan, and as such, The Planning System and Flood Risk Management (FRM), Guidelines for Planning Authorities, in which, its Technical Appendices outline the requirements for a Site-Specific Flood Risk Assessment.

4.2 The Planning System and Flood Risk Management, Guidelines for Planning Authorities

The FRM Guidelines outline methodologies for the “transparent consideration of flood risk at all levels of the planning process, ensuring consistency of approach throughout the country”.

“The core objectives of the FRM Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water runoff;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure 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 flood risk management.”

In order to achieve the aims and objectives that are set out in the FRM Guidelines, the key principles that should be applied to new development are as follows:

- Avoid the risk, where possible;
- Substitute less vulnerable uses, where avoidance is not possible; and

- Mitigate and manage the risk, where avoidance and substitution are not possible.

Justification for development is required in situations where 'avoid' and 'substitute' principles cannot be applied. This is further summarised in the FRM Guidelines Sequential Approach, as illustrated in *Figure 4.1*.

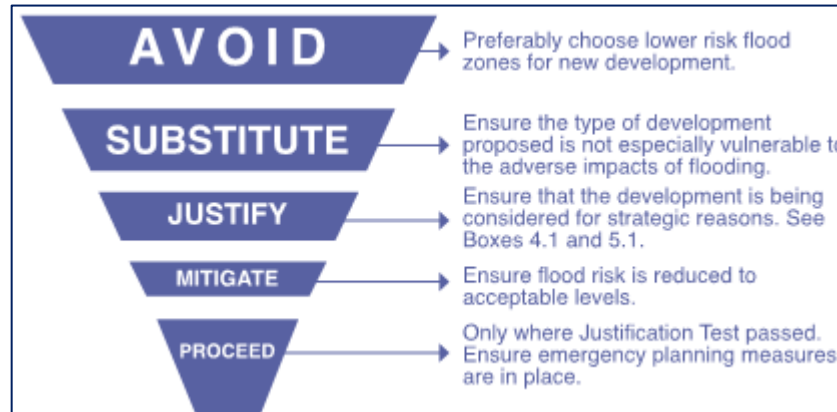


Figure 4.1 - Sequential Approach Principles in Flood Risk Management.

4.3 Flood Risk Assessment

The assessment of flood risk requires an understanding of where the water comes from (i.e. the source), how and where it flows (i.e. the pathways) and the people and assets that it affects (i.e. the receptors). This is illustrated further in *Figure 4.2*, as sourced from the FRM Guidelines.

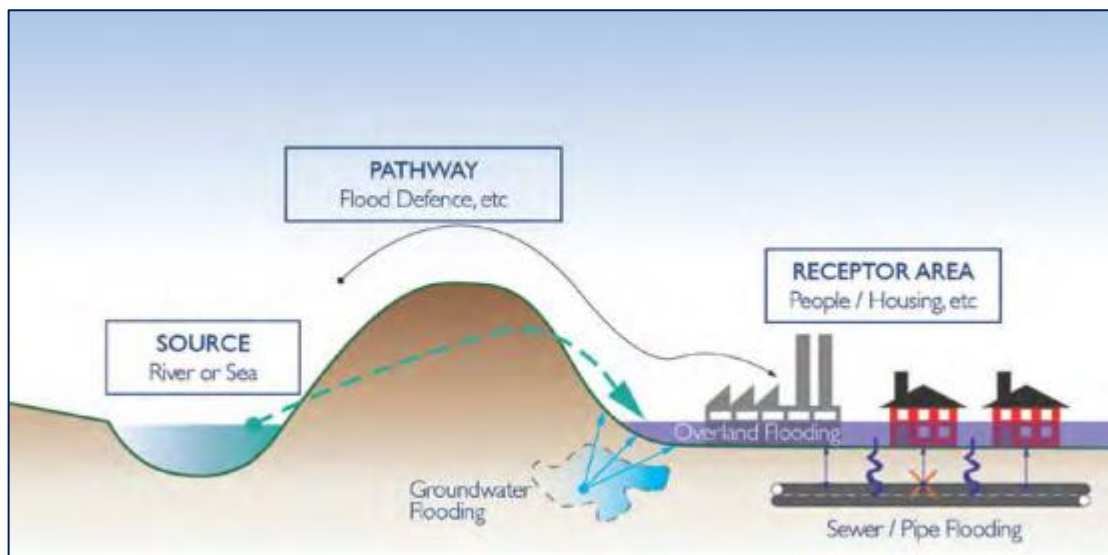


Figure 4.2 - Source - Pathway - Receptor Model

The main sources of flooding are rainfall or higher than normal sea or river levels.

The main pathways include rivers, streams, sewers, drains, overland flow, and river and coastal floodplains and their assets.

Receptors typically include people, their property and their environment.

All three elements of this model must be examined as part of the flood risk assessment, including the vulnerability and exposure of receptors. In order to determine its potential consequence.

Risks to people, property and the environment should be assessed over the full range of probabilities, including extreme events. Flood risk assessment should cover all sources of flooding, including effects of run-off from a development locally and beyond the development site.

4.3.1 Flood Risk Assessment Stages

The FRM Guidelines outline that a staged approach should be adopted when carrying out a flood risk appraisal or assessment of flood risk for individual planning applications. "These stages are:

- **Stage 1** – Flood risk identification
- **Stage 2** – Initial flood risk assessment
- **Stage 3** – Detailed flood risk assessment

4.4 Flood Zones

The FRM Guidelines identifies three types, or levels, of flood zones, which are defined as follows:

1. **Flood Zone A** – where the probability of flooding from rivers and sea is highest (greater than 1%AEP for fluvial, or 0.5%AEP for coastal flooding);
2. **Flood Zone B** – where the probability of flooding from rivers and sea is moderate (between 0.1%AEP and 1%AEP for fluvial and between 0.1%AEP and 0.5%AEP for coastal flooding);

3. **Flood Zone C** – where the probability of flooding from rivers and sea is low (less than 0.1%AEP for both fluvial and coastal flooding).

4.5 Development Vulnerability

Table 3.1 of the PSFRM Guidelines classifies the proposed commercial development as being '**less vulnerable development**', based on its proposed land use and type of development.

Table 3.2 of the PSFRM Guidelines, reproduced in *Figure 4.3* below, illustrates the types of development that are considered appropriate to each flood zone, and those that would be required to meet the criteria of a Justification Test, which establishes the criteria under which desirable development of a site within a floodplain may be warranted.

	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

Figure 4.3 - Matrix of Vulnerability Vs. Flood Zone

Therefore, based on the table above, *Less Vulnerable Development*, such as commercial offices, is classified as '**appropriate**' if it is located within either Flood Zone B or Flood Zone C.

4.6 Sequential Approach

A sequential approach, based on the development vulnerability and location with respect to flood zones, is a key tool in ensuring new development is first and foremost directed towards land that is at low risk of flooding. This approach is illustrated further in *Figure 4.4*.

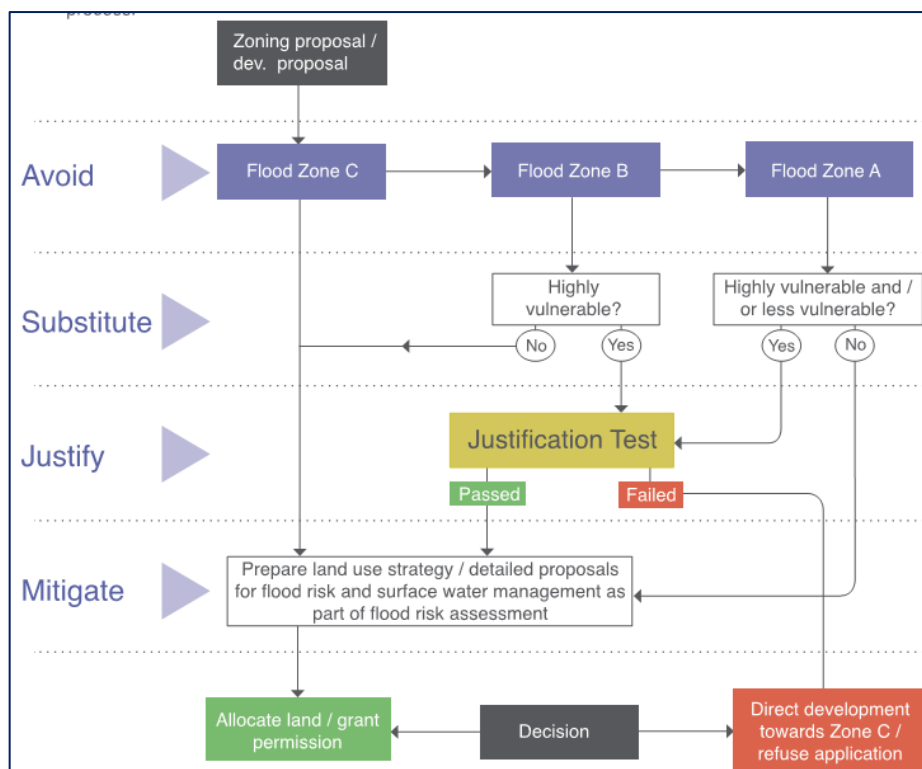


Figure 4.4 - Sequential Approach Mechanism (FRM Guidelines)

4.7 Meath County Development & 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.

INF POL 25: To have regard to the recommendations of the Fingal East Meath Flood Risk Assessment and Management Study (FEMFRAMS) and the Eastern Catchment Flood Risk Assessment and Management Study (CFRAMS).

INF POL 29: To facilitate the provision of new, or the reinforcement of existing flood defences and protection measures where necessary and in particular to support the implementation of flood schemes being progressed through the planning process during the lifetime of the Plan. The provision of flood defences will be subject to the outcome of the Appropriate Assessment process.”

4.8 Kildare County Council Development Plan 2017-2023

The Kildare County Development Plan identifies a number of policies relating to flooding, some are outlined below:

“SW3 - Support and co-operate with the Office of Public Works in delivering the Catchment Based Flood Risk Assessment and Management Programme in particular the Eastern and South Eastern CFRAM studies and associated Flood Management Plans. The recommendations and outputs arising from these studies shall be incorporated in preparing plans and assessing development proposals.

SW4 - Support the implementation of the EU Flood Risk Directive (2007/60/EC) on the assessment and management of flood risks and the Flood Risk Regulations (SI No 122 of 2010).

SW5 - Manage flood risk in the county in accordance with the requirements of the Planning System and Flood Risk Management Guidelines for Planning Authorities, DECLG and OPW (2009) and circular PL02/2014 (August 2014), in particular when preparing plans and programmes and assessing development proposals. For lands identified in the Strategic Flood Risk Assessment a site-specific Flood Risk Assessment to an appropriate level of detail, addressing all potential sources of flood risk, is required, demonstrating compliance with the aforementioned Guidelines or any updated version of these guidelines, paying particular attention to residual flood risks and any proposed site-specific flood management measures.

SW6 - Ensure effective management of residual risks for development permitted on floodplains.”

4.9 Flood Risk Assessment and Management Plan for Meath CDP 2021-2027

A Strategic Flood Risk Assessment (SFRA) was prepared in conjunction with the Meath County development Plan 2021-2027 by JBA. The SFRA includes flood maps and review of the flood risk to the **Maynooth Environs** i.e., Moygaddy.

The MCC SFRA comments that 'The River Rye Water flows adjacent to the southern and eastern border of the settlement, and a further tributary flows through the settlement from a north easterly direction. The CFRAM management plan confirms that there is an additional measure for Maynooth, however this is in Kildare and does not impact County Meath. The floodplain of both watercourses is appropriately zoned as F1 or H1. Existing development has largely avoided areas of high flood risk'.

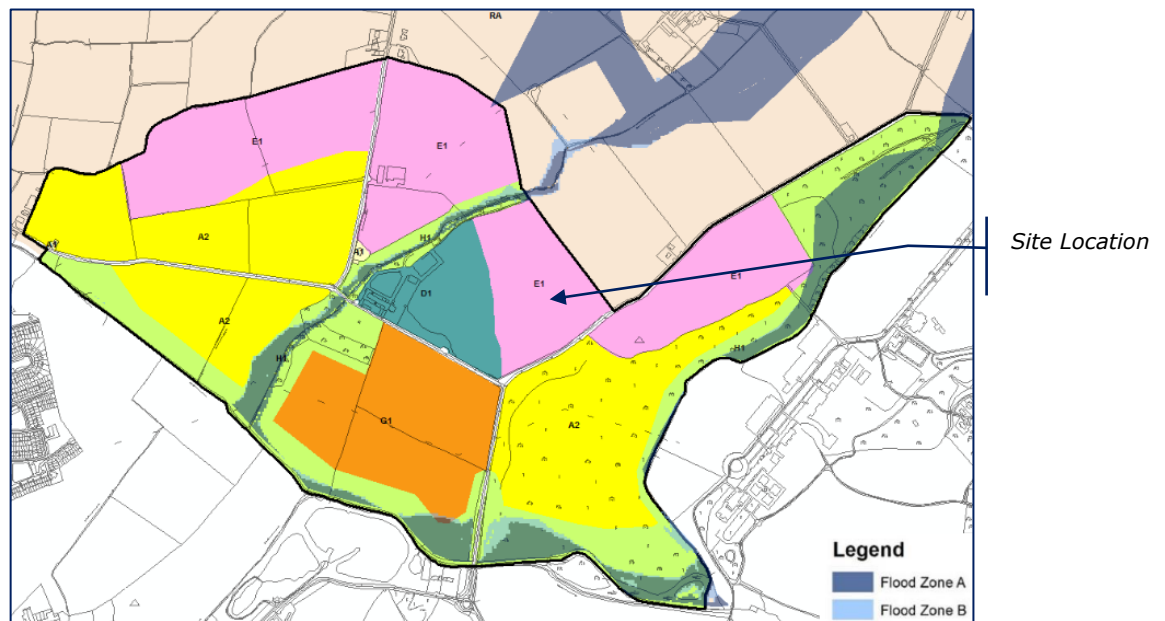


Figure 4.5 - Moygaddy Environs Flood Zones (MCC Dev Plan)

The proposed development is clearly located a significant distance away from Flood Zones A and B, as identified by the OPW's Catchment Flood Risk Assessment and Management (CFRAM) mapping of the river Ryewater.

4.10 Climate Change

Both the Greater Dublin Strategic Drainage Study (GSDSDS) 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 *GSDSDS* 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 4-1, below.

Table 4-1: Climate Change - Impact on Design Parameters

Design Category	Impact of Climate Change
Drainage	20% 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

5 STAGE 1 & 2 FLOOD RISK IDENTIFICATION & ASSESSMENT

Details of the information sources that were used as part of the flood risk identification and assessment associated with the subject development site are provided in *Section 2* of this report.

5.1 Existing Hydrological Environment

There are no watercourses in the immediate vicinity of site, see Figure 5.1. However, the subject site is located relatively close to both the river Ryewater, to its south, and its tributary: the Blackhall Little stream, to its west. The site is also aligned by a ditch, along its eastern extent, which appears to drain the local R157 Road directly to the river Ryewater.

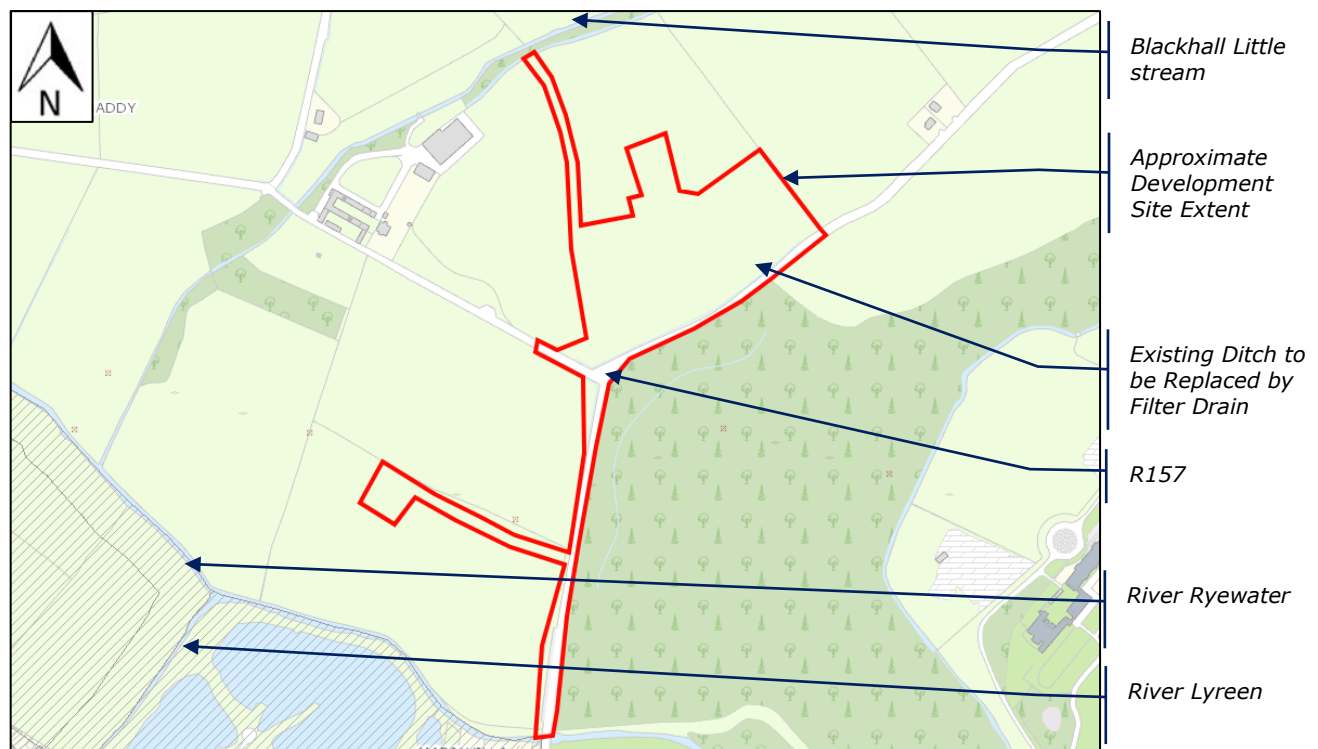


Figure 5.1: Hydrological Environment surrounding the site

5.2 Topographical Survey

The existing ground levels across the overall site are typically graded from a localised high point in the northern vicinity of the site, towards the southern boundary, typical high points between +60.18 mAOD at the centre of the site, falling to +56.22mAOD at the southern boundary.

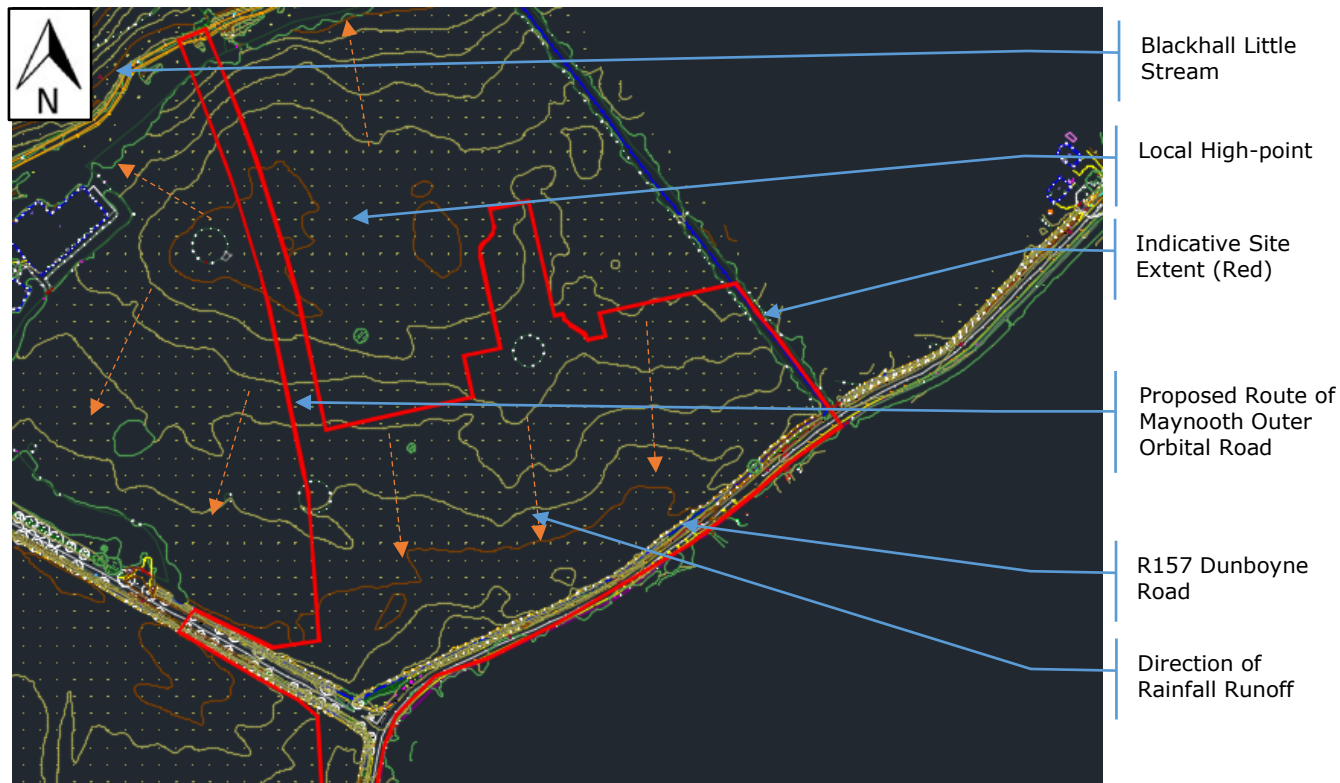


Figure 5.2 – Site Levels and Contour Overview

It is noted that the existing R157, Dunboyne Road appears to drain to the existing ditch alongside its northbound carriageway. This ditch conveys the runoff in a southerly direction, as far as the river Ryewater.

5.3 Site Geology

The geology of the site was reviewed using data from the Geological Survey of Ireland (available at EPA map viewer). From review of this interactive map, the proposed development is located in an area where the ground has '*Deep poorly drained mineral - Derived from mainly calcareous parent materials.*

The local groundwater is noted as being of low vulnerability, with the local aquifer being classified as being Locally Important, and Bedrock that is Moderately Productive, only in Local Zones.

5.4 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 historical site and local hydrology. The online interactive mapping, available from the OPW, does not show any historical hydrological features that may present any potential flood risk sources for assessment.

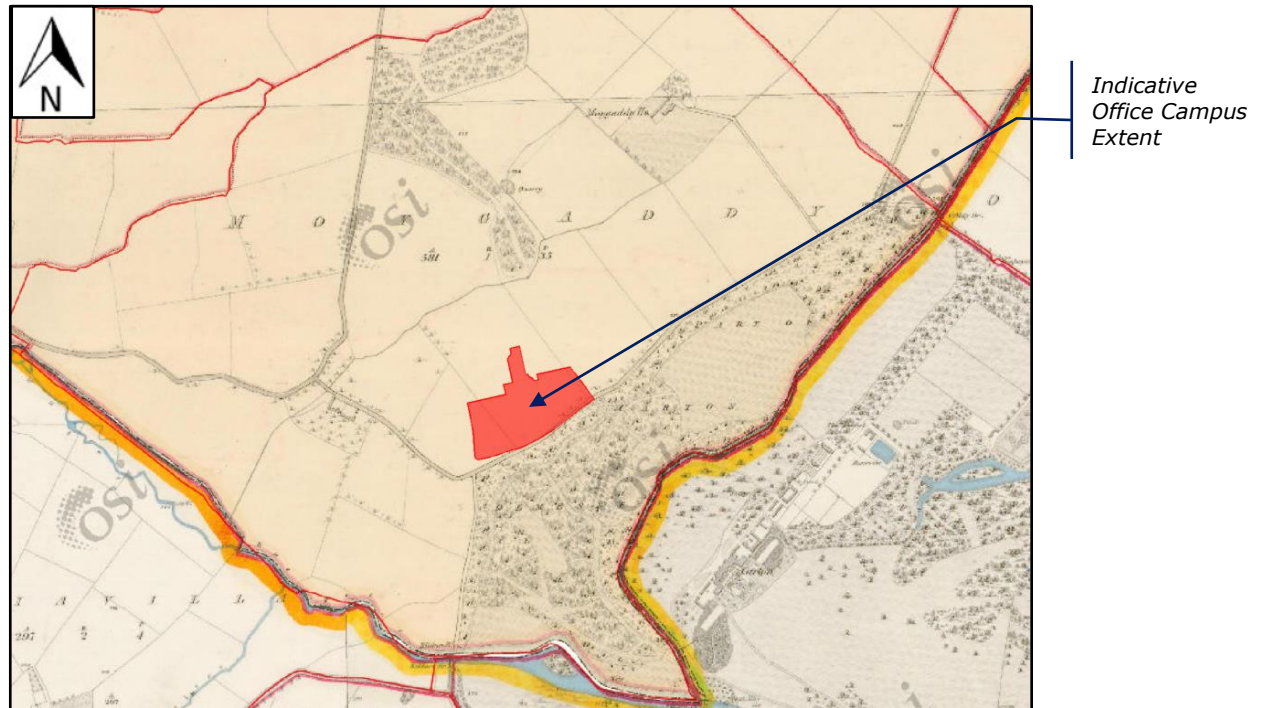


Figure 5.3 - Historic 6" Inch Map

5.5 Historical Flooding

The Office of Public Works (OPW) collates all information available from reports of flooding from all sources on a nationwide basis. This information is available from the OPW's website www.floodmaps.ie, which was consulted in order to obtain any information on previous flooding in the vicinity of the site. Refer to Figure 5-3 - OPW Historical Flooding, below.

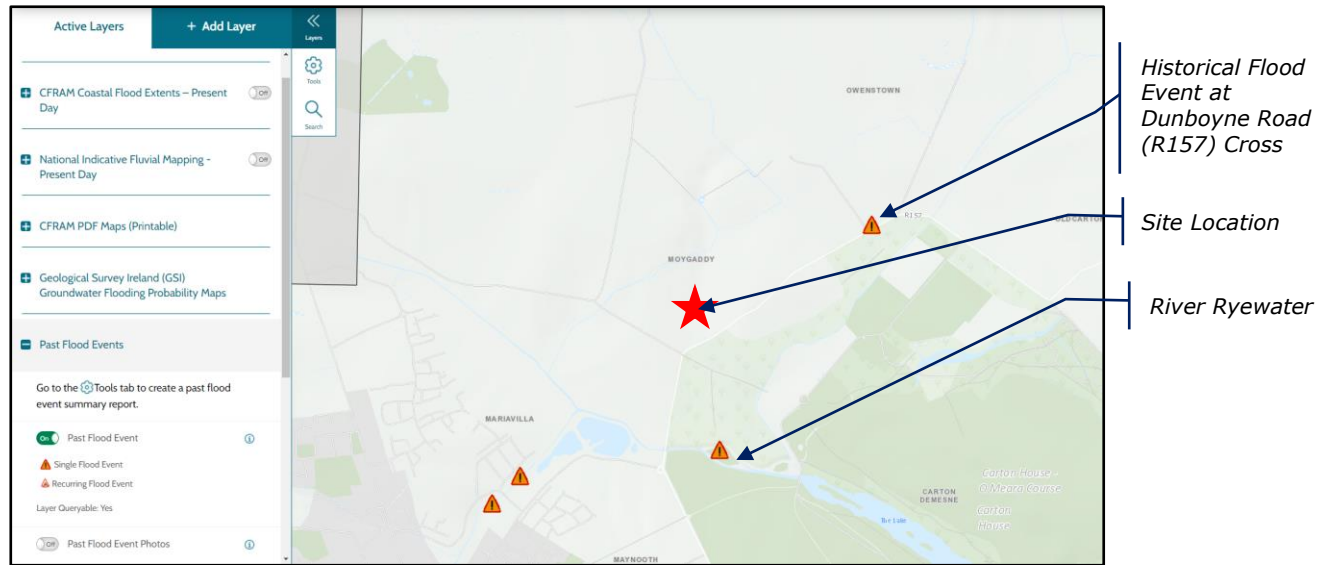


Figure 5.4 – OPW Historical Flooding (www.floodmaps.ie)

It is noted that the development lies partially within the Blackhall Little stream’s catchment area, along with the catchment of the river Ryewater, which does not have any record of past flooding events in the immediate vicinity.

Refer to **Appendix A** for a copy of the Historical Flooding Report.

5.6 Fluvial Flooding

Fluvial flooding occurs when a river overtops its banks due to a blockage in the channel or the channel capacity is exceeded due to excess rainfall in its catchment area.

The Blackhall Little stream is approximately 150m north of the site. The Blackhall Little stream is a tributary to the river Ryewater, to which it discharges approximately 1.0km downstream, which itself discharges to the river Liffey, at Leixlip, Co. Dublin. Refer to *Figure 4.2* for context of the site proximity to rivers.

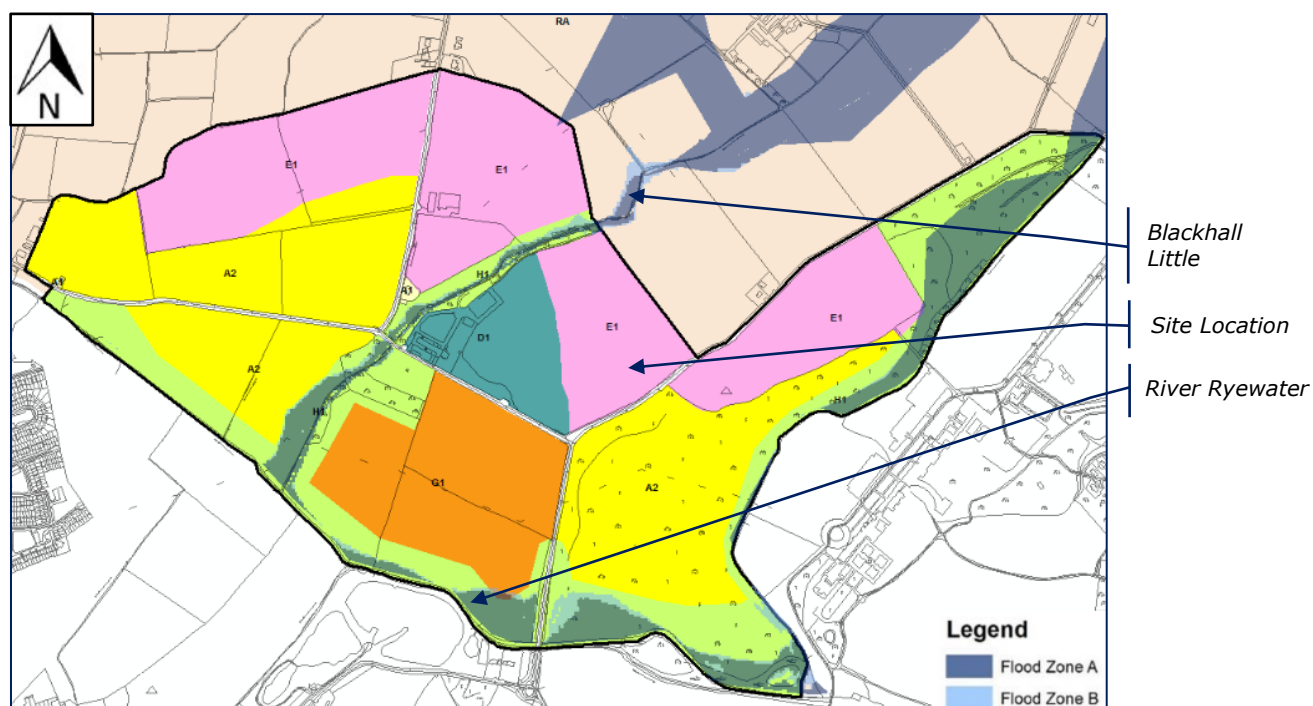


Figure 5.5 – Fluvial Flood Risk Zones (MCC Development Plan)

A review of the available CFRAM flood mapping associated with the river Ryewater, which is provided within the MCC Strategic Flood Risk Assessment Report, confirms that the proposed development site is not located within Flood Zones A or B, i.e., no apparent risk of fluvial flooding. Refer CFRAM Maps, included in **Appendix B** for further details and confirmation.

5.7 Flood Study on River Ryewater

JBA Consulting was appointed by the client Sky Castle Ltd. to prepare a Flood Risk Assessment and Management study for the proposed masterplan development i.e., the Moygaddy Environs, which this site forms a part of. The primary source of data that was used to identify flood risk to the site was the Eastern CFRAM study and the Meath County Development Plan 2021-2027, and the Kildare County Development Plan 2017 - 2023. A review of this data showed that the lands along the river Ryewater and the Blackhall Little stream (also known as Moygaddy stream) are subject to flooding during the 10%, 1% and 0.1% AEP fluvial flood events.

The scope of the detailed flood study was discussed and shared with both Meath County Council and Kildare County Council prior to developing the flood model. A copy of the scoping document is located in **Appendix C**.

The hydraulic model of the river Ryewater, the Blackhall Little stream and Lyreen River was created by JBA Consulting, to assist in the estimation of potential flood risk to the proposed development. The results of this model show that the site is not impacted by fluvial flooding during the 1% and 0.1% AEP fluvial flood events.

The hydraulic model that was developed for the river Ryewater included the proposed new bridge structures, as described in *Section 5.12*, were included as part of the flood study.

Following this study, it is clear that the proposed development site is located outside of Flood Zones A and B.

Refer to JBA Consulting's Flood Risk Assessment which is submitted under separate cover as part of this application

5.8 Coastal Flooding

Coastal flooding is caused by high sea levels resulting in the sea overflowing onto the land.

The proposed development site is located approximately 25.0km west from the eastern coast, and is therefore **not** considered at Risk from Coastal Flooding.

5.9 Pluvial Flooding

Pluvial flooding occurs when overland flow, resulting from rainfall events, cannot infiltrate into the ground, when drainage systems exceed their capacity or are blocked and when the water cannot discharge due to a high-water level in the receiving watercourse.

The subject site is just outside the study area extent of the OPW's Flood Resilience Pluvial Flood Study, for Meath. A review of the MCC County Development Plan's Strategic Flood Study does not identify the subject site, nor its immediate vicinity as an area at risk of pluvial flooding. Considering the

subject site is currently greenfield, the proposed new development is to be designed with a storm water management system in place to mitigate any resulting potential pluvial flood risk.

5.10 Groundwater Flooding

The OPW's Preliminary Flood Risk Assessment (PFRA) does not include an assessment of the flood risk posed by ground water in this area. 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.

5.11 Estimate of Flood Zone and Levels

From the available information, it can be concluded that the site is clearly located outside the extent of Flood Zones A and B for pluvial, fluvial and tidal flooding.

The site is not located in an area which benefits from a flood defence.

5.12 Proposed Development Context

The proposed surface water drainage network associated with the proposed development, is to contain a number of sustainable drainage systems that will reduce the rainfall runoff volumes from site, discharge rates being reduced to 5.5 l/s/ha, which is less than the calculated greenfield runoff equivalent rate.

The proposed surface water network is to consist of a single catchment with each individual office block unit also having their own independent sub-catchment prior to discharging to the main network.

The new development's surface water network is to discharge an attenuated flow rate to a proposed filter drain along the Dunboyne Road (R157) which will discharge to the river Ryewater, adjacent to the southern development boundary.

The surface water network is to typically comprise a gravity pipe network, with significant Sustainable Drainage Systems implemented, where practicable.

The typical traditional and Sustainable Drainage Systems (SuDS) provided, all of which have been designed in accordance with CIRIA C753, the SuDS Manual, are listed as follows:

- Pervious Paving;
- Rainwater Harvesting;
- Trapped Gullies;
- Geocellular Attenuation Storage;
- Flow Control Chambers;
- Interception Storage under Attenuation Storage.

There is a new pedestrian and cycle bridge structure to be installed, on the upstream side to the west of the existing Kildare Bridge. This new bridge is to comprise a single span structure, which stretches beyond the existing bridge's archways, and is supported on a reinforced earth abutment on both sides, tying into the existing embankment. Refer **Figure 5.5** – excerpt from design drawing S665-OCSC-XX-XX-DR-S-1707 – for details of proposed bridge structure.

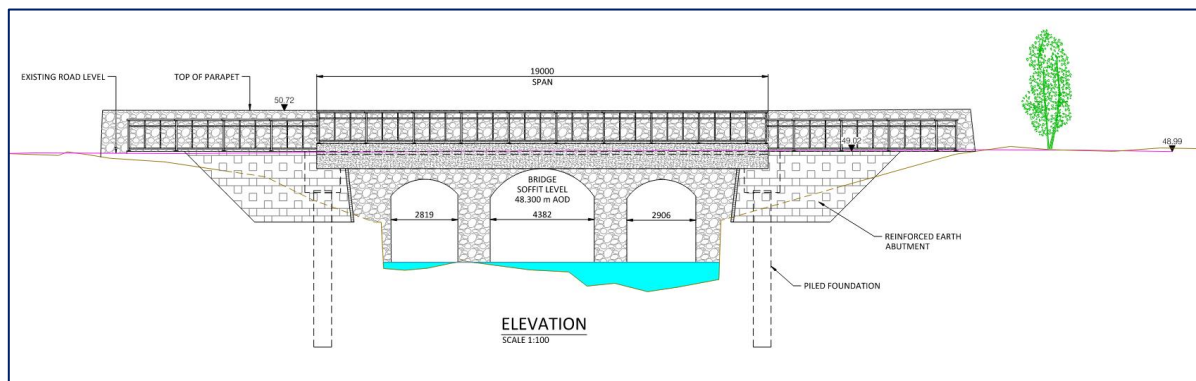


Figure 5.5 - Pedestrian / Cycle Bridge Structure

The impact of this proposed bridge structure was assessed by JBA Consulting, as part of a wider flood study of the Moygaddy Environs, with the conclusions indicating that the proposed bridge structure will have no impact on flood extent and levels. Refer to JBA Consulting's Cycleway / Pedestrian Bridge 2 Report for further details, which is submitted under separate cover as part of this application.

5.13 Section 50 Application

A Section 50 application to the Office of Public Works (OPW) is to be submitted following grant of planning permission, for the proposed bridge structure.

It is noted that an assessment on potential flood risk, in line with OPW's Section 50 specific requirements, have been assessed as part of JBA consulting's flood study and risk assessment for the Maynooth Environs, with no adverse impact noted.

6 CONCLUSIONS AND RECOMMENDATIONS

The proposed commercial development is considered '**Less Vulnerable**', in accordance with the guidance set out in The Planning System and Flood Risk Management (FRM) Guidelines.

A review of all available flood risk mapping, as discussed throughout this report, confirms that the proposed development avoids all predicted and identified fluvial and coastal flood risk extent i.e., is located within **Flood Zone C**. No development works are to be carried out in Flood Zones A and B, with the exception of the new pedestrian / cycle bridge structure, and installation of new utility infrastructure under the river Ryewater.

Therefore, the proposed development is considered '**appropriate**' for development, in accordance with The Planning System and Flood Risk Management (FRM), Guidelines.

It is further noted that the proposed development has been designed to provide sufficient surface water drainage infrastructure to ensure no pluvial flooding on site for all design rainfall events up to, and including, the 1% AEP *while also allowing for an additional climate change factor of 20% increase in rainfall intensity*. The proposed surface water drainage network has also been designed to attenuate all rainfall events to less than the greenfield equivalent runoff rates, so as to ensure no adverse impacts downstream as result of the proposed development. Refer to the Engineering Services Report, S665-OCSC-1A-XX-RP-C-0002, and associated design drawings for further details relating to the proposed surface water drainage network and management strategy.

Furthermore, the impact of this proposed pedestrian / cycle bridge structure, which is to cross the river Ryewater adjacent and to the west of the Kildare Bridge, was assessed by JBA Consulting as part of a wider flood study of the Moygaddy Environs, with the conclusions indicating that the proposed bridge structure will have no impact on existing flood extent and levels.

Refer to JBA's Masterplan Flood Risk Assessment report, which is submitted under separate cover as part of this application for further details.



APPENDIX A. FLOODMAPS.IE REPORT

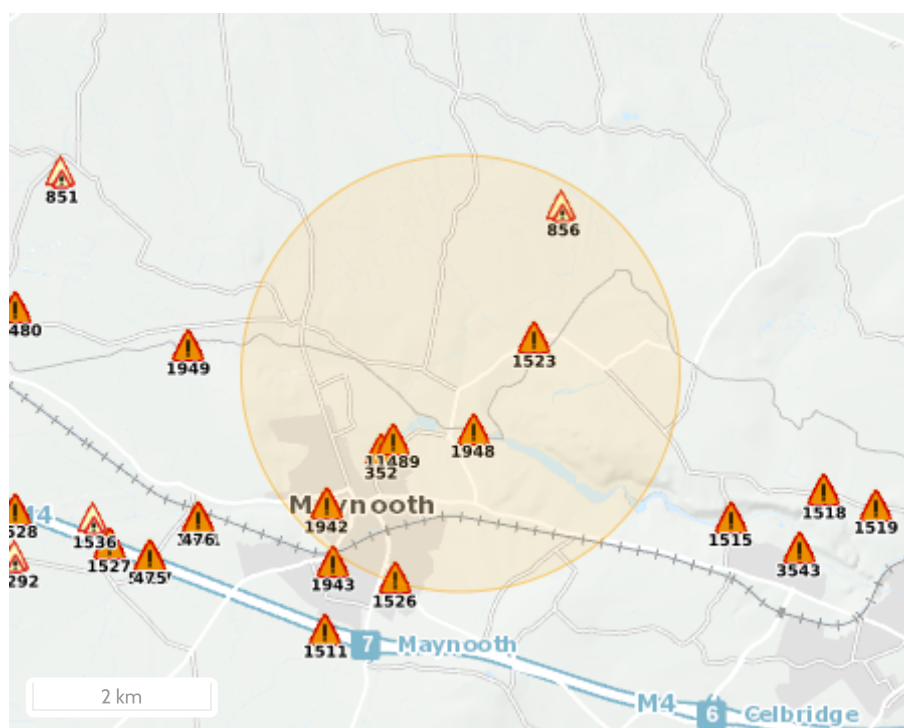
Appendix A

Floodmaps.ie Report

Report Produced: 22/3/2022 11:52

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.





Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

8 Results

Name (Flood_ID)	Start Date	Event Location
1. Lyreen Maynooth Nov 2002 (ID-352) Additional Information: Reports (6) Press Archive (5)	15/11/2002	Approximate Point
2. Killeany/Affolus/Owenstown Recurring (ID-856) Additional Information: Reports (2) Press Archive (0)	n/a	Approximate Point
3. Dunboyne Maynooth Road, Meath Nov 2002 (ID-1523) Additional Information: Reports (2) Press Archive (2)	14/11/2002	Approximate Point
4. Laurence Avenue, Maynooth Nov 2002 (ID-1526) Additional Information: Reports (2) Press Archive (0)	14/11/2002	Approximate Point
5. Lyreen Maynooth College Nov 2000 (ID-1942) Additional Information: Reports (1) Press Archive (5)	05/11/2000	Approximate Point
6. Ryewater Maynooth Carton Nov 2000 (ID-1948) Additional Information: Reports (2) Press Archive (6)	05/11/2000	Approximate Point

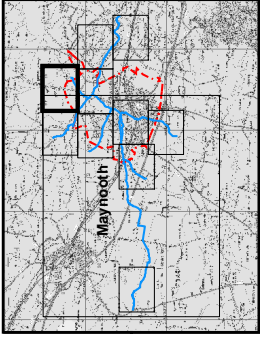
Name (Flood_ID)	Start Date	Event Location
7.  Lyreen Maynooth University June 1993 (ID-3539) Additional Information: Reports (1) Press Archive (0)	01/06/1993	Approximate Point
8.  Lyreen River 24th Oct 2011 Maynooth (ID-11489) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Approximate Point



APPENDIX B. CFRAM FLOOD EXTENT MAPPING

Appendix B

CFRAM Flood Extent Mapping



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

- Legend**
- █ 10% Fluvial AEP Event
 - █ 1% Fluvial AEP Event
 - █ 0.1% Fluvial AEP Event
 - █ Modeled River Centreline
 - █ AFA Extents
 - █ Embankment
 - █ Wall
 - Detention Area
 - Standard of Protection of Road Defences (Walls / Embankments)
 - 10% AEP
 - 0.1% AEP
 - Node Point
 - Node ID
 - Node Label

FINAL

REV: 02	NOTE: Amendment to Flood Extent. Bridge added in on Page 6.	DATE: 02/08/17
REV: 01	NOTE: Addition of downstream note.	DATE: 12/12/16

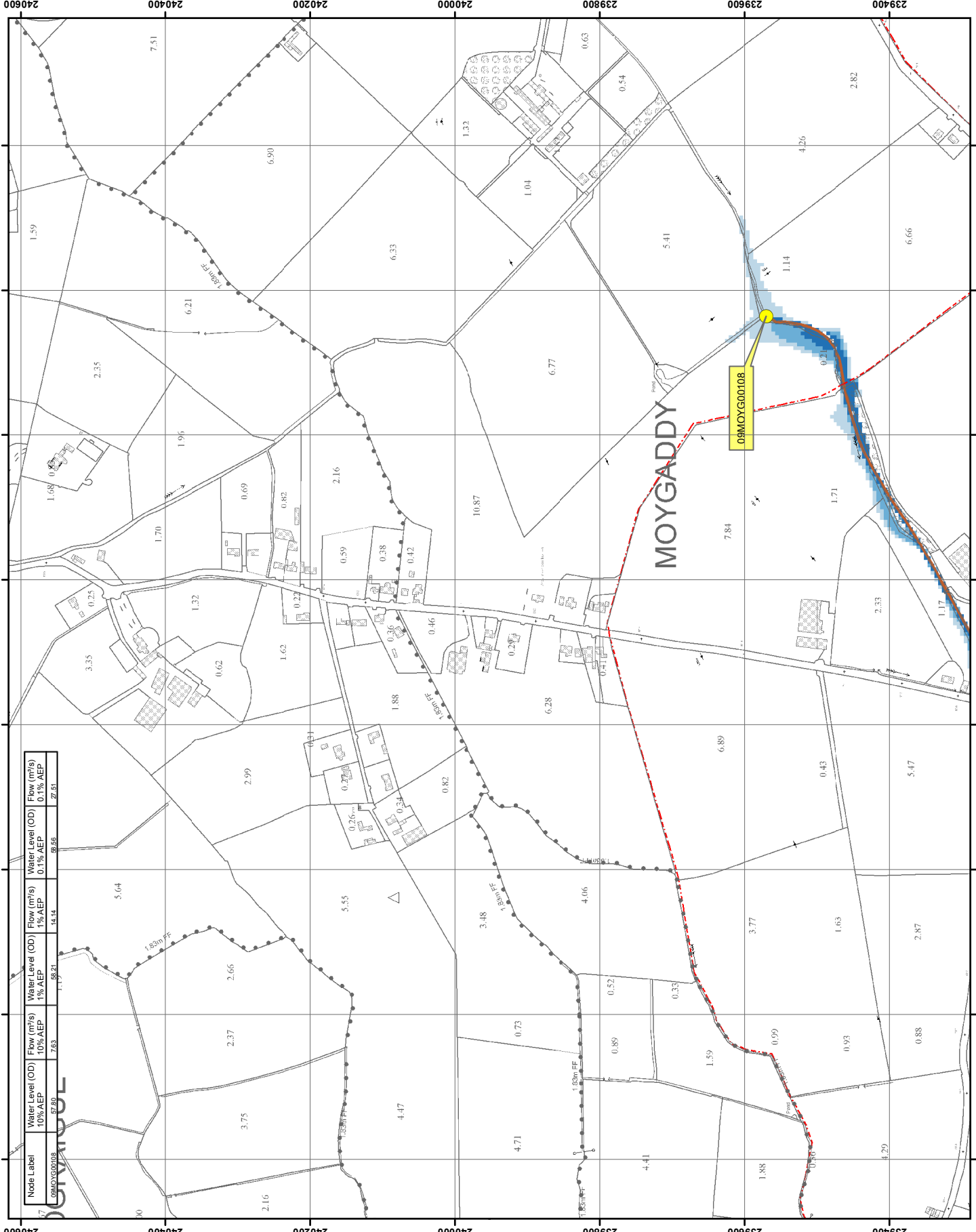


OPW
 Office of Public Works

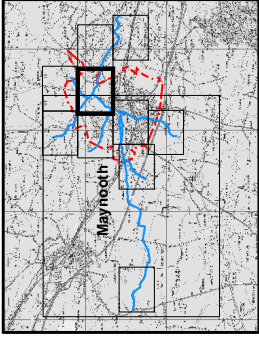
RPS
 RPS Group

The Office of Public Works
 15, Bowcher Road
 Dublin 12
 Co. Dublin
 E: rps@opw.gov.ie

Map:	
Map Type: EXTENT	Map Area: HPW
Source: FLUVIAL	Scenario: CURRENT
Drawn By: C.C.	Date: 1 December 2017
Checked By: D.I.	Date: 1 December 2017
Approved By: G.G.	Date: 1 December 2017
Drawing No.: E09MAY_EXFCD_F3_02	
Map Series: Page 2 of 11	
Drawing Scale: 1:5,000 @A3	



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09MOYG00108	57.80	7.63	58.21	14.14	59.86	27.51



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

- Legend**
- 10% Fluvial AEP Event
 - 1% Fluvial AEP Event
 - 0.1% Fluvial AEP Event
 - Modelled River Centreline
 - AFA Extents
 - Embankment
 - Wall
 - Defenced Area
 - Standard of Protection of Road Defences (Walls / Embankments)
 - 10% AEP
 - 1% AEP
 - 0.1% AEP
 - Node Point
 - Node ID
 - Node Label

FINAL

REV: 02	NOTE: Amendment to Flood Extent. Bridge added in on Page 8.	DATE: 02/08/17
REV: 01	NOTE: Addition of downstream node.	DATE: 10/12/16



OPW
 Office of Public Works

RPS
 RPS Group

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 15, Bowdler Road
 Jonestown, Swift Street
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 B17 6RZ
 E: rps@opw.gov.ie

Map:
 Moynooth Fluvial Flood Extents

Map Type: EXTENT

Source: FLUVIAL

Map Area: HPW

Scenario: CURRENT

Drawn By: C.C. Date: 1 December 2017

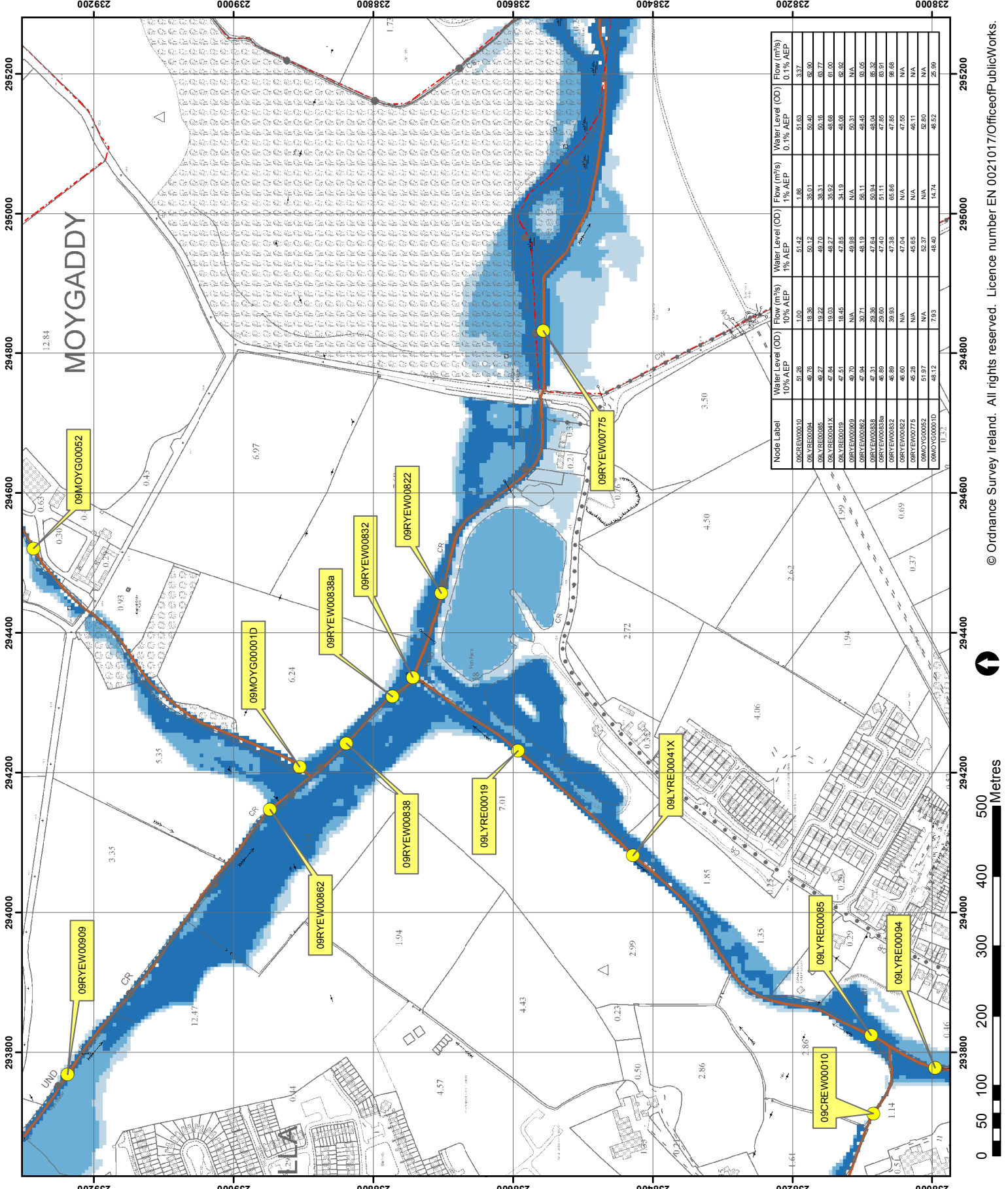
Checked By: D.I. Date: 1 December 2017

Approved By: G.G. Date: 1 December 2017

Drawing No.:
 E09MAY_EXFCFD_F3_09

Map Series: Page 9 of 11

Drawing Scale: 1:5,000 @A3



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09CREW00010	51.26	1.00	51.42	1.86	51.63	3.37
09LYRE00094	49.76	18.36	50.12	35.01	50.40	62.90
09LYRE00085	49.27	19.22	49.70	38.31	50.16	63.77
09LYRE00041X	47.84	19.03	48.27	35.92	48.68	61.00
09LYRE00019	47.51	18.45	47.85	34.19	48.08	62.92
09LYRE00099	49.70	N/A	49.85	N/A	50.31	N/A
09LYRE00082	47.64	39.71	48.19	55.11	48.45	93.05
09LYRE00088	47.31	29.36	47.64	50.94	48.04	85.32
09LYRE00088a	46.89	28.60	47.40	51.11	47.85	83.91
09LYRE00082	46.89	39.93	47.38	65.66	47.85	98.69
09LYRE00082	46.50	N/A	47.04	N/A	47.55	N/A
09LYRE00075	46.28	N/A	46.65	N/A	46.11	N/A
09MAYG00062	51.97	N/A	52.37	N/A	52.80	N/A
09MAYG00010	48.12	7.93	48.40	14.74	48.52	25.99



APPENDIX C. RIVER RYEWATER FLOOD STUDY SCOPING DOCUMENT

Appendix C

River Ryewater Flood Study Scoping Document

Proposed scope of works

Overview

A flood model is to be developed for the River Ryewater and its tributaries, with the Kildare Bridge (east of Maynooth) as its downstream boundary. The flood modelling is to include a study and report, which is to complement and support a series of planning applications for a new masterplan development, and the Maynooth Environs LAP lands (Refer Sketch provided) that aligns the River Ryewater at Moygaddy, Maynooth Environs, Co. Meath. The final planning process will involve a number of individual applications, including the proposed Maynooth Outer Relief Road (MOOR).

The MOOR is to have a new vehicular bridge crossing, over the River Rye Water, and another culvert structure to allow crossing of the Moygaddy Stream. Refer attached for masterplan outline and location, along with indicative route of the MOOR. There is also a proposed cycle / pedestrian bridge to be provided, as an extension to existing structures, at the existing Moygaddy Stream and at the Kildare Bridge structures.

Scope

Scope of Works for Flood Modelling and Risk Assessment & Management at Moygaddy to include:

Comprehensive Flood Risk Assessment and Management study of the River Ryewater Catchment within the environs of Maynooth Environs, Co. Meath, including the potential impact from the proposed new development and the Maynooth Outer Orbital Road (MOOR).

The Flood Study and Flood Risk Assessment will be concluded in accordance with the requirements of the OPW's Planning System and Flood Risk Management Guidelines.

Provide detailed hydrological and hydraulic assessment of the River Ryewater and its tributaries, to include recent changes to the topography and new development within the catchment, since the OPW CFRAM programme, and ensure that the subject development, including the proposed MOOR, associated infrastructure upgrades, and Maynooth Environs LAP extent, takes cognisance of this and does not cause adverse impact on other properties.

An analysis is required to take account of detailed topographic and bathymetric survey of the subject development lands and River Ryewater, which will be made available (and a review of same information and specifying additional information for OCSC to procure should it be necessary). It is noted that OPW have made survey information available from the original CFRAM, which will form the base data input.

Changes that have knowingly occurred within the contributing catchment include:

- construction of, and raised profile of, the land between the VEC school and the river's southern bank, on the Kildare side of the river (survey currently being procured);
- Significant new residential development has occurred in recent years in the Kilcock environs, with several recent grants of permission;
- Significant development has occurred in the vicinity of the Lyreen Stream, which is a tributary east of Maynooth;
- Other changes to catchment areas identified as part of review.

All modelling, assessment and reporting should be prepared in accordance with the requirements of 'The Planning System and Flood Risk Management' Guidelines (DEHLG, 2009), along with review and compliance of the latest of both the Meath and Kildare Counties' development plans. The following outlines a list of required review and outputs, as part of updating flood model and producing report:

- Review of existing flood model and CFRAM mapping for River Rye Water, along with assessment of river's hydraulics that may have changed since last update;

Lands at Moygaddy | Flood Study & FRAM



- Undertake an updated hydrological assessment of the River Rye Water's catchment and floodplain, taking into account the changes to the catchment since the model was last updated, allowing also for Climate Change factors in line with current best practice and Local Government guidelines;
- Review all available as-constructed drawings and data, approved planning design drawings, and updated surveys, for catchment areas including new development and constructed flood mitigation measures;
- Develop, calibrate and verify, for agreement with both Meath County Council and Kildare County Council, a new 1D-2D linked hydro-dynamic model of the River Rye Water, including all above data and information that has changed since last update of model;
- Hydraulic model simulations shall include but not be limited to: Baseline 1 in 10, 100 & 1 in 1000-year ARI events, post-development 1 in 10, 100 & 1 in 1000-year events & modelling to demonstrate the impact of mitigation measures;
- Confirm and provide the flood zone mapping (A, B & C, as per FRM Guidelines), and flood extent mapping (indicating depths and flood elevation levels, for ARI events noted previously) for all lands adjacent to the River Rye Water, in the vicinity of the subject lands and MOOR, including climate change factors;
- Flood mitigation measures, and assessment of their impact, to be identified, assessed, and included in the model;
- Carry out iterative hydraulic review of the proposed MOOR bridge design (including embankment and flow through structures), and Moygaddy Stream crossing (likely an oversized culvert) to ensure no adverse impact on existing properties, and help to establish and inform design levels of the new bridge structure at Moyglare / Poundhill, with sufficient freeboard in line with FRM & OPW Section Guidelines;
- Carry out sensitivity analysis of for up to 60% blockage of all existing and proposed structures (including new bridge, bridge extensions for pedestrian / cycle, and culvert crossings) within model, including culvert structures provided as part of embankment works, and inform of required changes that may affect design of bridge structure;
- Prepare a Flood Risk Assessment report (FRAM Study) in line with the sequential approach set out in the FRM Guidelines, which shall serve as a comprehensive update to the 2010, or more recent if available, report.
- Allowance for discussions with Local Authorities, as required.

It is envisaged that this report will act as an updated FRAM study, demonstrating that the subject Maynooth Environs LAP lands, and the developed MOOR crossing design (of River Rye Water and Moygaddy Stream), are suitable for development with no adverse impact on existing properties.



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