PORT OF WATERFORD LTD

PORT OF WATERFORD MASTER PLAN

STRATEGIC FLOOD RISK ASSESSMENT

IE CONSULTING

WATER-ENVIRONMENTAL-CIVIL

Integrated Engineering Consulting

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Appendix A — *Drawing No. IE1689-001-B*
Drawing No. IE1689-002-C
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1 Introduction

IE Consulting was requested by Malone O'Regan Limited, on behalf of The Port of Waterford, to undertake a Strategic Flood Risk Assessment (SSFRA) in order to inform the SEA and Master Plan for the proposed Port of Waterford development works.

The purpose of this SFRA is to assess the potential flood risk to the SEA and Master Plan area.

A hydrological engineer from IE Consulting undertook a survey of the Master Plan area and surrounding catchment on 18th June 2018.

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

This SFRA 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

Master Plan Option 2.1, Option 2.2, Option 2.3, Option 2.4, Option 3 and widening at Bingledies Channel are located in the vicinity of the existing Belview Port facility site at Gorteens and Drumdowney Upper, Slieverue, Co. Kilkenny.

Master Plan Option 3, the shore site developments, are predominantly bounded to the north and east by agricultural lands, to the south by the River Suir and to the west by the Gorteens Stream as illustrated in *Figure 1* below. Master Plan Option 1.4 is located on the River Suir as illustrated in *Figure 1* below. Master Plan Option 1.1, Option 1.2, Option 1.3 and Placement Site are located on the River Barrow Estuary as illustrated in *Figure 2* below.

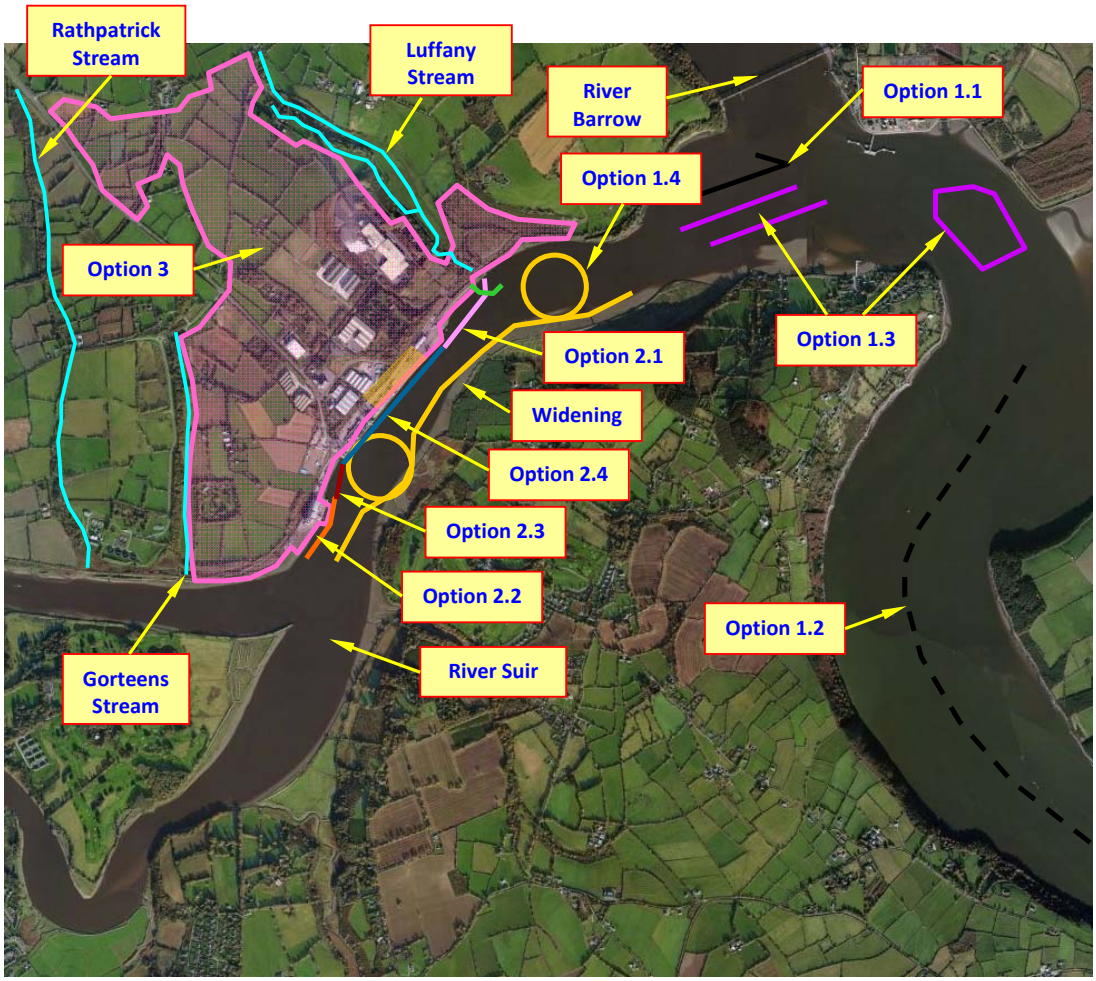


Figure 1 – Master Plan Options 1.1, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4 & 3 Locations

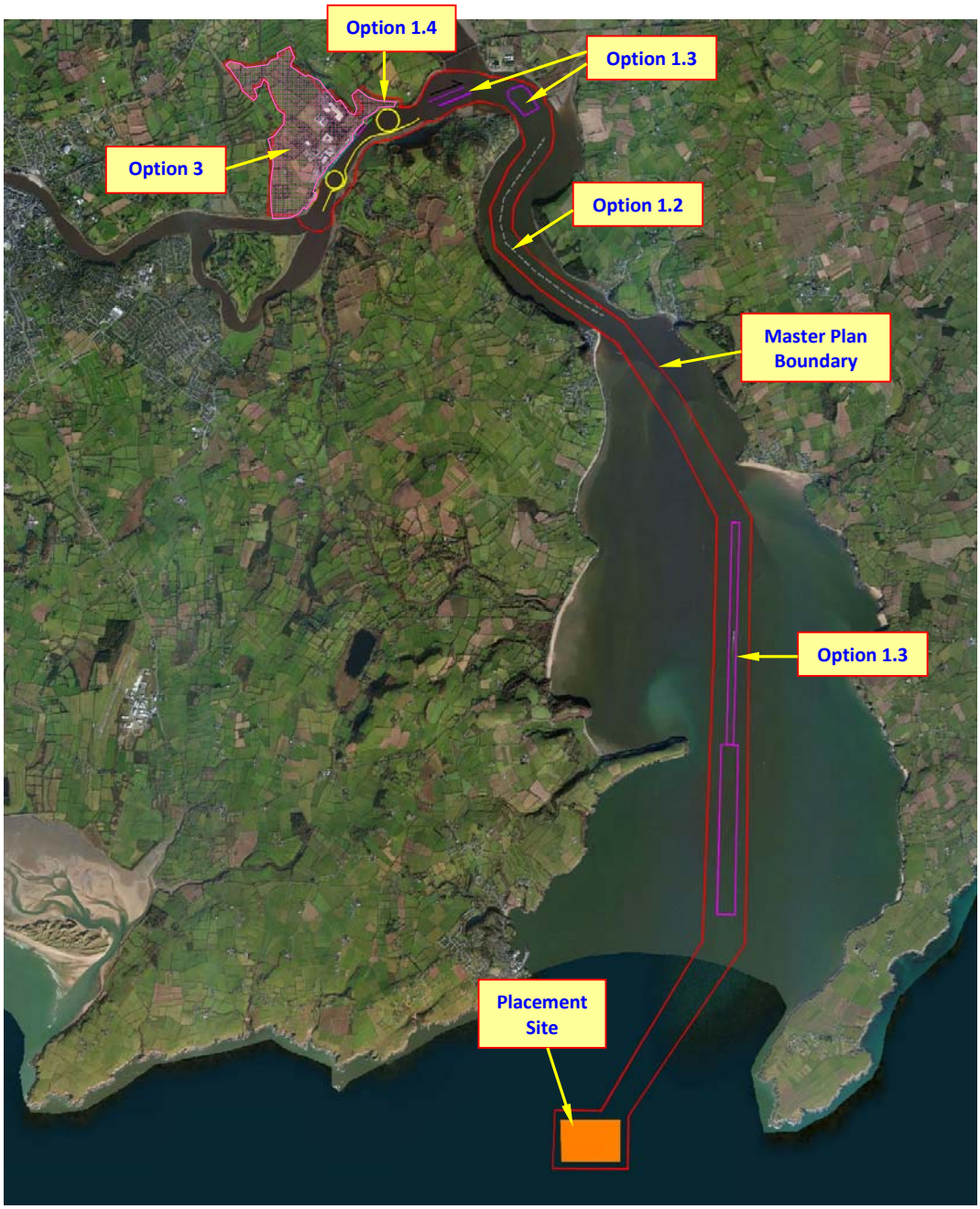


Figure 2 – Master Plan Options 1.2 & 1.3 Locations

Master Plan Options 1.1, 1.2, 1.3, 1.4 and 2.4 are in-channel and sub-surface works to be undertaken within the River Suir and River Barrow Estuary and are therefore not subject to flood risk. Detailed 2D hydrodynamic modelling undertaken by ABP Mer Ltd in respect of these works indicates that the works will not result in an adverse impact to the hydrological regime of the area or increase flood risk elsewhere. Therefore Options 1.1, 1.2 and 1.3 are not assessed further as part of this Strategic Flood Risk Assessment. .

2.2 Existing Topography Levels at Site

The lands for Master Plan Option 3, the shore site developments, slope moderately towards the River Suir at an approximate slope of 5.043% (1 in 19.83).

2.3 Local Hydrology, Landuse & Existing Drainage

The most immediate and significant hydrological features in the general vicinity of the Master Plan area are the River Suir, River Barrow, Luffany Stream, Gorteens Stream and the Rathpatrick Stream.

The River Suir is located adjacent to the south boundary of Master Plan Option 3 (*Figure 1* above) and is tidally influenced at this location. The River Suir converges with the River Barrow approximately 1.23Km east of the site at Cheek Point. The catchment area of the River Suir is approximately 3,563 km^2 to the confluence with the River Barrow.

The River Barow generally flows in a north to south direction 861m beyond the east boundary of Master Plan Option 3 (*Figure 1* above). The River Barrow converges with the River Suir approximately 1.23Km east of the site at Cheek Point. The catchment area of the River Barrow is approximately 3,015.7 km^2 to the confluence with the River Suir.

The Luffany Stream generally flows in a north-west to south-east direction through the boundary for Master Plan Option 3 (*Figure 1* above). The Luffany Stream discharges to the River Suir along the south boundary of Master Plan Option 3. Discharge from the Luffany Stream is controlled via a tidal valve.

The total catchment area of the Luffany Stream to the downstream boundary of the site is approximately 14.80km^2. Assessment of the upstream catchment area of the stream indicates a predominately rural catchment, with urban fraction accounting for less than 1.0% of the total catchment area.

The Gorteens Stream generally flows in a north to south direction adjacent to the western boundary of Master Plan Option 3 (*Figure 1* above). The Gorteens Stream discharges to the River Suir at the south-west corner of the Master Plan Option 3 boundary.

The total catchment area of the Gorteens Stream to the downstream boundary of the site is approximately 1.35km^2. Assessment of the upstream catchment area of the stream indicates a predominately rural catchment, with urban fraction accounting for less than 1.0% of the total catchment area.

The Rathpatrick Stream generally flows in a north to south direction 520m beyond the west boundary of Master Plan Option 3 (*Figure 1* above). The Rathpatrick Stream discharges to the River Suir 525m beyond the south-west corner of the Master Plan Option 3 boundary.

The total catchment area of the Rathpatrick Stream to the downstream boundary of the site is approximately 2.79km^2.

Assessment of the upstream catchment area of the stream indicates a predominately rural catchment, with urban fraction accounting for less than 9.4% of the total catchment area.

Figure 3 below illustrates the catchment area of the Luffany Stream, Gorteen Stream and Rathpatrick Stream in the vicinity of the Master Plan area.

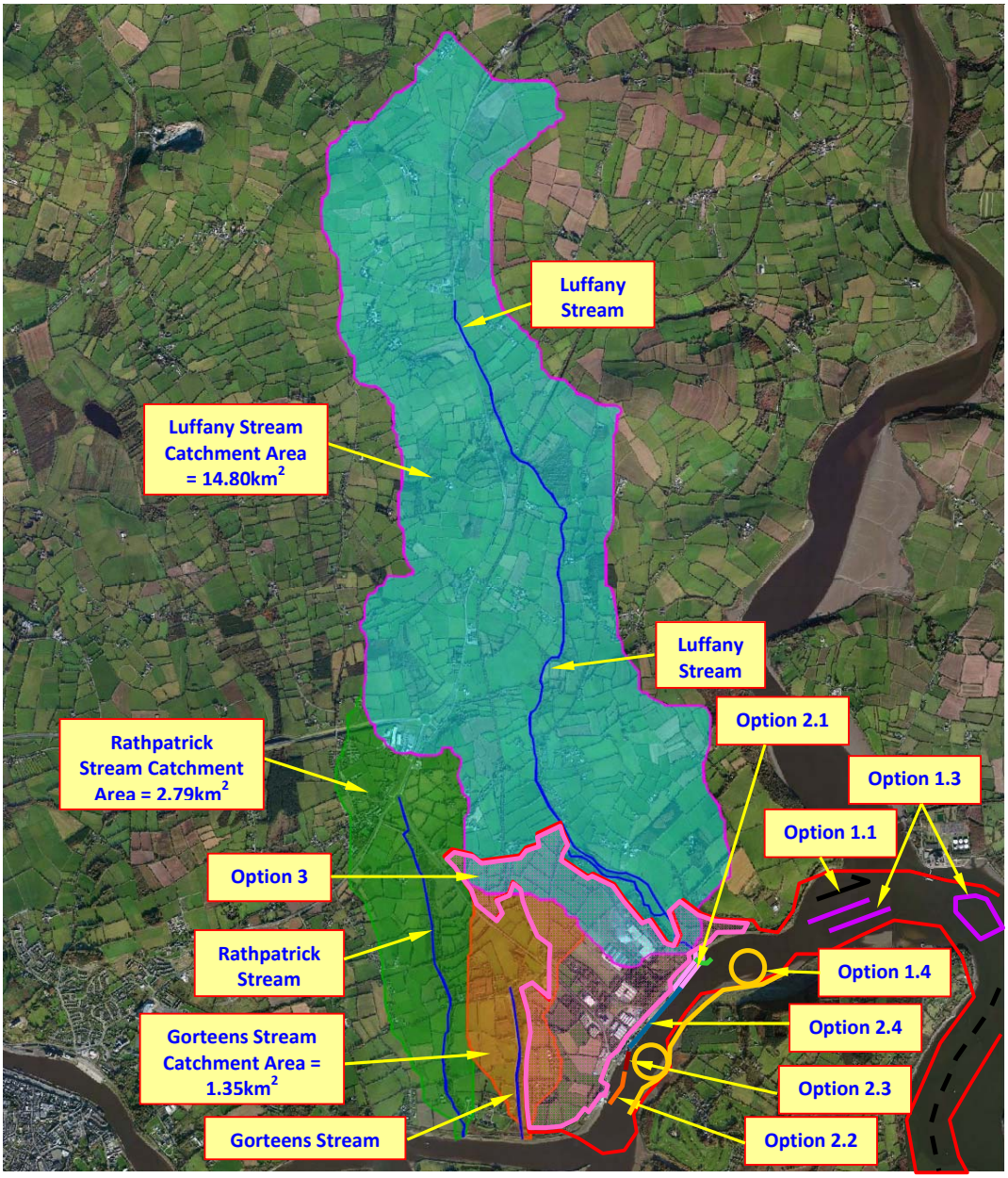


Figure 3 – Watercourse Catchment Areas

3 Initial Flood Risk Assessment

The flood risk assessment for the Master Plan area is undertaken in three principle 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 Master Plan area:-

Source/Pathway	Significant?	Comment/Reason
Tidal/Coastal	Yes	Master Plan Option 3 lands are located adjacent to the River Suir which is tidally influenced at this location.
Fluvial	Yes	The Luffany Stream flows through the Master Plan Option 3 boundary and the Gorteens Stream and Rathpatrick Stream are located adjacent to the west boundary of Master Plan Option 3.
Pluvial (urban drainage)	No	There is no significant urban drainage infrastructure in the vicinity of the Master Plan Option 3.
Pluvial (overland flow)	Possible	The Master Plan Option 3 lands slope from its northern parts, are bounded by elevated lands to the north and may provide a surface water discharge point to adjacent lands.
Surcharge/ Blockage	No	There are no significant hydraulic structures in the vicinity of Master Plan Option 3.
Groundwater	No	There are no significant springs or groundwater discharges recorded in the immediate vicinity of the Master Plan Option 3.

Table 1

The primary potential flood risks to the Master Plan area can be attributed to a tidal/coastal event in the River Suir and a fluvial flood event in the Luffany Stream/Gorteens Stream. Potential secondary flood risk can be attributed to overland pluvial flow from elevated lands to the north of the site.

In accordance with '*The Planning System and Flood Risk Management – Guidelines for Planning Authorities - DoEHLG 2009'* these potential flood risks are analysed in the subsequent *'Screening Assessment'* and *'Assessment of Flood Risk'* section of this study.

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 Master Plan area:-

4.1 OPW/EPA/Local Authority Hydrometric Data

Existing sources of OPW, EPA and local authority hydrometric data were investigated. This assessment has determined that there are a number of gauging stations in the vicinity of the Master Plan area. The location of the gauging stations is illustrated in *Figure 4* below. These stations are entered into the Register of Hydrometric Stations in Ireland as Station Numbers 16063 (Barrowbridge Downstream), 16065 (Great Island), 14066 (Barrowbridge Upstream) and 16064 (Cheekpoint).

Gauging Stations 16063, 16064 and 14066 are operated and controlled by the New Ross Port Company. Gauging Station 14066 is controlled by the ESB.

The register lists station number 16065 as inactive and station numbers 16063, 16064 and14066 as active, with recordings of water level only.

Data from these stations was not readily available and is therefore not considered further as part of this Site Specific Flood Risk Assessment.

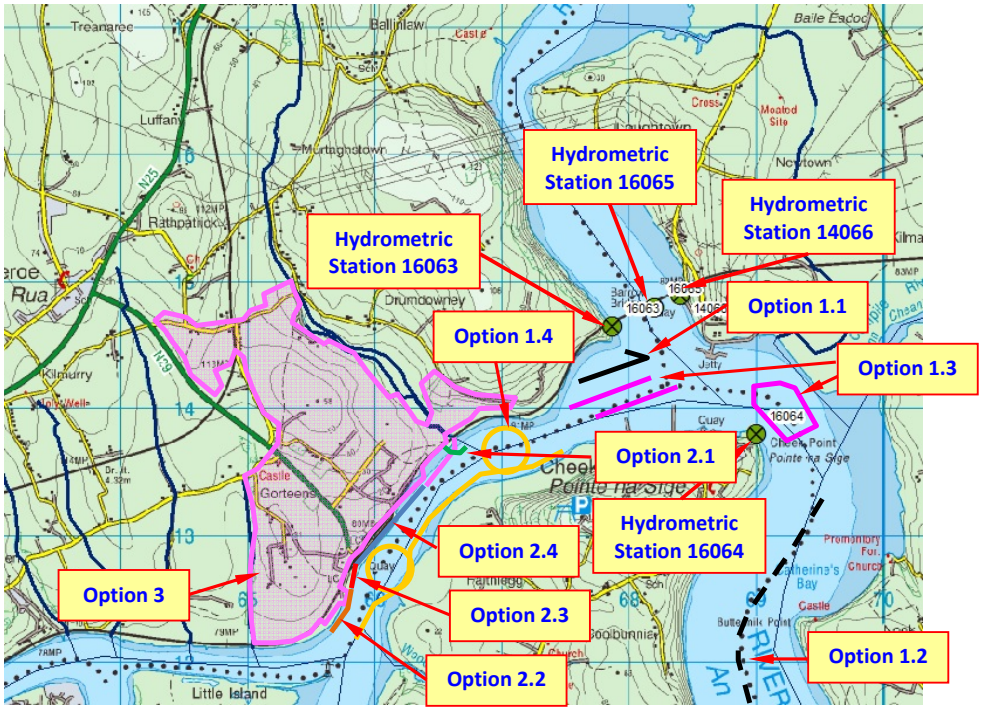


Figure 4 – Location of Gauging Stations

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 5 below illustrates an extract from the above indicative flood map in the vicinity of the Master Plan area.

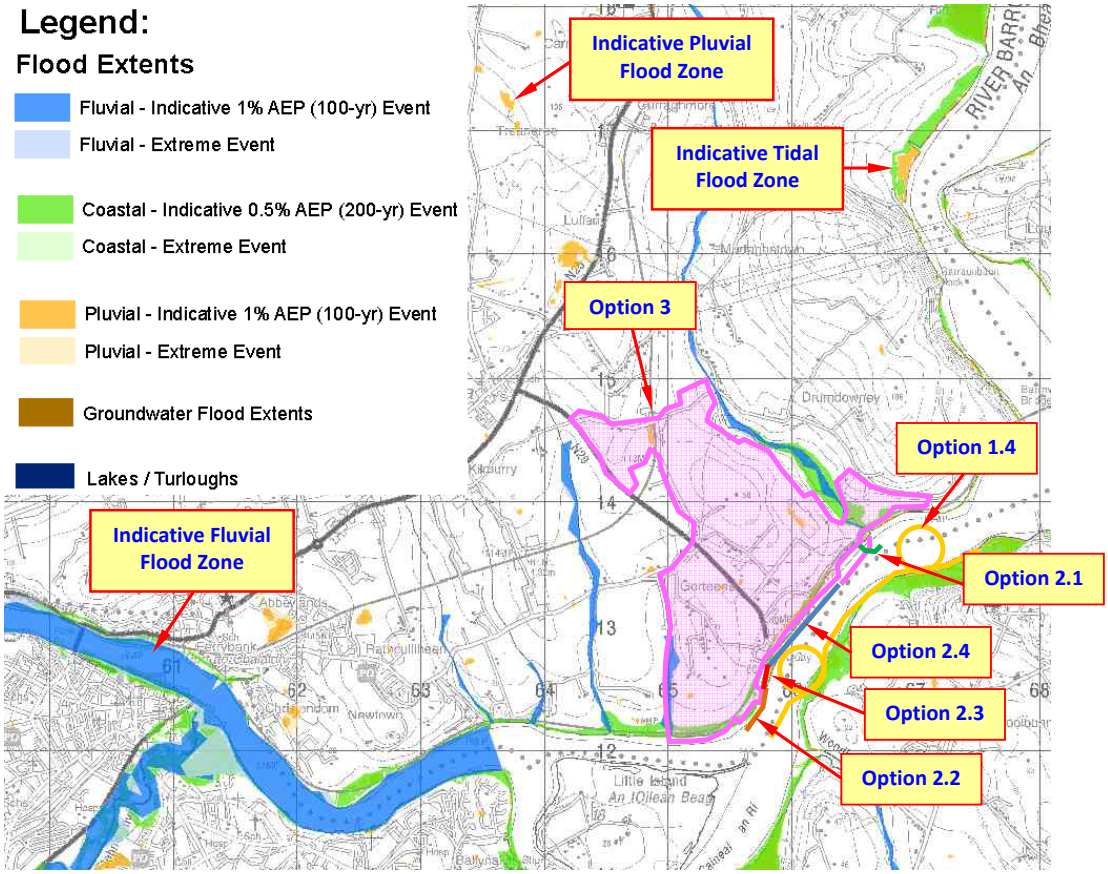


Figure 5 – PFRA Mapping

The PFRA flood mapping above indicates areas of indicative fluvial flooding mapped within the north-east and adjacent to the west boundary of the Master Plan Option 3 boundary.

The PFRA flood mapping indicates several small areas of indicative pluvial flooding mapped within the boundary of the Master Plan Option 3 and areas of potential tidal flooding mapped within the north-eastern and southern boundary of the Master Plan Option 3.

Figure 6 below illustrates the PFRA indicative flood zones from *Figure 5* overlaid onto higher resolution background mapping.

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

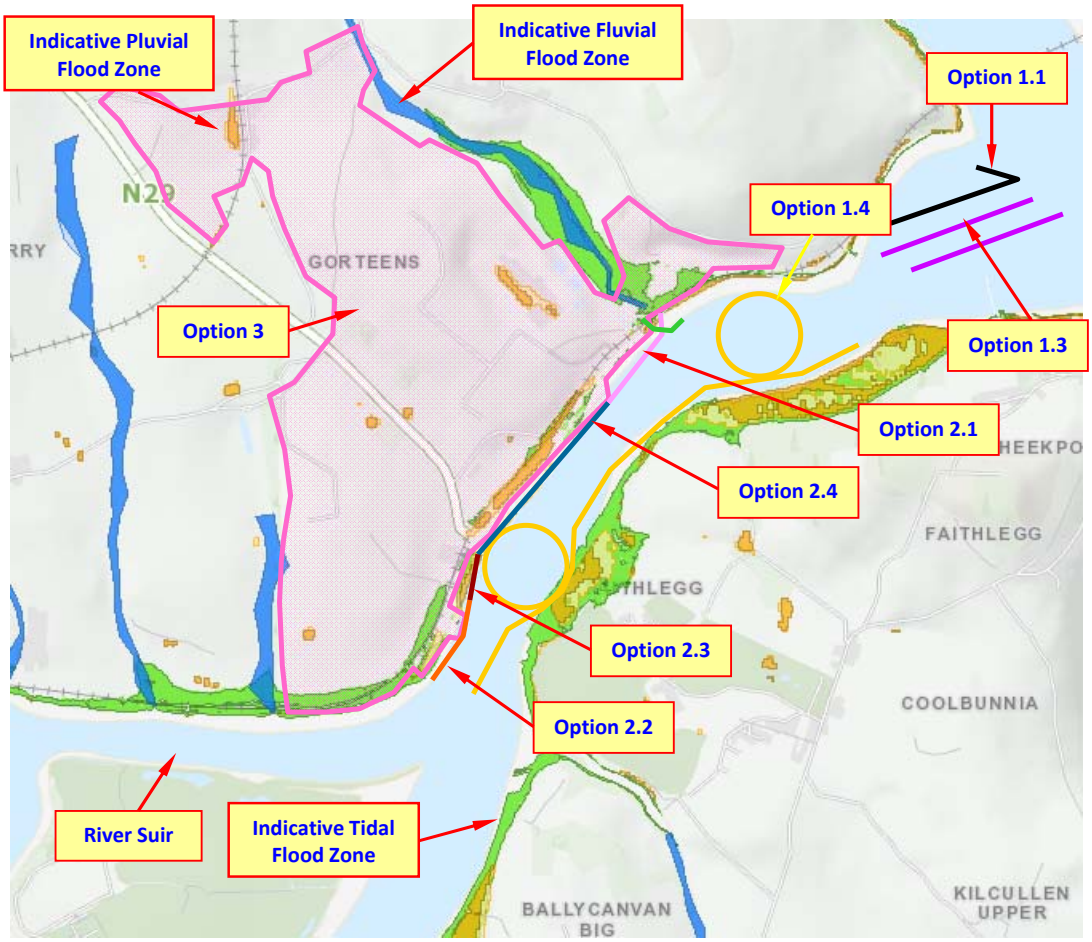


Figure 6 – PFRA Indicative Flood Mapping

4.3 OPW Flood Maps Website

The OPW Flood Maps Website (www.floods.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences in the vicinity of the Master Plan area. *Figure 7* below illustrates mapping from the Flood Maps website in the vicinity of the Master Plan area.

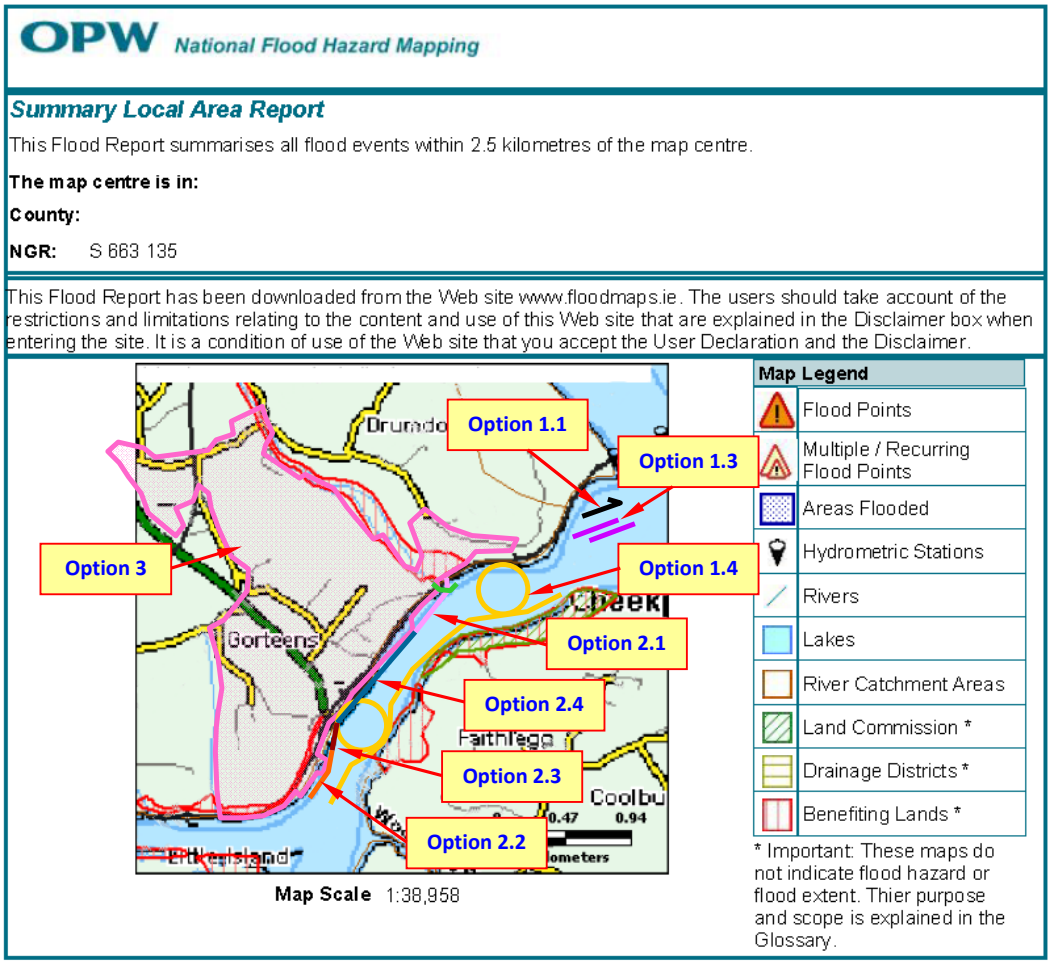


Figure 7 – OPW Flood Maps

Figure 7 above indicates that no historical incidents of flooding have been recorded in the vicinity of the Master Plan area. However, an area in the north-east of the Master Plan Option 3 boundary is mapped as falling within an area of Benefitting Lands. Whilst benefiting lands does not specifically indicate lands that may be at risk of flooding, it does indicate lands that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945).

4.4 Ordnance Survey Historic Mapping

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

Figures 8 and *Figure 9* below show the historic mapping for the area of the Master Plan.

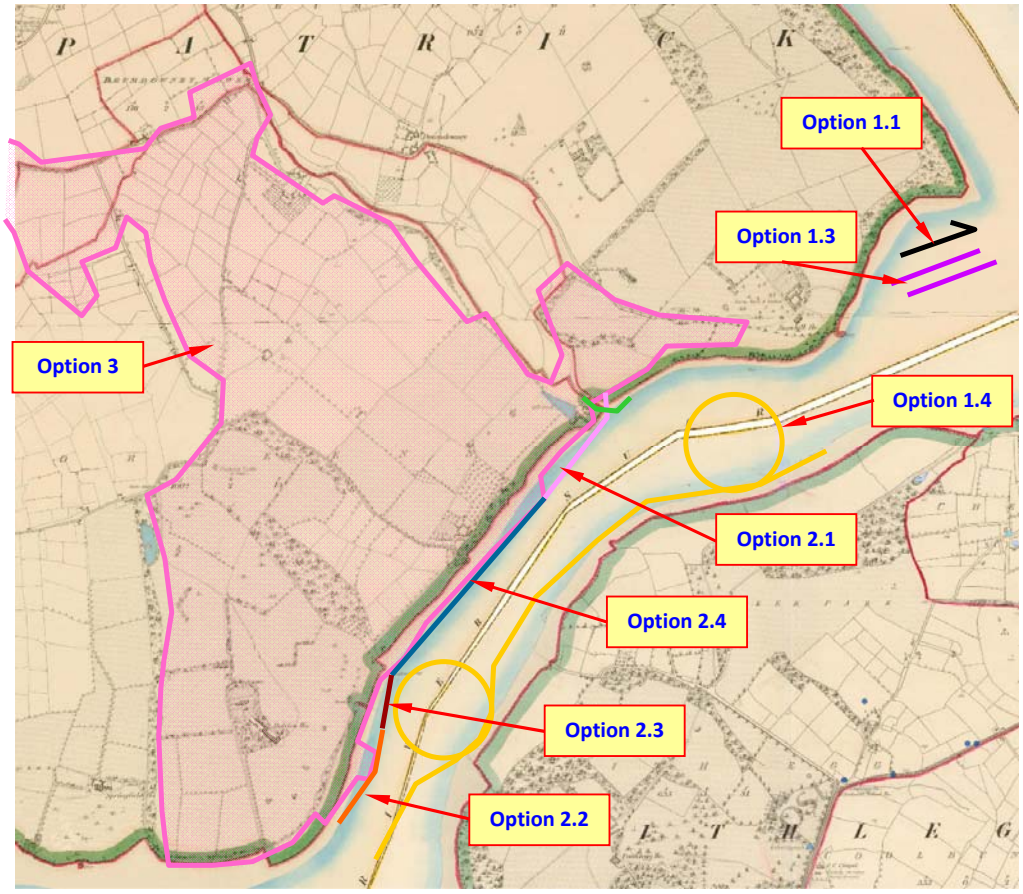


Figure 8 – Historic 6-Inch Mapping

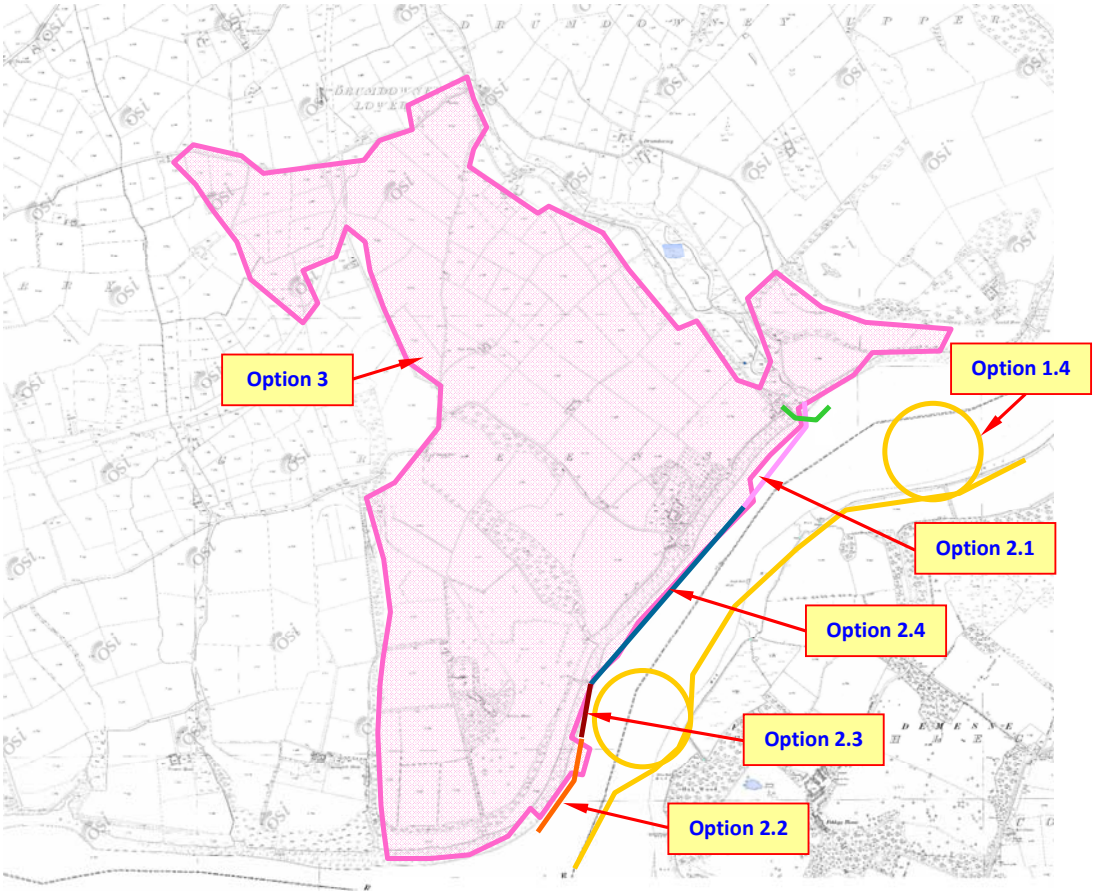


Figure 9 – Historic 25-Inch Mapping

The historic 6 inch map does not indicate any historical or anecdotal instances of flooding within or adjacent to the boundary of the Master Plan area.

4.5 Geological Survey of Ireland Mapping

The alluvial deposit maps of the Geological Survey of Ireland (GSI) were consulted to assess the extent of any alluvial deposits in the vicinity of the Master Plan area. Alluvial deposits can be an indicator of areas that have been subject to flooding in the recent geological past.

Figure 10 below illustrates the sub-soils mapping for the general area of the Master Plan area.

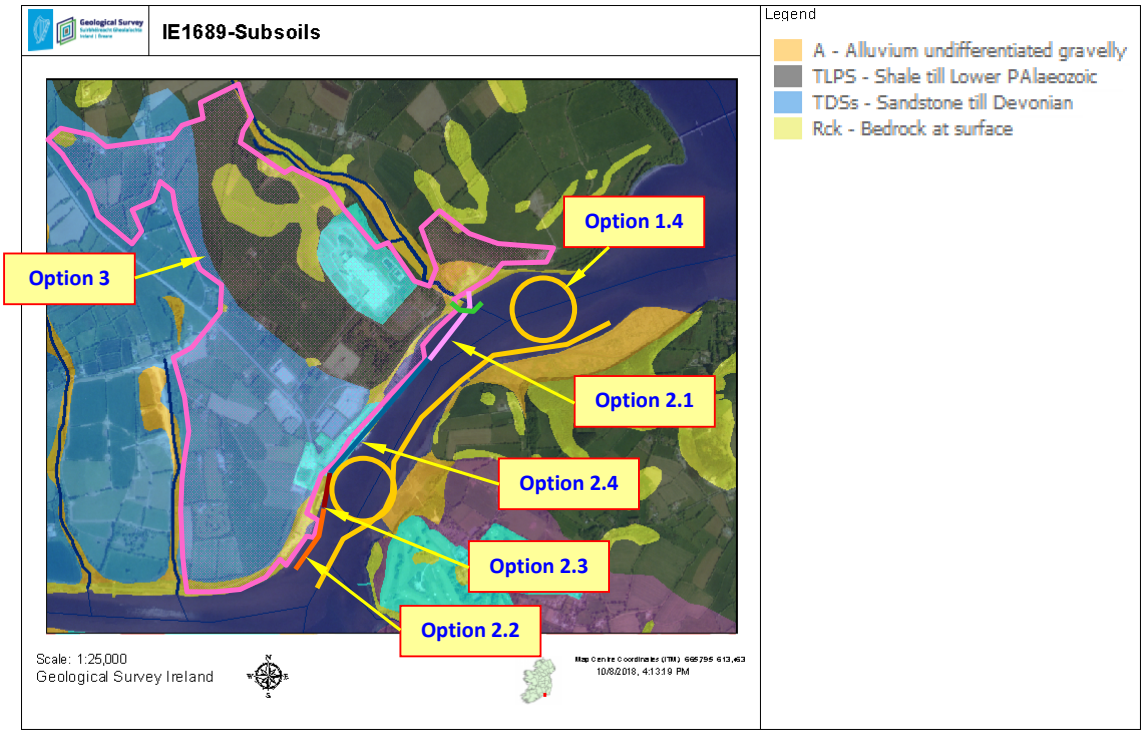


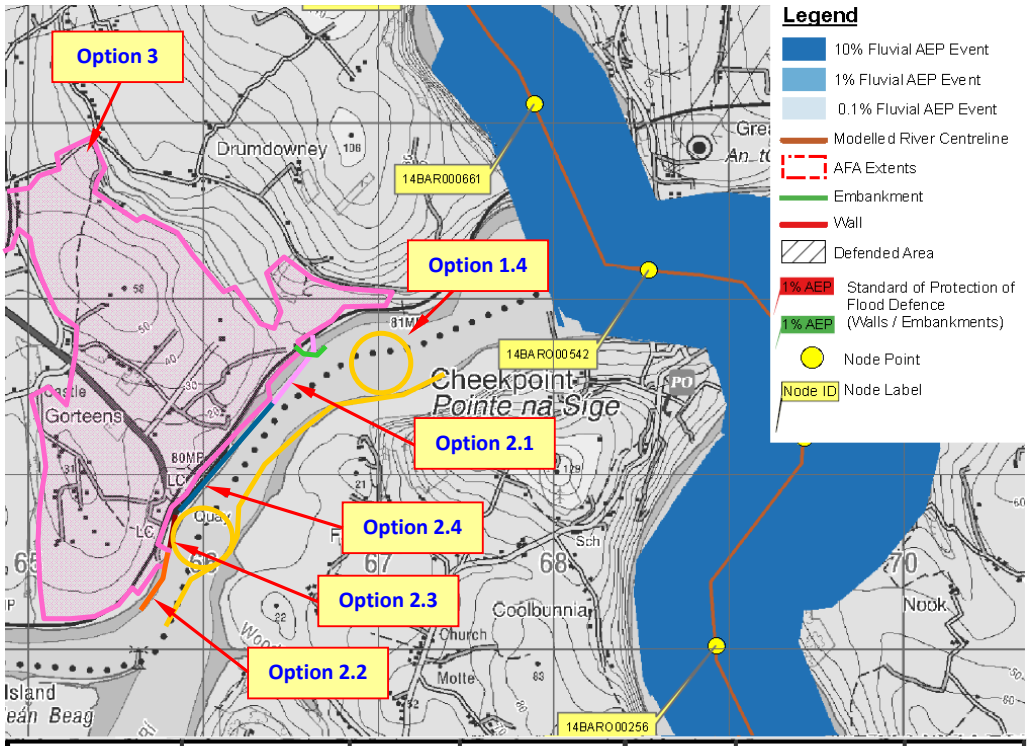
Figure 10 – GSI Subsoil Mapping

Figure 10 above indicates that the Master Plan Option 3 site is underlain by Devonian Sandstone till and Palaeozoic Shale till and to a lesser extent Made Ground and rock with an area of alluvium deposits mapped in the north east of the Master Plan Option 3 site boundary.

4.6 South Eastern Region CFRAM Study

The South Eastern Region Catchment Flood Risk & Management Study (CFRAMS) has been completed in 2015/2016. To date draft flood risk extent and depth maps for further assessment areas within the County Kilkenny area have been produced. These maps and details can inform relevant flood mitigation and management schemes. At present there are no CFRAM flood maps available for the reach of the River Suir adjacent to and within the Master Plan area. Draft CFRAMS predictive flood maps are however available for the reach of the River Barrow that falls within the Master Plan area. Draft CFRAMS predictive flood map number O14NRO_EXFCD_C0_SH09 illustrates predictive extreme fluvial flood extent zones associated with the River Barrow in the vicinity of the Master Plan area.

Figure 11 below (extracted from CFRAMS flood map O14NRO_EXFCD_C0_SH09), illustrates the predicted 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 Master Plan area.



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
14BARO00769	2.38	N/A	2.38	N/A	2.38	N/A
14BAR000661	2.37	N/A	2.37	N/A	2.37	N/A
14BARO00542	2.36	2264.30	2.36	2438.87	2.36	2645.80
14BARO00392	2.36	N/A	2.36	N/A	2.35	N/A
14BARO00256	2.35	N/A	2.35	N/A	2.34	N/A

Figure 11 – CRAMS Draft Flood Map

The draft CFRAM mapping for the area also provides information on predicted flood levels at various node points along the River Barrow. As illustrated in Figure 11 above, the three River Barrow node points relevant to the Master Plan area are Node '14BARO00661', Node '14BARO00542' and Node '14BARO00256'. *Table 2* below illustrates the predicted flood levels for each of the above node points.

Node No.	Fluvial AEP Event		
	10% AEP	1%AEP	0.1% AEP
	Water Level (m OD Malin)	Water Level (m OD Malin)	Water Level (m OD Malin)
14BARO00661	2.37	2.37	2.37
14BARRO00542	2.36	2.36	2.36
14BARRO00256	2.35	2.35	2.34

Table 2 – Predicted Flood Levels for Various Return Period Events for Selected Nodes

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/11, S/RA/EXT/MRFS/11 and S/RA/EXT/HEFS/11), illustrates the predicted extreme 0.5% AEP (1 in 200 year) or 0.1% AEP (1 in 1000 year) flood extents in the vicinity of the Master Plan Area for the current, mid range future and high end future scenarios.

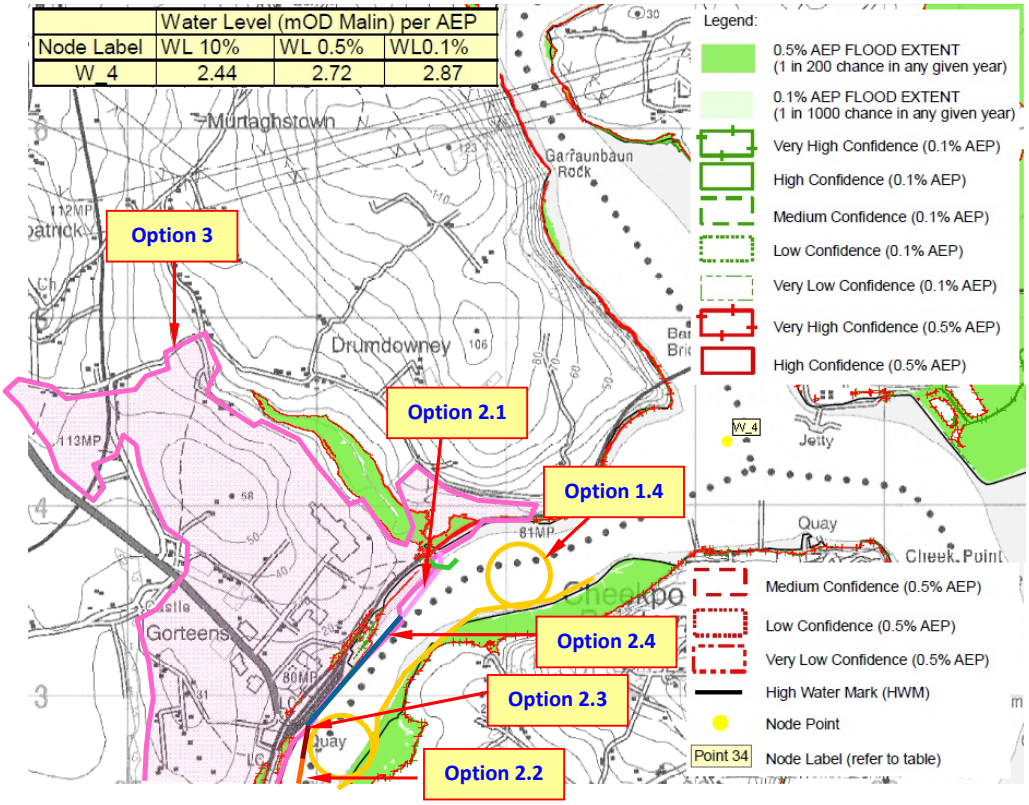


Figure 12 – ICPSS Current Scenario Tidal Flood Map

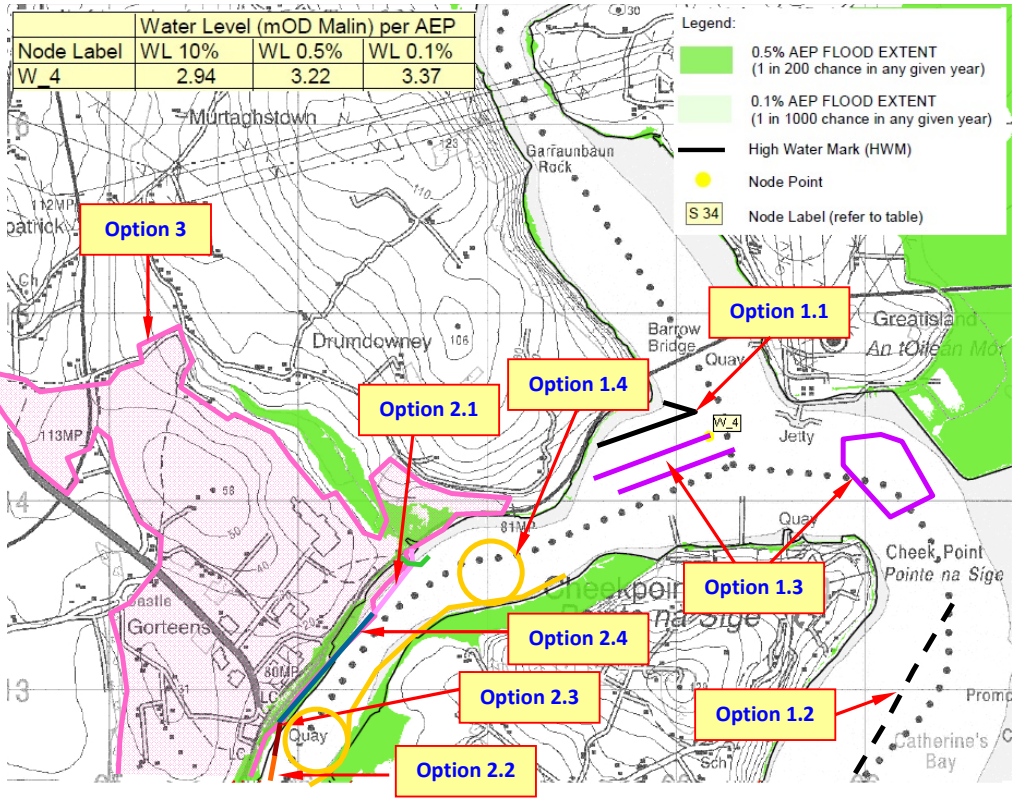


Figure 13 – ICPSS Mid Range Future Scenario Tidal Flood Map

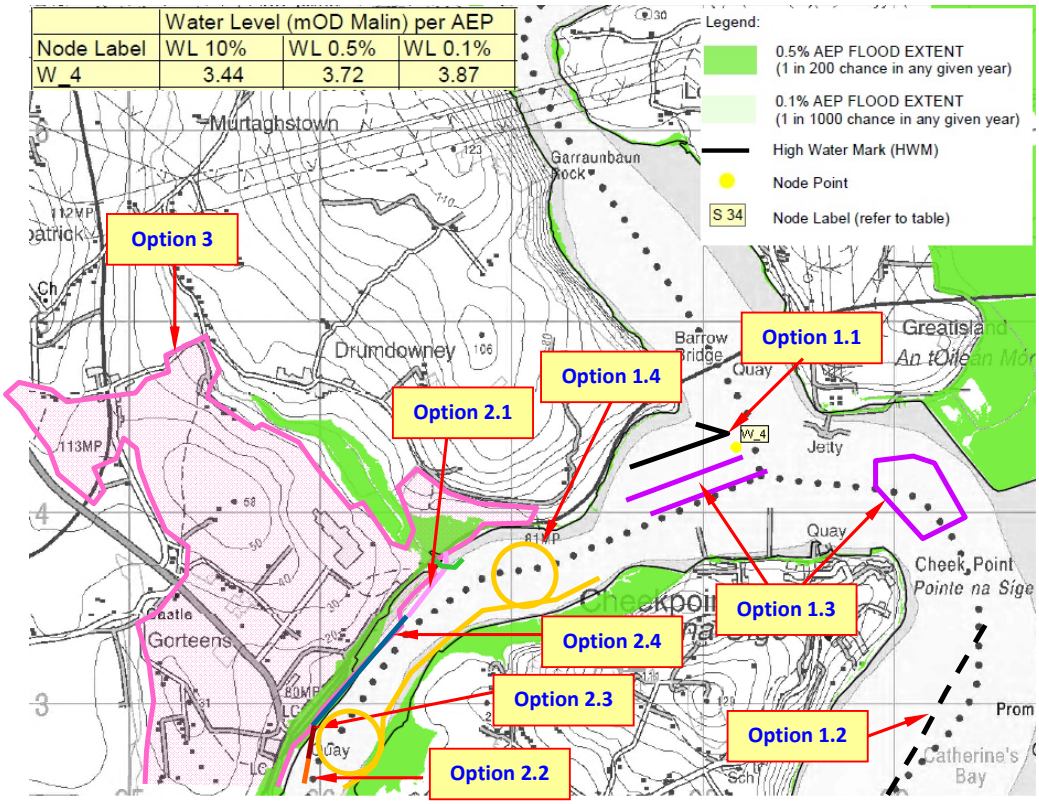


Figure 14 – ICPSS High End Future Scenario Tidal Flood Map

The ICPSS mapping for the area also provides information on predicted tidal / coastal flood levels at various node points within the modelled reaches of the River Suir and the River Barrow. The node point closest to the Master Plan Area is Node W_4, which is located at the confluence of the River Suir and the River Barrow, approximately 1545m east of Master Plan Option 3. Predicted extreme coastal flood levels at this node point are applicable for the purposes of estimation of extreme tidal / coastal flood level at the location of Master Plan Option 3. *Table 3* below illustrates the predicted extreme tidal / coastal flood levels for Node W_4.

Scenario	Node W_4 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	2.44	2.72	2.87
Mid range future	2.94	3.22	3.37
High end future	3.44	3.72	3.87

Table 3 – Predicted Tidal Water Levels at Node Point W_4

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.

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

The screening assessment indicates that parts of the Master Plan area are potentially susceptible to fluvial, pluvial and tidal flooding.

The particular flood risk to the Master Plan Area is assessed in the subsequent 'Assessing Flood Risk' stage of this study.

6 Assessing Flood Risk

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

The following sections present an assessment of the estimated 1% AEP and 0.1% AEP fluvial flood events in the Luffany Stream and Gorteens Stream and the 1 in 200 year (0.5% AEP) and 1 in 1000 (0.1% AEP) pluvial and tidal flood events.

6.1 Fluvial Flood Event Extents

The extreme fluvial flood event extents illustrated on the PFRA mapping shown in *Figure 5* and *Figure 6* above were overlayed onto the Master Plan boundary using the Autodesk Civil 3D software package. *Drawing Number IE1689-002-A, Appendix A* shows the PFRA fluvial flood extents in the vicinity of the overall Master Plan area.

6.2 Pluvial Flood Event Extents

The extreme pluvial flood event extents illustrated on the PFRA mapping shown in *Figure 5* and *Figure 6* above were overlayed onto the Master Plan boundary using the Autodesk AutoCAD software package. *Drawing Number IE1689-004-A, Appendix A* shows the PFRA pluvial flood extents in the vicinity of the overall Master Plan area.

6.3 Tidal Flood Event Extents

The extreme tidal flood event extents illustrated on the PFRA mapping shown in *Figure 5* and *Figure 6* above were overlayed onto the Master Plan boundary using the Autodesk AutoCAD software package. *Drawing Number IE1689-003-A, Appendix A* shows the PFRA tidal flood extents in the vicinity of the overall Master Plan area.

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 unless the Justification Test is satisfied. 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 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.

This Strategic Flood Risk Assessment has determined that a portion of the onshore Master Plan area falls within Flood Zone 'A' and Flood Zone 'B'. In accordance with the *'Planning System & Flood Risk Management Guidelines, DOEGLG, 2009'* development within these areas may be subject to the requirements of The Justification Test.

All development options in Group 1, 'options to minimise dredging and improve marine access', involve underwater works and will therefore not be impacted by potential fluvial and tidal flooding events.

All development options in Group 2 are considered to be 'water compatible developments' which are appropriate within Flood Zone 'A' and Flood Zone 'B' and are therefore not subject to the requirements of The Justification Test.

8 Summary Conclusions

In consideration of the findings of this Strategic Flood Risk Assessment and analysis the following conclusions and recommendations are made in respect of the Master Plan area:-

- *A Strategic Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed (Port Master Plan) and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.*
- *The Master Plan area has been screened, scoped and assessed for flood risk in accordance with the above guidelines.*
- *The primary flood risks to the Master Plan area can be attributed to a flood event in the Luffany Stream and Gorteens Stream and/or a tidal / fluvial flood event in the River Suir and River Barrow*
- *Preliminary Flood Risk Assessment (PFRA) mapping fluvial, pluvial and tidal flood extents have been overlaid onto the overall Master Plan area.*
- *All development options in Option 1 Group, 'options to minimise dredging and improve marine access', involve underwater works and will therefore not be impacted by potential fluvial and tidal flooding events. Development options in Option 1 Group will not increase flood risk elsewhere.*
- *All development options in Option 2 Group are considered to be 'water compatible developments' which are appropriate within Flood Zone 'A' and Flood Zone 'B' and are therefore not subject to the requirements of The Justification Test.*
- *Flood Zone 'A' borderlines a small area of the onshore Master Plan area (Option 3). Any proposed onshore development within this flood zone shall be subject to a Site Specific Flood Risk Assessment that shall determine the specific flood risk to and from proposed onshore development and shall proposed mitigation measures as may be appropriate.*
- *Overall, and subject to the findings of any Site Specific Flood Risk Assessment, this Strategic Flood Risk Assessment indicates that the Master Plan Development Options 1, 2 and 3 would not result in an adverse impact to the hydrological regime of the area or increase flood risk elsewhere.*

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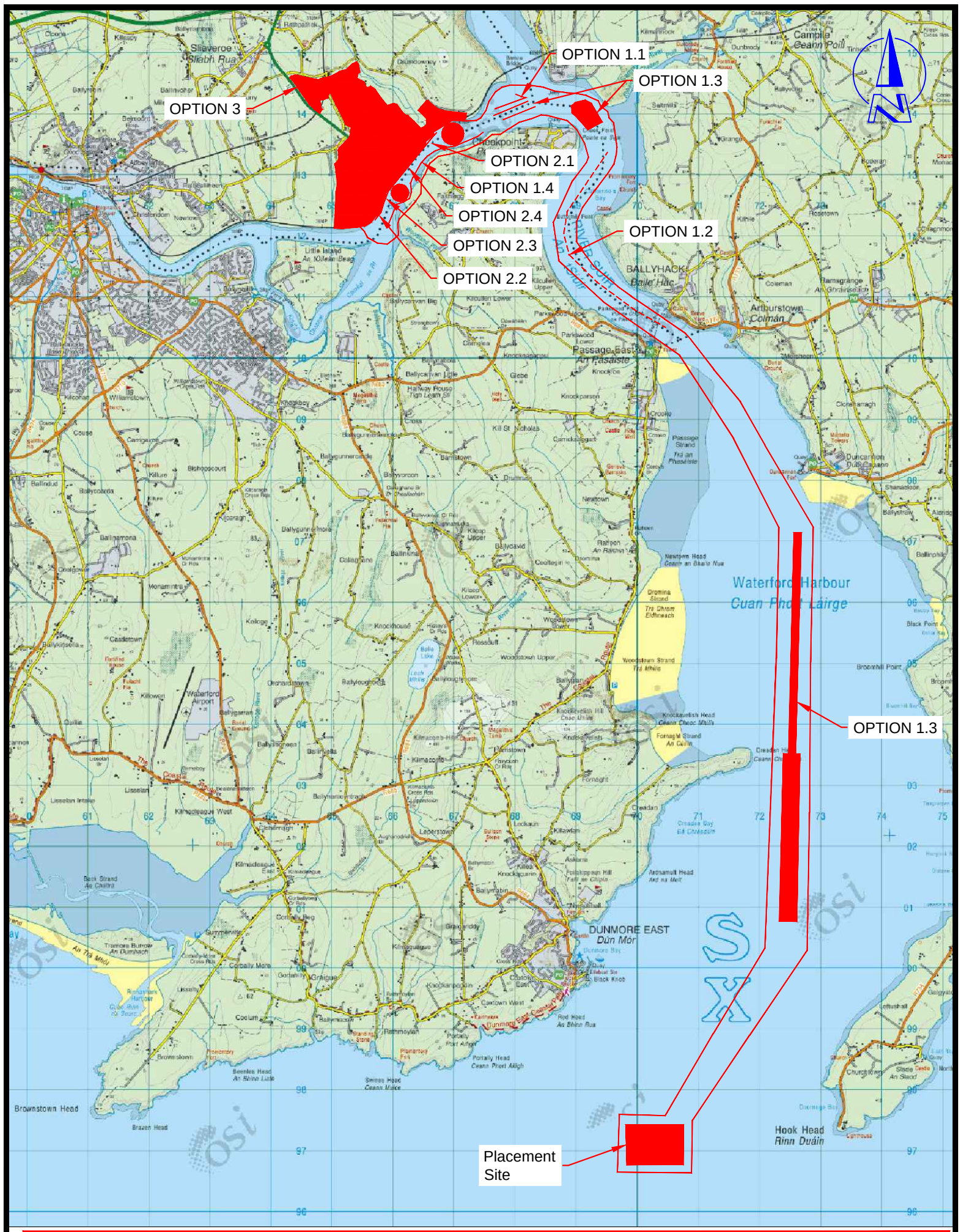
APPENDIX A

Drawing Number IE1689-001-B

Drawing Number IE1689-002-C

Drawing Number IE1689-003-C

Drawing Number IE1689-004-C



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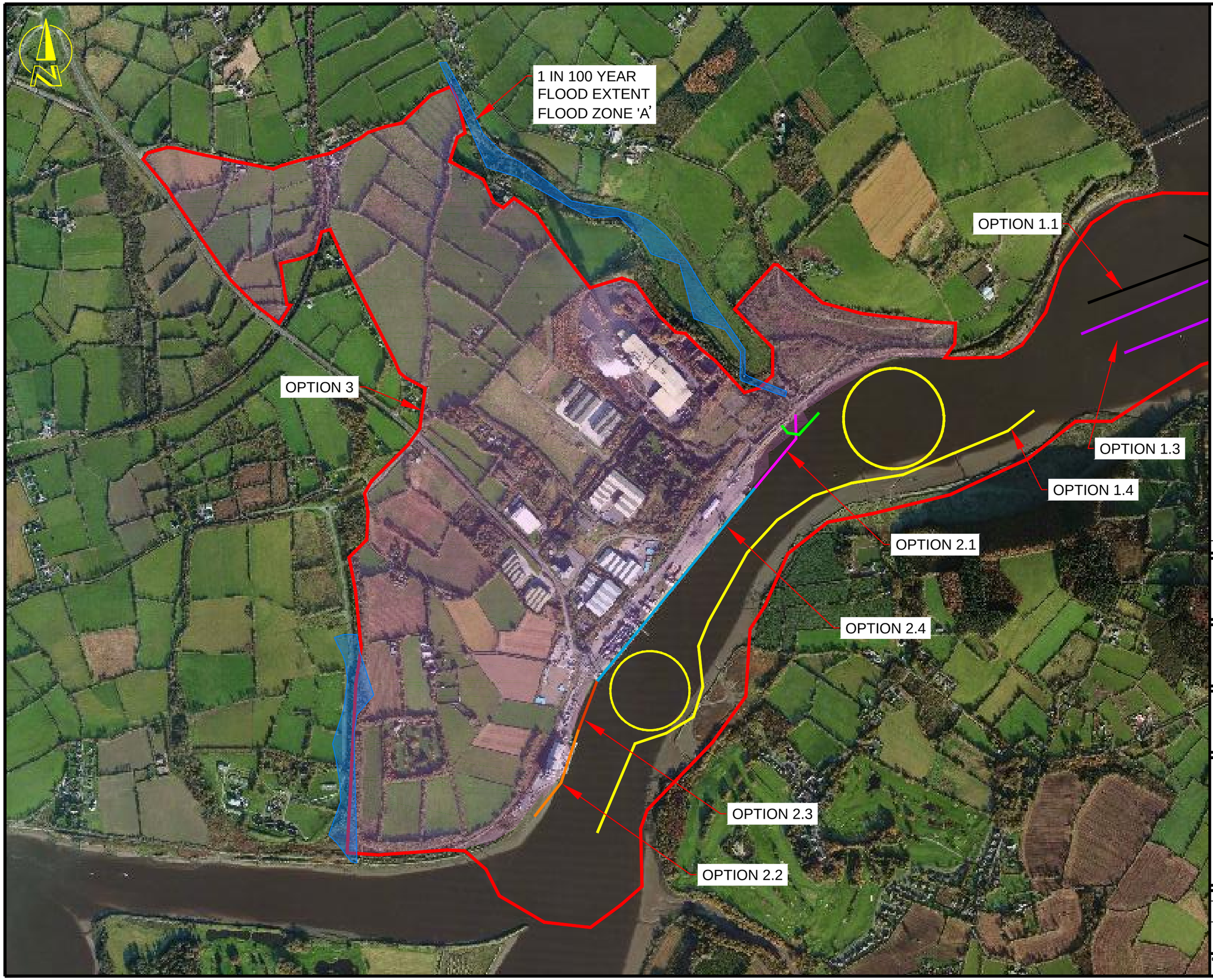
Project Title:	Port of Waterford Masterplan SFRA
Project Address:	Belview Port
Client:	Port of Waterford / MOR
Drg. Title:	Site Location Map

Dwg.Scale:	Date:	Dwg.No:	Job No:	Revision:	Dwg.By:
1:50,000	09/10/18	IE1689-001	IE1689	B	LM



LEGEND

- SITE BOUNDARY
- 100 YEAR FLOOD EXTENT (1% AEP) FLOOD ZONE 'A'
- 1000 YEAR FLOOD EXTENT (0.1% AEP) FLOOD ZONE 'B'
- FLOOD ZONE 'C'

rev.	date	amendment	drn	ckd
C	05.06.19	DRAWING RESCALED	LMc	PMS
B	30.05.19	MASTER PLAN OPTION AMMENDMENT	LMc	PMS
A	09.10.18	PLANNING	LMc	PMS

PORT OF WATERFORD MASTERPLAN

STRATEGIC FLOOD RISK ASSESSMENT

1 IN 100 YEAR (1% AEP) &
1 IN 1000 YEAR (0.1% AEP)
FLUVIAL FLOOD EXTENTS

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drawing no. IE1689-002	rev C	checked: NOM	
		approved: PMS	
		date: 09.10.2018	

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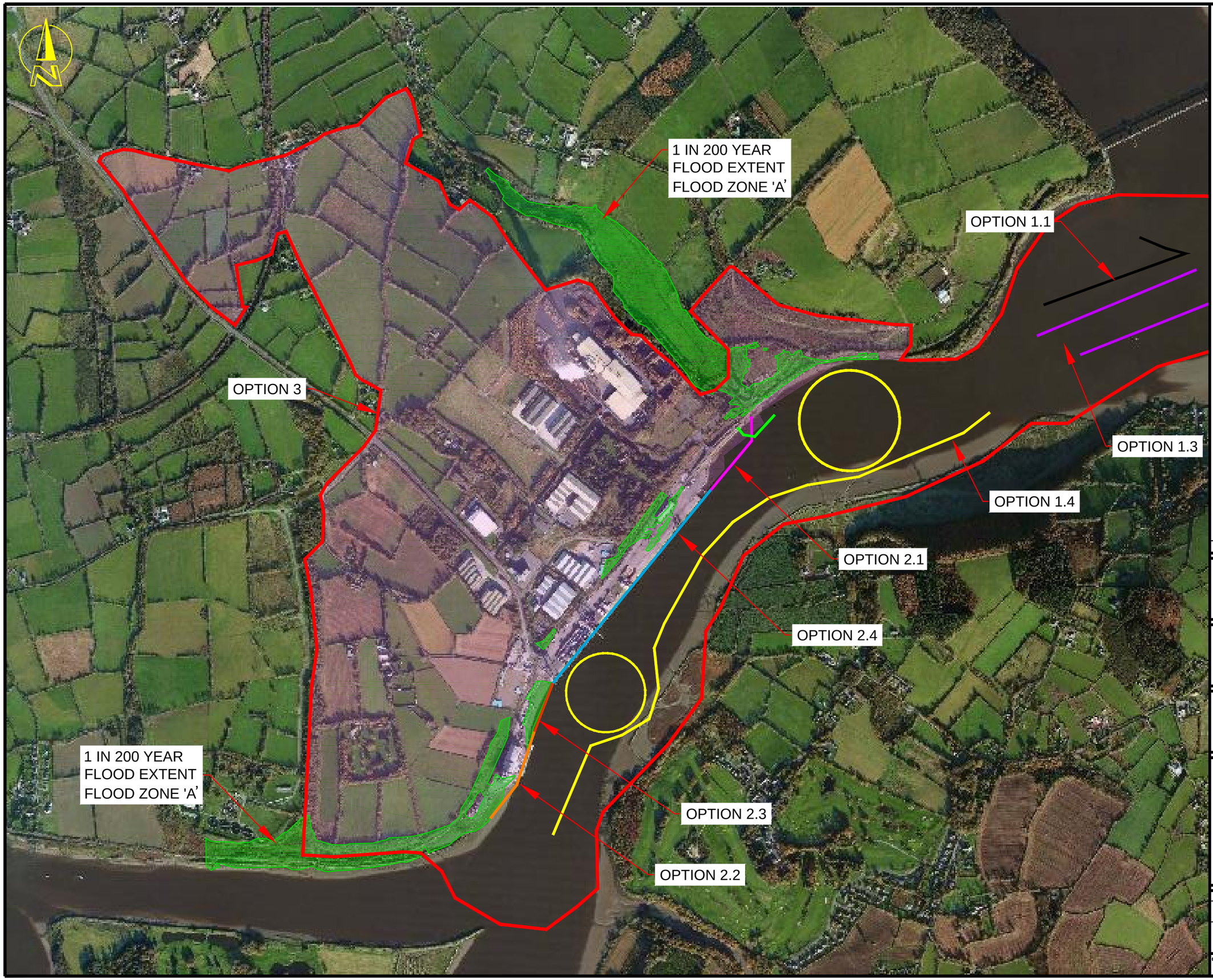

LEGEND

- SITE BOUNDARY
- 200 YEAR FLOOD EXTENT (0.5% AEP) FLOOD ZONE 'A'
- 1000 YEAR FLOOD EXTENT (0.1% AEP) FLOOD ZONE 'B'
- FLOOD ZONE 'C'

rev.	date	amendment	drn	ckd
C	05.06.19	DRAWING RESCALED	LMc	PMS
B	30.05.19	MASTER PLAN OPTION AMMENDMENT	LMc	PMS
A	09.10.18	PLANNING	LMc	PMS

PORT OF WATERFORD MASTERPLAN

STRATEGIC FLOOD RISK ASSESSMENT

1 IN 200 YEAR (0.5% AEP) &
1 IN 1000 YEAR (0.1% AEP)
TIDAL FLOOD EXTENTS

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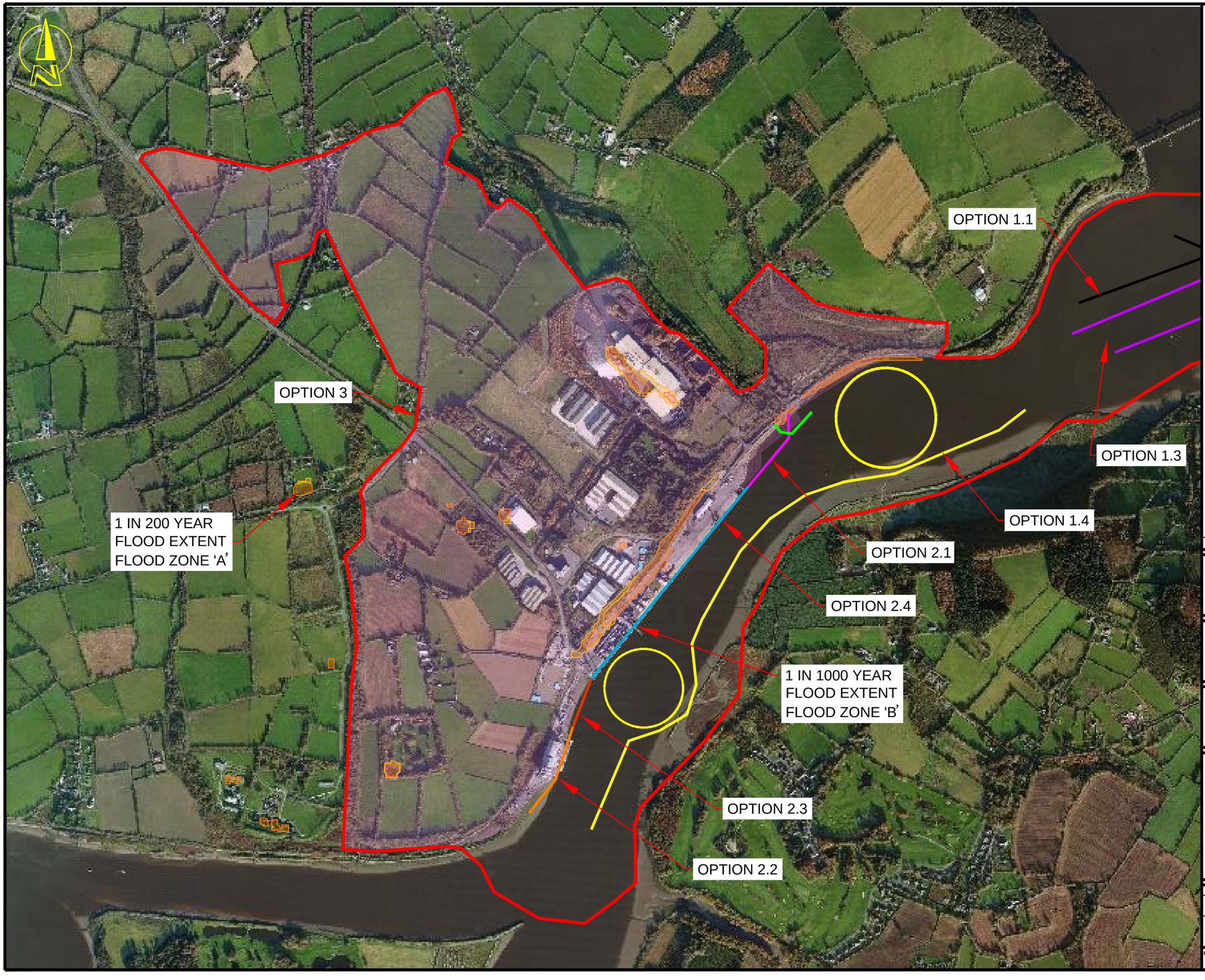

LEGEND

- SITE BOUNDARY
- 200 YEAR FLOOD EXTENT (0.5% AEP) FLOOD ZONE 'A'
- 1000 YEAR FLOOD EXTENT (0.1% AEP) FLOOD ZONE 'B'
- FLOOD ZONE 'C'

rev.	date	amendment	drn	ckd
C	05.06.19	DRAWING RESCALED	LMc	PMS
B	30.05.19	MASTER PLAN OPTION AMMENDMENT	LMc	PMS
A	09.10.18	PLANNING	LMc	PMS

PORT OF WATERFORD MASTERPLAN

STRATEGIC FLOOD RISK ASSESSMENT

1 IN 200 YEAR (0.5% AEP) &
1 IN 1000 YEAR (0.1% AEP)
PLUVIAL FLOOD EXTENTS

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		date:	09.10.2018

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