# Havenfalls Limited

# Site Specific Flood Risk Assessment

Waterrock, Midleton, Co. Cork


**October 2022**

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

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# Site Specific Flood Risk Assessment

Client: Havenfalls Limited

Location: Waterrock, Midleton, Co. Cork

Date: 10th October 2022



## Document Control

| PROJECT NUMBER: IE2338 | | DOCUMENT REF: IE2338_Report_5509 | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| 3.0 | ISSUE-01 | LMc | PMS | JK | 04-11-2022 |
| 2.0 | DRAFT-02 | LMc | PMS | JK | 12-10-2022 |
| 1.0 | DRAFT-01 | LMc | PMS | | 10-10-2022 |
| Revision | Purpose Description | Originated | Checked | Reviewed | Date |


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## Appendices

# 1. Introduction

IE Consulting was requested by Havenfalls Limited to undertake a Site Specific Flood Risk Assessment (SSFRA) in support of a planning application for a development site at Waterrock, Midleton, Co. Cork. It is proposed to construct a residential housing development and all associated site works.

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

A hydrological engineer from IE Consulting undertook a survey of the site area and surrounding catchment on 16th September 2021.

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 development site is located at Waterrock, Midleton, Co. Cork. The site is bounded to the north, west, south-east and east by agricultural lands and to the south by an existing commercial premise. The total area of the development site is approximately 9.5 hectares.

The location of the development site is illustrated on *Figure 1* below and shown on *Drawing Number IE2338-001-A*, *Appendix A*.

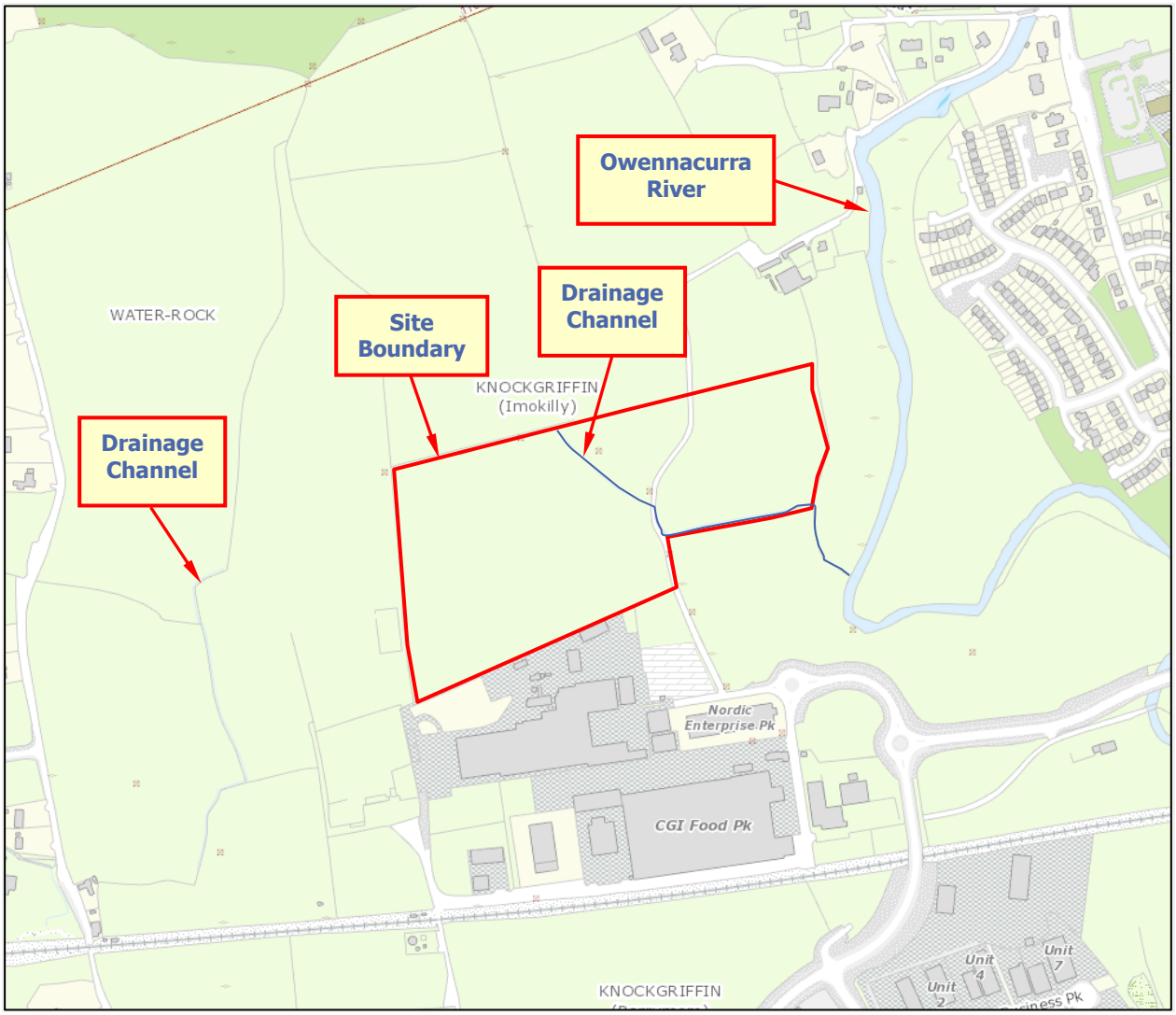



**Figure 1 – Site Location**

## 2.2. Existing Topography Levels at Site

The proposed development site slopes gently to moderately from two high points located in the west and centre of the site towards the site boundaries at gradients ranging from approximately 1.795% (1 in 55.72) to 6.671% (1 in 14.99).

Existing ground elevations range from approximately 17.61m OD (Malin) in the western area of the site to 11.00m OD (Malin) at the south-eastern corner of the site.

## 2.3. Local Hydrology, Landuse & Existing Drainage

On the day of the site survey the development site appeared to be well drained and free from any standing water.

The most immediate and significant hydrological feature in the vicinity of the proposed development site is the Owennacurra River located approximately 75m beyond the eastern boundary of the site as shown in *Figure 1* above.

Utilising the OPW Flood Studies Update (FSU) Portal software, the catchment area of the Owennacurra River was delineated and found to be approximately 99.212km$^2$ to a point downstream of the site. An assessment of the catchment area indicates a predominantly rural catchment with the urban fraction accounting for approximately 0.1% of the upstream catchment area.

In addition, a drainage channel bisects the area of the proposed development site.

# 3. Initial Flood Risk Assessment

The flood risk assessment for the site of the proposed development 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** | Yes | The site is located within a tidally influenced region. |
| **Fluvial** | Yes | The Owennacurra River is located approximately 75m beyond the eastern boundary of the site. In addition, a drainage channel bisects the site. |
| **Pluvial (urban drainage)** | No | There is no significant or major urban drainage or water supply infrastructure 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 in the vicinity of the development 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 development site can be attributed to an extreme fluvial and/or tidally influenced flood event in the Owennacurra River located approximately 75m beyond the eastern boundary of the site.

In accordance with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities - DOEHLG 2009' the potential flood risk to the proposed 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 two hydrometric gauging stations located upstream and one downstream of the site of the proposed development.

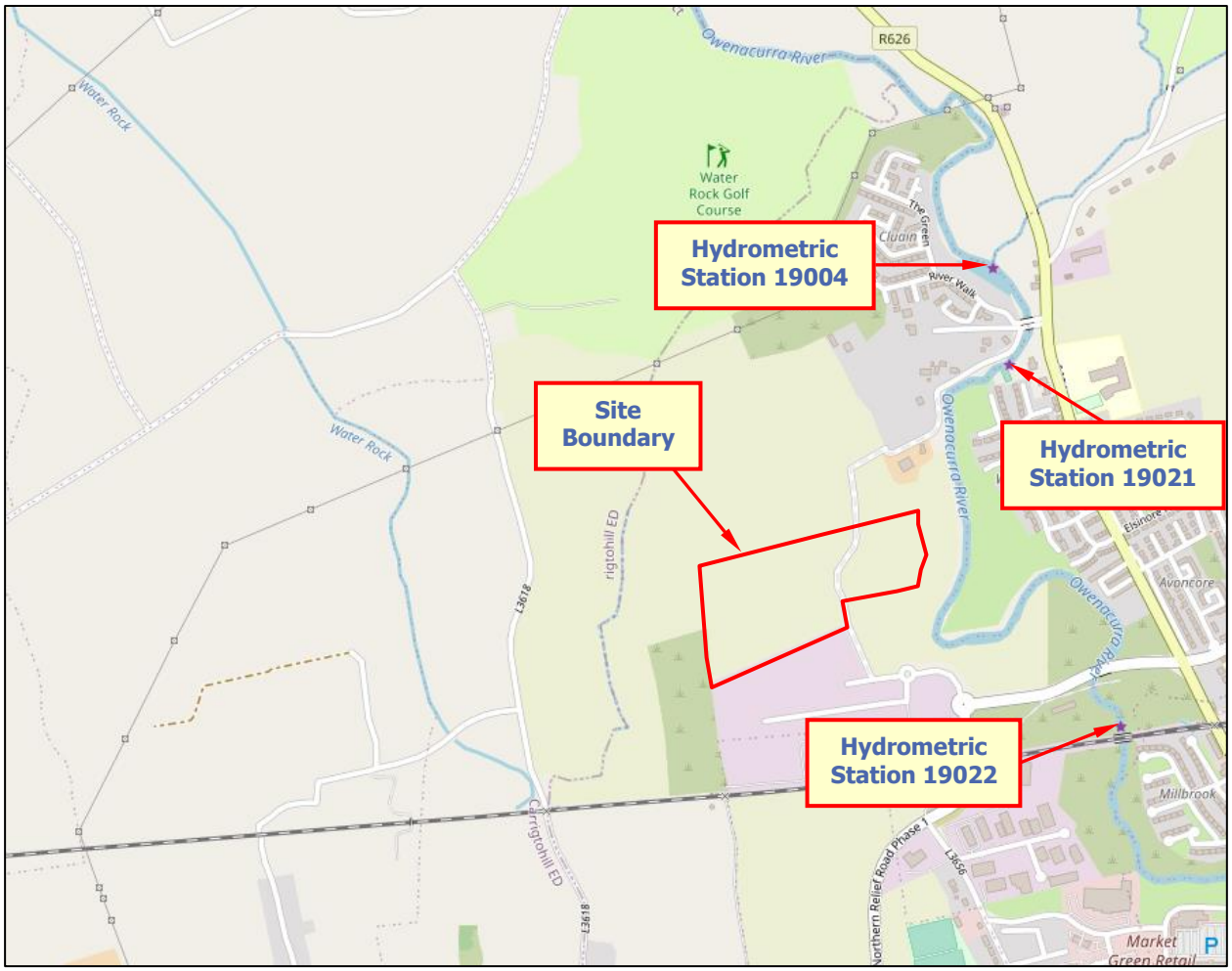



**Figure 2 - Hydrometric Gauging Stations**

Gauging Station 19004 is entered in the register of hydrometric gauging stations as an inactive staff gauge only station with spot flow measurements recorded only. No continuous level or flow records are available.

Gauging Station 19021 is entered in the register of hydrometric gauging stations as an inactive staff gauge only station with spot flow measurements recorded only. No continuous level or flow records are available.

Gauging Station 19022 is entered in the register of hydrometric gauging stations as an inactive recorder station with water level data available for hydrometric years 1983 to 1985.

## 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/39/A illustrates indicative flood zones within this area of County Cork.

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

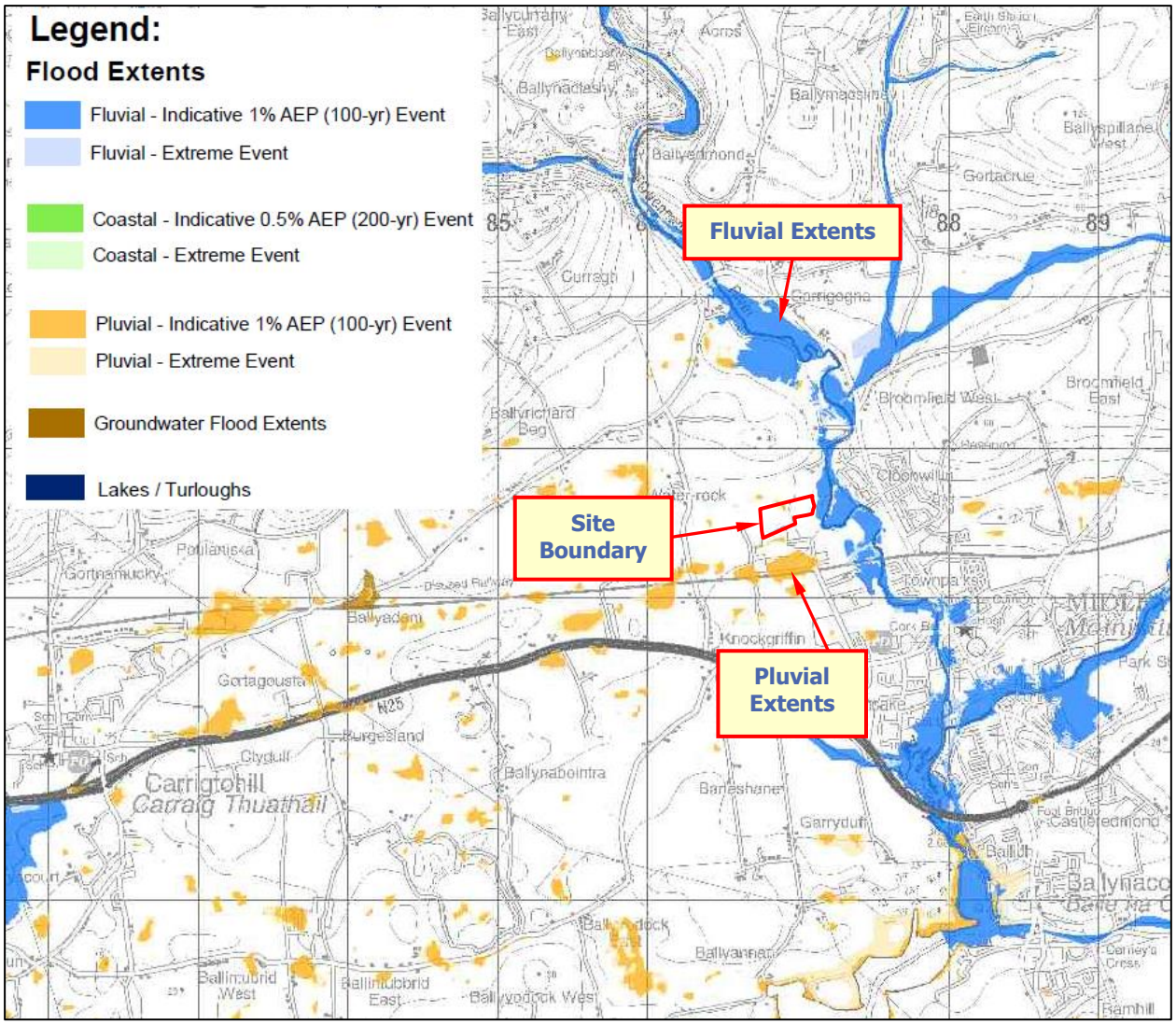



**Figure 3 - OPW PFRA Mapping**

The PFRA flood mapping indicates that the site of the proposed development does not fall within an indicative fluvial, pluvial or groundwater flood zone. An indicative fluvial flood zone is mapped adjacent to the eastern boundary of the site, however this does not encroach the site boundary.

It should also be noted that the indicated 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 Maps Website

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

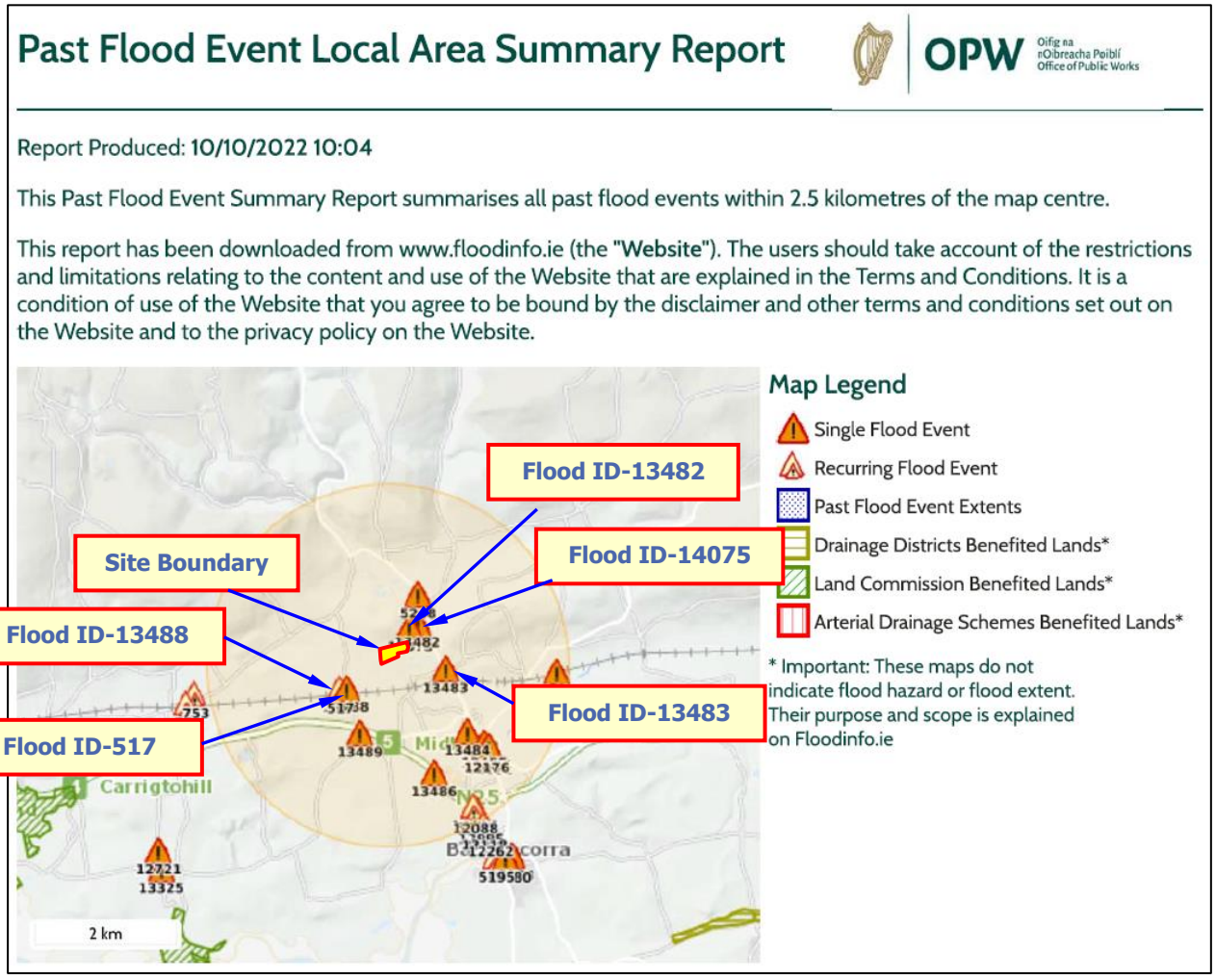



**Figure 4 - OPW Flood Maps**

*Figure 4* above reports five incidents of historical flooding recorded in the general vicinity of the site.

Flood ID 517 refers to recurring flooding at Water Rock, Midleton. No flood source is listed.

Flood ID 13488 refers to flooding that occurred on 29th December 2015. No flood source is listed.

Flood ID 13482 refers to flooding that occurred on 29th December 2015 from the Owennacurra River.

Flood ID 14075 refers to flooding that occurred on 19th February 2021 from the Owennacurra River at the location of Moores Bridge.

Flood ID 13483 refers to flooding that occurred on 29th December 2015 from the Owennacurra River.

It is not clear from these reports to what extent, if any, the area in the immediate vicinity of the site was impacted by any of these flood events.

## 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.

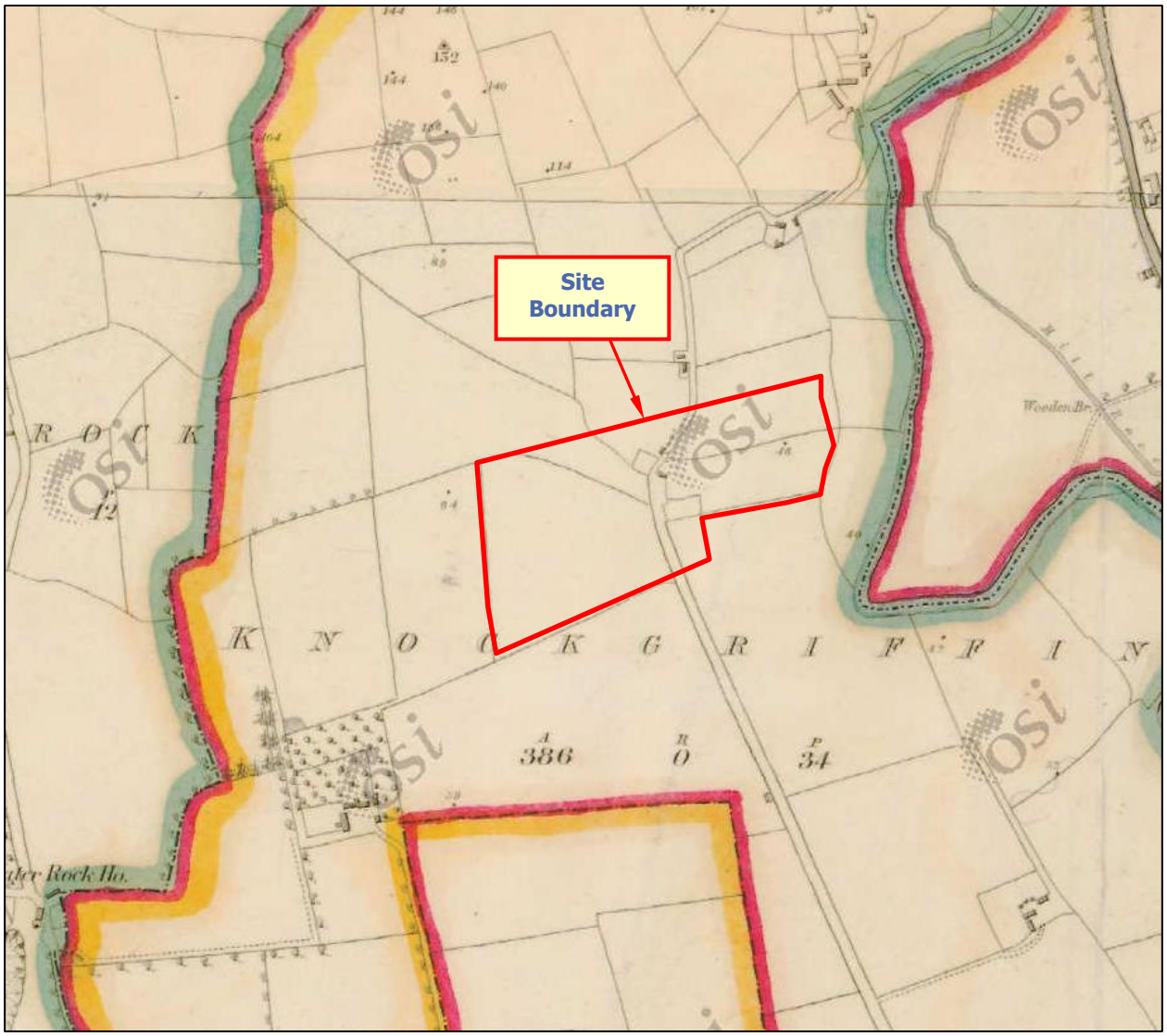



**Figure 5 - Historic 6 Inch Mapping**

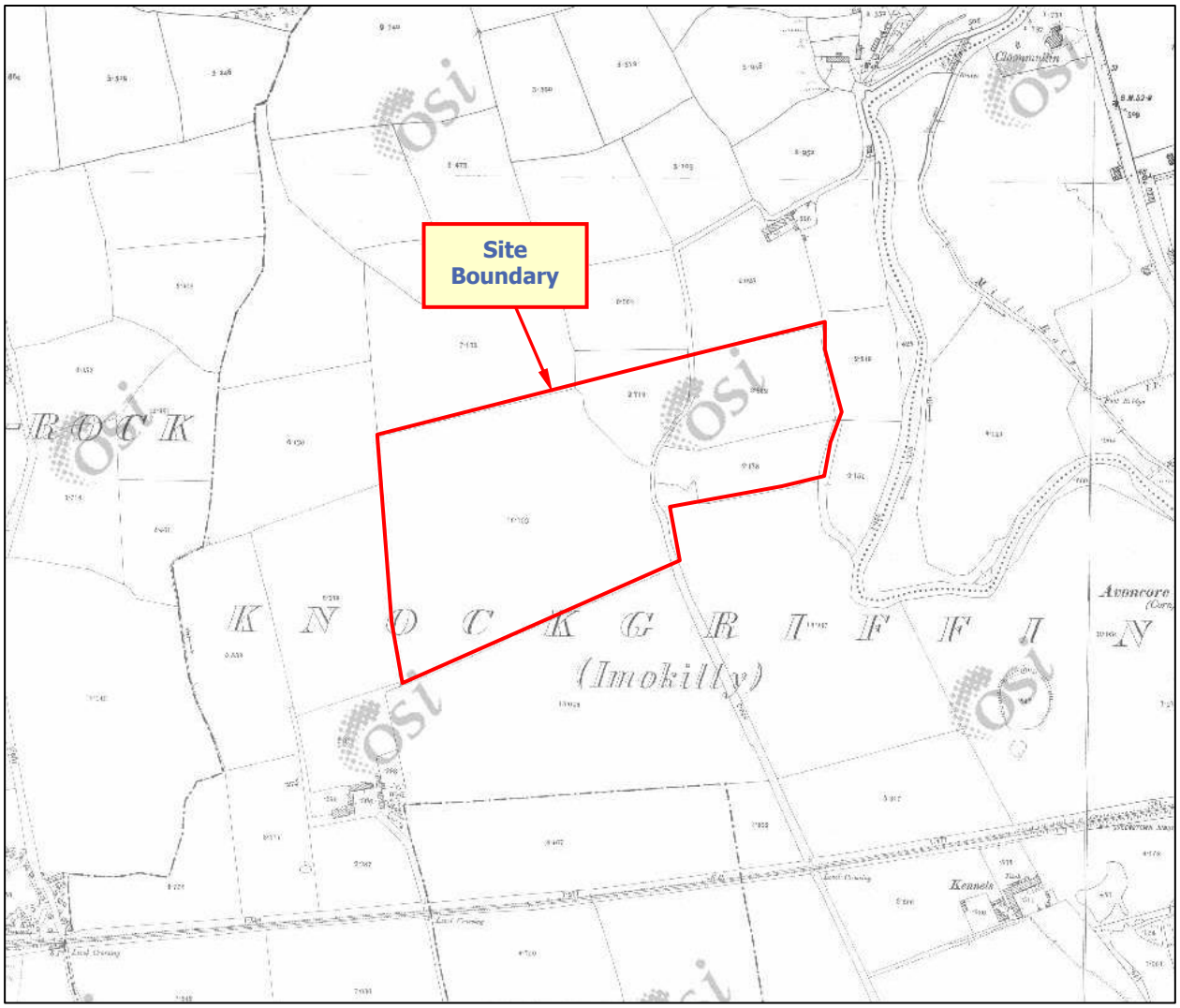



**Figure 6 - Historic 25 Inch Mapping**

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 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 proposed development site.

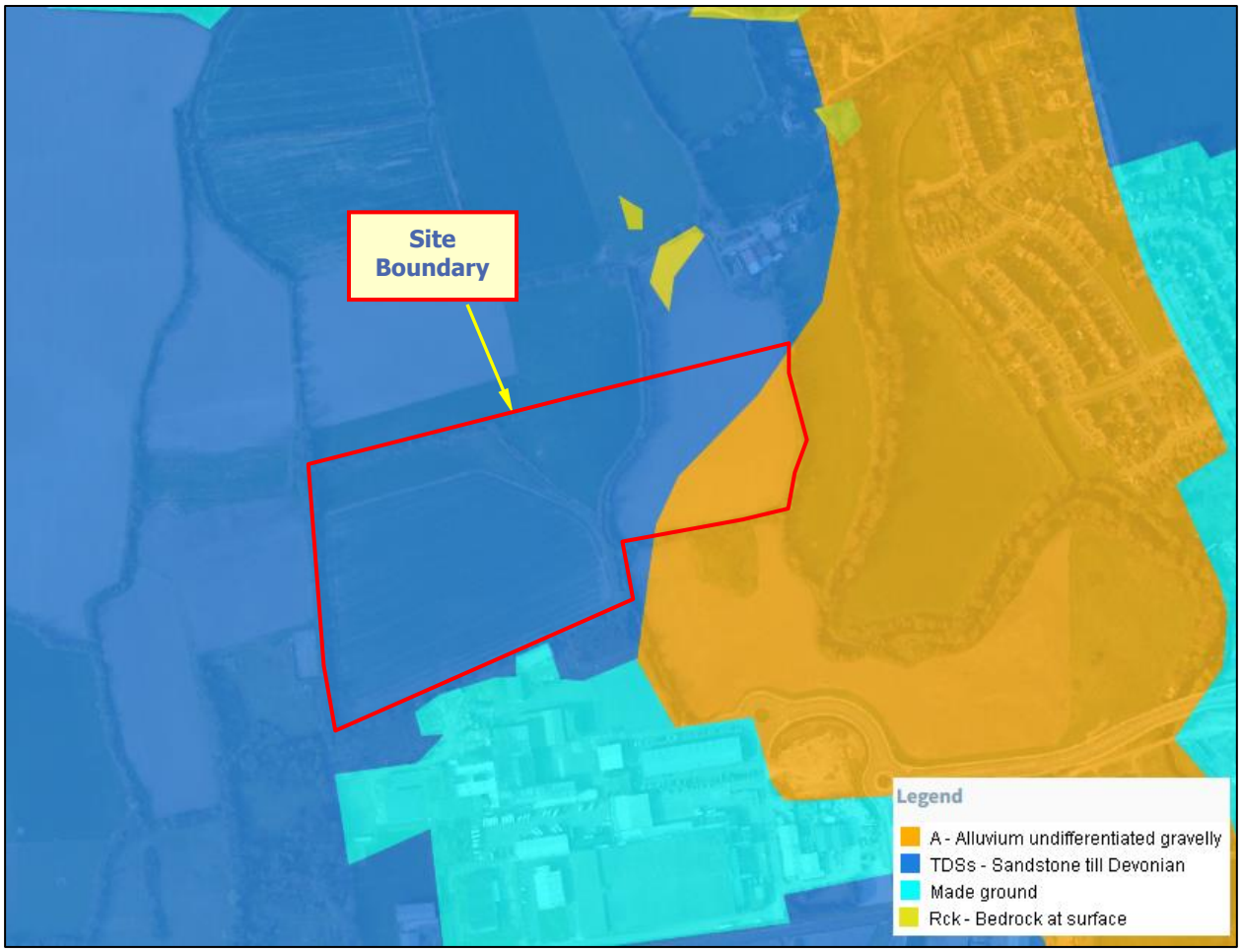



**Figure 7 - GSI Subsoil Mapping**

*Figure 7* above indicates that the proposed development is primarily underlain by Devonian Sandstone Till with an area to the east of the site underlain by Alluvium deposits.

## 4.6. 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 8* below illustrates an extract from the above groundwater flood mapping in the vicinity of the proposed development site.

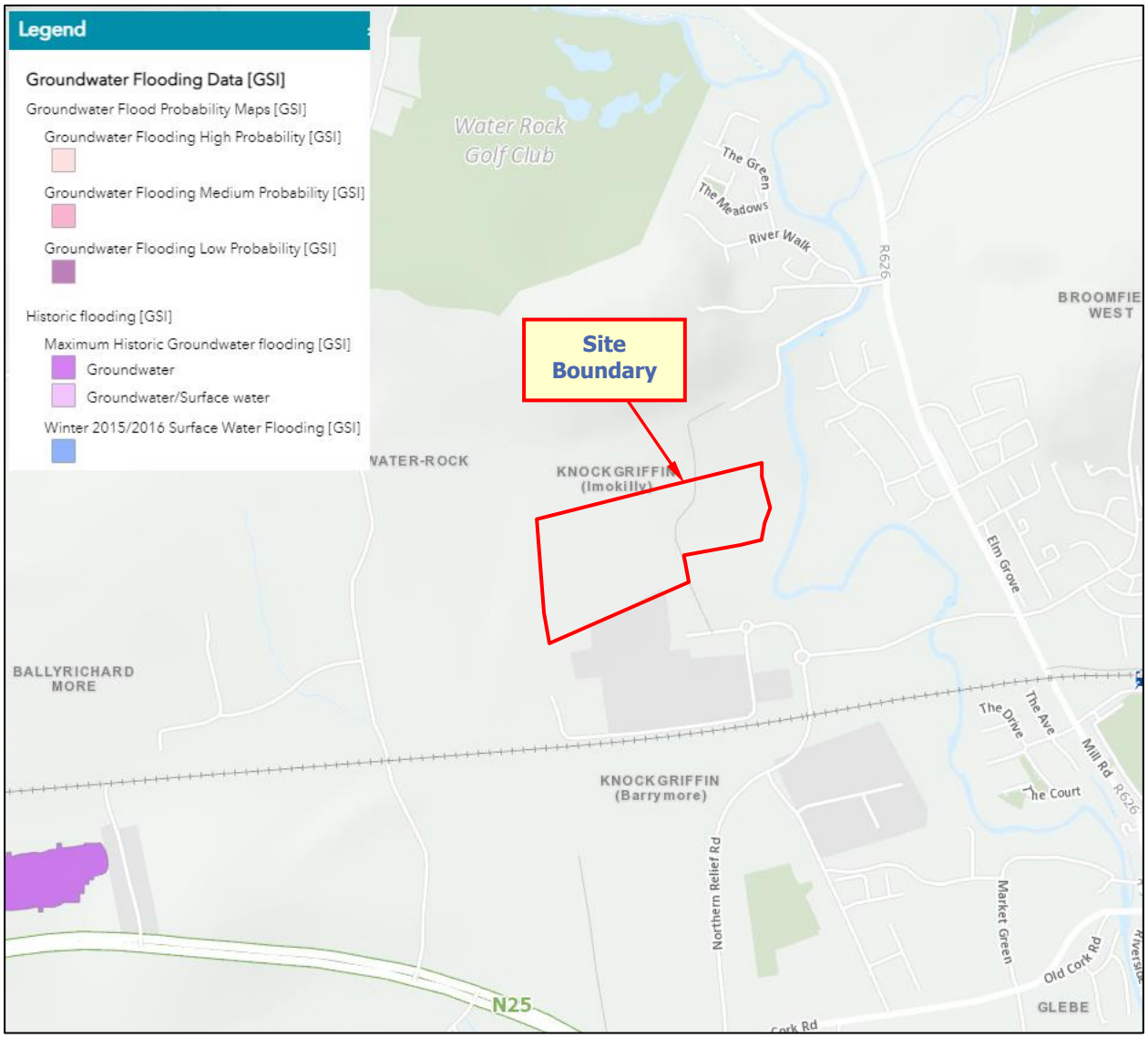



**Figure 8 - GSI Groundwater Flood Mapping**

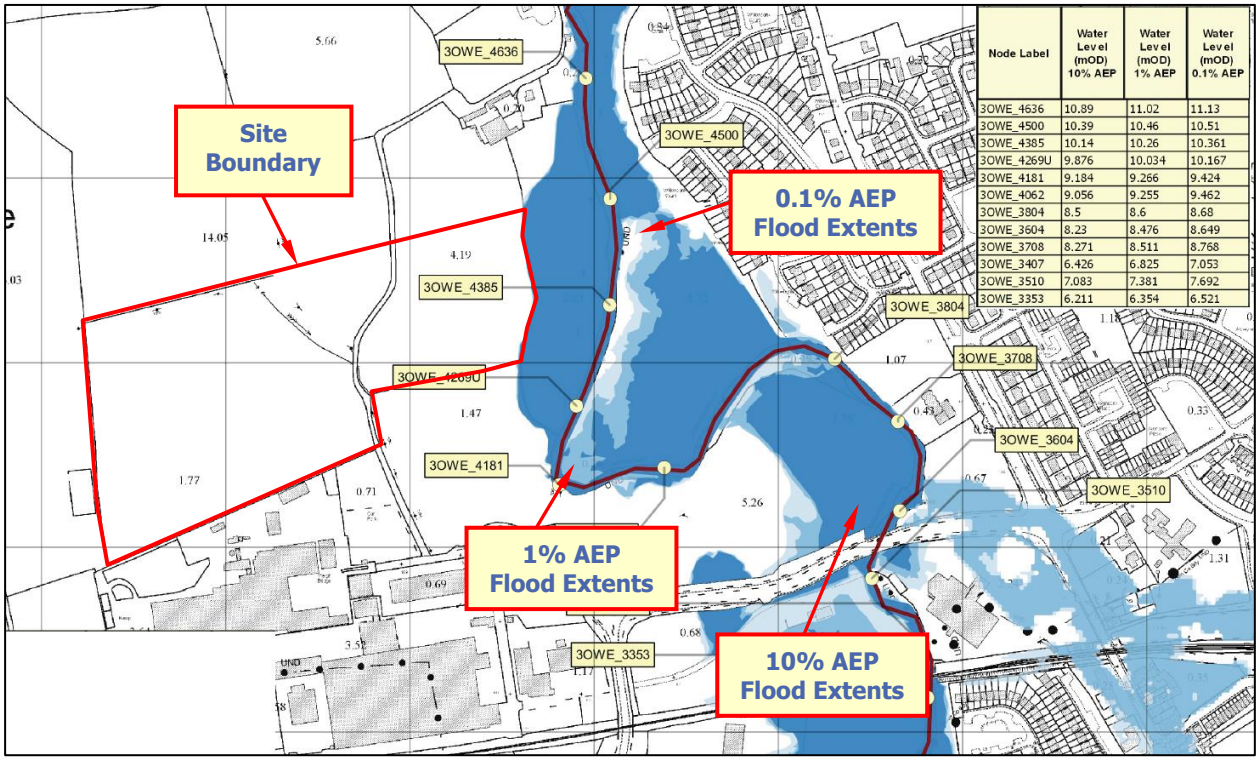
The above GSi Groundwater Mapping indicates no areas of predictive or historical groundwater or surface water flooding located within or in the immediate vicinity of the site.

## 4.7. Lee CFRAM Study

The Lee Catchment Flood Risk & Management Study (CFRAMS) has been undertaken by the OPW and the final version of the flood maps were issued in July 2016. Flood risk extent and depth maps for further assessment areas within County Cork have also been produced. OPW CFRAMS flood map number *EI19MBC_EXFCD_F2_Sht0038* illustrates predictive extreme fluvial flood extent zones associated with the Owennacurra River in the general vicinity of the proposed development site.

*Figure 9* below (extracted from CFRAMS flood map *EI19MBC_EXFCD_F2_Sht0038*) illustrates the predicted extreme 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood extents in the vicinity of the site.




| Node Label | Water Level (mOD) 10% AEP | Water Level (mOD) 1% AEP | Water Level (mOD) 0.1% AEP |
|---|---|---|---|
| 3OWE_4636 | 10.89 | 11.02 | 11.13 |
| 3OWE_4500 | 10.39 | 10.46 | 10.51 |
| 3OWE_4385 | 10.14 | 10.26 | 10.361 |
| 3OWE_4269U | 9.876 | 10.034 | 10.167 |
| 3OWE_4181 | 9.184 | 9.266 | 9.424 |
| 3OWE_4062 | 9.056 | 9.255 | 9.462 |
| 3OWE_3804 | 8.5 | 8.6 | 8.68 |
| 3OWE_3604 | 8.23 | 8.476 | 8.649 |
| 3OWE_3708 | 8.271 | 8.511 | 8.768 |
| 3OWE_3407 | 6.426 | 6.825 | 7.053 |
| 3OWE_3510 | 7.083 | 7.381 | 7.692 |
| 3OWE_3353 | 6.211 | 6.354 | 6.521 |

**Figure 9 – CFRAMS Flood Extent Mapping**

*Figure 9* above indicates that that a predictive current scenario 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone is mapped adjacent to the eastern boundary of the site, however these flood zone do not significantly encroach the site boundary. A full copy of the above OPW CFRAMS flood map is presented in *Appendix B*.

The Lee CFRAMS flood maps also provides information on predictive flood water levels and flows 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 Owennacurra River. The node points closest to the general area of the proposed development site are referenced as node points *30WE_4636, 30WE_4500, 30WE_4385* and *30WE_4269U,* as illustrated in *Figure 9* above.

Details of the predicted fluvial flood levels and flood volumes for the Lee CFRAMS node points in the general vicinity of the development site are listed in *Table 2* below, which has been extracted from the Lee CFRAMS flood map reference *EI19MBC_EXFCD_F2_Sht0038*.

| Node Label | Water Level (mOD) 10% AEP | Water Level (mOD) 1% AEP | Water Level (mOD) 0.1% AEP |
|---|---|---|---|
| 30WE_4636 | 10.89 | 11.02 | 11.13 |
| 30WE_4500 | 10.39 | 10.46 | 10.51 |
| 30WE_4385 | 10.14 | 10.26 | 10.361 |
| 30WE_4296U | 9.876 | 10.034 | 10.167 |

**Table 2 – Lee CFRAMS Fluvial Map - Predicted Flood Levels**

The Lee CFRAM flood maps are predictive flood maps, in that they provide predicted flood levels and extents for a 'design' flood event that has an estimated probability of occurrence (e.g., the 1% AEP event), rather than information for floods that have occurred in the past.

## 4.8. Climate Change

The OPW Floodinfo.ie resource was utilised to assess the potential mid-range future climate change scenario fluvial and tidal/coastal flood extents at the location of the proposed development site.

*Figure 10* below illustrates the predictive mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) fluvial flood extents at the location of the proposed development site as acquired from the OPW Floodinfo.ie resource.


**Figure 10 – Mid-Range (1% AEP) Future Climate Change Scenario Flood Mapping**

*Figure 10* above indicates that that a predictive mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) fluvial flood zone is mapped adjacent to the eastern boundary of the site, however this flood zone does not significantly encroach the site boundary.

*Figure 11* below illustrate the predictive mid-range future climate change 1 in 200 year (0.5% AEP) tidal/coastal flood extents at the location of the proposed development site as acquired from the OPW Floodinfo.ie resource.


**Figure 11 – Mid Range (0.5% AEP) Future Climate Change Scenario Flood Mapping**

*Figure 11* above indicates that that a predictive mid-range future climate change scenario 0.5% AEP + CC (1 in 200 year + climate change) tidal/coastal flood zone is mapped adjacent to the eastern boundary of the site, however this flood zone does not significantly encroach the site boundary.

# 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.

The screening assessment undertaken as part of this Site Specific Flood Risk Assessment indicates that the primary potential flood risk to the development site can be attributed to an extreme fluvial and/or tidal/coastal flood event in the Owennacurra River located 75m beyond the eastern boundary of the site. The screening assessment indicates that the site is not at significant risk of pluvial or groundwater flooding.

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, it is considered that sufficient quantitative information to complete an appropriate flood risk assessment for the proposed development can be derived from the information collated as part of the screening exercise alone. In particular, the final flood extent and depth maps for the area produced as part of the Lee CFRAM Study, dated January 2018, are based on the results of detailed hydraulic modelling undertaken along the reach of the Owennacurra River in the vicinity of the site, and therefore provides a reasonably accurate delineation of flood zones and prediction of flood level at and in the general location of the proposed development site.

The specific flood risks to and from the proposed development site is assessed in the subsequent 'Assessing Flood Risk' stage of this study report.

# 6. Assessing Flood Risk

Fluvial flood risk from a particular watercourse is normally assessed for a 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood event and coastal/tidal Flood risk is normally assessed for a 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) flood event, in accordance with most county development plans and in accordance with the DOEHLG guidelines 'The Planning System and Flood Risk Management Guidelines'.

The information and data acquired and collated as part of the screening exercise, in particular the information derived from the Lee CFRAM Study, indicates that an extreme 0.1% AEP (1 in 1000 year) fluvial flood extent associated with the Owennacurra River potentially intrudes on the eastern boundary of the site. The site is not predicted to be impact by a 10% AEP (1 in 10 year) or 1% AEP (1 in 100 year) flood event in either the Owennacurra River.

## 6.2 Flood Zone Delineation

The OPW Floodinfo.ie resource mid-range future scenario fluvial and tidal/coastal flood extents were superimposed onto the proposed site layout. *Figure 12* and *Figure 13* below illustrate the mid-range future fluvial and tidal/coastal flood extents overlaid onto the proposed site layout respectively.


**Figure 12 – Mid Range (0.5% AEP) Future Climate Change Scenario Flood Mapping**

*Figure 12* above indicates that the proposed development site would not be significantly impacted due to the occurrence of a mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) fluvial flood event.

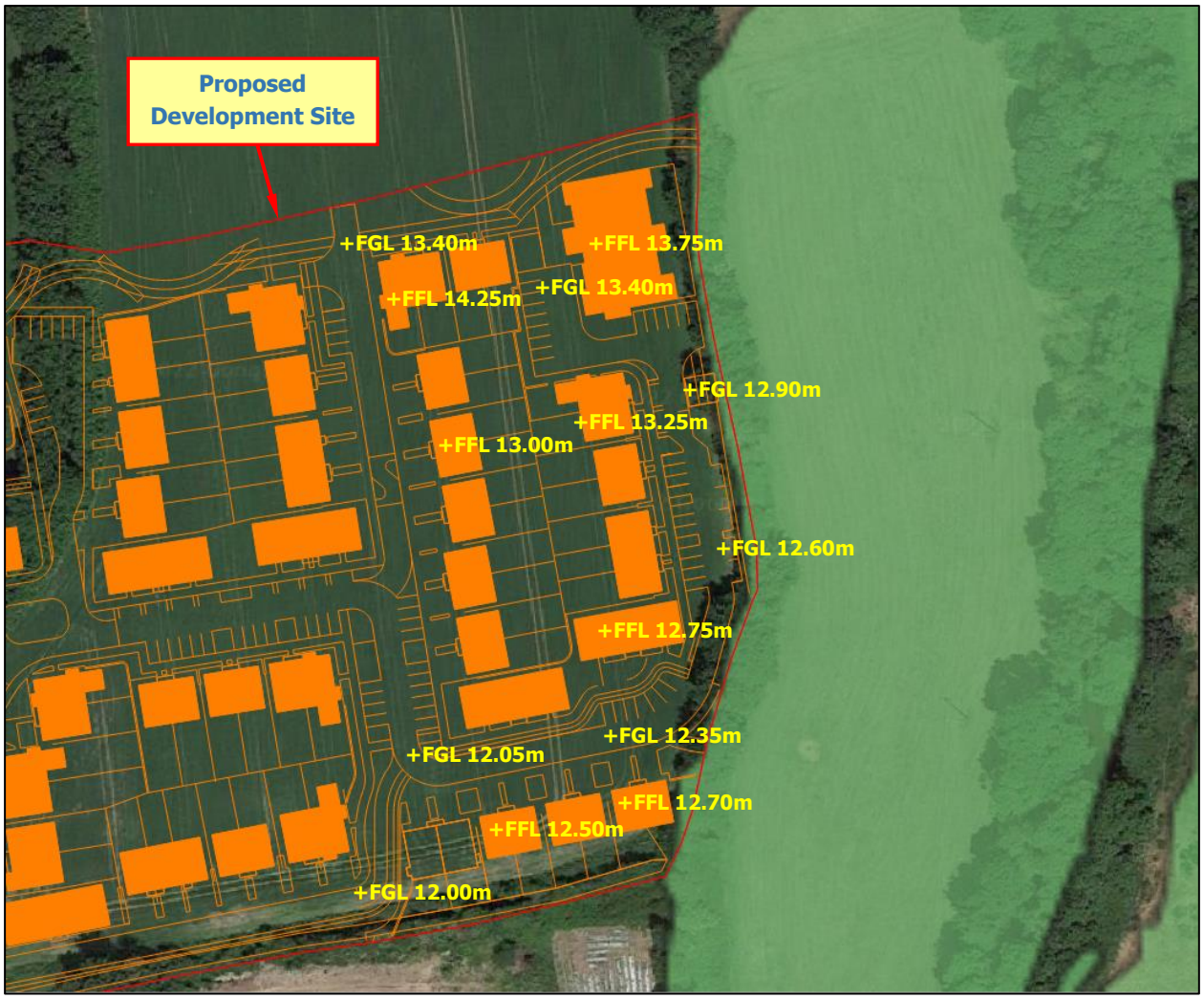



**Figure 13 – Mid Range (0.5% AEP) Future Climate Change Scenario Flood Mapping**

*Figure 13* above indicates that the proposed development site would not be significantly impacted due to the occurrence of a mid-range future climate change scenario 0.5% AEP + CC (1 in 200 year + climate change) tidal/coastal flood event.

With reference to *Figure 12* and *Figure 13* above, the proposed finished floor levels (FFL) associated with the proposed dwelling units adjacent to the eastern boundary of the site range from **14.25m OD – 12.50m OD**. Proposed finished ground levels (FFL) at this location range from **13.40m OD – 12.00m OD**.

As listed in *Table 2* above, the OPW CFRAMs predictive 0.1% AEP (1 in 1000 year) flood level associated with the Owennacurra River ranges from **11.13m OD** at the upstream extent of the site to **10.167m OD** at the downstream extent of the site. The proposed development site finished floor levels and finished ground levels are therefore significantly elevation above predictive 0.1% AEP (1 in 1000 year) fluvial flood levels in the Owennacurra River located beyond the eastern boundary if the site.

In this regard the proposed development site does not fall within a delineated current scenario or mid-range future climate change scenario 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone or a delineated current scenario or mid-range future climate change scenario 0.5% AEP (1 in 200 year) or 0.1% AEP (1 in 1000 year) tidal/coastal flood zone.

# 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 reaction 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 development site does not fall within a delineated current scenario or mid-range future climate change scenario 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone or a delineated current scenario or mid-range future climate change scenario 0.5% AEP (1 in 200 year) or 0.1% AEP (1 in 1000 year) tidal/coastal flood zone. The development as proposed 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 and 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 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 primary flood risk to the proposed development site can be attributed to a fluvial and/or tidal/coastal flood event in the Owennacurra River located 75m beyond the eastern boundary of the site.*
- *The site is not at significant risk of pluvial or groundwater flooding.*
- *The assessment and analysis undertaken as part of this SSFRA indicates that the proposed development site does not fall within a delineated current scenario or mid-range future climate change scenario 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone or a delineated current scenario or mid-range future climate change scenario 0.5% AEP (1 in 200 year) or 0.1% AEP (1 in 1000 year) tidal/coastal flood zone. The development as proposed 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.*
- *The OPW CFRAMs predictive 0.1% AEP (1 in 1000 year) flood level associated with the Owennacurra River ranges from **11.13m OD** at the upstream extent of the site to **10.167m OD** at the downstream extent of the site.*
- *The proposed finished floor levels (FFL) associated with the proposed dwelling units adjacent to the eastern boundary of the site range from **14.25m OD – 12.50m OD**. Proposed finished ground levels (FFL) at this location range from **13.40m OD –12.00m OD**.*
- *The proposed development site finished floor levels and finished ground levels are therefore significantly elevation above predictive 0.1% AEP (1 in 1000 year) fluvial flood levels in the Owennacurra River located beyond the eastern boundary if the site.*
- *It is recommended that the development as proposed includes an appropriate storm water management system that limits storm water runoff from the proposed development to existing greenfield runoff rates.*

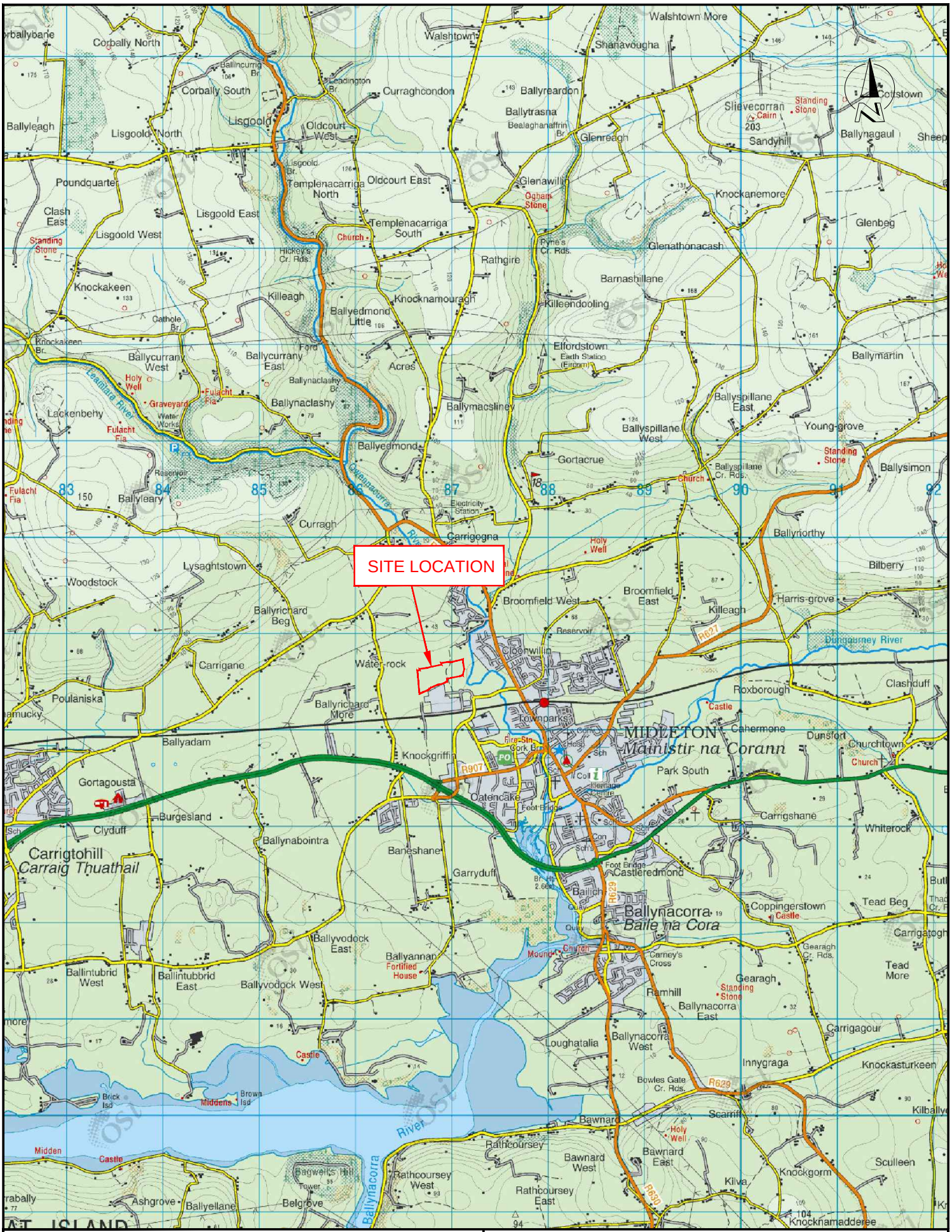
- *It is recommended that any culverting or channel re-profiling proposed in order to divert or re-align the existing drainage channel that bisects the site be adequately sized in order to convey as a minimum the 1% AEP + CC (1 in 100 year + climate change) flow volume associated with the upstream catchment of the drainage channel.*
- *In consideration of the findings and implementation of the recommendations of this Site Specific Flood Risk Assessment, the development as proposed is not expected to result in an adverse impact to the existing hydrological regime of the area or increase flood risk elsewhere and is therefore considered to be appropriate from a flood risk perspective.*

# Appendices

# Appendix A. Drawings

IE2338-001-A Site Location

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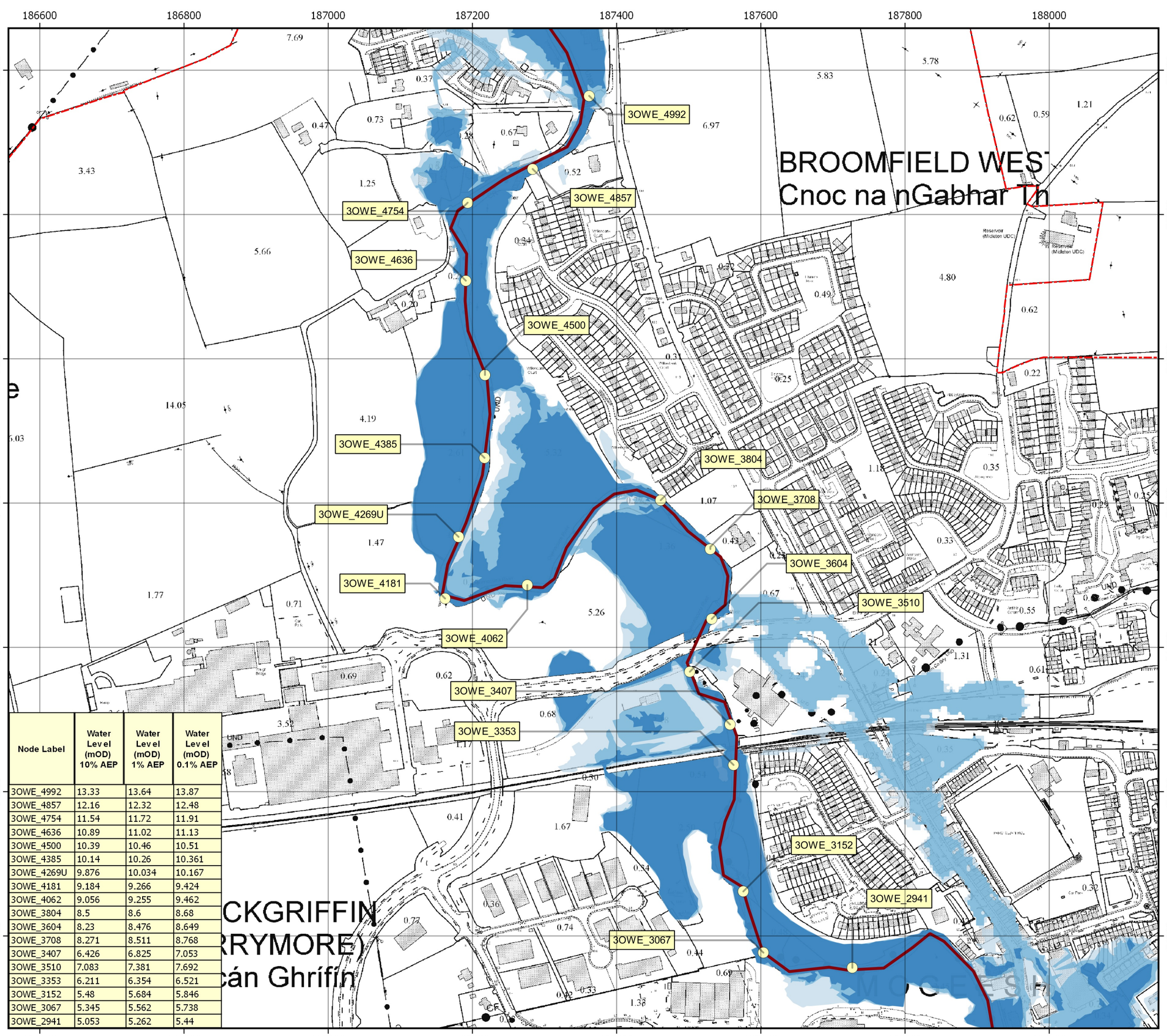
IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

| | |
|---|---|
| Project Title: | FLOOD RISK ASSESSMENT |
| Project Address: | WATERROCK, MIDLETON, CO. CORK |
| Client: | O'SHEA LEADER CONSULTING ENGINEERS |
| Drg. Title: | SITE LOCATION MAP |

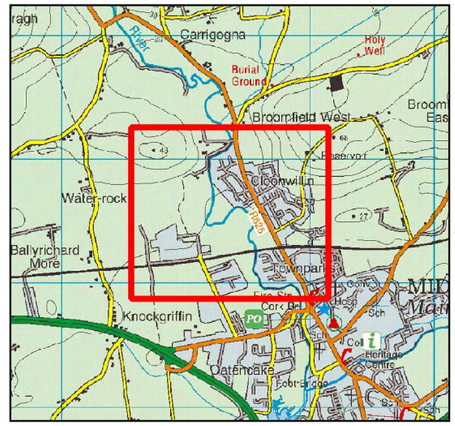
| Dwg.Scale: | Date: | Dwg.No: | Job No: | Revision: | Dwg.By: |
|---|---|---|---|---|---|
| 1:50,000 | 21/12/21 | IE2338-001 | IE2338 | A | LMc |

# Appendix B. CFRAMS Mapping




| Node Label | Water Level (mOD) 10% AEP | Water Level (mOD) 1% AEP | Water Level (mOD) 0.1% AEP |
|---|---|---|---|
| 3OWE_4992 | 13.33 | 13.64 | 13.87 |
| 3OWE_4857 | 12.16 | 12.32 | 12.48 |
| 3OWE_4754 | 11.54 | 11.72 | 11.91 |
| 3OWE_4636 | 10.89 | 11.02 | 11.13 |
| 3OWE_4500 | 10.39 | 10.46 | 10.51 |
| 3OWE_4385 | 10.14 | 10.26 | 10.361 |
| 3OWE_4269U | 9.876 | 10.034 | 10.167 |
| 3OWE_4181 | 9.184 | 9.266 | 9.424 |
| 3OWE_4062 | 9.056 | 9.255 | 9.462 |
| 3OWE_3804 | 8.5 | 8.6 | 8.68 |
| 3OWE_3604 | 8.23 | 8.476 | 8.649 |
| 3OWE_3708 | 8.271 | 8.511 | 8.768 |
| 3OWE_3407 | 6.426 | 6.825 | 7.053 |
| 3OWE_3510 | 7.083 | 7.381 | 7.692 |
| 3OWE_3353 | 6.211 | 6.354 | 6.521 |
| 3OWE_3152 | 5.48 | 5.684 | 5.846 |
| 3OWE_3067 | 5.345 | 5.562 | 5.738 |
| 3OWE_2941 | 5.053 | 5.262 | 5.44 |

**Location Plan:**




**LEGEND**

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

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


OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

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


Project:
LEE CFRAM STUDY

Map: **MIDLETON & BALLYNACORRA FLUVIAL FLOOD EXTENT MAP**

| | | | |
|---|---|---|---|
| Map Type: | EXTENT | | |
| Source: | FLUVIAL | | |
| Map Area: | HPW | | |
| Scenario: | CURRENT | | |
| Drawn by: | IH | Date: | Jan - 2018 |
| Checked by: | MC | Date: | Jan - 2018 |
| Approved by: | JM | Date: | Jan - 2018 |

Map No.:
I19MBC_EXFCD_F2_Sht0038

Revision: F2

Map Scale: 1:5,000 Plot Scale: 1:1 @ A3