



APPENDIX 9-5

FLOOD RISK ASSESSMENT

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1. INTRODUCTION

This Stage 2 Flood Risk Assessment (FRA) supplements Chapter 9: *Hydrology and Hydrogeology* of the Environmental Impact Assessment Report (EIAR) for the proposed Slievegrine Renewable Energy Development, located approximately 5 km southwest of Dungarvan, Co. Waterford

As detailed in Section 1.1.2 in Chapter 1: *Introduction to the Proposed Project*, for the purposes of this document, the following references are used: 'Proposed Project', 'Proposed Wind Farm' 'Proposed Grid Connection', 'Proposed Turbines', 'Proposed 110kV Underground Cabling Route', 'Proposed 110kV Substation', 'Proposed 220kV Loop-in Substation'. A detailed description of the Proposed Project is provided in Chapter 4: *Description of the Proposed Project* of this EIAR.

1.1 Purpose of Assessment

The purpose of this Stage 2 FRA is to determine whether the Proposed Project could be affected by flooding or could itself cause flooding within the EIAR Site Boundary ('the Site') or at downstream receptors. The main flood risk would be associated with stormwater collected by the proposed Site drainage system which is then planned to be discharged to receiving watercourses such as the Licky River (**Figure 1**).

Flood risk can generally be expressed as:

$$\text{Flood Risk} = \text{Probability of Flooding} \times \text{Consequences of Flooding}$$

Accordingly, the FRA has considered both hydrological characteristics of the receiving environment and the potential drainage volumes that can be generated by the Proposed Project.

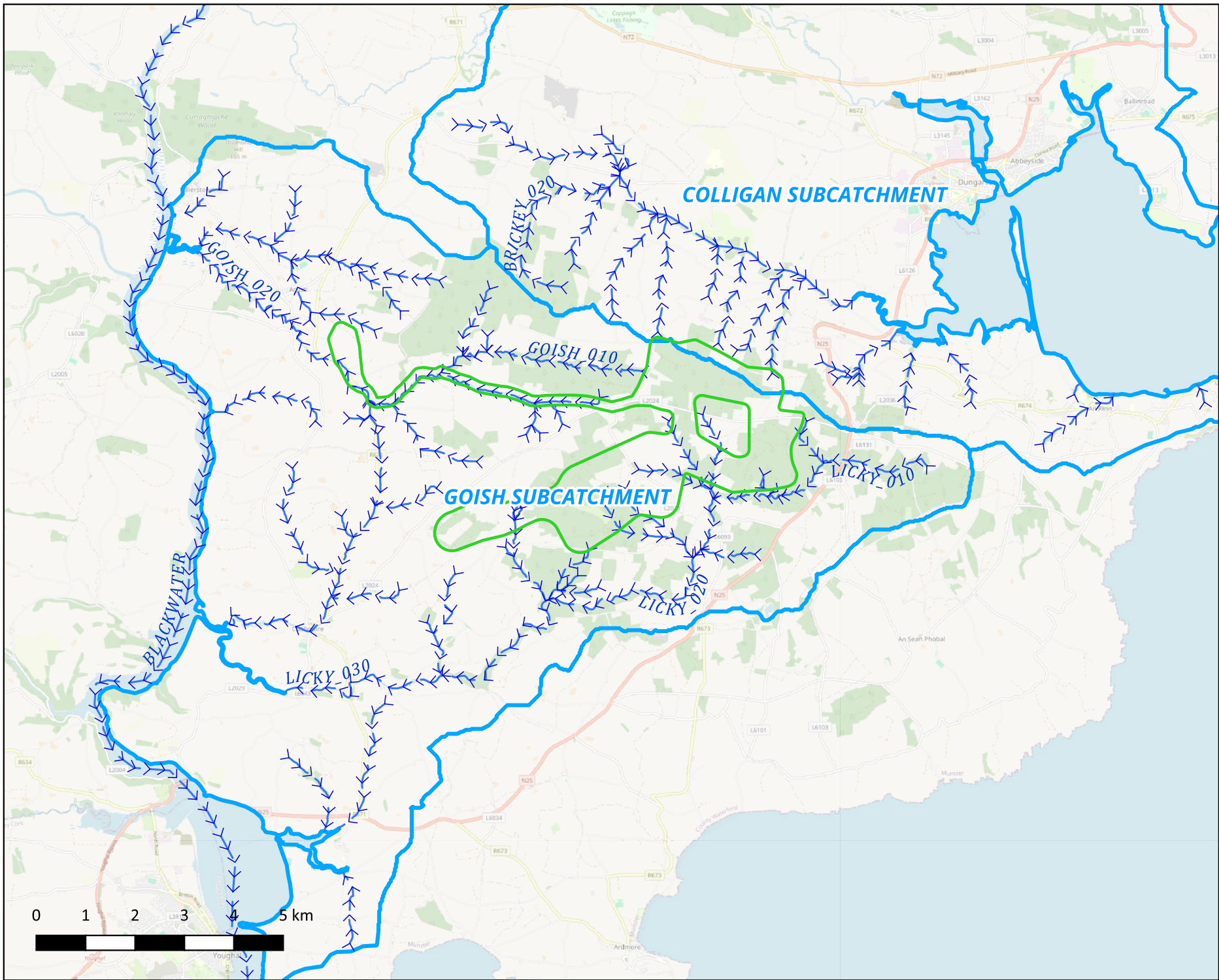
1.2 Statement of Authority

This FRA was prepared by Dr. Sean Wheeler, supported by Liliana Paredes. Technical review was provided by Henning Moe.

Dr. Wheeler is a professional hydrogeologist with over 5 years of practical experience in water resource management and assessment. Seán's previous experience includes the preparation of Land, Soils and Geology and Hydrology and Hydrogeology chapters for EIARs.

Liliana Paredes is a professional hydrogeologist with an MSc in hydrogeology from Barcelona University. Liliana is experienced conducting environmental monitoring, processing environmental data using commonly applied analytical tools and GIS, and supporting the preparation of EIAR chapters.

Henning Moe is a registered professional geologist (PGeo, EurGeol) with more than 30 years of practical experience. He holds a BSc in Geology and a MSc in Hydrogeology from University College London. Henning led the preparation hydrology and hydrogeology chapters of two recent wind farm EIARs in Co. Mayo, Sheskin South and Glenora, which were approved by ACP in 2024 and 2025, respectively. Over the past several years, he supported the Environmental Protection Agency (EPA) on numerous WFD-related projects and helped prepare technical guidance related to the authorisation of discharges to ground, implementation of source protection measures in context of the drinking water regulations and conducting investigative assessments in rural and urban catchments involving a wide range of environmental pressures and mitigation measures. He has also supported projects with the Geological Survey Ireland, National Parks and Wildlife Service (NPWS), and the Pesticide Control and Forestry Services of the Department of Agriculture, Food and Marine (DAFM).



- Map Legend**
- EIAR Site Boundary
 - WFD River Waterbodies
 - WFD Sub-catchments



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WFD Subcatchments and Waterbodies

Project Title Sievegrine Renewable Energy Development, Co. Waterford	
Drawn By SW	Checked By HM
Project No. 240740	Drawing No. 1
Scale 1:100,000	Date 25/08/2026



1.3

Legislation and Guidance

Due regard has been given to the following legislation and guidance related to flood risk assessment:

- › EU Directive on the Assessment and Management of Flood Risks [2007/60/EC];
- › The Planning System and Flood Risk Management - Guidelines for Planning Authorities (Office of Public Works, OPW, 2009);
- › Planning and Development Act 2000 (as amended); and
- › The Water Policy Regulations (S.I. No. 722 of 2003).

1.4

Methodology

Following the guidance document 'The Planning System and Flood Risk Management (PSFRM) - Guidelines for Planning Authorities' (OPW 2009), the Stage 2 FRA involves:

- › Flood risk identification, to determine whether surface water flooding issues may be present at a site; and
- › An initial flood risk assessment, to confirm sources of flooding that may affect a development (in this case, the Proposed Project).

The FRA therefore identifies potential sources of flooding, appraises the adequacy of the available information, and assesses the available information insofar as it relates to flood risk at the Site and any identified receptors.

Accordingly, flood-related information was researched and collated from the following public data and information sources:

- › Office of Public Works (OPW) Preliminary Flood Risk Assessment (PFRA) Maps.
- › OPW National Flood Hazard Maps
- › Waterford City and County Development Plan (WCCDP)
- › Ordnance Survey of Ireland (OSI)
- › Geological Survey of Ireland (GSI)
- › Environmental Protection Agency (EPA)
- › Site walkover and drainage observations (February 2025 and February 2026)

Climate change is also considered, in accordance with the OPW Flood Risk Management Climate Change Sectorial Adaptation Plan (2019), prepared under the National Adaptation Framework. The referenced Plan defines two future flood risk scenarios: the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). Consistent with the OPW guidance, the MRFS was adopted for this assessment. The MRFS assumes a 20% increase in peak flow above the current scenario estimations.

2.

FLOOD RISK IDENTIFICATION

The following sources of relevant information were checked to identify potential flood risk:

- > OPW flood incident maps.
- > OPW indicative fluvial and coastal flood maps (www.floodinfo.ie).
- > OPW community-scale flood extents (www.floodinfo.ie).
- > OPW preliminary flood risk assessment (PFRA) maps from the CFRAM programme (www.cfram.ie).
- > GSI groundwater flood extent maps (www.gsi.ie).
- > Lastly, the OPW arterial drainage scheme was checked, and the historical 6" and 25" Ordnance Survey maps were checked for local drainage features that could help explain observations made during the site walkover.

2.1

OPW Flood Incident Maps

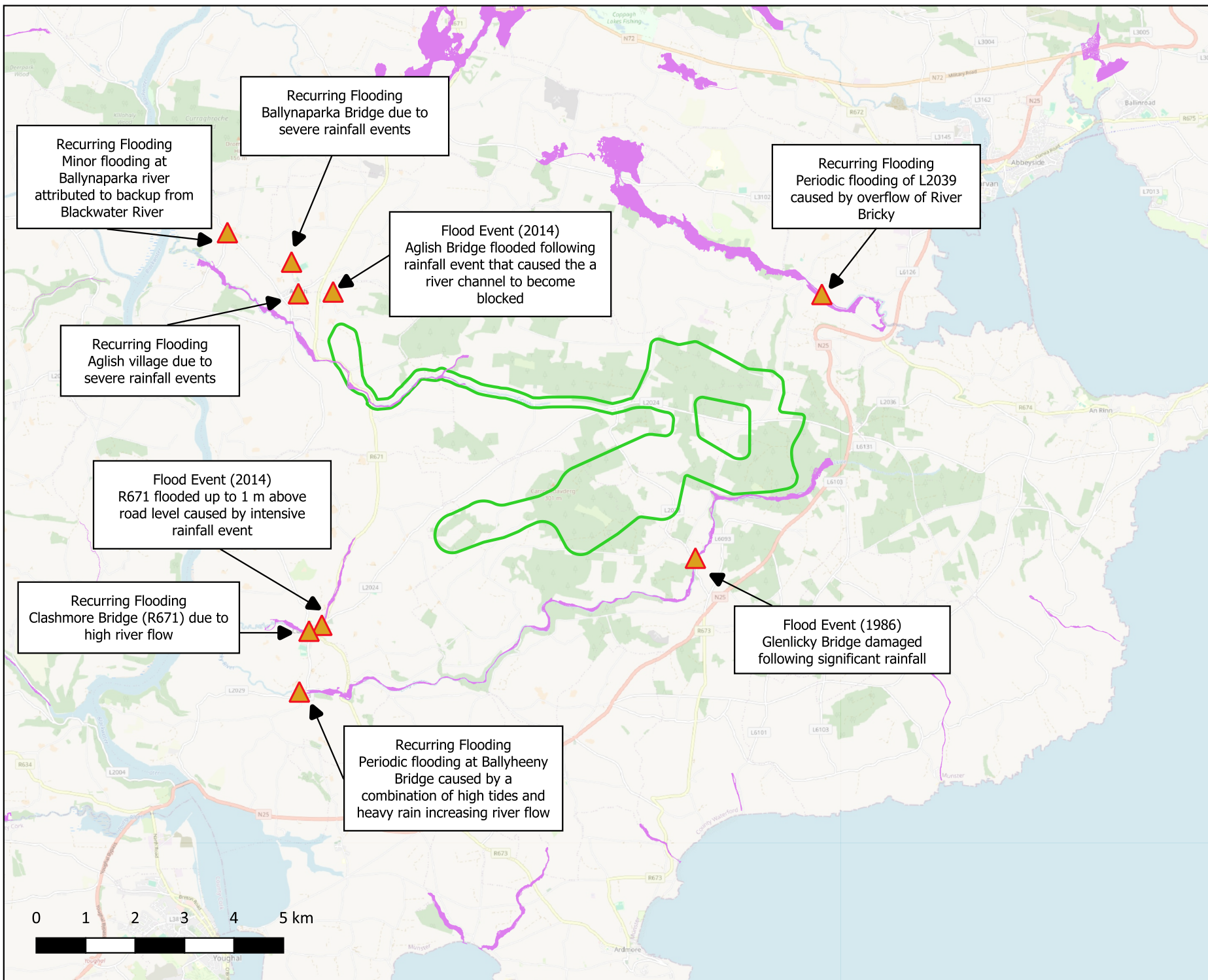
The OPW Past Flood Events mapping (Floodinfo.ie, accessed on 15 June 2026) shows past fluvial flooding at Glenlicky Bridge, on the Licky River, immediately south of the Site (**Figure 2**).

According to a report by the Waterford County Engineer (1986), widespread flooding occurred on three occasions in 1986. On 25 August 1986, a daily rainfall total of 71.3 mm was recorded at Met Éireann's rainfall station in Dungarvan, resulting in significant flooding that damage Glenlicky Bridge, to the extent that it was considered unsafe for traffic (County Engineer, 1986).

Daily rainfall exceeded 70 mm on three occasions since 1986, including 91.8 mm recorded on 19 October 2001 (**Figure 3**). While no further flood events at Glenlicky Bridge have been recorded in the OPW database, recurring fluvial flooding has been recorded further downstream at Licky Ballyheeny Bridge, also on Licky River, approximately 4.1 km southwest of the Site. This flooding is attributed to "*a combination of high tides and heavy rain increasing flow in the River Licky*." (ESBI 2006).

The fluvial flood events shown on the Goish River occurred in 2006 and 2014 and are linked to heavy rainfall and, in one documented instance, constricted river flow at an overpass within the village of Aglish, with "flood waters overspilling the parapet of the overpass" (OPW 2014).

The fluvial flood event on the Brickey River occurred in October 2006, and it is inferred it may be linked to high rainfall and high tides backing up the river level (ESBI 2006).



Map Legend

-  EIAR Site Boundary
-  OPW NIFM Fluvial MRFS 1:100
-  OPW Past Flood Events



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Drawing Title

Past Flood Events and Modelled (Predicted) Fluvial Flood Extents

Project Title
Slievegrine Renewable Energy Development, Co. Waterford

Drawn By	SW	Checked By	HM
Project No.	240740	Drawing No.	2
Scale	1:100,000	Date	25/08/2026



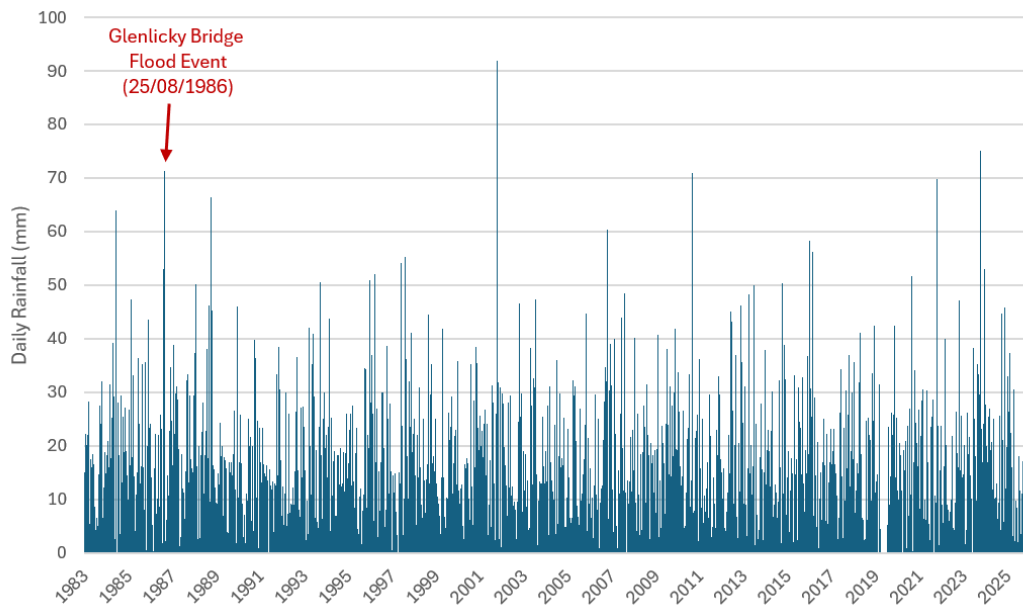


Figure 3: Daily Rainfall at Met Éireann Station - Dungarvan (Carriglea) 1983 - Present

2.2

OPW Fluvial Flood Maps

With the exception of a narrow stretch along the grid connection route which follows a west-flowing tributary of the Goish River, the OPW's National Indicative Flood Mapping¹ does not show any modelled (predicted) fluvial flood extents (**Figure 2**) that intersect the Site. However, both the OPW-modelled "low probability" and "medium probability" MRFS fluvial flood extents (accounting for climate change) are mapped downslope of each receptor water body into which site-related drainage flows, namely the Licky, Goish, and Brickey Rivers. Notably, the modelled flood extent of the Licky River especially is only ~25 m from the southern EIAR Site Boundary.

It should be noted that the indicative flood mapping shows modelled flood extents and not actual past, recorded flood extents. The OPW modelling is based on "*estimated probability of occurrence, rather than information for actual floods that have occurred in the past*". As stated by OPW on the Floodinfo website, "*Flooding from other reaches of river may occur, but has not been mapped, and so areas that are not shown as being within a flood extent may therefore be at risk of flooding from unmodelled rivers (as well as from other sources)*".

During site walkover surveys, flooding of local roads and access tracks was observed at multiple locations during wet weather events, along with considerably waterlogged conditions in fields and forested areas, and signs of stream/river bank erosion. As described in Chapter 9 of the EIAR, the lands within the Site are extensively drained as part of farming and forestry operations. The observed road- and field-flooding is inferred to reflect localised pluvial flooding and water backing up due to inadequate drainage.

Historical Ordnance Survey Ireland (OSI) 6- and 25-inch mapping indicate few locations that are "*prone to flooding*" within the Site. There are pockets within or amongst forest plantations marked by rushes (as an indicator of poorly drained conditions) and boggy ground that naturally serve to maintain water-logged conditions.

¹ Modelled extents of land that might be flooded by rivers (fluvial flooding) during a theoretical or 'design' flood event with an estimated probability of occurrence. Medium probability events are defined by AEP of 1% (or 100 year return period). Low probability events are defined by AEP of 0.1% (or 1,000 year return periods).

The OPW community-scale flood extent maps in the area are mainly associated with tidally influenced estuaries (**Figure 4**). Like the National Indicative Flood Mapping discussed above, these maps are also available for a range of probabilities and account for climate change.

2.3 OPW Coastal Flood Maps

The lowest, tidally-influenced sections of the Licky, Goish, and Brickey Rivers are mapped within the 10% AEP (1 in 10 year) coastal flood hazard extents (**Figure 5**). The Site itself is far removed from any coastal flood risk extent.

2.4 GSI Groundwater Flood Maps

The GSI Groundwater Flooding Data Viewer (accessed on 24 June 2026) indicates no recorded historic groundwater flood events in the vicinity of the Proposed Project. The Site is also not situated within any High, Medium or Low probability groundwater flooding location.

2.5 OPW Arterial Drainage

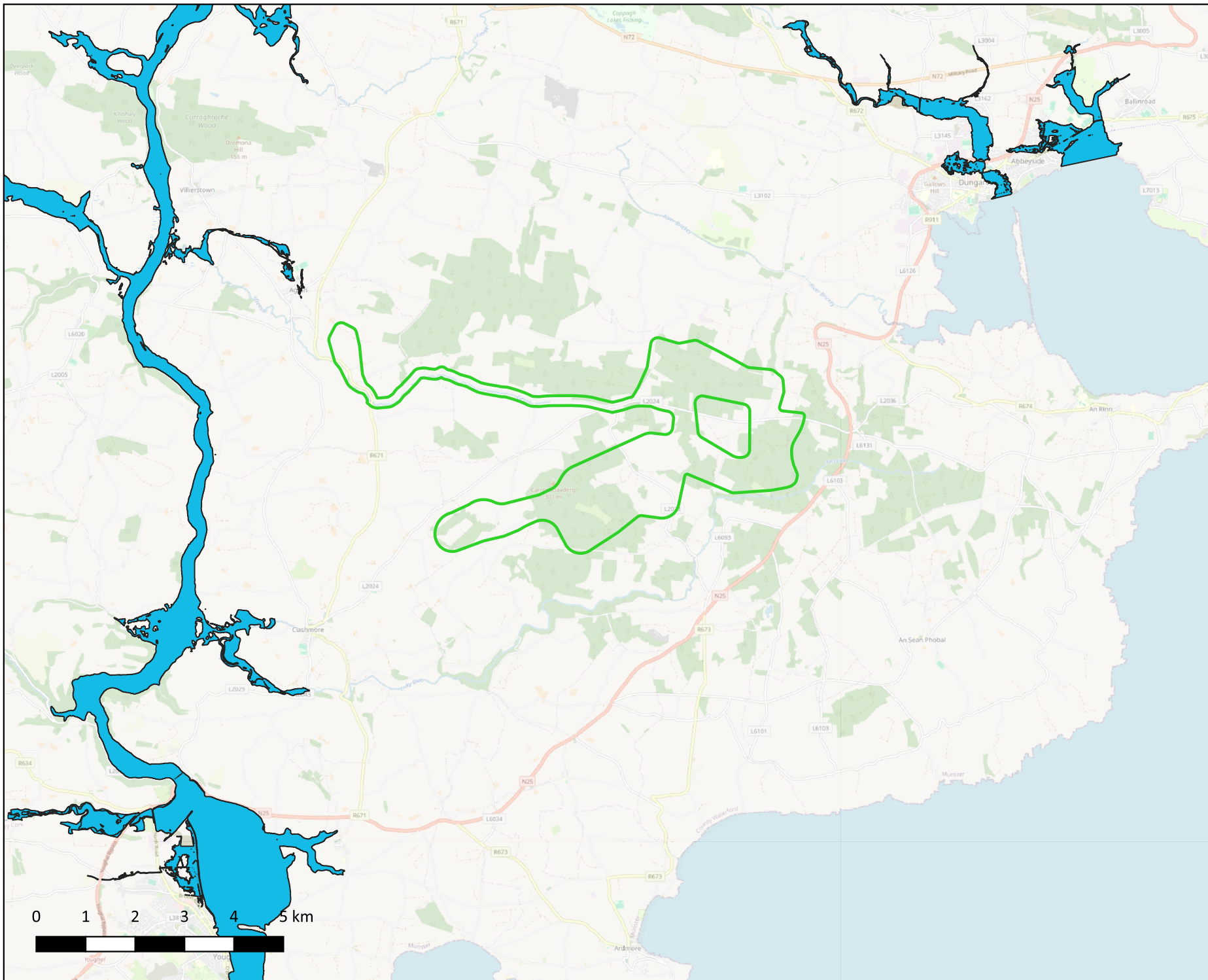
According to the OPW arterial drainage map, only the Brickey River is part of OPW's arterial drainage scheme. The Site is not located within any arterial drainage benefitting lands.

2.6 Summary of Flood Risk Identification

The planning system and flood risk management guidelines (OPW 2009) define flood zones as follows:

- Flood Zone A – High probability of fluvial flooding (greater than 1% Annual Exceedance Probability (AEP), or the 1 in 100-year event);
- Flood Zone B - Moderate probability of fluvial flooding (between 0.1 and 1% AEP, or between the 1 in 1000-year and 1 in 100-year event) and;
- Flood Zone C - Low probability of fluvial flooding (less than 0.1% AEP, or less frequent than the 1 in 1,000-year event).

The OPW modelled, indicative flood extent maps show areas of low and medium probability fluvial flood zones along a section of the grid connection route that runs immediately adjacent to and parallel to a tributary of the Goish River. This section of the grid connection route can, therefore, be considered to be in a Flood Zone B. The remainder of the Proposed Project is considered to be in Flood Zone C.



Map Legend

-  EIAR Site Boundary
 -  OPW Community Scale Flood Extents
- Fluvial MRFS 1:100



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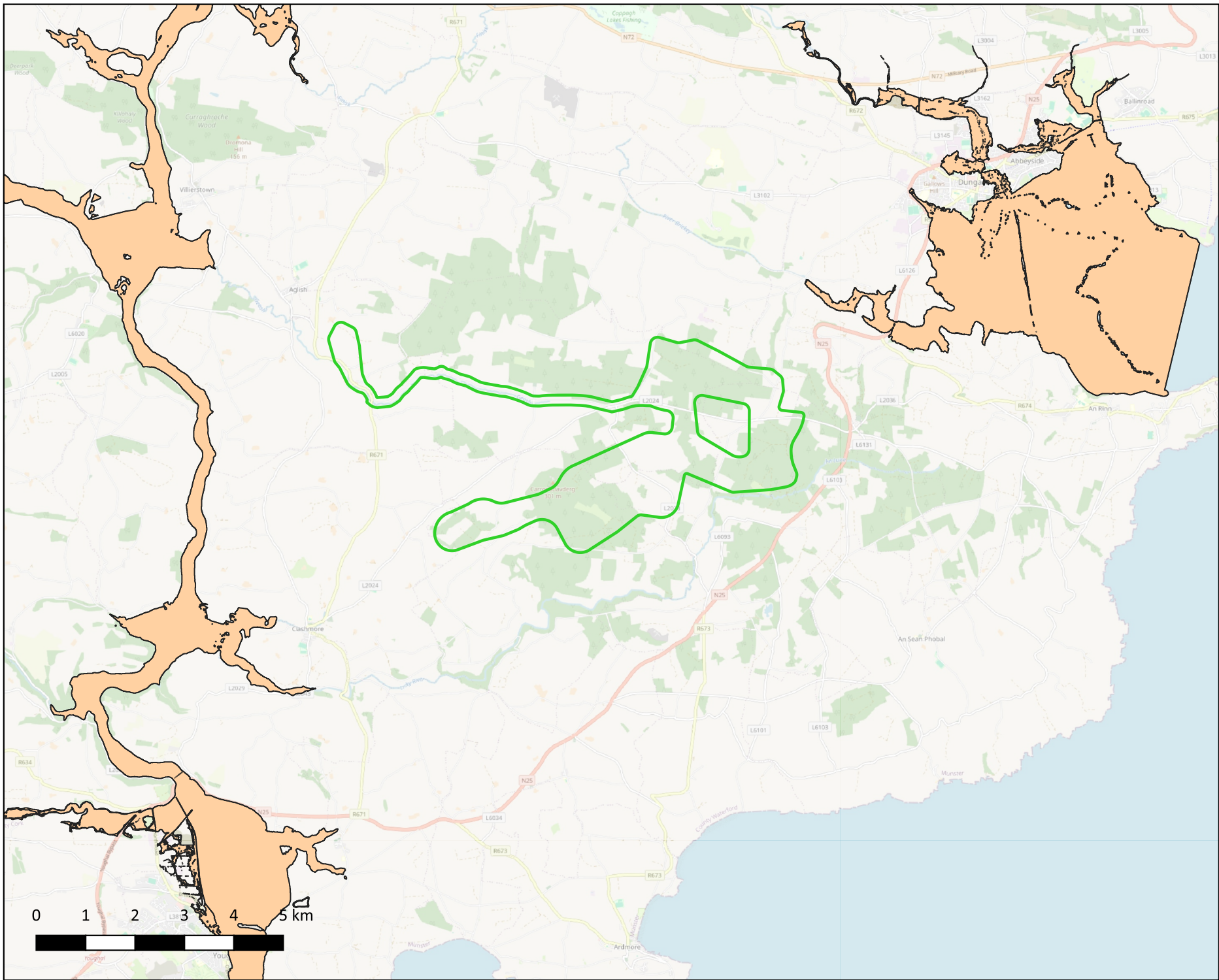
Drawing Title

Community Scale Flood Extents - Fluvial

Project Title
Slievegrine Renewable Energy
Development, Co. Waterford

Drawn By	SW	Checked By	HM
Project No.	240740	Drawing No.	4
Scale	1:100,000	Date	25/08/2026





Map Legend

- EIAR Site Boundary
- OPW Community Scale Flood Extents

Coastal MRFS 1:200



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Community Scale Flood Extents - Coastal

Project Title Slievegrine Renewable Energy Development, Co. Waterford	
Drawn By SW	Checked By HM
Project No. 240740	Drawing No. 5
Scale 1:100,000	Date 25/08/2026



3. FLOOD RISK ASSESSMENT

3.1 Justification Test

Based on the planning system and flood risk management guidelines (OPW 2009), a ‘justification test’ needs to be passed which assesses the appropriateness, or otherwise, of a particular development that is being considered in areas of moderate or high flood risk. The requirement for a ‘justification test’ is determined by the flood zone and the *vulnerability* classification of the proposed development. The guidelines categorise different types of development into three *vulnerability* classes based on their sensitivity to flooding. Wind farms, which include electricity-generating infrastructure, are considered a “*Highly Vulnerable Development*” in the context of flood risk.

Table 1 below presents the decision matrix for determining the appropriateness of a development in relation to its location in a mapped flood zone.

Table 1: Decision Matrix for Determining the Appropriateness of a Development (Source: OPW 2009)

Flood Zone (Probability)	Annual Exceedance Probability (AEP)	Development Appropriateness		
		Highly Vulnerable	Less Vulnerable	Water Compatible
A (High)	<u>Fluvial & Pluvial Flooding</u> More frequent than 1% AEP	Justification Test	Justification Test	Appropriate
	<u>Coastal Flooding</u> More frequent than 0.5% AEP			
B (Medium)	<u>Fluvial & Pluvial Flooding</u> 0.1% to 1% AEP	Justification Test	Appropriate	Appropriate
	<u>Coastal Flooding</u> 0.1% to 0.5% AEP			
C (Low)	<u>Fluvial, Pluvial & Coastal Flooding</u> Less frequent than 0.1% AEP	Appropriate	Appropriate	Appropriate

The AEP of flooding across all areas of the Proposed Project has been identified based on available data (as detailed in Section 2). Climate change was accounted for by considering the Mid-Range Future Scenario (MRFS) for each AEP, which assumes a 20% increase in peak flow above the current scenario estimations. Based on this assessment, the Proposed Project, including the wind turbines and electrical substations, resides primarily in Zone C, hence the development is deemed appropriate.

One section of the EIAR Site Boundary (the section that relates to the Proposed 110kV Underground Cabling Route) requires a justification test as it intersects Zone B. The Proposed 110kV Underground Cabling Route follows local roads which sit at higher elevation than the stream/river system, and there are no known, recorded incidents in the past of road flooding along this section. Accordingly, the development is deemed appropriate from the flood risk perspective, so long as the route and associated installations (cables in trenches, refer to Chapter 4 of the EIAR) do not intersect the indicative flood zones. At Broken Bridge, along the Goish River, the Proposed 110kV Underground Cabling Route will inevitably cross the tributary flowing from the north. In this case, we recommend and any related construction works (of the grid connection trenches) in this area do not take place during flooded conditions.

3.2 Planning Policy

The Waterford City and County Development Plan (WCCDP, 2022-2028) (the ‘Plan’) incorporates strategic planning objectives that promote and facilitate the adoption of renewable energy technologies, as outlined in Chapter 2: ‘*Background to the Proposed Project*’ of the EIAR. The planning policy objectives seek “To support in conjunction with other relevant agencies, wind energy initiatives, both onshore and offshore, and wave energy...” (WCCDP Chapter 6; UTL 13).

WCCDP (UTL 10) and the strategic flood risk assessment (SFRA) which accompanies the Plan, further seek to reduce the risk of new developments being affected by possible future flooding by:

- › Avoiding development in mapped areas at risk of flooding.
- › Reducing the causes of flooding to and from existing and future developments.
- › Promoting the application of sustainable urban drainage systems (SuDS).
- › Where development in floodplains cannot be avoided, taking a sequential approach to flood risk management based on avoidance, reduction, and adaptation to the risk.
- › Ensuring that all proposals for development falling within Flood Zones A or B are consistent with the “The Planning System and Flood Risk Management –Guidelines for Planning Authorities 2009”, “Climate Action and Low Carbon Development Act” (2021), and any amendment thereof, and the “Waterford Strategic Flood Risk Assessment” (2021) as included in Appendix 13.

3.3

Summary of the Current Hydrological Environment

The baseline hydrological characteristics and conditions of the subcatchments that influence this Stage 2 FRA are presented in detail in Chapter 9 of the EIAR. In brief:

- › The majority of the Proposed Project occupies the southern slopes of Drum Hills, thus draining south to the Licky River. Approximately 83% of the total EIAR Site Boundary area drains to the Licky River. The remainder drains to the Brickey River (5% of area) and the Goish River (12 % of area).
- › The Site is extensively, artificially drained by both agricultural field drains which have been dug for land improvement purposes, forestry drains which have been dug to accommodate forestry operations, and road drains which have been dug to prevent flooding of local and forestry roads.
- › The subcatchments generally exhibit poorly drained soil/subsoil characteristics, which partly explains the density of artificial drainage, and is underlain by ‘poorly productive ‘bedrock’ which tends to enhance surface runoff. Groundwater is a relatively minor component of the water balance overall.
- › The tributary streams/rivers that cross the Site are ‘flashy’, meaning they tend to respond quickly to rainfall events.
- › There are no gauging stations on any of the receptor rivers, and river flow estimates currently rely on flow metrics derived from EPA’s Hydrotol for ungauged catchments, at relevant locations immediately downgradient of the Proposed Project. Annual mean flows are 0.841 m³/s for the Licky River and 0.606 m³/s for the Goish River. Of note, as presented in Chapter 9 of the EIAR, the higher-end flow metrics (reflecting flood flow conditions) in the Licky River are comparably higher than the Goish River, which is not the case for the lower-end flows. This suggests that the Licky River may be more prone to flood-flow conditions as a function of its subcatchment characteristics.

3.4

Summary of the Proposed Drainage System

The proposed drainage design and drainage design calculations are presented in detail in Appendix 4-2 of Chapter 4 and Appendix 9-4 to Chapter 9 of the EIAR respectively. The drainage system will intercept, by design, greenfield and hardstand drainage to i) facilitate water management across the Site, ii) protect water quality in receptor water bodies, and iii) reduce flood risk of same during all phases of the Proposed Project.

Upstream of new infrastructure components, e.g., turbines and their hardstand areas, greenfield runoff will be intercepted to bypass works areas. In working areas and downslope of roads, ‘dirty water’ will

be intercepted via swales and directed to dedicated settlement ponds for removal of suspended solids prior to controlled discharge.

The proposed drainage system will be integrated with the existing forestry, agricultural and road drainage network. Drains passing beneath roads will be culverted. Streams intercepted by access roads will be crossed by clear-span culverts. All culverts will be designed to accommodate 1 in 100-year return period storm events. Along the Proposed 110kV Underground Cabling Route, grid cables which traverse streams/rivers will cross the watercourses via one of four proposed optional methodologies, depending on location-specific conditions (see Section 4.8.2.8 of Chapter 4 of the EIAR for further details).

Importantly, the proposed drainage system is designed to deliver water to multiple tributary streams/rivers and receptor water bodies at multiple locations, to purposefully spread the total discharge across a wider area, to alleviate any flood risk downslope of the Site. The drainage water will pass through check dams in drains and settling basins/pods at the ends of drains, before being discharged diffusely across ground away from tributary streams or rivers. In no instances will water be discharged directly to streams or rivers.

As such, the proposed drainage system will not significantly change the baseline hydrological or hydrogeological characteristics of the subcatchments that host the Proposed Project. However, with the recognising that enhanced drainage can or will influence the timing of delivery of water to the receptor rivers (with mapped indicative flood extents), the attenuation of water energy and slowing of water transfers are considered key factors to success, which will have to be followed up on during subsequent detailed drainage design and construction planning. The final drainage design will ultimately determine how runoff moves through the Site to the receptor water bodies.

3.5

Stage 2 FRA Outcome

None of the proposed infrastructure is located within Flood Zone A. Based on a conservative interpretation of the available flood mapping, the Proposed Project is located predominantly within Flood Zone C. Only a linear and narrow section of the Proposed 110kV Underground Cabling Route partially intersects with Flood Zone B. According to OPW guidance (2009), underground cabling and associated access roads are classified as Less Vulnerable. The 110kV underground electrical cabling is inherently resilient to flooding. Temporary flooding of the Proposed 110kV Underground Cabling Route is not expected to adversely affect the Proposed Project during any phase of works.

The inferred flood risk associated with the Proposed Project is inferred to be low and manageable. While localised pluvial flooding is documented within the Site (refer to the photo log in Appendix 9-1 of Chapter 9 of the EIAR), the principal flood hazard associated with the Proposed Project is fluvial flooding of the Licky River especially. The planned construction of new infrastructure will result in increased runoff rates from hardstand areas compared to existing conditions. Drainage management is proposed which retains existing subcatchment-scale characteristics but breaks the water energy and attenuates water transfer during and following storm events. Subject to the implementation of the many, specific proposed drainage measures which are presented in Chapter 9 of the EIAR, the Proposed Project is not expected to increase or otherwise change the currently defined fluvial flood risk in receptor water bodies.

On this basis, the Proposed Project is considered acceptable from a flood risk perspective. It is also consistent with the Waterford City and County Development Plan 2022-2028.

4.

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APPENDIX 1

OPW FLOOD EVENT REPORTS


OPW

 Oifig na
nOibreacha Poiblí
Office of Public Works

Flood Event Report

Flooding at Aglish Bridge on 14th of November 2014

The information contained in this report has been extracted from a Flood Data Collection Form submitted to The Office of Public Works (OPW) by a consultant

Location and date of flood event:

Location: Aglish Bridge, Aglish Village, Cappoquin, County Waterford

National Grid Reference:

Irish Grid Co-ordinates: 212244E, 90897N

This flooding event started on 14/11/2014 at approximately 6am and ended at approximately 10am on the same date. The peak flooding occurred at approximately 7am.

Source and cause:

The source of the flood waters was a river (and the cause was a channel blockage).

The flooding occurred on the River Bleach in the Goish catchment.

The property is located adjacent to a stream. An overpass has been constructed over the stream to accommodate vehicular access to the rear of the property. This overpass consists of 4 o. large diameter concrete pipes and a concrete slab deck. During a period of heavy rainfall, waters overtop the overpass structure, resulting flood water enters the rear garden of the property. Water subsequently flow3ed down the back yard, into the out house and into the dwelling via the back/side door of the property. All gorund floor areas of the dwelling suffered flooding.

Flood data:

The following flood information was provided:			
Flood Parameter	Max Value	Typical Value	Comments
Flood Level (metres OD Malin)	20.601		Flood mark on wall at side of property
Flood Depth (metres)			
Flood Flow (m ³ /s)			
Flood Velocity (m/s)			

Occasional flooding has been reported at this location.

Property located immediately adjacent to a watercourse. A number of structures have been constructed over the waterbody.

Impacts of flooding event:

It was recorded that this flooding event had the following impacts.

Impacts to property:

Residential – 1 residential property reportedly affected

Additional information:

The property is located adjacent to Aglish Bridge in Aglish village. Immediately east of the property, a stream flows north through the village. The stream is restricted by two structures on the eastern boundary of the impacted property. The initial restriction consists of an overpass to allow vehicular access to the rear of the impacted property. This overpass consists of 4 no. 600mm diameter concrete pipes with a concrete slab bridge deck. The second restriction consists of an overpass extending immediately east of the gable end of the property to the far side of the main wall (approximately 22m in length). This structure accommodates the bridge over the main road through the village.

During a period of heavy rainfall water became restricted at the initial overpass, resulting in flood waters overspilling the parapet all of the overpass (approx. 1.3m above bed level). This water entered the rear garden of the property via the vehicular entrance gate. It then flowed down the rear yard, flooding the outhouse shed and rear yard. The level of flood waters recorded in the yard adjacent to the property was 0.547m in depth. At this point the flood waters entered the property via the back/side door to the kitchen. The finish floor level of the kitchen is 0.075m above that of the yard. This resulted in floor levels within the kitchen being approx. 0.470 in depth. Flooding occurred throughout the entire ground floor of the property. In the front sitting room, flood waters were above the socket lugs (approx 400mm in depth).

This property has flooded previously – a similar (not as severe) flood event occurred 2 years previously.


OPW

 Oifig na
nOibreacha Poiblí
Office of Public Works

Flood Event Report

Flooding at Clashmore on 14th of November 2014

The information contained in this report has been extracted from a Flood Data Collection Form submitted to The Office of Public Works (OPW) by a consultant

Location and date of flood event:

Location: Chapel Lane, Clashmore, County Waterford

National Grid Reference:

Irish Grid Co-ordinates: 212749E, 84201N

This flooding event started on 14/11/2014 at approximately 00:00 and ended at on 15/11/2014 at approximately 00:00. The peak flooding occurred at approximately 3am on 14/11/2014.

Source and cause:

The source of the flood waters was runoff and the cause was exceedance of surface water drainage capacity.

The flooding occurred in the Goish catchment on the river Gleanogle.

Event occurred at a junction on the R671 adjacent to the bridge over the river Gleanogle. During a period of heavy rainfall, surface water runoff flowed down the road from the Church (located at a higher level). On the parapet structure of the bridge, an orifice to permit surface water into the river was insufficient for the volume of water, resulting in ponding occurring on the R671 road directly to the front of the property. Reported flood depths approximately 1m above road level. Extent of flooding approximately 60m.

Flood data:

The following flood information was provided:			
Flood Parameter	Max Value	Typical Value	Comments
Flood Level (metres OD Malin)	11.729		1m above road level
Flood Depth (metres)			
Flood Flow (m ³ /s)			
Flood Velocity (m/s)			

Occasional flooding has been reported at this location.

Flooded property has flooded at least 3 times previously. As a result, a flood barrier has been installed at the front door of the property. Some flood events have resulted from incapacity of adjacent bridge.

Impacts of flooding event:

It was recorded that this flooding event had the following impacts.

Impacts to property:

Residential – 1 residential property reportedly affected

Impacts to transport infrastructure

Road – Approximately .07km of R671 affected

Impacts to Water & Wastewater Infrastructure

Wastewater – Septic tank of cottage on L3202 flooded, disruption period approximately 2 days

Impacts to Agricultural Land & Forestry

Pasture – 2-3 hectares of grassland (deer farm) on south side of R687 flooded

Tillage – 2-3 hectares of arable land on the north side of R687 flooded

Additional information:

Following a period of intense rainfall, surface water ponded to a depth of 1.0m. This surface water came from minor road past the Church. The flooded property owner has installed a flood barrier at the front door to the property. This barrier is 3 feet in height. Flood mark recorded on the property side of the front boundary wall was 1.0m. Waters enter the property via the hinges to the front door. As a result of the flood barrier, internal flood levels within the property were approx. 0.027m in height.

The property owner cited the cause of flooding as insufficient drainage.

The property has flood 3 times in the past.

The flood resulted in R671 route being impassable directly outside the property over a distance of 70m. It took a day for the ponded water to be disperse to the adjacent river (River Gleanogle)/adjacent lands. The excess flowed into the yard of the property and dispersed into the river via an orifice on the right hand side of the river bank.

Waterford County Council has lowered the level of the road directly outside the property since the flood event. The bridge structure consists of a 3 arch structure under the R671 (2 large arches and 1 small arch).

In the past, flooding has resulted due to incapacity of the adjacent bridge structure over the R671.

FLOOD DAMAGE TO GLENLICKY BRIDGE, CO. WATERFORD, 25 AUGUST, 1986

County Engineer

Extraordinary Flood Damage to Roads and Bridges in County Waterford, 1986:

Heavy rainfall and consequential widespread flooding occurred in County Waterford on three occasions in 1986, 6th/7th January, 5th/6th August, and 25th/26th August.

During the January flooding widespread damage was caused to all classes of roads, particularly in the West of the County where exceptionally torrential rainfall occurred in a band stretching from Ardmore through Clashmore to Cappoquin and Mount Melleray. Almost one mile of hard shoulder on National Primary Route N.25 had it's surface ripped away in whole or in part, and 22 different Regional or County Roads were seriously damaged. Remedial works costing £74,146 were necessary.

The first flooding in August (5th/6th) resulted in significant damage to many road surfaces and edges. On the second occasion (Hurricane Charlie, 25th Aug.), however, catastrophic damage was caused to many road surfaces, some bridges and a river weir. In all, 65 different public roads were seriously damaged, while a myriad of other routes suffered minor damage. In some instances, the entire road surface was ripped away by flood waters, while in others, extensive edge damage was caused especially at bends and on gradients, often resulting in deep trenches being gouged out along these roads. The damage was widespread, most intensive and serious in the West of the County.

A weir on the Owenashad River (a tributary of the Munster Blackwater) at Lismore was demolished. Four bridges were affected, one seriously (floor and abutment damage at Ballynakill Bridge, near Kilbrien), two with minor damage (Lismore, Toor), and one to failure (Glenlicky Bridge). The latter is described further below. The total damage arising from the August flooding has resulted in remedial works costing £201,685.

Overall, then, flood damage to roads and bridges in County Waterford, during 1986 resulted in remedial works totalling £275,831, which breaks down as follows:-

ROAD CLASS	Jan.1986	Aug.1986	TOTAL
National Primary	£29,834	£19,800	£49,634
National Secondary	222	1,098	1,320
Regional	741	4,259	5,000
County (incl. Bridges)	43,349	176,528	219,877
TOTAL:	74,146	201,685	275,831

Flood Damage to Glenlicky Bridge:

It is estimated that at least 75 mm. of rainfall fell over a large part of County Waterford on 25 August 1986. This rain was accompanied by gale force south east winds, and resulted in widespread flooding. It was of a "severity that would be expected only once in a century on average" (Ref. Met. Service Monthly Weather Bulletin, Aug. 1986). The Licky River was one of the worst affected rivers in the County, and the flood flow in this river on 25 August resulted in the failure of Glenlicky Bridge.

Glenlicky Bridge is a two span bridge on the County Road over the Licky River, which provides access to the Council's Water Supply Intake and Pumphouse, as well as to local farms. The bridge was constructed in 1947, by direct labour, and is composed of a 12 feet wide concrete slab on steel beams supported on reinforced concrete abutments and a central pier. The total bridge length, between abutments, is 37 feet. Details of the bridge, as well as the flood level of 25 August and other relevant levels are shown on Drawing 897-1. The bridge is located at Glenlicky, one mile west of Kiely's Cross junction for Ardmore (on N.25).

Flood level on 25 August 1986 was 1.15 metres higher than the bridge soffit level and 0.58 metres above deck level. Accordingly, the eye of the bridge was insufficient to pass the flood flow, which itself was accelerated by the restrictions resulting from the main components of the structure and a severe scouring action was created in the river bed. The channels scoured out by the rapid flow of the river (see Drawing 897-1) disturbed the bearing capacity of the stratum beneath the central pier leading to its settlement and its displacement sideways (Plates 1,2,3). The steel beams, normally supported by the central pier, sagged leading to severe cracking of the concrete deck slab (Plate 4) and to the concrete on the face of the steel beams. The bridge was thus considered to have failed and to be unsafe for traffic.



Bricker
C.D.S.

Photo 6



Photo 5



Photo 4.



Brickey CDS. 28/10/04

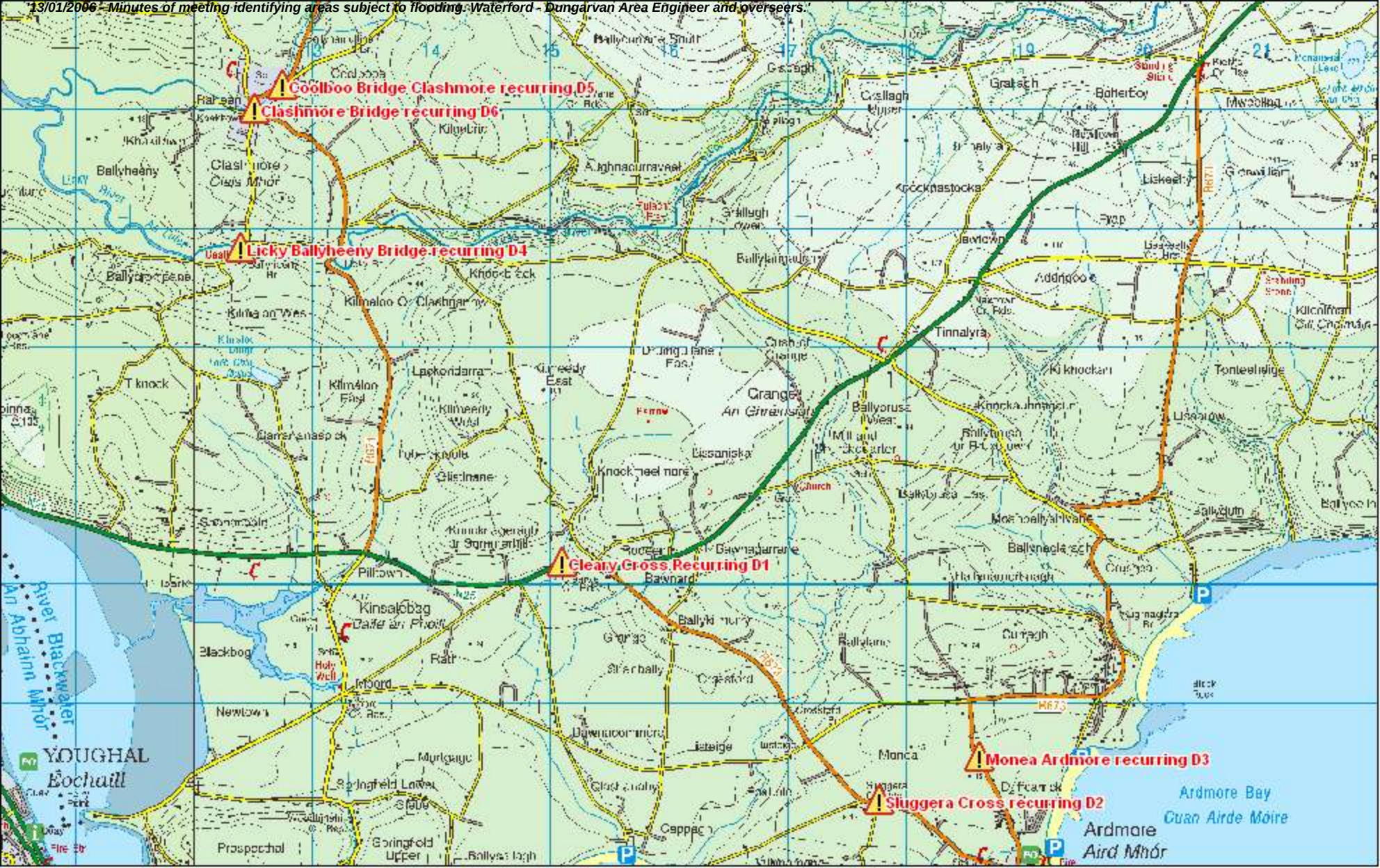


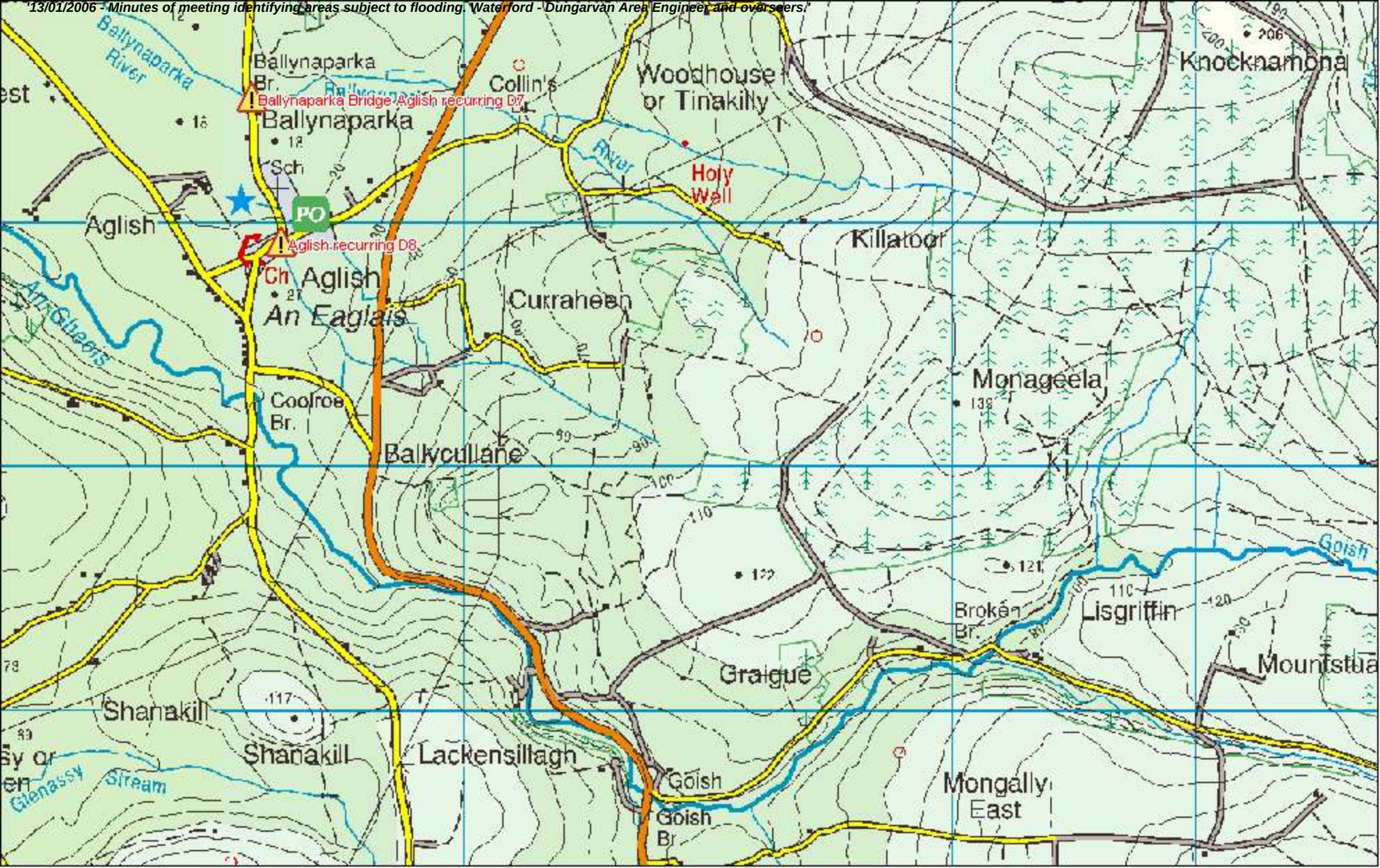
MINUTES OF MEETING

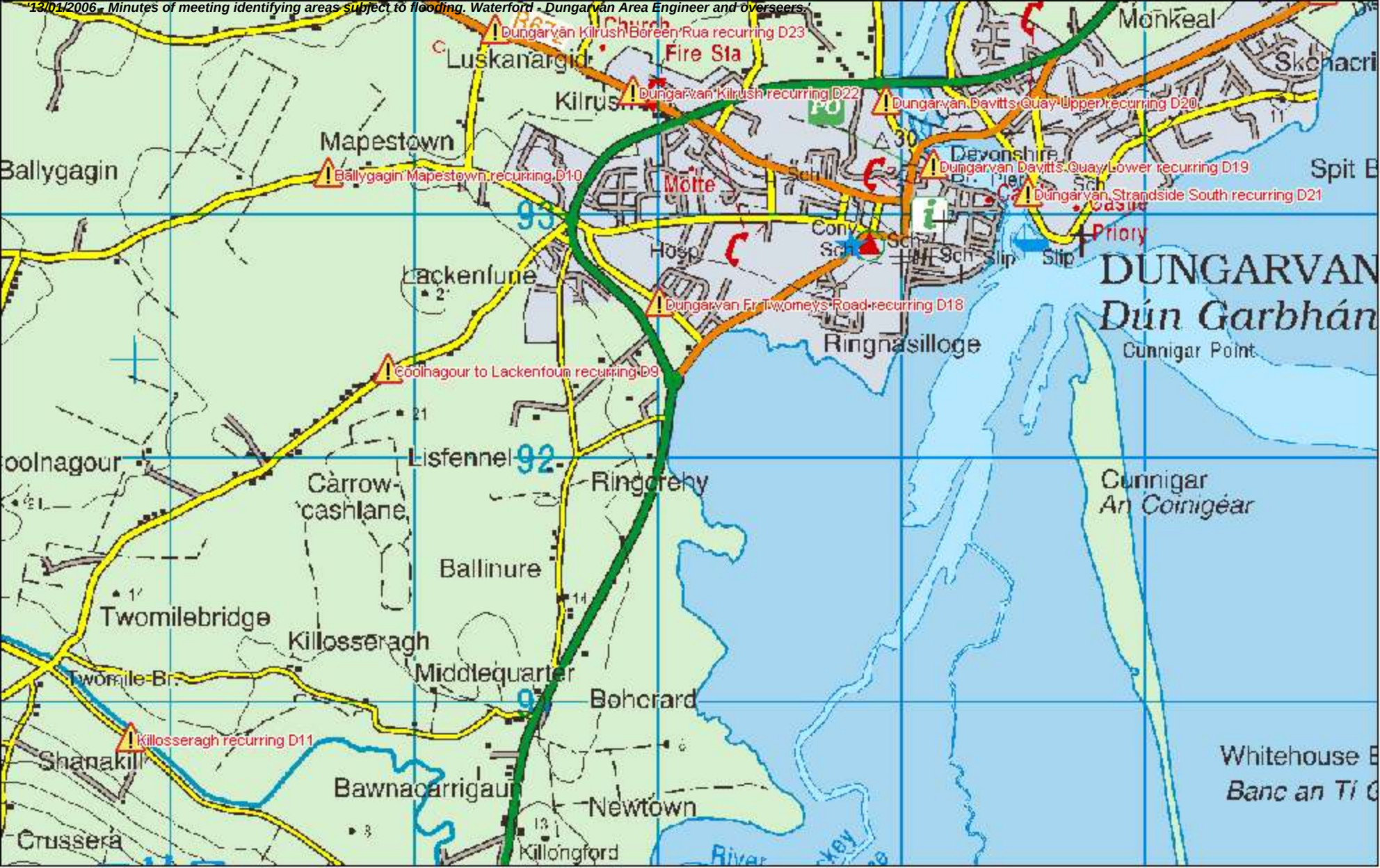
Reference:	P4D403A – F310 – 033 – 004 – 2604	
Project No.:	P4D403A	
Project Title:	OPW Flood Hazard Mapping – Phase 1	
Purpose of Meeting:	Oral Report of Areas prone to flooding – Dungarvan Area, Co. Waterford	
Participating:	Area Engineer, Dungarvan	Waterford County Council
	General Services Supervisors	Waterford County Council
	Search Manager	ESBI
Venue:	Waterford County Council, Dungarvan, Waterford	
Date of Meeting:	13/01/2006	
Copies to:	WCC	
Compiled by:	Search Manager	
Status	Approved	
Approved for ESBI:	Search Manager	
Approved for Waterford County Council	Area Engineer,	
Date:	27/02/2006	

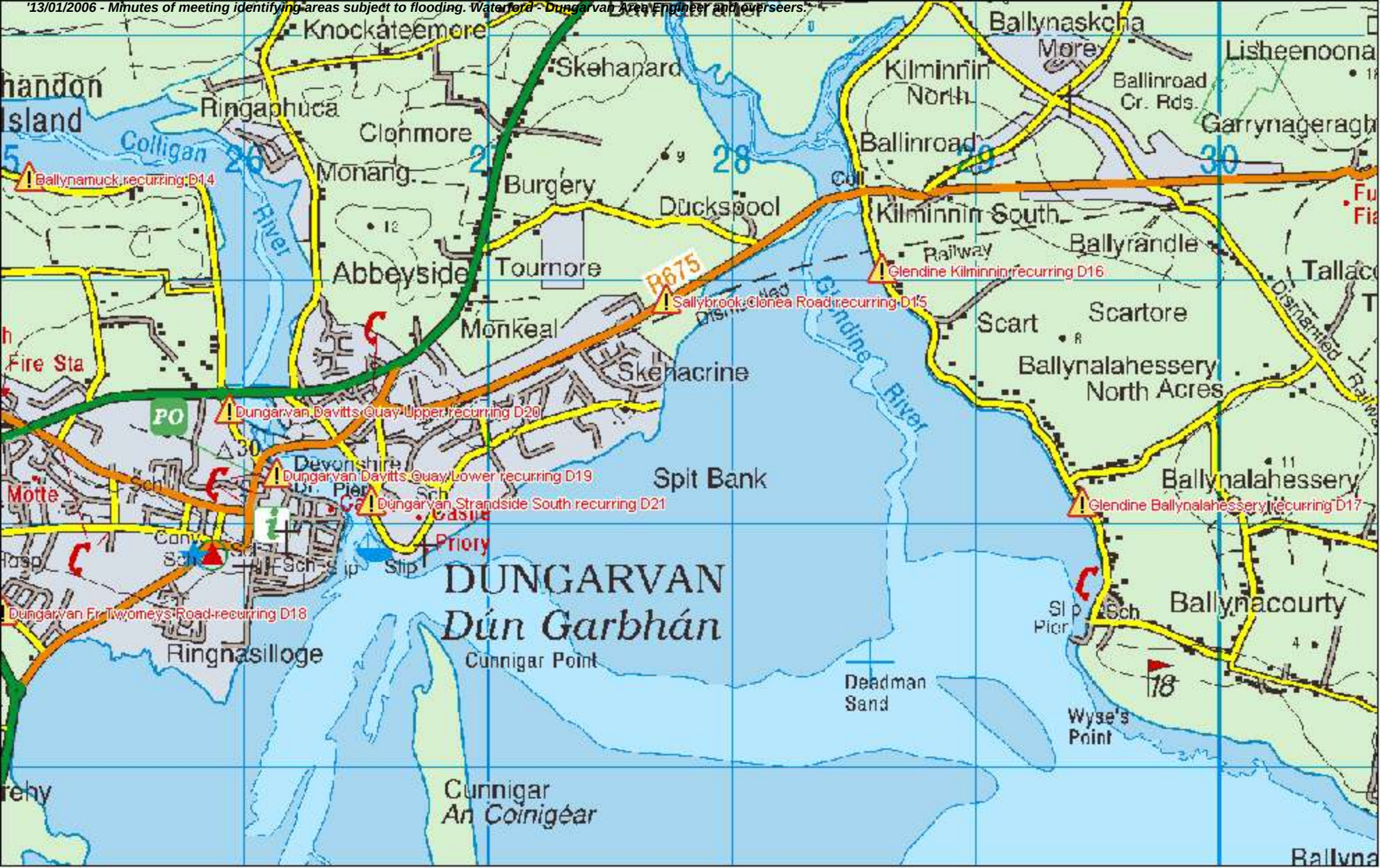
ITEM NO.	MINUTE	ACTION BY
1.	Flood Locations	
1.1	At the meeting, locations vulnerable to regular or historic flooding in the Dungarvan district were identified by the Waterford County Council (WCC) Area Engineer and District Overseers. These places were geolocated digitally by ESBI in conjunction with WCC on OSI mapping using the MapInfo GIS package. The GIS mapping prepared has been printed onto 5 separate sheets. The flood locations are listed and described below under Heading 1.2.	
1.2	1. Cleary's Cross – recurring flooding of the N25 National Primary Road. Flood ID 3801 2. Sluggera Cross – recurring flooding of the R673 regional road near Ardmore. The road is periodically impassable. Flood ID 3802 3. Monea Ardmore - severe recurring flooding at a low point of the R673. Road periodically impassable. Flood ID 3803 4. Ballyheeny Bridge - severe recurring flooding. Road periodically impassable. Flood caused by a combination of high tides and heavy rain increasing flow in the River Licky. Flood ID 3804 5. Coolbooa Bridge at Clashmore – recurring flooding of Regional road R671 due to high flows in river. One house adjacent to river affected. Flood ID 3805 6. Clashmore Bridge - recurring flooding of Regional road R671 due to high flows in river. Properties at lower end of street affected. Flood ID 3806 7. Ballynaparka Bridge at Aglish – recurring flooding. Properties affected Flood ID 3807 8. Aglish village – village can flood under severe rainfall events. Flood ID 3808 9. Coolnagour to Lackenfune area – recurring flooding of the road. A low lying stretch up to 700m in length becomes flooded causing the road to be periodically impassable. Flood ID 3809 10. Ballygagin Mapestown area - recurring flooding of the road. The road is periodically impassable. Flooding due to overflow from a sluggeragh and a stream following heavy rainfall. Runoff from this area of flooding affects the Coolnagour to Lackenfune area. Flood ID 3810 11. Killosseragh – approximately 1 mile of road is flooded on a recurring basis and is periodically impassable following overflow from the adjacent canal. Flood ID 3811 12. Colligan River at Kildangan Bridge. A combination of heavy rain and high tides causes overbank flow from the Colligan on a recurring basis. A factory and the N72 road are flooded periodically. Flood ID 3812 13. Ballymacmague. The flood described at Kildangan bridge extends to Ballymacmague on the R672 Regional Road. One house is periodically flooded. Flood ID 3813	

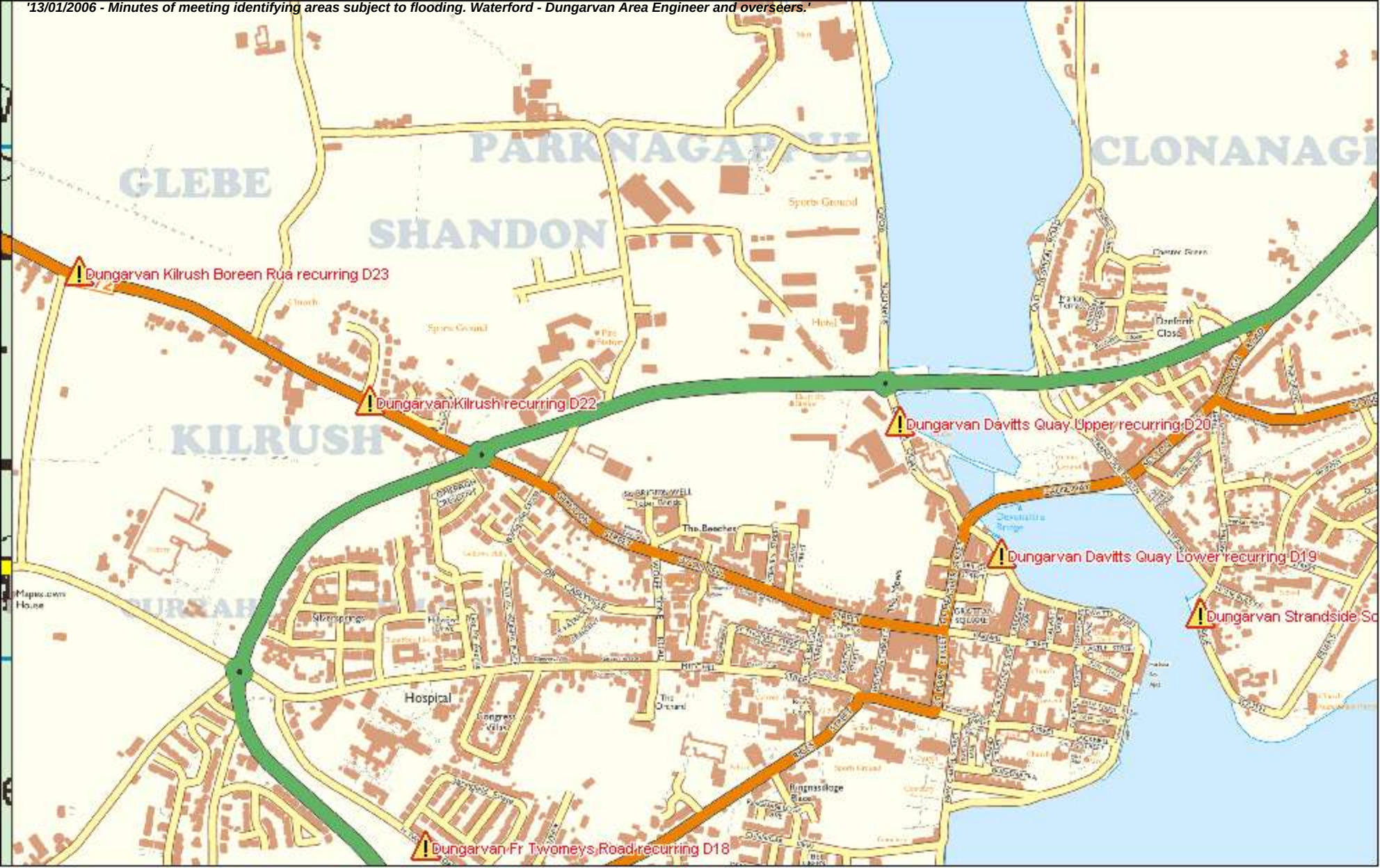
ITEM NO.	MINUTE	ACTION BY
	14. Ballynamuck in Dungarvan on the Colligan River. The road is blocked on a recurring basis due to high tides. Flood ID 3814 15. Dungarvan Clonea Road in the Sallybrook area. The road is flooded periodically due to high tides. Flood ID 3815 16. Glendine Estuary at Kilminnin. The road is flooded periodically due to high tides. Flood ID 3816 17. Glendine Estuary at Ballynalahessery. The road is flooded periodically due to high tides where there are low points in the coastal defences. Flood ID 3817 18. Dungarvan on Fr Twomeys Road The road has been flooded periodically.. Flood ID 3818 19. Dungarvan at Davitts Quay Lower. Flooding of the Quay and a number of premises occurred from the Colligan River in October 2004 due to a combination of high tides, rainfall and winds. Flood ID 3819 20. Dungarvan at Davitts Quay Upper. Flooding of the Quay and a number of premises occurred from the Colligan River in October 2004 due to a combination of high tides, rainfall and winds. Flood ID 3820 21. Dungarvan at Strandside South. Recurring flooding of this area occurs following high tides. Flood ID 3821 22. Dungarvan in the Kilrush area. Flooding occurs regularly following heavy rainfall. Flood ID 3822 23. Dungarvan in the Kilrush Boreen Rua area. Flooding occurs regularly following heavy rainfall. One house has flooded. Flood ID 3823	
2.	Processing of Data	
2.1	The locations listed under Heading 1.2 above will be incorporated into the project database as Flood Events. The unique ID number assigned by the project database is indicated for each flood event. They will then be mapped in the project GIS as points in accordance with the locations indicated on the attached mapping.	
3.	Defence Asset	
3.1	It was noted that the Cunnigar Spit which is a natural formation offers significant flood protection to Dungarvan.	











! Dungarvan Kilrush Boreen Rua recurring D23

! Dungarvan Kilrush recurring D22

! Dungarvan Davitts Quay Upper recurring D20

! Dungarvan Davitts Quay Lower recurring D19

! Dungarvan Strandside recurring D18

! Dungarvan Fr Twomeys Road recurring D18



MINUTES OF MEETING

Reference:	P4D403A – F310 – 018 – 004 – 2606	
Project No.:	P4D403A	
Project Title:	OPW Flood Hazard Mapping – Phase 1	
Purpose of Meeting:	Oral Report of Areas prone to flooding – Lismore Area, Co. Waterford	
Participating:	Area Engineer, Lismore Town Clerk – Lismore G.S.S. – Tooraneena G.S.S – Lismore G.S.S – Ballyduff G.S.S – Tallow G.S.S - Cappoquin Search Manager	Waterford County Council Waterford County Council Waterford County Council Waterford County Council Waterford County Council Waterford County Council Waterford County Council ESBI
Venue:	Lismore Area Office, Waterford	
Date of Meeting:	13/01/2006	
Copies to:	WCC	
Compiled by:	Search Manager	
Status	Final	
Approved for ESBI:	Search Manager	
Approved for Waterford County Council	Area Engineer	
Date:	25/01/2006	

ITEM NO.	MINUTE	ACTION BY
1	Documents Issued	
1.2	The following documents were kindly lent by Waterford County Council (WCC) to ESBI: A. Set of photos of flooding in the Lismore area These photos will be scanned by ESBI and returned to Waterford County Council at the earliest convenience.	
2.	Flood Locations	
2.1	At the meeting, locations vulnerable to regular or historic flooding in the Lismore district were identified by the WCC Area Engineer and Overseers. These locations are itemised below in paragraph 2.2. These places were geolocated by ESBI in conjunction with WCC on a 1:50,000 OSI map using the MapInfo GIS package. The GIS mapping prepared has been printed onto 5 separate sheets.	
2.2	1. River Blackwater at Inchinleanna West. The R666 Regional road is regularly impassable due to recurring flooding from the Blackwater. Flood ID 3824 2. River Blackwater at Inchinleanna East. The R666 Regional road is regularly impassable due to recurring flooding from the Blackwater. Flood ID 3825 3. River Blackwater at Mocollop. The R666 Regional road is regularly impassable due to recurring flooding from the Blackwater. One house at risk. Flood ID 3826 4. River Blackwater at Ballynerroon. The road is regularly impassable due to recurring flooding from the Blackwater. One house at risk. Flood ID 3827 5. River Blackwater at Ballyduff Bridge. The road to Ballynerroon is regularly impassable due to recurring flooding from the Blackwater. Flood ID 3828 6. River Blackwater at Ballyduff. The road is regularly impassable due to recurring flooding from the Blackwater. One house at risk. It is understood the church has flooded in the past. Flood ID 3829 7. River Blackwater at Garra. The R666 Regional road was regularly impassable due to recurring flooding from the Blackwater. Alleviation works have been undertaken. Flood ID 3830 8. River Blackwater at the Ice House near Lismore. The R666 Regional road is regularly impassable due to recurring flooding from the Blackwater. A number of houses have flooded during major floods. Backing up of the Blackwater occurs during high tides. Flood ID 3831 9. River Blackwater at Ballyrafter, Lismore. Commercial property and two houses are regularly flooded due to overflow from the River Blackwater, the Owennashad tributary and the Lismore Canal. The N72 National Secondary Route and R666 Regional road have been impassable for three to four days resulting in a 30km diversion for traffic. Flood ID 3833 10. River Blackwater at Kilbree West. The road is regularly impassable due to recurring	

ITEM NO.	MINUTE	ACTION BY
	flooding from the Blackwater. Flood ID 3834 11. Tourin. Regular flooding occurs in a marshy area when high levels in the Blackwater cause backing up into the local tributary. Two roads are flooded. Alleviation works have been undertaken. Flood ID 3835 12. River Blackwater at Camphire. The road is regularly impassable due to recurring flooding from the Blackwater. Access to one house blocked. Flood ID 3836 13. River Finisk just upstream of Millstreet. The R671 regional road is regularly impassable due to recurring flooding from the Finisk. Flood ID 3837 14. River Magaha at Kilcloher Bridge. Regular flooding occurs at the junction of the N72 and R671 roads. Photos available. Flood ID 3838 15. River Blackwater at Kilbree East. The road is regularly impassable due to recurring flooding from the Blackwater. One house at risk. Caused by a combination of high tides and heavy rainfall. Flood ID 3839 16. River Blackwater at Kitchenhole Salterbridge. The N72 National Secondary Route is regularly impassable due to recurring flooding from the Blackwater. Flood ID 3840 17. River Blackwater at Salterbridge. The N72 National Secondary Route is regularly impassable due to recurring flooding from the Blackwater. One house at risk. Flood ID 3841 18. River Blackwater at Cappoquin Boathouse. The boathouse is regularly flooded by the Blackwater. Flood ID 3842 19. River Blackwater at Twig Bog Cappoquin. A car-park and the car-park entrance are regularly flooded by the Blackwater. Flood ID 3843 20. River Finisk at Finisk Bridge. The N72 National Secondary Route is impassable during major floods from the Finisk. Flood ID 3844 21. River Finisk at Quarter. Regular flooding occurs when high levels in the Blackwater during spring tides cause backing up into the local tributary, the Finisk. A road is flooded. Flood ID 3845 22. Monyvroe. Two houses are flooded in a localised low spot when high levels occur in neighbouring rivers. Flood ID 3846 23. River Blackwater at Villierstown Pier. Regular flooding from the Blackwater occurs placing one house at risk. Flood ID 3848 24. River Ballynaparka at Bleach. Regular minor flooding occurs when high levels in the Blackwater cause backing up into the local tributary, the Ballynaparka. A road is flooded. Flood ID 3849 25. River Bride at Tallowbridge. Due to a combination of high tides and rainfall, flooding causes the R634 regional road to be regularly impassable. Flood ID 3850 26. River Blackwater at Ballynatray/Lackaroe. The road is regularly impassable during flooding caused by high tides in the Blackwater. Flood ID 3851	

ITEM NO.	MINUTE	ACTION BY
3.	Processing of Data	
3.1	The locations listed under Heading 2.2 above will be incorporated into the project database as Flood Events. A unique ID number will be assigned by the project database to each flood event. They will then be mapped in the project GIS as points in accordance with the locations indicated on the associated mapping.	





