Port of Waterford Company

Site Specific Flood Risk Assessment

Belview Port, Slieverue, Waterford

February 2025

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Site Specific Flood Risk Assessment

Client: Port of Waterford Company

Location: Belview Port, Slieverue, Waterford

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Contents

Appendices

1. Introduction

IE Consulting was commissioned by Malone O'Regan Consulting Engineers to undertake a Site Specific Flood Risk Assessment (SSFRA) in support of a planning application for a proposed development at Belview Port, Slieverue, Co Kilkenny.

The development as proposed comprises an Offshore Renewable Energy (ORE) Capable Terminal located on a 250m wharf extension, land reclamation, ancillary works and biodiversity enhancement area (gross site area c. 8ha), partly on land and partly in the near shore area of the coastal planning authority (Kilkenny County Council) at Port of Waterford, Belview, Co. Kilkenny. The application is accompanied by an Environmental Impact Assessment Report (EIAR) and a Natura Impact Statement (NIS).

The development as proposed includes for the construction of a 250m extension to the existing wharves at the container/bulk handling terminal at Belview port, as a continuation of the existing wharves, comprising a reinforced concrete suspended deck supported on reinforced concrete beams and steel piles with the structure extending into the River Suir (SAC) and partly on land with associated wharf-side dredging, demolition of downstream access ramp, land reclamation, covering an area of approximately 1.25 hectares using reclaimed material and quarried rock, removal of 1 No. piled Dolphin structure, construction of two separate quayside ORE Operative support facilities located at the downstream area of the port with associated support and warehouse/workshop buildings, berthing pontoons, yard areas and crane installations, construction of one 3-storey administrative office and staff facilities building located on the reclaimed area, construction of one 3-storey administrative office and staff facilities building and associated car parking for all staff located on the north side of the Rosslare-Limerick railway line. The proposed development includes a route for pumped foul water drainage to the mains drainage system, including associated settlement tanks, pumping station and pipework. Biodiversity Enhancement Area (1.82ha) located to the northeast of the wharf extension in existing agricultural wet grassland that is bisected by the Luffany Stream, Replacement Electricity Substation, Relocation of existing weighbridges, Extension, by approx. 30m, to the main surface water drainage pipe serving the Smartply facility.
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.

Quoted ground levels or estimated flood levels relate to Ordnance Datum (Poolbeg) 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 development is located at Gorteens, Slieverue, Co. Kilkenny. The site is bounded to the north and west by existing port facilities and to the south and south-east by the River Suir Estuary.

The location of the site of the proposed development is illustrated on *Figure 1* below and shown on *Drawing Number IE3030-001-A, Appendix A.*

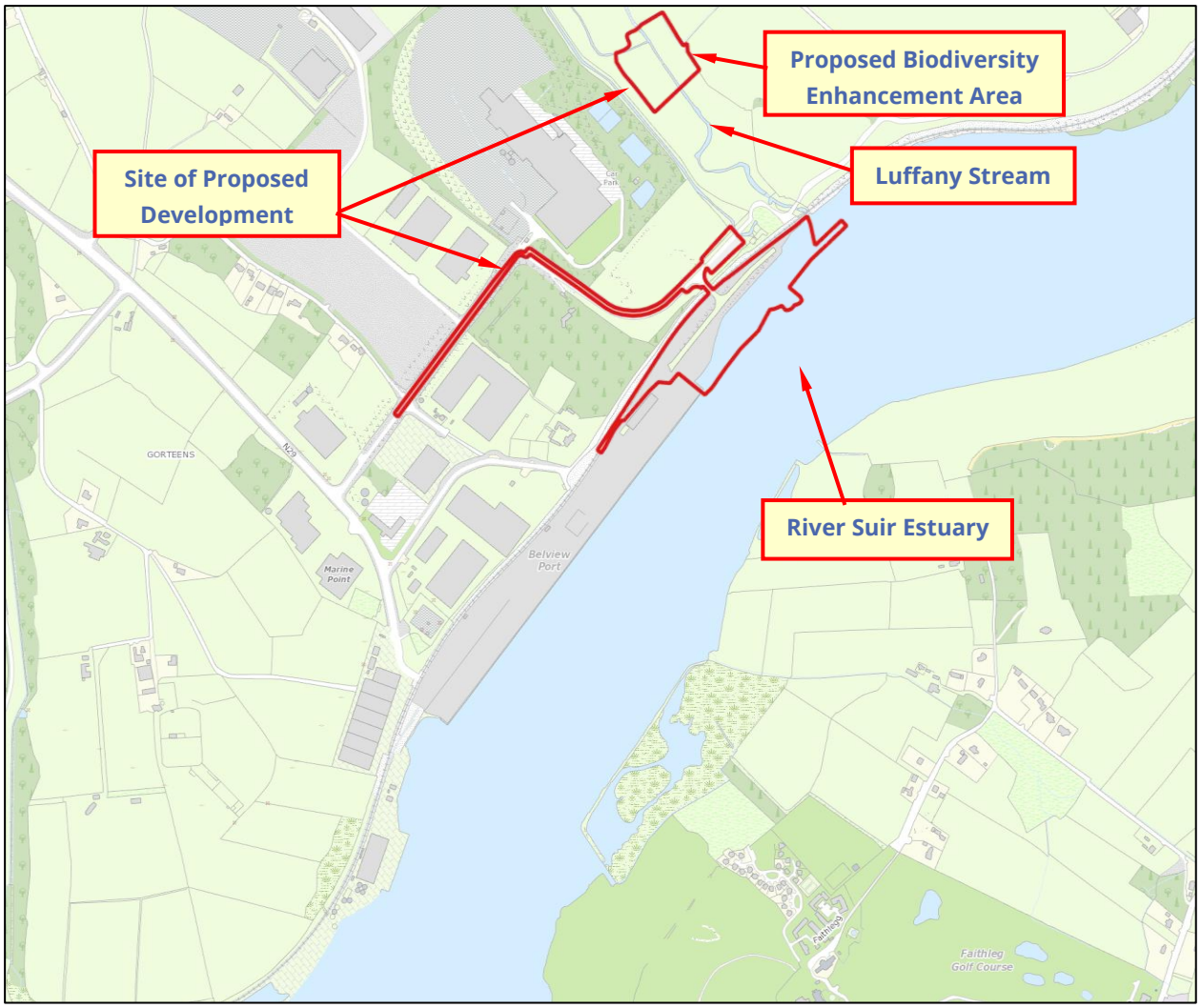

Figure 1 – Site Location

2.2. Existing Topography Levels at Site

The site of the proposed development slopes steeply to moderately in a north to south direction at an average approximate slope of 11.85% (1 in 8.44). Existing ground elevations at the location of the site range from approximately 35.36m OD (Poolbeg) at the northern boundary of the site to 5.58m OD (Poolbeg) at the location of the existing wharf facility adjacent to the south-eastern boundary of the site.

2.3. Local Hydrology, Landuse & Existing Drainage

The most immediate hydrological features in the vicinity of the site of the proposed development are the River Suir Estuary which is located adjacent to the south-eastern boundary of the site and the Luffany Stream that flows in a north-west to south-east direction adjacent to the north-eastern boundary of the site.

Utilising the OPW Flood Studies Update (FSU) Portal software, the catchment area of the River Suir Estuary was delineated. The total catchment area of the River Suir Estuary was found to be approximately 3485km^2 to a point downstream of the site. An assessment of the River Suir Estuary upstream catchment area indicates that the catchment is predominantly rural in nature with the urban fraction accounting for approximately 0.8% of the total catchment area.

The total catchment area of the Luffany Stream was found to be approximately 14.82km^2 to a point downstream of the boundary of the site. An assessment of the Luffany Stream upstream catchment area indicates that the catchment is predominantly rural in nature with the urban fraction accounting for approximately 0.4% of the total catchment area.

There are no other significant fluvial watercourses or hydrological features mapped within or immediately adjacent to the boundary of the 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 in a tidally influenced region.
Fluvial	Yes	The River Suir Estuary is located adjacent to the south-eastern boundary of the site. The Luffany Stream is located adjacent to the north-eastern boundary of the site.
Pluvial (urban drainage)	No	There is no significant or major urban drainage or water supply infrastructure located within or immediately adjacent to 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 restrictive hydraulic structures located within or immediately 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 site of the proposed development can be attributed to an extreme fluvial and or tidal/coastal flood event in the River Suir Estuary located adjacent to the south-eastern boundary of the site, and/or an extreme tidal/fluvial flood event in the Luffany Stream located adjacent to the north-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 site of the proposed development 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.

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

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 four hydrometric gauging stations located in the general vicinity of the site of the proposed development.

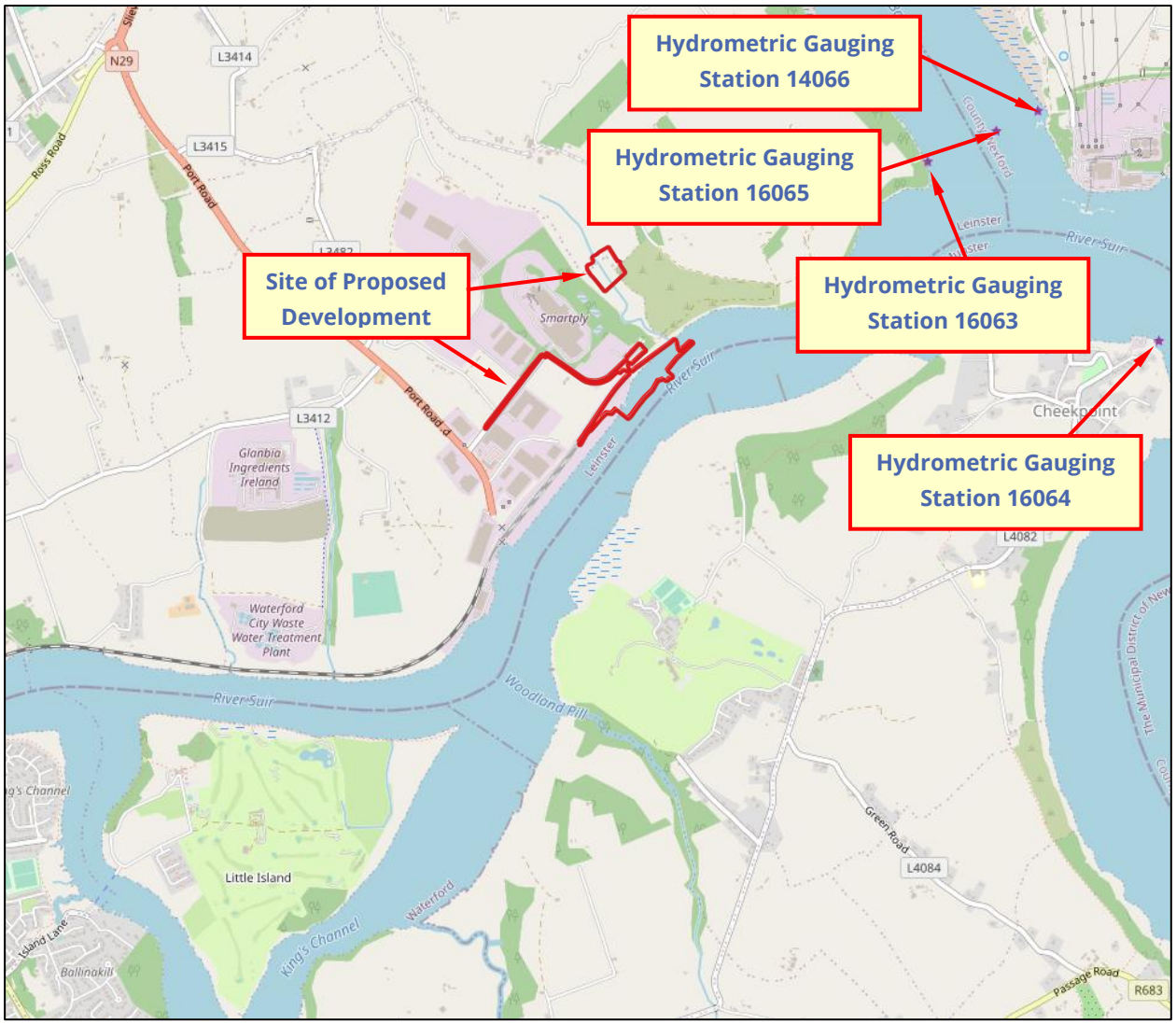

Figure 2 - Hydrometric Gauging Stations

Gauging Station 16063 (Barrow Bridge DS) is entered in the Register of Hydrometric Stations of Ireland as an inactive recorder station with water level measurements recorded for hydrometric years 1950 to 2015.

Gauging Station 16065 (Great Island) is entered in the Register of Hydrometric Stations of Ireland as an inactive recorder station with water level measurements recorded for hydrometric years 1950 to 2015.

Gauging Station 14066 (Barrow Bridge US) is entered in the Register of Hydrometric Stations of Ireland as an inactive recorder station with water level measurements recorded for hydrometric years 1950 to 2015.

Gauging Station 16064 (Cheek Point) is entered in the Register of Hydrometric Stations of Ireland as an inactive recorder station with water level measurements recorded for hydrometric years 1950 to 2015.

There is a high resolution of available hydrometric gauges within the general location of Belview Port with hydrometric data available for hydrometric years 1950-2015. This data set has been utilised for the purposes of providing predictive flood level data for this area as discussed below in the subsequent sections of this Screening Assessment.

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/89/A illustrates indicative flood zones within this area of County Kilkenny.

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

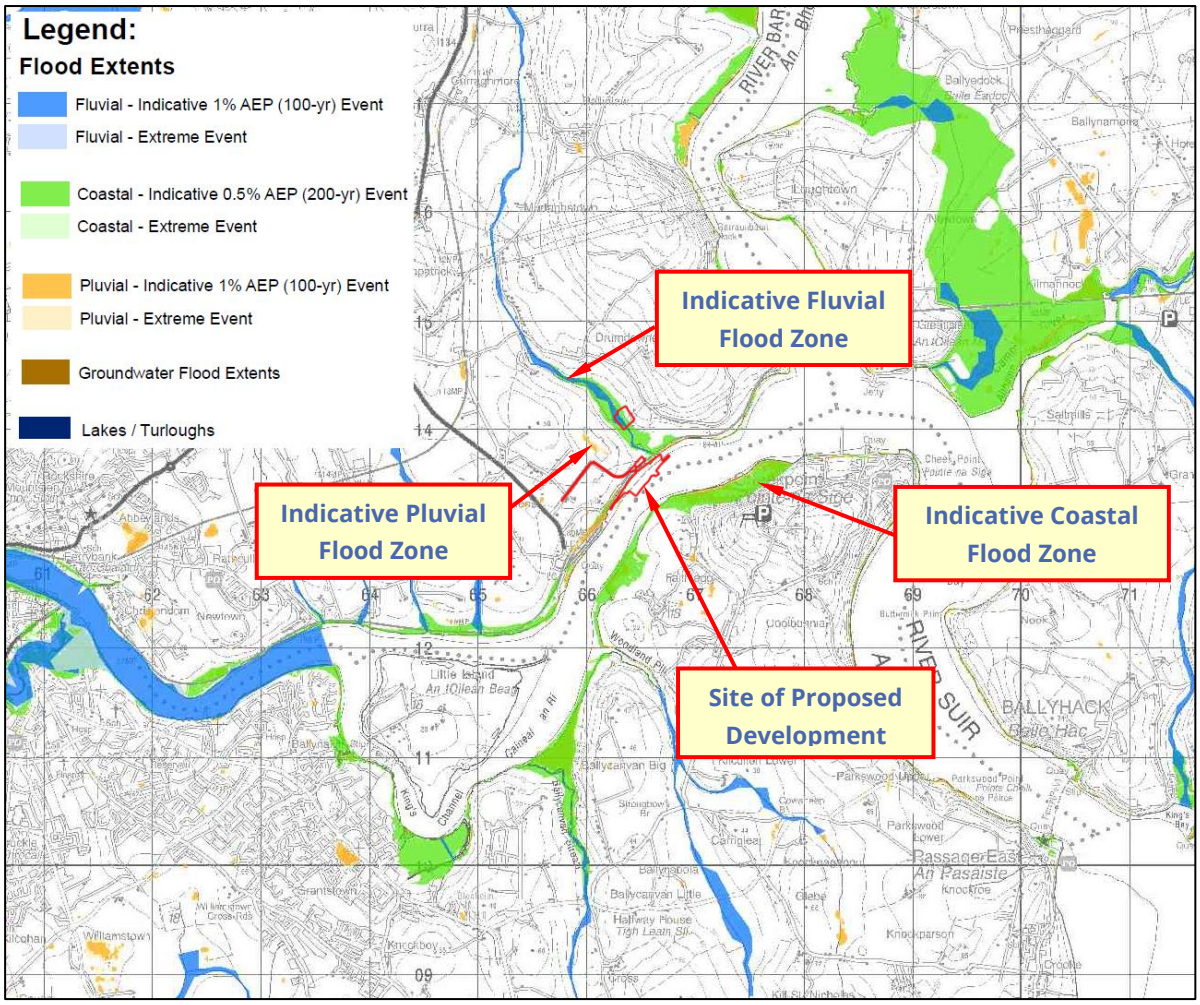

Figure 3 - OPW PFRA Mapping

The OPW PFRA flood mapping indicates that the location of the proposed wharf extension does not fall within an indicative fluvial, tidal/coastal flood, pluvial or groundwater flood zone. The location of the proposed Biodiversity Enhancement area is indicated as falling within an indicative tidal/coastal flood zone.

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 National Indicative Fluvial Mapping

The OPW National Indicative Fluvial Mapping (NIFM) set has been produced for catchments greater than 5km2 in areas for which flood maps were not produced under the OPW National CFRAM Programme. This mapping set is intended to supersede the OPW PFRA mapping set by producing a higher quality and higher resolution fluvial mapping set. The National Indicative Fluvial Mapping (NIFM) flood extent maps are based on the results of a more detailed and higher resolution hydraulic modelling exercise in comparison to the OPW PFRA indicative flood maps and therefore provide a reasonably accurate delineation of extreme indicative fluvial flood zones at and in the general vicinity of the site of the proposed development.

Figure 4 below illustrates an extract from the OPW NIFM at and in the vicinity of the proposed development site for the present day scenario 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) and mid-range future climate change scenario 1% AEP+CC (1 in 100 year + climate change) and 0.1% AEP+CC (1 in 1000 year + climate change) fluvial flood events.

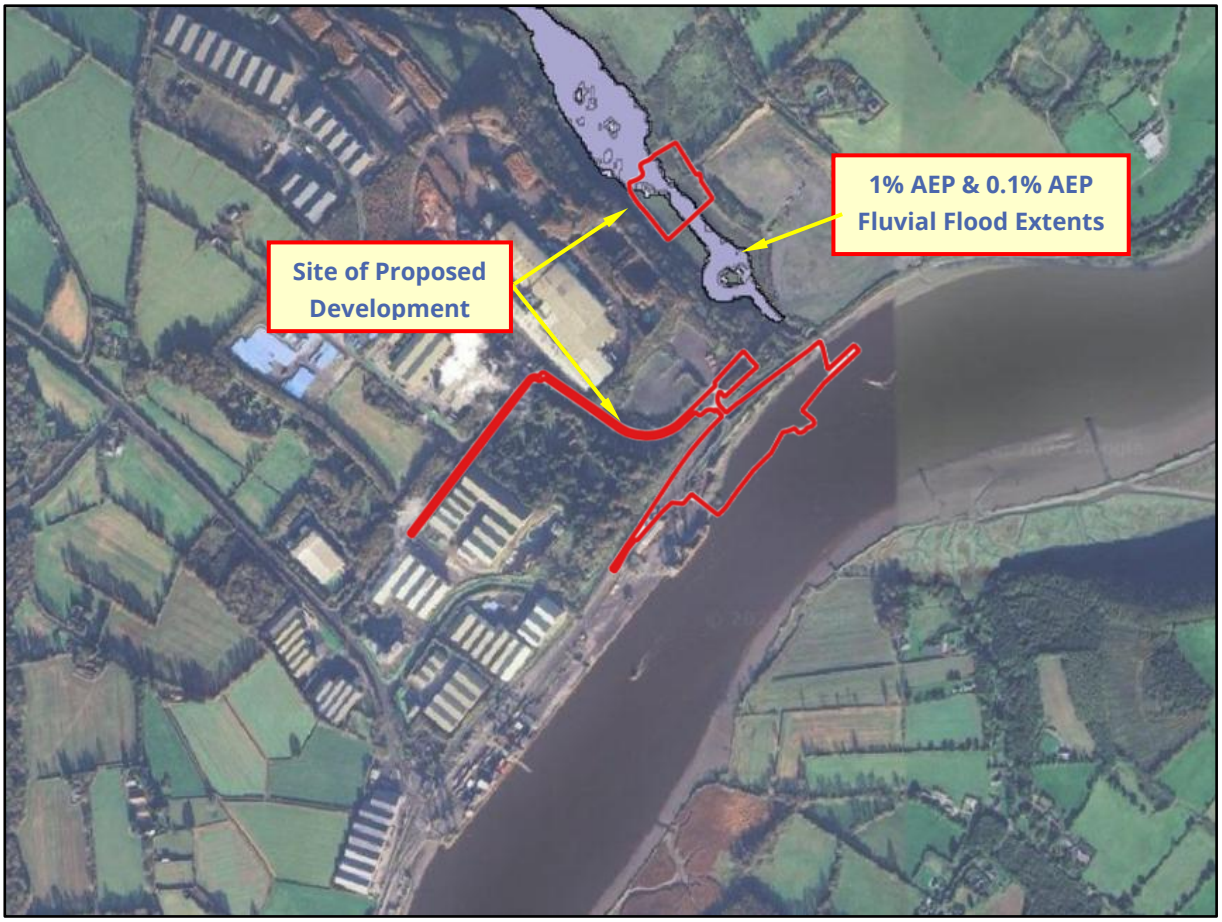

Figure 4 – 1% AEP & 0.1% AEP Present Day & Mid-Range Future Climate Change Scenario Fluvial Flood Extents

Figure 4 above indicates that the site of the proposed wharf extension does not fall within a present day or mid-range future climate change scenario 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone.

The location of the proposed Biodiversity Enhancement area is indicated as partially falling within a present day and mid-range future climate change scenario 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone.

4.4. 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 site of the proposed development.

Figure 5 below illustrates mapping from the Flood Info website in the vicinity of the site.

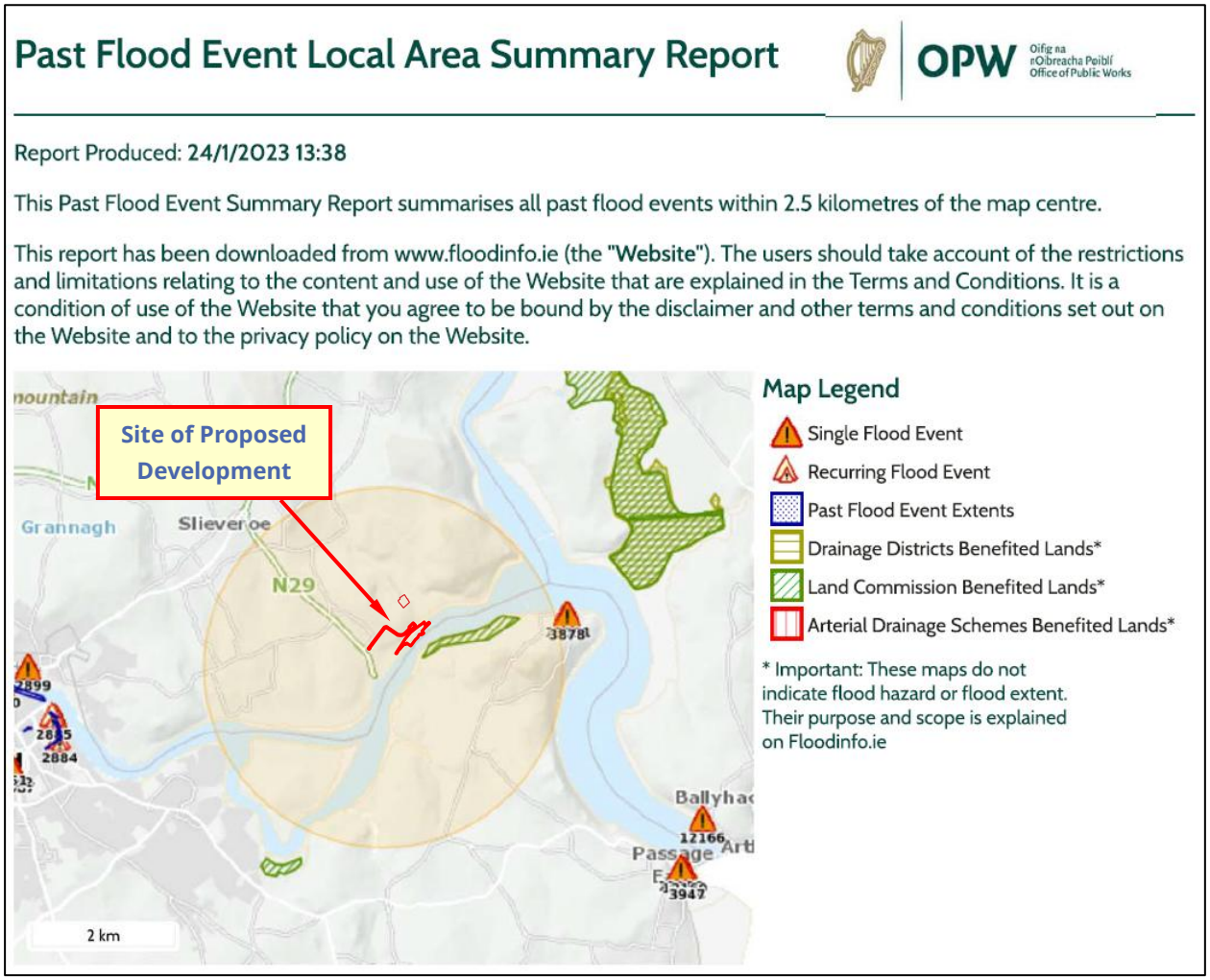

Figure 5 - OPW Flood Info Records

Figure 5 above indicates no historic instances of flooding recorded within or adjacent to the site of the proposed development.

4.5. 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 6* and *Figure 7* below show the historic mapping for the area of the site of the proposed development.

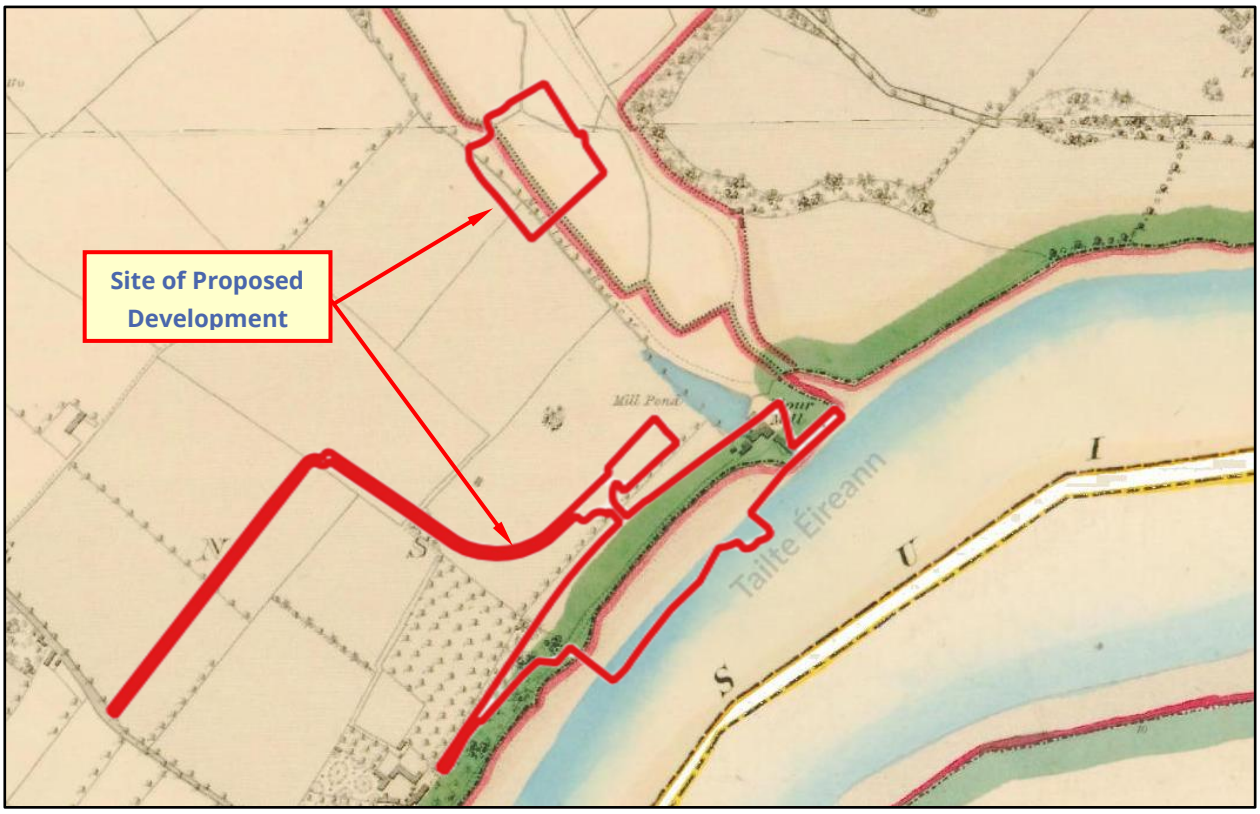

Figure 6 - Historic 6 Inch Mapping

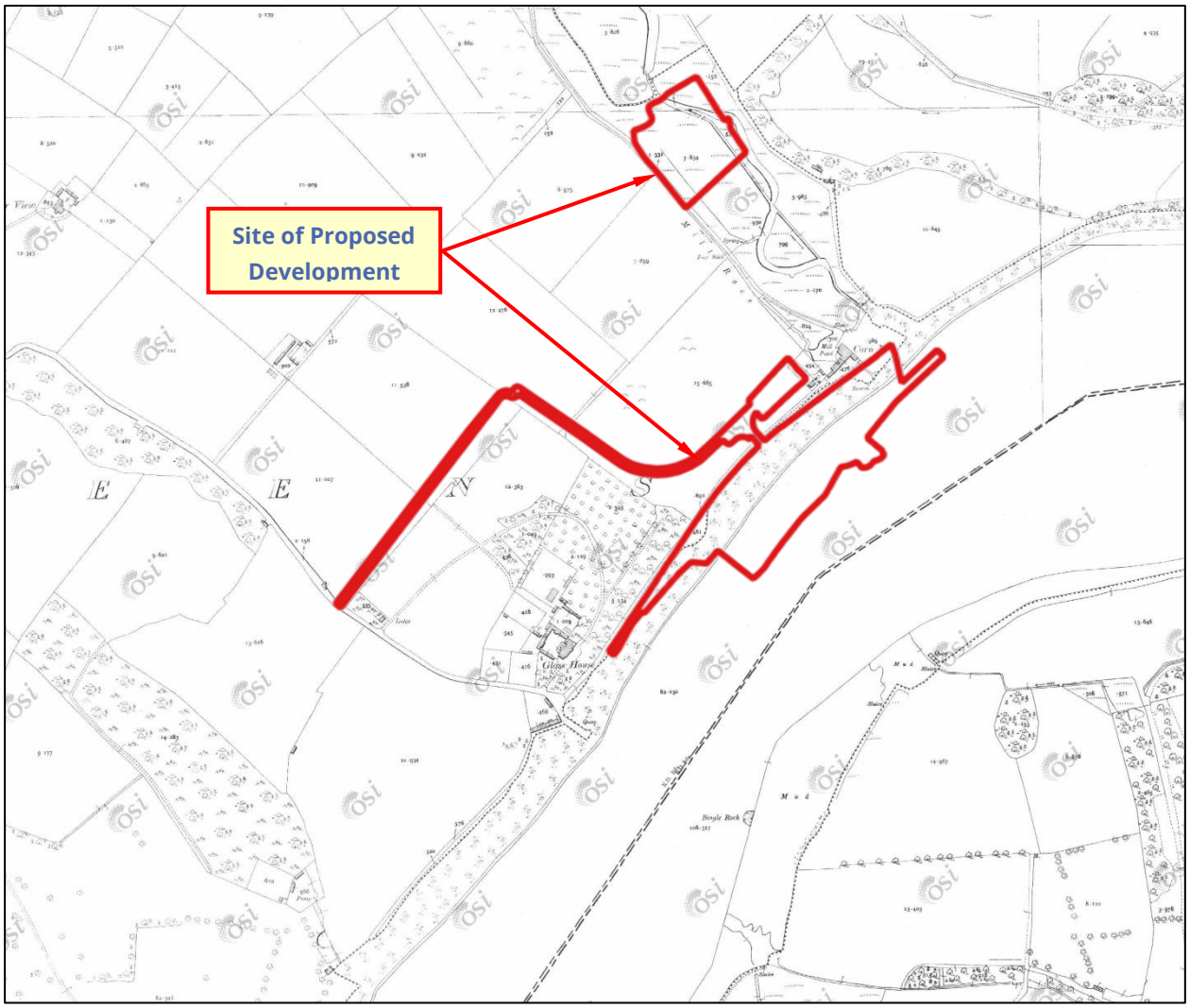

Figure 7 - Historic 25 Inch Mapping

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 site of the proposed development.

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 site of the proposed development.

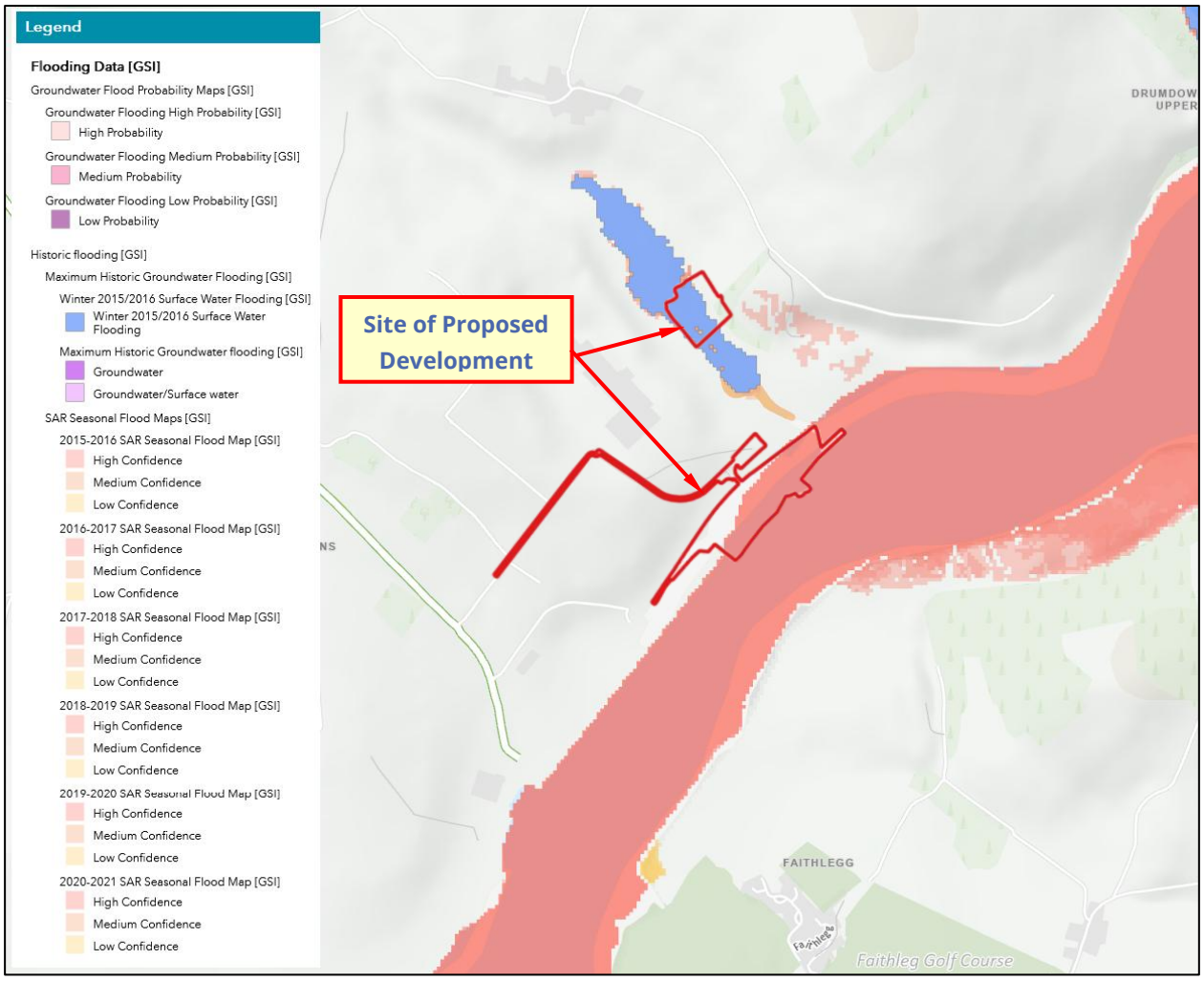

Figure 8 - GSI Groundwater Flood Mapping

The above GSi Groundwater Mapping indicates that the Belview Port Quay, including the area of the proposed wharf extension, falls within SAR Seasonal Flooding flood zones.

(SAR refers to 'Synthetic Aperture Radar' and is a remote sensing technique employed in order to rapidly produce indicative and predictive flood maps over a large geographical area).

The SAR Seasonal Flooding mapping are a series of remote sensing based flood maps which outline the recorded peak flood extents over each winter season and do not distinguish between groundwater and surface water flooding. It is therefore presumed that the SAR Seasonal Flooding illustrated in *Figure 8* above is representative of fluvial/tidal flooding originating from the River Suir.

The location of the proposed Biodiversity Enhancement area is indicated as falling within an historic surface water flood zone.

4.7. Suir CFRAM Study

The Suir Catchment Flood Risk & Management Study (CFRAMS) has been undertaken by the OPW and the Final version of the flood maps were issued in June 2016. Flood risk extent and depth maps for further assessment areas within Co Kilkenny have also been produced. This area of County Kilkenny has only been partially included as an Area of Further Assessment as part of the Suir CFRAM Study.

Figure 9 below (extracted from CFRAMS flood map *O16WTD_EXMCD_F0_18*), illustrates the predictive current scenario extreme 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood extents in the vicinity of the site of the proposed development. It is noted that there is no discernable difference in predictive fluvial flood extents between these three return period flood events. This is likely due to the specific hydrological nature and hydrological regime of the River Suir Estuary watercourse at this location.

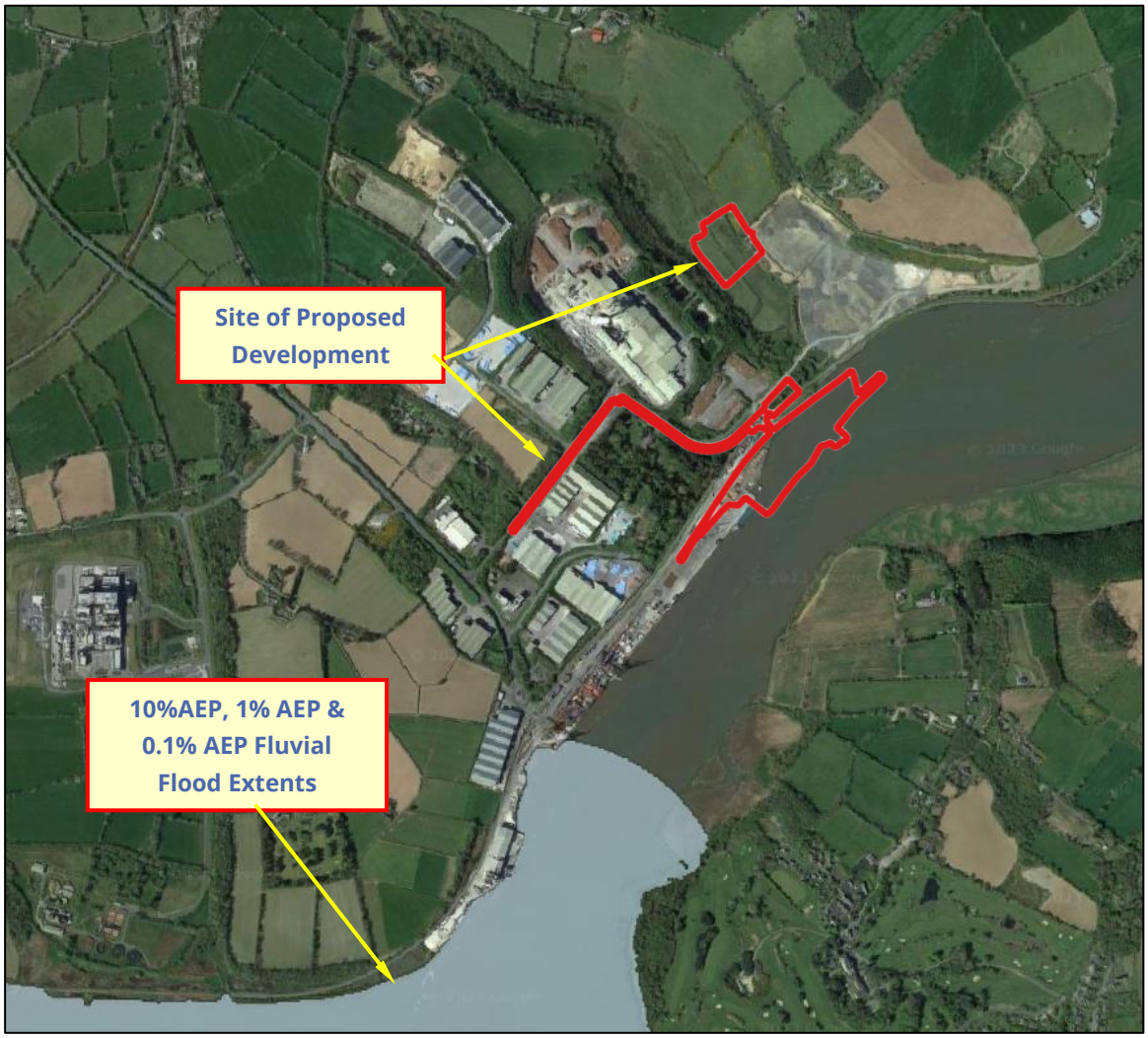

Figure 9 – OPW CFRAMS Flood Extent Mapping

The OPW CFRAMS flood map also provides information on predictive water levels & 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 (hydrological estimation points) within the River Suir Estuary for the present day scenario and mid-range future climate change scenario.

The node points closest to the site of the proposed development are referenced as node point *Node Point 14BARO00542, 14BARO00542a* and *14BARO00661* in the vicinity of the site as illustrated in *Figure 10* below.

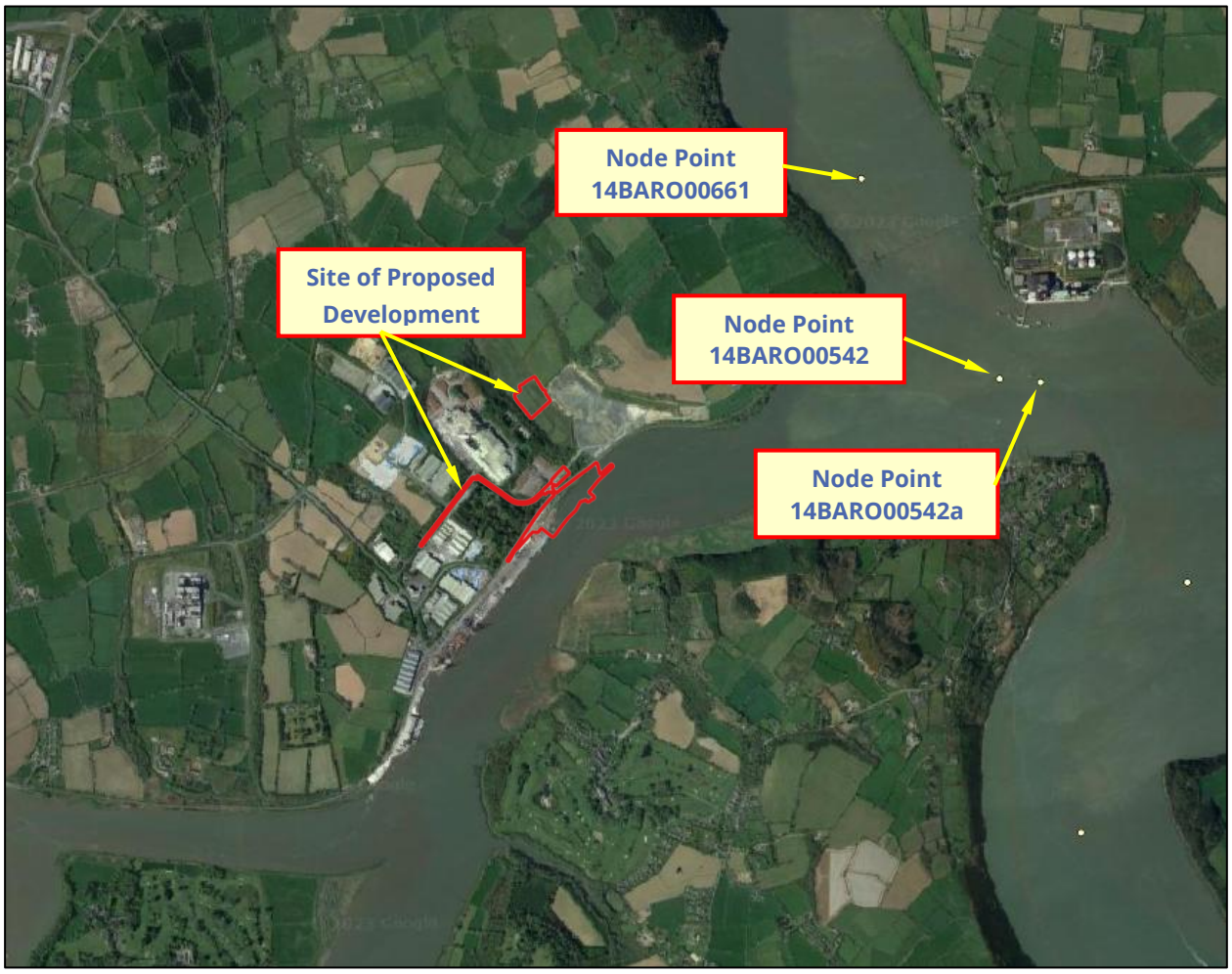

Figure 10 – CFRAM Node Point Locations

Table 2 below lists the predictive extreme fluvial flood levels and flood volumes for *Node Point 14BARO00542* for the present day scenario and mid-range future climate change scenario as acquired from the OPW wms resource.

Scenario	Node Point 14BARO00542 Extreme Fluvial Flood Flow and Level					
	10% AEP Water Level (mOD Poolbeg)	10% AEP Volume (m^3/s)	1% AEP Water Level (mOD Poolbeg)	1% AEP Volume (m^3/s)	0.1% AEP Water Level (mOD Poolbeg)	0.1% AEP Volume (m^3/s)
Present Day	5.09	2265.96	5.10	2442.74	5.02	2645.56
Mid-Range Future	5.57	2563.29	5.59	2738.27	5.52	2968.26

Table 2 – Predictive Fluvial Flood Levels & Volumes at Node Point 14BARO00542

Table 3 below lists the predicted extreme fluvial flood levels and flood volumes for *Node Point 14BARO00542a* for the present day scenario and mid-range future climate change scenario as acquired from the OPW wms resource.

Scenario	Node Point 14BARO00542a Extreme Fluvial Flood Flow and Level					
	10% AEP Water Level (mOD Poolbeg)	10% AEP Volume (m^3/s)	1% AEP Water Level (mOD Poolbeg)	1% AEP Volume (m^3/s)	0.1% AEP Water Level (mOD Poolbeg)	0.1% AEP Volume (m^3/s)
Present Day	5.09	2325.54	5.10	2502.07	5.02	2699.6
Mid-Range Future	5.57	2623.83	5.59	2798.47	5.52	3027.87

Table 3 – Predictive Fluvial Flood Levels & Volumes at Node Point 14BARO00542a

Table 4 below lists the predicted extreme fluvial flood levels and flood volumes for *Node Point 14BARO00661* for the present day scenario and mid-range future climate change scenario as acquired from the OPW wms resource.

Scenario	Node Point 14BARO00661 Extreme Fluvial Flood Flow and Level					
	10% AEP Water Level (mOD Poolbeg)	10% AEP Volume (m^3/s)	1% AEP Water Level (mOD Poolbeg)	1% AEP Volume (m^3/s)	0.1% AEP Water Level (mOD Poolbeg)	0.1% AEP Volume (m^3/s)

Present Day	5.10	2210.67	5.11	2387.69	5.03	2595.27
Mid-Range Future	5.59	2506.8	5.60	2681.95	5.52	2912.64

Table 4 – Predictive Fluvial Flood Levels & Volumes at Node Point 14BARO00661

4.8. Irish Coastal Protection Strategy Study (ICPSS)

The ICPSS, which was undertaken by the OPW, was completed in 2013 and modelled a combination of tide levels and storm surges in order to estimate extreme event water levels and to map potential coastal flood extents for various return period events along the Irish coastline.

Tidal/coastal flood extent mapping was produced for the 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) return periods including allowances for projected future climate changes. In addition to the present day scenario, two scenarios were considered representing a Mid-Range and High End Future Climate Change Scenario, based on sea level rises of + 0.5m and +1.0m respectively due to the potential impact of climate change.

Figure 11 below (extracted from ICPSS flood maps *S/RA/EXT/11)*, illustrates the extreme present day scenario 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) tidal/coastal flood extents in the vicinity of the site of the proposed development.

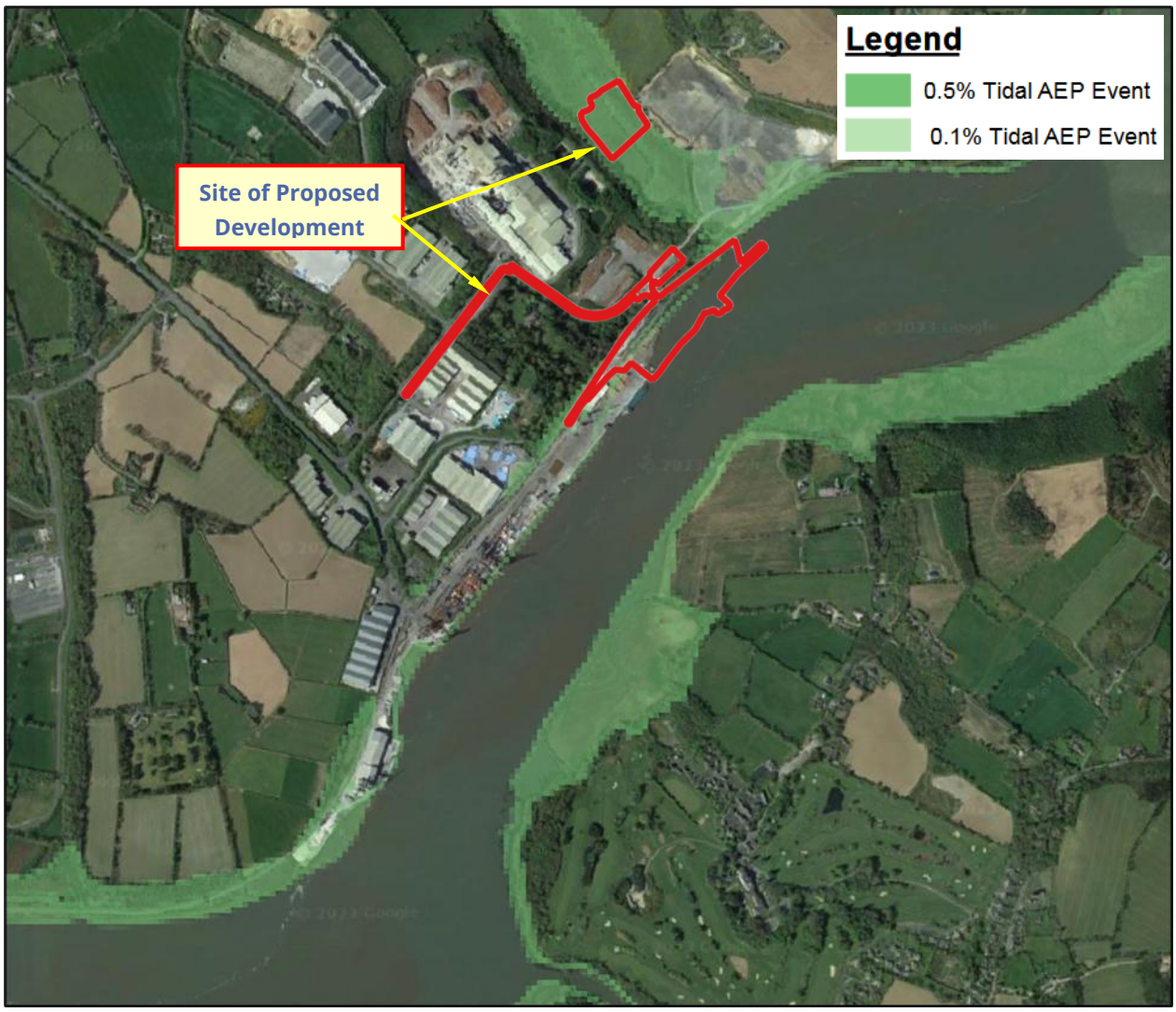

Figure 11 – ICPSS Present Day Scenario Tidal Flood Extent Map

Figure 11 above indicates that a minor limited area of the site of the proposed wharf extension falls within a present day scenario 0.1% AEP (1 in 1000 year) ICPSS tidal/coastal flood zone. The location of the proposed Biodiversity Enhancement area is indicated as falling within a 0.5% AEP (1 in 200 year) and a present day scenario 0.1% AEP (1 in 1000 year) ICPSS tidal/coastal flood zone.

Figure 12 below (extracted from ICPSS flood maps *S/RA/DEP/11)*, illustrates the predictive extreme present day scenario 0.5% AEP (1 in 200 year) flood depths in the vicinity of the site of the proposed development.

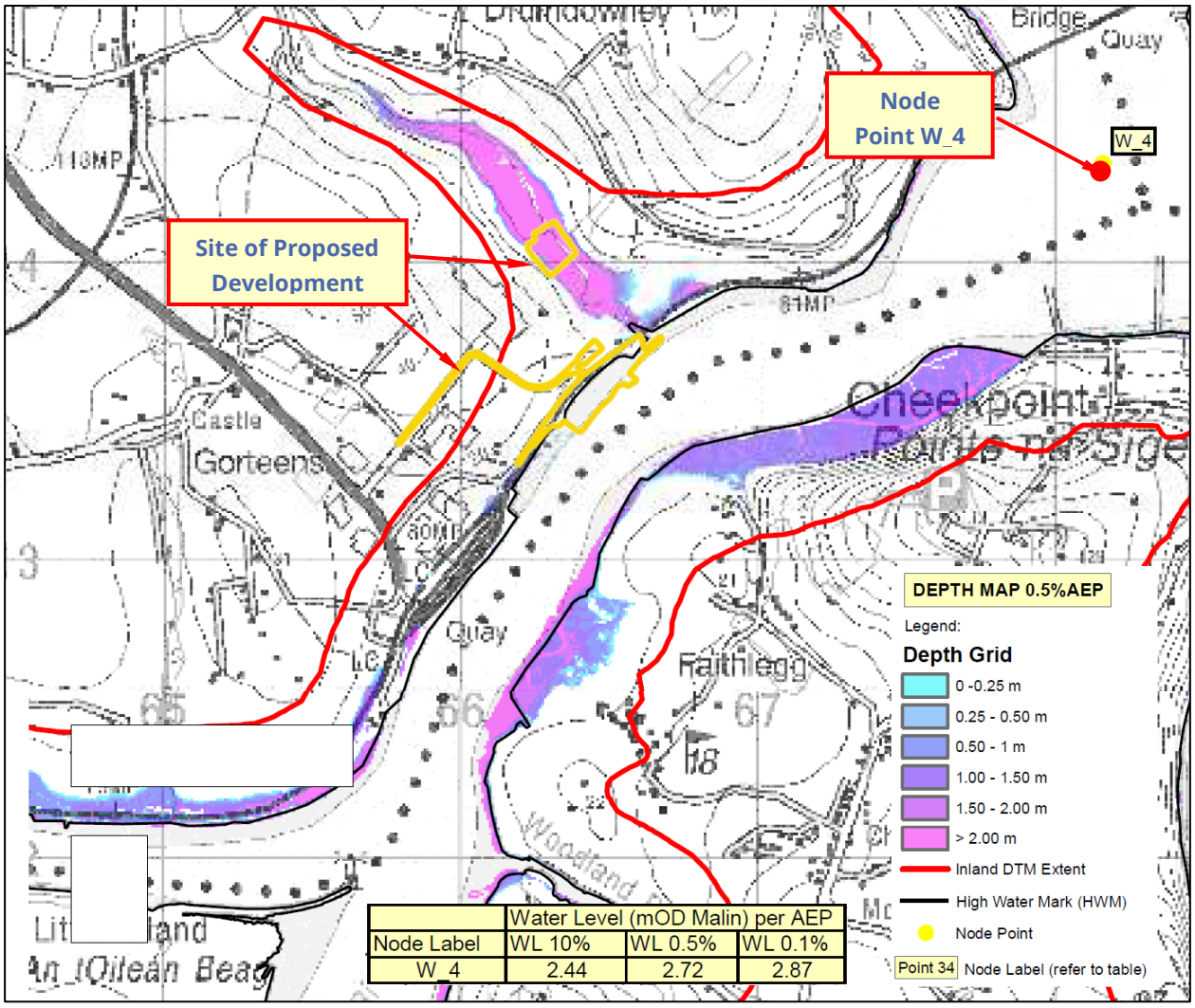

Figure 12 – ICPSS Current Scenario 0.5% AEP Tidal Flood Depths Map

Figure 12 above indicates present day scenario 0.5% AEP (1 in 200 year) tidal/coastal flood depths in the range of 0.0m - >2.0m at the location of the proposed Biodiversity Enhancement area.

Figure 13 below (extracted from ICPSS flood map *S/RA/EXT/MRFS/11)*, illustrates the predictive mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) and 0.1% AEP+CC (1 in 1000 year + climate change) tidal/coastal flood extents in the vicinity of the site of the proposed development.

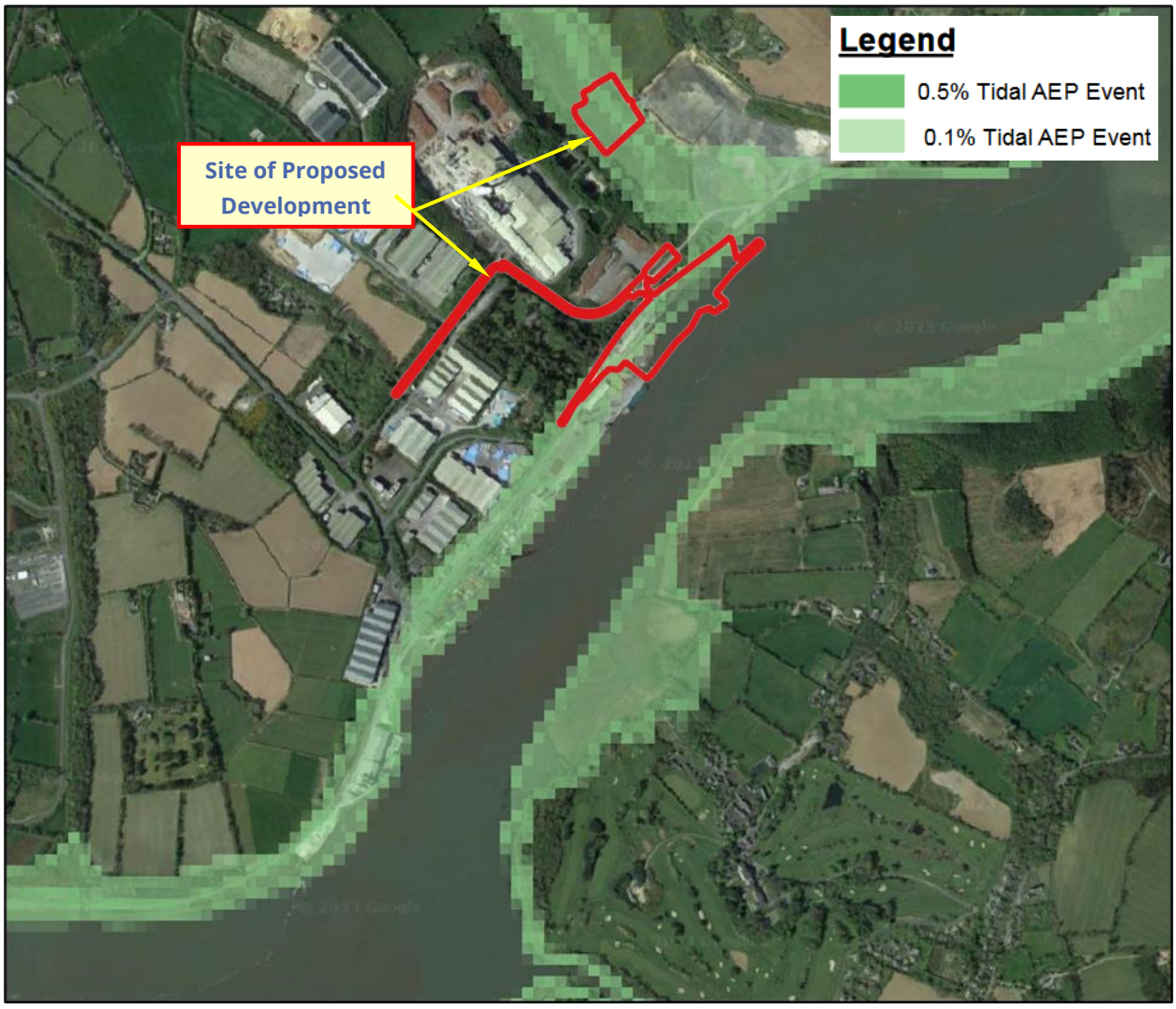

Figure 13 – ICPSS Mid-Range Future Climate Change Scenario Tidal/Coastal Flood Extent Map

Figure 13 above indicates that the site of the proposed wharf extension partially falls within a mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) and 0.1% AEP+CC (1 in 1000 year + climate change) ICPSS tidal/coastal flood zone.

The ICPSS mapping for the area also provides information on predictive tidal/coastal flood levels at a number of node points (hydrological estimation points) within the River Suir Estuary. As illustrated in *Figure 12* above, the node point closest to the site of the proposed development is Node Point W_4 located approximately 1.7 km north-east of the site. Predictive extreme flood levels at this node point are applicable for the purposes of estimation of extreme tidal/coastal flood levels at the location of the site of the proposed development.

Table 5 below lists the predictive extreme tidal/coastal flood levels for Node Point W_4 for the present day scenario and the mid-range future climate change scenario 10% AEP (1 in 10 year), 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) tidal/coastal flood events.

	Node W_4 Extreme Tidal / Coastal Flood Level		
Scenario	**10% AEP Water Level (mOD)**	**0.5% AEP Water Level (mOD)**	**0.1% AEP Water Level (mOD)**
Present Day	5.15	5.43	5.58
Mid-Range Future	5.65	5.93	6.08

Table 5 – Predictive Tidal/Coastal Water Levels at Node Point W_4

4.9. National Coastal Flood Hazard Mapping (NCFHM) 2021

The National Coastal Flood Hazard Mapping (NCFHM) was produced by the OPW in 2021 using the estimated extreme water level outputs from Phase 1 of the Irish Coastal Wave and Water Level Modelling Study (ICWWS 2018). It includes coastal flood extent and depth maps which have been produced for the 50%, 20%, 10%, 5%, 2%, 1%, 0.5% and 0.1% Annual Exceedance Probabilities (AEPs) for the Present Day Scenario and Mid-Range Future Climate Change Scenario. The ICWWS provides a prediction of extreme coastal water levels associated with astronomical tide, storm surge and seiche/local wind set-up allowance.

The mid-range future climate change scenario is based on sea level rises of + 0.5m due to the potential impact of climate change.

The output of the 2021 NCFHM and 2018 ICWWS is considered to provide a more accurate and higher resolution determination of predictive tidal/coastal flood extents, flood depths and flood levels in comparison to the 2013 Irish Coastal Protection Strategy Study (ICPSS) and is intended to supersede the latter outputs of the ICPSS.

Figure 14 below illustrates the predictive extreme present day scenario 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) OPW NCFHM tidal/coastal flood extents in the vicinity of the site of the proposed development.

Figure 14 – OPW NCFHM Tidal/Coastal Flood Extents – Present Day Scenario

Figure 14 above indicates that a limited area of the site of the proposed wharf extension falls within a present day scenario 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) OPW NCFHM tidal/coastal flood zone.

The location of the proposed Biodiversity Enhancement area falls within a present day scenario 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) OPW NCFHM tidal/coastal flood zone.

Figure 15 below illustrates the predictive extreme present day scenario 0.5% AEP (1 in 200 year) OPW NCFHM tidal/coastal flood depths in the vicinity of the site of the proposed development.

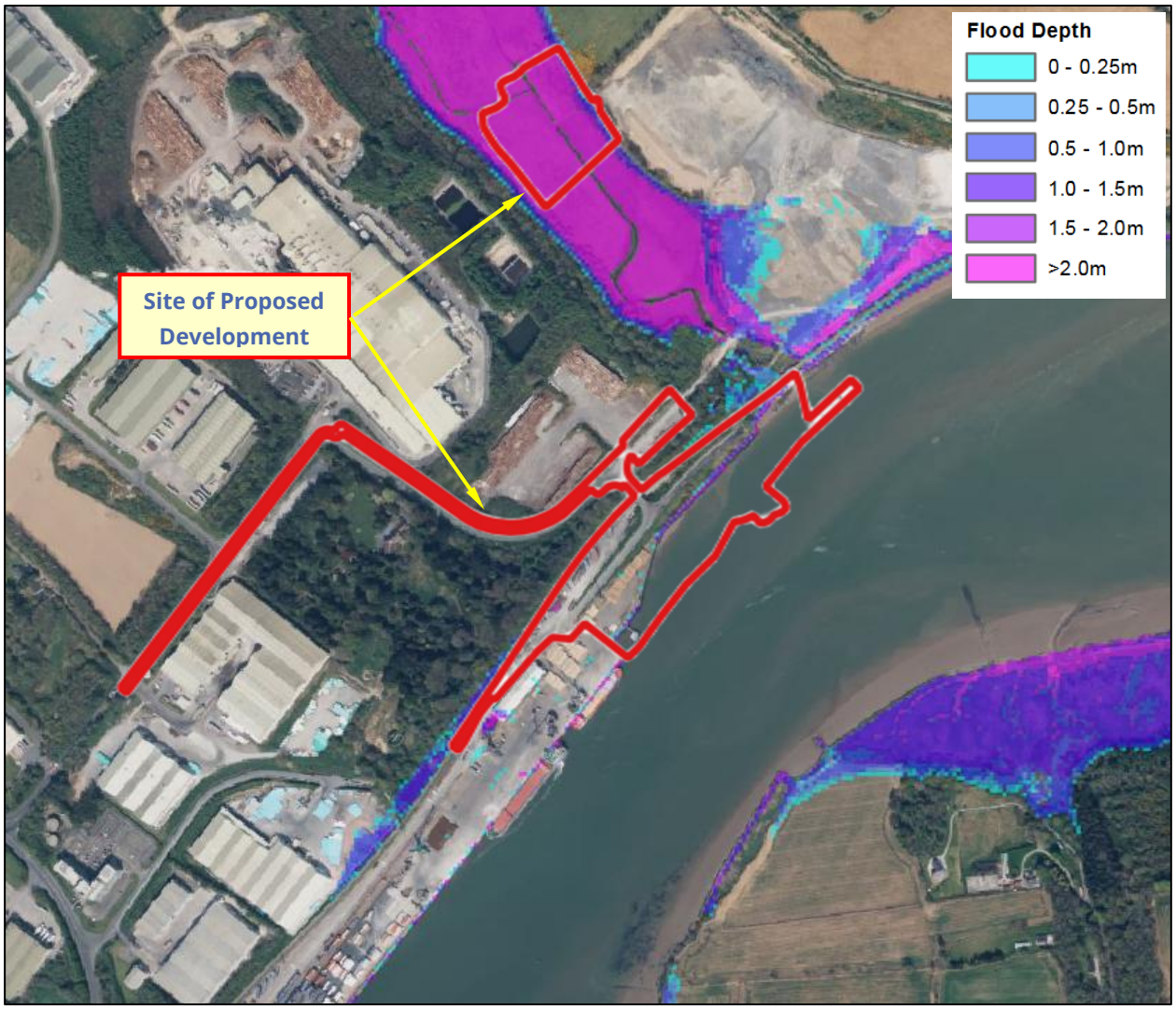

Figure 15 – OPW NCFHM Tidal/Coastal 0.5% AEP Flood Depths – Present Day Scenario

Figure 15 above indicates present day scenario 0.5% AEP (1 in 200 year) tidal/coastal flood depths in the range of 0.0m ->2.0m primarily at the location of the proposed Biodiversity Enhancement area.

Figure 16 below illustrates the predictive extreme present day scenario 0.1% AEP (1 in 1000 year) OPW NCFHM tidal/coastal flood depths in the vicinity of the site of the proposed development.

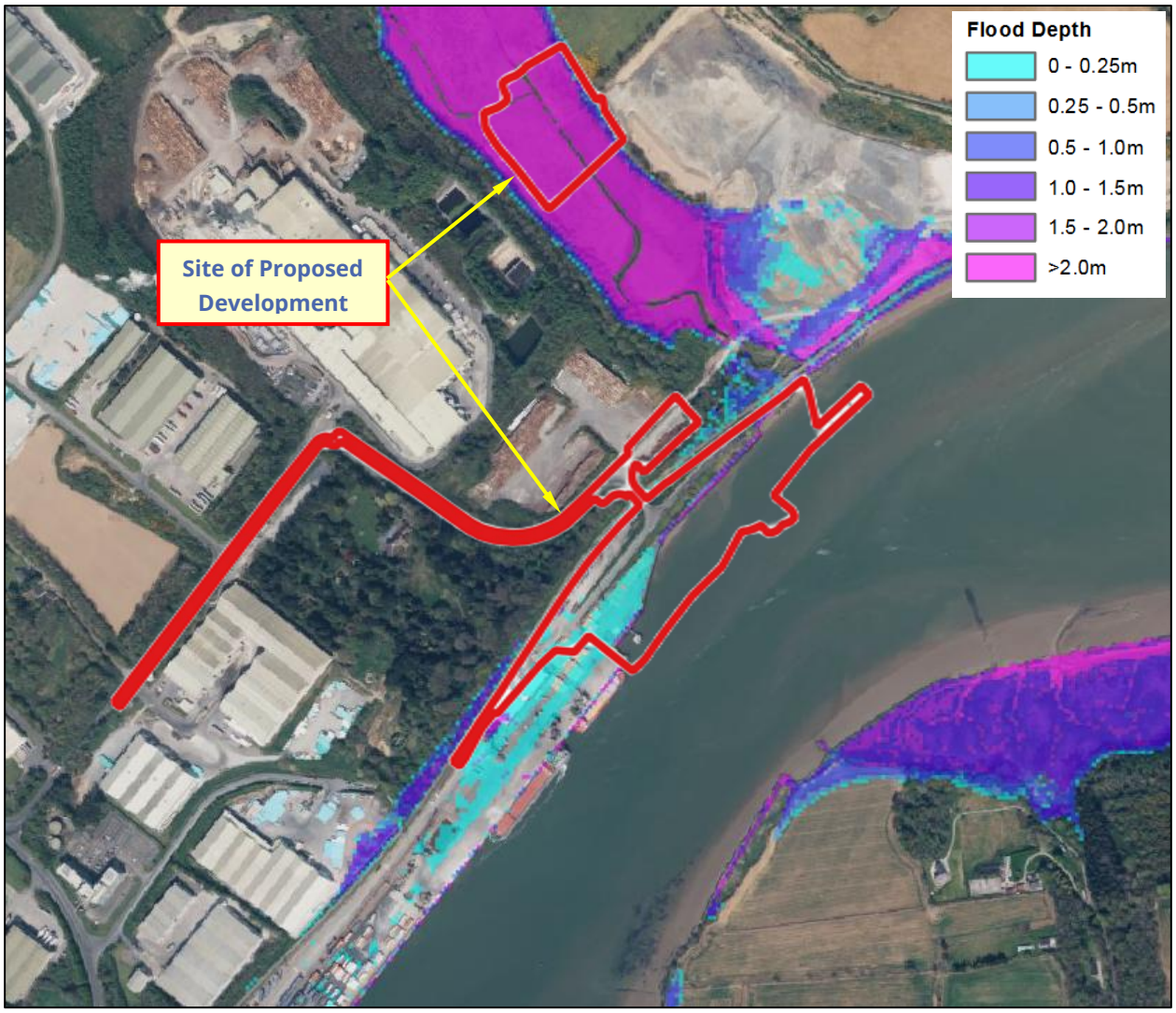

Figure 16 – OPW NCFHM Tidal/Coastal 0.1% AEP Flood Depths – Present Day Scenario

Figure 16 above indicates present day scenario 0.1% AEP (1 in 200 year) tidal/coastal flood depths at the location of the proposed wharf extension primarily in the range of 0.0m - 0.25m.

Figure 16 above indicates present day scenario 0.1% AEP (1 in 200 year) tidal/coastal flood depths at the location of the proposed Biodiversity Enhancement Area in the range of 0.0m - >2.0m.

Figure 17 below illustrates the predictive extreme mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) and 0.1% AEP+CC (1 in 1000 year + climate change) OPW NCFHM tidal/coastal flood extents in the vicinity of the site of the proposed development.

Figure 17 – OPW NCFHM Tidal/Coastal Flood Extents – Mid-Range Future Climate Change Scenario

Figure 17 above indicates that the site of the proposed wharf extension partially falls within a mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) and 0.1% AEP+CC (1 in 1000 year + climate change) OPW NCFHM tidal/coastal flood zone.

The location of the proposed Biodiversity Enhancement area falls within a mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) and 0.1% AEP+CC (1 in 1000 year + climate change) OPW NCFHM tidal/coastal flood zone.

Figure 18 below illustrates the predictive extreme mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) OPW NCFHM tidal/coastal flood depths in the vicinity of the site of the proposed development.

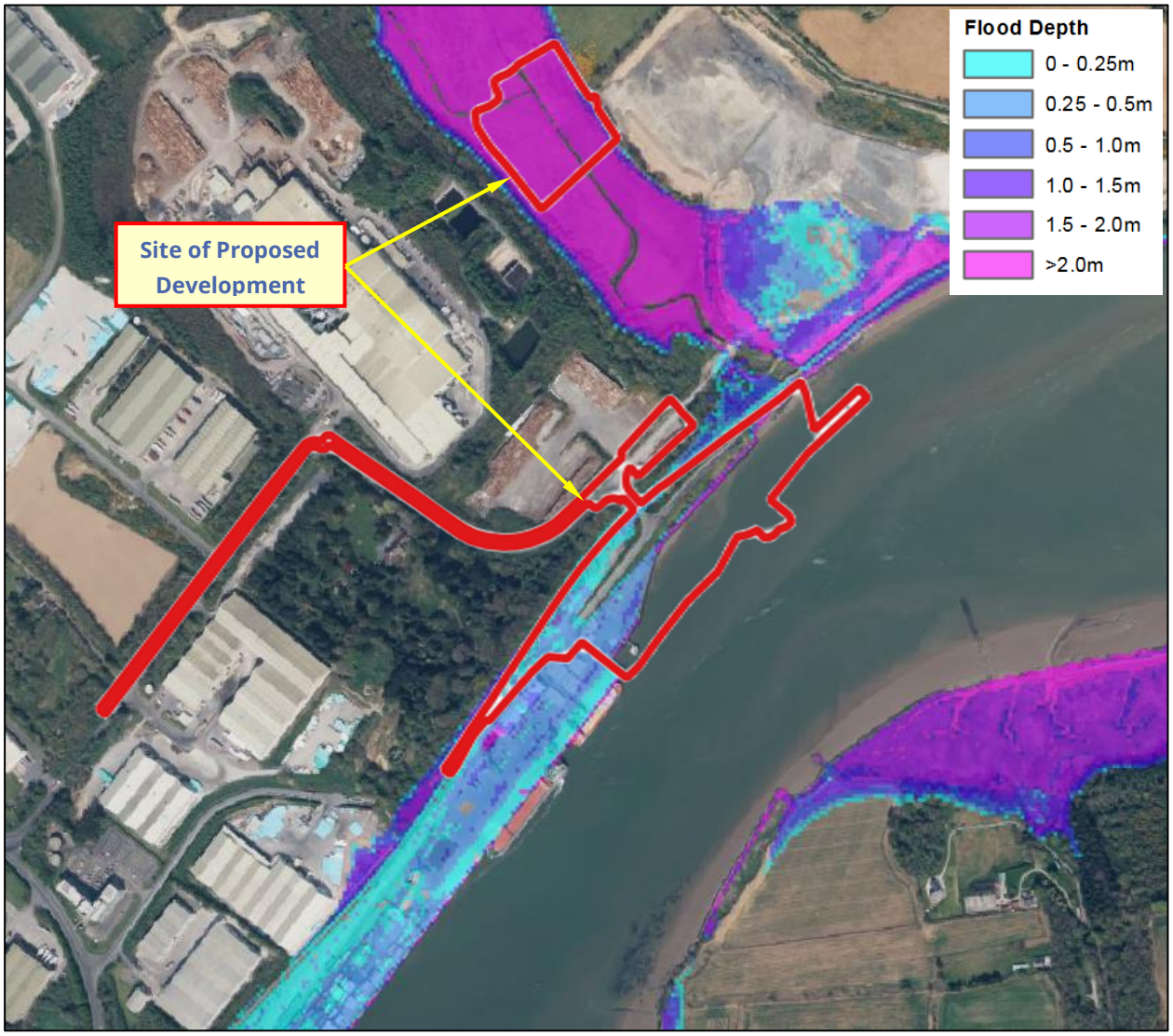

Figure 18 – OPW NCFHM Tidal/Coastal 0.5% AEP Flood Depths – Mid-Range Future Climate Change Scenario

Figure 18 above indicates mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) tidal/coastal flood depths at the location of the proposed wharf extension primarily in the range of 0.0m – 1.0m.

Figure 18 above indicates mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) tidal/coastal flood depths at the location of the proposed Biodiversity Enhancement Area in the range of 0.0m - >2.0m.

Figure 19 below illustrates the predictive extreme mid-range future climate change scenario 0.1% AEP+CC (1 in 1000 year + climate change) OPW NCFHM tidal/coastal flood depths in the vicinity of the site of the proposed development.

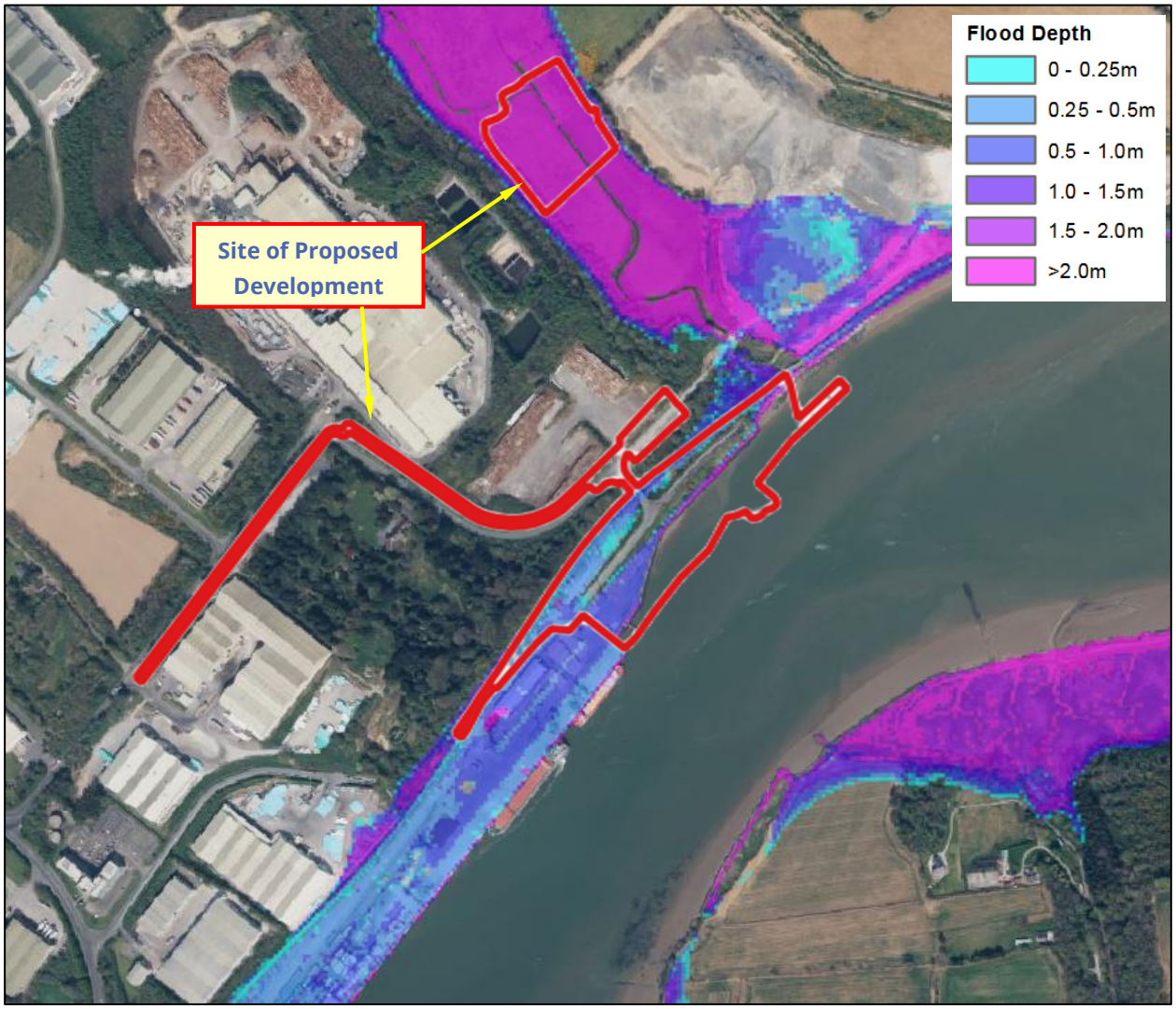

Figure 19 – OPW NCFHM Tidal/Coastal 0.1% AEP Flood Depths – Mid-Range Future Climate Change Scenario

Figure 19 above indicates mid-range future climate change scenario 0.1% AEP+CC (1 in 1000 year + climate change) tidal/coastal flood depths at the location of the proposed wharf extension primarily in the range of 0.0m – 1.5m.

Figure 19 above indicates mid-range future climate change scenario 0.1% AEP+CC (1 in 1000 year + climate change) tidal/coastal flood depths at the location of the proposed Biodiversity Enhancement Area in the range of 0.0m - >2.0m.

The OPW NCFHM resource provides information on the predictive extreme tidal flood levels at various node points (hydrological estimation points) along the River Suir Estuary undertaken as part of the 2018 Irish Coastal Wave & Water Level Modelling Study (ICWWS). The ICWWS node point closest to the application site is referenced as node point *Node SP-W4* as illustrated in *Figure 20* below.

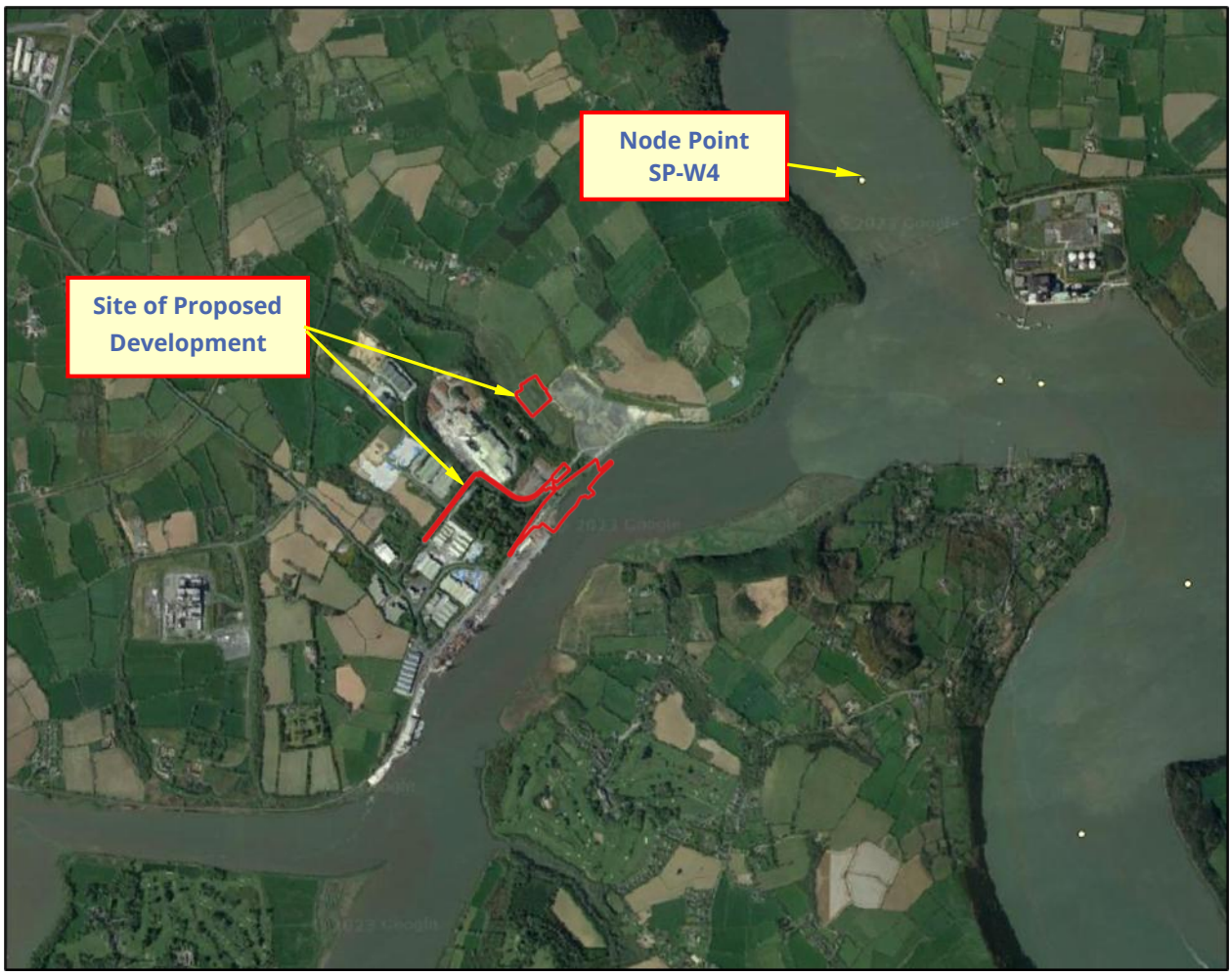

Figure 20 – OPW ICWWS – Node Point Location

Table 6 below lists the predictive extreme tidal/coastal flood levels for *Node Point SP-W4*.

	Node Point SP-W4 Extreme Tidal / Coastal Flood Level		
Scenario	**10% AEP Water Level (mOD Poolbeg)**	**0.5% AEP Water Level (mOD Poolbeg)**	**0.1% AEP Water Level (mOD Poolbeg)**
Present Day	5.24	5.62	5.83
Mid-Range Future	5.74	6.12	6.33

Table 6 – Predictive Tidal-Coastal Flood Water Levels at Node Point SP-W4

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 as proposed.

The above screening assessment indicates that the primary potential flood risk to the site of the proposed development can be attributed to an extreme tidal/coastal flood event in the River Suir Estuary and/or an extreme fluvial flood event in the Luffany Stream. In particular, the potential flood risk to the site of the proposed wharf extension can be attributed to an extreme tidal/coastal flood event in the River Suir Estuary. The potential flood risk to the site of the proposed Biodiversity Enhancement Area can be attributed to an extreme tidal/coastal flood event in the River Suir Estuary and an extreme fluvial flood event in the Luffany Stream. The screening assessment indicates that the site of the proposed development is not at 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 application site, it is considered that sufficient quantitative information to complete an appropriate flood risk assessment can be derived from the information collated as part of the screening exercise alone.

In particular, the flood extent maps and flood levels produced as part of the OPW Irish Coastal Protection Strategy Study (ICPSS) and the OPW National Coastal Flood Hazard Mapping (NCFHM) are based on the results of detailed hydraulic modelling undertaken along the River Suir Estuary at this location, and therefore provide a reasonably accurate delineation of flood zones and prediction of flood water levels at and in the general vicinity of the site of the proposed development.

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

6. Assessment of Flood Risk

Fluvial flood risk is normally assessed for a 1% AEP (1 in 100 year) and a 0.1% AEP (1 in 1000 year) flood event and Tidal/Coastal flood risk is normally assessed for a 0.5% AEP (1 in 200 year) and a 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 screening assessment undertaken as part of this Site Specific Flood Risk Assessment indicates that the site of the proposed wharf extension partially falls within a present day scenario and mid-range future climate change scenario 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) OPW NCFHM tidal/coastal flood zone. The site of the proposed wharf extension does not fall within a predictive, indicative, historic or anecdotal fluvial, pluvial or groundwater flood zone.

The site of the proposed Biodiversity Enhancement Area partially falls within an indicative fluvial flood zone and totally falls within a present day scenario and mid-range future climate change scenario 0.5% AEP (1 in 200 year) and 0.1% AEP+CC (1 in 1000 year + climate change) OPW NCFHM tidal/coastal flood zone. The site of the proposed Biodiversity Enhancement Area does not fall within a predictive, indicative, historic or anecdotal fluvial, pluvial or groundwater flood zone.

6.1. Assessment of Extreme Flood Levels

Extreme flood levels have been derived as part of the Irish Coastal Protection Strategy Study (ICPSS) at node point (hydrological estimation point) *Node Point W_4* located on the River Suir Estuary. This is the closest hydrological estimation point to the site of the proposed development, therefore predictive flood levels at this node point are applicable for the purposes of assessing extreme tidal/coastal flood levels at the location of the site of the proposed development.

In order to ensure a robust and sustainable assessment of potential flood risk to the site of the proposed development it is considered prudent to assess flood risk to the site of the proposed development in consideration of the present day scenario and mid-range future climate change scenario 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) tidal/coastal flood events.

In this regard the predictive extreme flood levels at node point *Node Point W_4* (*Table 5* above) are utilised as the basis of the assessment of potential flood risk to the site of the proposed development.

6.2. Flood Risk to & From Proposed Wharf Extension & Buildings

Reference to the proposed site layout drawings and associated details provided by Malone O'Regan Consulting Engineers indicate that the proposed new wharf extension shall be constructed to a finished ground level ranging from **6.285m OD (Poolbeg)** at the face of the wharf, falling to **5.975m OD (Poolbeg)** at the back of the wharf.

The finished ground level of the proposed new wharf extension shall therefore be constructed to a level of **0.705m – 0.395m** above the predictive predictive present day scenario 0.1% AEP (1 in 1000 year) flood level of **5.58m OD (Poolbeg)**, and to a level of **0.355m-0.045m** above the predictive mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) flood level of **5.93m OD (Poolbeg)**.

The potential tidal/coastal flood risk to the proposed new wharf extension is therefore considered to be negligible.

The building structures associated with the proposed new wharf extension shall be constructed to a finished ground floor level of **6.35m OD**, which is **0.77m** above the the predictive predictive present day scenario 0.1% AEP (1 in 1000 year) flood level of **5.58m OD**, and **0.27m** above the predictive mid-range future climate change scenario 0.1% AEP+CC (1 in 1000 year + climate change) flood level of **6.08m OD (Poolbeg)**.

The potential tidal/coastal flood risk to the proposed building structures is therefore considered to be negligible.

The marshalling area at the back of the proposed new wharf extension shall be constructed to a finished ground level ranging from **5.80m OD (Poolbeg) – 6.20m OD (Poolbeg)**, which is **0.22m – 0.62m** above the predictive present day scenario 0.1% AEP (1 in 1000 year) flood level of **5.58m OD (Poolbeg).**

The potential tidal/coastal flood risk to the proposed marshalling area is therefore considered to be negligible.

The proposed wharf extension is considered to be water compatible development and shall be constructed utilising a system of supporting pipes and a constructed platform which will be elevated above extreme tidal/coastal flood levels as presented above. Any volume of tidal/coastal flood waters that may be offset due to the development as proposed will be imperceptible and unquantifiable in nature.

The development as proposed at this location would not result in an adverse impact to the existing hydrological regime of the area or increase flood risk elsewhere.

6.3. Flood risk to & From Proposed Biodiversity Enhancement Area

The site of the proposed Biodiversity Enhancement Area partially falls within an indicative fluvial flood zone and totally falls within a present day scenario and mid-range future climate change scenario 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) OPW NCFHM tidal/coastal flood zone.

The works proposed at this location (Biodiversity Enhancement works) will not involve the construction of any structure or any significant ground level raising or infilling works, and will simply involve minor works in order to enhance the biodiversity regime at this location and are considered as water compatible works.

The development as proposed at this location (Biodiversity Enhancement Area) would not result in an adverse impact to the existing hydrological regime of the area or increase flood risk elsewhere.

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% or 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 site of the proposed development as proposed falls within a tidal/coastal Flood Zone 'A' and Flood Zone 'B'.

In accordance with the *'Planning System & Flood Risk Management Guidelines, DOEGLG, 2009'* the development as proposed may be subject to the requirements of the Justification Test.

8. Justification Test for Development Management

In the context of the '*Planning System and Flood Risk Management Guidelines, DOEHLG, 2009',* and in consideration of the scenario that the site of the proposed development is undefended, the assessment and analysis undertaken as part of this Site Specific Flood Risk Assessment indicates that the site of the development as proposed falls within a tidal/coastal Flood Zone 'A' and Flood Zone 'B'.

Table 3.1 of the guidelines lists the vulnerability class of various types of development. The development as proposed is 'Water-Compatible Development' (docks and marinas, dockside activities that require a waterside location, and a Biodiversity Enhancement Area)

Table 3.2 of the guidelines (*duplicated below*) provides a matrix of different vulnerability classes of development in relation to Flood Zones A, B and C, and lists if development is appropriate in each Zone and where the Justification Test should be applied.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable Development (including essential infrastructure	Justification Test	Justification Test	Appropriate
Less Vulnerable Development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test

With reference to the table above, the type and form of development as proposed is 'Water Compatible Development' and the site of the development as proposed falls within a tidal/coastal Flood Zone 'A' and Flood Zone 'B', therefore the development as proposed is deemed to be appropriate and is not subject to the Justification Test.

9. Summary Conclusions

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 as proposed:

- A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development as proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.
- The site of the proposed development has been screened, scoped and assessed for flood risk in accordance with the above guidelines.
- The assessment undertaken as part of this Site Specific Flood Risk Assessment indicates that the site of the proposed wharf extension partially falls within a present day scenario and mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) and 0.1% AEP+CC (1 in 1000 year + climate change) OPW NCFHM tidal/coastal flood zone.
- The site of the proposed wharf extension does not fall within a predictive, indicative, historic or anecdotal fluvial, pluvial or groundwater flood zone.
- The site of the proposed Biodiversity Enhancement Area partially falls within an indicative fluvial flood zone and totally falls within a present day scenario and mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) and 0.1% AEP+CC (1 in 1000 year + climate change) OPW NCFHM tidal/coastal flood zone.
- The site of the proposed Biodiversity Enhancement Area does not fall within a predictive, indicative, historic or anecdotal fluvial, pluvial or groundwater flood zone.
- The finished ground level of the proposed new wharf extension shall be constructed to a level of **0.705m – 0.395m** above the predictive predictive present day scenario 0.1% AEP (1 in 1000 year) flood level of **5.58m OD (Poolbeg)**, and to a level of **0.355m-0.045m** above the predictive mid-range future climate change scenario 0.5% AEP+CC (1 in 200 year + climate change) flood level of **5.93m OD (Poolbeg)**.
- The potential tidal/coastal flood risk to the proposed new wharf extension is therefore considered to be negligible.

- The building structures associated with the proposed new wharf extension shall be constructed to a finished ground floor level of **6.35m OD**, which is **0.77m** above the the predictive predictive present day scenario 0.1% AEP (1 in 1000 year) flood level of **5.58m OD**, and **0.27m** above the predictive mid-range future climate change scenario 0.1% AEP+CC (1 in 1000 year + climate change) flood level of **6.08m OD (Poolbeg)**.
- The potential tidal/coastal flood risk to the proposed building structures is therefore considered to be negligible.
- The marshalling area at the back of the proposed new wharf extension shall be constructed to a finished ground level ranging from **5.80m OD (Poolbeg) – 6.20m OD (Poolbeg)**, which is **0.22m – 0.62m** above the predictive present day scenario 0.1% AEP (1 in 1000 year) flood level of **5.58m OD (Poolbeg).**
- The potential tidal/coastal flood risk to the proposed marshalling area is therefore considered to be negligible.
- In the context of 'The Planning System & Flood Risk Management Guidelines' the proposed wharf extension and proposed Biodiversity Enhancement Area works are considered to be water compatible development and are therefore not subject to the requirements of the Justification Test.
- In summary, the potential flood risk to the development as proposed is negligible. The development as proposed would not result in an adverse impact to the existing hydrological regime of the area or increase flood risk elsewhere. The development as proposed is therefore considered to be appropriate from a flood risk perspective.

Appendices

Appendix A. Drawings

IE3030-001-A Site Location Map

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IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Project Title:	FLOOD RISK ASSESSMENT
Project Address:	BELVIEW PORT, SLIEVERUE, WATERFORD
Client:	MALONE O'REGAN CONSULTING ENGINEERS
Drg. Title:	SITE LOCATION MAP

Dwg.Scale:	Date:	Dwg.No:	Job No:	Revision:	Dwg.By:
1/50,000	07/02/25	IE3030-001	IE3030	A	LMc