

Flood Risk Assessment

Cummeennabuddoge Wind Farm

M01944-02_DG02 | June 2024

DOCUMENT CONTROL

Document Filename	M01944-02_FR01 Cummeennabuddoge Wind Farm - Stage 2 FRA_Rev01.docx.docx
Document Reference	M01944-02_DG02
Title	Flood Risk Assessment
Project Client	FuturEnergy Ireland
Project Manager	Kyle Somerville
Author(s)	Duncan Hartwick, Iain Muir
Branch	DUBLIN Unit 12, The BEaT Centre, Stephenstown Industrial Estate, Balbriggan T: +353 (0)1 5138963 W: www.mccloyconsulting.ie

REVISION HISTORY

Rev	Date	Prep	Chk	App	Amendments	Reason for Issue
00	16/11/2023	DH	IM	DKS	Original	For information / approval
01	08/02/20234	KS	IM	KS	Amended per client comments	For Planning
02	21/06/20234	KS	IM	KS	Amended per client comments	For Planning

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Recipient	Revision					
	0	1	2	3	4	5
FILE	✓	✓				
FuturEnergy Ireland	✓	✓				

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1 INTRODUCTION

1.1 Terms of Reference

This Stage 2 Flood Risk Assessment (FRA) report was commissioned by FuturEnergy Ireland via its lead consultant to support a planning application for the proposed Cummeennabuddoge Wind Farm development (hereafter referred to as the 'Proposed Development').

1.2 Statement of Authority

This FRA was prepared and reviewed by qualified professionals with appropriate experience in the fields of flood risk, drainage, and hydraulic modelling studies. The key staff members involved in this project are:

- Duncan Hartwick *BEng (Hons) BSc (Hons) MIEI* – Project Engineer with experience in flood risk assessment, hydrology, and hydraulic modelling.
- Iain Muir *MSc CEnv MEnvSc* – Senior Consultant and Chartered Environmentalist specialising in environmental assessment and applied hydrology, with experience in fluvial flood hydrology and modelling.
- Kyle Somerville *BEng (Hons) CEng MIEI* – Director and Chartered Engineer specialising in flood risk assessment, flood modelling, and drainage / surface water management design.

1.3 Objectives of the Assessment

This Stage 2 FRA has the following objectives:

- To identify flooding or surface water management issues at the site that warrant further investigation.
- To confirm the sources of flooding that may be significant or possibly significant to the site.
- To appraise the adequacy of existing flood risk information.
- To determine whether further assessment is required.

Where necessary or appropriate, this report will set out recommended mitigation measures.

1.4 Approach to the Assessment

1.4.1 Method of Assessment

The method of assessment applied complies with the Source-Pathway-Receptor model and provides a spatial assessment of flood risk to people, property, and the environment at the Proposed Development. Consideration has been given to the sources and extent of all potential sources of flooding at the site, including fluvial, pluvial, urban drainage, and groundwater flooding. Existing runoff characteristics and the risk of flooding from surface water drainage are also considered.

1.4.2 Hydraulic Model Status

The application site is in County Kerry and County Cork. The primary stakeholders are Kerry County Council (CC) and Cork County Council (CC), as well as the Office of Public Works (OPW). OPW, Kerry CC, and Cork CC data has, therefore, been used to form the basis of this assessment and is presented in line with the relevant guidance and requirements.

Flood mapping for watercourses adjacent to and within the Proposed Development site has been produced as part of the OPW's Preliminary Flood Risk Assessment (PFRA) and more recent National Indicative Fluvial Mapping (NIFM) dataset. While the PFRA and NIFM flood mapping is relatively coarse, the indicative PFRA and NIFM flood extents can help build a general understanding of floodplains at the site and in surrounding areas (in the absence of more detailed model data).

1.4.3 Planning Guidelines

The requirements for FRAs are set out in the OPW's The Planning System and Flood Risk Management – Guidelines for Planning Authorities, 2009 (hereafter referred to as the 'OPW Guidelines') and accompanying Technical Appendices. Further guidance is provided in the OPW's Climate Change Sectoral Adaptation Plan, 2019, and CIRIA Research Project 624 Development and Flood Risk – Guidance for the Construction Industry, 2004.

The planning guidelines applicable to the Proposed Development are implemented in the Kerry County Development Plan 2022-2028, specifically through the Strategic Flood Risk Assessments (SFRA) undertaken to inform the Development Plan; and Cork County Development Plan 2022-2028 and its SFRA.

The Kerry and Cork SFRAs were prepared in accordance with the requirements of the OPW Guidelines and adopt an identical Flood Zone standard. Flood Zones are the extents of a design flood event that determine whether development is appropriate from a flood risk point of view. They are defined in both the OPW Guidelines and SFRAs as follows:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding).

The SFRAs clarify that Flood Zones are to be used to determine suitability of proposed development and are to be derived from 'present day' hydrological estimates. The SFRA also states that Flood Zones are generated without the inclusion of climate change and that, in addition to flood zoning, developments should be designed to be resilient to the effects of climate changes.

The OPW Guidelines state that a Stage 2 Initial Flood Risk Assessment is "*to confirm sources of flooding that may affect a plan area of proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate*". Planning and development decisions can be made based on a Stage 2 FRA provided a precautionary approach is taken. However, further work as part of a detailed Stage 3 FRA may be recommended.

2 SITE AND DEVELOPMENT DETAILS

2.1 Site Location

The Proposed Development site is located approximately 20 km east / south-east of Killarney in County Kerry (ITM coordinates 520500, 583500). Context and location are shown Figure 2.1 and Figure 2.2, respectively, and on the drawings submitted in support of the application.

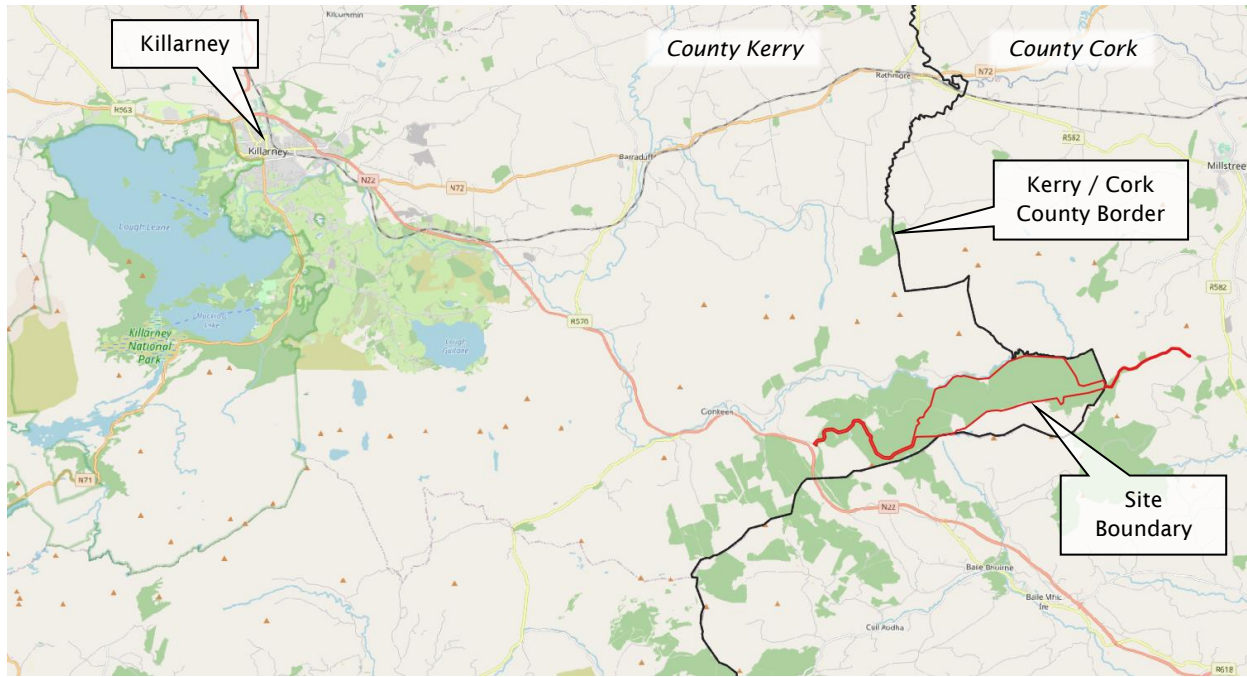


Figure 2.1 Location Context

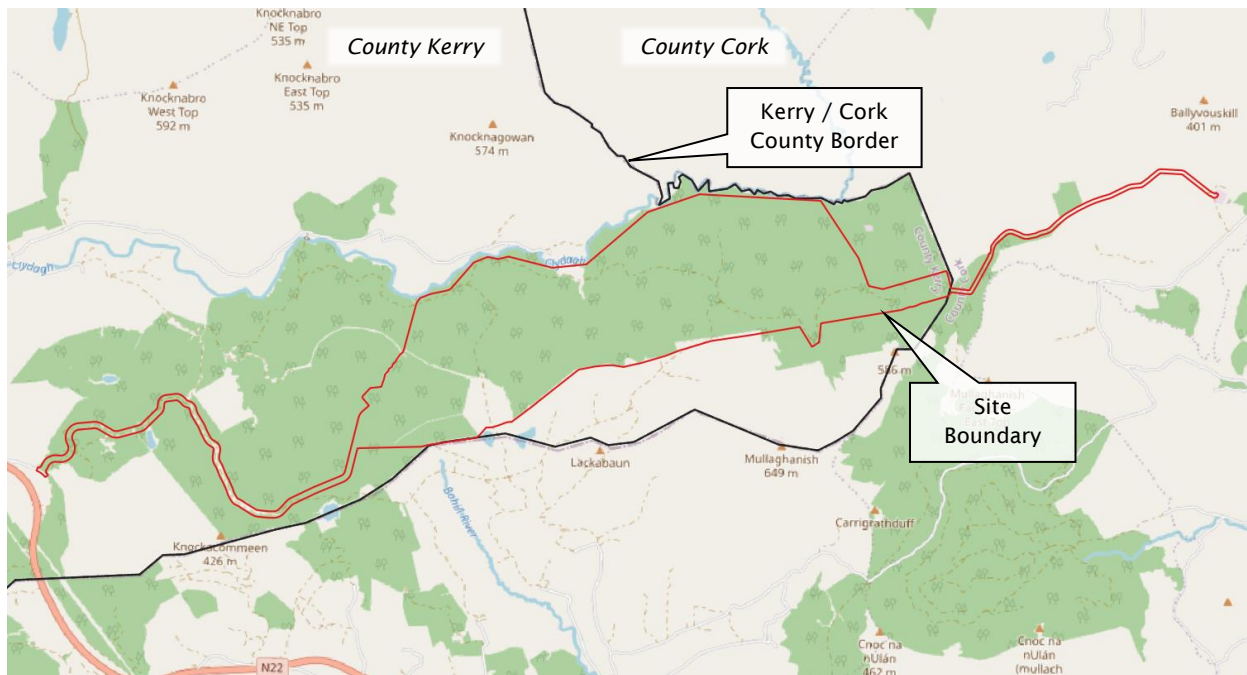


Figure 2.2: Site Location

2.2 Site Description

2.2.1 Existing Land Use

The Proposed Development site lies within an existing Coillte commercial forestry plantation. Site access is via an existing entrance in the west of the site, off a local road that is accessed from the N22 National Road. The existing entrance is currently used for the forestry operations.

2.2.2 Site Characteristics

Site characteristics are described in detail in 'Chapter 11: Hydrology, Water Quality and Flood Risk' of the Environmental Impact Assessment Report (EIAR) that this assessment is intended to support. Any aspects that are relevant to flood risk and drainage are summarised in the following sections.

2.2.2.1 Topography

The topography within the Site Boundary typically slopes down from the southern boundary (maximum approximately 520 m OD) to the northern boundary (at approximately 300 m OD) with the Lackabaun and Mullaghanish mountain peaks located to the south of the site.

Most of the central section of the site is located between 300-400 m OD, and the watercourses crossing the site have created a ridge and shallow valley system. Lower elevations are observed in the west of the site where the access track join from the N22, which is at approximately 270 m OD. The tracks within 1.5 km of the N22 are steep, climbing from an elevation of 270 m OD to approximately 380 m OD as shown in Figure 2.3 below.

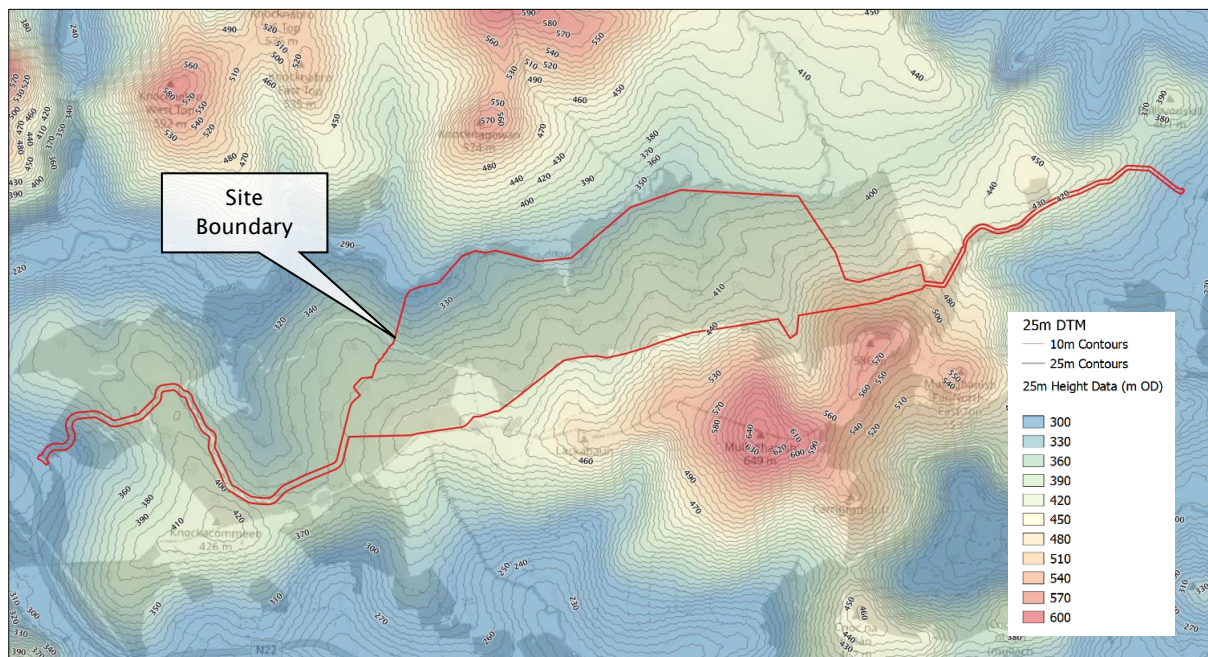


Figure 2.3: Topography Derived from 1m LiDAR

2.2.2.2 Hydrological Setting

Watercourses and lakes within or adjacent to the Proposed Development site, based on the Environmental Protection Agency (EPA) 'flow network' and 'lake' datasets, are shown in Figure 2.4.

The most significant watercourse proximal to the Proposed Development is the River Clydagh which flows in a generally westward direction along the northern extent of the Site Boundary. Several of its tributaries, including the Clydaghroe and Mullaghanish streams, flow through the Proposed Development site. In the west of the site where a cable route is proposed, proximal watercourses are tributaries of the Foherish and Finnow Rivers. Given the steeply sloped nature of the site, the watercourses would tend to have steep gradients characteristic of upland streams.

Further detail on watercourses at and downstream of the Proposed Development site are described in EIAR Chapter 11: Hydrology, Water Quality and Flood Risk.

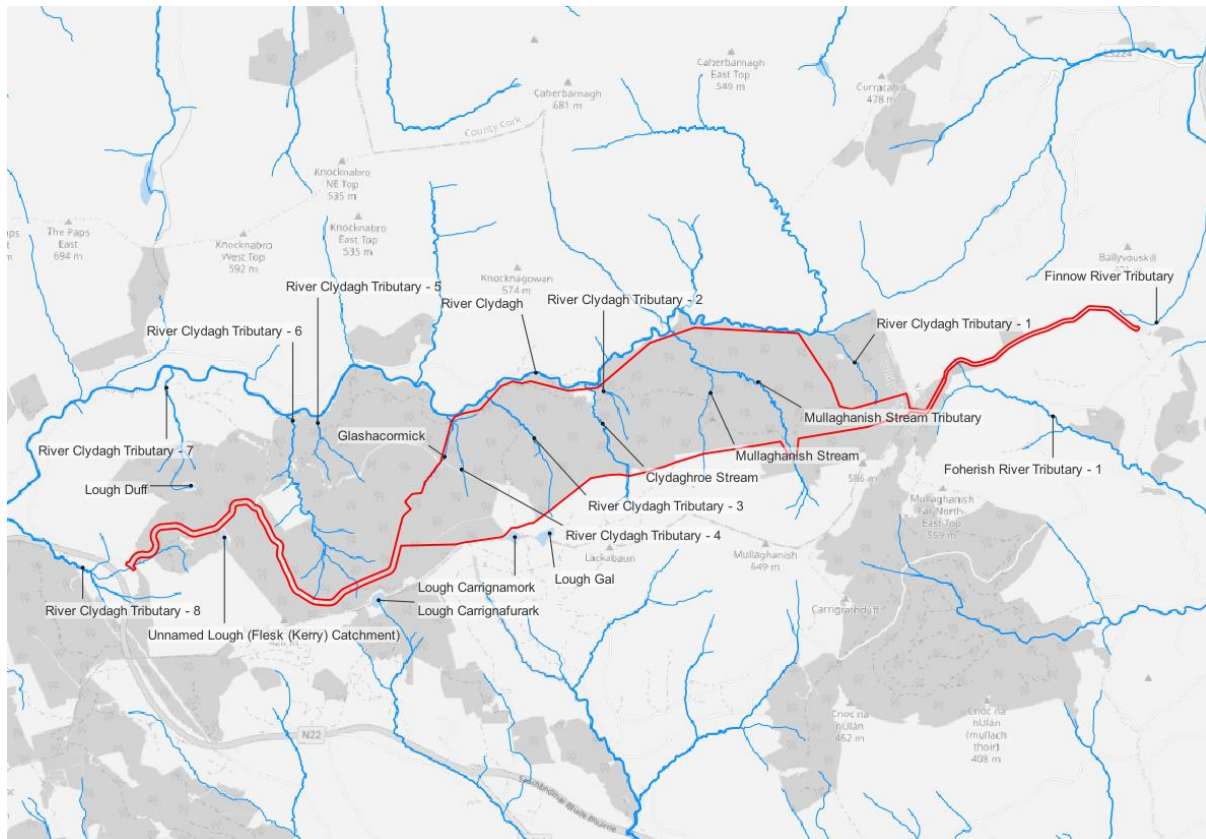


Figure 2.4: EPA Rivers and Lakes

2.3 Development Proposals

The Proposed Development is detailed in the accompanying Environmental Impact Assessment Report (EIAR) Chapter 4: Description of Development, but in summary comprises; the construction of 17 no. wind turbines and associated hardstand areas, an electrical substation, control building, electrical connections, met mast, upgraded tracks, permanent drainage features, and borrow pits. Felling of existing woodland and additional temporary works will also be required for construction.

2.4 Vulnerability Classification

The Proposed Development comprises essential infrastructure including electricity-generating power stations (wind turbine generators), electrical sub-station, and ancillary infrastructure; and internal access roads. Vulnerability classifications are shown in Table 2.1, based on the classification criteria set out in the OPW Guidelines.

Table 2.1: Vulnerability Classification

Part	Use	Classification
Power Generation / Sub-Station and ancillary electrical infrastructure	Essential Infrastructure	Highly Vulnerable Development
Access Tracks / Roads	Local Transport Infrastructure	Less Vulnerable Development

3 BACKGROUND INFORMATION REVIEW

As part of the data collection phase for this assessment, several available sources of information generally as set out in the OPW Guidelines were investigated to build an understanding of the potential risk of flooding to the Proposed Development site. The following review highlights the key findings of the background information review.

3.1 Kerry County Council

3.1.1 Kerry County Development Plan 2022-2028

Section 11.5 of the Kerry County Development Plan 2022-2028 sets out relevant information, guidance, and plan objectives in relation to land use and flood risk management. An SFRA was published in November 2021 to inform the Kerry County Development Plan.

3.1.1.1 Strategic Flood Risk Assessment for the Kerry County Development Plan 2022-2028

Section 6 of the Kerry SFRA sets out key policies for the Development Plan and requirements for flood risk and development management for all development. The development management requirements relevant to this FRA are summarised as follows:

- SFRA_01 – Site-Specific Flood Risk Assessment
 - An FRA should be carried out for all developments in accordance with the OPW Guidelines.
 - FRAs should build on the measures set out in the Kerry SFRA and consider new information and site-specific data to ensure that all potential flood risk issues are identified, mitigated, and managed to an acceptable level.
 - FRAs should be carried out to an appropriate level of detail to identify flood risk to a development and quantify potential impacts of any proposal on flood risk elsewhere.
 - The minimum requirement is a Stage 1 FRA.
 - A Stage 2 FRA would be required for any site within or near Flood Zone A or B, and this may need to be further developed into a Stage 3 FRA depending on the adequacy of the information available, the nature of the flood risk, and details of the proposed development.
- SFRA_02 – Addressing Flood Risk in New Development
 - Any proposal in an area at risk of flooding that is considered acceptable in principle must demonstrate that appropriate mitigation measures will be put in place and that residual risks can be managed to an acceptable level.
- SFRA_04 – Maintaining Existing Drainage Regime and Flow Paths
 - Existing overland and channelized flow paths should be maintained, and floodplain storage and conveyance areas should be protected.
 - Where it is essential to modify flow paths or ground levels in floodplains, the impact of any such modifications should be quantified and mitigated as part of a site-specific FRA.
- SFRA_05 – Development on Floodplains
- SFRA_06 – Finished Floor Levels
 - The finished floor level of all new developments should be constructed above the 1% Annual Exceedance Probability (AEP) Mid-Range Future Scenario (MRFS) flood level plus freeboard. Appropriate freeboard is typically 300 to 500 mm, but this should be assessed on a case-by-case basis depending on the sensitivity of the site to exceedance flows, climate change, residual risk, etc.
- SFRA_07 – Residual Risks
 - Residual Risks should be assessed at a site-specific scale and appropriate measures should be implemented to manage all identified residual risk.
- SFRA_08 – Surface Water Management
 - Sustainable Urban Drainage Systems (SuDS) and other nature-based surface water drainage solutions should be incorporated into the design of new developments.

- SuDS design should be carried out in accordance with the Greater Dublin Strategic Drainage Study (GSDS) 2005 and CIRIA SuDS Manual 2015.
- SFRA_09 – Climate Change
 - Current industry standard is to accommodate the MRFS, which corresponds to a 20% increase in fluvial flows and rainfall depths and a 0.5 m sea level rise.
 - However, the High-End Future Scenario (HEFS) corresponding to a 30% increase should be considered on a case-by-case basis for certain development, such as critical infrastructure, or where the consequences of exceedance are high.
 - The implications of any flooding associated with a HEFS event should be examined and understood for all proposals.
- SFRA_10 – Safe Access / Egress and Emergency Planning
 - An Emergency Plan should be established for all new developments interfacing with Flood Zones A and B.

3.2 Cork County Council

3.2.1 [Cork County Development Plan 2022-2028](#)

Section 11.11 of the Cork County Development Plan 2022-2028, which came into effect on 6th May 2022, sets out relevant information, guidance, and policy objectives in relation to flood risk management. The requirements and objectives relevant to this FRA are summarised as follows:

- Paragraph 11.11.18 – All proposed development must consider the impact of surface water flood risks on drainage design. SuDS drainage design should ensure no increase in flood risk to the site, or the downstream catchment.
- Paragraph 11.11.26 – OPW guidance recommends two climate change scenarios. For critical or extremely vulnerable development (e.g., substations), a 20% increase in rainfall, 30% increase in river flows, and 1.0 m increase in sea level should be applied (i.e., the HEFS). For less vulnerable and highly vulnerable development, allowances of 20% for rainfall and river flows and 0.5 m for sea level rise should be applied (i.e., the MRFS).
- Objective WM11-15 – Flood Risk Assessments
 - For sites in Flood Zone A or B, a site-specific FRA will be required.
 - For sites in Flood Zone C, an examination of all potential sources of flooding and consideration of climate change (in the form of a Stage 1 or Stage 2 FRA) will be required. In limited circumstances where the Stage 1 or Stage 2 FRA identifies potential sources of flood risk, a site-specific FRA may also be required.

3.2.1.1 [Strategic Flood Risk Assessment for the Cork County Development Plan 2022-2028](#)

A Stage 2 SFRA was published in July 2021 to inform the Cork County Development Plan. Development management recommendations in the SFRA are set out in Section 5 of that report and are consistent with the policies in the County Development Plan.

3.3 Office of Public Works

3.3.1 [Preliminary Flood Risk Assessment](#)

The first phase of the OPW's National Catchment Flood Risk Assessment and Management (CFRAM) Programme involved a Preliminary Flood Risk Assessment (PFRA). As part of the PFRA, national-coverage indicative flood mapping. The purpose of the PFRA was to inform the next phase of the CFRAM Programme by identifying Areas for Further Assessment [AFAs] that would require more detailed modelling. The site and surrounding area are not within an AFA and, as such, more detailed CFRAM flood maps do not exist for the site. It is noted that the PFRA was based on available or readily derivable information and is considered coarse / indicative only.

PFRA data has latterly been superseded by National Indicative Fluvial Mapping (NIFM) (refer to Section 3.3.2) and PFRA data is therefore deemed withdrawn by OPW; however, NIFM coverage does not extend to small catchments and there is no new national pluvial dataset.

Reference is therefore made to PFRA flood data in relation to screening of pluvial flooding, and screening of fluvial data associated river reaches not included on the latter NIFM datasets due to their small catchment size.

Flood data indicates that the site is affected by the indicative 1% AEP flood extents of the River Clydagh and its tributaries within the Site Boundary, as shown in Figure 3.1, and that these flood extents follow the watercourse centrelines.

The Proposed Development site is not indicated to be affected by pluvial or groundwater flooding.

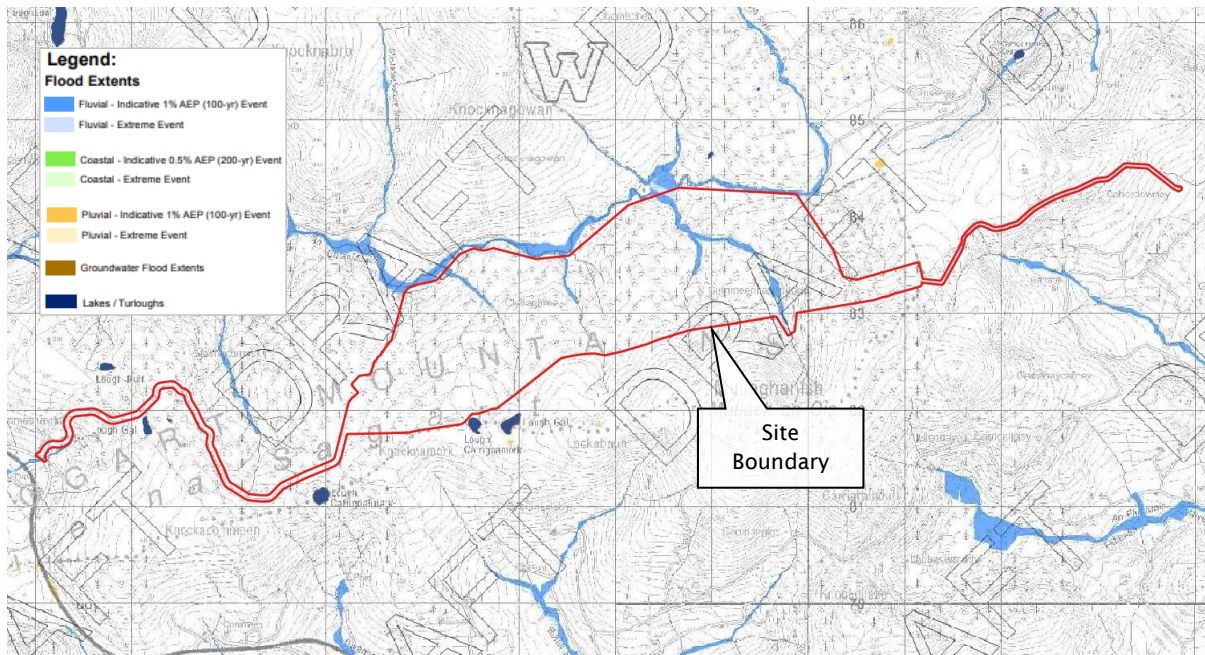


Figure 3.1: OPW PFRA Flood Map

3.3.2 [National Indicative Fluvial Mapping](#)

The OPW produced NIFM flood mapping for catchments greater than 5 km² in areas for which detailed CFRAM flood maps do not exist. NIFM flood mapping was produced for a range of present day and climate change (i.e., MRFS and HEFS) scenarios.

NIFM flood mapping indicates that the site is marginally affected by the present day, MRFS, and HEFS flood extents of the River Clydagh, as shown in Figure 3.2, Figure 3.3, and Figure 3.4, respectively.

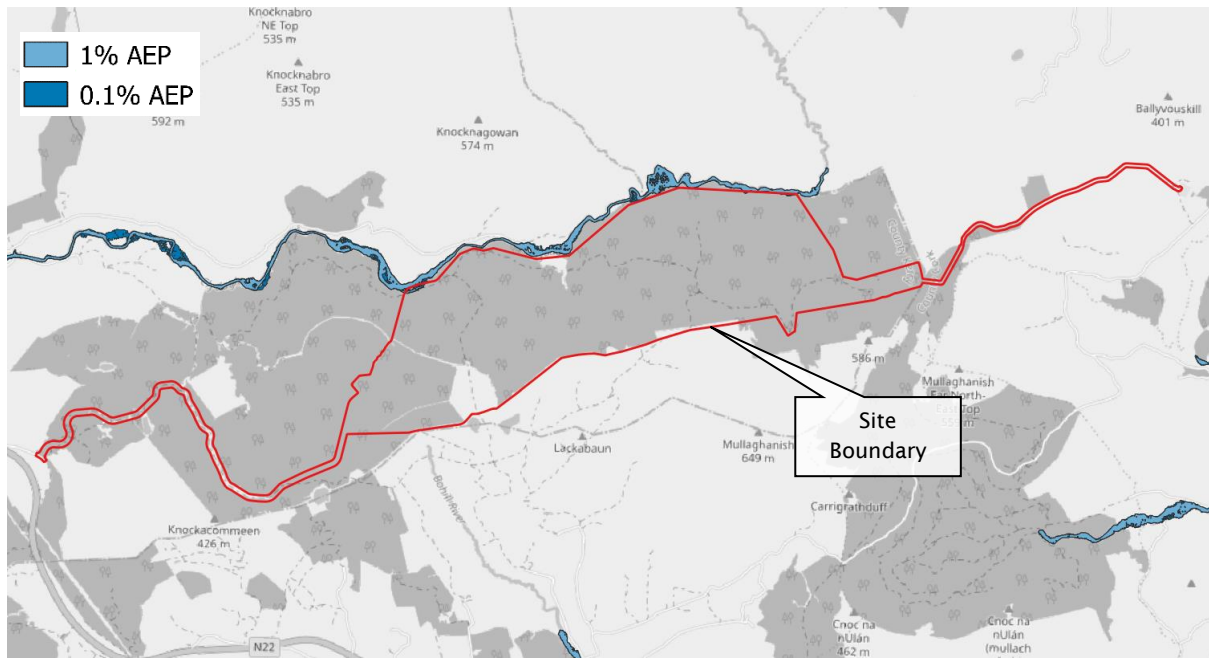


Figure 3.2: OPW NIFM 1% AEP and 0.1% AEP Present Day Flood Extents

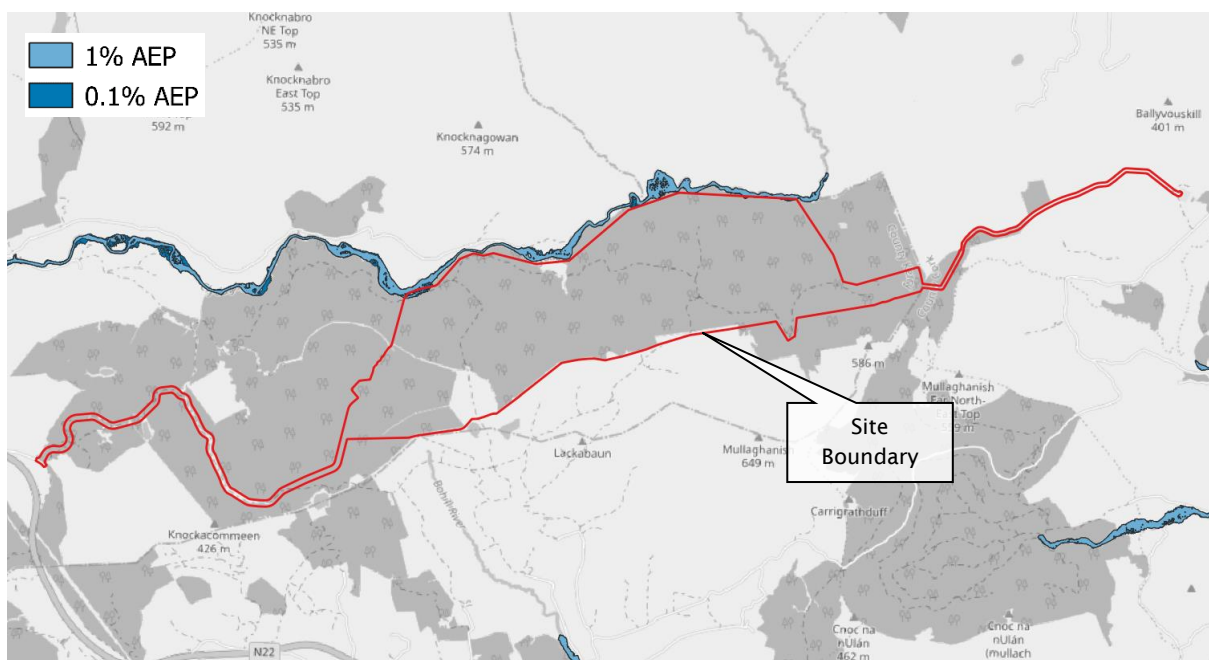


Figure 3.3: OPW NIFM 1% AEP and 0.1% AEP Mid-Range Future Scenario Flood Extents

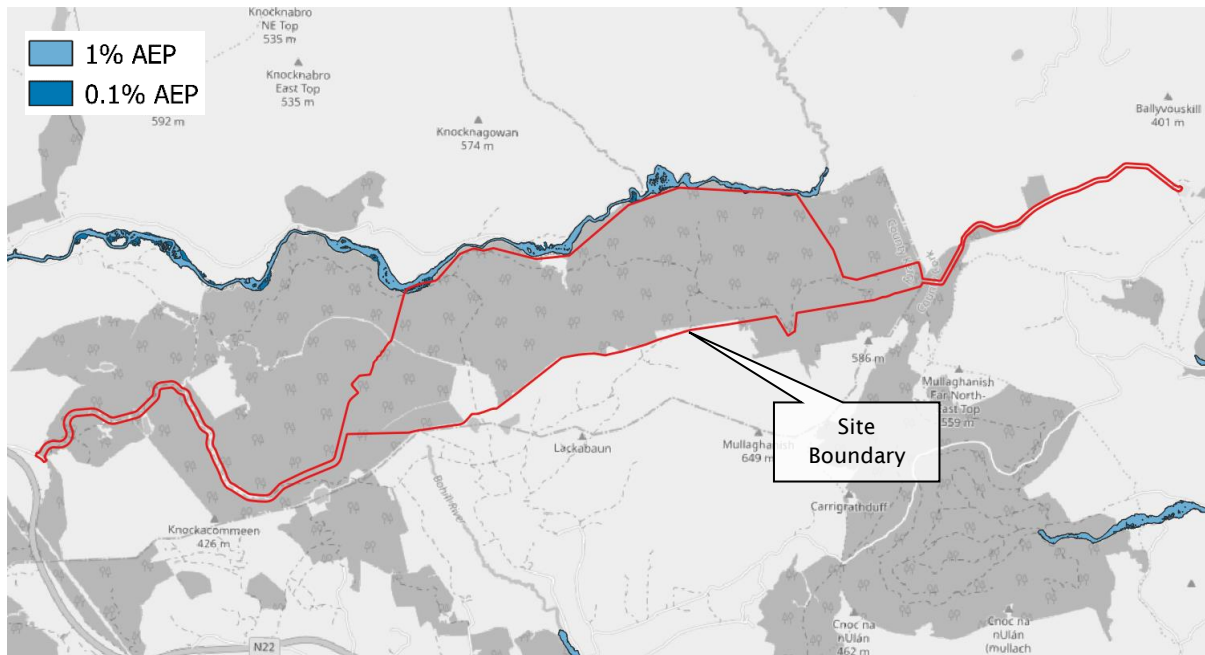


Figure 3.4: OPW NIFM 1% AEP and 0.1% AEP High End Future Scenario Flood Extents

3.3.3 Past Flood Events

OPW 'Past Flood Event' mapping (available through floodmaps.ie) does not provide any records of flooding at or in the immediate vicinity of the Proposed Development site. The nearest flood event is shown to have occurred on the River Clydagh (ref: L7058 Clydagh Valley) in July 2005, approximately 6 km downstream of the Site Boundary. No evidence of historic flooding of the site was found.

3.4 Geological Survey Data

Review of the GSI Groundwater surface flood map dataset indicates no areas prone to potential above ground surface flooding within the application boundary.

3.5 Internet / Media Background Search

An internet / media background search found a news report on flooding from the River Clydagh, approximately 8 km downstream from the Site Boundary, which resulted in road closures at Loo Bridge in February 2021¹. There are no reports of flooding at or in the immediate vicinity of the site.

¹ <https://www.independent.ie/regionals/kerryman/news/chaos-as-roads-and-homes-swamped-40124819.html>

4 ASSESSMENT OF FLOOD MECHANISMS

4.1 Preamble

In accordance with the OPW Guidelines, development management objectives advise against inappropriate development in areas at risk of flooding and aim to avoid new development that increases flood risk elsewhere. The following assessment determines the flood hazards to life and property at the Proposed Development site to subsequently assess the site relative to the OPW Guidelines.

4.2 Initial Assessment

Table 4.1 presents a screening assessment of the Proposed Development site for potential flooding mechanisms requiring further detailed assessment, based on the information established in Section 3. Flooding mechanisms screened as being significant or possibly significant and requiring further assessment have been assessed further in subsequent sections. Mitigation of flood hazards, where required, is detailed in Section 5.2.

Table 4.1: Potential Flooding Mechanisms

Source / Pathway	Significant?	Reason
Fluvial Flooding	Yes	OPW flood mapping indicates that the Proposed Development site is affected by fluvial flooding from the River Clydagh and its tributaries.
Coastal Flooding	No	The site is not in a coastal area.
Urban Drainage	No	There are no existing developments with significant drainage infrastructure in the vicinity of the Proposed Development site.
Surface Water / Pluvial Flooding	No	OPW PFRA flood mapping indicates that the Proposed Development site is not in an area at risk of significant pluvial flooding.
Surface Water Discharge	Possible	Any development has the potential to increase the impermeable area at a site and thereby cause an increase in the rate and volume of surface water runoff from the site.
Groundwater	No	OPW PFRA mapping and GSI data indicates that the Proposed Development site is not in an area at risk of groundwater flooding. Due to the site topography, there are no areas that would cause impoundment of groundwater.
Lakes / Loughs	No	OSI mapping shows that there are two loughs in the south-west of the Site Boundary. Lough Gal drains via one of the tributaries through the site that discharges to the River Clydagh. Any flooding would originate from the tributary and be assessed as fluvial. Lough Carrignamork drains away from the site.
Impoundments / Artificial Sources	No	There are no impoundments in the vicinity of or that drain towards the Proposed Development site.

4.3 Fluvial Flooding

4.3.1 Existing Flood Risk (Present Day)

OPW indicative flood mapping indicates that the Proposed Development site is affected by the flood extents of the River Clydagh and several of its tributaries within the Site Boundary.

Predicted flood levels are not available for the site. Comparison of 'maximum indicative flood extents' (i.e., greater of the PFRA and NIFM flood extents) in any given location with height data represents a conservative approach and is deemed to be appropriate for a Stage 2 FRA. It is noted that PFRA and NIFM indicative flood extents for the River Clydagh are largely identical. However, NIFM flood mapping does not include flood extents for the tributaries within the Site boundary whereas PFRA flood mapping does.

Comparison of maximum indicative flood extents with height data indicates that the proposed turbine locations are min. 1 m higher than adjacent floodplains and min. 60 m from the nearest indicative flood extents or watercourse centrelines. As shown in Figure 4.1, the majority of the proposed access tracks are sited outside the maximum indicative flood extents.

While watercourse crossings have been minimised as far as possible, bridges / culverts are necessary to facilitate access to / within the site. All watercourse crossings will be required to comply with OPW Section 50 guidelines, to provide free inlet conditions and freeboard to design flood levels and, as such, not be at risk of flooding and cause no increased flood risk elsewhere.

Therefore, the risk of flooding to the proposed development is sufficiently low as to require no further assessment.

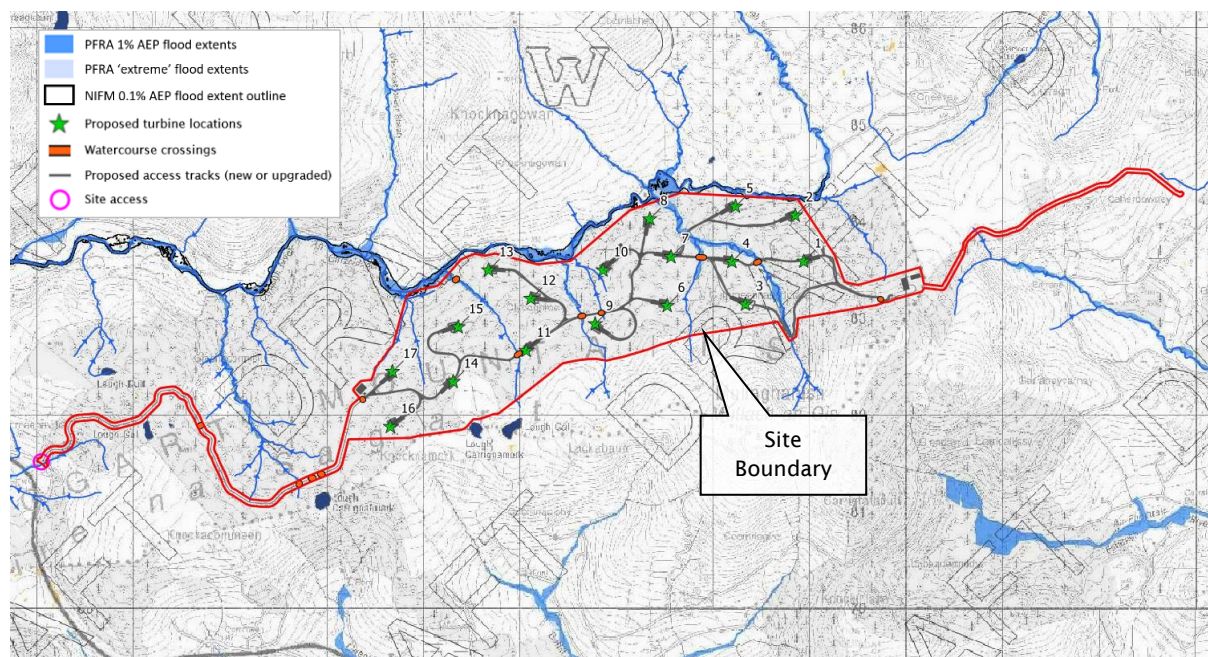


Figure 4.1: Maximum Indicative Fluvial Flood Extents vs. Proposed Layout

4.3.2 Effect of Climate Change

The Kerry County Council County Development Plan requires that development is assessed to ensure that it is resilient to the effect of climate change, with the Mid Range Future Scenario (MRFS) being the relevant standard and High End Future Scenario (HEFS) being applicable to essential infrastructure. HEFS therefore is not relevant to the Proposed Development as it is not essential infrastructure.

NIFM flood mapping indicates that the 1% AEP and 0.1% AEP present day flood extents of the River Clydagh are effectively the same as those for both climate change scenarios (the MRFS and HEFS). This can be attributed to the fact that the River Clydagh flows through the Clydagh Valley, which would limit the potential extent of flooding in the area.

Given the steep gradients of the watercourses within the Site Boundary, the MRFS and HEFS climate change flood extents of these watercourses are similar to the present-day flood extents. Therefore, for the reasons outlined in Section 4.3.1, the Proposed Development is assessed as not being at risk from flooding including allowance for the impact of climate change, including for the HEFS scenario.

Mitigation of flood risk to future development is discussed in Section 5.2.

4.3.3 Effect of Development

All development is sited within Flood Zone C, as defined in the OPW Guidelines, except for where access tracks are required to cross watercourses within the site.

Design of watercourse crossings will be required to comply with OPW Section 50 guidelines, which will include providing freeboard to design flood levels and ensuring no increase in flood risk elsewhere because of the bridge / culvert.

Given that all development is sited in Flood Zone C and that new watercourse crossings shall meet the Section 50 requirements, the Proposed Development will have no impact on flood risk elsewhere.

A watercourse crossing schedule providing hydrological analysis and culvert sizing (in line with Section 50 requirements) for new crossings required as part of the Proposed Development is included in EIA Technical Appendix 11.4: Surface Water Management Plan.

4.4 Surface Water (Pluvial) Flooding

4.4.1 Surface Water Discharge

The Proposed Development will cause an increase in impermeable areas (i.e., tracks, hard standing), meaning it has the potential to cause an increase in flood risk elsewhere if surface water discharge is not adequately managed.

Mitigation of residual impact of surface water to the development and off-site receptors by means of an effective surface water drainage network and surface water management is outlined in Section 5.2.4 of this report and further detailed in EIA Technical Appendix 11.4: Surface Water Management Plan.

5 SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.1 Summary of Findings

OPW indicative flood mapping indicates that the Proposed Development site is affected by fluvial flooding from the River Clydagh and its tributaries. There are no other significant flood mechanisms affecting the site.

This Stage 2 FRA has determined that **all proposed development is sited in Flood Zone C**, as defined in the OPW Guidelines, except for where access tracks are proposed to cross watercourses. Watercourse crossings will be subject to OPW Section 50 guidelines and, as such, will provide freeboard to design flood levels and not increase flood risk elsewhere (refer to EIA Technical Appendix 11.4: Surface Water Management Plan for further detail on water crossing design requirements). In being resilient to flooding and not increasing flood risk elsewhere, the Proposed Development will comply with the OPW Guidelines.

Watercourse crossings will be subject to approval by the OPW under Section 50 guidance and, while not necessarily subject to FRAs, will require a level of hydraulic analysis consistent with a Stage 3 FRA (refer to EIA Technical Appendix 11.4: Surface Water Management Plan for further detail).

5.2 Design Requirements

The following section details measures to be incorporated into proposals submitted in support of a planning application and to be further developed in any detailed design or variation post-determination of the planning application.

5.2.1 Land Use

All aspects of the Proposed Development are sited in Flood Zone C and, therefore, considered 'appropriate'. The exception is where access tracks are proposed to cross watercourses which will be required to meet OPW Section 50 requirements (refer to EIA Technical Appendix 11.4: Surface Water Management Plan for further detail on water crossing design requirements).

5.2.2 Design Levels

In accordance with the OPW Guidelines, 500 mm freeboard is generally applied to the Flood Zone A flood level for less vulnerable development (i.e., access roads) and to Flood Zone B flood level for highly vulnerable development (i.e., turbines and associated electrical infrastructure).

Height data suggests that the proposed turbine locations are min. 1 m higher than adjacent flood extents indicated on OPW flood mapping. Access tracks are generally outside the floodplain except where they are required to cross watercourses. Watercourse crossings shall provide freeboard to the relevant design flood levels, in line with OPW Section 50 requirements (refer to EIA Appendix 11.4: Surface Water Management Plan for further detail on water crossing design requirements).

5.2.3 Access Levels

Site access is in Flood Zone C, meaning safe access to and egress from the Proposed Development will be possible during an extreme flood event.

All proposed access tracks are sited in Flood Zone C or will provide freeboard to the relevant design flood level, in line with OPW Section 50 requirements.

5.2.4 Drainage Design

Surface water drainage design is per the requirements of the Kerry Development Plan 2022-2028 and to the standards of the Kerry County Council Water Services Department. The Kerry Development Plan 2022-2028 states that it is an objective to incorporate and promote the use of Sustainable Drainage Systems (SuDS), and that these are to be designed in accordance with the GSDS and CIRIA SuDS Manual

(refer to EIA Technical Appendix 11.4: Surface Water Management Plan for further detail on surface water management measures).

SuDS components are proposed that are suitable for the nature of the development and character of the site. Surface water management is detailed in EIA Technical Appendix 11.4: Surface Water Management Plan.

5.3 Maintenance Requirements

5.3.1 Drainage System Maintenance

The site owner / operator shall be responsible for maintenance of drainage networks at the site and ensure that maintenance of the drainage system is provided for. The drainage layout for the site ensures that key SuDS features requiring maintenance are situated in accessible locations.

Maintenance plans for drainage assets shall include (where applicable):

- Cyclical (min. annual) check of all surface water drainage features – in particular, clearing of debris.
- Cyclical (min. annual) visual inspection of any surface or underground features – blockages and obstructions to be removed by excavation and jetting, as required.

5.4 Summary of Flood Risk and Mitigation

Table 5.1 summarises the mechanisms of flooding identified by this study and their associated hazards / consequence, per the OPW Guidelines, as well as proposed measures to mitigate the predicted risk.

Table 5.1: Summary of Risks and Mitigation

Flood Mechanism / Potential Effect	Consequence	Summary and Mitigating Measures
Fluvial flooding	Risk to life and property	All proposed development is sited in Flood Zone C and at elevations that are sufficiently raised above adjacent indicative flood extents or watercourse centrelines. The exception is where access tracks are proposed to cross watercourses. New watercourse crossings will require Section 50 consent. A watercourse crossing schedule with analysis and design of watercourse crossings to meet Section 50 standards is submitted separately as part of EIA Technical Appendix 11.4.
Effect of the development	Increased risk to adjacent lands and developments	All proposed development is sited in Flood Zone C and will therefore have no impact on flooding elsewhere. In obtaining Section 50 consent, new watercourse crossings will have no impact on flood risk elsewhere for the design flood event.
Pluvial / surface water flooding	Risk to property on the site, and risk to adjacent lands and property	On-site surface water flooding is mitigated by a site drainage system which meets Local Authority drainage standards. Off-site surface water effects are mitigated by provision of SuDS components and no increase in rate and volume of runoff of surface water from the site because of the development, as detailed in EIA Technical Appendix 11.4..

