Maynooth, Railpark (West), Co. Kildare, Flood Risk Assessment

Final

November 2025

Prepared for:

Maynooth Montane Limited

www.jbaconsulting.ie

Document Status

Issue date	20 November 2025
Issued to	Maynooth Montane Limited
BIM reference	OMJ
Revision	A3-C02
Prepared by	Luigi Arbore BSc MSc MEngSc Analyst
Reviewed by	Ross Bryant BSc MSc CEnv MCIWEM C.WEM Associate Director
Authorised by	Ross Bryant BSc MSc CEnv MCIWEM C.WEM Associate Director

Carbon Footprint

The format of this report is optimised for reading digitally in pdf format. Paper consumption produces substantial carbon emissions and other environmental impacts through the extraction, production and transportation of paper. Printing also generates emissions and impacts from the manufacture of printers and inks and from the energy used to power a printer. Please consider the environment before printing.

Contract

JBA Project Manager	Ross Bryant
Address	24 Grove Island, Corbally, Limerick
JBA Project Code	2024s1720

This report describes work commissioned by Maynooth Montane Limited, by an instruction dated 14/11/2024. Luigi Arbore of JBA Consulting carried out this work.

Purpose and Disclaimer

Jeremy Benn Associates Limited ("JBA") has prepared this Report for the sole use of The Maynooth Montane Limited and its appointed agents in accordance with the Agreement under which our services were performed.

JBA has no liability for any use that is made of this Report except to Maynooth Montane Limited for the purposes for which it was originally commissioned and prepared.

No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by JBA. This Report cannot be relied upon by any other party without the prior and express written agreement of JBA.

The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by JBA has not been independently verified by JBA, unless otherwise stated in the Report.

JBA disclaims any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to JBA's attention after the date of the Report.

Certain statements made in the Report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the Report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. JBA specifically does not guarantee or warrant any estimates or projections contained in this Report.

Unless otherwise stated in this Report, the assessments made assume that the sites and facilities will continue to be used for their current purpose without significant changes.

Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in issuing this Report.

Copyright

© Jeremy Benn Associates Limited 2025

Contents

1 Introduction 1

1.1 Terms of Reference 1
1.2 Flood Risk Assessment Aims and Objectives 1
1.3 Development proposal 2
1.4 Report Overview 3

2 Site Background 4

2.1 Location 4
2.2 Watercourses 5
2.3 Site Geology 6
2.4 Local Groundwater Data 7
2.5 Local Topography 7

3 Flood Risk Identification 9

3.1 Flood History 9
3.2 Predictive Flood Mapping 11
3.3 Sources of Flooding 14

4 Flood Risk Assessment 17

4.1 Flood Risk 17
4.2 Mitigation 17
4.3 Residual Risk 20

5 Conclusion 21

A Understanding Flood Risk 22

A.1 Probability of Flooding 22
A.2 Flood Zones 23
A.3 Consequence of Flooding 23
A.4 Residual Risk 24

B Proposed Stormwater Design 25

List of Figures

Figure 1-1: Site plan Layout 2
Figure 2-1: Site Location and Watercourses 4
Figure 2-2: Subsoil Map 6
Figure 2-4: Local Topography 8
Figure 3-1: Past Flood Event Points 10
Figure 3-2 Land use Zoning, Maynooth Local Area Plan (2025-2031) 11
Figure 3-3: CFRAM Fluvial Flood Extents Present Day 12
Figure 3-4 NIFM River Flood Extents Present Day 13
Figure 3-5 North- South Profile across the Royal Canal and railway Line 15
Figure 3-6 Plan View 16
Figure 4-1 Eastern CFRAM River Flood Extents- Mid- Range Future Scenario 18

List of Tables

Table A-1: Conversion between return periods and annual exceedance probabilities 22
Table A-2: Flood Zones 23

Abbreviation

AEP	Annual Exceedance Probability
AFA	Area for Further Assessment
CFRAM	Catchment Flood Risk Assessment and Management
DoHELG	Department of the Environment, Heritage and Local Government
DTM	Digital Terrain Model
FB	Freeboard
FFL	Finish Floor Levels
FRA	Flood Risk Assessment
FSR	Flood Studies Report
GSI	Geological Survey of Ireland
LiDAR	Light Detection and Ranging
NIFM	National Indicative Fluvial Mapping
OPW	Office of Public Works
PFRA	Preliminary Flood Risk Assessment
RR	Rainfall-Runoff
RMS	Root Mean Square
SAAR	Standard Average Annual Rainfall (mm)
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Urban Drainage System
WL	Water Level

1 Introduction

Under the Planning System and Flood Risk Management Guidelines for Planning Authorities (DoEHLG & OPW, 2009), the proposed development must undergo a Flood Risk Assessment (FRA) to ensure sustainability and effective management of flood risk.

1.1 Terms of Reference

JBA Consulting was appointed to prepare a Flood Risk Assessment (FRA) for the proposed residential development at Railpark, located in Maynooth, Co. Kildare. This report was prepared at the request of Maynooth Montane Limited Ltd to conduct a Flood Risk Assessment (FRA) for the site.

The site is identified as Railpark West.

1.2 Flood Risk Assessment Aims and Objectives

This study is being completed to inform the future development of the site as it relates to flood risk. It aims to identify, quantify and communicate to Planning Authority officials and other stakeholders the risk of flooding to land, property and people and the measures that would be recommended to manage the risk.

The objectives of this FRA are to:

- Identify potential sources of flood risk;
- Confirm the level of flood risk and identify key hydraulic features;
- Assess the impact that the proposed development has on flood risk;
- Develop an appropriate flood risk mitigation and management measures which will allow for the long-term development of the site.

Recommendations for development have been provided in the context of the 2009 OPW / DECLG planning guidance, "The Planning System and Flood Risk Management". A review of the likely effects of climate change, and the long-term impacts this may have on any development has also been undertaken.

For general information on flooding, the definition of flood risk, flood zones and other terms see 'Understanding Flood Risk' in Appendix A.

1.3 Development proposal

The development will comprise a Large-Scale Residential Development (LRD) on a site at “Railpark West”, in the townland of Railpark, Maynooth, Co. Kildare.

The proposed development is for 139 no. units comprising 36 no. houses (ranging in heights up to 3 storeys), 95 no. apartments (5 no. blocks ranging in heights up to 5 storeys partially over podium parking) and 08 no. duplexes (1 no. 3/4 storey Block).

The proposal includes for a new vehicular/pedestrian/cyclist access from the permitted Maynooth Eastern Ring Road (MERR) to the east and the adjoining development to the South, and pedestrian/cyclist access (and vehicular access for one of the proposed houses) to Parklands Grove/Old Railpark to the north of the site.

The development also includes all car and bicycle parking at surface and podium underdeck level, new streets and footpaths, bin stores, residential private open spaces, public & communal open spaces, boundary treatments, waste management areas, landscaping and all associated site development works.

Refer to Figure 1-1 for the proposed site layout.

Figure 1-1: Site plan Layout

1.4 Report Overview

Section 2 of this report gives an overview of the study location and associated watercourses. Section 3 contains background information on flood risk. Section 4 provides initial assessment of flood risk and mitigation measures. The conclusion is provided in Section 5.

2 Site Background

2.1 Location

This section provides background information on the proposed residential development at Railpark in Maynooth, Co. Kildare. The site is located in the administrative jurisdiction of Kildare County Council. The existing area is greenfield in nature. The site covers an area of 2.8 hectares, located 1.1km east of Maynooth town centre and 0.2km south of the Royal Canal.

The site is bordered to the north by a cluster of detached residential properties along Parklands Grove, the residential development located further to the west of the site. The wider immediate surrounding area is defined by greenfield agricultural lands.

Furter to the north the Royal Canal and Dublin-Sligo railway line runs parallel in an east-west direction.

The indicative alignment of the proposed link road, as shown in Figure 2-1, runs along the eastern perimeter of the proposed site.

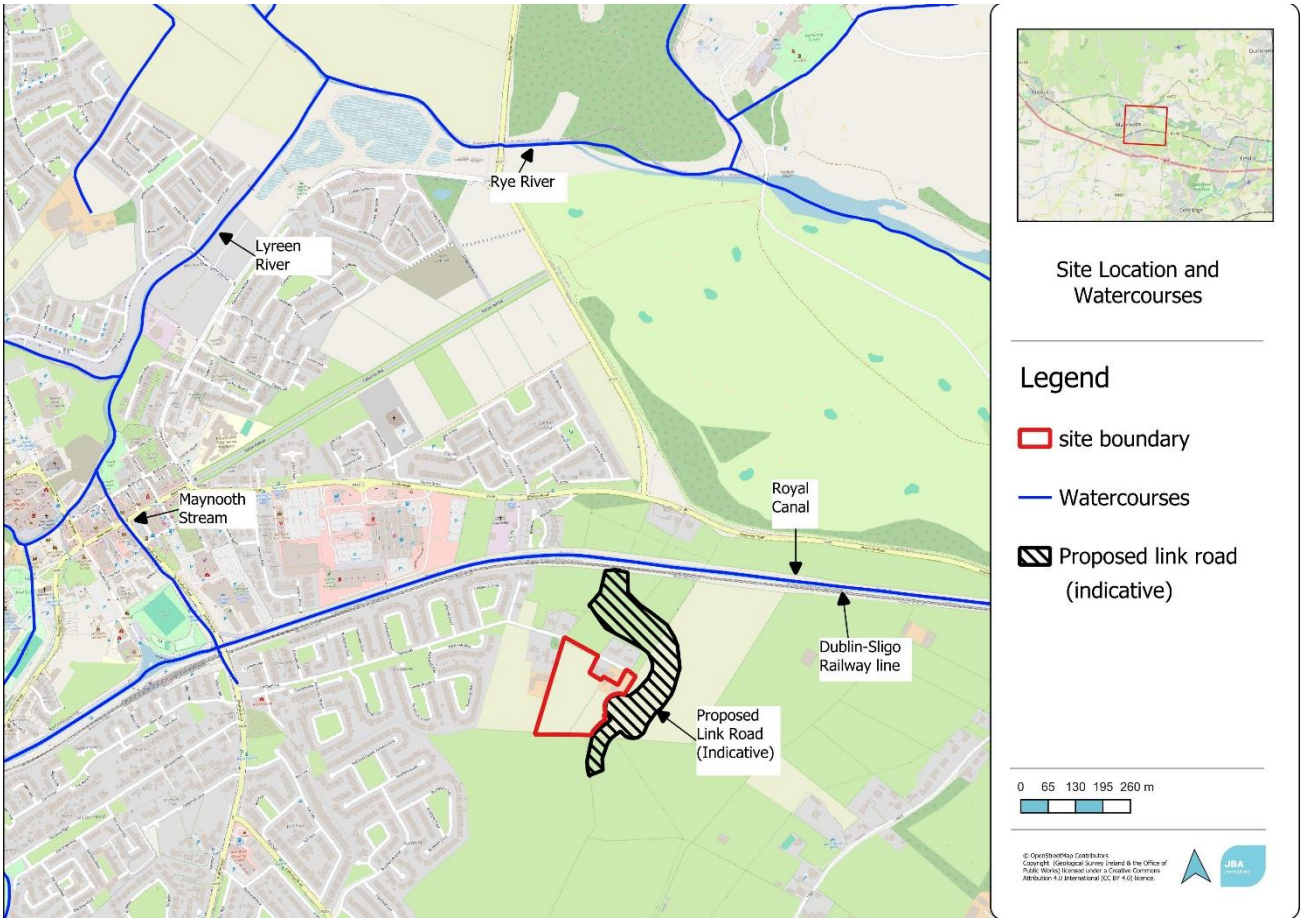


Figure 2-1: Site Location and Watercourses

2.2 Watercourses

The Royal Canal, the primary hydrological feature of the area is located approximately 190m north of the proposed site. Running parallel to the canal is the Dublin-Sligo railway line. The canal traverses Maynooth to the south of the town centre, serving as a waterway linking Cloondara, Co. Longford, to Dublin.

Further to the north there are three watercourses in the study area which are identified as follows,

- Maynooth Stream
- Lyreen River
- Rye River

The Maynooth Stream flows in a northerly direction under the Royal Canal approx. 700m west of the site and ultimately mergers with the Lyreen River to the north. The Lyreen River predominantly flows in a northeasterly direction through Maynooth appx 1.2km northwest of the stie before discharging into the Rye River approximately 1.2 km north of the site.

The Rye River flows in an easterly-southeasterly direction through Maynooth and is located approximately 1.2km north of the proposed development.

Refer to Figure 2.1 for the surrounding watercourses.

2.3 Site Geology

The groundwater and geological maps of the site, provided by the Geological Survey of Ireland (GSI), have been studied. The underlying bedrock at the site is Waulsortian Limestones, described as massive unbedded lime-mudstone. The subsoil at the proposed site and along the planned road consists entirely of limestone-derived till, while 20 metres west of the site, the subsoil transitions to an urban classification.

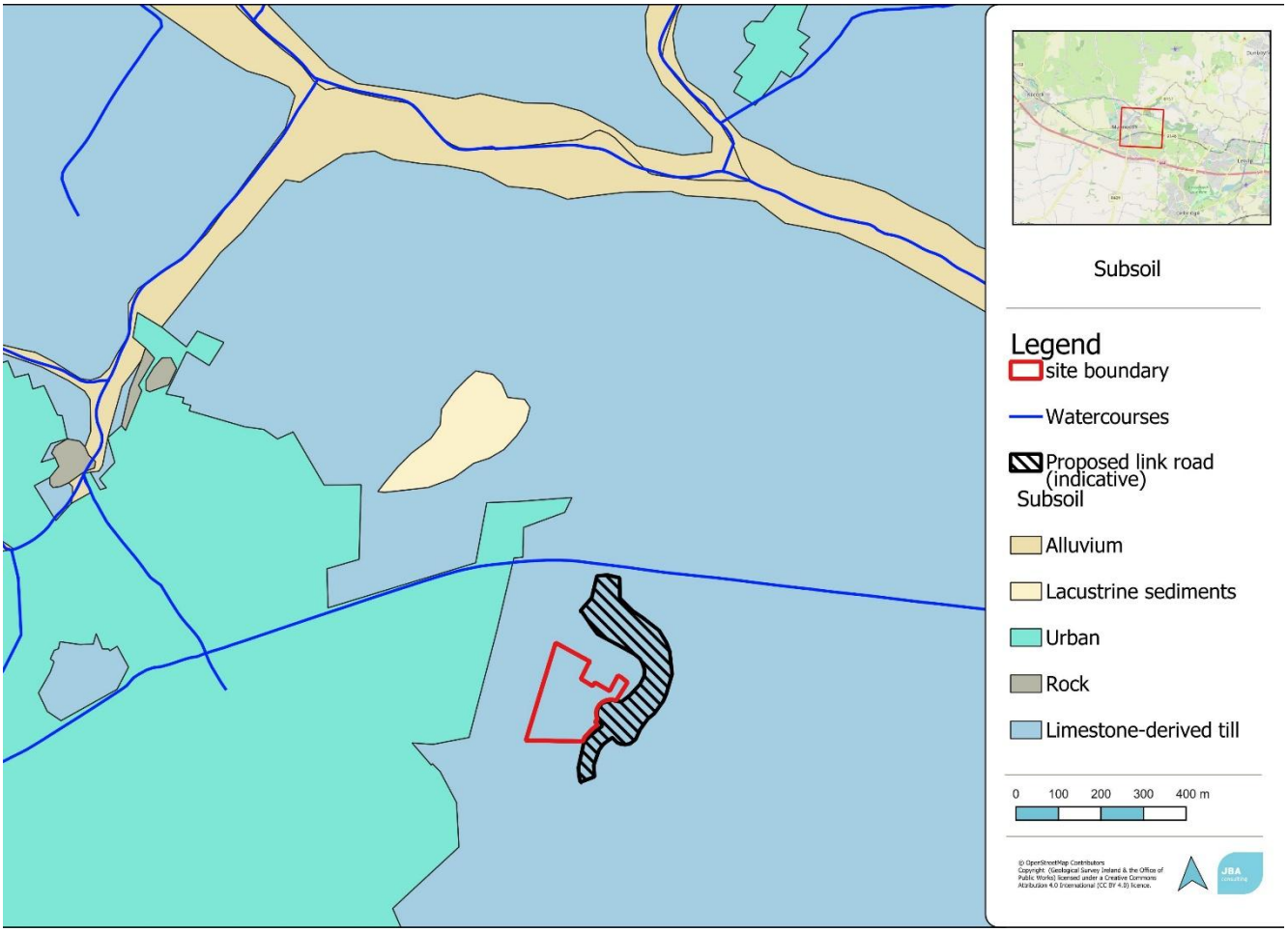


Figure 2-2: Subsoil Map

2.4 Local Groundwater Data

The available GIS well and karst feature database has been reviewed as part of the FRA process. No extraction well or karst features have been identified within the study area.

Moreover, approximately 1.1 kilometres to the northwest of the proposed site are two areas associated with surface water flooding: the Surface Water Flooding Zone (2015–2016) and the Seasonal Surface Water Flooding Zone (2020–2021). Additionally, an area designated as the Historic Groundwater Flooding Zone is located 1.1 kilometres to the southwest of the site. Given the distance of these zones from the proposed site, they are not expected to pose a groundwater flooding risk to the site.

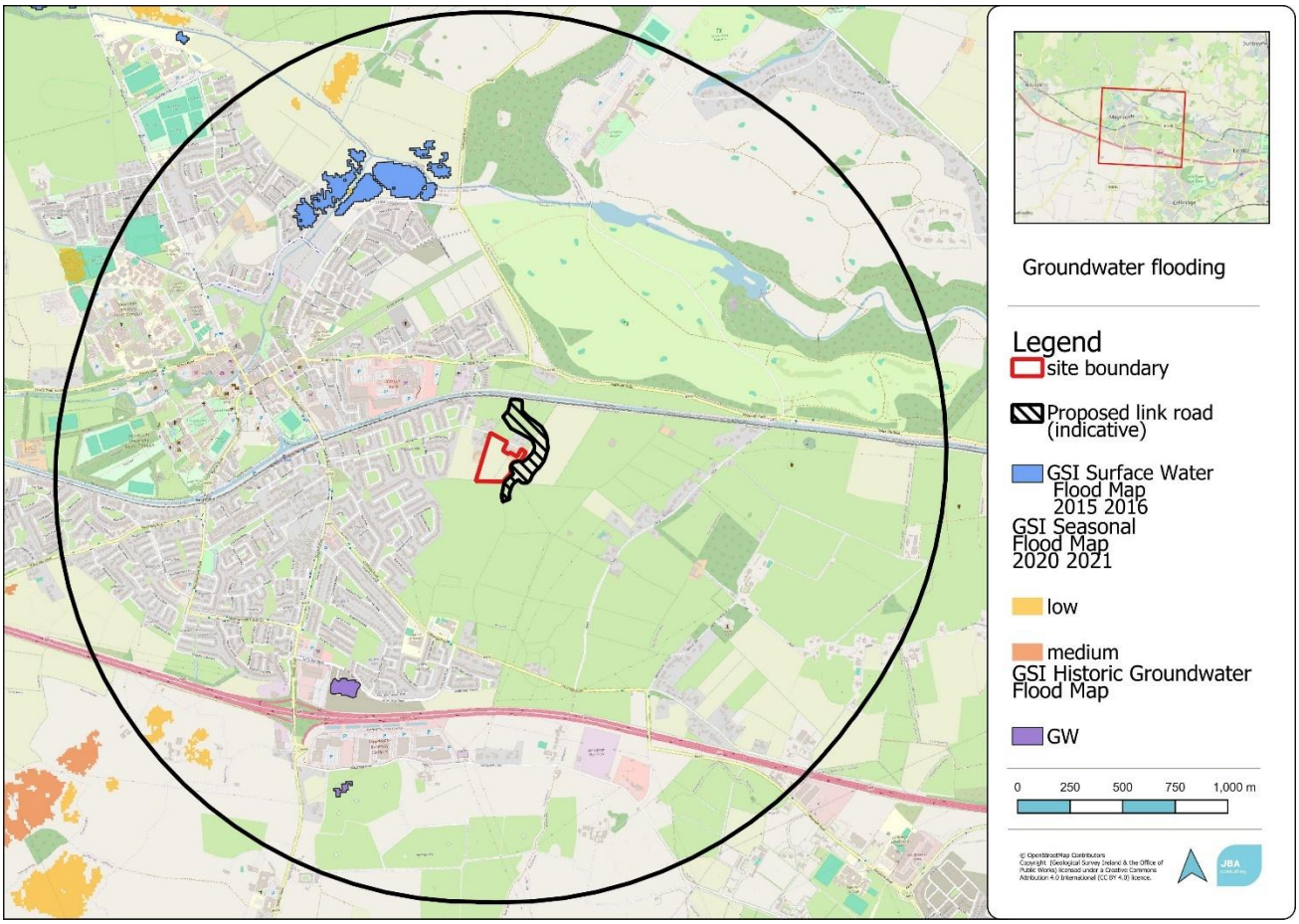


Figure 2-3 Groundwater flooding

2.5 Local Topography

The topographical survey conducted by LOC Consulting Ltd identifies key gradients within the site boundary. The central area, at 62.23 mOD, slopes northward to 59.57 mOD, while the eastern section, at 62.89 mOD, falling westward. This data highlights a predominantly northward and westward gradient. .

Refer to Figure 2-4 for the topographical survey.

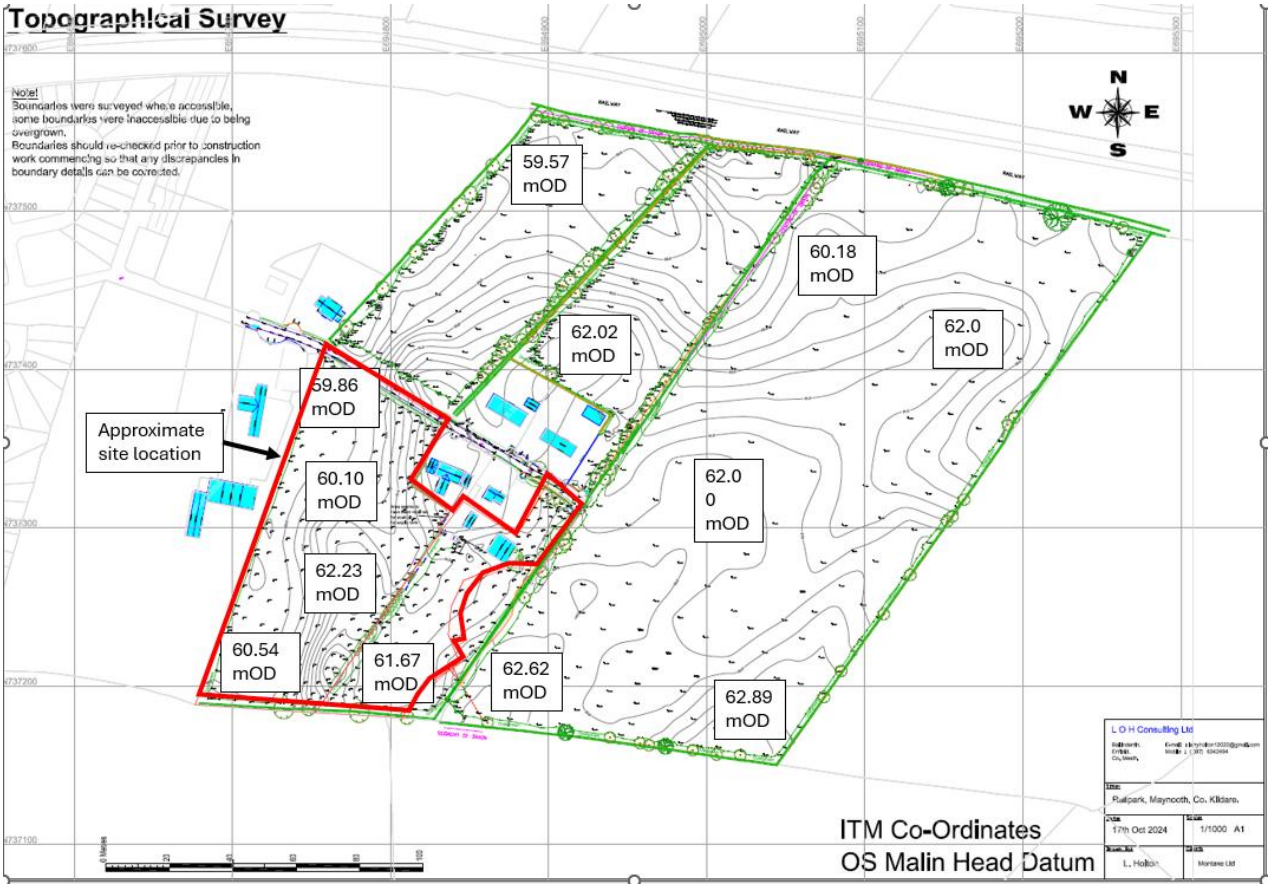


Figure 2-4: Local Topography

3 Flood Risk Identification

An assessment of the potential for and scale of flood risk at the site is conducted using historical and predictive information. This identifies any sources of potential flood risk to the site and reviews historical flood information. The findings from the flood risk identification stage of the assessment are provided in the following sections. Further detail on the Planning Guidelines and technical concepts are provided in Appendix A.

3.1 Flood History

A number of sources of flood information have been reviewed to establish any recorded flood history at, or near the site. This includes the OPWs national flood information portal, www.floodinfo.ie, and general internet searches.

3.1.1 Floodinfo.ie

The OPW have established a National Flood Risk Hazard Mapping website, www.floodinfo.ie, which highlights areas at flood risk through the collection of recorded data and observed flood events.

The website provides comprehensive national data detailing a historical event ~300m from the proposed site:

- Flood ID-1526: Flooding on November 2002 occurred at Laurence's Avenue, approximately 715 metres from the proposed site. The incident was caused by low-lying terrain, a surface water pipe blocked by tree root intrusion, and inadequate drainage capacity.
- Flood ID-1943: Flooding on November 2000 occurred on the Meadowbrook and Lyreen Rivers in Maynooth, impacting Meadowbrook Estate and Parson Street, approximately 1329 metres from the proposed site.
- Flood ID-1942: Flooding on November 2000 occurred on the Meadowbrook and Lyreen Rivers in Maynooth, affecting the Lyreen area and Maynooth College, approximately 1500 metres from the proposed site.

There are no historical records indicating any flood events at the subject site in recent times.

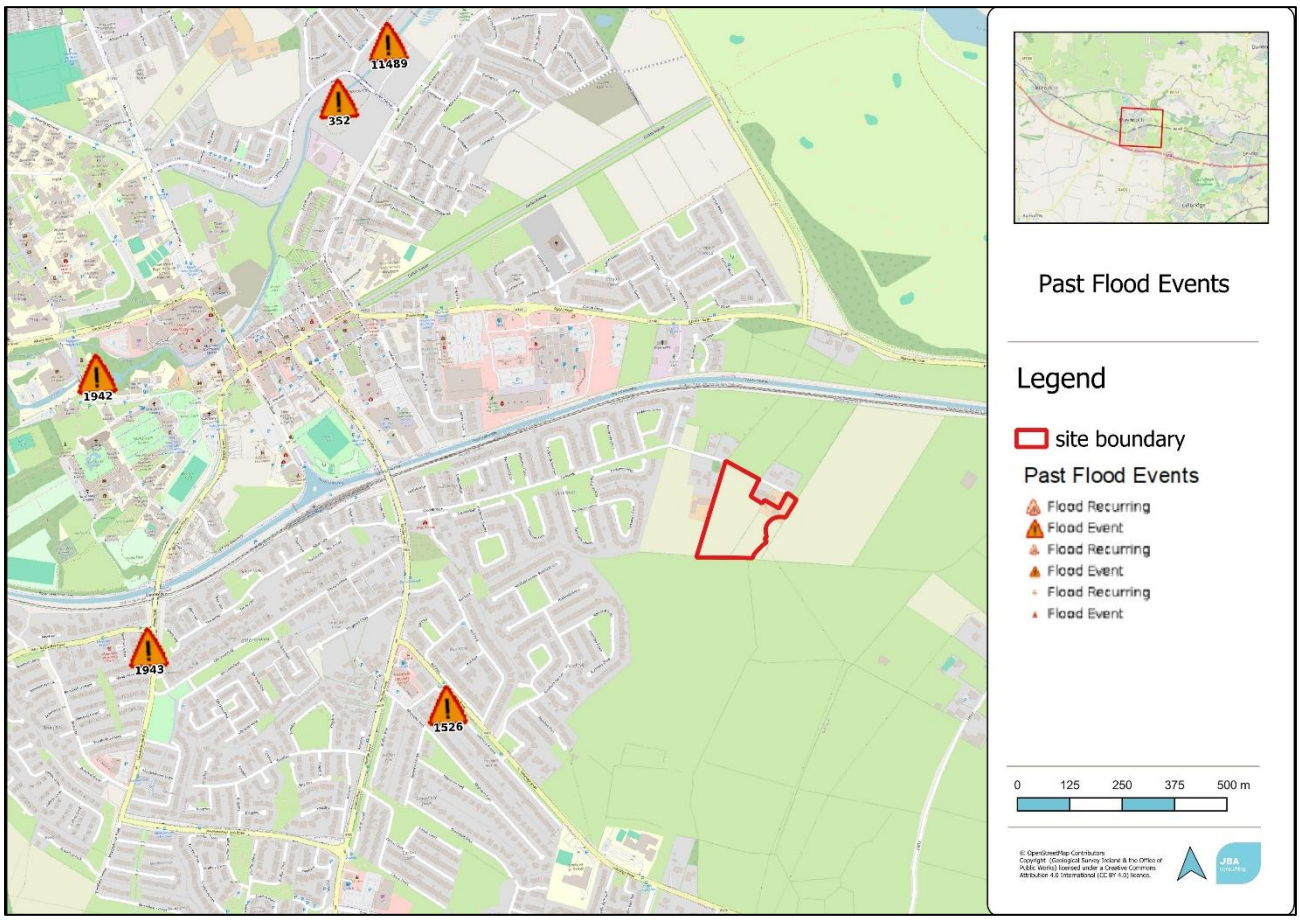


Figure 3-1: Past Flood Event Points

3.1.2 Internet Searches

An internet search was conducted to gather information about whether the site had previously been affected by flooding, and no additional incidents were reported at the site beyond those already documented in the previous section 3.1.1.

3.1.3 Lyreen and Meadowbrook Flood Relief Scheme

The Lyreen and Meadowbrook Flood Relief Scheme was initiated in 2001 following major flooding in November 2000 and was constructed from 2002 to 2003. The scheme works included cleaning 4km of the Lyreen River channel and 1.6km of the Meadowbrook River channel, cleaning / repairing / replacement of culverts, together with the cleaning out of aqueducts at Bond Bridge and Jackson's Bridge. The scheme also provided trash screens and flap valves on channels, where appropriate, and a damaged wall at Parsons Lane was repaired. The scheme provides increased flood protection for 30 properties against flooding from the Meadowbrook and Lyreen Rivers.

According to floodinfo.ie, it is proposed to progress the development of a further flood relief scheme for Maynooth to augment the existing scheme, and to provide a standard of protection of 1% AEP for fluvial flood events.

Both the Lyreen River and Meadowbrook Stream are located in excess of 1km away from the site, meaning the site is not at risk from fluvial flooding from these watercourses.

3.2 Predictive Flood Mapping

The wider area has been a subject to predictive flood mapping or modelling studies and other related studies and plans.

- Maynooth Local Area Plan 2025-2031incorporating Strategic Flood Risk Assessment
- Eastern Catchment Flood Risk Assessment and Management (ECFRAM) Study
- National Indicative Fluvial Mapping (NIFM) study

3.2.1 Maynooth Local Area Plan 2025-2031 Incorporating Strategic Flood Risk Assessment

Under the Maynooth Local Area Plan 2025-2031, a Draft Strategic Flood Risk Assessment (SFRA) was carried out in accordance with the Core Strategy and the requirements and provisions of the Planning and Development Act 2000 (as amended). The site has been zoned as 'B: Existing Residential & Infill' in the north-west area and 'C: New Residential' for all other areas with a high risk of vulnerability. A review shows the site is not subject to flooding during the 1% (Flood Zone A) and 0.1% (Flood Zone B) AEP fluvial flood events.

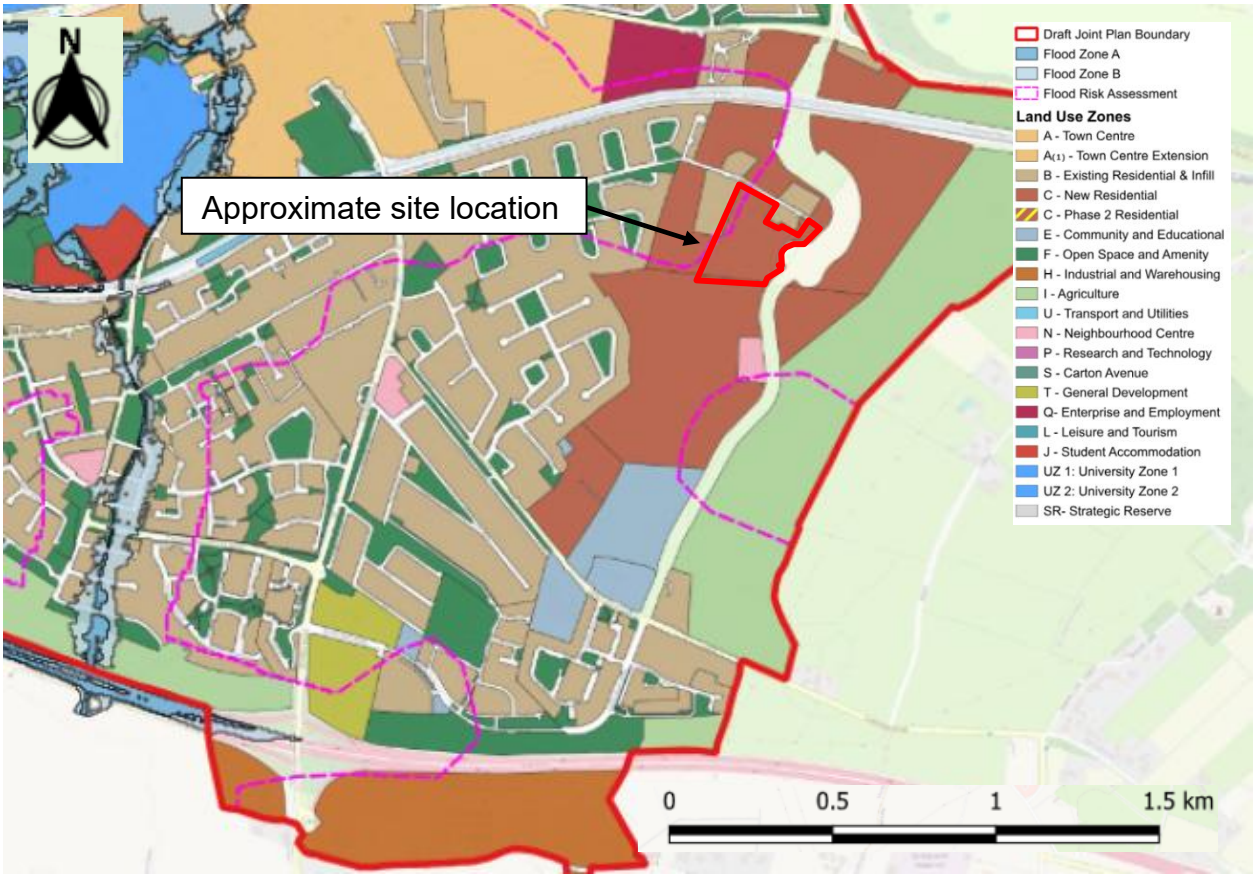


Figure 3-2 Land use Zoning, Maynooth Local Area Plan (2025-2031)

3.2.2 Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study

The primary source of data with which to identify flood risk to the site is the Eastern CFRAM study. The Eastern CFRAM study covers c.6,300 sq.km and involves detailed hydraulic modelling of rivers and their tributaries, along with coastal flood modelling. Flood maps are publicly available for the 10%, 1% and 0.1% AEP fluvial flood events, and covers (amongst others):

- Rye Water; and
- Lyreen River;

Maynooth was identified as an Area for Further Assessment (AFA) as part of the superseded OPW PFRA study. The AFAs were the focus of the CFRAM studies. The flood extents for the Maynooth area were available. A review shows the site is not subject to flooding during the 10%, 1% (Flood Zone A) and 0.1% (Flood Zone B) fluvial flood events. The CFRAM extents are based on the undefended scenario, and therefore do not take account of flood protection structures such as embankments. Refer to Figure 3-3 for the Eastern CFRAM fluvial flood extents in the Maynooth area. The study also confirms no flooding on-site for the 10%, 0.5% and 0.1% AEP coastal flood events.

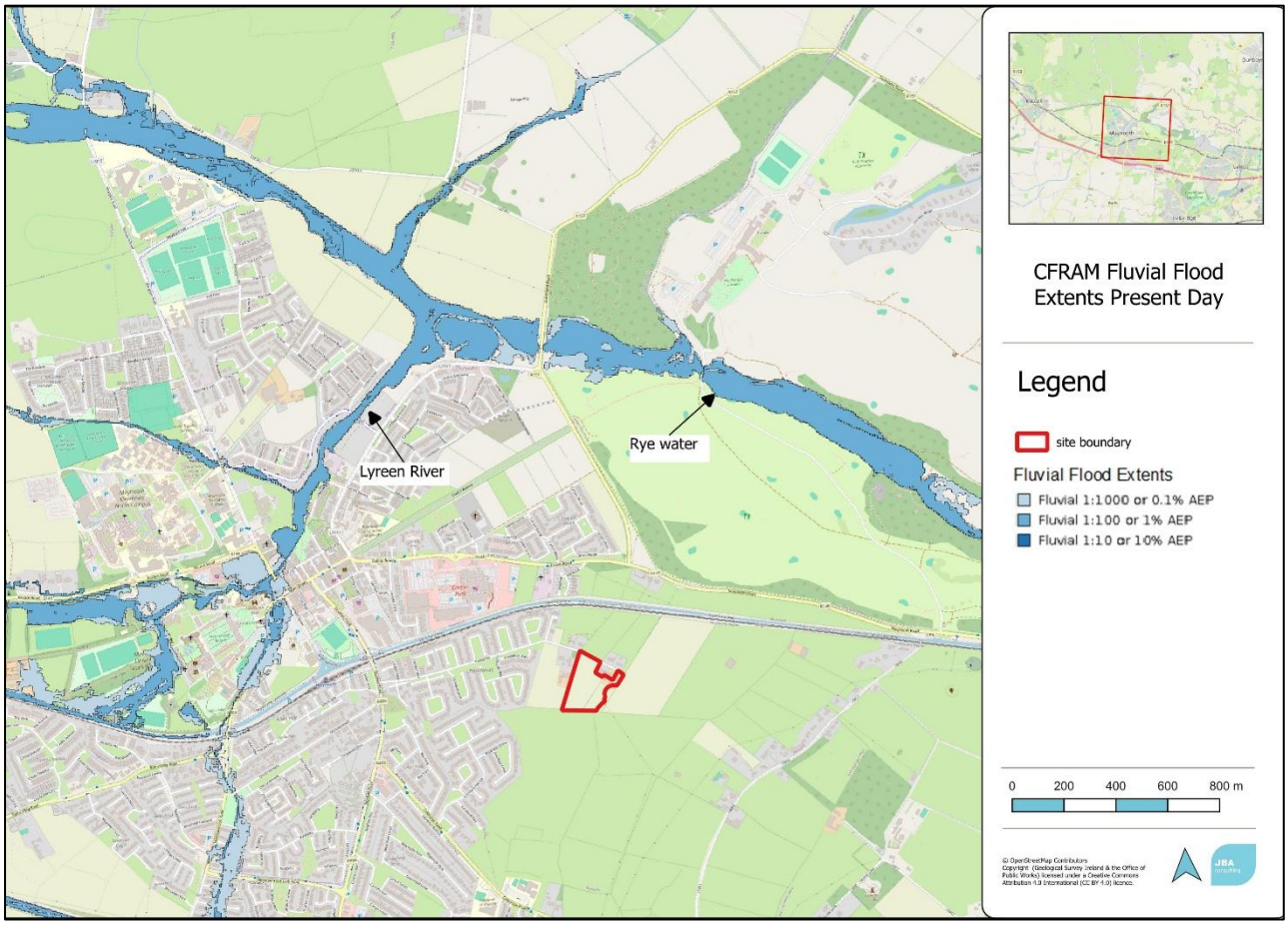


Figure 3-3: CFRAM Fluvial Flood Extents Present Day

3.2.3 National Indicative Fluvial Mapping (NIFM) Study

The OPW hosts the National Indicative Fluvial Mapping study on the floodinfo.ie portal. This fluvial mapping shows the modelled extent of lands than might be flooded by rivers during a theoretical flood event with an estimated probability of occurrence for watercourses not covered by the CFRAM AFAs. This predictive flood mapping replaces the superseded OPW PFRA study. Flood extents for the Maynooth area have been finalised. The watercourses in the study area have not been included in the NIFM study as the watercourses have been modelled as part of CFRAM. Refer to Figure 3-4.

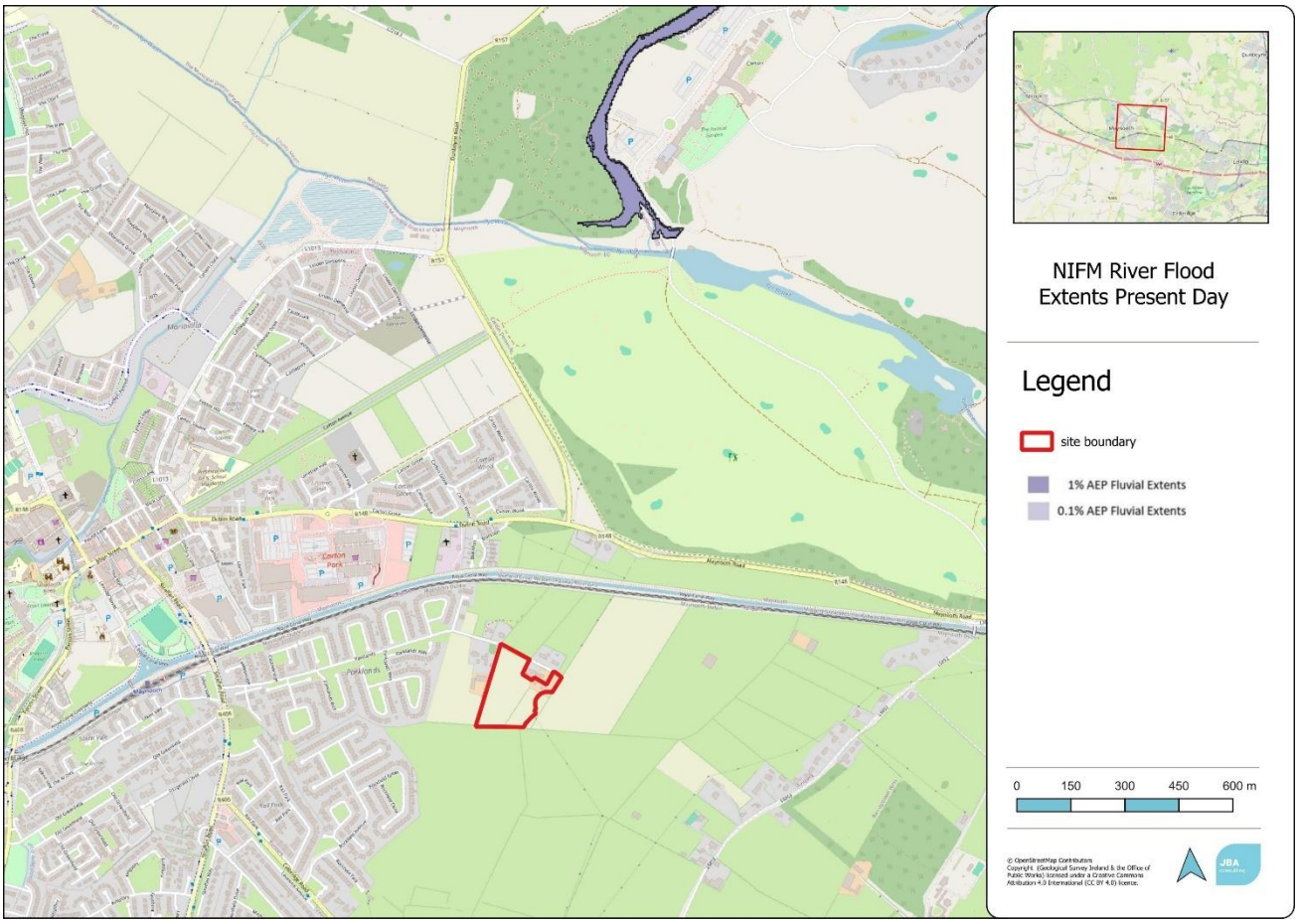


Figure 3-4 NIFM River Flood Extents Present Day

3.3 Sources of Flooding

The initial stage of a Flood Risk Assessment requires the identification and consideration of probable sources of flooding. Following the initial phase of this Flood Risk Assessment, it is possible to summarise the level of potential risk posed by each source of flooding.

3.3.1 Fluvial

There are several watercourses in the area, principally the Rye Water, Lyreen River and Maynooth Stream. This flood risk is identified as follows:

- The Maynooth Local Area Plan incorporating Strategic Flood Risk Assessment shows that the existing site is not subject to flooding during the 1% (Flood Zone A) and 0.1% (Flood Zone B) AEP fluvial flood events;
- The Eastern CFRAM study shows that the site is not subject to flooding during the 10%, 1% (Flood Zone A) and 0.1% (Flood Zone B) AEP fluvial flood events; and
- The National Indicative Fluvial Mapping (NIFM) study shows that the site is not subject to flooding during the 1% (Flood Zone A) and 0.1% (Flood Zone B) fluvial flood events.

Therefore, the site is located in Flood Zone C, and at a low risk of fluvial flooding. Site-specific mitigation measures are not required to manage the ongoing fluvial risk for lands within Flood Zone C. Climate change is discussed in Section 4.2.4

3.3.2 Coastal

Maynooth is located inland and is not impacted by predictive and historic tidal flooding, as confirmed by the Eastern CFRAM and National Coastal Flood Hazard Mapping (NCFHM) 2021 studies.

The risk of tidal flooding has been screened out at this stage.

3.3.3 Pluvial

Pluvial, or surface water, flooding is the result of rainfall-generated flows that arise before runoff can enter a watercourse or sewer. It is usually associated with high-intensity rainfall events. Flood risk from pluvial sources exists in all areas. Adequate surface water drainage systems will manage the pluvial flooding risk.

There was no record of historic pluvial / surface water flooding within the existing site. Site-specific mitigation measures to manage the pluvial flooding risk are outlined in Section 4.2. Residual risk is further discussed in Section 4.3.

3.3.4 Groundwater

Groundwater flooding occurs when subsurface water levels rise significantly, affecting the upper soil strata and overland areas that are typically dry. Within the study area, no extraction wells or karst features have been identified. Moreover, approximately 1.1 kilometres to the northwest of the proposed site are two areas associated with surface water flooding: the Surface Water Flooding Zone (2015–2016) and the Seasonal Surface Water Flooding Zone (2020–2021). Additionally, an area designated as the Historic Groundwater Flooding Zone is located 1.1 kilometres to the southwest of the site. No predictive extents of groundwater flooding were identified on-site or within its immediate vicinity. Consequently, the flood risk from groundwater sources is considered low. Given the distance and nature of the identified risks, the potential for groundwater flooding impacting the proposed site is negligible, allowing this risk to be screened out from further detailed assessment.

3.3.5 Royal Canal

A review of historic flood information relating to the Royal Canal confirms no historic flooding events on-site. The Maynooth area has also not been identified as being at potentially significant flood risk. The risk from the Royal Canal is further discussed in

Section 4.1. In relation to the Royal Canal, a review of OPW topographic data shows the canal has a bed level of c.59mOD, and the railway line has a level of c.60mOD. In the event of a rising water level in the canal, floodwaters would first have to breach the embankment on the north side and flood the adjacent lands. The floodwaters would then have to exceed a level of c.60mOD to flood the development proposal site to the south of the railway line. This risk is deemed to be very low. The findings from the Flood Risk Identification stage of this FRA also confirm this. The risk of flooding relating to the Royal Canal can be screened out at this stage. Refer to Figure 3-5 and Figure 3-6 for the topographical profile across the Royal Canal and railway line.

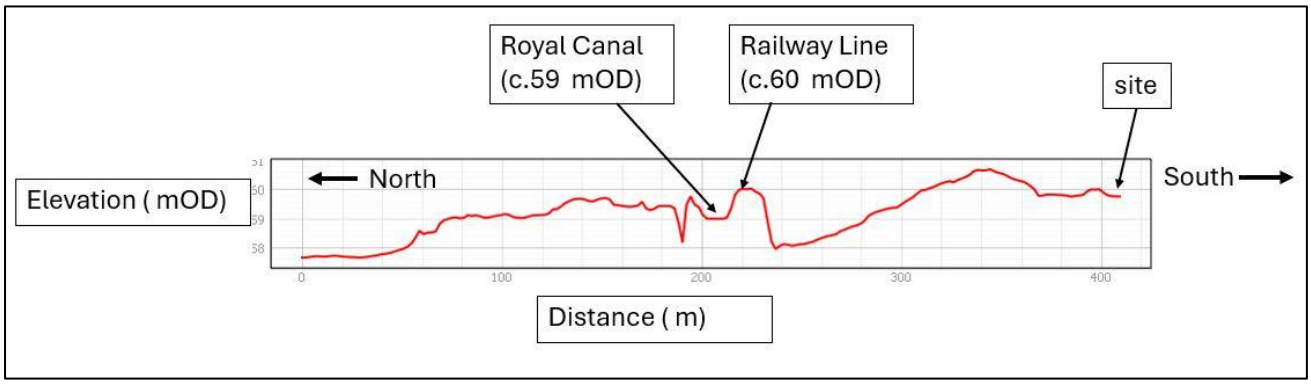


Figure 3-5 North- South Profile across the Royal Canal and railway Line

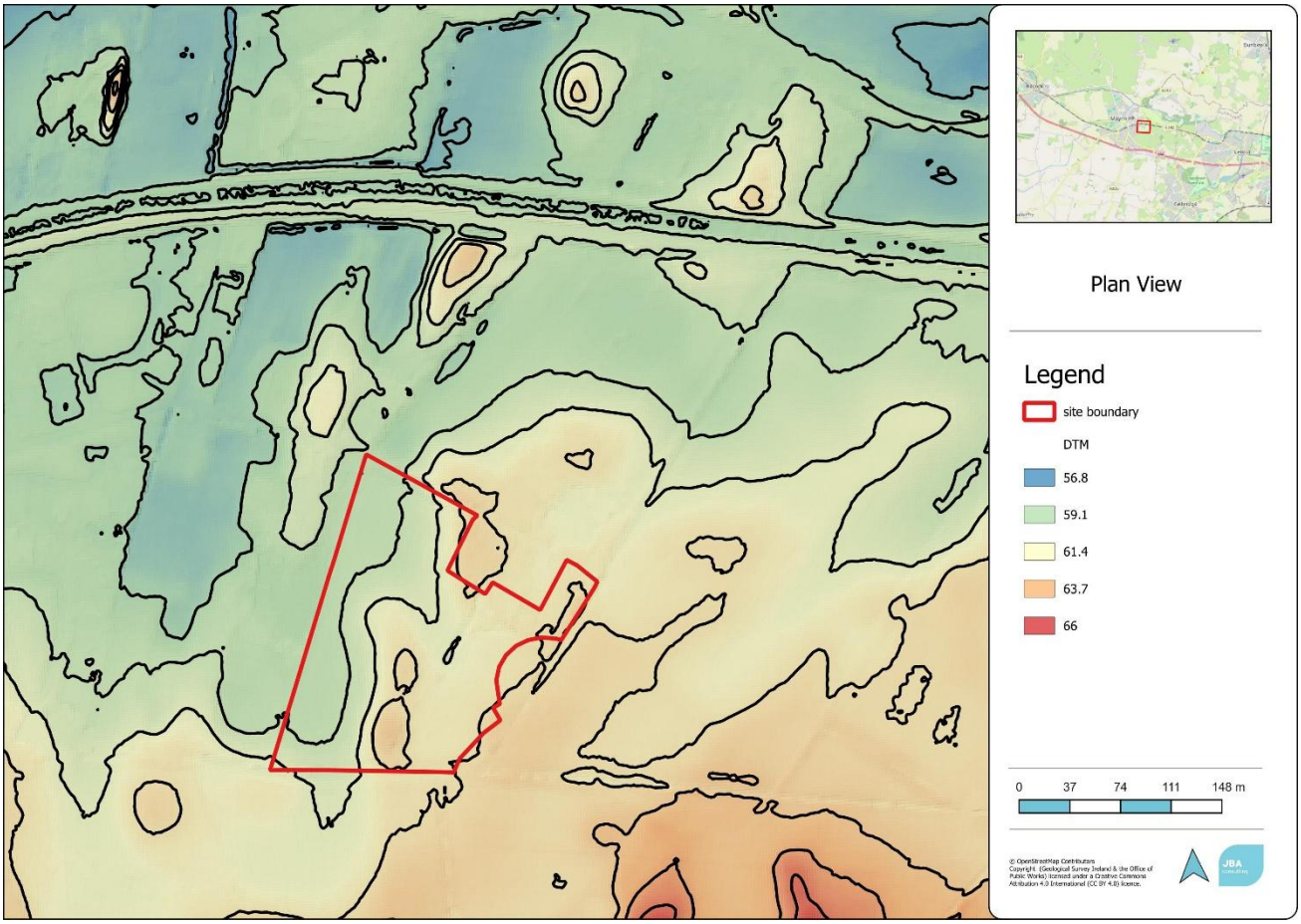


Figure 3-6 Plan View

4 Flood Risk Assessment

4.1 Flood Risk

The development proposal is considered to be wholly located within Flood Zone C, i.e. at a low risk of flooding. Development within Flood Zone C does not require the Justification Test to be passed, regardless of vulnerability class, as it is considered to be Appropriate development as per Table 3.2 (Matrix of vulnerability versus flood zone) of 'The Guidelines'.

This FRA also confirms the development proposal has been identified as being at risk from flooding during pluvial events of varying probability. Site-specific mitigation measures are required to manage the ongoing pluvial risk.

In relation to the Royal Canal, residual risk has also been screened out.

4.2 Mitigation

4.2.1 Finished Floor Levels (Fluvial / River Flood Risk)

Site-specific mitigation measures are not required to manage the risk associated with fluvial flooding for development within Flood Zone C. The proposed Finished Floor Levels (FFL) are therefore appropriate. A minimum freeboard of 150mm should be provided between the Finished Floor Levels (FFL) of the residential blocks and the external footpaths, car parking, and nearside roadway edges to further enhance resilience against localized surface water accumulation.

4.2.2 Surface Water Drainage Systems (Pluvial / Rainfall Flood Risk)

The existing site is mostly greenfield in nature. As it is proposed to cover much of the site in hardstanding areas, this will lead to an increase in surface water runoff. To manage the surface water runoff within the site the development has incorporated a stormwater drainage system designed in accordance with the requirements of the KCC SuDS Guidance Document.

The proposed stormwater layout is presented in Appendix B, also refer to the supporting application documents for the detailed design and drainage report. The system includes soakaway pits, stormwater attenuation volume and a hydrobrake. Refer to the wider planning application for the detailed design and reports.

4.2.3 Access

With reference to Figure 4-1, all access roads to the development are located outside the 1% AEP climate change scenario. Therefore, access to the development is not considered to be an issue and can be maintained during a 1% AEP flood event.

4.2.4 Climate Change (Fluvial and Pluvial Risk)

In accordance with OPW guidelines, it is necessary to assess the risk associated with climate change, which under the Mid-Range Future Scenario (MRFS) corresponds with an increase in flows of 20% for the 1% AEP fluvial event, or a 0.5m increase in tidal levels for the 0.5% AEP coastal event. The KCDP 2023-2029 SFRA also agrees that a 20% increase in river flows for all return periods up to 100 years must be considered. The risk of coasting flooding has been screened out during the Flood Risk Identification stage, and the corresponding 0.5% AEP MRFS coastal flood extents do not extend into Co. Kildare. The Eastern CFRAM MRFS fluvial extents were available. A review shows the site is not subject to flooding during the 1% AEP MRFS fluvial event, Refer to Figure 4-1.

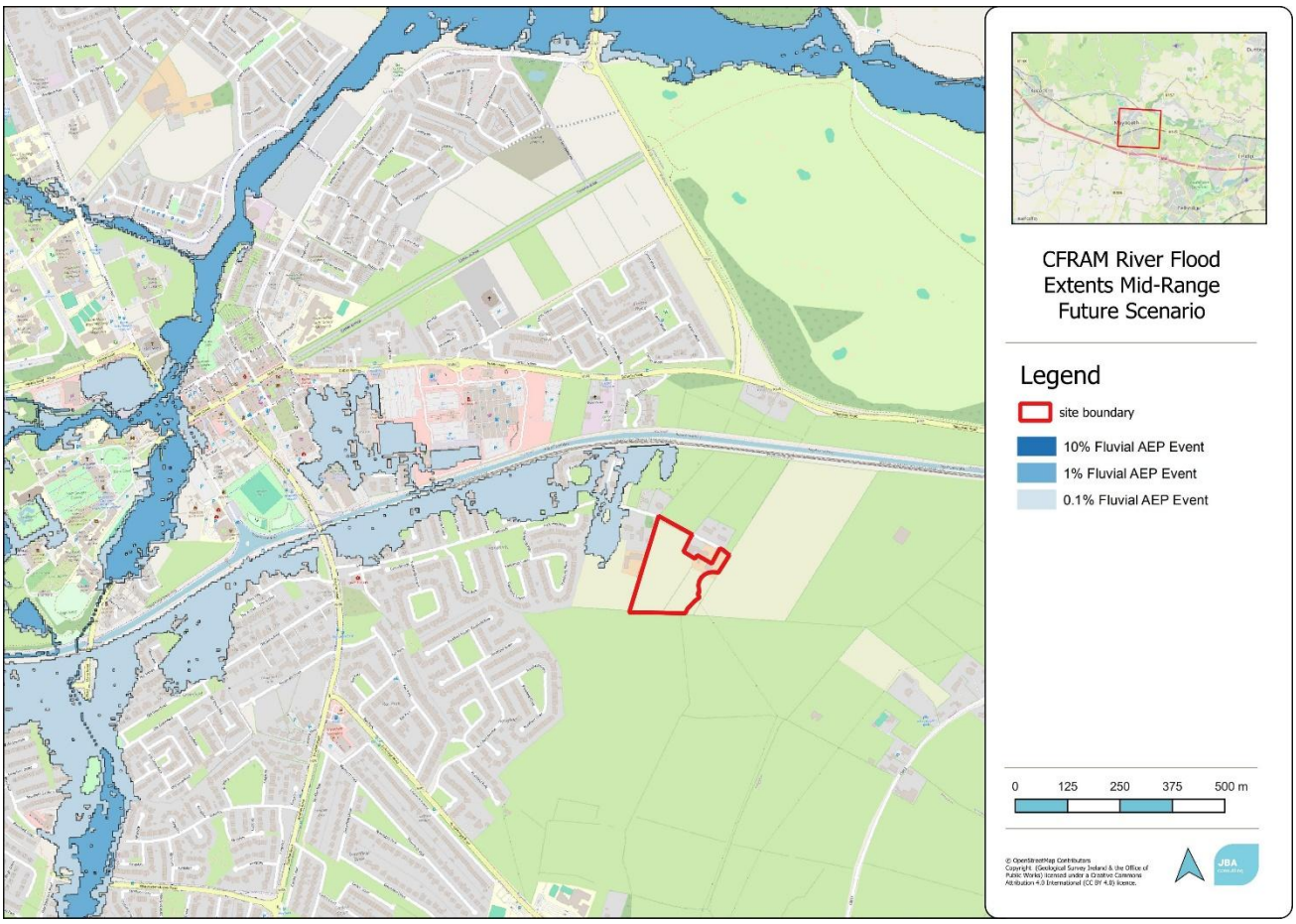


Figure 4-1 Eastern CFRAM River Flood Extents- Mid- Range Future Scenario

Regarding pluvial risk, to manage the potential increase in rainfall due to climate change an allowance of 20% has been incorporated into the stormwater design in accordance with the requirements of the KCDP 2023-2029 SFRA(1).

(7)Rps, STRATEGIC FLOOD RISK ASSESSMENT OF THE KILDARE COUNTY DEVELOPMENT PLAN 2023-2029, Available at Strategic Flood Risk Assessment.pdf, (Accessed the 22nd November 2024).

4.3 Residual Risk

Residual risks are defined as risks that remain after all risk avoidance, substitution and mitigation measures have been taken. This flood risk assessment identifies the failure of the proposed surface water drainage systems as the main residual risk to the proposed development. Failure of the surface water systems can result from blockages, settlement, valve failures and irregular / improper maintenance.

To protect against the potential failure of the stormwater the provided minimum threshold of 150mm will protect the residential properties. Furthermore, the roadway has been graded to convey surface water away from the residential properties.

5 Conclusion

JBA Consulting has undertaken a site-specific Flood Risk Assessment (FRA) for a residential development located at Railpark, Maynooth, Co. Kildare. The proposed development comprises 139 no. units made up of 36 no. houses, 95 no. apartments and 08 no. duplexes.

The site predominantly consists of undeveloped greenfield land. Situated approximately 196 metres to the north is the Royal Canal, the area's primary hydrological feature. Running parallel to the canal is the Dublin-Sligo railway line.

A review of the available sources of flooding indicates there are no instances of historic flooding on-site. The site is located outside the zones of flooding for the 1% (Flood Zone A) and 0.1% (Flood Zone B) AEP fluvial events.

The risks of flooding from coastal sources and the Royal Canal have been screened out. Similarly, the risk of groundwater flooding has also been excluded.

This FRA has determined that the existing site is located in Flood Zone C, meaning it is at a low risk of flooding. Development within Flood Zone C does not require site-specific mitigation measures to manage the risk of fluvial flooding. All development within Flood Zone C is deemed to be Appropriate under 'The Planning System and Flood Risk Management', and does not require the Justification Test to be passed.

There is a risk of flooding from pluvial / rainfall events of varying probability. Surface water drainage systems, including SUDS elements, are proposed to convey and treat runoff prior to discharge from site into the downstream networks / watercourses and manage the pluvial risk.

The risk from climate change relating to fluvial sources has been assessed and shown not to affect the site. It is recommended to include a 20% climate change allowance when calculating rainfall depths / intensities to manage the pluvial climate change risk, as per the Kildare County Development Plan 2023-2029 Strategic Flood Risk Assessment. Residual risk has been identified as the failure of the proposed surface water drainage systems. Several mitigation measures have been recommended to manage this risk.

This FRA was undertaken in accordance with 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities' (2009) and agrees with the core principles contained within. The development proposal has been subject to a commensurate assessment of risk.

A Understanding Flood Risk

Flood risk is generally accepted to be a combination of the likelihood (or probability) of flooding and the potential consequences arising. Flood risk can be expressed in terms of the following relationship: Flood Risk = Probability of Flooding x Consequences of Flooding

A.1 Probability of Flooding

The likelihood or probability of a flood event (whether tidal or fluvial) is classified by its Annual Exceedance Probability (AEP) or return period (in years). A 1% AEP flood has a 1 in 100 chance of occurring in any given year.

In this report, flood frequency will primarily be expressed in terms of AEP, which is the inverse of the return period, as shown in the table below and explained above. This can be helpful when presenting results to members of the public who may associate the concept of return period with a regular occurrence rather than an average recurrence interval and is the terminology which will be used throughout this report.

Table A-1: Conversion between return periods and annual exceedance probabilities

Return period (years)	Annual exceedance probability (%)
2	50
10	10
50	2
100	1
200	0.5
1000	0.1

A.2 Flood Zones

Flood Zones are geographical areas illustrating the probability of flooding. For the purposes of the Planning Guidelines, there are 3 types or levels of flood zones, A, B and C.

Table A-2: Flood Zones

Zone	Description
Flood Zone A	Where the probability of flooding is highest; greater than 1% (1 in 100) from river flooding or 0.5% (1 in 200) for coastal/tidal flooding.
Flood Zone B	Moderate probability of flooding; between 1% and 0.1% from rivers and between 0.5% and 0.1% from coastal/tidal.
Flood Zone C	Lowest probability of flooding; less than 0.1% from both rivers and coastal/tidal.

It is important to note that the definition of the flood zones is based on an undefended scenario and does not take into account the presence of flood protection structures such as flood walls or embankments. This is to allow for the fact that there is a residual risk of flooding behind the defences due to overtopping or breach and that there may be no guarantee that the defences will be maintained in perpetuity.

A.3 Consequence of Flooding

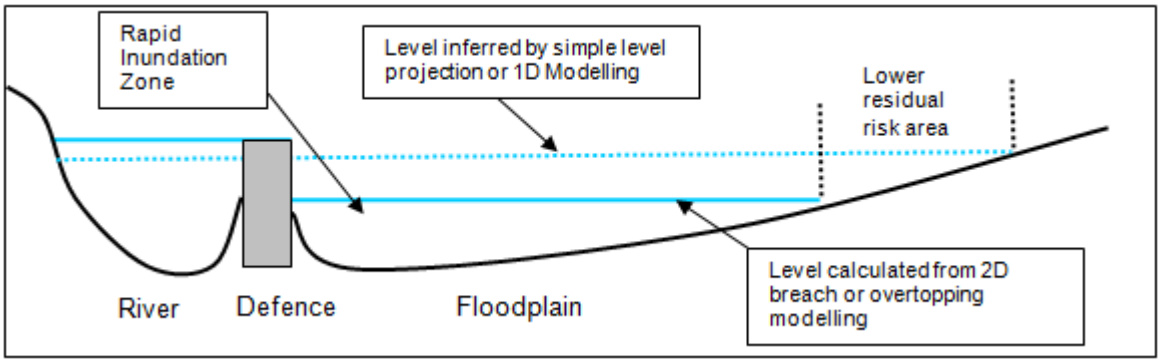
Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc.).

The 'Planning System and Flood Risk Management' provides three vulnerability categories, based on the type of development, which are detailed in Table 3.1 of the Guidelines, and are summarised as:

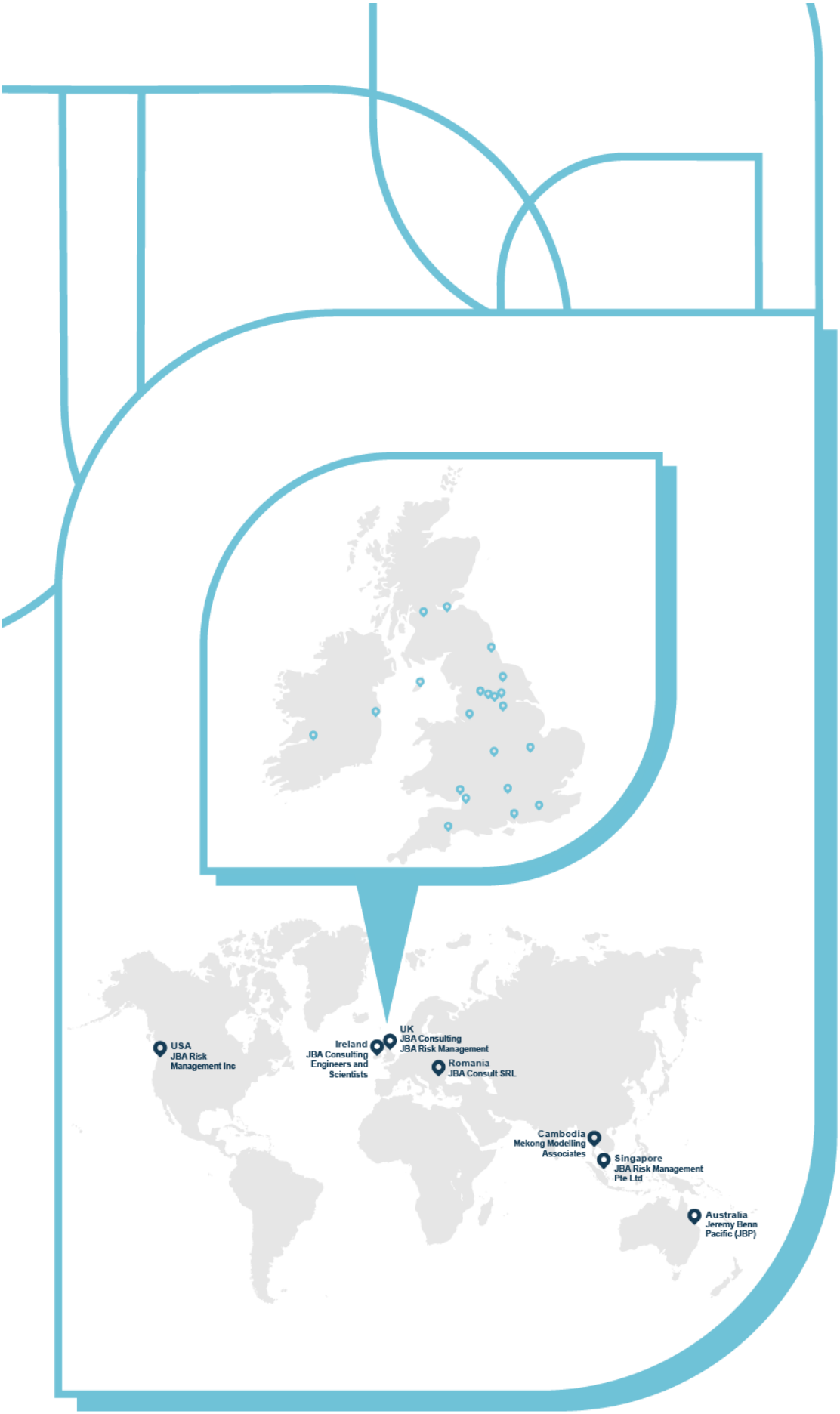
- Highly vulnerable, including residential properties, essential infrastructure and emergency service facilities;
- Less vulnerable, such as retail and commercial and local transport infrastructure;
- Water compatible, including open space, outdoor recreation and associated essential infrastructure, such as changing rooms.

A.4 Residual Risk

The presence of flood defences, by their very nature, hinder the movement of flood water across the floodplain and prevent flooding unless river levels rise above the defence crest level, or a breach occurs. This is known as residual risk.



B Proposed Stormwater Design



JBA consulting

Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn Associates Limited

Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001:2018

CHAS Accredited Contractor CHAS.co.uk
IEMA
Cyber Essentials Certified
CIEEM Registered
Armed Forces Covenant
Member of The 5% Club