

Kildare County Council

Site Specific Flood Risk Assessment

Playground & Car Parking Development at Leixlip Amenity Centre, Station Road, Leixlip, Co. Kildare



December 2022

Site Specific Flood Risk Assessment

Client: Kildare County Council

Location: Playground & Car Parking Development at Leixlip
Amenity Centre, Station Road, Leixlip, Co. Kildare

Date: 12th December 2022

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Contents

1.	Introduction	1
2.	Proposed Site Description	2
2.1.	General	2
2.2.	Existing Topography Levels at Site	3
2.3.	Local Hydrology, Landuse & Existing Drainage	3
3.	Initial Flood Risk Assessment	4
3.1.	Possible Flooding Mechanisms	4
4.	Screening Assessment	5
4.1.	OPW/EPA/Local Authority Hydrometric Data	5
4.2.	OPW PFRA Indicative Flood Mapping	7
4.3.	OPW Flood Info Past Flood Events	8
4.4.	Ordnance Survey Historic Mapping	9
4.5.	Geological Survey of Ireland Mapping	10
4.6.	Eastern CFRAM Study	11
4.7.	Geological Survey of Ireland Groundwater Flood Mapping	13
4.8.	Leixlip Local Area Plan 2015-2021	14
4.9.	Royal Canal – Preliminary Flood Risk Analysis	15
4.10.	Climate Change	15
5.	Scoping Assessment	18
6.	Assessment of Flood Risk	19
7.	Development in the Context of the Guidelines	20
8.	Summary Conclusions & Recommendations	22

Appendices

Appendix A. Drawings

1. Introduction

IE Consulting was commissioned by Kildare County Council to undertake a Site Specific Flood Risk Assessment (SSFRA) in support of a planning application for a proposed playground and car parking development at Leixlip Amenity Centre, Station Road, Leixlip, Co. Kildare.

The purpose of this SSFRA is to assess the potential flood risk to the site of the proposed playground development and to assess the impact that the development as proposed may or may not have on the hydrological regime of the area.

Quoted ground levels or estimated flood levels relate to Ordnance Datum (Malin) unless stated otherwise.

This flood risk assessment study has been undertaken in consideration of the following guidance document:

'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG 2009.

2. Proposed Site Description

2.1. General

The site of the proposed playground and car parking development is located within the grounds of Leixlip Amenity Centre, Station Road, Leixlip, Co. Kildare. The site is bounded to the north by the Maynooth Road and to the west, east and south by the Leixlip Amenities Centre facility site. The total area of the proposed development site is approximately 0.465 hectares.

The location of the proposed development site is illustrated on *Figure 1* below and is shown on *Drawing Number IE2631-001-B, Appendix A*.

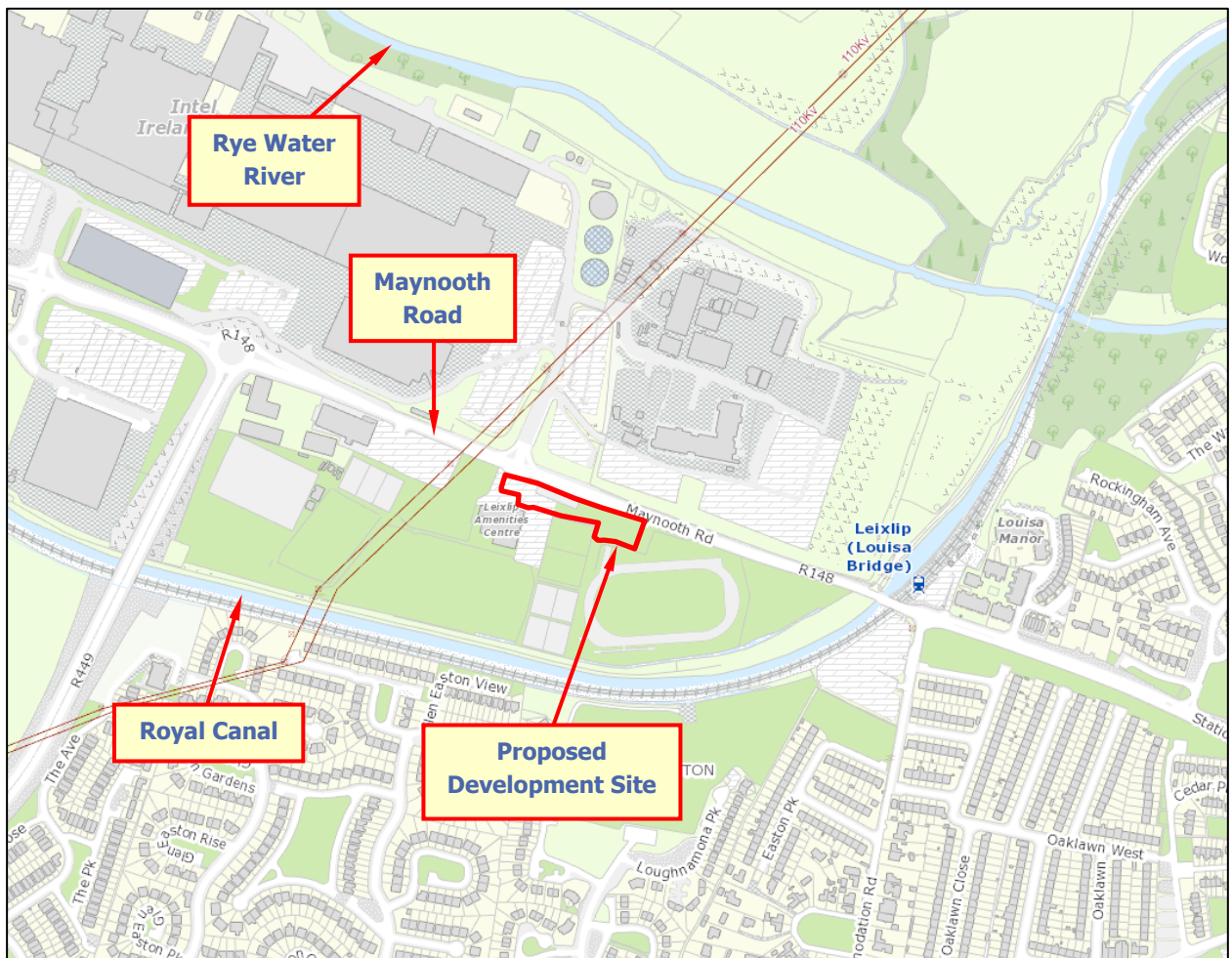


Figure 1 – Site Location

2.2. Existing Topography Levels at Site

The proposed development site slopes very gently from the north-western corner of the site to the south-eastern corner of the site at an approximate gradient of 1.031%.

Existing ground elevations range from approximately 56.085m OD (Malin) at the western boundary of the site to 54.375m OD (Malin) at the south-eastern corner of the site.

2.3. Local Hydrology, Landuse & Existing Drainage

The most immediate hydrological features in the general vicinity of the proposed playground development site are the Rye Water River, which flows in a north-west to south-east direction approximately 375m beyond the northern boundary of the site and the Royal Canal located approximately 144m beyond the southern boundary of the site.

The catchment area of the Rye Water River was delineated and found to be approximately 207.613km² to a point downstream of the site. An assessment of the Rye Water River upstream catchment area indicates that the catchment is predominantly rural in nature with the urban fraction accounting for approximately 2.42% of the total catchment area.

3. Initial Flood Risk Assessment

The flood risk assessment for the proposed development site is undertaken in three principal stages, these being 'Step 1 – Screening', 'Step 2 – Scoping' and 'Step 3 – Assessing'.

3.1. Possible Flooding Mechanisms

Table 1 below summarises the possible flooding mechanisms in consideration of the site:

Source/Pathway	Significant?	Comment/Reason
Tidal/Coastal	No	The site is not located within a coastal or tidally influenced region.
Fluvial	Possible	The Rye Water River is located approximately 375m beyond the northern boundary of the site. The Royal Canal is located approximately 144m beyond the southern boundary of the site.
Pluvial (urban drainage)	No	There is no major or significant drainage or water supply infrastructure located in the immediate vicinity of the site.
Pluvial (overland flow)	No	The site is not surrounded by significantly elevated lands and does not provide an important surface water discharge point to adjacent lands
Blockage	No	There are no significant or restrictive hydraulic structures located within or adjacent to the boundary of the site.
Groundwater	No	There are no significant springs or groundwater discharges mapped or recorded in the immediate vicinity of the site

Table 1: Flooding Mechanisms

The primary potential flood risk to the proposed playground and car parking development site can be attributed to an extreme fluvial flood event in the Rye Water River and/or the Royal Canal located approximately 375m and 144m beyond the northern and southern boundaries of the site respectively.

In accordance with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities - DOEHLG 2009' the potential flood risk to the proposed playground development site is analysed in the subsequent 'Screening Assessment' and 'Scoping Assessment' section of this study report.

4. Screening Assessment

The purpose of the screening assessment is to establish the level of flooding risk that may or may not exist for a particular site and to collate and assess existing current or historical information and data which may indicate the level or extent of any flood risk.

If there is a potential flood risk issue then the flood risk assessment procedure should move to 'Step 2 – Scoping Assessment' or if no potential flood risk is identified from the screening stage then the overall flood risk assessment can end at 'Step 1'.

The following information and data was collated as part of the flood risk screening assessment for the proposed development site.

4.1. OPW/EPA/Local Authority Hydrometric Data

Existing sources of OPW, EPA and local authority hydrometric data were investigated. As illustrated in *Figure 2* below, this assessment has determined that there are three hydrometric gauging stations located on the Rye Water River and one on the Royal Canal in the general vicinity of the proposed development site.



Figure 2 - Hydrometric Gauging Stations

Station 9361, located upstream of the proposed site on the Royal Canal, is entered into the Register of Hydrometric Stations in Ireland as an active hydrometric recorder. There is water level data available from July 2012 to present, therefore this information may be suitable to assist in the prediction of extreme flood levels at this location.

Station 9001, located downstream of the proposed site on the Rye Water River, is entered into the Register of Hydrometric Stations in Ireland as an active hydrometric recorder. There is water level and flow data available from October 1956 to the present, therefore this information may be suitable to assist in the prediction of extreme flood levels at this location.

Station 9022, located downstream of the proposed site on the Rye Water River, is entered into the Register of Hydrometric Stations in Ireland as an inactive hydrometric recorder. There is water level and flow data available from October 1983 to June 1986, therefore this information is not suitable to assist in the prediction of extreme flood levels at this location.

Station 9012, located downstream of the proposed site on the Rye Water River, is entered into the Register of Hydrometric Stations in Ireland as an inactive staff gauge only station. This station has recorded spot flow measurements only with no continuous water level or flow records available.

4.2. OPW PFRA Indicative Flood Mapping

Preliminary Flood Risk Assessment (PFRA) Mapping for Ireland was produced by the OPW in 2011. OPW PFRA flood map number 2019/MAP/237/A illustrates indicative flood zones within this area of County Kildare.

Figure 3 below illustrates an extract from the above indicative flood map in the vicinity of the proposed development site.

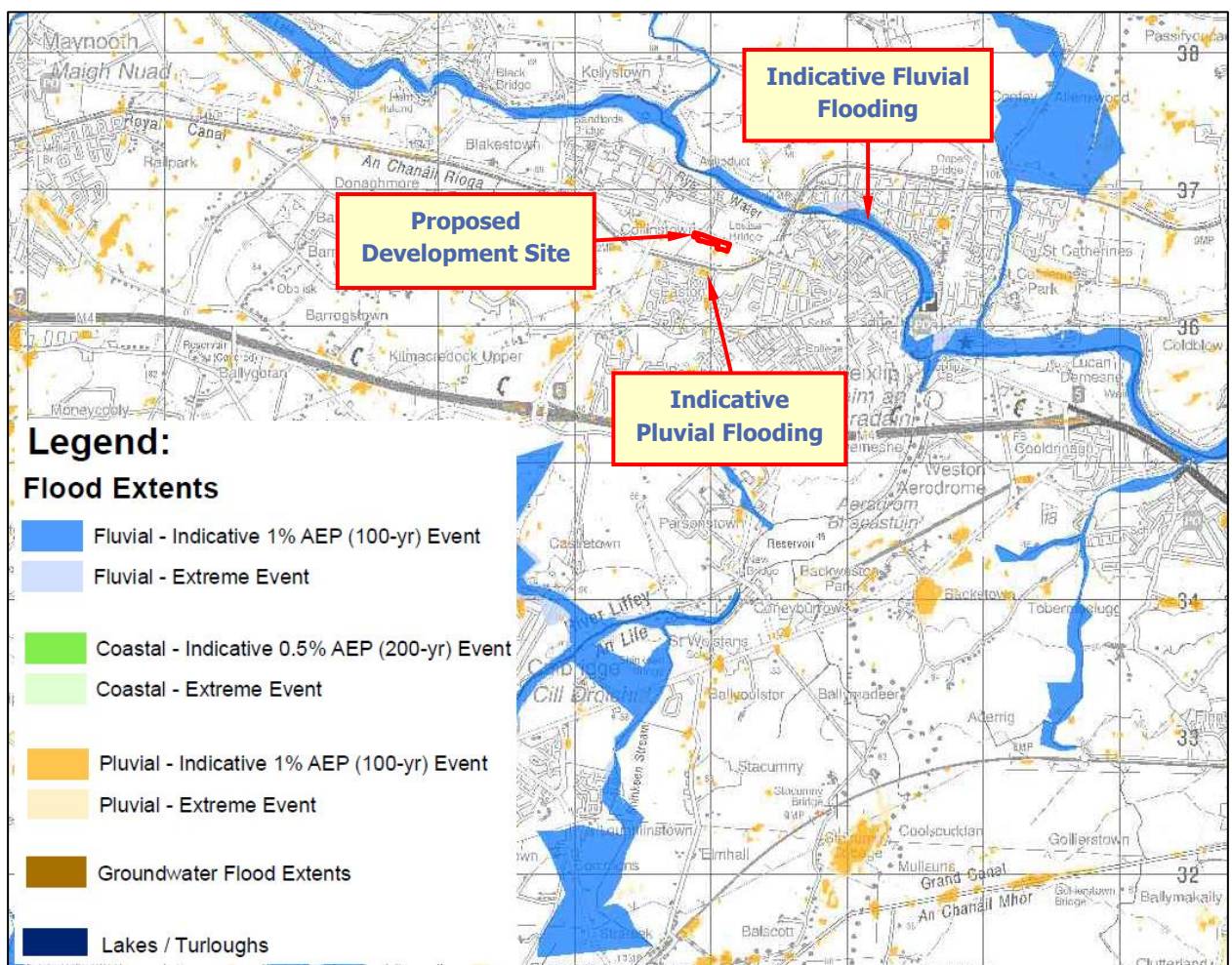


Figure 3 - OPW PFRA Mapping

The PFRA flood mapping indicates that the proposed development site does not fall within an indicative fluvial or groundwater flood zone. Two minor areas of indicative extreme pluvial flooding are mapped

within the site adjacent to the eastern boundary, however it is considered that these do not indicate a significant pluvial flood risk to the site.

It should be noted that the extent of flooding illustrated on these maps was developed using a low resolution digital terrain model (DTM) and illustrated flood extents are intended to be indicative only. The flood extents mapped on the PFRA maps are not intended to be used on a site specific basis.

4.3. OPW Flood Info Past Flood Events

The OPW Flood Info Website (www.floodinfo.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences recorded in the vicinity of the proposed development site. *Figure 4* below illustrates mapping from the Flood Info website in the vicinity of the site.

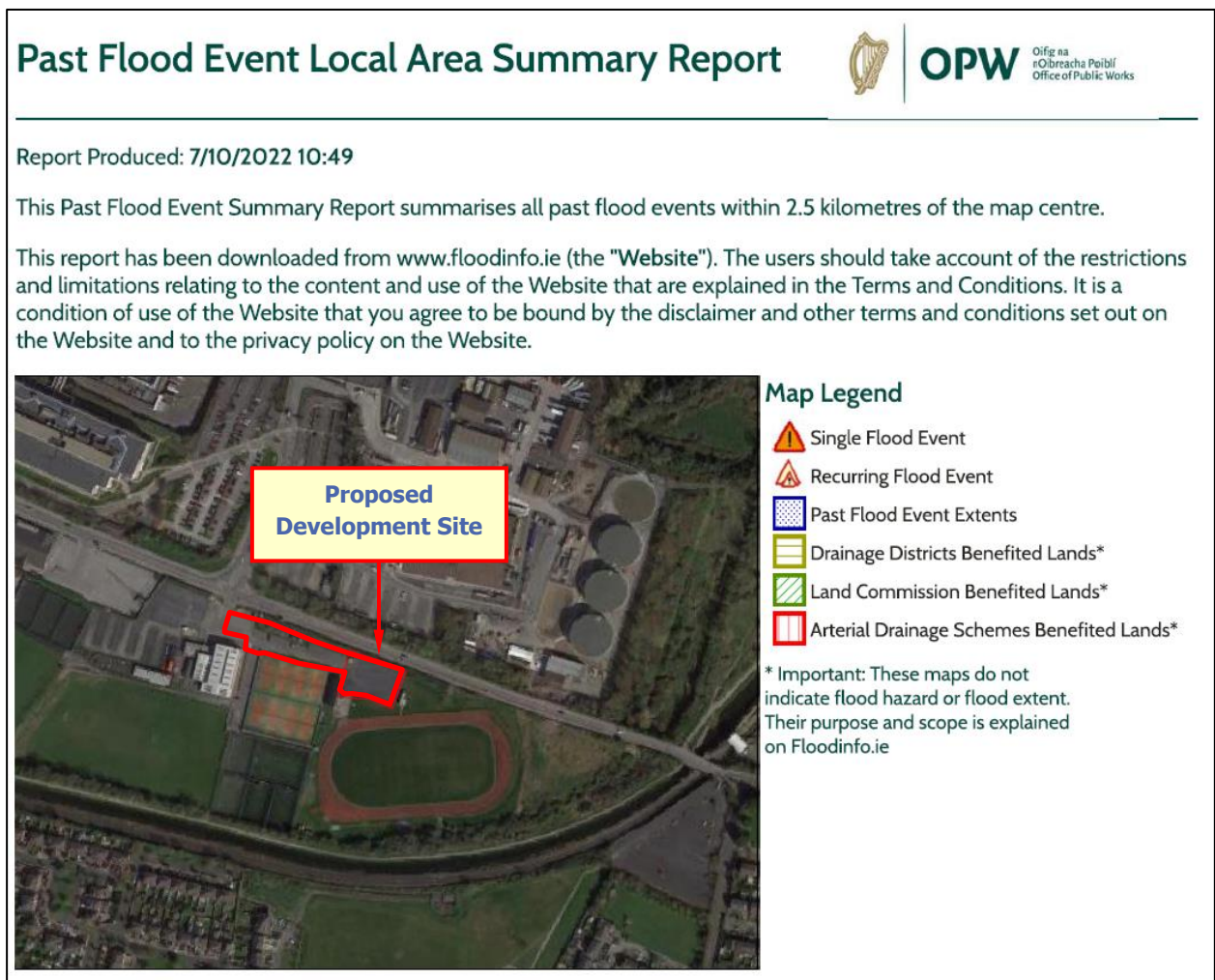


Figure 4 - OPW Flood Info Records

Figure 4 above indicates that there are no recorded or anecdotal instances of flooding at or in the immediate vicinity of the proposed development site.

4.4. Ordnance Survey Historic Mapping

Available historic mapping for the area was consulted, as this can provide evidence of historical flooding incidences or occurrences. The maps that were consulted were the historical 6-inch maps (pre-1900), and the historic 25-inch map series.

Figure 5 and Figure 6 below show the historic mapping for the area of the proposed development site.

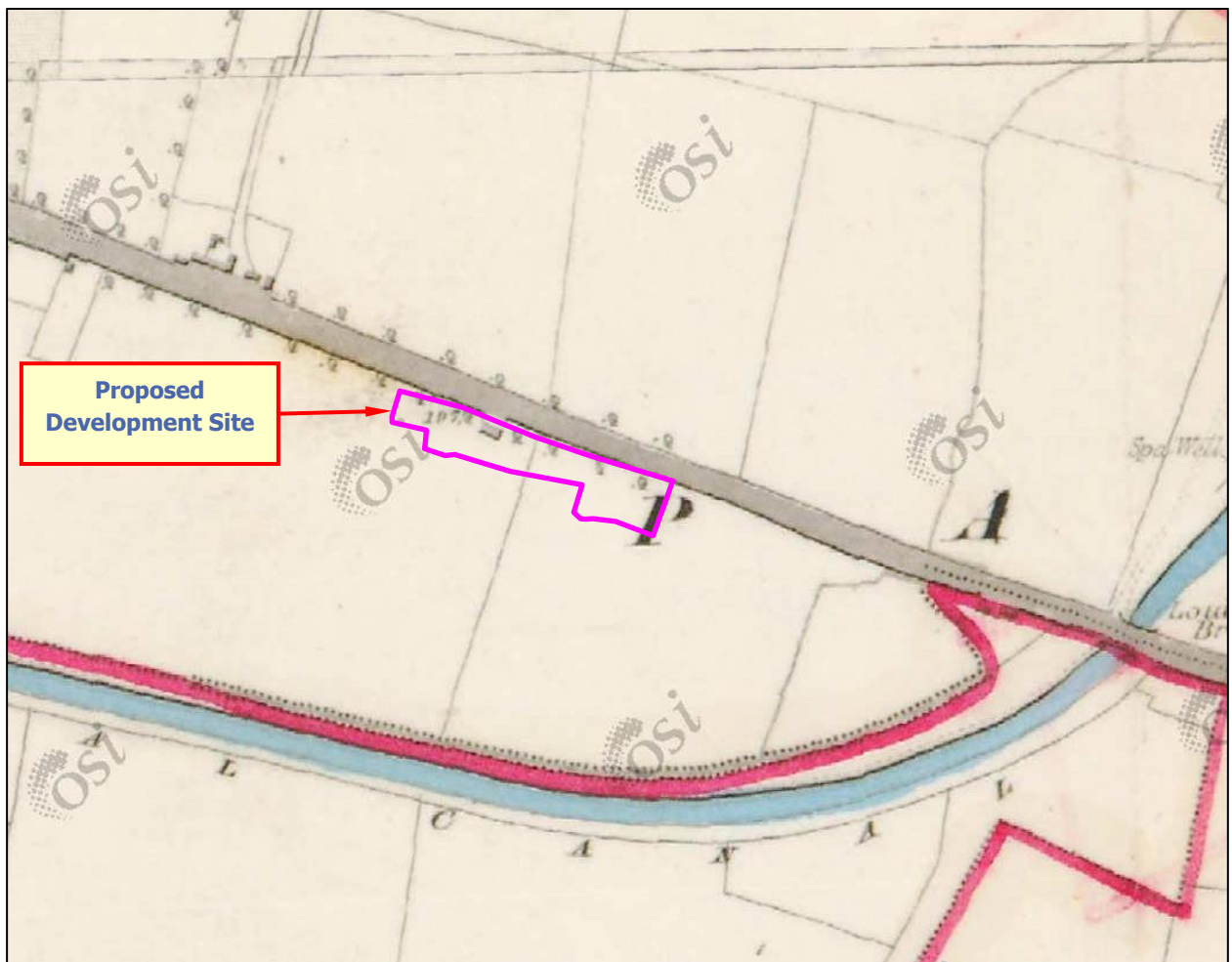


Figure 5 - Historic 6 Inch Mapping

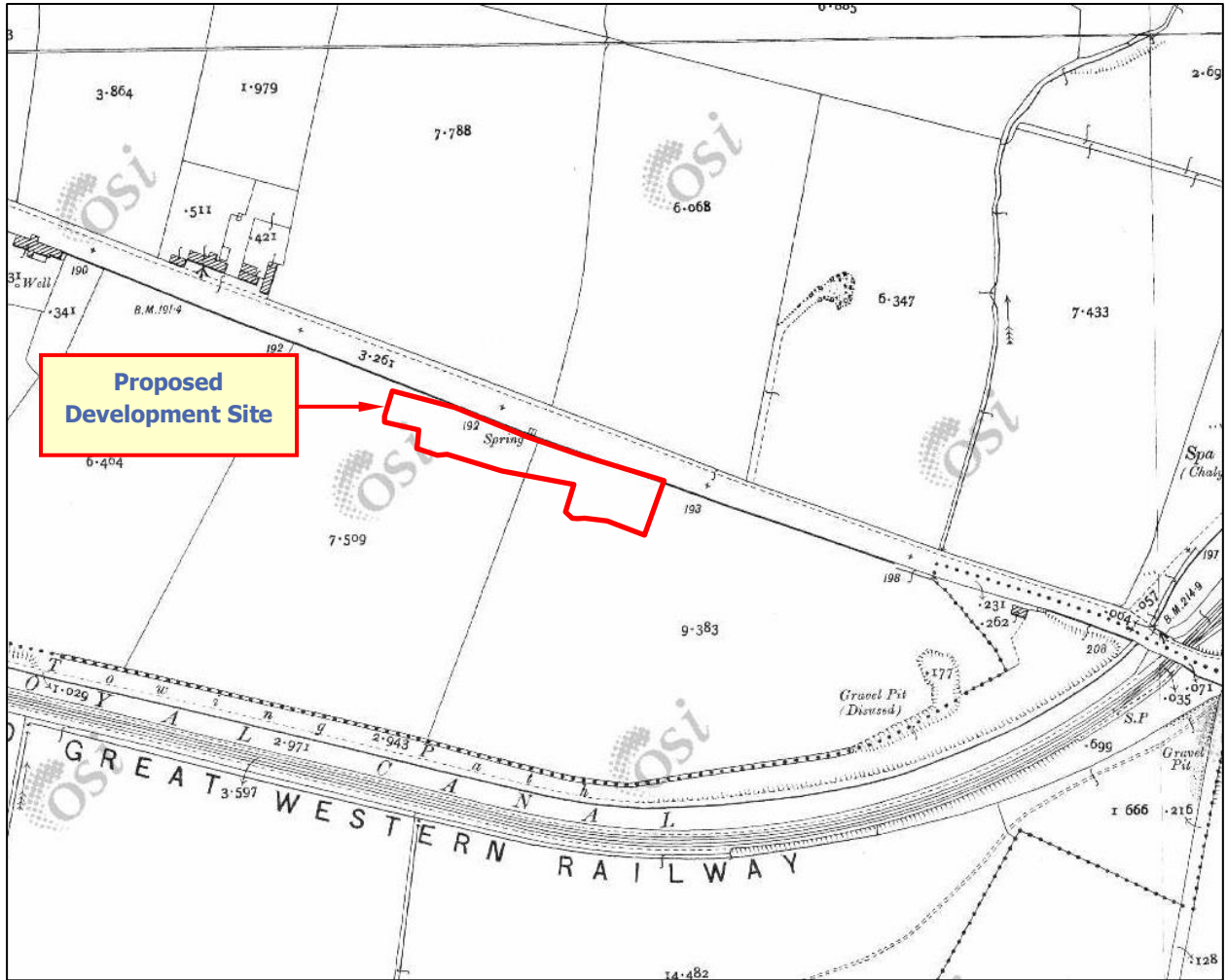


Figure 6 - Historic 25 Inch Mapping

The historic 6 inch and 25 inch mapping does not indicate any historical or anecdotal instances of flooding within or adjacent to the boundary of the proposed development site.

4.5. Geological Survey of Ireland Mapping

The alluvial deposit maps of the Geological Survey of Ireland (GSI) were consulted to assess the extent of any alluvial deposits in the vicinity of the proposed development site. Alluvial deposits can be an indicator of areas that have been subject to flooding in the recent geological past. *Figure 7* below illustrates the sub-soils mapping for the general area of the site.



Figure 7 - GSI Subsoil Mapping

Figure 7 above indicates that the entirety of the site underlain by Carboniferous Limestone Till. Alluvium deposits are not mapped within or in the vicinity of the site.

4.6. Eastern CFRAM Study

The Eastern Catchment Flood Risk & Management Study (CFRAMS) has been undertaken by the OPW and the final version of the flood maps were issued in December 2017. Flood risk extent and depth maps for further assessment areas within Leixlip have also been produced.

OPW CFRAMS predictive fluvial flood map number *E09LEI_EXFCD_F2_02* illustrates predictive extreme fluvial flood extent zones associated with the Rye Water River in the vicinity of the proposed development site. Figure 8 below (extracted from CFRAMS flood maps *E09LEI_EXFCD_F2_02*), illustrates the predictive extreme 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) flood extents in the general vicinity of the site.

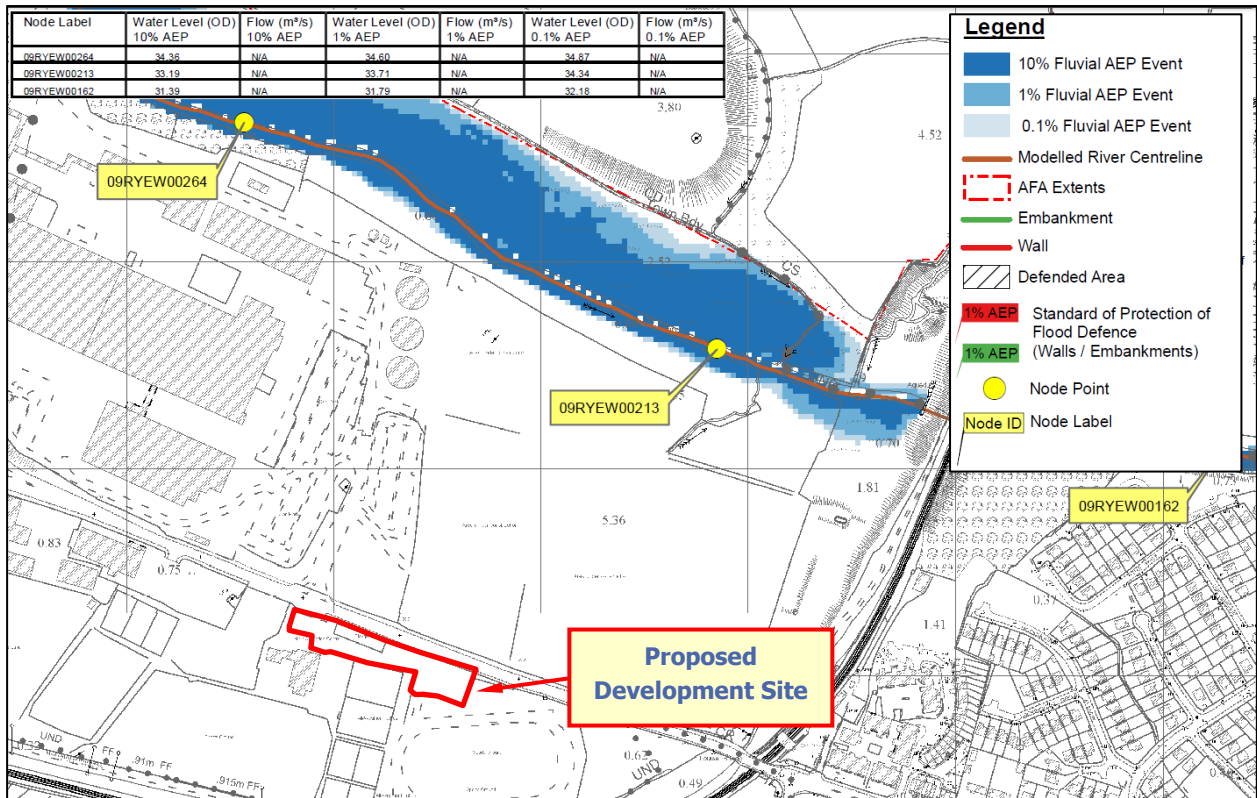


Figure 8 – CFRAMS Fluvial Flood Maps

As illustrated in *Figure 8* above, the proposed development site does not fall within a predictive 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone.

The Eastern CFRAMS flood map reference *E09LEI_EXFCD_F2_02* provides information on predicted flood water levels and volumes for 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) fluvial flood events at various node points along the Rye Water River. The node points closest to the proposed development site are referenced as node points *09RYEW00264*, *09RYEW00213* and *09RYEW00162* located upstream and downstream of the site as illustrated in *Figure 8* above. Details of the predicted fluvial flood levels and flood volumes for these CFRAMS node points are listed in *Table 2* below.

Node Label	Water Level (m OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (m OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (m OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09RYEW00264	34.36	N/A	34.60	N/A	34.87	N/A
09RYEW00213	33.19	N/A	33.71	N/A	34.34	N/A
09RYEW00162	31.39	N/A	31.79	N/A	32.18	N/A

Table 2: CFRAMS Predicted Fluvial Flows and Flood Levels

It is noted that the lowest topographical elevation within the boundary of the proposed development site is 54.375m OD (Malin), which is 19.505m higher than the upstream predicted 0.1% AEP (1 in 1000 year) flood level in the Rye Water River.

4.7. Geological Survey of Ireland Groundwater Flood Mapping

Historic and Predictive Groundwater Mapping for Ireland was prepared by the GSI Department of Communication, Climate Action and Environment in collaboration with Trinity College Dublin and the Institute of Technology Carlow.

Figure 9 below illustrates an extract from the above groundwater flood mapping in the vicinity of the proposed development site.

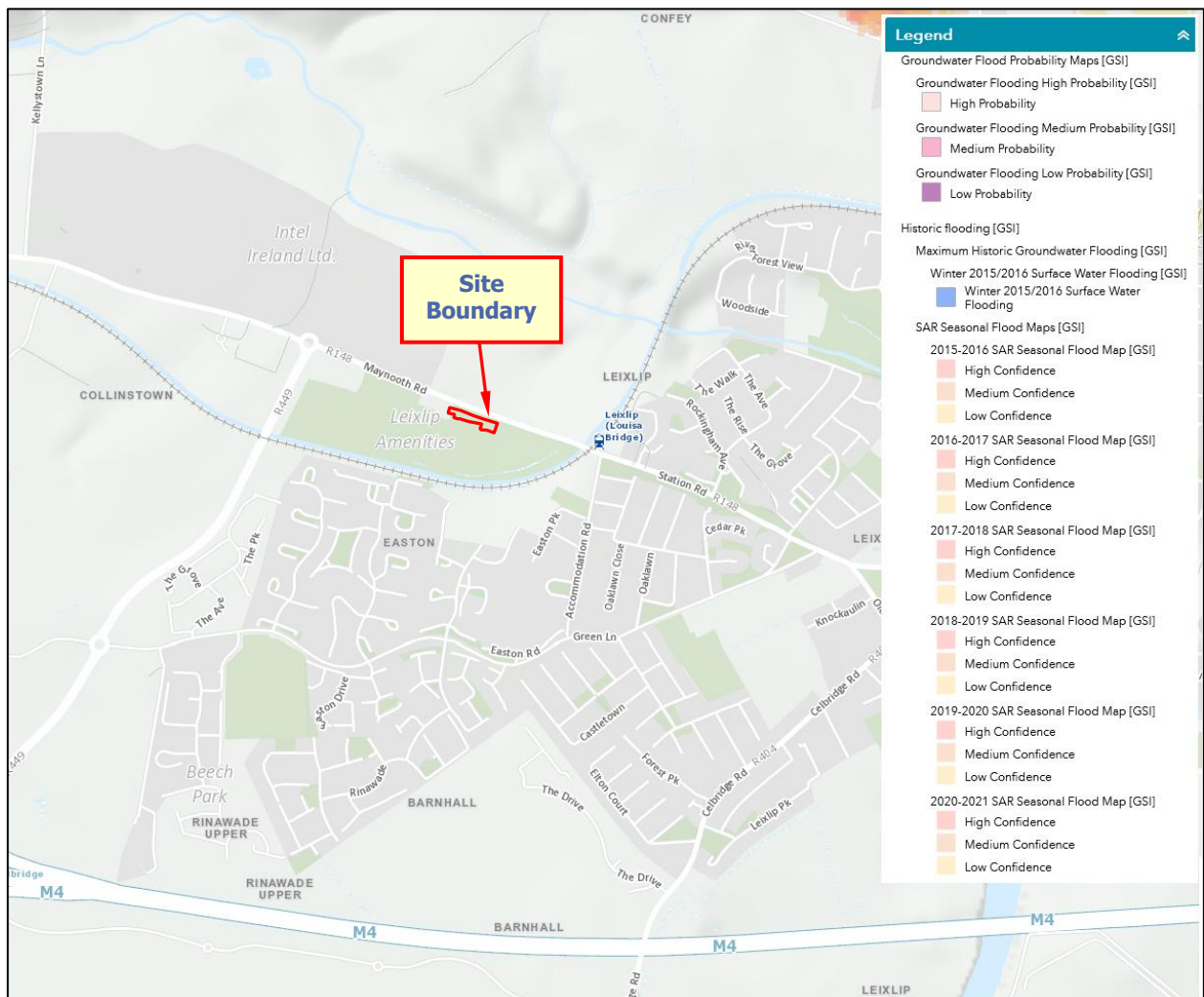


Figure 9 - GSI Groundwater Flood Mapping

The above GSI Groundwater Mapping indicates no areas of predictive or historical groundwater or surface water flooding located in the vicinity of the site.

4.8. Leixlip Local Area Plan 2015-2021

As part of the Leixlip Local Area Plan 2015-2021, Leixlip was assessed for flood risk in line with the standards and recommendations of the DoEHLG Planning System & Flood Risk Management Guidelines.

Figure 10 below illustrates an extract from the Leixlip Local Area Plan Flood Risk Map in the vicinity of the proposed development site.

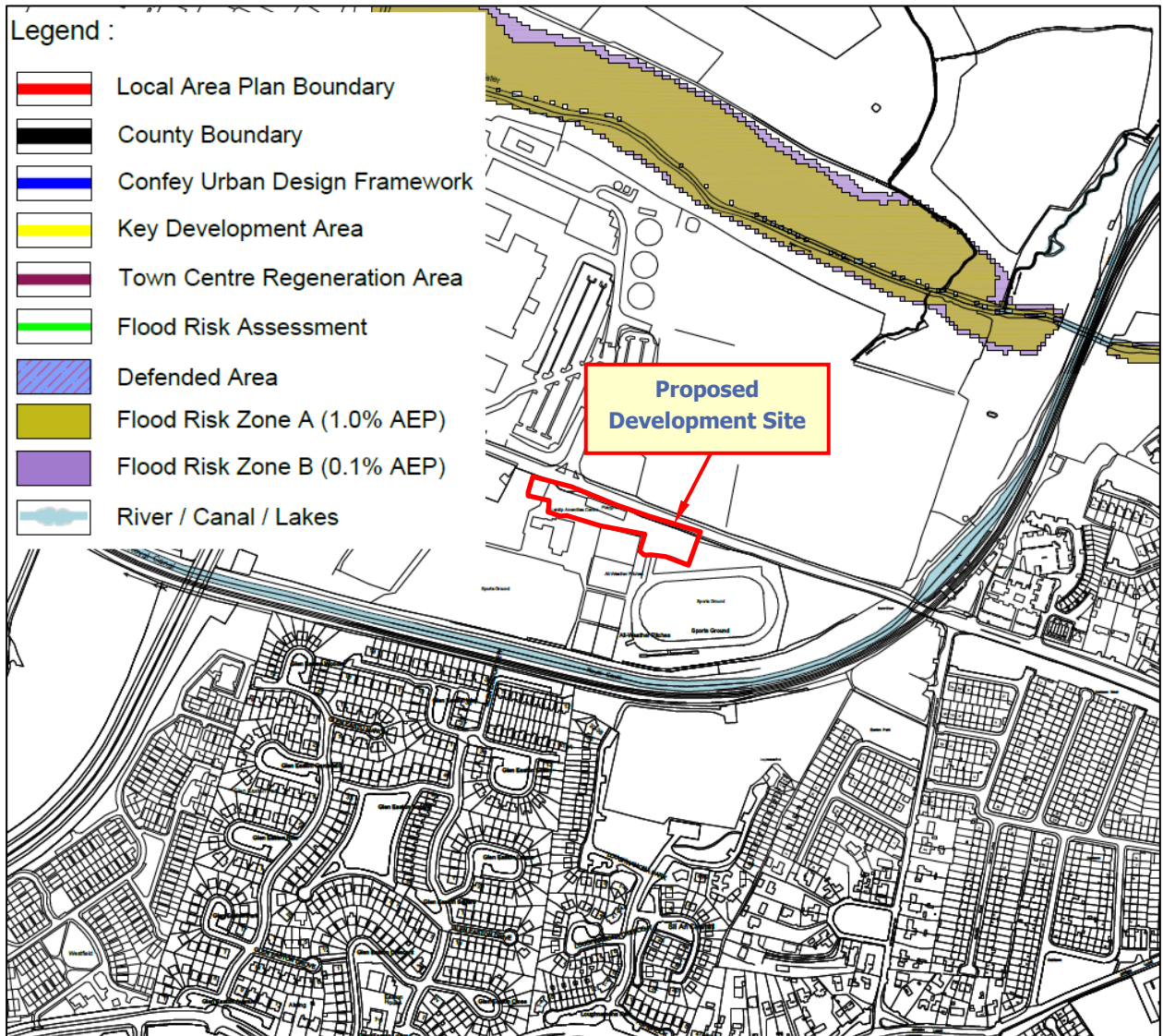


Figure 10 – Leixlip LAP 2015 -2021 – Flood Risk Map

As illustrated in Figure 10 above, the proposed development site does not fall within a predictive, indicative or strategic fluvial flood zone.

4.9. Royal Canal – Preliminary Flood Risk Analysis

In July 2011 a Preliminary Flood Risk Analysis Report was undertaken by Waterways Ireland to assess the possible flood risk to adjacent lands and properties associated with the Royal Canal, the Grand Canal, Lough Allen Canal, the Jamestown Canal and the River Blackwater / Errina-Plassey Canal.

In relation to the assessment of the Royal Canal, the analysis determined that no historic instances of flooding have been recorded at Leixlip, and that due to the on-going management, inspection and assessment of this watercourse, the risk of flooding from the Royal Canal to adjacent lands and properties in Leixlip is considered to be extremely LOW.

4.10. Climate Change

The flood extents illustrated in *Figure 8* above are based on the current scenario 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) fluvial flood extents in the Rye Water River and do not account for the potential impact of climate change. The potential mid-range future climate change scenario (MRFS) fluvial flood extents in the general location of the proposed playground development site are shown in *Figure 11* below, which have been acquired from the OPW CFRAMS mapping web map service dataset.



Figure 11 – National CFRAM Dataset Mid-Range Future Climate Change Scenario Fluvial Flood Extents

Figure 11 above indicates that the site of the proposed development does not fall within a MRFS 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) fluvial flood zone.

The OPW CFRAMS mapping web map service dataset provides information on predicted flood water levels for the 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) fluvial flood events at various node points along the Rye Water River. The node points closest to the proposed development site are illustrated in Figure 12 below. Details of the predicted fluvial flood levels for these node points are listed in Table 3 below.



Figure 12 – OPW CFRAMS Node Points

Node Label	10% AEP Water Level (m OD)	1% AEP Water Level (m OD)	0.1% AEP Water Level (m OD)
Node Point US of Site	34.50	34.75	35.22
Node Point DS of the Site	33.50	34.08	34.93

Table 3: MRFS Predicted Fluvial Flood Levels

It is noted that the lowest topographical elevation within the boundary of the site is recorded as 54.375m OD (Malin), which is 19.155m higher than the upstream predicted 0.1% AEP (1 in 1000 year) flood level in the Rye Water River.

5. Scoping Assessment

The purpose of the scoping stage is to identify possible flood risks and to implement the necessary level of detail and assessment to assess these possible risks, and to ensure these can be adequately addressed in the flood risk assessment. The scoping exercise should also identify that sufficient quantitative information is already available to complete a flood risk assessment appropriate to the scale and nature of the development proposed.

In consideration of the information collated as part of the screening exercise, and the availability of other information and data specific to the area of the proposed development site, it is considered that sufficient quantitative information to complete an appropriate flood risk assessment for the proposed development site can be derived from the information collated as part of the screening exercise.

In particular, the current flood extent maps for the area produced as part of the Eastern CFRAM study are based on the results of detailed hydraulic modelling undertaken along the Rye Water River and provide a reasonably accurate delineation of flood zones in the general vicinity of the proposed development site.

6. Assessment of Flood Risk

The screening assessment undertaken as part of this Site Specific Flood Risk Assessment indicates that the proposed playground and car parking development site is not susceptible to predictive, indicative, historic or anecdotal fluvial, groundwater or canal flooding. Two minor areas of indicative extreme pluvial flooding are mapped within the site adjacent to the eastern boundary, however it is considered that these do not indicate a significant pluvial flood risk to the site.

Therefore the potential primary and direct flood risk to the proposed playground development site is considered to be LOW.

There are no significant or restrictive hydraulic structures or significant urban drainage or water supply infrastructure located within or adjacent to the boundary of the site. Therefore the potential residual and secondary flood risk to the proposed development site is considered to be LOW.

It is recommended that the proposed playground and car parking development incorporates an appropriate storm water management / drainage system in accordance with the relevant Kildare County Council drainage policy and which does not permit surface water runoff from adjoining lands to discharge to and pond within the boundary of the proposed development site.

7. Development in the Context of the Guidelines

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' three flood zones are designated in consideration of flood risk to a particular development site.

Flood Zone 'A' – where the probability of flooding from rivers and watercourses is the highest (greater than 1% or 1 in 100 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'B' – where the probability of flooding from rivers and watercourses is moderate (between 0.1% or 1 in 1000 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'C' – where the probability of flooding from rivers and watercourses is low or negligible (less than 0.1% of 1 in 1000 year for both river and watercourse and coastal flooding). Flood Zone 'C' covers all areas that are not in Zones 'A' or 'B'.

The 'Planning System and Flood Risk Management Guidelines' list the planning implications for each flood zone, as summarised below:

Zone A – High Probability of Flooding. Most types of development would not be considered in this zone. Development in this zone should be only be considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the 'Planning System and Flood Risk Management Guidelines' justification test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space and outdoor sports and recreation would be considered appropriate in this zone.

Zone B – Moderate Probability of Flooding. Highly vulnerable development such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses, strategic transport and essential utilities infrastructure would generally be considered inappropriate in this zone, unless the requirements of the justification test can be met. Less vulnerable development such as retail, commercial and industrial uses and recreational facilities might be considered appropriate in this zone. In general however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone 'C' and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to the development can be adequately managed and that development in this zone will not adversely affect adjacent lands and properties.

Zone C – Low to Negligible Probability of Flooding. Development in this zone is appropriate from a flood risk perspective. Developments in this zone are generally not considered at risk of fluvial flooding and would not adversely affect adjacent lands and properties from a flood risk perspective.

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' the assessment and analysis undertaken as part of this Site Specific Flood Risk Assessment indicates that the proposed playground and car parking development site does not falls within a predictive, indicative or strategic fluvial flood zone. The proposed playground development site therefore falls within Flood Zone 'C'.

In accordance with the 'Planning System & Flood Risk Management Guidelines, DOEGLG, 2009' the development as proposed is not subject to the requirements of the Justification Test.

8. Summary Conclusions & Recommendations

In consideration of the findings of this Site Specific Flood Risk Assessment and analysis the following conclusions and recommendations are made in respect of the proposed development site:

- *A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.*
- *The proposed development site has been screened, scoped and assessed for flood risk in accordance with the above guidelines.*
- *The assessment and analysis undertaken as part of this Site Specific Flood Risk Assessment indicates that the proposed development site is not susceptible to predictive, indicative, historic or anecdotal fluvial, groundwater or canal flooding.*
- *Two minor areas of indicative extreme pluvial flooding are mapped within the site adjacent to the eastern boundary, however it is considered that these do not indicate a significant pluvial flood risk to the site.*
- *The proposed development site falls within a fluvial Flood Zone 'C'.*
- *The proposed development is not expected to result in an adverse impact to the existing hydrological regime of the area, will not impact or impede access to a watercourse, flood plain or flood protection and management facilities and would not increase the risk of flooding to adjacent lands or properties.*
- *It is recommended that the proposed playground and car parking development incorporates an appropriate storm water management / drainage system in accordance with the relevant Kildare County Council drainage policy and which does not permit surface water runoff from adjoining lands to discharge to and pond within the boundary of the site.*
- *In consideration of the findings of this Site Specific Flood Risk Assessment and the incorporation of the recommendations made in this report, it is considered that the development as proposed is appropriate from a flood risk perspective.*

Appendices

Appendix A. Drawings

IE2631-001-B Site Location



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Project Title:	FLOOD RISK ASSESSMENT
Project Address:	LEIXLIP AMENITY CENTRE, STATION ROAD, LEIXLIP
Client:	KILDARE COUNTY COUNCIL
Drg. Title:	SITE LOCATION MAP
Dwg. Scale:	1:50,000
Date:	07/10/22
Dwg.No.:	IE2631-001
Job No.:	IE2631
Revision:	B
Dwg.By:	LMC