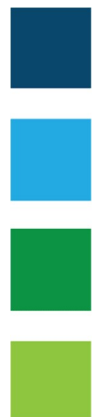


Appendix 2-8 – Flood Risk Assessment



Cloghercor Wind Farm, Co. Donegal
Flood Risk Assessment



Wind Farm at Clogherachullion & Cloghercor, Co. Donegal

Flood Risk Assessment

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1.0 INTRODUCTION

TOBIN Consulting Engineers were appointed by Orsted/FEI to undertake a Flood Risk Assessment (FRA) for their lands (see Figure 1-1) and proposed wind farm site (see Figure 1-2) at Clogherachullion and Cloghercor, Co. Donegal.

Figure 1-1 shows the location of the subject site. The approximately 20km² subject site is comprised of forestry, bogland and lakes. A number of watercourses flow through the subject site. All the watercourse flow in a north-westerly direction towards the Gweebarra River that flows in a south-westerly direction before discharging to the Atlantic Ocean approximately 7km from the western site boundary. The subject site ground levels ranging from approximately 1mOD at the north-western corner of the subject site up to 275mOD at the southern boundary of the subject site. The site falls in a westerly direction, with the western boundary of the subject site low lying, and the eastern side of the subject site considerably higher.

The purpose of this report ('Stage 2' Flood Risk Assessment report as defined by The Planning System and Flood Risk Management Guidelines) is to identify, quantify, and communicate the risks of flooding, if any. The report assesses at the entire land holdings including the proposed wind farm and the areas for future development, as one subject site.

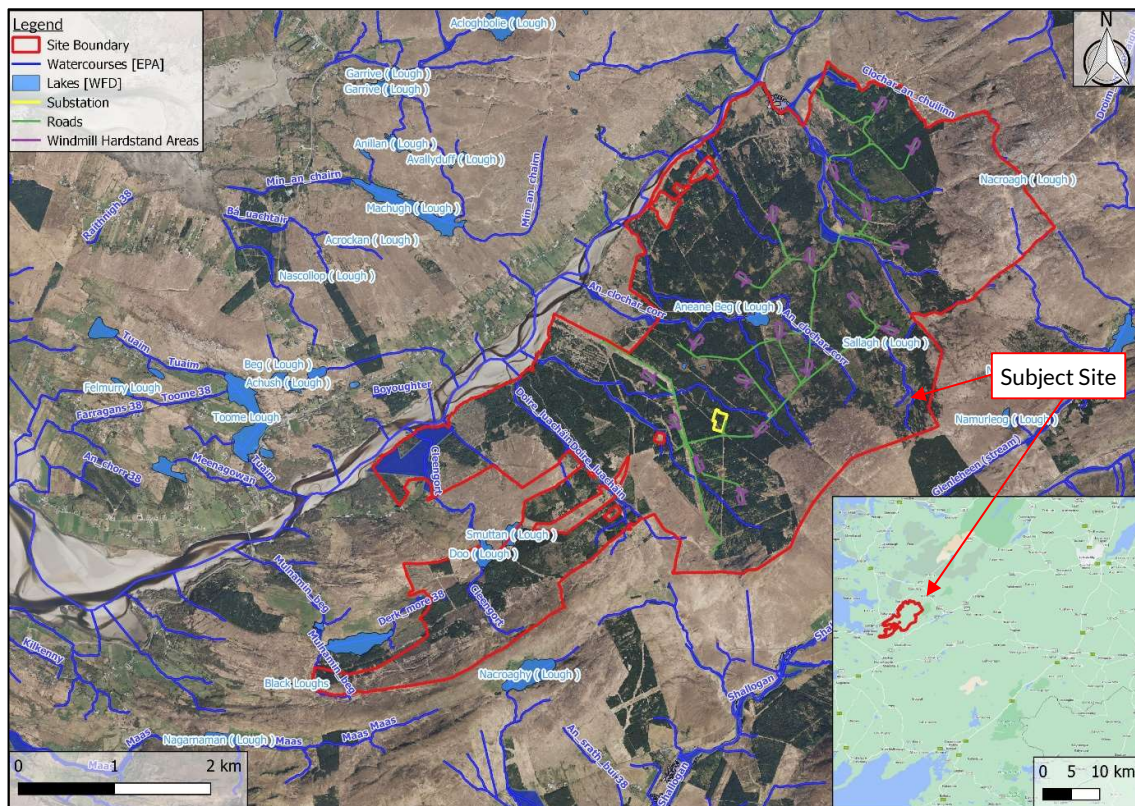


Figure 1-1 Site Location

A summary of the overall proposed project is as follows:

- Erection of 19 no. wind turbines with an overall blade tip height of between 185-2m, a rotor diameter of between 149-164m, a hub height of between 112-125m, and all associated foundations and hard-standing areas in respect of each turbine;

- Construction of new site entrance with access onto the L6483 local road for the construction phase (operational phase maintenance traffic only), and utilisation of a permitted forest entrance (Pl. Ref. 1951040) to the L6483 as a second construction phase site access point. A third site entrance on the L6483 will form the operational phase public entrance to the wind farm;
- Improvements and temporary modifications to existing public road infrastructure to facilitate delivery of abnormal loads and turbine delivery and construction access at 5 locations on the R262 and N56 in the townlands of Tullycumber, Drumard, Darney, Cashelreagh Glebe and Aghayeevoge;
- Construction of an area of temporary hard standing to function as a blade transfer area to facilitate turbine delivery in the townland of Drumnacross;
- Widening of sections of the L6363 and L6483 within the road corridor (up to 4.5m running width) to facilitate delivery of abnormal loads/turbines in the townlands of Cloghercor, Shallogan More, Derryloaghan and Straboy;
- Construction of 2 no. temporary construction compounds with associated temporary site offices, parking areas and security fencing;
- Installation of 1 no. permanent meteorological mast with a height of 100m;
- 4 no. borrow pits;
- Construction of new internal site access roads and upgrade of existing site roads, to include passing bays and all associated drainage;
- Construction of drainage and sediment control systems;
- Construction of 1 no. permanent 110kV electrical substation including:
 - 1 no. EirGrid control building containing worker welfare facilities and equipment store;
 - 1 no. Independent Power Producer (IPP) control building containing HV switch room, site offices, kitchen facilities, storeroom and toilet amenities.
 - All electrical plant and infrastructure and grid ancillary services equipment;
 - Parking;
 - Lighting;
 - Security Fencing;
 - Wastewater holding tank;
 - Rainwater harvesting equipment;
 - All associated infrastructure and services including site works and signage;
- All associated underground electrical and communications cabling connecting the wind turbines to the proposed wind farm substation;
- All works associated with the connection of the proposed wind farm to the national electricity grid, which will be via a loop-in 110 kV underground cable connection (approximately 4.01km cable length within trenches on approximately 3.36km of internal access roads) to the existing 110kV overhead line in the townland of Cloghercor, Co. Donegal, with two new 16m and 21m high steel lattice end masts at each interface;
- Removal of fourteen existing wooden polesets between the two new end masts;
- All related site works and ancillary development including berms, landscaping, and soil excavation;
- Forestry felling to facilitate construction and operation of the proposed development and any onsite forestry replanting;
- Development of a permanent public car park with seating/picnic tables at the end of the construction phase of the development at the location where the proposed grid connection intersects the L6483;
- Permanent recreational facilities including marked walking and cycling trails along the site access roads and paths, and associated recreation and amenity signage; and

- Approximately 252.5ha of biodiversity enhancement lands located over 3km from the proposed wind turbines.

A 10-year planning permission and 35-year operational life from the date of commissioning of the entire wind farm is being sought.

The site layout for the proposed wind farm site is outlined in Figure 1-2.

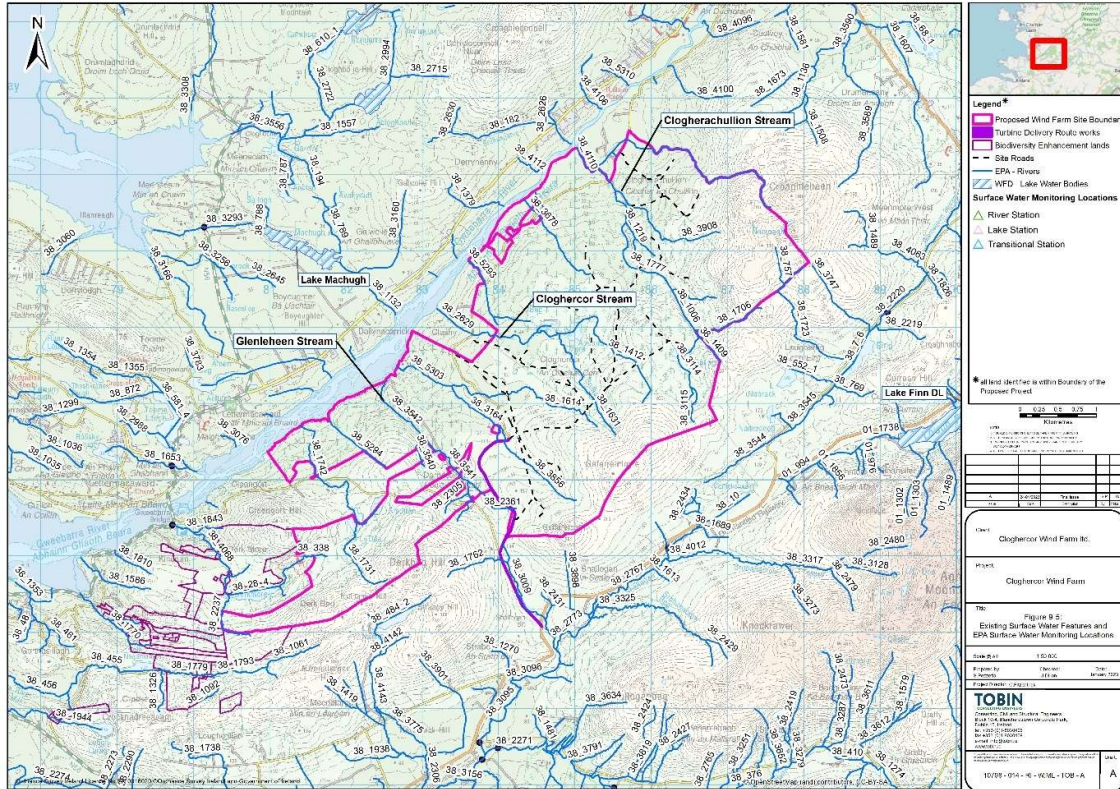


Figure 1-2 Proposed Development

2.0 FLOOD RISK MANAGEMENT GUIDANCE

This Strategic Flood Risk Assessment was carried out in accordance with the following flood risk management guidance documents:

- The Planning System and Flood Risk Management Guidelines for Planning Authorities
- Flood Risk Management Climate Change Sectoral Adaptation Plan
- Donegal County Council Development Plan

2.1 The Planning System and Flood Risk Management Guidelines

The Planning System and Flood Risk Management Guidelines for Planning Authorities (PSFRM Guidelines) were published in 2009 by the Office of Public Works (OPW) and Department of the Environment, Heritage and Local Government (DoEHLG). Their aim is to ensure that flood risk is considered in development proposals and the assessment of planning applications.

2.1.1 Flood Zones and Vulnerability Classes

The PSFRM Guidelines discuss flood risk in terms of flood zones A, B, and C, which correspond to areas of high, medium, or low probability of flooding, respectively. The extents of each flood zone are based on the Annual Exceedance Probability (AEP) of various flood events.

The PSFRM Guidelines also categorise different types of development into three vulnerability classes based on their sensitivity to flooding.

Table 2-1 shows a decision matrix that indicates which types of development are appropriate in each flood zone and when the Justification Test (see Section 2.1.2) must be satisfied. The annual exceedance probabilities used to define each flood zone are also provided.

Table 2-1 Decision Matrix for Determining the Appropriateness of a Development

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 PSFRM Guidelines state that electricity generating power stations and substations are classified as “essential infrastructure”. The proposed wind farm contains essential infrastructure such as an electrical substation which has been assessed against a 1-in-1,000-year flood event (0.1% AEP).

The PSFRM guidelines classify essential infrastructure, such as electricity substations, as ‘highly vulnerable’ in terms of their sensitivity to flooding, while the proposed turbines and ancillary works are considered ‘water compatible’.

The proposed substation is therefore considered appropriate in Flood Zone C, where the probability of flooding is less than 1-in-1,000-years (<0.1% AEP).

2.1.2 The Justification Test

Any proposed development being considered in an inappropriate flood zone (as determined by Table 2-1) must satisfy the criteria of the Justification Test outlined in Figure 2-1 (taken from the PSFRM Guidelines).

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

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

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
 - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
 - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
 - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
 - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

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

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

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

Figure 2-1 Criteria of the Justification Test

2.2 The Flood Risk Management Climate Change Adaptation Plan

The Flood Risk Management Climate Change Sectoral Adaptation Plan was published in 2019 under the National Adaptation Framework and Climate Action Plan. This plan outlines the OPW's approach to climate change adaptation in terms of flood risk management.

This approach is based on a current understanding of the potential impacts of climate change on flooding and flood risk. Research has shown that climate change is likely to worsen flooding through more extreme rainfall patterns, more severe river flows, and rising mean sea levels.

To account for these changes, the Adaptation Plan presents two future flood risk scenarios to consider when assessing flood risk:

- Mid-Range Future Scenario (MRFS)
- High-End Future Scenario (HEFS)

Table 2-2 indicates the allowances that should be added to estimates of extreme rainfall depths, peak flood flows, and mean sea levels for the future scenarios.

Table 2-2 Climate Change Adaptation Allowances for Future Flood Risk Scenarios

Parameter	Mid-Range Future Scenario (MRFS)	High-End Future Scenario (HEFS)
Extreme Rainfall Depths	+ 20%	+ 30%
Peak River Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 0.5 m	+ 1 m

The proposed development has considered a Mid-Range Future Scenario (MRFS) as this represents a likely future scenario.

2.3 County Donegal Development Plan 2018-2024

The current County Donegal Development Plan provides a strategic framework for land use planning for 2018 to 2024. Section 5.4 outlines Donegal County Council’s strategy for the management of flooding, with the aim “to manage development proposals within flood risk areas in a sequential manner based on avoidance, substitution, justification and mitigation and to otherwise ensure that flood risks can be managed to an acceptable level without increasing flood risk elsewhere”.

The development plan sets out seven key policies, integrating land use planning and flood risk management:

- F-P-1** It is a policy of the Council to ensure that all development proposals comply with The Planning System and Flood Risk Management - Guidelines for Planning Authorities’, November 2009, DoEHLG. In doing so the planning authority shall:
 - Assess developments in accordance with the Sequential approach and precautionary principle set out in the Planning System and Flood Risk Management - Guidelines for Planning Authorities’; and
 - Utilise the Draft Flood Risk Management Plans (and any associated flood risk mapping) prepared as part of the CFRAMS programme, or any other flood risk datasets or mapping it considers appropriate, in assessing flood risk.
- F-P-2** It is a policy of the Council to require applicants/developers to submit, where appropriate, an independent ‘Flood Risk Assessment’ in accordance with the Flood Risk Management Guidelines, DEHLG, 2009 or any subsequent related publication and/or ‘Surface Water Drainage Calculations’, from suitably qualified persons.
- F-P-3** It is a policy of the Council to require applicants/developers to submit, where appropriate, evidence of compliance with the Justification test set out in S5.15 of The Planning System and Flood Risk Management - Guidelines for Planning Authorities’ (DoEHLG 2009) or any subsequent related publication.
- F-P-4** It is a policy of the Council not to permit development where flood or surface water management issues have not been, or cannot be, addressed successfully and/or where the presence of unacceptable residual flood risks remain for the development, its occupants and/or property or public infrastructure elsewhere including, inter alia, up or downstream.
- F-P-5** It is a policy of the Council to promote the use of Sustainable Urban Drainage Systems (SUDs), flood attenuation areas, the controlled release of surface waters and use of open spaces and semi permeable hard surfaces for appropriate development proposals.
- F-P-6** It is a policy of the Council to consider the development of long and short-term flood remediation works, including embankments, sea defences, drainage channels, and attenuation ponds to alleviate flood risk and damage to livelihoods, property and business subject to environmental considerations including potential impact on designated shellfish water and, fresh water pearl mussel catchment areas, compliance with Article 6 of the Habitats Directive, best practice in Coastal Zone Management and the Marine Resource and Coastal Management policies of this Plan.
- F-P-7** It is a policy of the Council not to permit developments which would hinder the maintenance of river or drainage channels.

3.0 INITIAL FLOOD RISK ASSESSMENT

3.1 Past Flood Events

The OPW's National Flood Information Portal¹ provides past flood event mapping with records of flooding reports, meeting minutes, photos, and/or hydrometric data.

There are no past flood events located within the subject site. The closest recorded past flood event is located approximately 2.5km north of the subject site. This event is noted as a recurring flood event. The flood source is noted as being from coastal/ estuarine waters. Minutes from a Donegal County Council meeting held on the 12th January 2006 notes that high tides once or twice a year flood low lying lands. The adjacent road is also liable to flood occasionally.

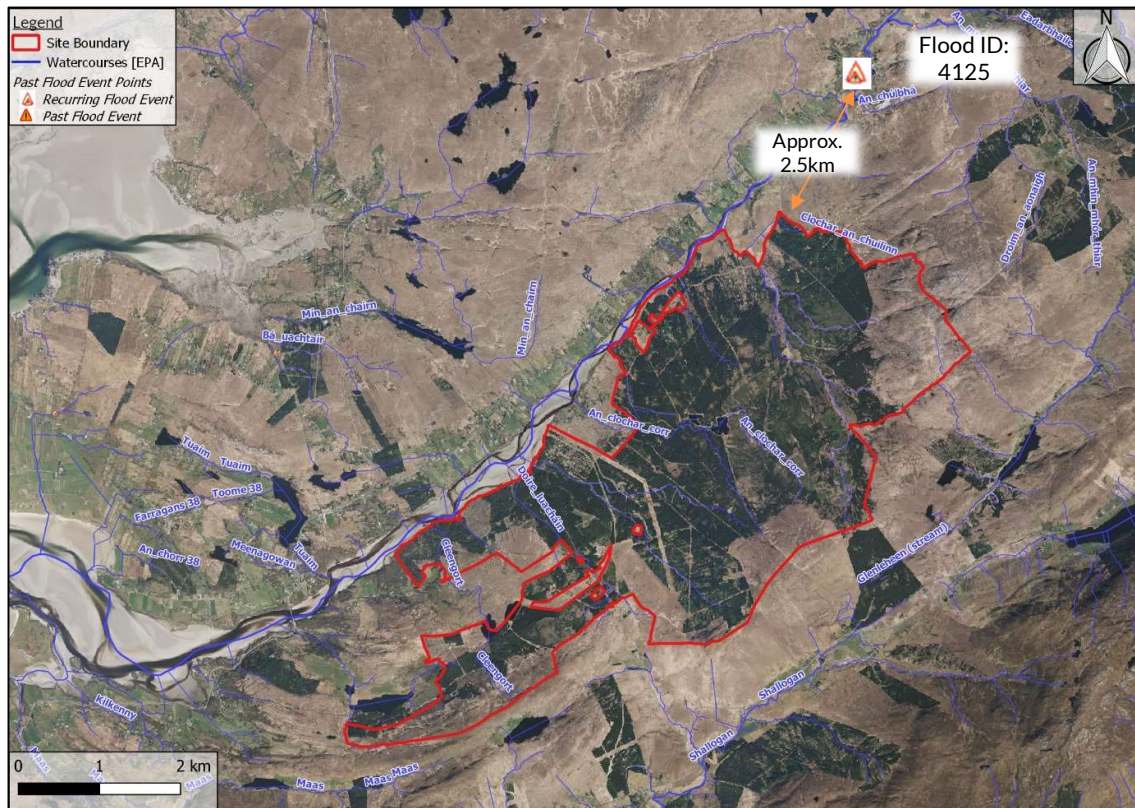


Figure 3-1 OPW Flood Map of Past Flood Events

¹ floodinfo.ie

3.2 OPW Preliminary Flood Risk Assessment (PFRA) Study

In 2009, the OPW produced a series of maps to assist in the development of a broad-scale FRA throughout Ireland. These maps were produced from several sources.

The OPW’s National Preliminary Flood Risk Assessment (PFRA) Overview Report from March 2012 noted that *“the flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location”*².

Figure 3-2 provides an overview of the fluvial, coastal, pluvial, and groundwater indicative flood extents in the vicinity of the subject site.

The PFRA mapping indicates that portions of the subject site are liable to fluvial flooding during the 1 in 100-year flood event. These flood extents are isolated to the watercourses within the subject site.

There are pockets of small pluvial flood extents located within the subject site. These extents are located in localised depressions within the subject site.

There is some coastal flooding noted along the western boundary of the subject site. There are also two Lakes/ Turloughs identified within the subject on the PFRA mapping.

Figure 3-3 below outlines the fluvial flood extents identified by the PFRA mapping.

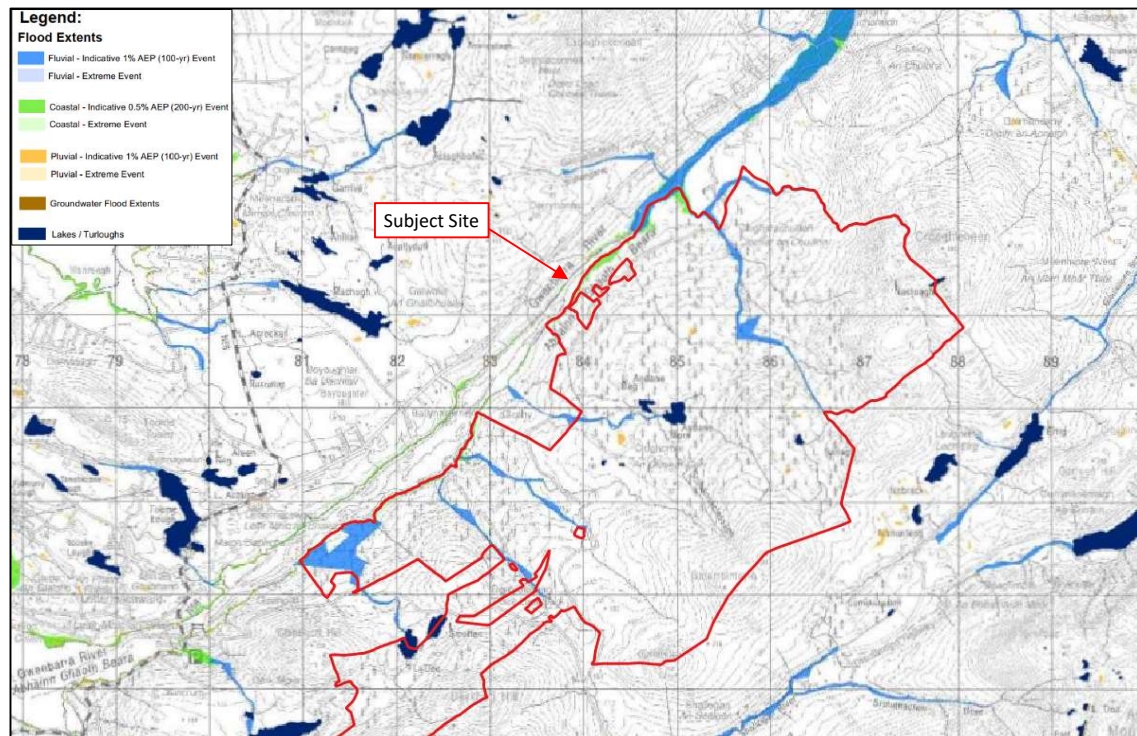


Figure 3-2 Indicative Flood Mapping (extract from PFRA Map 397)

² The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

NIFM mapping was produced for one of the watercourses within the subject site. This mapping indicates that a small portion of the subject site is susceptible to flooding during the 1 in 100-year and 1 in 1,000-year flood events. There is no critical infrastructure located in the vicinity of the modelled flood extents.

The NIFM update also included an assessment of the likely impact of climate change on flood risk in the area. The flood extents for a Mid-Range Future Scenario are shown in Figure 3-5.

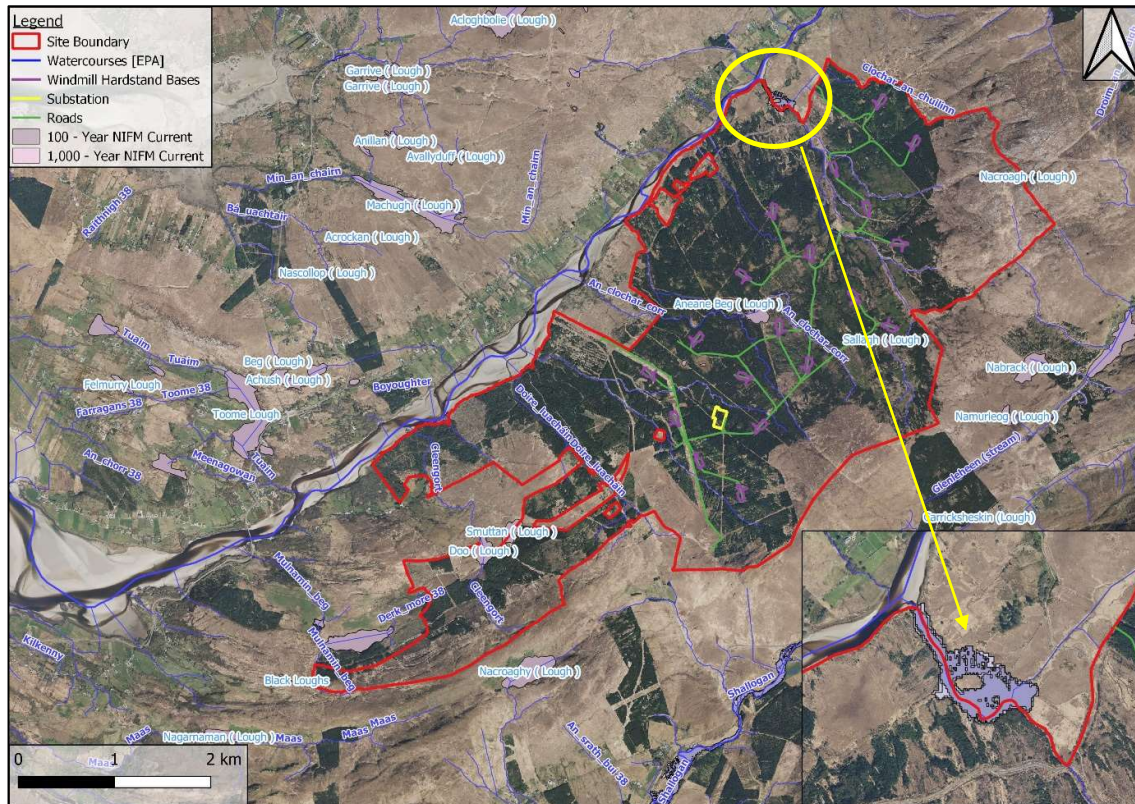


Figure 3-4 NIFM Current Flood Extents

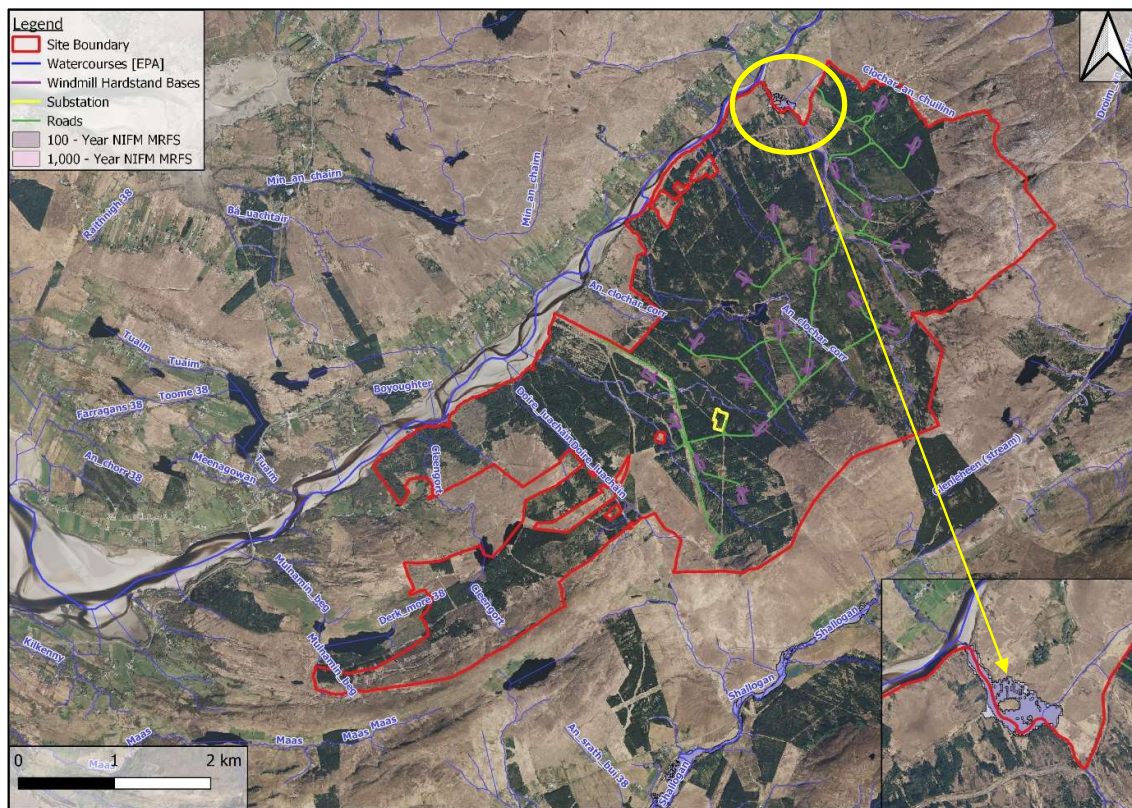


Figure 3-5 NIFM MRFS Flood Extents

3.3 Catchment Flood Risk Assessment and Management Study

In 2015, the OPW produced flood maps¹ as part of the Catchment Flood Risk Assessment and Management (CFRAM) Study. The flood extents in these maps are based on detailed modelling of Areas for Further Assessment identified by the National Preliminary Flood Risk Assessment.

The subject site and adjacent watercourses are not modelled as part of the CFRAM study.

3.4 Irish Coastal Protection Strategy Study (ICPSS)

The Irish Coastal Protection Strategy Study (ICPSS) is a national study that was commissioned in 2003 with the objective of providing information to support decision making about how best to manage risks associated with coastal flooding and coastal erosion. The Study was completed in 2013 and provides strategic current scenario and future scenario (up to 2100) coastal flood hazard maps and strategic coastal erosion maps for the national coastline.

The ICPSS flood extents show a portion of the subject site is liable to flooding during the 1 in 200 and 1 in 1,000-year flood events. Figure 3-6 below shows the current day flood extents and Figure 3-7 below shows the MRFS flood extents at the subject site. These modelled flood extents are not near any of the critical infrastructure of the proposed development.

The closest modelled ICPSS node is located in Gweebarra Bay (Node No.: NW23). This is approximately 7km west of the subject site. The water level at this node for the 1 in 200-year and 1 in 1,000-year flood events are 3.25mOD and 3.48mOD respectively. Ground levels within the subject site range from approximately 1mOD at the north-western corner of the subject site up to 275mOD at the southern boundary of the subject site. The FFLs of the critical infrastructure range from 54mOD to 179mOD.

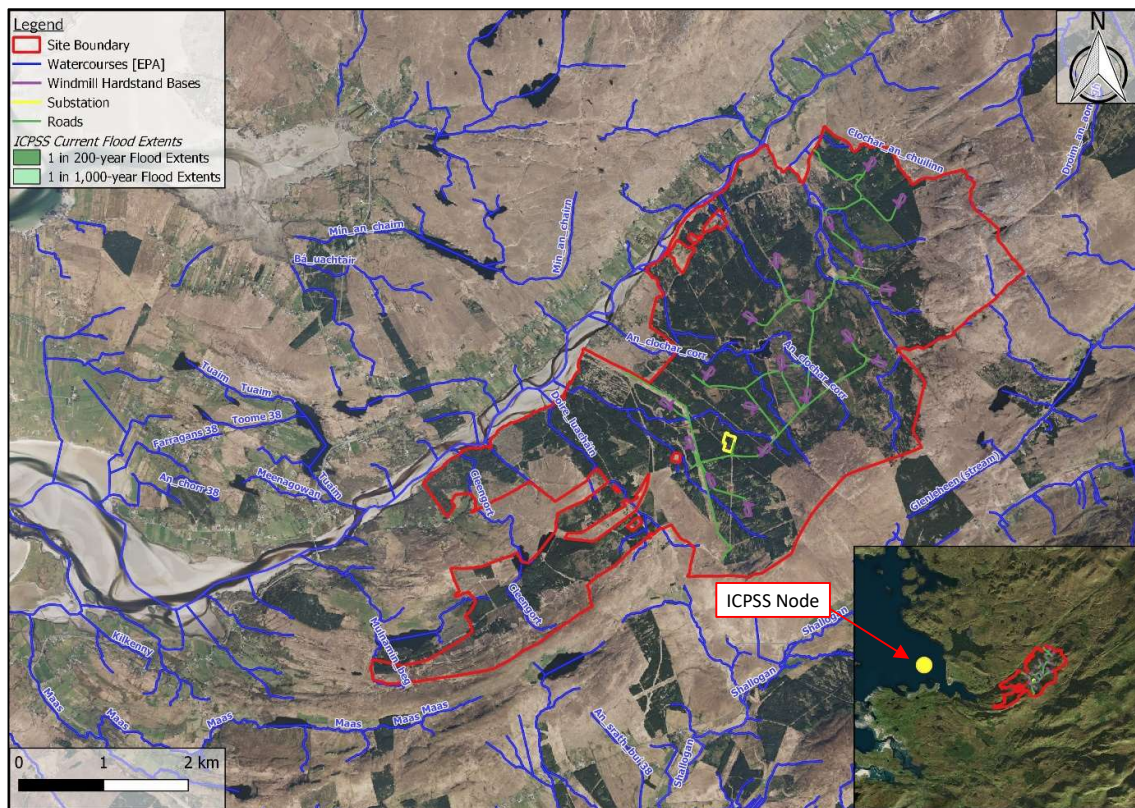


Figure 3-6 ICPSS Current Flood Extents

3.5 Geological Survey Ireland Mapping

The Geological Survey Ireland (GSI) provides mapping⁴ with data related to Ireland’s subsurface. Based on the map shown in Figure 3-8, there are no karst features (caves, springs, turloughs, etc.) in the surrounding area.

GSI mapping⁵ in the vicinity of the subject site shows there is historical seasonal groundwater flooding at the subject site. The GSI mapping shows these areas as flooding seasonally from 2015 up 2021, which is the most recent mapping available.

This groundwater flooding is limited to areas around two lakes within the subject site. These lakes are located in localised depressions within the subject site and away from all critical infrastructure.

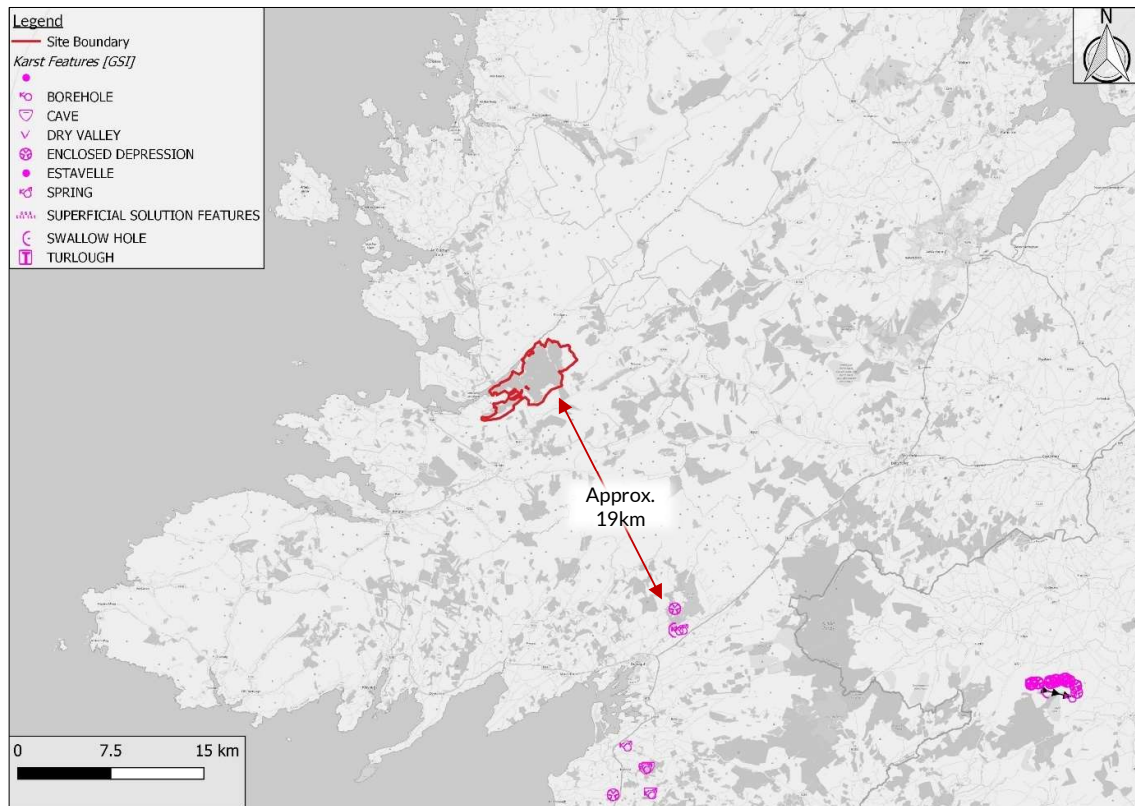


Figure 3-8 GSI Mapping of Karst Features

⁴ <https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx>

⁵ <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=848f83c85799436b808652f9c735b1cc>

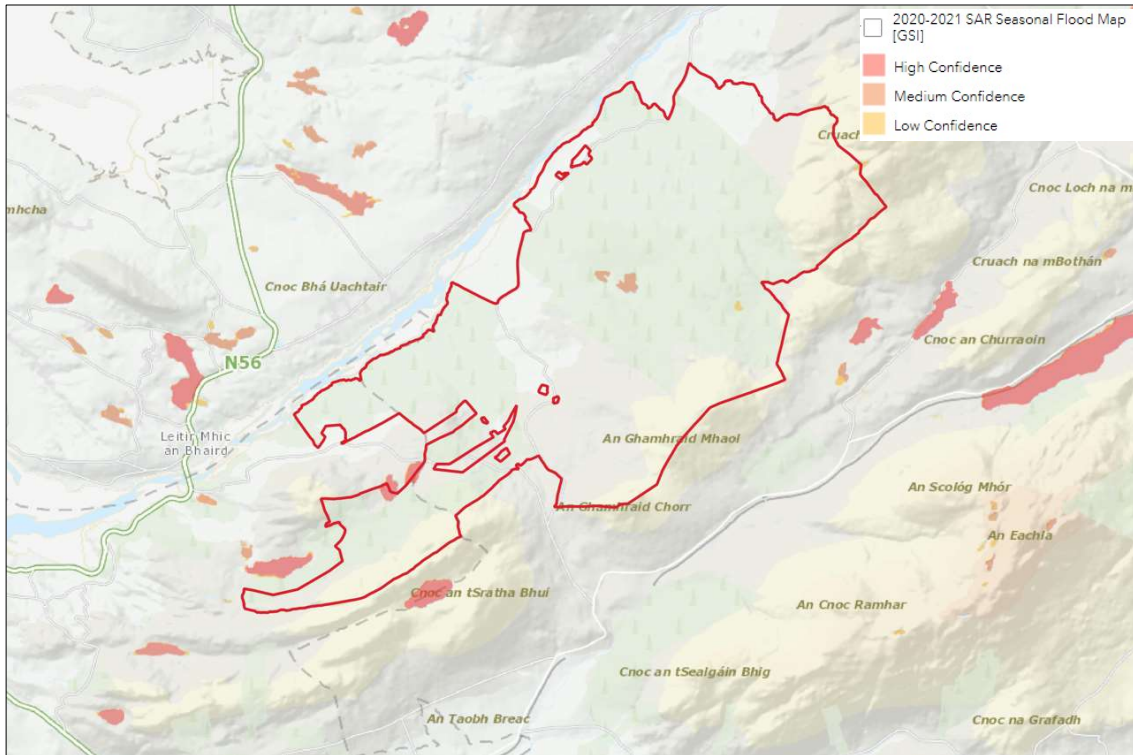


Figure 3-9 GSI Mapping of Groundwater and Surface Water Flooding

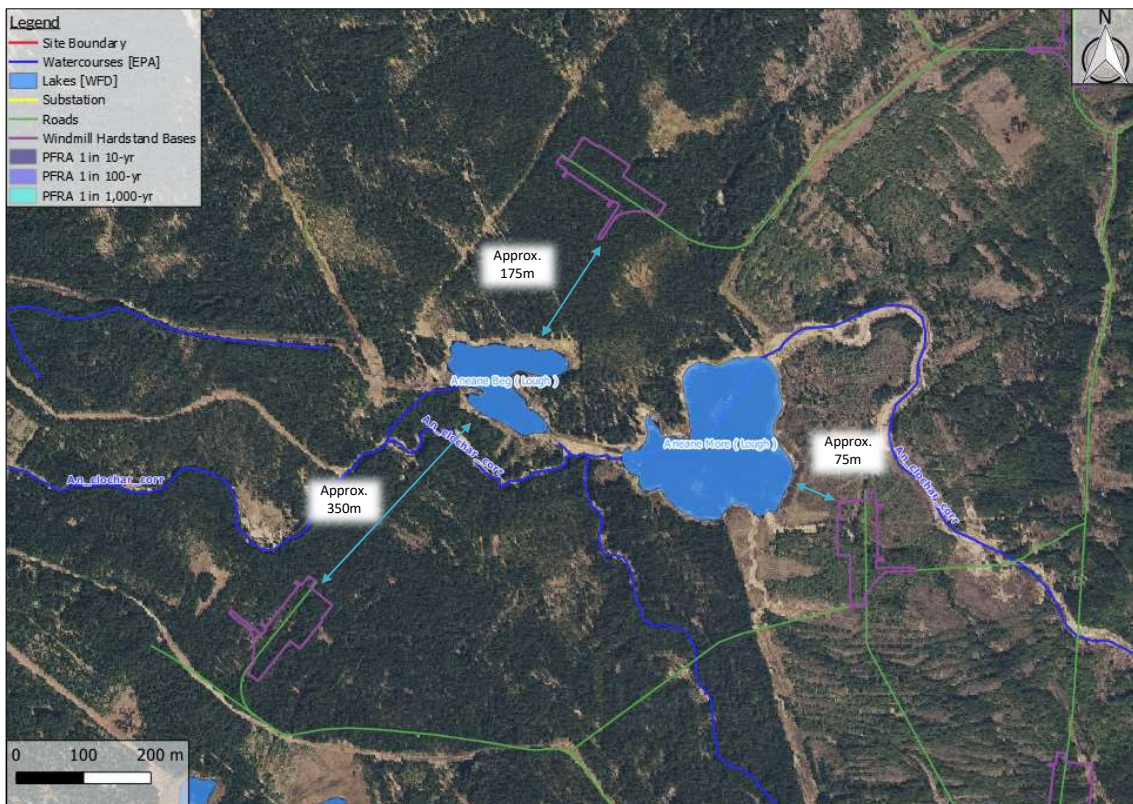


Figure 3-10 Groundwater flooding locations

4.0 DETAILED FLOOD RISK ASSESSMENT

Referring to Section 2.1, the PSFRM guidelines classify essential infrastructure, such as electricity substations, as 'highly vulnerable' in terms of their sensitivity to flooding, while the proposed turbines and ancillary works are considered 'water compatible'.

Therefore, vulnerable elements of the development should be constructed in 'Flood Zone C', i.e. that there is less than a 0.1% probability of the site flooding. Accordingly, the proposed development has been assessed against a 1,000-year flood event (i.e. 0.1% Annual Exceedance Probability).

4.1 Fluvial Flooding

The proposed development is located adjacent to the Clochar an Chuilinn watercourse, along with several small watercourses which flow into the Gweebarra/ Owenwee (Doochary) watercourse. There are also two lakes within the site boundary, Aneane More and Aneane Beg.

Given the mountainous terrain of the proposed development site, the headwaters of a number of watercourses are located within the boundary of the proposed site. Due to the size of these streams (catchment area <2.5km²), they were not surveyed/modelled as part of the OPW's CFRAM programme.

However, the lower reaches of the watercourses within the subject site are covered by the PFRA mapping. The mapping shows that there some areas of the subject site are susceptible to inundation from the 1 in 100 and 1 in 1,000-year fluvial flood events.

The Clochar An Chuilinn watercourse shows fluvial flooding during the 1 in 100 and 1 in 1,000-year flood events. The stream is U shaped in this area. The stream varies in width along its reach from 1.3m to 2.3m. The depth of the channel varies from 1m to 2m. The closest infrastructure to the stream is a wind turbine which is located approximately 150m south of the stream. The ground level at the stream is approximately 25mOD. The ground level at the proposed wind turbine is 47mOD.

The second watercourse that is unmapped by the PFRA is an unnamed watercourse located in the northern portion of the subject site. The stream is approximately 1m wide and 0.5m deep. The stream is U shaped. The closest piece of infrastructure to the flood extents is a wind turbine that is located 50m east of the modelled fluvial flood extents. Based on the existing site topography there is approximately a 2m level difference between the flood extents and the proposed turbine location. The ground level at the flood extents is approximately 47mOD while the existing ground level at the turbine location is 49mOD.

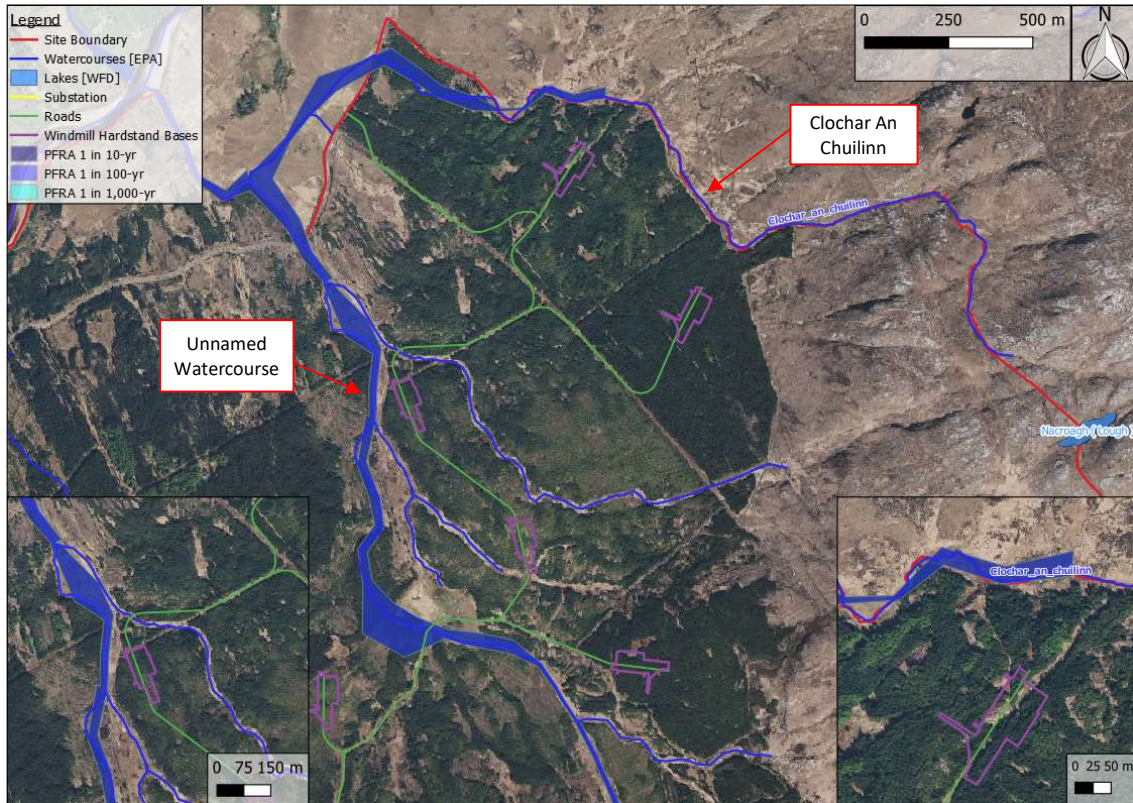


Figure 4-1 Northern portion of the subject site PFRA extents

Portions of the southern part of the subject site are also modelled by the PFRA. An Clochar Corr is the name of the watercourse located in the south of the subject site. The watercourses width ranges from 1.6m to 2m. The depth of the watercourse ranges from 0.8m to 1.3m. The watercourse is prodominantly V shaped. The watercourse drains the two lakes within the subject site, Aneane More and Aneane Beg. The closest critical infrastructure to the modelled flood extents is a windturbine located approximately 50m south of the watercourse. The ground level at the flood extents is approximately 90mOD while the existing ground level at the turbine location is 92mOD.

There is an unnamed watercourse 1km south of An Clochar Corr that is also modelled by the PFRA. The closest critical infrastructure to the modelled flood extents is a windturbine located approximately 50m west of the watercourse. The ground level at the flood extents is approximately 95mOD while the existing ground level at the turbine location is 99mOD.

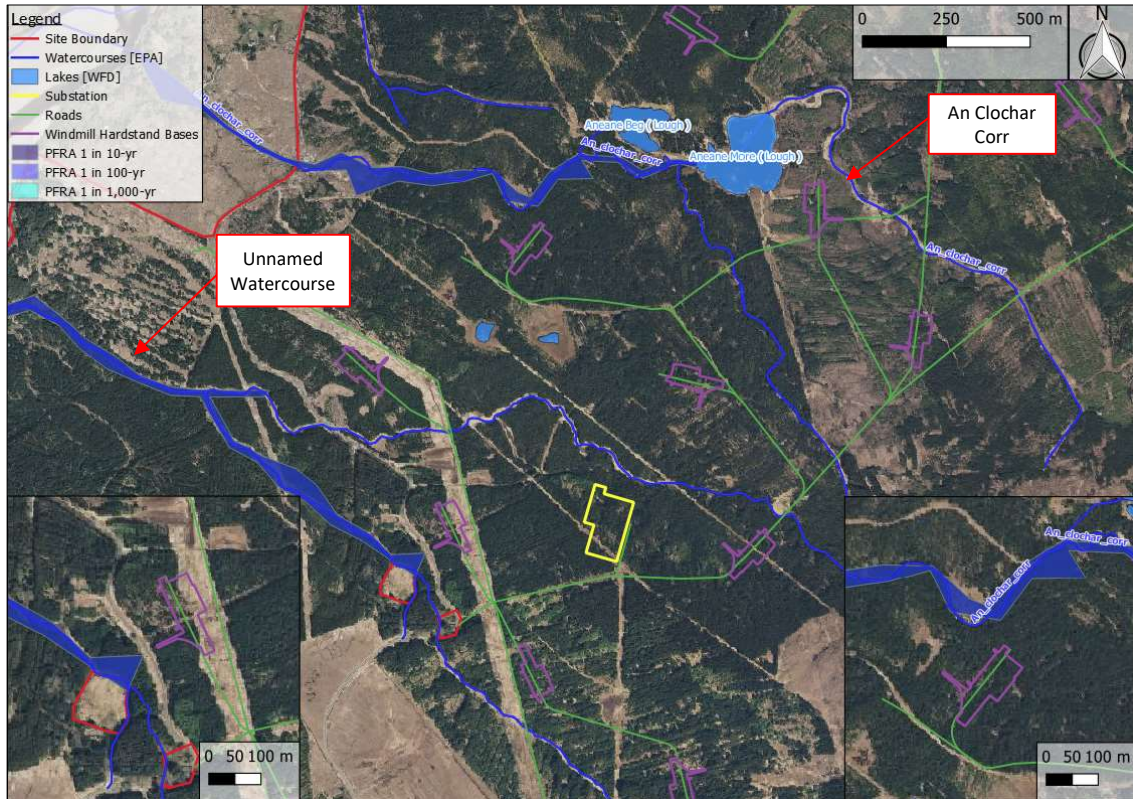


Figure 4-2 Southern portion of the subject site PFRA extents

In addition to the PFRA mapping a portion of the subject site is also NIFM mapped. The NIFM mapping shows some existing fluvial flood extents, presented in Figure 3-4, for the Clochar An Chuilinn watercourse. It indicates portions of the subject site may be at risk of flooding during the 1 in 100-year and 1 in 1,000-year fluvial flood events. These flood extents are located approximately 0.7km from the nearest piece of critical infrastructure, a turbine. The ground level at the modelled flood extents is approximately 7mOD, while the existing ground levels at the proposed turbine location are 49mOD.

The mountainous terrain and natural topography of the subject site creates a stream network that provides a natural overland flow path to convey water away from the essential infrastructure and discourage flood storage at the subject site. The natural topography of the subject site is such that flood waters would flow away from all critical infrastructure.

There are a number of windturbines located in the vicinity of local watercourses however, there is a significant difference in the elevations of the infrastructure and the watercourses. The proposed substation is not located near any watercourse with modelled flood extents.

Based on the available information, it is estimated that the risk of fluvial flooding to the development is minimal.

4.2 Pluvial Flooding

There are pockets of small pluvial flood extents located within the subject site. These extents are located in localised depressions within the subject site (see Figure 3-2).

The largest area of pluvial flooding is located at the base of a hill within the subject site. The estimated ground levels at the location of the predicted pluvial flooding are 91mOD. There is a wind turbine located in the vicinity of this predicted pluvial flood event. The groundlevel at the proposed location of the wind turbine is 93mOD. There is a second area of predicted pluvial flooding located in a local depression. The ground levels in the area where the pluvial flooding occurs is 91mOD. The closest critical infrastructure is located approximately 200m north. Existing ground levels in this area are 95mOD. There are two pluvial flood events located in the vicinity of the eastern boundary of the subject site. These two events are located at approximately 158mOD and 167mOD respectively. The nearest critical infrastructure in the vicinity of these predicted pluvial flood extents is 170mOD.

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

The proposed wind farm site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with an extreme flood event or a scenario where the stormwater drainage system becomes blocked.

Therefore, it is estimated that risk of pluvial flooding associated with the proposed development is minimal.

4.3 Groundwater Flooding

The PFRA study (Figure 3-2) does not show any groundwater flooding in the vicinity of the subject site. Geological Survey Ireland (GSI) groundwater flooding extents in the area (Figure 3-9), shows there is historical seasonal groundwater flooding at the subject site. There has been seasonal groundwater flooding at these location from 2015 to 2021, which is the latest mapping available.

This groundwater flooding is limited to areas around two lakes within the subject site. These lakes are located in localised depression within the subject site. The ground levels at the lake are 96mOD. The existing ground levels at the nearest critical infrastructure is 102mOD. The lakes are a minimum of approximately 75m from all critical infrastructure.

Therefore, it is estimated that the proposed development is not at risk of groundwater flooding.

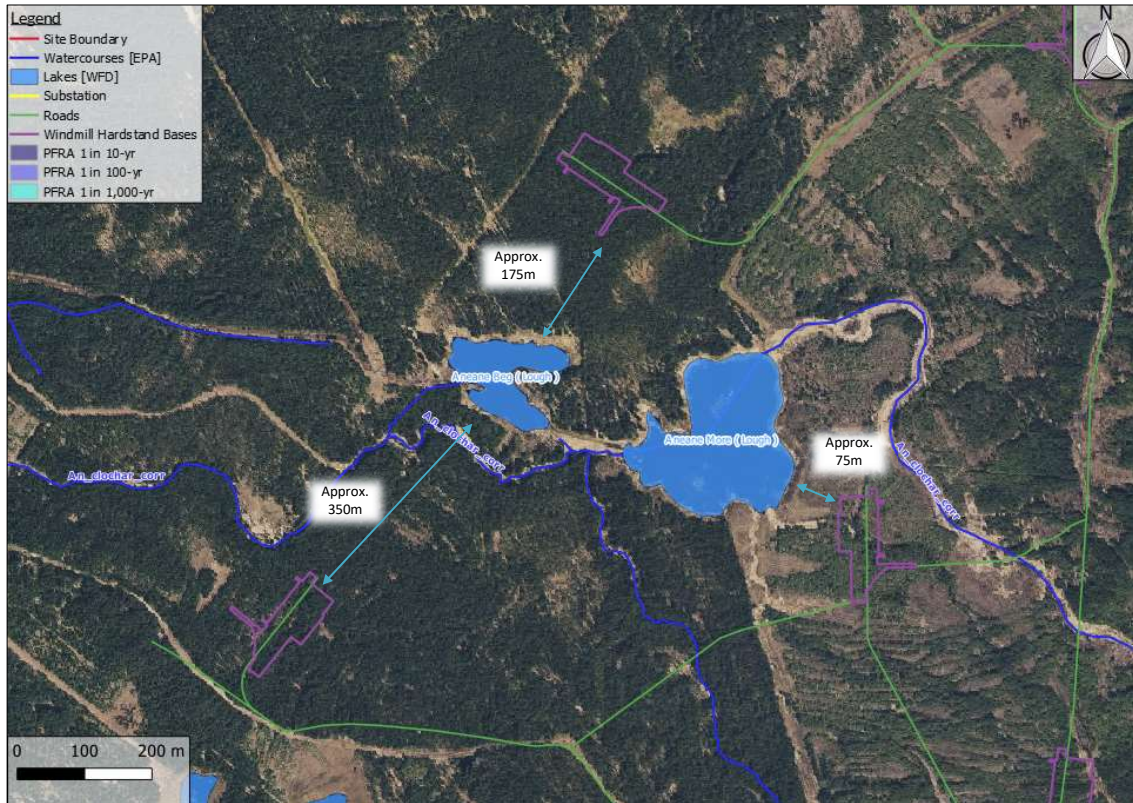


Figure 4-3 Groundwater flooding locations

4.4 Coastal Flooding

The subject site is located approximately 7km inland from the sea. The ICPSS mapping identifies portions of the subject as being liable to flooding during the 1 in 200-year and 1 in 1,000-year flood events. The closest modelled ICPSS node is located in Gweebarra Bay (Node No.: NW23). This is approximately 7km west of the subject site. The water level at this node for the 1 in 200-year and 1 in 1,000-year flood events are 3.25mOD and 3.48mOD respectively. The flood extents are isolated to the along the western boundary of the subject site.

Ground levels along the western boundary range from 1mOD to 10mOD. The closest piece of infrastructure to the coastal flood extents is located approximately 1km away. This is a wind turbine. The existing ground level at turbine location is 55mOD. This significant level difference and distance from the flood extents remove the potential flood risk.

It is therefore estimated that the risk of coastal flooding associated with the development is minimal.

5.0 CONCLUSIONS

TOBIN Consulting Engineers were appointed by Orsted/FEI to undertake a Flood Risk Assessment (FRA) for their proposed wind farm development at Clogherachullion and Cloghercor, Co. Donegal.

The PSFRM Guidelines state that electricity generating power stations and substations are classified as “essential infrastructure”. The proposed wind farm contains essential infrastructure such as a substation which has been assessed against a 1-in-1,000-year flood event (0.1% AEP).

The PSFRM guidelines classify essential infrastructure, such as electricity substations, as ‘highly vulnerable’ in terms of their sensitivity to flooding, while the proposed turbines and ancillary works are considered ‘water compatible’.

The proposed substations are therefore considered appropriate in Flood Zone C, where the probability of flooding is less than 1-in-1,000-years (<0.1% AEP).

Pluvial Flooding:

Based on the indicative pluvial flood mapping presented in the OPW Preliminary Flood Risk Assessment, there are areas of pluvial flooding within the subject site, corresponding to localized depressions (see Figure 3-2). These areas are not located at the proposed infrastructure.

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

The proposed development and topography of the developed site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with an extreme flood event or a scenario where the stormwater drainage system becomes blocked.

Groundwater Flooding:

GSI mapping suggests parts of the subject site are liable to flooding. These areas are only around the lakes that located within the subject site. The ground levels at the lake are 96mOD. The existing ground levels at the nearest critical infrastructure is 102mOD. The lakes are approximately 85m from the critical infrastructure.

Coastal/Tidal Flooding:

ICPSS mapping identifies portions of the subject as being liable to flooding during the 1 in 200-year and 1 in 1,000-year flood events. The flood extents are isolated to the low-lying area along the western boundary of the subject site. Ground levels along the western boundary range from 1mOD to 10mOD. The existing ground level at the location of the nearest critical infrastructure is 55mOD.

Fluvial Flooding:

There are a number of local watercourses within the bounds of the proposed wind farm site however, there is a significant difference in the elevations of the infrastructure and the watercourses. The proposed substation is not located near any watercourse. Essential infrastructure, such as electricity substations, are classified as 'highly vulnerable' in terms of their sensitivity to flooding, while the proposed turbines and ancillary works are considered 'water compatible'. The existing ground levels at the proposed substation are more than 3m above bank levels of the adjacent watercourse, with headwater arising within the subject site.

There are small portions of low-lying areas along the western boundary of the subject site that are at risk of coastal flooding. However, the ground levels at nearest critical infrastructure are approximately 54m higher than the approximate levels of the flood extents.

PFRA mapping shows there are areas of the subject site susceptible to fluvial flooding. However, there is no critical infrastructure in these areas and there is a minimum of a 2m difference in ground levels between the flood extents or banks and nearest infrastructure.

Therefore, it is estimated that the risk of flooding to the proposed development will be minimal, and that the development will not increase the risk of flooding elsewhere.

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