WILLIAM NEVILLE & SONS

PROPOSED DEVELOPMENT

CANCUR PARK, WEXFORD

SITE SPECIFIC FLOOD RISK ASSESSMENT

IE CONSULTING

WATER-ENVIRONMENTAL-CIVIL

Integrated Engineering Consulting

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Appendix 7.2.2	*Aerial Photographs*

7.2.1 Introduction

IE Consulting was requested by William Neville and Sons Ltd, to undertake a Site Specific Flood Risk Assessment (SSFRA) and Hydrological Assessment of Sediment transport at and in the vicinity of a proposed residential development site at Carcur Park, Wexford.

Permission is sought by William Neville and Sons for:

A total of **413 residential units** consisting of 175 houses (12 four bedroom detached houses & Garages, 20 four bedroom Semi-Detached houses, 2 four bedroom corner detached houses, 80 three bedroom Semi Detached Houses, 20 three bedroom terraced houses, 7 three bed end of terrace houses, 4 three bedroom corner houses, 20 two bedroom terraced houses, 6 two bedroom end of terrace, 4 Semi-Detached houses), 7 apartment blocks with a total of 238 Apartments: (Block One: (47 units over 5 floors: 40 two bed, 7 three bed), Block Two: (50 units over 7 floors: 4 one bed, 38 two bed, 8 three bed), Block Three: (45 units over 7 floors: 3 one bed, 34 two bed, 8 three bed), Block Four: (20 units over 4 floors: 1 one bed, 19 two bed), Block Five: (38 units over 5 floors: 1 one bed, 37 two bed,) Block Six: (19 units over 4 floors: 3 one bed, 15 two bed, 1 four bed) Block Seven: (19 units over 4 floors: 3 one bed, 15 two bed, 1 four bed)). **Together with two crèche facilities** (Crèche A: 346.4 sqm floor area. Crèche B 395.3sq.m floor area). A total of **767 Car parking spaces** (248 private parking spaces, 501 public spaces and 18 creche spaces). and all associated site works". The proposal shall be delivered over four phases of development. An EIAR (Environmental Impact Assessment Report), an NIAR (NATURA Impact Assessment Report) and a SSFRA (Site Specific Flood Risk Assessment have been prepared as part of the planning application.

The purpose of this SSFRA and Hydrological Assessment is to assess the potential flood risk to the proposed development site and to assess the impact the development of the site may or may not have on the hydrological regime of the area. In addition this report shall includes an assessment of the existing hydro-geomorphological regime of the area and a professional opinion on whether the development may or may not have an impact on the existing hydrogeomorphological regime in the River Slaney Estuary.

A hydrological engineer from IE Consulting undertook a survey of the existing site area and surrounding catchment on the 3rd January 2017.

Quoted ground levels and 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.

7.2.2 Proposed Site Description

7.2.2.1 General

The proposed development site is located at Carcur Park, approximately 3km north-west of Wexford Town centre.

The site is bounded to the north and east by the River Slaney Estuary and to the south and west by the Dublin to Wexford railway line and the Wexford Wanderers rugby grounds. The proposed development site covers an area of approximately 13 hectares.

The location of the proposed development site is illustrated in *Figure 1* below and shown on *Drawing Number IE1297-001-A in Appendix A*.

Figure 7.2.1 – Site Location

7.2.2.2 Existing Topography Levels at Site

The existing site slopes moderately from west to east at an average gradient of approximately 1 in 41 (2.42%). Existing ground elevations range from approximately 10.831m OD (Malin) at the highest point in the west of the site to -0.070m OD (Malin) in the eastern area of the site.

7.2.2.3 Local Hydrology, Landuse & Existing Drainage

The most immediate and significant hydrological feature in the vicinity of the site is the River Slaney Estuary, which is located adjacent to the northern and eastern boundaries of the site. At this location, the River Slaney generally flows in a west to east direction and is tidally influenced.

7.2.3 Initial Flood Risk Assessment

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

7.2.3.1 Possible Flooding Mechanisms

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

Source/Pathway	Significant?	Comment/Reason
Tidal/Coastal	Yes	The proposed development site is located adjacent to the River Slaney Estuary.
Fluvial	Yes	The River Slaney is located adjacent to the northern and eastern boundaries of the proposed development site.
Pluvial (urban drainage)	No	There is no significant urban drainage infrastructure in the immediate vicinity of the proposed development 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.
Surcharge/ Blockage	No	There are no significant or restrictive hydraulic structures located on the River Slaney immediately downstream of the proposed development site.
Groundwater	No	There are no significant springs or groundwater discharges recorded in the immediate vicinity of the proposed site.

Table 7.2.1

The primary potential flood risk to and from the proposed development site can be attributed to a fluvial or tidal flood event in the River Slaney Estuary. In accordance with '*The Planning System and Flood Risk Management – Guidelines for Planning Authorities - DOEHLG 2009'* this potential flood risk is analysed in the subsequent *'Screening Assessment'* and *'Assessment of Flood Risk'* section of this study report.

7.2.4 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.

7.2.4.1 OPW/EPA/Local Authority Hydrometric Data

Existing sources of OPW, EPA and local authority hydrometric data were investigated. As illustrated in *Figure 3* below, this assessment has determined that there are two active hydrometric gauging stations located in the vicinity of the proposed development site. There is a station located approximately 2.5 km downstream of the site at Wexford Harbour and the second station is located 1.5 km upstream of the site on the River Slaney, at Ferrycarrig Bridge. These stations are entered into the Register of Hydrometric Stations in Ireland as Station Number 12064 and 12066 respectively. Station Number 12064 is under the management of the Office of Public Works (OPW) and Station Number 12066 is under the management of the Marine Institute. These stations are listed as active water level only recorder stations with records available from April 2003 for Station Number 12064 and from January 2000 for Station Number 12066.

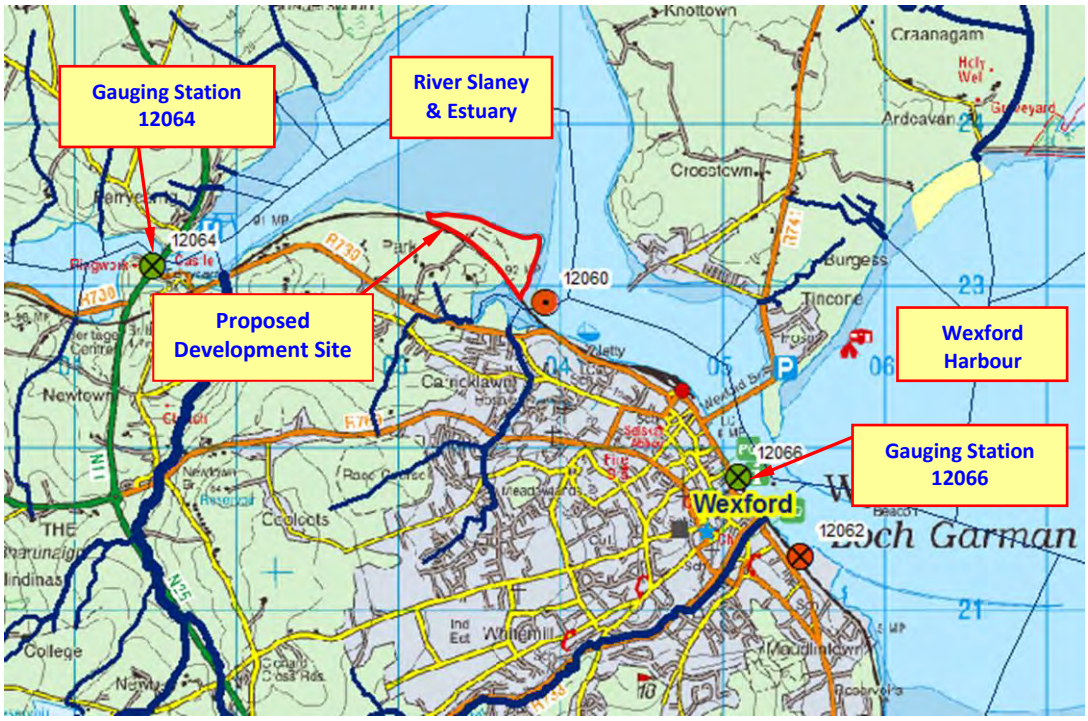


Figure 7.2.3 – Hydrometric Gauging Stations

The hydrometric data from gauging stations 12064 and 12066 was examined to assess the suitability of the data to assist in the prediction of extreme fluvial flood levels in the River Slaney at the location of the proposed development site. Annual maxima data is not readily available for these hydrometric stations and therefore may not be suitable to enable a statistical analysis to be applied in order to predict extreme flood levels in the vicinity of the proposed development site.

7.2.4.2 OPW Draft PFRA Predicative Flood Mapping

Preliminary Flood Risk Assessment (PFRA) Mapping for Ireland was produced by the OPW in 2011. OPW PFRA predictive flood map number 2019/MAP/108/A illustrates predictive flood zones within this area of County Wexford.

Figure 4 below illustrates an extract from the above predictive flood map in the vicinity of the proposed development site.

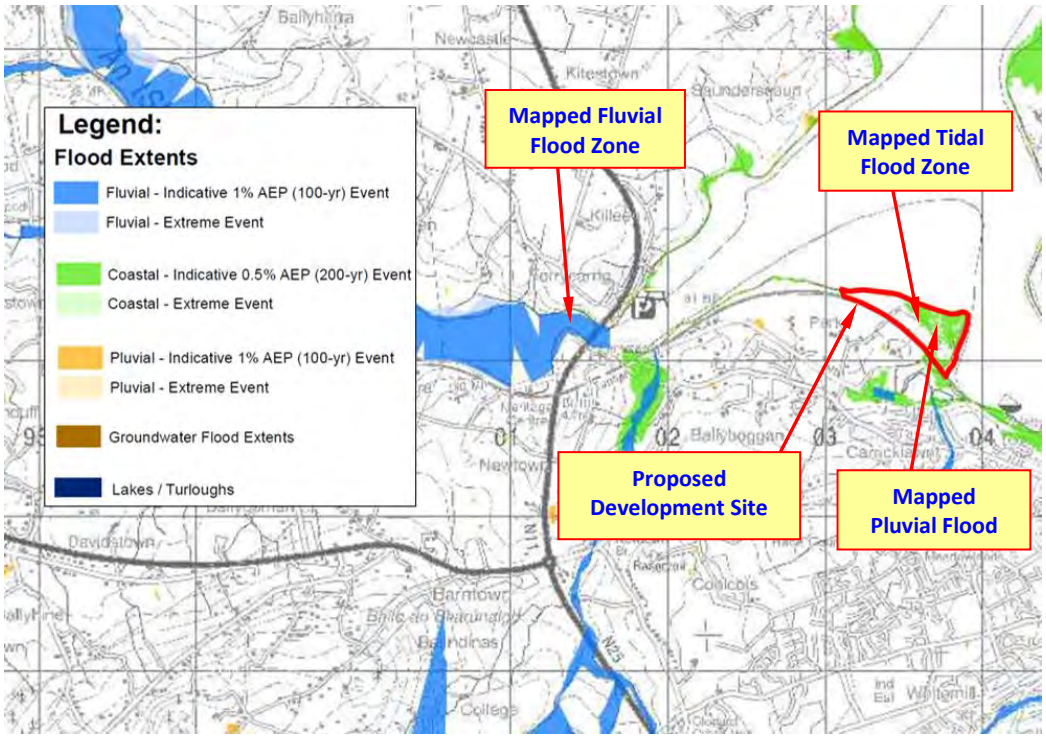


Figure 7.2.4 – PFRA Mapping

The PFRA predictive flood mapping above indicates that the proposed development site is located within an area of potential tidal and pluvial flooding. No areas of mapped indicative fluvial or groundwater flooding are indicated within or immediately adjacent to the boundary of the site.

Figure 5 below illustrates the PFRA predictive flood zone from *Figure 4* above overlaid onto higher resolution background mapping.

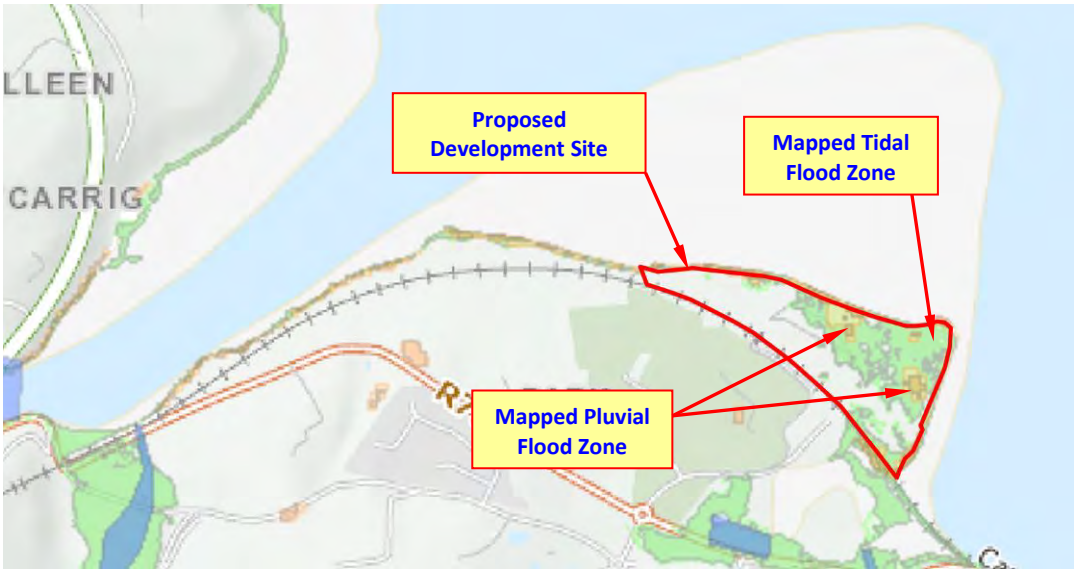


Figure 7.2.5 – PFRA Mapping

7.2.4.3 OPW Flood Maps Website

The OPW Flood Maps Website (www.floodmaps.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences in the vicinity of the proposed development site. *Figure 6* below illustrates the floodmaps.ie mapp from the in the vicinity of the site.

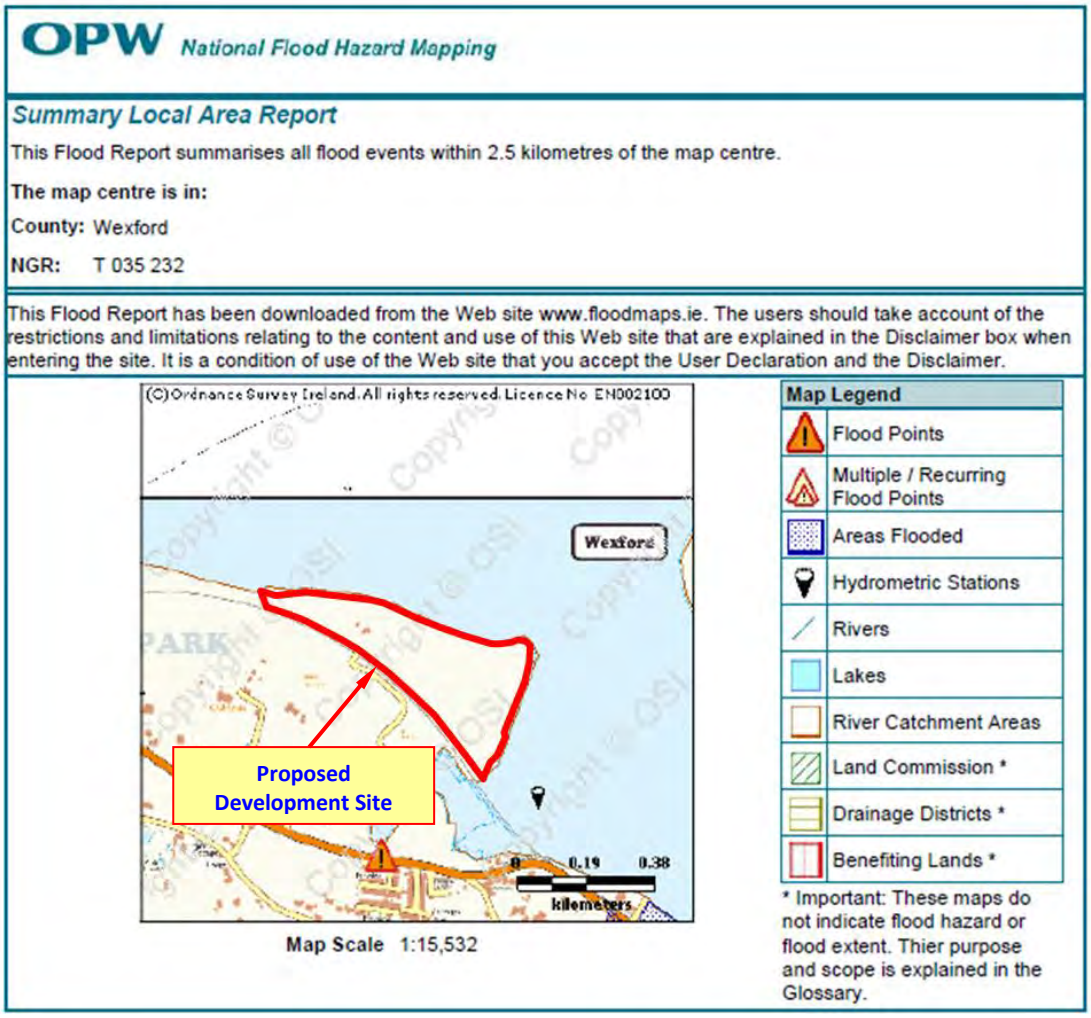


Figure 7.2.6 – OPW Flood Maps

Figure 6 above indicates no historical, anecdotal or recurring flooding instances in the vicinity of the proposed development site.

7.2.4.4 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 maps (pre-1900), and the 25-inch map series.

Figure 7 and *Figure 8* below illustrate the historic mapping for the area of the proposed development site.

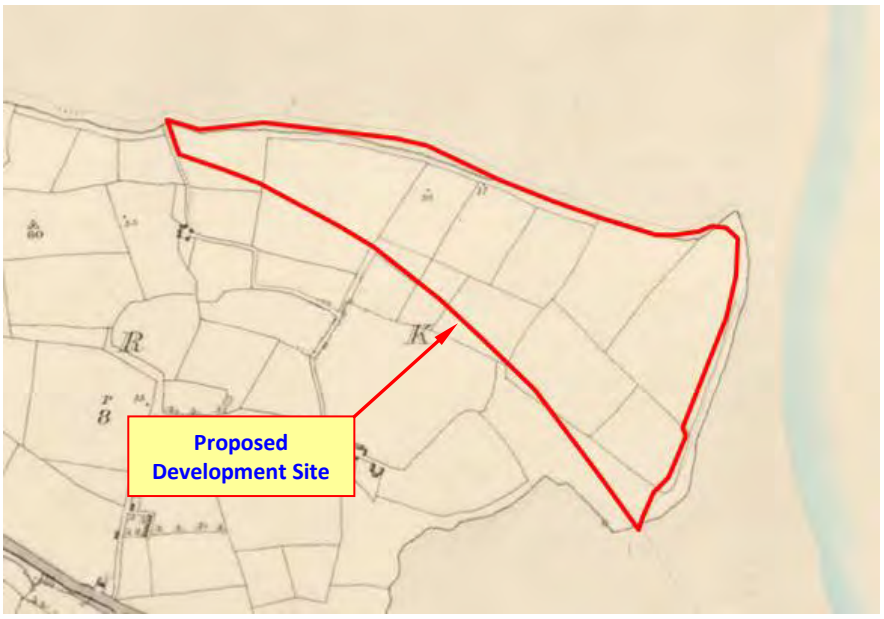


Figure 7.2.7 – Historic 6 inch Mapping

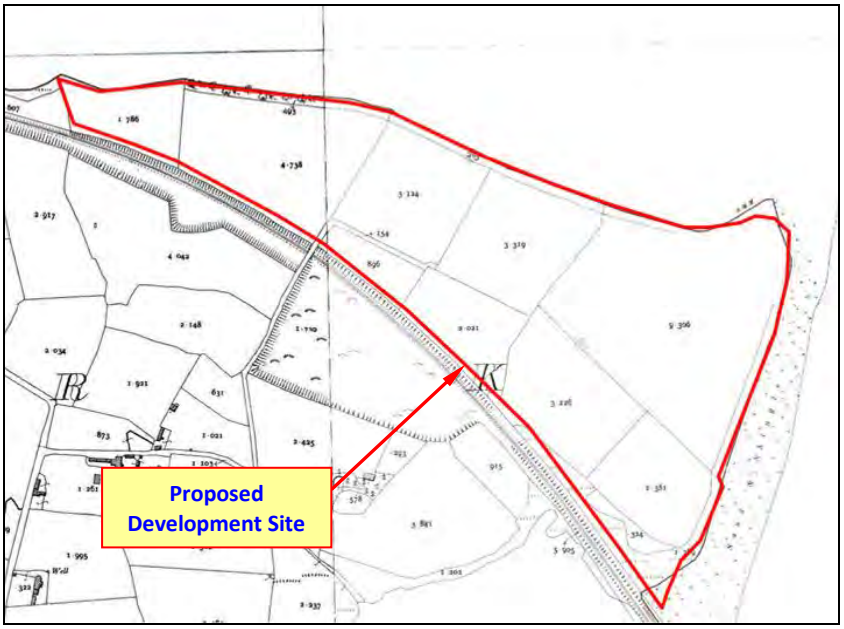


Figure 7.2.8 – Historic 25 inch Mapping

The historic 6-inch and 25-inch mapping above does not indicate any historical or anecdotal instances of flooding in the immediate vicinity of the proposed development site.

7.2.4.5 Geological Survey of Ireland Mapping

The alluvium deposit maps of the Geological Survey of Ireland (GSI) were consulted to assess the extent of any alluvium deposits in the vicinity of the proposed development site. Alluvium deposits can be an indicator of areas that have flooded in the recent geological past. *Figure 9* below illustrates the GSI River Basin District sub-soils mapping for the general area of the proposed development site.

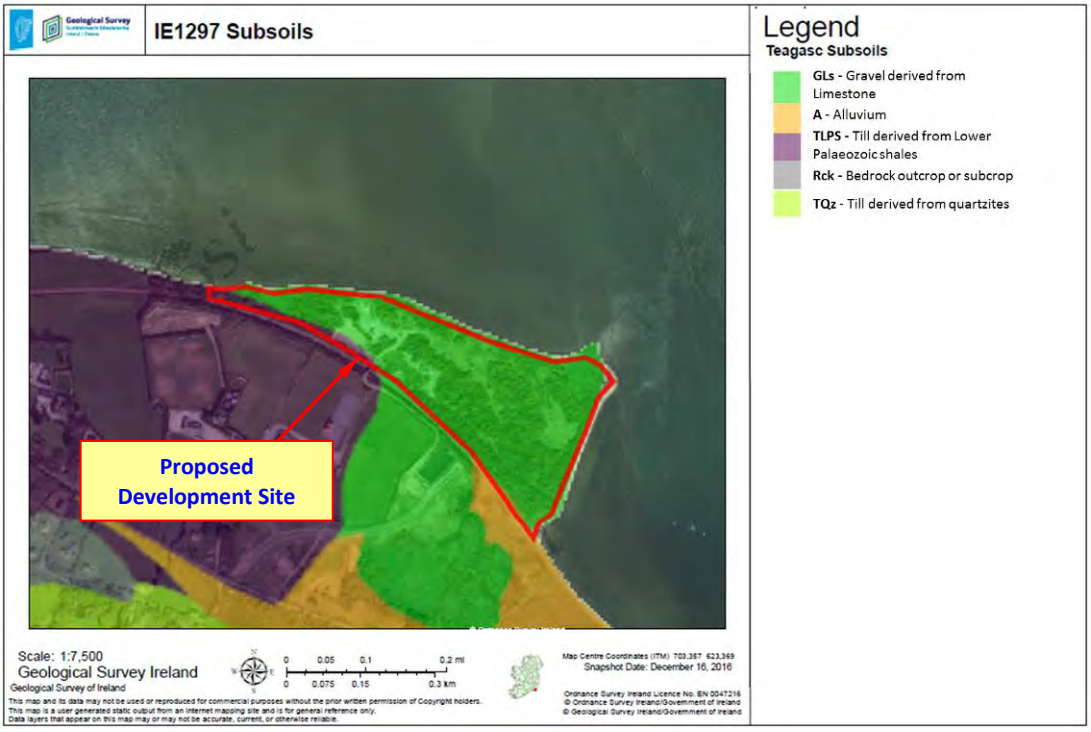


Figure 7.2.9 – GSI Subsoil Mapping

Figure 9 above indicates that the proposed site is primarily underlain by gravel derived from limestone, there is a mapped area of alluvium deposits adjacent to the south-eastern boundary of the site. Mapped alluvium deposits can indicate areas that may have been subject to flood inundation in the recent geological past.

7.2.4.6 South Eastern CFRAM Study

The South Eastern 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 Wexford have been produced. OPW CFRAMS predictive flood maps number *O12WEX_EXFCD_F0_07* and *O12WEX_EXCCD_F0_07* illustrate predictive fluvial and tidal flood extent zones associated with the River Slaney and Wexford Harbour, in the vicinity of the proposed development site. As illustrated in *Figure 10* below (extracted from CFRAMS flood map *O12WEX_EXFCD_F0_07*) an extreme 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) fluvial flood zone is mapped within the northern and eastern areas of the proposed development site.

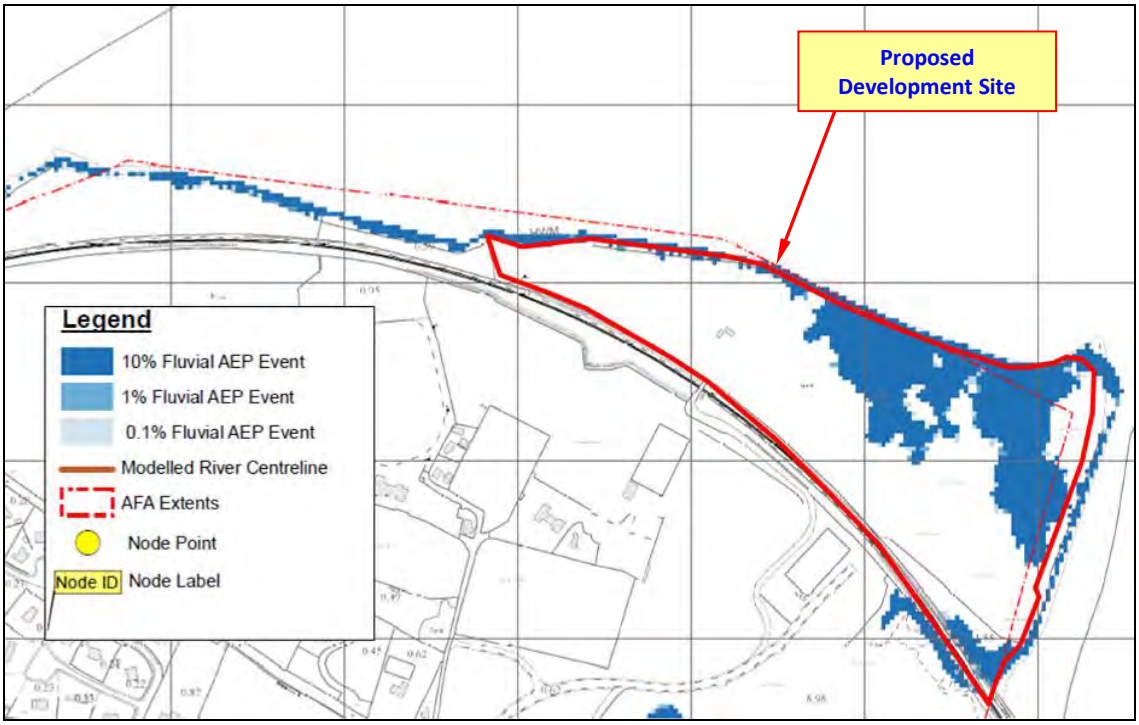


Figure 7.2.10 – CRAMS Final Fluvial Flood Map

The above map does not indicate any hydrological estimation points, or node points, for the predicted flood levels for 10% AEP, 1% AEP and 0.1% AEP fluvial flood events along the reach of the River Slaney in the immediate vicinity of the proposed development site. However Node Point 12SLAN00012 listed on CFRAMS flood map *O12WEX_EXFCD_F0_05* is located 1.5km upstream of the site at Ferrycarrig Bridge. Details of the predicted fluvial flood levels for these node points are illustrated in *Table 2* below, which has been extracted from the Final CFRAMS flood maps references *O12WEX_EXFCD_F0_05*.

Node Label	Water Level (OD) 10% AEP	Flow (m^3/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m^3/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m^3/s) 0.1% AEP
12SLAN00012	1.32	N/A	1.34	N/A	1.34	N/A

Table 7.2.2 –CFRAMS Fluvial Map - Predicted Flood Levels

The 1% and 0.1% AEP flood levels at node point *12SLAN00012* are shown to be the same level. These levels were queried with the OPW who confirmed the levels are correct.

As illustrated in *Figure 11* below (extracted from CFRAMS flood map *O12WEX_EXCCD_F0_07*) an extreme 10% AEP (1 in 10 year), 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) tidal flood zone is mapped within the north and eastern area of the proposed development site.

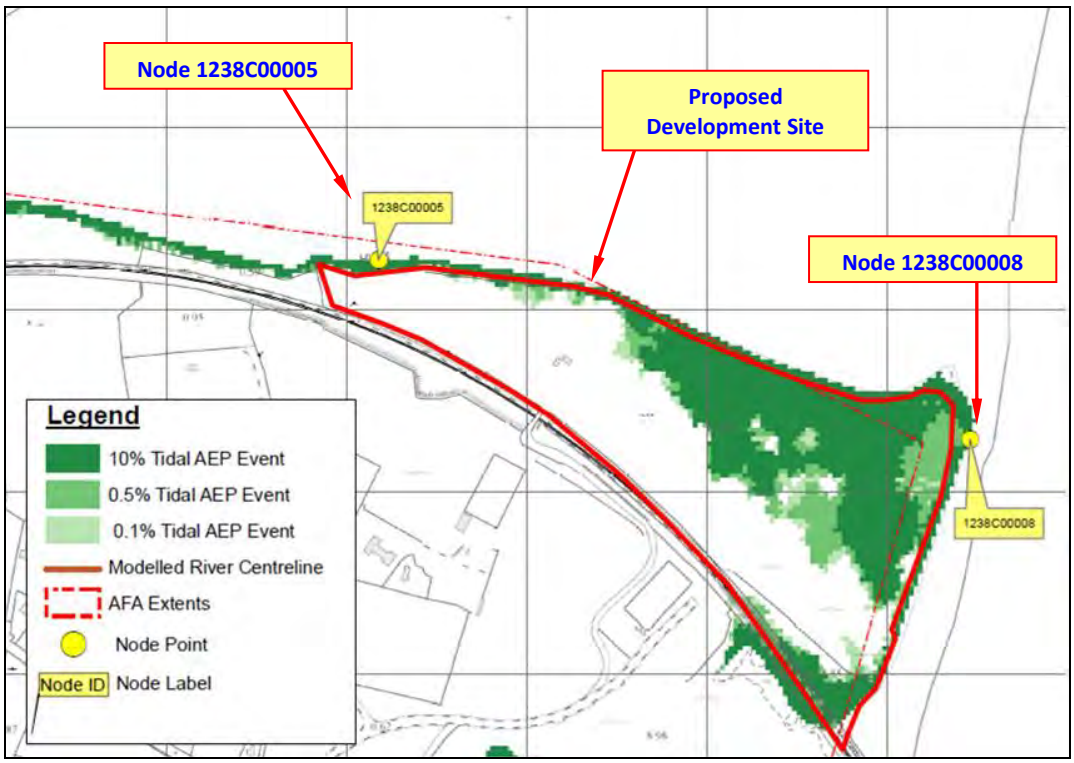


Figure 7.2.11 – CRAMS Final Tidal Flood Map

The above map also indicates the predicted flood levels for 10% AEP, 0.5% AEP and 0.1% AEP tidal flood levels at various node points along the modelled reach of the River Slaney. The closest tidal node points to the proposed development site are node points 1238C00005 *and 1238C00008*, as illustrated in *Figure 11* above.

Details of the predicted tidal flood levels for these node points are illustrated in *Table 3* below, which has been extracted from the Final CFRAMS flood maps references *O12WEX_EXCCD_F0_07*.

Node Label	Water Level (OD) 10% AEP	Flow (m^3/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m^3/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m^3/s) 0.1% AEP
1238C00005	1.39	N/A	1.67	N/A	1.84	N/A
1238C00008	1.03	N/A	1.66	N/A	1.84	N/A

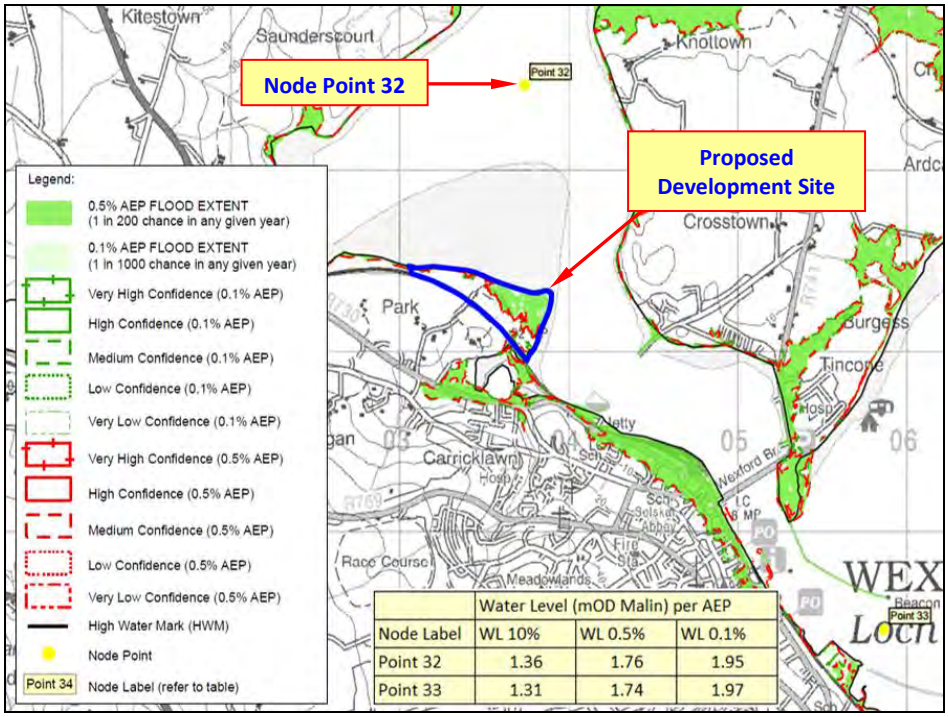
Table 7.2.3 –CFRAMS Tidal Map - Predicted Flood Levels & Volumes

7.2.4.7 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.

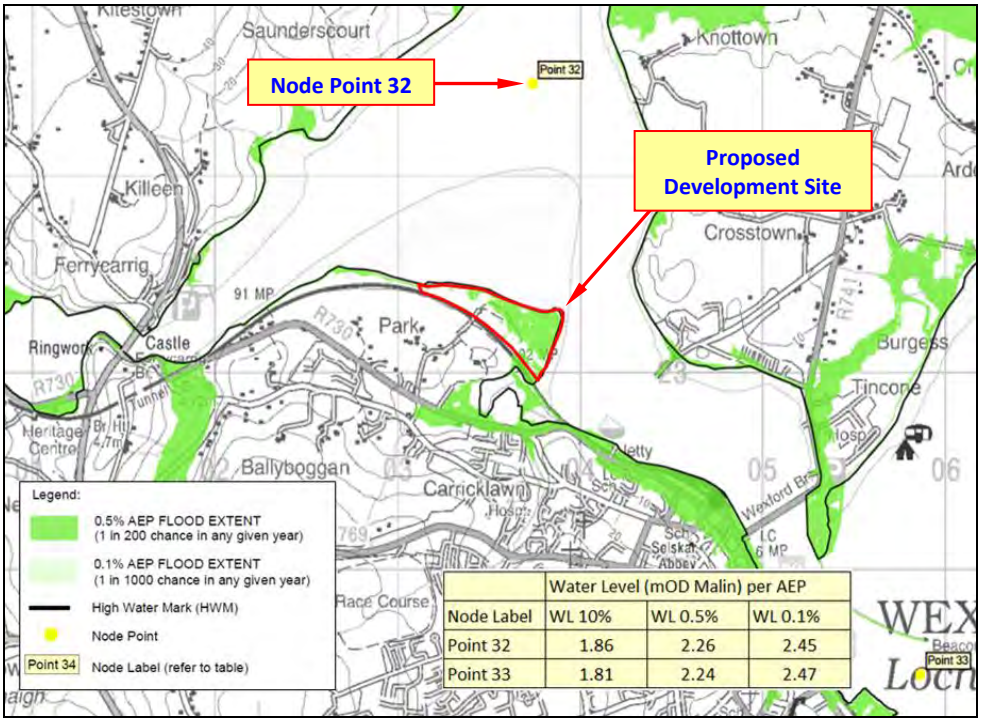
Coastal / tidal flood extent mapping was produced for the 0.5% and 0.1% return periods including allowances for projected future climate changes. In addition to the current scenario, two scenarios were considered representing a Mid-Range and High End Future Scenario, based on sea level rises of + 500mm and +1000mm respectively.

Figure 12, Figure 13 and *Figure 14* below (extracted from ICPSS flood maps *S/RA/EXT/19, S/RA/EXT/MRFS/18* and *S/RA/EXT/HEFS/19*), illustrates the predicted extreme 0.5% AEP (1 in 200 year) and 0.1% AEP (1 in 1000 year) flood extents in the vicinity of the proposed development site for the current, mid-range future and high end future scenarios.



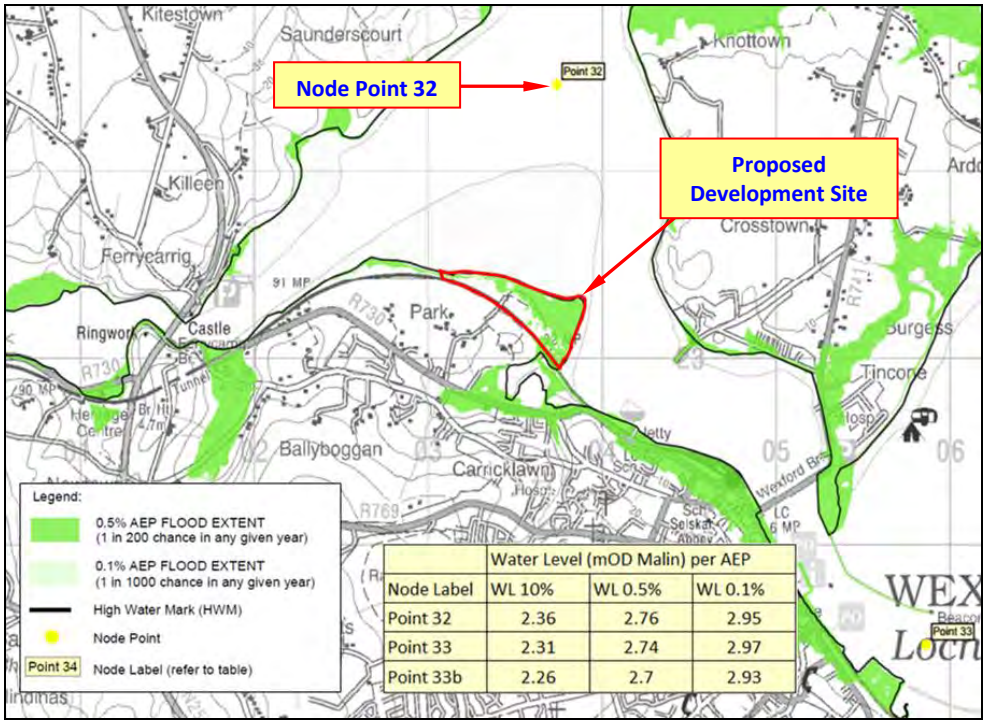
	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5%	WL 0.1%
Point 32	1.36	1.76	1.95
Point 33	1.31	1.74	1.97

Figure 7.2.12 – ICPSS Current Scenario Tidal Flood Extent Map



	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5%	WL 0.1%
Point 32	1.86	2.26	2.45
Point 33	1.81	2.24	2.47

Figure 7.2.13 – ICPSS Mid-Range Future Scenario Tidal Flood Extent Map



	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5%	WL 0.1%
Point 32	2.36	2.76	2.95
Point 33	2.31	2.74	2.97
Point 33b	2.26	2.7	2.93

Figure 7.2.14 – ICPSS High End Future Scenario Tidal Flood Extent Map

The ICPSS mapping for the area also provides information on predicted tidal flood levels at several node points in Wexford Harbour. The closest node point to the proposed development site is Node Point 32 located approximately 1 km north of the proposed site respectively. Predicted extreme flood levels at this node point are applicable for the purposes of estimation of extreme tidal flood levels at the location of the proposed development site. *Table 4* below illustrates the predicted extreme tidal flood levels for Node Point 32.

Scenario	Node 32 Extreme Tidal / Coastal Flood Level		
	10% AEP	0.5%AEP	0.1% AEP
	Water Level (m OD Malin)	Water Level (m OD Malin)	Water Level (m OD Malin)
Current	1.36	1.76	1.95
Mid-Range Future	1.86	2.26	2.45
High End Future	2.36	2.76	2.95

Table 7.2.4 – Predicted Tidal Water Levels at Node Point 32

7.2.4.8 Draft Wexford County Development Plan 2013-2019

As part of the Draft Wexford County Development Plan, a Strategic Flood Risk Assessment was prepared in accordance with the Guidelines for Planning Authorities 'The Planning System and Flood Risk Management'. The flood risk mapping produced as part of this assessment was collated from a number of sources and shows the delineation of Flood Zones 'A' and 'B' within Wexford town.

Figure 15 below illustrates the flood zone delineation mapping for the area of the proposed development site produced as part of this Strategic Flood Risk Assessment.

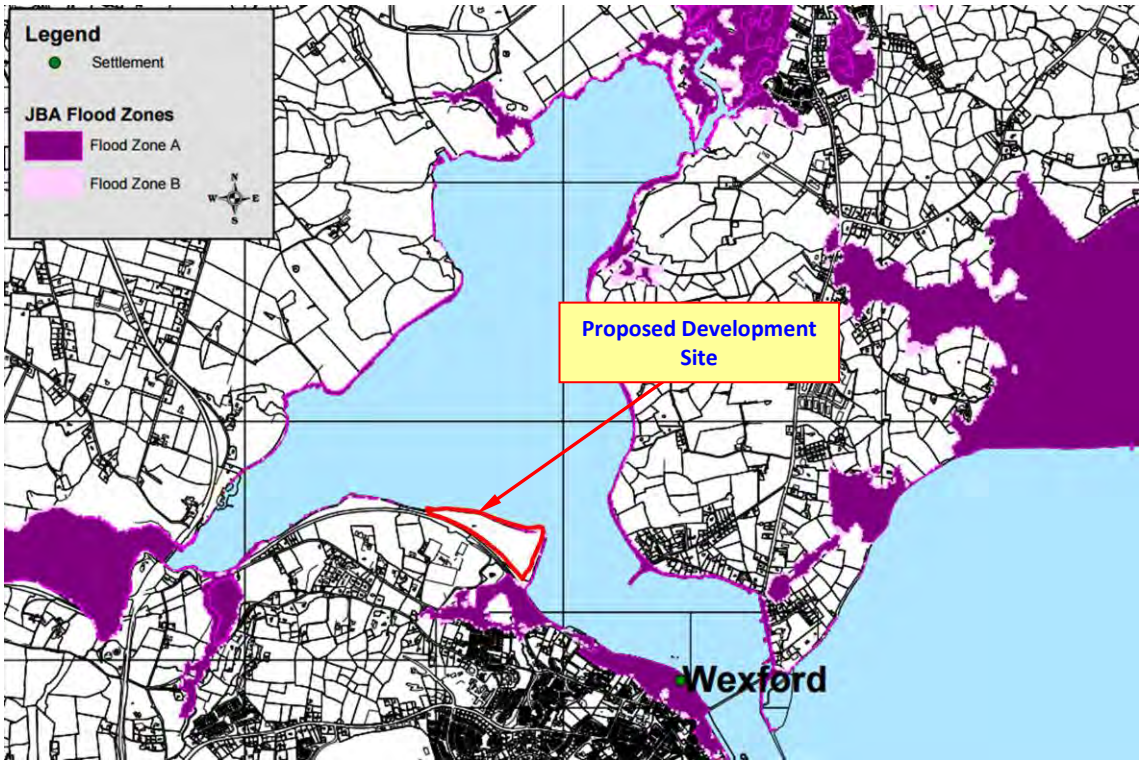


Figure 7.2.15 –Draft Wexford County Development Plan 2013-2019 SFRA Mapping

Figure 15 above indicates that area of the proposed development site does not fall within a delineated Flood Zone A and Flood Zone B. It should be noted that the estimated flood zone delineation illustrated in *Figure 15* above is intended for the purposes of a development plan assessment and are strictly indicative only. The Draft Wexford County Development Plan states that the above is an 'Indicative Flood Extent Map'.

7.2.5 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 above screening assessment indicates that areas of the proposed development site may be susceptible to fluvial and /or tidal flood risk due to an extreme flood event in the River Slaney Estuary.

Whilst the PFRA maps indicate potential areas of pluvial flooding within the site this due to localised undulations within the site as a result of quarry works that were undertaken at the site in the past. The site is not surrounded by significantly elevated lands and does not provide an important surface water discharge point to adjacent lands. Therefore the potential pluvial flood risk posed to the site is considered low.

In consideration of the information collated as part of the screening exercise, and the availability of other information and data specific to the proposed 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 tidal and fluvial flood extent maps available for the area produced as part of the South Eastern CFRAMS and the Irish Coastal Protection Strategy Study are based on the results of detailed hydrological and hydraulic modelling undertaken along the reach of the River Slaney and the Slaney Estuary in the vicinity of the proposed site, and therefore provide a reasonably accurate delineation of flood zones and prediction of extreme flood levels at this location. Hydrometric data from existing gauging stations in the area would have been incorporated in the CFRAMS hydraulic modelling of the River Slaney and the Estuary, thereby providing a reasonable high level of confidence in the prediction of flood extents and levels in the vicinity of the proposed site.

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

7.2.6 Assessing Flood Risk

The above screening assessment indicates that areas of the proposed development may be susceptible to direct fluvial and tidal flood risk due to an extreme flood event in the River Slaney and the Slaney Estuary. The following section assesses the flood risk to and from the proposed development site.

Tidal flood risk is normally assessed for a 1 in 200 (0.5% AEP) and 1 in 1000 year (0.1% AEP) tidal flood event and 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 in accordance with most county development plans and in accordance with the DOEHLG guidelines *'The Planning System and Flood Risk Management Guidelines'*.

7.2.6.1 Estimation of Extreme Tidal Flood Levels

Extreme tidal flood levels have also been derived as part of the Irish Coastal Protection Strategy Study at *Node Point 32* for the Current Scenario and the High End Future Scenario in the vicinity of the site as illustrated in *Table 5* below.

Scenario	Node 32 Extreme Tidal Flood Level	
	0.5% AEP WL (mOD)	0.1% AEP AEP WL (mOD)
Current	1.76	1.95
High End future	2.76	2.95

Table 7.2.5 – Tidal Flood Levels

7.2.6.2 Estimation of Extreme Fluvial Flood Levels

Extreme fluvial flood levels have also been derived as part of the South Eastern CFAM Study at *Node Point 12SLAN00012* in the vicinity of the site as illustrated in *Table 6* below.

Return Period	Node 32 (mOD)
1 in 100 Years (1% AEP)	1.34
1 in 1000 Years (0.1% AEP)	1.34

Table 7.2.6 – Fluvial Flood Levels

7.2.6.3 Contour Mapping and Flood Extent Delineation

In order to assist in the assessment of any potential flooding in the general area of the proposed development site and to enable an accurate representation of flood zone mapping to be developed, a detailed Digital Terrain Model (DTM) and contour mapping was developed to encompass the area of the proposed development site.

The DTM and contour mapping was developed using aerial flown Laser Imaging Detection & Ranging Data (LiDAR) acquired from the Ordnance Survey of Ireland for the Cancur Park area and using a specialist computer software package employed by IE Consulting. The LiDAR data supplied is referenced to the Irish Transverse Mercator (ITM) co-ordinate system and was supplied in ASCII file format. The DTM and contour mapping developed for the modelled area is illustrated in *Figure 14, Figure 14a, Figure 14b* and *Figure 15* below:-

Figure 7.2.14 – Contour Mapping

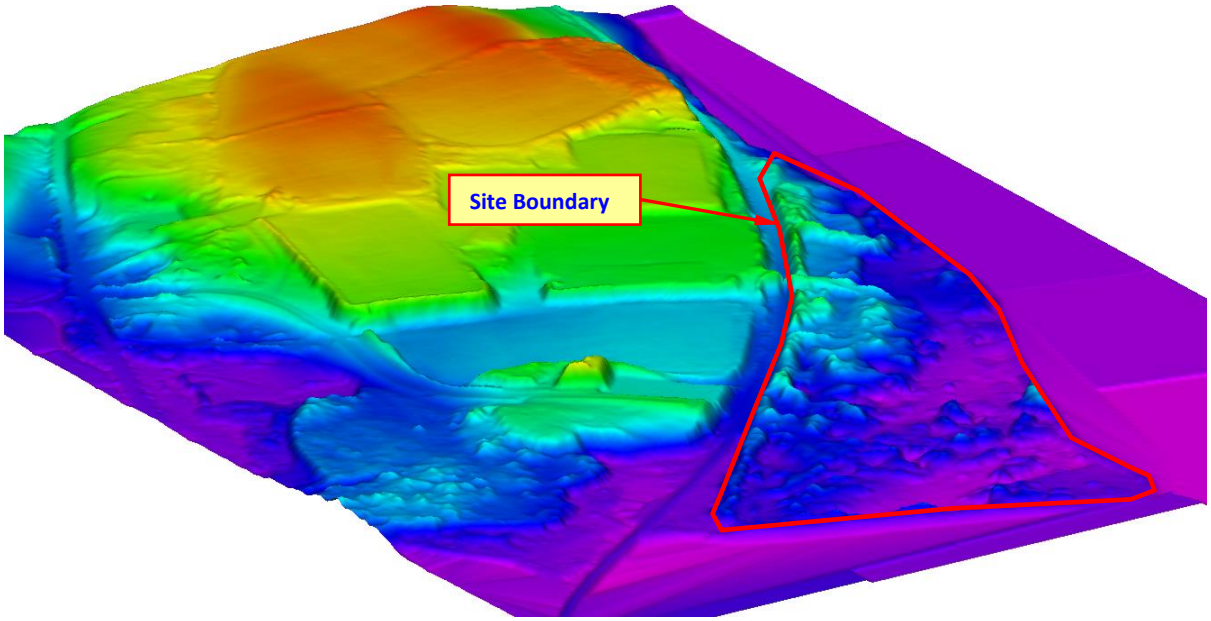


Figure 7.2.14a – LiDAR Derived DTM (Exaggerated Vertical Scale)

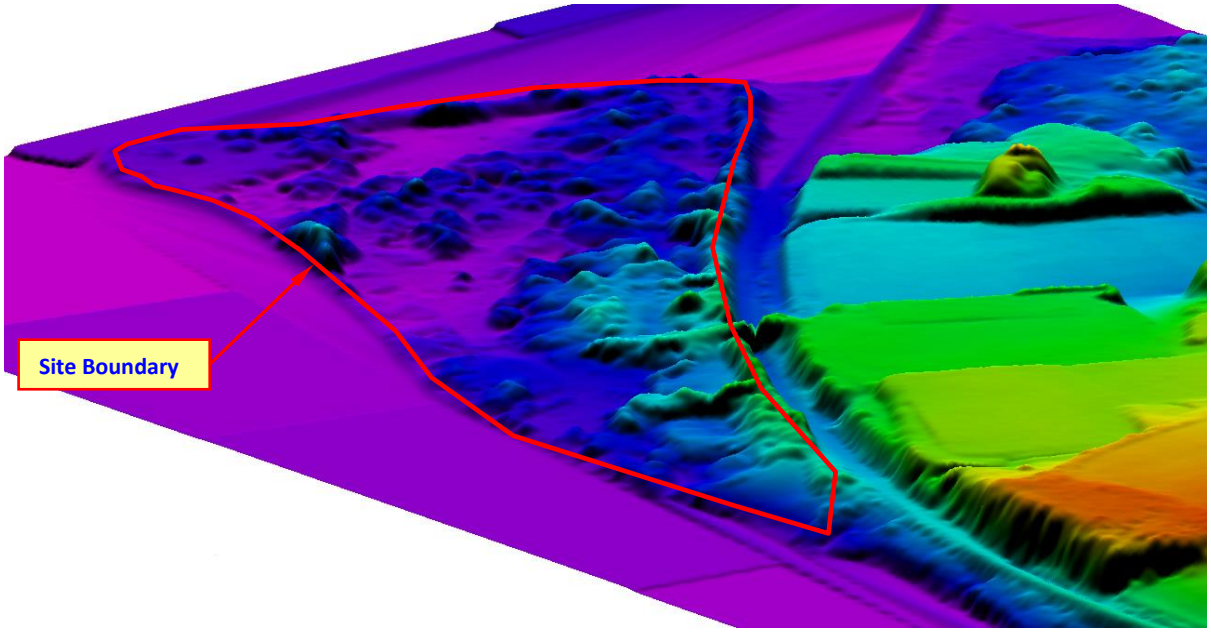


Figure 7.2.14b – LiDAR Derived DTM (Exaggerated Vertical Scale)

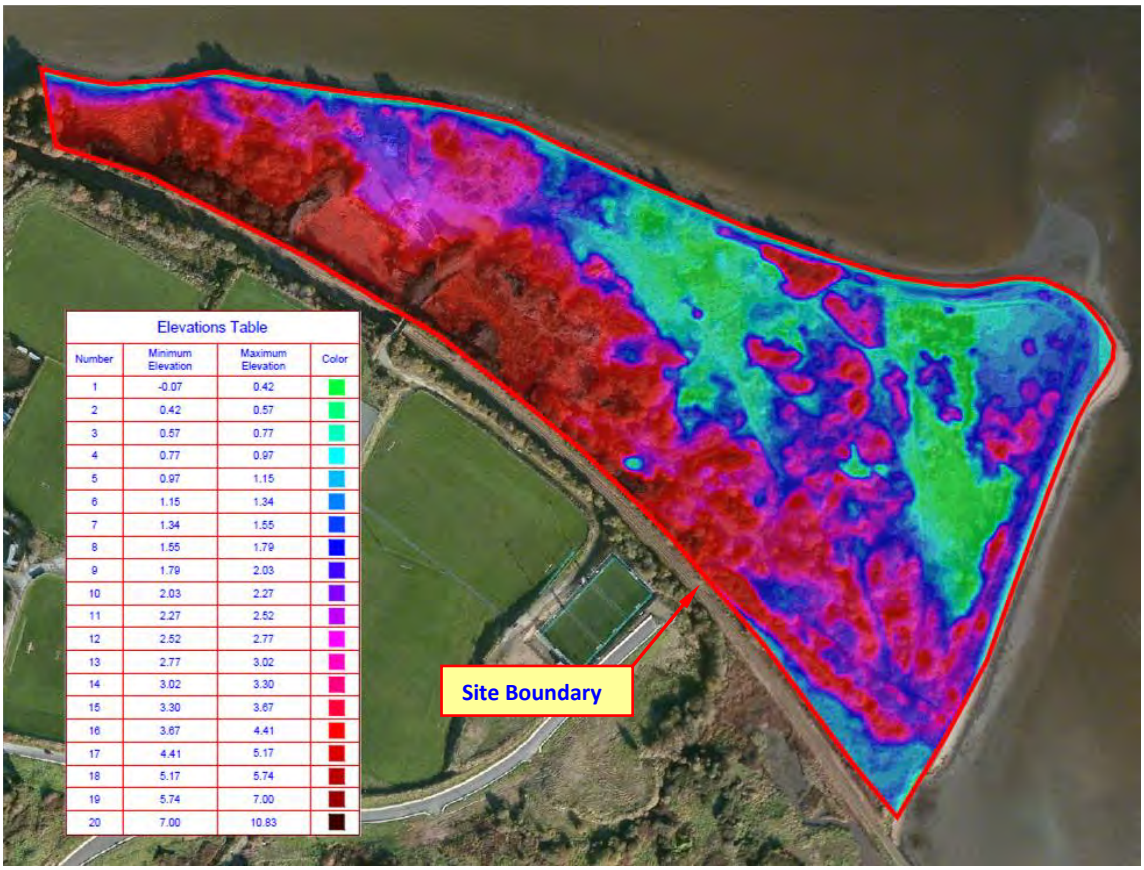


Figure 7.2.15 – LiDAR Derived DTM

7.2.6.4 Flood Zone Mapping & Delineation

Utilising the DTM illustrated in *Figure 14* and *Figure 15* above, and the calculated 1 in 100 year (1% AEP) and 1 in 1000 year (0.1% AEP) extreme fluvial flood levels for the River Slaney and the 1 in 200 year (0.5% AEP) and 1 in 1000 year (0.1% AEP) extreme tidal flood levels in the Slaney Estuary, the flood zones were delineated using the hydrology module of an appropriate software package. The software enables a user defined flood level to be mapped and modelled onto a DTM over the full extent of the area being assessed.

The highest topographical elevation within the boundary of the proposed development site is 10.831m OD, which is located adjacent to the south-western boundary of the site. The lowest point within the site is -0.07m OD, which is located in the eastern area of the site. The DTM illustrated in *Figure 15* above indicates that the north-eastern area of the site is below the extreme tidal and fluvial flood levels listed in *Table 5* and *Table 6* above. Drawing Numbers *IE1297-002-A*, *IE1297-003-A* and *IE1297-004-A Appendix A,* illustrates the delineated fluvial and tidal Flood Zone 'A' and Flood Zone 'B' over the full area of the proposed development site.

7.2.6.5 Flood Depth & Volume Analysis

An analysis was undertaken to assess the depths and volumes of flood waters that may potentially inundate the proposed development site during an extreme fluvial or tidal flood event in the River Slaney Estuary. Using the hydrology module of an appropriate software package further analysis was therefore undertaken to determine the range of flood water depths and volumes that may possibility inundate the area of the proposed development site.

Drawing Numbers *IE1297-005-A*, *IE1297-006-A* and *IE1297-007-A, Appendix A,* illustrate the calculated depth of flood waters that may occur within the undeveloped site boundary in consideration of 0.1% AEP fluvial and tidal flood events in the River Slaney and Slaney Estuary, including the Current and High End Future Scenarios for a 0.1% AEP tidal event. The possible depth of flood waters for these return periods is illustrated on the drawings via a graphical representation of flood depths within the boundary of the proposed development site and via a table of predicted flood water depths. The flood water depth table presents flood water depths over 20 separate elevation ranges within the boundary of the proposed development site.

By applying a Triangulated Irregular Network (TIN) analysis to the existing DTM surface and the predicted 0.1% AEP year extreme flood levels in the River Slaney and Slaney Estuary, the volume of flood waters which may inundate the proposed development site was calculated. Potential maximum and mean flood depths and volumes that may inundate the site are summarised in *Table 7* below.

	0.1% AEP Fluvial Flood Event	0.1% AEP Tidal Flood Event – Current Scenario	0.1% AEP Tidal Flood Event – High End Future Scenario
Maximum Flood Depth (m)	**1.410**	**2.020**	**3.020**
Mean Flood Depth (m)	**0.546**	**0.898**	**1.386**
Total Flood Water Volume (m^3)	**20,073.76**	**48,754.78**	**120,274.74**

Table 7.2.7 – Site Flood Depth and Inundation Volumes

7.2.6.6 Hydrological Impact of the Proposed Development

There is potential for surface water runoff generated within the proposed development site to result in an adverse impact to the existing hydrological regime of the area. Surface water runoff generated within the site shall be attenuated to Greenfield Runoff rates in accordance with the GDSDS to protect the hydrological regime of the area including the River Slaney and the Estuary.

There are five attenuation systems proposed within the development site, which have been designed for no flooding up to the 1 in 100 year rainfall event. The discharge from each of these attenuation systems shall be limited to Greenfield Runoff rates using a flow control device such as a 'Hydrobrake'. The discharge pipes shall be fitted with tidal flaps and shall discharge to the estuary.

The proposed surface water management system shall not result in any displacement of flood waters in the area. As such there will be no increase in runoff from the site beyond the 'greenfield' runoff rate and therefore the development as proposed will not pose an increased flood risk to the area.

7.2.7 Proposed 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*' this flood risk assessment has determined that areas within the proposed development site may fall within Flood Zone 'A' and Flood Zone 'B'. In accordance with the *'Planning System & Flood Risk Management Guidelines, DOEGLG, 2009*' development proposals for the site are subject to the requirements of The Justification Test.

7.2.8 Discussion

The above analysis and flood zone delineation undertaken as part of this Site Specific Flood Risk Assessment (SSFRA) indicates that areas of the proposed development site may be susceptible to flood inundation during an extreme fluvial or tidal event in the River Slaney and Slaney Estuary. In order to enable a sustainable development of the site and to reduce the risk of flood inundation to the site it is proposed to raise the existing ground levels within the site area to a minimum level of 2.95m OD, which is the predicted 1 in 1000 year (0.1% AEP) High End Future Scenario tidal flood level in the vicinity of the site. This level is 1m higher than the 1 in 1000 year tidal flood level for the Current Scenario and 1.61m higher than the predicted 1 in 1000 year fluvial flood level at this location.

Given the massively significant volumes of flood waters in the River Slaney Estuary during an extreme 0.1% AEP tidal flood event, displacement of these negligible volumes of flood waters from the area of the proposed development site would simply be attenuated within the vast volume of flood waters within the Estuary and would have an imperceptible impact on the hydrological regime of the area.

The volume of flood waters that may have inundated the existing site during a 1 in 1000 year (0.1% AEP) fluvial event has the potential to result in a displacement of approximately 20,073m^3 of floodwaters as result of raising the site to a minimum ground level of 2.95m OD. The estimated 0.1% AEP fluvial flood conveyance volume in the River Slaney in the vicinity of the proposed development site is approximately 739.19m^3/s (taken from the Draft CFRAMS map *O12WEX_EXFCD_C0_SH05* as this information was not included in the Final CFRAMS map*)*, therefore a volume of 20,073m^3 would equate to 27 seconds of the 1 in 1000 year (0.1% AEP) flood conveyance flow in the River Slaney. Displacement of this negligible volume of flood waters from the area of the proposed development site would simply be attenuated within the vast volume of flood waters within the River Slaney at this location and would have an imperceptible impact on the hydrological regime of the area.

In consideration of the above assessment and analysis, overall, development of the site is not expected to result in an adverse impact to the hydrological regime of the area and is not expected to adversely impact on adjacent lands or properties.

7.2.9 Hydromorphological Impact of Proposed Development

The proposed development may have the potential to impact on sediment transport with the River Slaney Estuary. Deposition of sediment material occurs in areas of low velocity within the Estuary and erosion occurs in areas of high velocity.

The site was examined for the deposition of sediment from the Estuary by carrying out a high resolution aerial survey and a detailed walkover survey by a hydrological engineer from IE Consulting.

This assessment demonstrated that the entire site is completed covered in dense and well established vegetation (excluding the immediate shoreline). There is no evidence to suggest any area of the site forms part of the natural sediment transportation and disposition regime of the Slaney Estuary. There was also no evidence to indicate any significant erosion within or along the boundary of the proposed development site.

Figure 16 and *Figure 17* below illustrate the established dense vegetated nature of the site and demonstrate that the site does not form an important part of the natural sediment transportation and disposition regime of the Slaney Estuary. Refer to *Appendix B* for detailed photos of the entire site.

Development of the site is therefore not expected to have an adverse impact on the existing hydromorphological regime of the Slaney Estuary.

Figure 7.2.16 – Aerial View of Northern Site Boundary

Figure 7.2.17 – Aerial View of Eastern Site Boundary

7.2.10 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 proposed development site is undefended, this Site Specific Flood Risk Assessment has determined that area of the proposed development site fall within Flood Zone 'A' and Flood Zone 'B'.

Table 3.1 of the guidelines lists the vulnerability class of various types of development. In consideration of the development proposals for the site (residential development) the development is considered as 'Highly Vulnerable Development'.

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, an area of the proposed development is categorised as 'Highly Vulnerable Development' and areas of the site fall within a delineated Flood Zone 'A' and Flood Zone 'B', therefore development proposals within delineated Flood Zone 'A' and Flood Zone 'B' are subject to the requirements of The Justification Test.

Where 'Highly vulnerable Development' is proposed within a delineated 'Flood Zone A' and Flood Zone 'B', the planning authority must be satisfied that the development satisfies the criteria of the Justification Test as described in Box 5.1 of the guidelines (*duplicated below*):-

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.

2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:

   (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;

   (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;

   (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and

   (iv) The development proposed addresses the above in a manner that is compatible with the achievement of wider planning objectives in relation to development of good urban design and Vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Each of the criteria listed in Box 5.1 above are considered as follows:-

1. *The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these guidelines.*

   Answer – The subject site is zoned for mixed use high density residential development under the Wexford Town & Environs Development Plan 2010 - 15 (Extended) with site specific development objectives for the provision of road infrastructure (Objective T8) access to the third river crossing point. Other objectives include provision of a river walk and landmark buildings to define the future entrance experience to the town and create a sense of place.

2. *The proposal has been subject to an appropriate flood risk assessment that demonstrates:*

   (i) The development proposed will not increase flood risk elsewhere and, if practical will reduce overall flood risk;

   Answer – Areas of the proposed undeveloped site may potentially be impacted by an extreme tidal or fluvial flood event in the River Slaney and Slaney Estuary. Development of the site will result in displacement of tidal and fluvial flood waters that may have inundated areas of the site pre-development.

   However, given the significant volumes of flood waters in the River Slaney Estuary during an extreme tidal or fluvial flood event, displacement of these negligible volumes of flood waters from the area of the proposed development site would simply be attenuated within the vast volume of flood waters within the River Slaney Estuary and would have an imperceptible impact on the hydrological regime of the area.

   The proposed surface water management system shall attenuate surface water runoff from the development to Greenfield Runoff rates in accordance with the GDSDS and shall not result in any displacement of flood waters in the area. As such there will be no increase in runoff from the site beyond the 'greenfield' runoff rate and therefore the development as proposed will not pose an increased flood risk to the area.

   (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;

Answer – The proposed development site shall be raised to a minimum level of 2.95m OD, which equates to the predicted 1 in 1000 year High End Future Scenario tidal flood level in the vicinity of the site. This level is 1m higher than the 1 in 1000 year tidal flood level for the Current Scenario and 1.61m higher than the predicted 1 in 1000 year fluvial flood level at this location.

It is recommended he proposed finished floor level shall be a minimum of 0.3m above the predicted 0.1% AEP High-End Future Scenario tidal flood level of 2.95m OD (2.95 + 0.3 = 3.25m OD). This shall minimise flood risk to property and residents.

(iii) *The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding or any future flood risk management measures and provisions for emergency services access;*

Answer – Access to the proposed development site during an extreme flood event is provided by raising the ground levels in the site to a minimum level of 2.95m OD, which is equates to the 1 in 1000 year (0.1% AEP) tidal flood level for the High End Future Scenario. There is minimal residual risk to the proposed development as the proposed ground levels are 1m above the peak 1 in 1000 year flood adjacent to the site for the Current Scenario.

(iv) *The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes;*

Answer – The site has benefited from a masterplan design process which was progressed in tandem with both a Natura Impact Assessment (NIA) and an Environmental Impact Assessment Report (EIAR). The result is a multi-disciplinary design response tailored to exploit the opportunities presented by the site with minimal impacts on the environment. All site specific policies of the Development Plan have been achieved. The development presents a considered and contemporary solution to extend and enrich Wexford Town while being sensitive to its riverside context. The proposed development will complement the existing skyline when viewed on approach from the northern side of the River Slaney and in urban design terms, will define the Northern termination point of the town.

7.2.11 Summary Conclusions & Recommendations

In consideration of the findings of this site specific flood risk assessment and analysis the following conclusions and recommendations are made in respect of the proposed development site:-

- *A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.*
- *The area of the proposed site has been screened, scoped and assessed for flood risk in accordance with the above guidelines.*
- *The primary flood risk to the proposed site can be attributed to an extreme fluvial and/or tidal flood event in the River Slaney and Slaney Estuary located adjacent to the northern and eastern boundaries of the site.*
- *Based on the Final CFRAM fluvial mapping in the vicinity of the site, the 1% AEP (1 in 100 Year – Flood Zone 'A') and 0.1% AEP (1 in 1000 year – Flood Zone 'B') extreme flood levels in the River Slaney in the vicinity of the proposed development site are predicted as 1.34 m OD (Malin) for both the 1% and 0.1% AEP events respectively.*
- *Based on the Irish Coastal Protection Strategy Study mapping in the vicinity of the site, the 0.5% AEP (1 in 200 Year – Flood Zone 'A') and 0.1% AEP (1 in 1000 year – Flood Zone 'B') extreme tidal flood levels in the River Slaney in the vicinity of the proposed development site are predicted as 1.76 m OD (Malin) and 1.95 m OD (Malin) for the Current Scenario and 2.76 m OD (Malin) and 2.95 m OD (Malin) for the High End Future Scenario respectively.*
- *A detailed Digital Terrain Model (DTM) has been developed for the area of the proposed development site. Utilising the DTM the predicted extreme fluvial and tidal flood extents have been delineated over the full extent of the proposed development site.*
- *In consideration of the findings of this Site Specific Flood Risk Assessment, and in the context of 'The Planning System & Flood Risk Management Guidelines – 2009' areas of the proposed development site fall within Flood Zone 'A' and Flood Zone 'B'.*
- *It is proposed to raise the existing ground levels within the site area to a minimum level of 2.95m OD, which is equal to the predicted 1 in 1000 year (0.1% AEP) High End Future Scenario tidal flood level in the vicinity of the site. This level of 2.95m OD is 1m above the 1 in 1000 year tidal flood level for the Current Scenario.*

- *It is recommended that the finished floor levels are constructed a minimum of 0.3m above the predicted 1 in 1000 year tidal flood level (0.1% AEP) for the High End Future Scenario, i.e. 2.95 + 0.3m = 3.25m OD (Malin).*
- *It is recommended that any existing or proposed surface water pipes or culverts within the site boundary are fitted with appropriately designed tidal flap valves.*
- *In consideration of the Current Scenario, the volume of tidal flood waters that may be displaced by the proposed development site are negligible in consideration of the occurrence of an extreme 0.5% AEP or 0.1% AEP tidal flood event in the Slaney Estuary. Displacement of these negligible volumes of flood waters from the area of the proposed development site would simply be attenuated within the vast volume of flood waters within the slaney Estuary and would have an imperceptible impact on the hydrological regime of the area.*
- *In consideration of the predicted 0.1% AEP flow rate in the River Slaney in the vicinity of the site the volume of fluvial flood waters that may be displaced by the proposed development site are negligible in consideration of the occurrence of an extreme 1 % AEP or 0.1% AEP fluvial flood event in the River Slaney. Displacement of these negligible volumes of flood waters from the area of the proposed development site would simply be attenuated within the vast volume of flood waters within the River Slaney and would have an imperceptible impact on the hydrological regime of the area.*
- *The proposed surface water management system shall attenuate surface water runoff from the development to Greenfield Runoff rates in accordance with the GDSDS and shall not result in any displacement of flood waters in the area. As such there will be no increase in runoff from the site beyond the 'greenfield' runoff rate and therefore the development as proposed will not pose an increased flood risk to the area.*
- *As discussed in Section 9 above, development of the site is therefore not expected to have an adverse impact on the existing hydromorphological regime of the Slaney Estuary.*
- *In consideration of the assessment and analysis undertaken as part of this Site Specific Flood Risk Assessment, overall development of the site is not expected to result in an adverse impact to the hydrological regime of the area and is not expected to adversely impact on adjacent lands or properties.*

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

APPENDIX 7.2.1

Drawing Number IE1297-001-A

Drawing Number IE1297-002-A

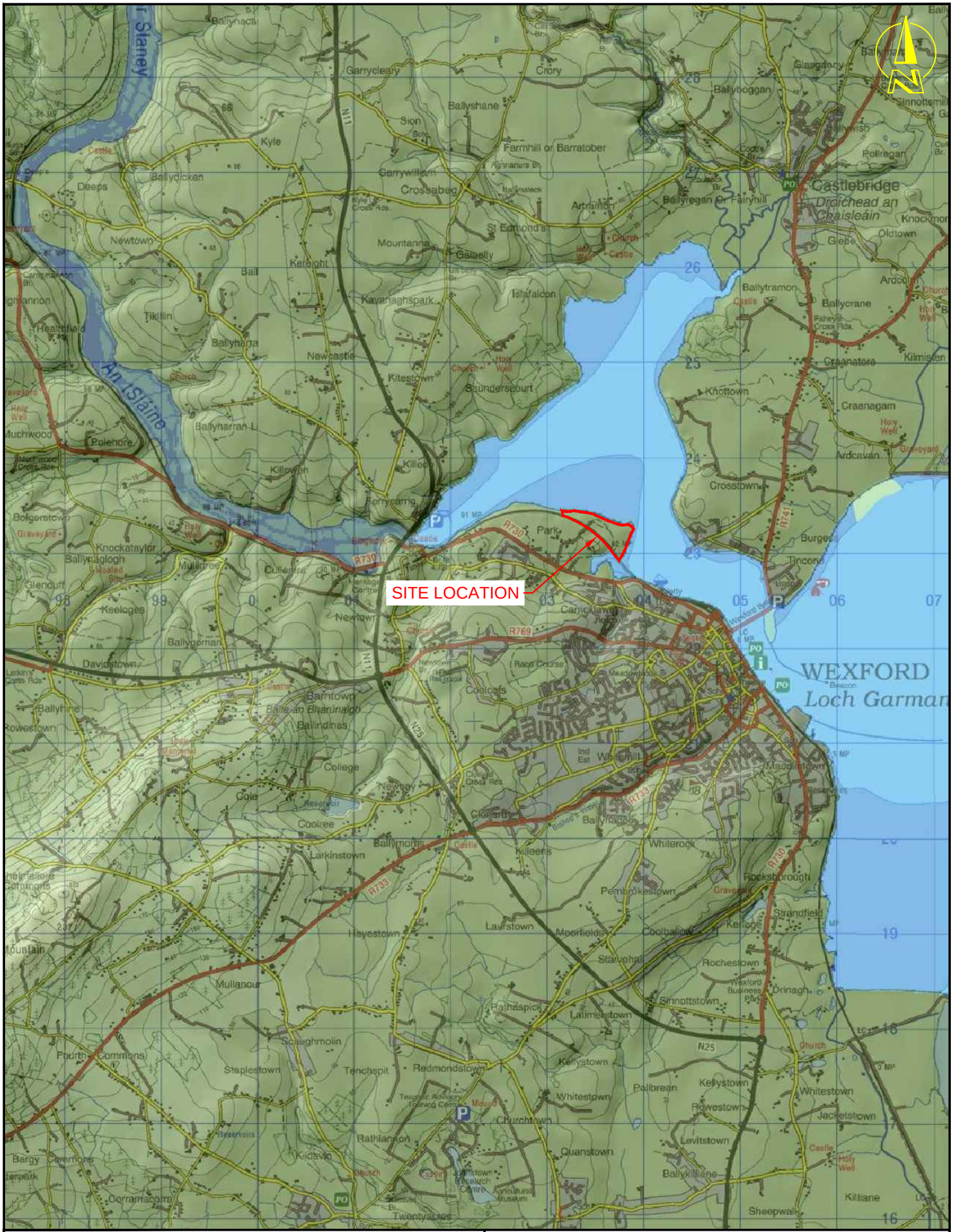
Drawing Number IE1297-003-A

Drawing Number IE1297-004-A

Drawing Number IE1297-005-A

Drawing Number IE1297-006-A

Drawing Number IE1297-007-A



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Project Title:	FLOOD RISK ASSESSMENT
Project Address:	CARCUR PARK, WEXFORD TOWN, CO. WEXFORD
Client:	WILLIAM NEVILLE AND SONS
Drg. Title:	SITE LOCATION MAP

Dwg.Scale:	Date:	Dwg.No:	Job No:	Revision:	Dwg.By:
1:50,000	21/12/16	IE1297-001	IE1297	A	DB

LEGEND

SITE BOUNDARY

100 YEAR & 1000 YEAR FLOOD EXTENT

rev.	date	amendment	drn	ckd
A	21.02.17	PLANNING	NOM	PMS

CARCUR PARK,
WEXFORD TOWN,
CO. WEXFORD

SITE SPECIFIC FLOOD
RISK ASSESSMENT

CURRENT SCENARIO
1 IN 100 YEAR & 1 IN 1000 YEAR FLUVIAL
FLOOD EXTENTS

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INNOVATION CENTRE
GREEN ROAD
CARLOW

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drawing no.	rev	checked:	PMS
IE1297-002	A	approved:	PMS
		date:	21.02.2017

LEGEND

- SITE BOUNDARY
- 200 YEAR TIDAL FLOOD EXTENT
- 1000 YEAR TIDAL FLOOD EXTENT

rev.	date	amendment	drn	ckd
A	21.07.17	PLANNING	NOM	PMS

CARCUR PARK,
WEXFORD TOWN,
CO. WEXFORD

SITE SPECIFIC FLOOD
RISK ASSESSMENT

CURRENT SCENARIO
1 IN 200 YEAR & 1 IN 1000 YEAR
TIDAL FLOOD EXTENTS

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WATER-ENVIRONMENTAL-CIVIL

INNOVATION CENTRE
GREEN ROAD
CARLOW

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drawing no. IE1297-003	rev A	checked: PMS	
		approved: PMS	
		date: 21.02.2017	

LEGEND

- SITE BOUNDARY
- 200 YEAR TIDAL FLOOD EXTENT
- 1000 YEAR TIDAL FLOOD EXTENT

rev.	date	amendment	drn	ckd
A	21.02.17	PLANNING	NOM	PMS

CARCUR PARK,
WEXFORD TOWN,
CO. WEXFORD

SITE SPECIFIC FLOOD
RISK ASSESSMENT

HIGH END FUTURE SCENARIO
1 IN 200 YEAR & 1 IN 1000 YEAR
TIDAL FLOOD EXTENTS

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

INNOVATION CENTRE
GREEN ROAD
CARLOW

TELEPHONE: 059 91 33084
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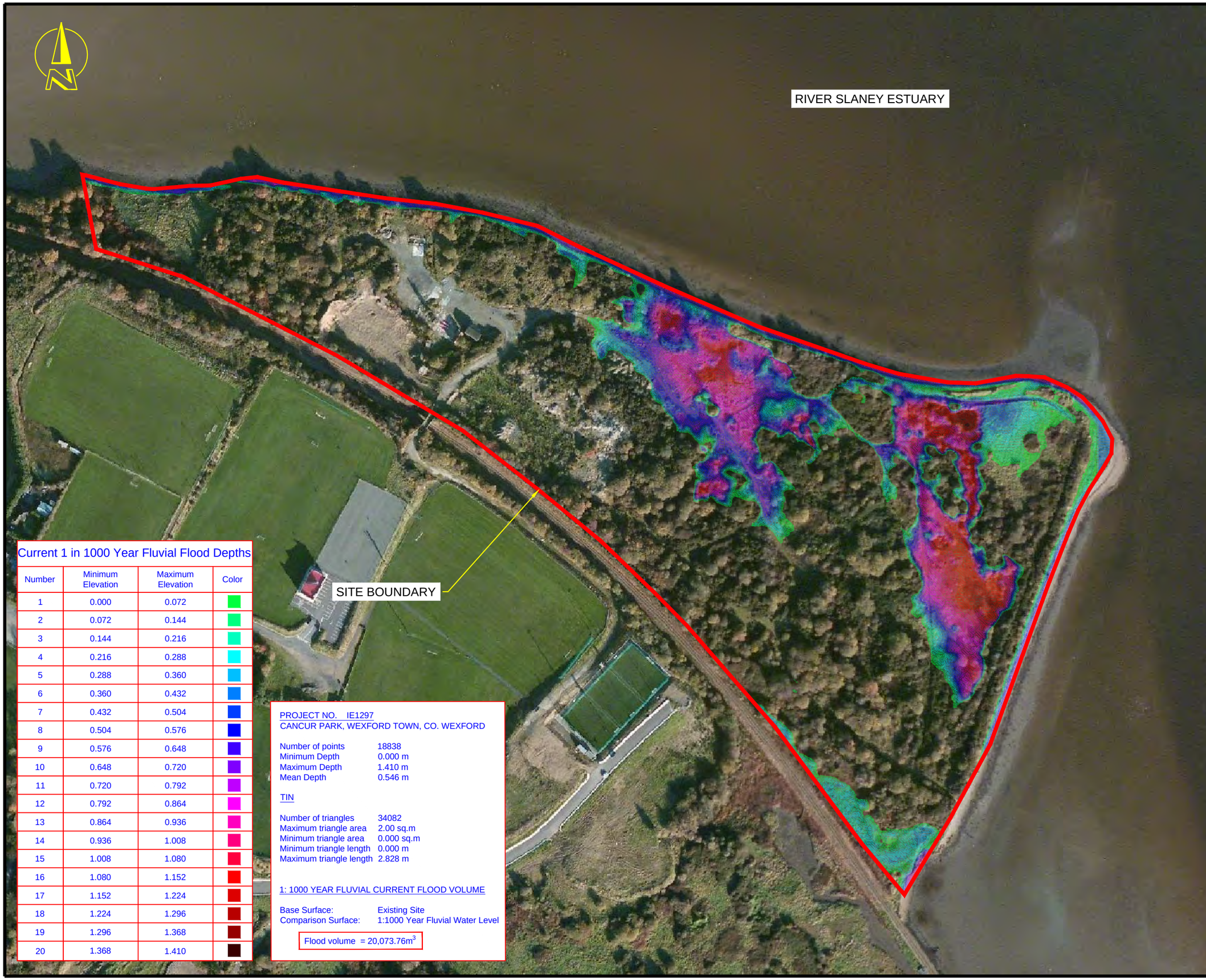
		drawn: NOM	
drawing no. IE1297-004	rev A	checked: PMS	
		approved: PMS	
		date: 21.02.2017	



Current 1 in 1000 Year Fluvial Flood Depths

Number	Minimum Elevation	Maximum Elevation	Color
1	0.000	0.072	
2	0.072	0.144	
3	0.144	0.216	
4	0.216	0.288	
5	0.288	0.360	
6	0.360	0.432	
7	0.432	0.504	
8	0.504	0.576	
9	0.576	0.648	
10	0.648	0.720	
11	0.720	0.792	
12	0.792	0.864	
13	0.864	0.936	
14	0.936	1.008	
15	1.008	1.080	
16	1.080	1.152	
17	1.152	1.224	
18	1.224	1.296	
19	1.296	1.368	
20	1.368	1.410	

PROJECT NO. IE1297
CANCUR PARK, WEXFORD TOWN, CO. WEXFORD

Number of points	18838
Minimum Depth	0.000 m
Maximum Depth	1.410 m
Mean Depth	0.546 m

TIN

Number of triangles	34082
Maximum triangle area	2.00 sq.m
Minimum triangle area	0.000 sq.m
Minimum triangle length	0.000 m
Maximum triangle length	2.828 m

1: 1000 YEAR FLUVIAL CURRENT FLOOD VOLUME

Base Surface:	Existing Site
Comparison Surface:	1:1000 Year Fluvial Water Level

Flood volume = 20,073.76m^3

LEGEND

SITE BOUNDARY

rev.	date	amendment	drn	ckd
A	21.02.17	PLANNING	NOM	PMS

CARCUR PARK,
WEXFORD TOWN,
CO. WEXFORD

SITE SPECIFIC FLOOD
RISK ASSESSMENT

CURRENT SCENARIO
1 IN 1000 YEAR (0.1% AEP)
FLUVIAL FLOOD WATER DEPTH ANALYSIS

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

INNOVATION CENTRE
GREEN ROAD
CARLOW

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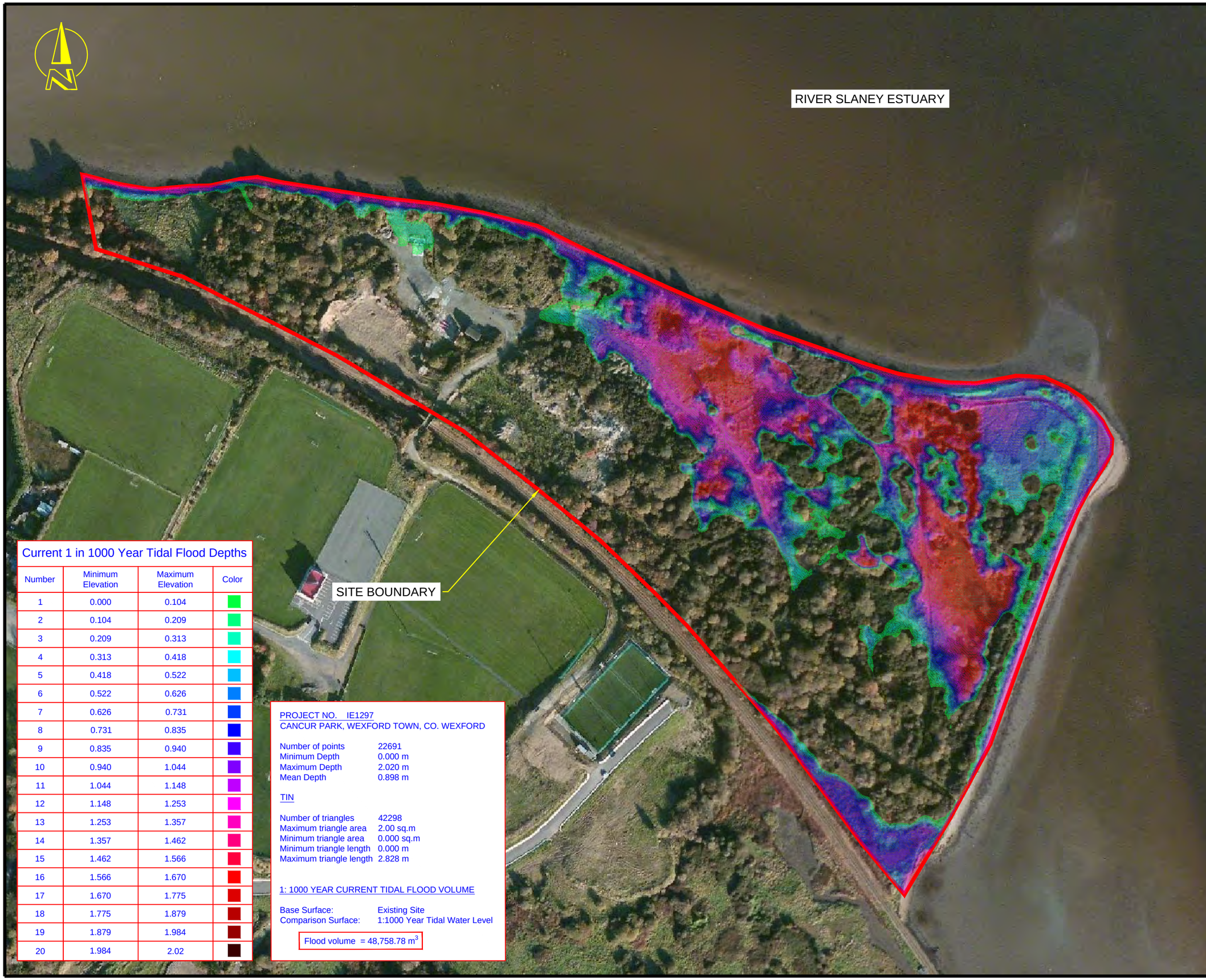

Current 1 in 1000 Year Tidal Flood Depths

Number	Minimum Elevation	Maximum Elevation	Color
1	0.000	0.104	
2	0.104	0.209	
3	0.209	0.313	
4	0.313	0.418	
5	0.418	0.522	
6	0.522	0.626	
7	0.626	0.731	
8	0.731	0.835	
9	0.835	0.940	
10	0.940	1.044	
11	1.044	1.148	
12	1.148	1.253	
13	1.253	1.357	
14	1.357	1.462	
15	1.462	1.566	
16	1.566	1.670	
17	1.670	1.775	
18	1.775	1.879	
19	1.879	1.984	
20	1.984	2.02	

PROJECT NO. IE1297
CANCUR PARK, WEXFORD TOWN, CO. WEXFORD

Number of points	22691
Minimum Depth	0.000 m
Maximum Depth	2.020 m
Mean Depth	0.898 m

TIN

Number of triangles	42298
Maximum triangle area	2.00 sq.m
Minimum triangle area	0.000 sq.m
Minimum triangle length	0.000 m
Maximum triangle length	2.828 m

1: 1000 YEAR CURRENT TIDAL FLOOD VOLUME

Base Surface:	Existing Site
Comparison Surface:	1:1000 Year Tidal Water Level

Flood volume = 48,758.78 m^3

LEGEND

SITE BOUNDARY

rev.	date	amendment	drn	ckd
A	21.02.17	PLANNING	NOM	PMS

CARCUR PARK,
WEXFORD TOWN,
CO. WEXFORD

SITE SPECIFIC FLOOD
RISK ASSESSMENT

CURRENT SCENARIO
1 IN 1000 YEAR (0.1% AEP)
TIDAL FLOOD WATER DEPTH ANALYSIS

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

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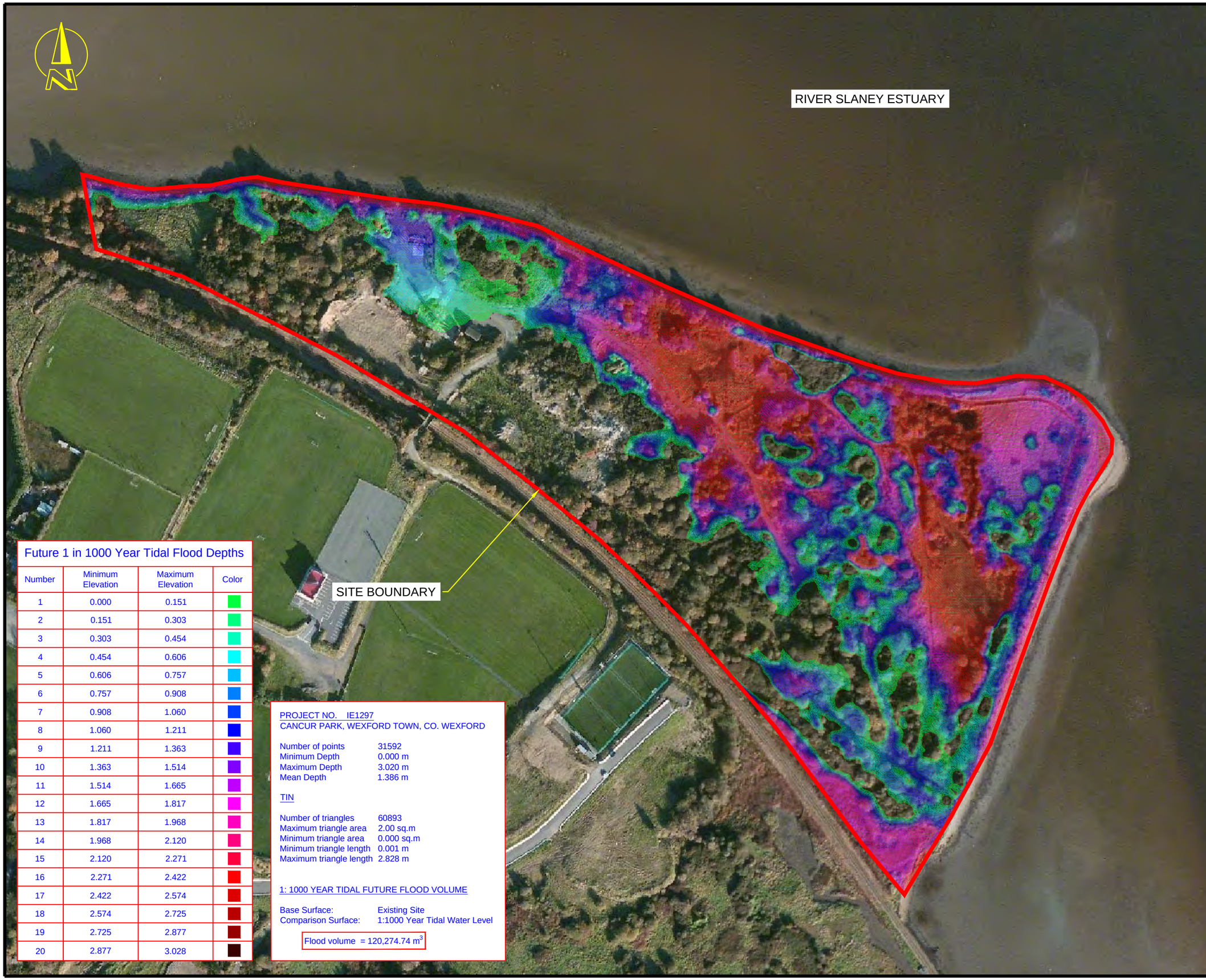

Future 1 in 1000 Year Tidal Flood Depths

Number	Minimum Elevation	Maximum Elevation	Color
1	0.000	0.151	
2	0.151	0.303	
3	0.303	0.454	
4	0.454	0.606	
5	0.606	0.757	
6	0.757	0.908	
7	0.908	1.060	
8	1.060	1.211	
9	1.211	1.363	
10	1.363	1.514	
11	1.514	1.665	
12	1.665	1.817	
13	1.817	1.968	
14	1.968	2.120	
15	2.120	2.271	
16	2.271	2.422	
17	2.422	2.574	
18	2.574	2.725	
19	2.725	2.877	
20	2.877	3.028	

PROJECT NO. IE1297
CANCUR PARK, WEXFORD TOWN, CO. WEXFORD

Number of points	31592
Minimum Depth	0.000 m
Maximum Depth	3.020 m
Mean Depth	1.386 m

TIN

Number of triangles	60893
Maximum triangle area	2.00 sq.m
Minimum triangle area	0.000 sq.m
Minimum triangle length	0.001 m
Maximum triangle length	2.828 m

1: 1000 YEAR TIDAL FUTURE FLOOD VOLUME

Base Surface:	Existing Site
Comparison Surface:	1:1000 Year Tidal Water Level

Flood volume = 120,274.74 m^3

LEGEND

SITE BOUNDARY

rev.	date	amendment	drn	ckd
A	21.02.17	PLANNING	NOM	PMS

CARCUR PARK,
WEXFORD TOWN,
CO. WEXFORD

SITE SPECIFIC FLOOD
RISK ASSESSMENT

HIGH END FUTURE
1 IN 1000 YEAR (0.1% AEP)
TIDAL FLOOD WATER DEPTH ANALYSIS

IE CONSULTING
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INNOVATION CENTRE
GREEN ROAD
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IE1297-007	A	approved:	PMS
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APPENDIX 7.2.2

Aerial Photographs

Photo 7.2.1 – Northern boundary

Photo 7.2.2 – North-eastern boundary

Photo 7.2.3 – North-eastern corner

Photo 7.2.4 – Eastern boundary

Photo 7.2.5 – South-eastern corner

Photo 7.2.6 –View from south-eastern corner looking north-west

Photo 7.2.7 –View looking north-west

Photo 7.2.8 –View looking north-west

Photo 7.2.9 –View looking west

Photo 7.2.10 –View looking at western corner of site

Photo 7.2.11 –View looking at western corner of site including abandoned quarry buildings

Photo 7.2.12 –View looking at western corner of site