

SITE-SPECIFIC FLOOD RISK ASSESSMENT

**Public Realm Upgrade, Kilcullen, Co. Kildare
For Kildare County Council**

PROJECT NO. P294

17 January 2022



OCSC

O'CONNOR | SUTTON | CRONIN

Multidisciplinary
Consulting Engineers



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DOCUMENT CONTROL & HISTORY

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P01	S2	EH	SMG	AH	17.01.2022				

SITE-SPECIFIC FLOOD RISK ASSESSMENT

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APPENDICES

APPENDIX A. OPW HISTORICAL FLOODING REPORT

1 INTRODUCTION

1.1 Appointment

O'Connor Sutton Cronin & Associates (OCSC) have been appointed by *Kildare County Council* to carry out A Site-Specific Flood Risk Assessment for the proposed Public Realm Upgrade, Kilcullen, Co. Kildare.

1.2 Administrative Jurisdiction

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

- Kildare County Council Development Plan (2017 – 2023);
- Greater Dublin Strategic Drainage Study (GDSDS);
- The Planning System and Flood Risk Management Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government and the Office of Public Works).

1.3 Site Location

The subject site is located along the R448 road at Kilcullen Square, in the Kilcullen environs of County Kildare, as shown in **P294-OCSC-XX-XX-DR-C-1201**. The proposed development site is immediately bound by:

- The River Liffey, to the west;

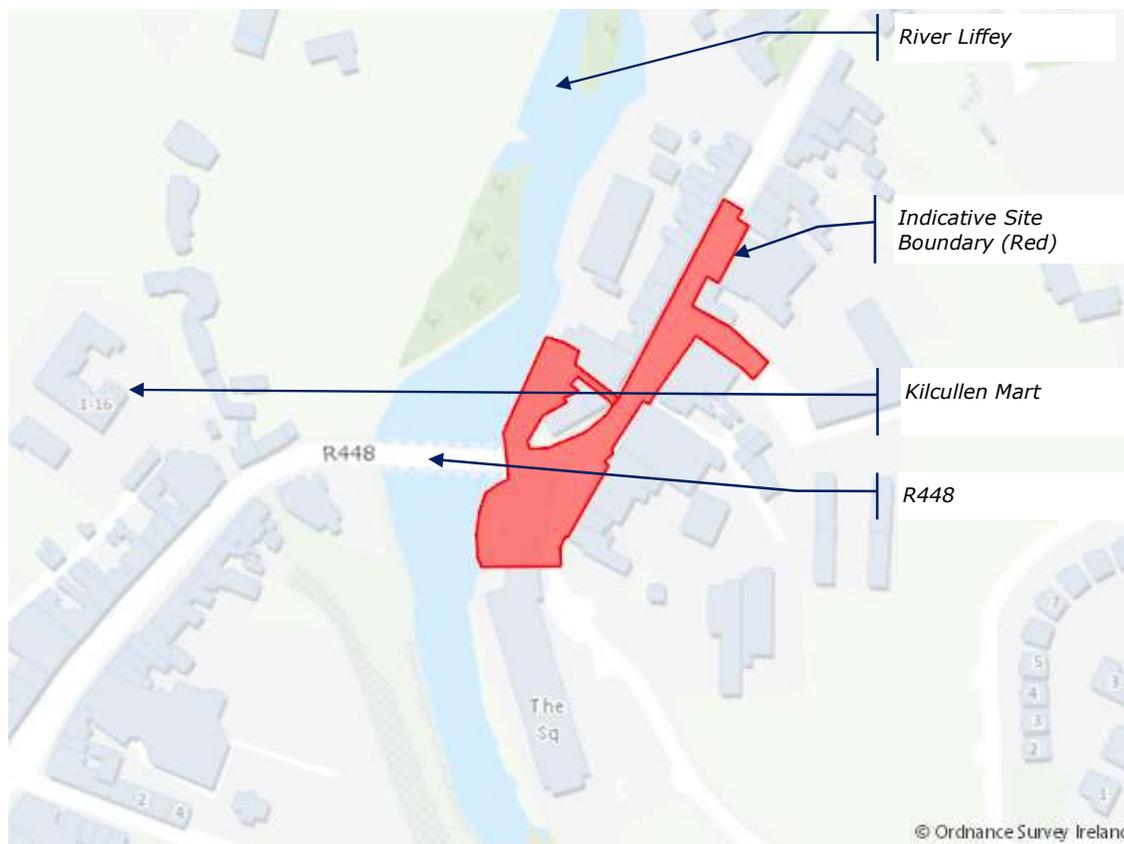


Figure 1.1 - Site Location (www.myplan.ie)

1.4 Existing Site Overview

The overall development site area, including works in the public realm, is **c.0515-hectares**, and is currently zoned by Kildare County Council for **A2, Town Centre**. This zoning seeks 'to provide for the development and improvement of appropriate town centre uses including retail, commercial, office and civic use'.

The site is currently urban and is used for commercial and retail purposes.

The existing ground levels across the overall site are typically graded from south to north, towards the River Liffey, with typical high-points in the order of +103.00mOD along the eastern boundary, whereas existing levels are typically +101.5mOD at the northernmost extent. There are several isolated high and low points across the site, with no typical gradient.

1.5 Proposed Development Context

The proposed scheme will consist of the following:

- Demolition of an existing car park, southeast of Killcullen Bridge and construction of a multipurpose pedestrian event plaza.
- The upgrade of the pedestrian pathway adjacent running adjacent to the river and under the bridge towards the rear of the Town Hall;
- Extensive re-paving throughout.
- Demolition of the existing and reconfiguration of the on-road parking spaces.
- Upgrade of Surface Water Drainage Network.
- Undergrounding of existing overhead cables and installation of new utility ducting.
- Provision of new pedestrian crossing points.
- Tree planting and landscaping.



Figure 1.2 – Site Environs (www.google.com/maps)

The proposed development will consist of both demolition and construction works. The demolition will consist of existing footpath paving layout of the area within the red line boundary. The proposed works will also include provision of site boundary protection to all frontages and all ancillary site works.

It is a goal of this report to ensure existing business practices are inconvenienced as little as possible during the contract period. The Contractor shall liaise with businesses within the Part 8 site and provide regular updates on programme and phasing.

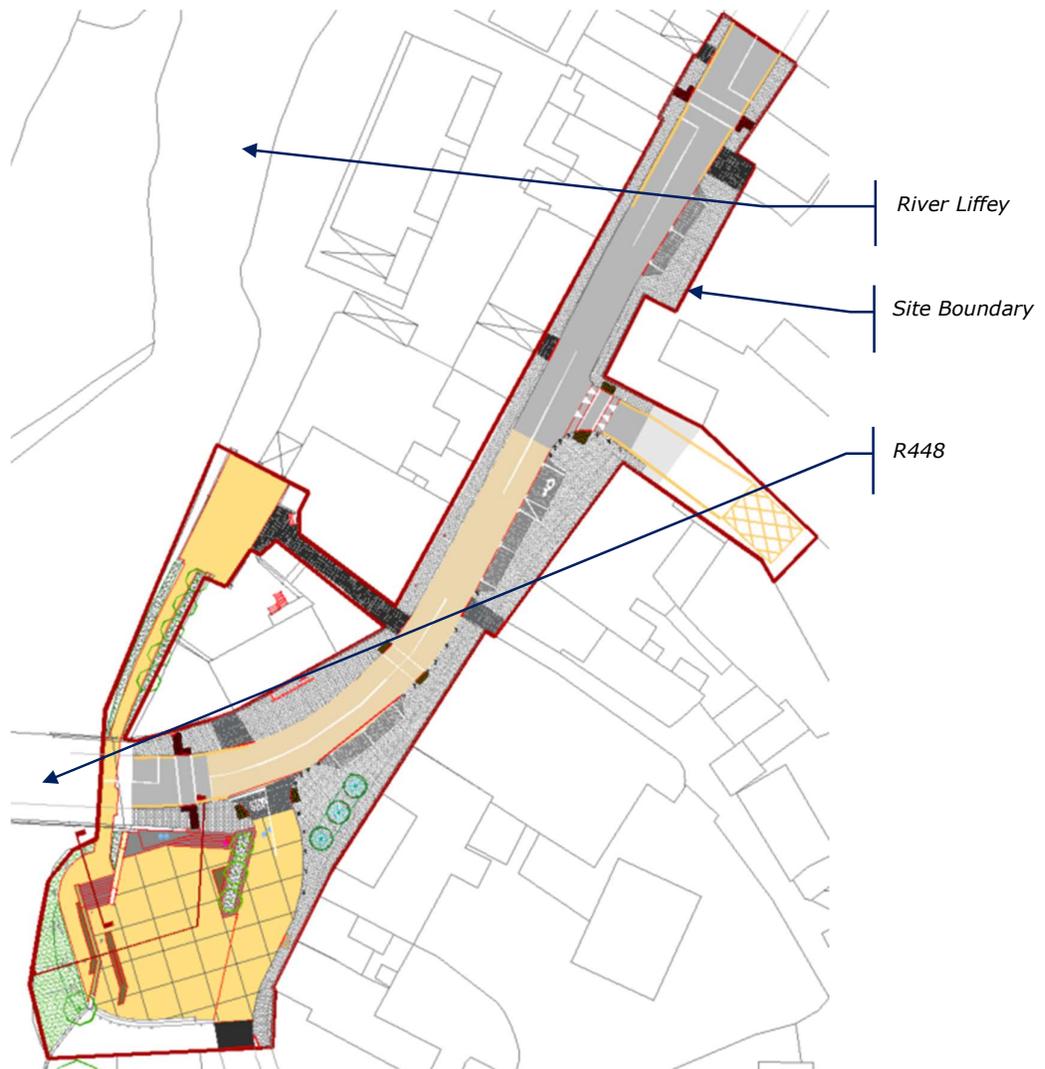


Figure 1.2 – Proposed Site Layout

2 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.* Kildare 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 **P294-OCSC-XX-XX-RP-C-0001** for details.

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;
- Kildare County Council 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;
- Kildare County Council's and Irish Water's Drainage and Watermain Records KCC and Irish Water Records;
- Geological Survey of Ireland Maps website www.gsi.ie;
- Architectural drawings;
- Topographical survey of the proposed site.

3 FLOOD RISK ASSESSMENT

3.1 Design Guidelines Overview

Any planning permission sought on the subject lands are required to adhere to the Local Authority requirements *i.e.* the Kildare 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.

3.2 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 3.1*.



Figure 3.1 – Sequential Approach Principles in Flood Risk Management.

3.3 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 3.2*, as sourced from the FRM Guidelines.

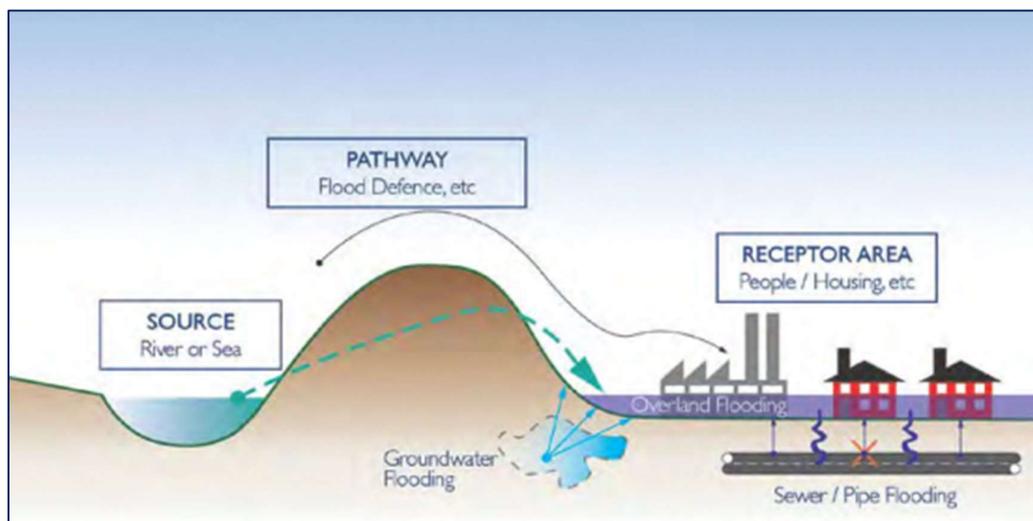


Figure 3.2 – Source - Pathway - Receptor Model

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.

3.3.1 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.

3.4 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).

3.5 Development Vulnerability

Table 3.3 of the PSFRM Guidelines classifies the proposed Realm Upgrade 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 3.3* 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 3.3 - Matrix of Vulnerability Vs. Flood Zone

Therefore, based on the table above, *Less Vulnerable Development*, such as Local transport infrastructure with commercial buildings in the vicinity, is classified as '**appropriate**' if it is located within either Flood Zone B or Flood Zone C.

3.6 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 3.4*.

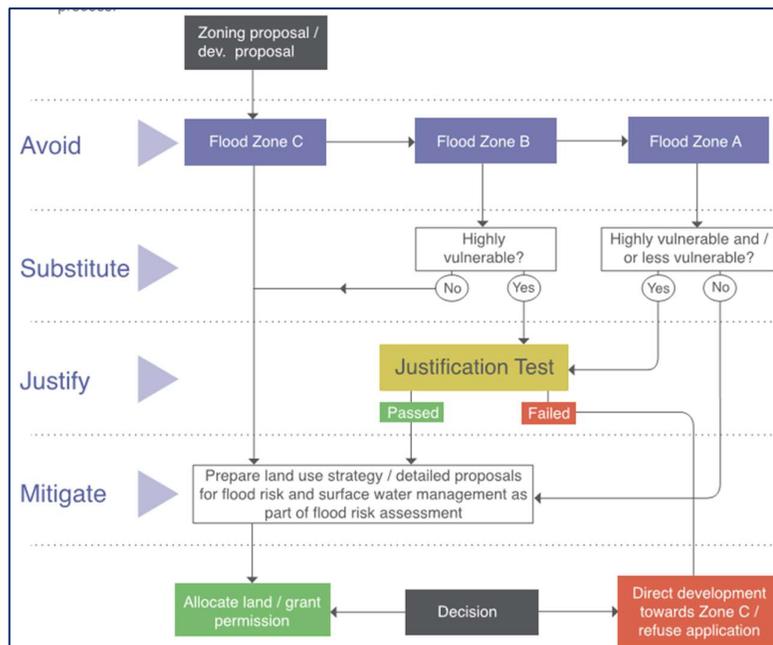


Figure 3.4 - Sequential Approach Mechanism (FRM Guidelines)

4 FLOOD RISK AND MITIGATION MEASURES

4.1 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. The report shows one flood event at Kilcullen town on June 1993. Refer to *Figure 4.1 - OPW Historical Flooding*, below.

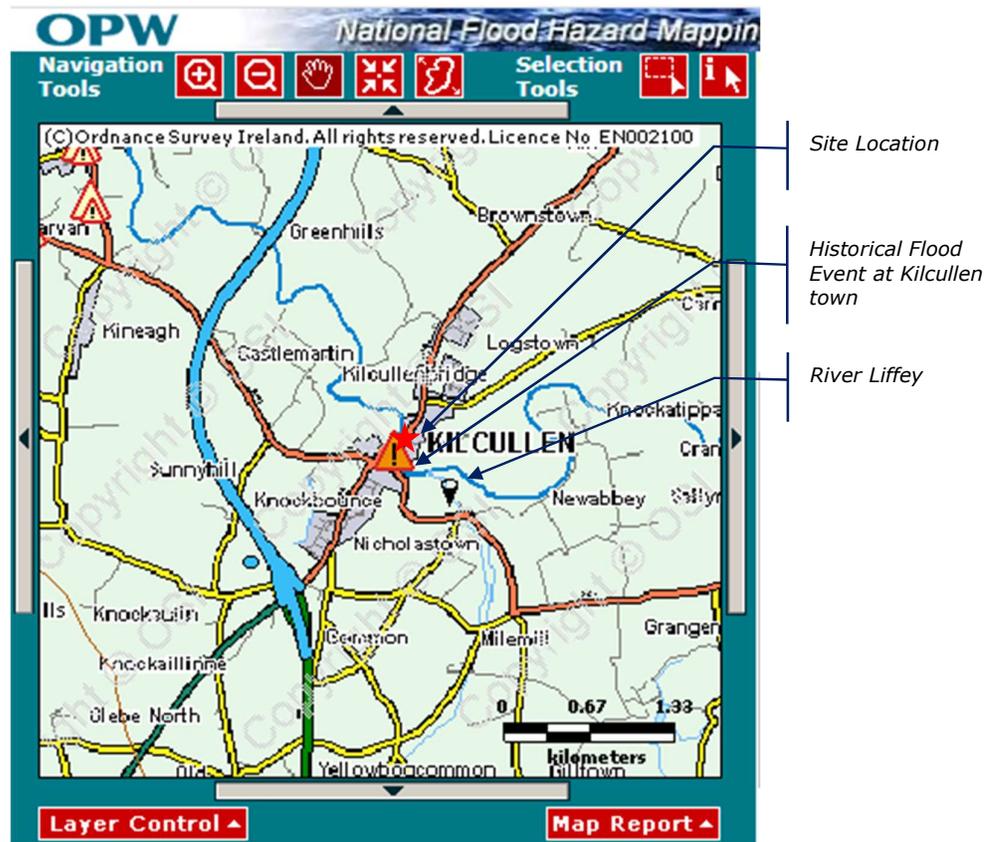


Figure 4.1 – OPW Historical Flooding (www.floodmaps.ie)

It is noted that the development lies within the Liffey's catchment area, which has previously had a history of flooding at Kilcullen town, pre-dating the 1993 event.

Extensive drainage improvement works have been carried out in 2005, as a part of the Kilshane Road development works, with no such flood events being recorded since.

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

4.2 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.

4.2.1 Site Location

The River Liffey goes through Kilcullen town and is located western corner of the subject site. The River Liffey rises in the northern section of the Wicklow Mountains entering the Irish Sea at the midpoint of Dublin Bay.

The proposed site is located approximately 5m – 10m east of a non-tidal section of the River Liffey. The south west boundary of the site is in close proximity of the River Liffey's flood plan. Refer to *Figure 4.2* for context of the site proximity to rivers.

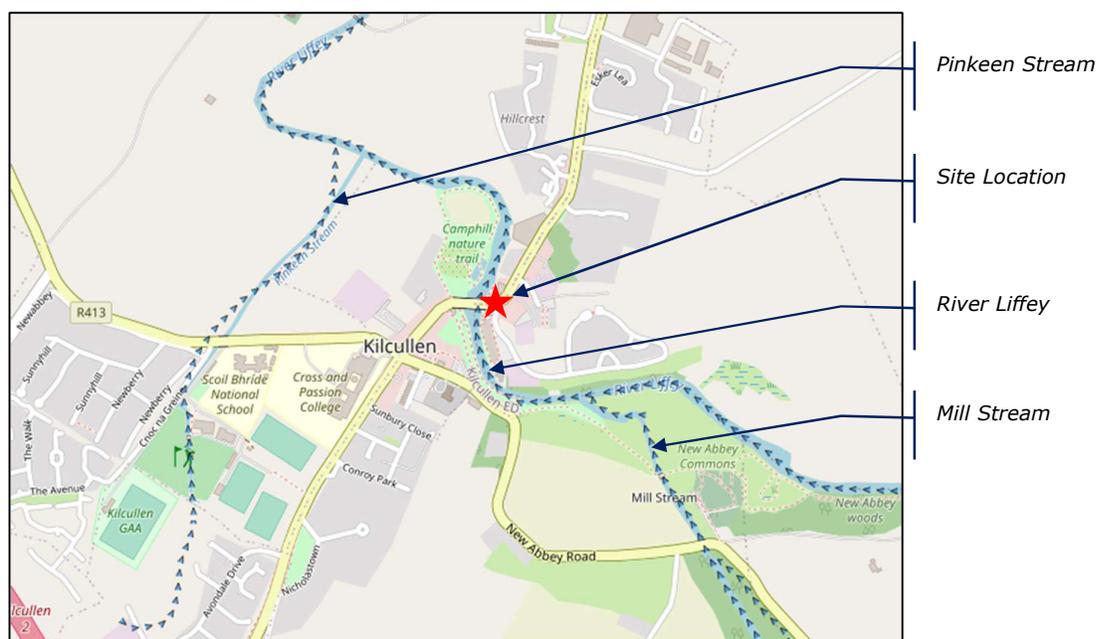


Figure 4.2 - Site Proximity to River Sources

4.2.2 Catchment Flood Assessment and Management

The OPW have developed the 'Final Flood Risk and Hazard' maps as part of the 'Catchment Flood Risk Assessment and Management' (CFRAM) programme. As part of this programme the predicted flood extent of the River Liffey has been modelled for the 10%, 1% and 0.1% AEP flood extents.

A review of the OPWs Catchment Flood Risk Assessment Mapping (CFRAM) indicates that the proposed development is located outside of Flood Zone A and Flood Zone B of the predicted flood extents of the River Liffey. Refer to *Figure 4.3* for the fluvial flood extent mapping.

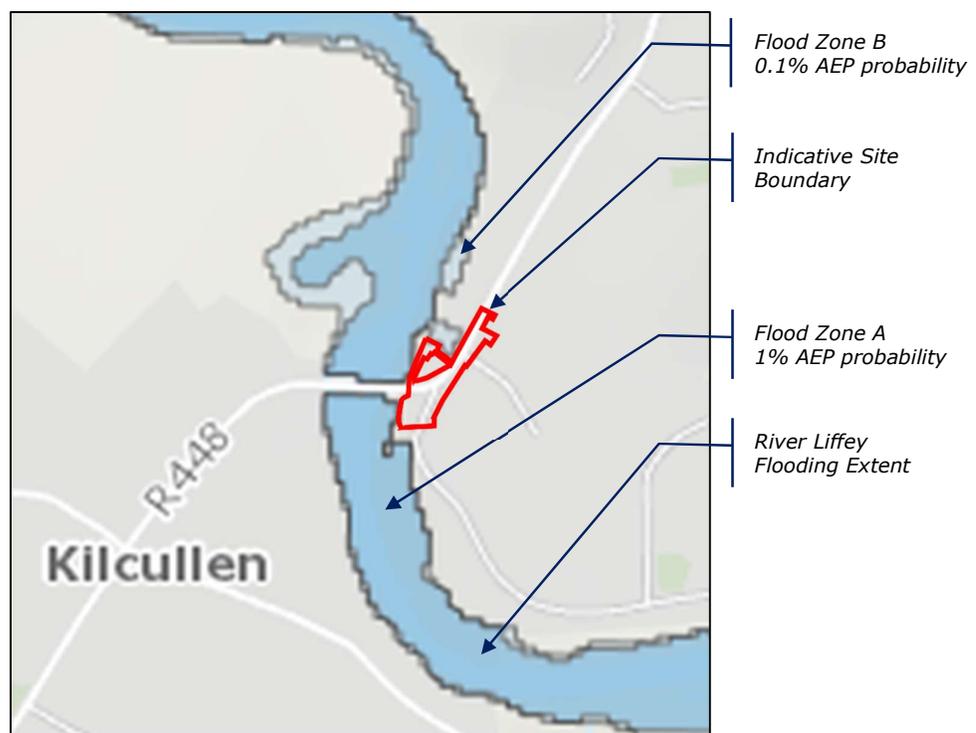


Figure 4.3 – Fluvial Flood Extent Mapping (www.floodinfo.ie)

Figure 4.3 above shows the predicted extent of the 1% and 0.1% AEP event to the River Liffey. The above indicates that the proposed development is located outside of the extent of the 1% and 0.1% AEP flood events.

4.2.3 Proposed Development Context

From the information available, it can be concluded that the proposed site is located outside Flood Zone A and B and is not at significant risk of fluvial flooding.

Based on the above information, it can be concluded that the proposed site is not a risk of fluvial flooding and no mitigation measures are required.

4.3 Coastal Flooding

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

4.3.1 Site Location

The proposed site is located approximately 40km western coast and is not located in the vicinity of any tidally influenced sections of the River Liffey, therefore is not considered at risk of Coastal Flooding. Refer to *Figure 4.4* for context of the coastal flood extent mapping.



Figure 4.4 – Coastal Flood Extent Mapping (www.floodinfo.ie)

4.4 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.

4.4.1 Preliminary Flood Risk Assessment

The subject site is just outside the study area extent of the OPW's Pluvial Flood Study, for Dublin.

4.4.2 Proposed Development Context

The proposed site is to contain a new gravity surface water network that has been designed to ensure that no flooding is experienced within the proposed site during rainfall events up to and including the 1% AEP including an additional 20% intensity to allow for climate change projections.

The above ensures that pluvial flooding is not considered a significant risk to the proposed site, nor as a result of the proposed site, therefore pluvial is not considered a risk to the proposed site.

4.5 Groundwater Flooding

From a review of Geological Survey of Ireland online interactive mapping, the proposed site does not appear to be at risk of groundwater flooding.

4.5.1 Historic Groundwater Flooding

According to information from Geological Survey of Ireland (www.gsi.ie), can be visualised historic groundwater flooding that was occurred in the winter 2015/2016. Refer to *Figure 4.5* for context of the historic groundwater flood extent mapping.

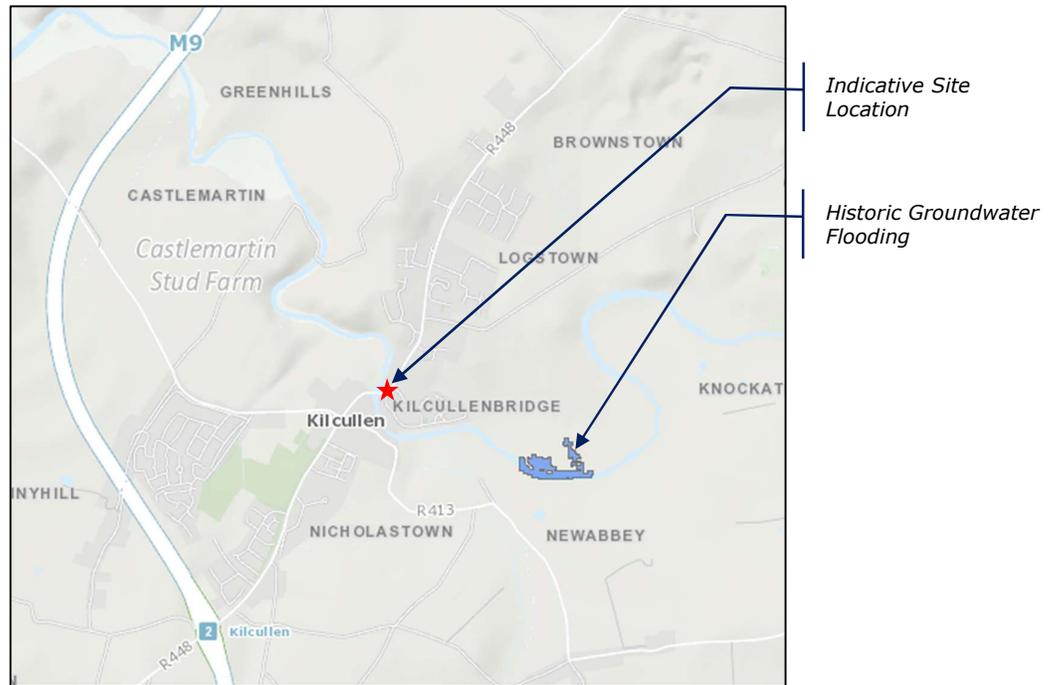


Figure 4.5 – Historic Groundwater Flood Extent Mapping (www.gsi.ie)

According to information from the Geological Survey of Ireland can be concluded that groundwater flooding is a negligible risk to the proposed site and no mitigation measures are required.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Flood Risk Assessment Overview

As detailed within the previous sections of this report, the proposed development is considered a '**Less Vulnerable Development**' and it is located within **Flood Zone C** for both Fluvial and Coastal flooding, nor is it considered to be at risk from pluvial or groundwater flooding. Therefore, in accordance with the Planning System and Flood Risk Management Guidelines for planning authorities there is no significant risk of flooding within the proposed site and is **appropriate** for development.

5.2 Proposed Development Infrastructure

All rainfall within the proposed site is to discharge a surface water network to a petrol interceptor, which discharges to the River Liffey to the west of the site. The rejuvenation of the public realm in going to include road gullies and channel drains to collect the rainfall to discharge to the surface water network.

5.3 Recommendations

It has been demonstrated in the earlier sections that the site is not at apparent risk of flooding from external sources, or as result of the proposed development.

In order to minimise the risk of flooding within the development, it is recommended that all drainage infrastructure is designed and installed in accordance with the relevant standards.

As the proposed site is located outside the flood zones for the River Liffey and costal flooding and is not at significant risk of flooding from pluvial or ground water flooding, no further mitigation measures are required for the proposed development.

Refer to the Engineering Service Report, **P294-OCSC-XX-XX-RP-C-0001**, and associated design drawings for further details relating to the proposed surface water drainage network and management strategy.

Eoghan Healy

(B.Eng)

For OCSC MULTIDISCIPLINARY CONSULTING ENGINEERS



APPENDIX A. OPW HISTORICAL FLOODING REPORT

Appendix A

OPW Historical Flooding Report

Summary Local Area Report

This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Kildare

NGR: N 841 095

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Scale 1:40,449

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained in the Glossary.

1 Result



1. Liffey Kilcullen June 1993

County: Kildare

Additional Information: [Reports \(2\)](#) [Press Archive \(1\)](#) [More Mapped Information](#)

Start Date: 10/Jun/1993

Flood Quality Code:3

MINUTES OF MEETING

Reference: P4D403A – F310 – 017 – 004-001 Page 1 of 2

Project No.: P4D403A

Project Title: OPW Flood Hazard Mapping – Phase 1

Purpose of Meeting: Kildare County Council – Oral Report – Area Engineer – Naas

Participating:

Area Engineer	Kildare County Council
Overseer/Supervisor	Kildare County Council
Search Manager	ESBI

Venue: KCC Naas

Date of Meeting: 01/04/05

Copies to:

Compiled by: Search Manager ESBI

Status Draft

Approved for ESBI:

**Approved for Kildare
County Council**

Date:

Meeting with Area Engineer for Naas 01/04/05

The Area Engineer and his supervisor outlined 12 areas that are or were prone to flooding. These are: -

1. Kill River, Arthurstown Road –
 - a. The Kill River overflows its banks and inundates the Arthurstown road on a recurring basis. This is generally coincident with extended periods of heavy rain.
 - b. A number of houses along the Arthurstown road have been subject to flooding when the Kill River overflows its banks and inundates the road carriageway.Flood Id = 589
2. Johnstown – Historical flooding problem in the town of Johnstown particularly related to the Morell River. Engineering Consultants Report is available and will be forwarded by KCC.
Flood Id = 590
3. Rathmore – New Housing Estate in Rathmore is subject to flooding during periods of heavy rainfall. It is thought that the land drainage has been interfered during the construction of the estate.
Flood Id = 591
4. Punchestown Race Course – The entrance to Punchestown is subject to recurring flooding during periods of heavy rainfall. A new soakaway is due to be installed as part of a pipelaying scheme for the area. It is expected that this will resolve this localised flooding.
Flood Id = 593
5. Silverhill – Junction of N81 and Silverhill road. Silverhill road subject to recurring flooding during periods of heavy rain.
Flood Id = 594
6. Kilcullen Town – Subject to flooding in 1993 when the Liffey burst its banks. Bank in the town got flooded, particularly the cellar of the building.
Flood Id = 595
7. Brannockstown – Subject to flooding historically but works have been carried out in the town and problem has been solved.
Flood Id = 596
8. Carragh – Road floods, Associated with a pipe which drains from development and ties into the River Liffey.
Flood Id = 597
9. Eadestown - Cemetery at Eadestown flooded historically but no flooding has occurred since a pipe was installed from the road area to the nearby stream.
Flood Id = 598
10. Naas – Limited capacity culvert causes occasional flooding at Hotel on the Newbridge road.
Flood Id = 600
11. Newtown Road – In vicinity of a private lake, road flooding occurs during periods of heavy rain due to limited capacities of pipes and culverts under driveways along the road.
Flood Id = 601
12. Ladytown Area – Sluice gate system on a river in this location, when closed during periods of heavy rain, water backs up and floods yard. It was suggested that motorway flooding M7 could be related to this problem.
Flood Id = 602