HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St
Dungarvan
Co.Waterford
Ireland

tel: +353 (0)58 44122
fax: +353 (0)58 44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

SESKIN RENEWABLES WIND FARM,
CO. KILKENNY AND CO. LAOIS

FLOOD RISK ASSESSMENT

FINAL REPORT

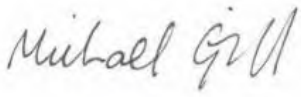
Prepared for:

MKO

Prepared by:

HYDRO-ENVIRONMENTAL SERVICES

DOCUMENT INFORMATION

Document Title:	**Seskin Renewables Wind Farm, Co. Laois and Co. Kilkenny Flood Risk Assessment**
Issue Date:	**27/06/2025**
Project Number:	**P1653-1**
Project Reporting History:	**None**
Current Revision No:	**P1653-1_ FINAL_F0**
Author(s):	**Michael Gill Adam Keegan Nitesh Dalal**
Signed:	 **Michael Gill B.A., B.A.I., M.Sc., MIEI Managing Director – Hydro-Environmental Services**

Disclaimer:
This report has been prepared by HES with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our terms and conditions and taking account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. The flood risk assessment undertaken as part of this study is site specific and the report findings cannot be applied to other sites outside of the survey area which is defined by the site boundary. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

TABLE OF CONTENTS

FIGURES IN TEXT

TABLES IN TEXT

1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO to undertake a Flood Risk Assessment (FRA) for the Proposed Seskin Renewables Wind Farm and associated Grid Connection Route, Co. Kilkenny and Co. Laois. The core of the Proposed Wind Farm site is located approximately 2.5 kilometres south of the town of Durrow, Co. Laois, 43.2 kilometres northwest of the town of Ballyragget, Co Kilkenny and 5.9 kilometres east of the village of Cullahill, Co. Laois. The Proposed Wind Farm will connect into the proposed onsite 38kV substation, which is located in the east of the Proposed Wind Farm site. This substation will be connected to the existing 110kV Ballyragget Substation via a c. 3.4km long underground cabling route. The existing Ballyragget 110kV Substation is located approximately 1.8km southeast of the Proposed Wind Farm site. A site location map is attached as **Figure A**.

The following assessment is carried out in accordance with '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*' (DoEHLG, 2009).

This FRA is written to accompany Chapter 9 of the Environmental Impact Assessment Report (EIAR) for the Proposed Wind Farm Site and the Proposed Grid Connection Route. The Proposed Project is described in full in Chapter 4 of the EIAR. For the purposes of this FRA, and to be consistent with the EIAR, the various components are described and assessed using the following references: 'Proposed Development, 'Proposed Wind Farm', 'Proposed Grid Connection Route' and the 'Site' (as defined in Chapter 1, Section 1.1.1, of the EIAR).

This Stage 1 FRA report has been completed to identify the flood risk at the Proposed Seskin Renewables Wind Farm. Please note that this Stage 1 FRA will be upgraded to a Stage II or Stage III FRA upon receipt of the final layout and final details of the Proposed Wind Farm Site. Flood risk identification is an important part of the flood risk assessment process and identifies any areas of the Proposed Wind Farm Site (if any) which may be at risk of flooding.

1.2 STATEMENT OF QUALIFICATIONS

Hydro-Environmental Services (HES) are a specialist geological, hydrological, hydrogeological and environmental practice which delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford.

Our core areas of expertise and experience includes soils, subsoils and geology. We routinely complete impact assessments for land soils and geology, hydrology and hydrogeology for a large variety of project types.

This Flood Risk Assessment Report was prepared by Adam Keegan, Michael Gill and Nitesh Dalal.

Adam Keegan PGeo (B.Sc., M.Sc.) is a hydrogeologist with 7 years environmental consultancy experience in Ireland. Adam has worked on numerous Environmental Impact Assessments, Flood Risk Assessment Reports for infrastructure projects, such as wind farms, strategic housing developments and quarries. Adam has experience in intrusive site investigation works within mapped karst environments and experience in trial and production well drilling within areas mapped as Regionally Karstified Aquifers. Adam has worked on several wind farm EIAR projects, including Seven Hills WF, Croagh WF, Lyrenacarriga WF (SID), Cleanrath WF, Carrownagowan WF (SID), and Coole WF.

Michael Gill PGeo (BA, BAI, MSc, Dip. Geol., MIEI) is an Environmental Engineer with over 22 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms in Ireland. He has also managed EIAR assessments, Flood Risk Assessments for infrastructure projects including private residential and commercial developments which are occasionally sited within areas of known karstification, particularly in the East Galway/Clare area. In addition, he has substantial experience in intrusive site investigation and site suitability assessments, karst and epikarst hydrology/hydrogeology within proposed wind farm sites, water resource assessments for commercial and public water supplies including trial and production well drilling within a karst environment, surface water drainage design and SUDs design, and surface water/groundwater interactions. In addition, Michael has worked for Seven Hills WF, Oweninny WF, Cloncreen WF, Derrinlough WF and Yellow River WF, and over 120 other wind farm-related projects.

Nitesh Dalal (B.Tech, PG Dip., MSc) is an Environmental Scientist with over 7 years' experience in environmental consultancy and environmental management in India. Nitesh holds a M.Sc. in Environmental Science from University College Dublin (2024), a PG Diploma in Health, Safety and Environment from Annamalai University, India (2021) and B.Tech. in Environmental Engineering (2016) from Guru Gobind Singh Indraprastha University, India (2016).

1.3 REPORT LAYOUT

This FRA report has the following format:

- Section 2 describes the site setting and details of the Proposed Wind Farm Site and the Proposed Grid Connection Route;
- Section 3 outlines the hydrological and geological characteristics of the Surface water Catchment and existing drainage;
- Section 4 describes the site-specific flood risk assessment (FRA) undertaken for the Proposed Wind Farm Site and the Proposed Grid Connection Route which was carried out in accordance with the above-mentioned guideline;
- Section 5 presents Planning policy and responses to that policy outlined in this FRA; and,
- Section 6 presents the FRA report conclusions.

2. BACKGROUND INFORMATION

2.1 INTRODUCTION

This section provides details on the topographical setting of the site along with a description of the Proposed Wind Farm Site and Proposed Grid Connection Route.

2.2 SITE LOCATION AND TOPOGRAPHY

The core of the Proposed Wind Farm Site is located approximately 2.5 kilometres south of the town of Durrow, Co. Laois, 3.2 kilometres northwest of the town of Ballyragget, Co Kilkenny and 5.9 kilometres east of the village of Cullahill, Co. Laois. The N77 National Secondary Road runs in a north-south orientation, east of the Site. It is proposed to access the Proposed Development via an existing agricultural access off the L58333 Local Road, part of the old N77, on the eastern side of the Site.

The land within the Site is mainly improved agricultural grassland, primarily used for grazing.

The Proposed Wind Farm will connect into the proposed onsite 38kV substation, which is located in the east of the Proposed Wind Farm site. This substation will be connected to the existing 110kV Ballyragget Substation via a c. 3.4km long underground cabling route. The existing Ballyragget 110kV Substation is located approximately 1.8km southeast of the Proposed Wind Farm site. The proposed onsite 38kV Substation, , adjacent temporary construction compound and the first c. 0.3km of the underground cabling route to Ballyragget Substation are elements of the Proposed Grid Connection which overlap with the Proposed Wind Farm site.

The approximate centre of the Site is located at E 642016, N 673936. The northwestern and central sections of the Site are situated within an elevated area of ground (~150-200mOD) within a broader area that slopes to the east and south to elevations of ~80-90mOD. The Grid Connection underground cabling route is situated along the N77 road, along the eastern margin of the site at elevations of ~80mOD.

A site location map is shown as **Figure A**.

2.3 PROPOSED DEVELOPMENT DETAILS

The Proposed Wind Farm site comprises 8 no. wind turbines with associated infrastructure including hardstands, access roads and substation, as well as 2 no. temporary construction compounds located in the townlands of Seskin, Ballynaslee and Ballyconra, Co. Kilkenny and the townlands of Tinwear and Archerstown, Co. Laois. The Proposed Grid Connection route is located in the townland of Ballynaslee, Ballyconra and Moatpark, Co. Kilkenny.

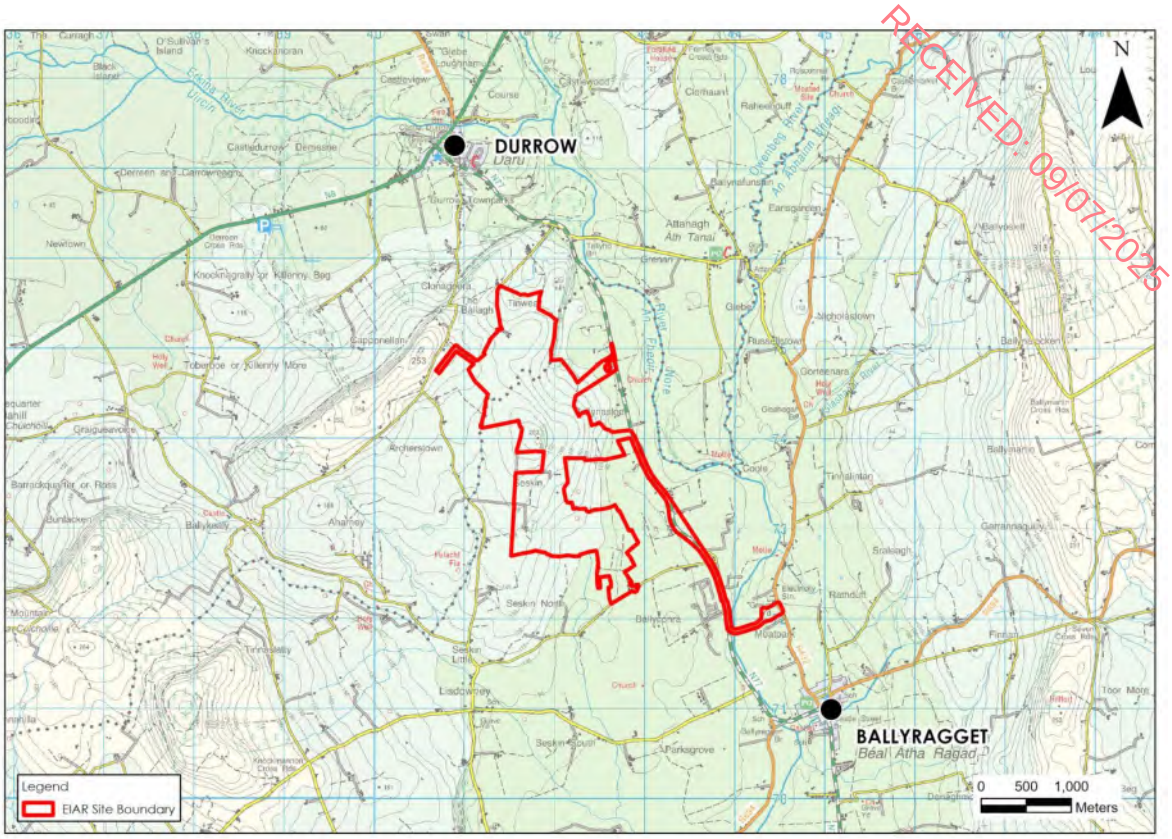


Figure A: Site Location Map

3. EXISTING ENVIRONMENT AND CATCHMENT CHARACTERISTICS

3.1 INTRODUCTION

This section gives an overview of the hydrological and geological characteristics of the Proposed Development Site, the Proposed Grid Connection Route and the surrounding region.

3.2 HYDROLOGY

3.2.1 Regional and Local Hydrology

The Proposed Wind Farm Site and the Proposed Grid Connection Route are located in the regional River Nore surface water catchment within Hydrometric Area 15 of the Southeastern River Basin District (SERBD).

The Proposed Wind Farm Site and the Proposed Grid Connection Route are located in the regional River Nore surface water catchment within Hydrometric Area 15 of the Southeastern River Basin District (SERBD).

On a more local scale the majority of the Proposed Wind Farm Site is located within the Nore_SC_070 sub-catchment while small area in the north of the Proposed Wind Farm Site is located within the Nore_SC_050 sub-catchment. Within the Nore_SC_050 sub-catchment, the Proposed Wind Farm Site is located within the Nore_110 river sub-basin while within the Nore_SC_070 sub-catchment, the Proposed Wind Farm Site is located within the Nore_120 river sub-basin, the Lisdowney_010 river sub-basin and the Nore_140 river sub-basin.

Within the Nore_110 river sub-basin, the Durrow Townspark stream flows northeast discharging to the River Nore (Nore_110 section of the River Nore). The River Nore then flows south and drains out into Nore_120 section of the River Nore.

Within the Lisdowney_010 river sub-basin, the Archerstown stream flows south, discharging to the Lisdowney stream which drains out into the River Nore (Nore_140). Within the Nore_140 river sub-basin, the Ballyconra stream flow south, discharging to the Lisdowney stream and ultimately discharges to the River Nore.

The Proposed Grid Connection route exists within the Nore_120 river sub-basin and varies in distance between 0-850m from the River Nore (Nore_120 section of the river). The Proposed Grid Connection crosses the Nore_120 river section at the proposed watercourse crossing.

On a broad scale the majority of the Proposed Grid Connection Route is located within the Nore_SC_070 sub-catchment while a small area is located within the Nore_SC_060 sub-catchment, where the grid route crosses to the eastern side of the River Nore. Within the Nore_SC_070 sub-catchment, the Proposed Grid Connection Route is mapped within the Nore_120 river sub-basin while within the Nore_SC_060 sub-catchment the Proposed Grid Connection Route is also mapped within the Nore_120 river sub-basin.

A local hydrology map is attached as **Figure B**.

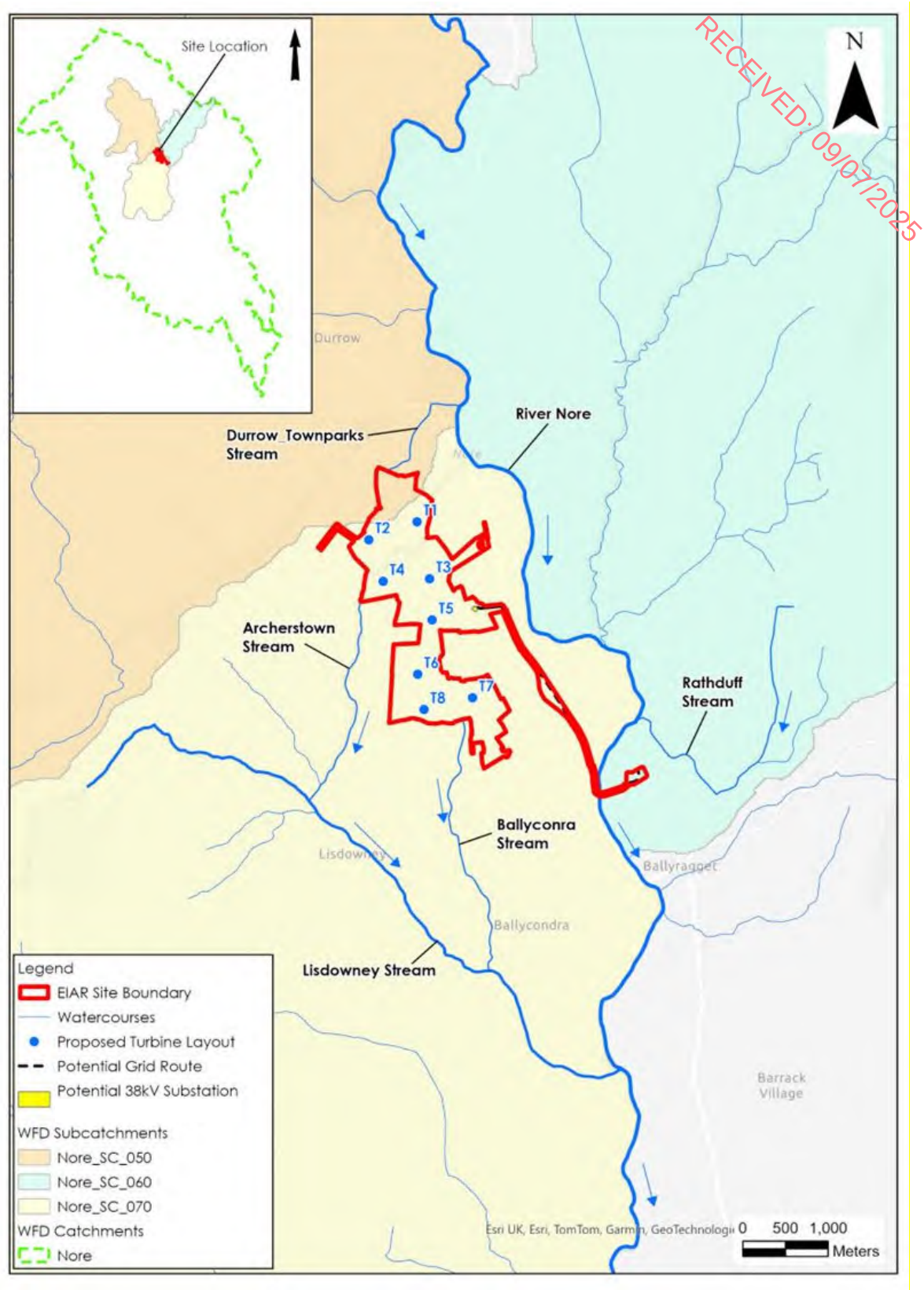


Figure B: Local Hydrology Map

3.2.2 Rainfall and Evaporation

The SAAR (Standard Average Annual Rainfall) recorded at Durrow, the closest rainfall station to the proposed development site with long term SAAR data, is 879mm (www.met.ie). Durrow rainfall station is located ~1.5km north of the Proposed Wind Farm site.

The average potential evapotranspiration (PE) at Kilkenny (~18km south-southwest of the Proposed Wind Farm Site) is taken to be 458.8mm (www.met.ie). The actual evapotranspiration (AE) is calculated to be 435.9mm (95% PE).

Met Éireann also provide a grid of average annual rainfall for the entire country for the period of 1991 to 2020. Based on this more site-specific modelled rainfall values, the annual rainfall at the Proposed Wind Farm Site is estimated at 879 mm/year.

The effective rainfall (ER)[1] represents the water available for runoff and groundwater recharge. The ER for the Proposed Wind Farm Site is calculated as follows:

Effective rainfall (ER) = AAR – AE

= 879mm/year – 435.9mm/year

ER = 443.1mm/year

The recharge coefficient estimates from the GSI (www.gsi.ie), range between 22.5-85%, based on the expected or observed outcrop/subcrop near the surface. Based on the GSI mapping, a groundwater recharge cap of 100 mm/year is applied to the majority of the site's aquifers in the western, northeastern and central areas. Therefore, surface runoff rates for these areas of the Wind Farm Site are estimated to be 343.1mm/year. A groundwater recharge cap is not applied to the aquifers in the central and southeastern areas of the Site. Therefore, surface runoff rates in these areas of the site are expected to be near 0 mm/year, which broadly aligns with the lack of surface water drainage features across this portion of the site. The only area where surface water drainage features is seen is at the faulted boundary between the sandstone/siltstone/shale formations and the Carboniferous Limestone rocks.

Climate change projections for Ireland are provided by Regional Climate Models (RCM's) downscaled from larger Global Climate Models (GCM's). Projections for the period 2041-2060 (mid-century) are available from Met Eireann. The data indicates a projected decrease in summer rainfall from 0 to 13% under the medium-low emission range scenario and an increase in the frequency of heavy precipitation events of 20%. In total, the projected annual reduction in rainfall near the Wind Farm Site is 8% under the medium-low emission scenario and 4% under the high emissions scenario. As stated above the local average long term rainfall data for the Wind Farm Site is estimated to be 879mm/yr. Under the medium-low emissions scenario this may reduce to~809mm/yr, while under the high emissions scenario this figure may change to ~844mm/yr.

In addition to average rainfall data, extreme value rainfall depths are available from Met Eireann. **Table A** below presents return period rainfall depths for the area of the Wind Farm site site. These data are taken from https://www.met.ie/climate/services/rainfall-return-periods and they provide rainfall depths for various storm durations and sample return periods (1-year, 5-year, 30-year, 100-year).

[1] *ER – Effective Rainfall is the excess rainfall after evaporation which produces overland flow and recharge to groundwater.*

Table A. Seskin – Return Period Rainfall Depths (mm)

	Return Period (Years)			
Duration	**1**	**5**	**30**	**100**
5 mins	3.9	6.9	12.2	17.5
15 mins	6.5	11.3	20.1	28.6
30 mins	8.2	13.8	23.5	32.7
1 hours	10.4	16.9	27.6	37.4
6 hours	19.4	28.3	41.6	52.8
12 hours	24.7	34.5	48.7	60.3
24 hours	31.4	42.2	57.1	68.9
2 days	38.4	50.5	66.9	79.6

3.3 GEOLOGY

The published soil maps (**www.gsi.ie**) for the local area shows that the majority of the Proposed Wind Farm Site is overlain by Shallow well drained mineral (Mainly acidic) (AminSW), Deep well drained mineral (Mainly acidic) (AminDW) and Shallow well drained mineral (Mainly basic) (BminSW) with small areas of Mineral poorly drained (Mainly acidic) (AminPD). The majority of the Proposed Grid Connection route is overlain by Shallow well drained mineral (Mainly basic) (BminSW) with small areas of Alluvial (mineral) (AlluvMIN) and Made ground (Made).

The published subsoil maps (**www.gsi.ie**) for the local area shows that the majority of the Proposed Wind Farm Site was underlain by Till derived from Namurian sandstones and shales (TNSSs) and Bedrock outcrop or subcrop (Rck) with small areas of Kartsified bedrock outcrop or subcrop (KaRck) and Gravels derived from Limestones (GLs). The majority of the Proposed Grid Connection Route was underlain by Gravels derived from Limestones (GLs) with small area underlain by Alluvium (A).

A local subsoil map is shown as **Figure C.**

Based on the GSI Bedrock Geology 110k mapping (www.gsi.ie), the Proposed Wind Farm site is underlain by a total of 5 no. bedrock geological formations. The east of the Proposed Wind Farm site is mapped to be underlain by the Clogrenan Formation. This formation comprises of cherty, muddy calcarenitic limestones. The southeastern corner of the Proposed Wind Farm site is mapped to be underlain by the Ballyadams Formation, which consists of crinoidal wackestone/packstone limestone. The western section of the Proposed Wind Farm site is mapped to be underlain predominantly by the Bregaun Flagstone Formation, which consists of thick, flaggy sandstone and siltstone. A small area in the northwest of the Proposed Wind Farm is underlain by the Moyadd Coal Formation, which consists of shale, siltstone and minor sandstone. Finally a small area towards the centre of the Proposed Wind Farm site is underlain by the Killeshin Siltstone Formation which comprises of muddy siltstone.

There are 2 faults mapped at the Proposed Wind Farm site that run from north to south and from north to southwest. The GSI map the limestone bedrock of the Ballyadams Formation to be dipping 26° to the northeast, while the flagstone/sandstone bedrock of the Breguan Formation is mapped as dipping 50° to the east/southeast. This GSI map the occurrence of several areas of bedrock outcrop in the Proposed Wind Farm site.

A local bedrock geology map is shown as **Figure D.**

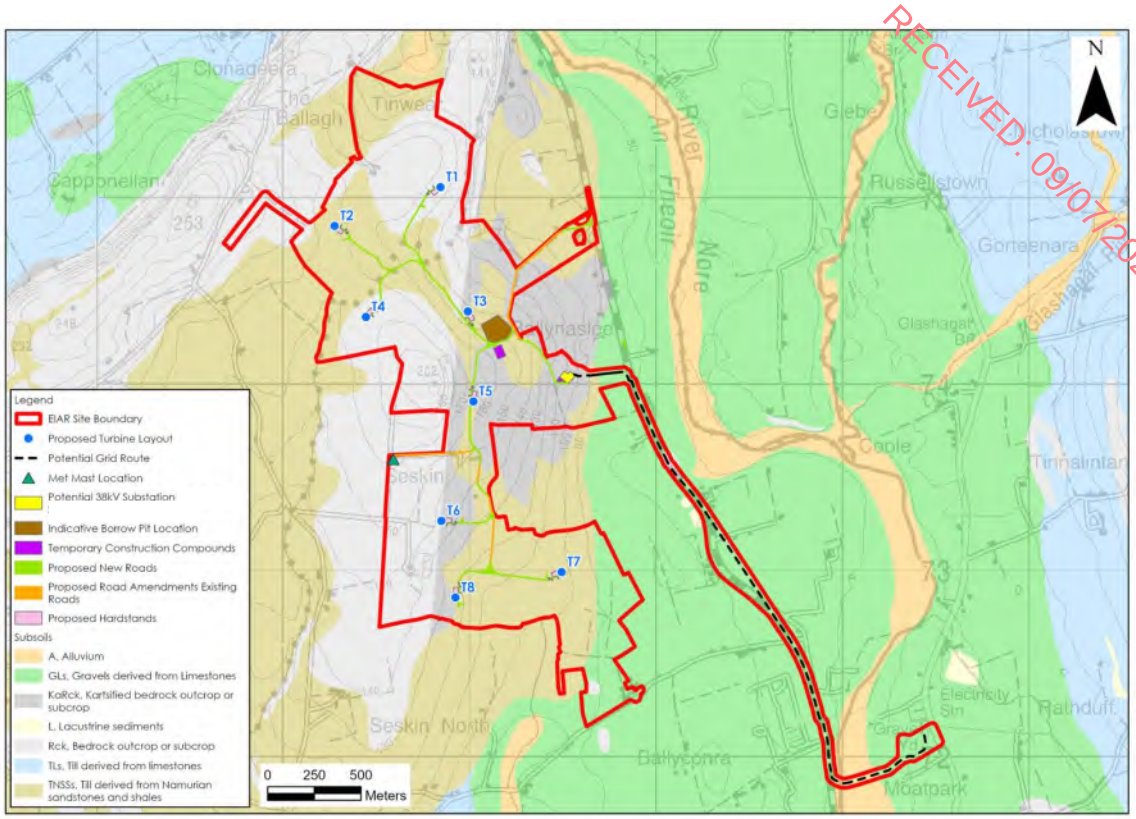


Figure C: Local Subsoil Map (www.gsi.ie)

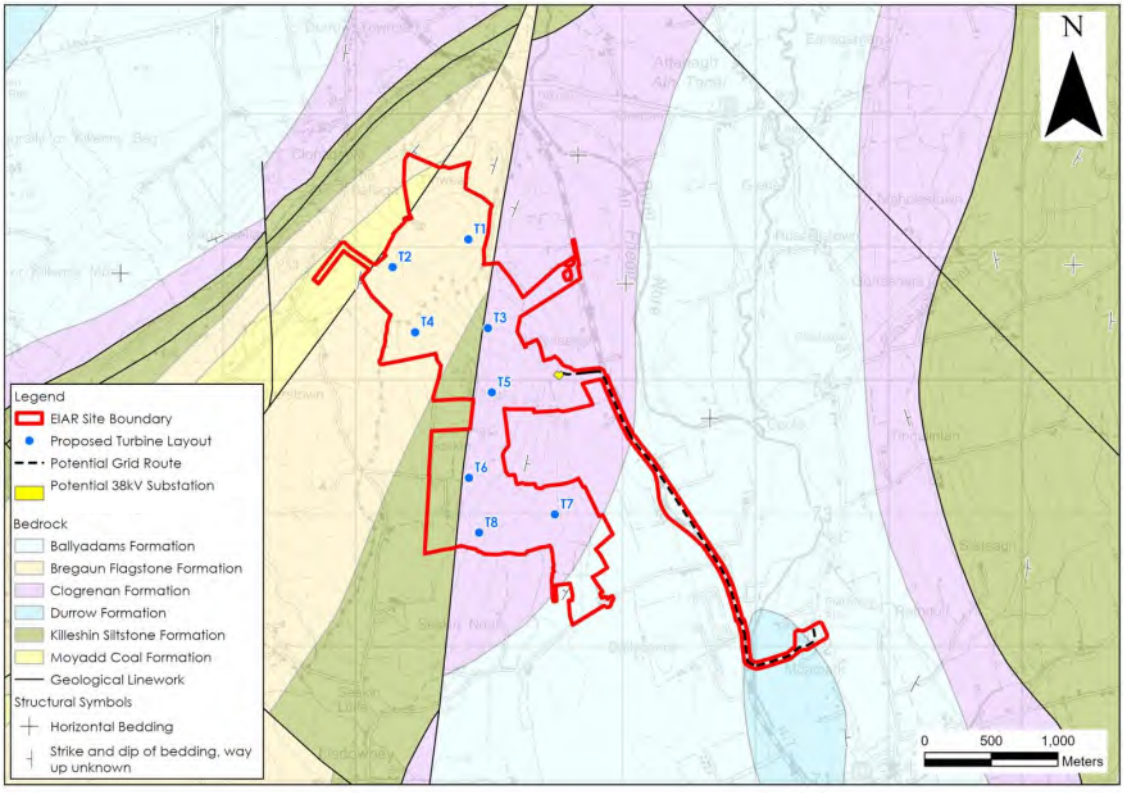


Figure D: Local Bedrock Geology Map (www.gsi.ie)

3.4 SITE DRAINAGE

3.4.1 Existing Site Drainage

The lack of surface water drainage features across the site, demonstrates a significant bias towards groundwater recharge through the soil and subsoil, rather than surface water runoff. There are only 2 no. watercourses which drain the area, the Archerstown stream and the Ballyconra stream, both of which are small 5th order streams with very low flow, neither of which are mapped within the Proposed Wind Farm Site. During several site visits there was no flow observed in these channels, while during times of heavy rainfall (November -December 2024), the flow was observed at between 1-2 l/s.

As groundwater recharge dominates across the site, the primary pathway for rainfall is via infiltration to the underlying groundwater aquifer.

A flow diagram for the existing drainage system is shown as **Figure E** below.

3.4.2 Proposed Site Drainage

Runoff control and drainage management are key elements in terms of mitigation against effects on the underlying groundwater aquifer and surface water courses. Two distinct methods will be employed to manage drainage water within the Proposed Development. The first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage and recharge patterns. The second method involves collecting any drainage/runoff waters from works areas within the Wind Farm site that might carry silt or sediment, and nutrients, to route them along collector drains within which recharge can occur, and outfall to infiltration areas and subsequent infiltration through the subsoil, or where infiltration to ground is not suitable, to route them towards new proposed silt traps and settlement ponds (or stilling ponds) prior to controlled diffuse release into the existing drainage network. There will be no direct discharges to the existing hydrological features (agricultural drains or natural watercourses).

During the construction phase, all runoff from works areas (i.e. dirty water) will be slowed down and treated to a high quality prior to being released. A schematic of the proposed site drainage management is shown as below.

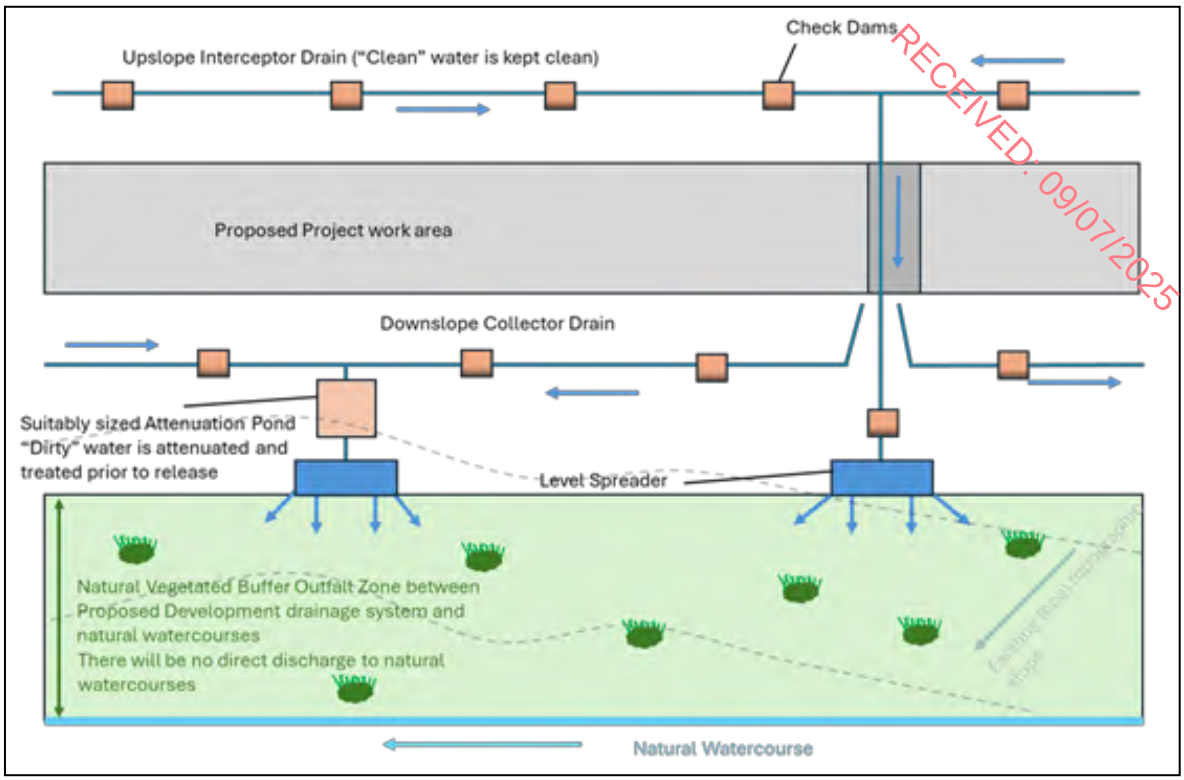


Plate A: Schematic of proposed site drainage management

3.5 DESIGNATED SITES & HABITATS

Within the Republic of Ireland designated sites include Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs).

Ramsar sites are wetlands of international importance designated under the Ramsar Convention (adopted in 1971 and came into force in 1975), providing a framework for the conservation and wise use of wetlands and their resources.

The closest designated site to the Proposed Wind Farm Site is the River Barrow and River Nore SAC (Site Code: 002162), which is situated 100m from the Proposed Grid Route along N77. The proposed Grid Connection runs adjacent to the River Barrow and River Nore SAC along the N77 national road. Rivers and streams that drain the Proposed Wind Farm site or the Proposed Grid Connection Route ultimately drain towards the River Barrow and River Nore SAC.

The River Nore/Abbeyleix Woods Complex pNHA (Site Code: 002076) and the River Nore SPA (Site Code: 004233) which are situated 100m east of the Proposed Grid Connection Route along N77.

Lisbigney Bog SAC/pNHA (Site Code: 000869) is located ~4.2km northeast of the Proposed Wind Farm Site. There is no surface water connection between the Proposed Wind Farm Site and Lisbigney Bog.

Cullahill Mountain SAC/pNHA (Site Code: 000831) is located ~5.8km to the west of the Proposed Wind Farm Site and there is no hydrological connection between this designated site and the Proposed Wind Farm Site.

The Spahill and Clomantagh Hill SAC/pNHA (Site Code: 000849) is located ~8.2km southwest of the Proposed Wind Farm site. There is no surface water connection between the Proposed Wind Farm Site and this SAC/pNHA.

Waterford Harbour pNHA (Site Code: 000787) is located downstream of the Proposed Project site within Waterford Harbour.

4. SITE SPECIFIC FLOOD RISK ASSESSMENT

4.1 INTRODUCTION

The following flood risk assessment is carried out in accordance with '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*' (DoEHLG, 2009). The basic objectives of these guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and,
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

4.2 FLOOD RISK ASSESSMENT PROCEDURE

This section of the report details the site-specific flood risk assessment carried out for the proposed windfarm Site and surrounding area. The primary aim of the assessment is to consider all types of flood risks and the potential impact on the development. As per the relevant guidance (DOEHLG, 2009), the stages of a flood risk assessment are:

- *Flood risk identification* – identify whether there are surface water flooding issues at a site;
- *Initial flood risk assessment* - confirm sources of flooding that may affect a proposed development; and,
- *Detailed flood risk assessment – quantitative appraisal of potential risk to a proposed development*.

As per the Guidelines, there are essentially two major causes of flooding:

Coastal flooding which is caused by higher sea levels than normal, largely as a result of storm surges, resulting in the sea overflowing onto the land. Coastal flooding is influenced by the following three factors, which often work in combination:

- High tide level;
- Storm surges caused by low barometric pressure exacerbated by high winds (the highest surges can develop from hurricanes); and,
- Wave action, which is dependent on wind speed and direction, local topography and exposure.

Due to its inland location, coastal flooding is not applicable to the Site.

Inland flooding which is caused by prolonged and/or intense rainfall. Inland flooding can include a number of different types:

- Overland flow occurs when the amount of rainfall exceeds the infiltration capacity of the ground to absorb it. This excess water flows overland, ponding in natural hollows and low-lying areas or behind obstructions. This occurs as a rapid response to intense rainfall and eventually enters a piped or natural drainage system.

- River flooding occurs when the capacity of a watercourse is exceeded or the channel is blocked or restricted, and excess water spills out from the channel onto adjacent low-lying areas (the floodplain). This can occur rapidly in short steep rivers or after some time and some distance from where the rain fell in rivers with a gentler gradient.

- Flooding from artificial drainage systems results when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity and the system becomes blocked, and / or cannot discharge due to a high water level in the receiving watercourse. This mostly occurs as a rapid response to intense rainfall. Together with overland flow, it is often known as pluvial flooding. Flooding arising from a lack of capacity in the urban drainage network has become an important source of flood risk, as evidenced during recent summers.

- Groundwater flooding occurs when the level of water stored in the ground rises as a result of prolonged rainfall to meet the ground surface and flows out over it, i.e. when the capacity of this underground reservoir is exceeded. Groundwater flooding tends to be very local and results from interactions of site-specific factors such as tidal variations. While water level may rise slowly, it may be in place for extended periods of time. Hence, such flooding may often result in significant damage to property rather than be a potential risk to life.

- Estuarial flooding may occur due to a combination of tidal and fluvial flows, i.e. interaction between rivers and the sea, with tidal levels being dominant in most cases. A combination of high flow in rivers and a high tide will prevent water flowing out to sea tending to increase water levels inland, which may flood over river banks.

The Flood Risk Management Guidelines provide direction on flood risk and development. The guidelines recommend a precautionary approach when considering flood risk management and the core principle of the guidelines is to adopt a risk based sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for inland and coastal flooding.

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning.

There are three types or levels of flood zones defined within the guidelines:

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); and,

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). Flood Zone C covers all areas of the plan which are not in zones A or B.

Once a flood zone has been identified for a site, the guidelines set out the different types of development appropriate to each identified zone (pg 25, Table 3.1 of the Guidelines). Exceptions to the restriction of development due to potential flood risks are provided for through the application of a Justification Test, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated by the applicant.

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of particular developments that, for the reasons outlined above, are being considered in areas of moderate or high flood risk. The test is comprised of two processes:

- The first is the **Plan-making Justification Test** described in chapter 4 of the Guidelines and used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding. Plan making Justification Tests are made at Plan/Policy development stage such as County Development Plans, or Local Area Plans.

- The second is the **Development Management Justification Test** described in chapter 5 of the Guidelines and used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land. For example, application of Development Management Justification Test would be required at a site specific level, such as for this FRA assessment, if a Justification Test is required.

4.3 FLOOD RISK IDENTIFICATION

4.3.1 Historical Mapping

To identify those areas as being at risk of flooding, historical mapping (*i.e.* 6" and 25" base maps) were consulted. There are identifiable map texts along the River Nore that are mapped as 'liable to flood' in close proximity to the Proposed Grid Connection route. These areas labelled as 'liable to flood' do not encroach upon the Proposed Grid Connection Route.

4.3.2 Soils Maps - Fluvial Maps

A review of the soil types in the vicinity of the Proposed Wind Farm site was undertaken as soils can be a good indicator of past flooding in an area. Due to past flooding of rivers, deposits of transported silts/clays referred to as alluvium build up within the flood plain and hence the presence of these soils is a good indicator of potentially flood prone areas.

Based on the EPA/GSI soil map for the local area, no fluvial or lacustrine deposits are mapped within the Proposed Wind Farm site. The closest Alluvium soil is mapped adjacent to the northern boundary of the Proposed Wind Farm Site. The Alluvium soil is also mapped in the area along the Nore river. The presence of these soils indicates areas where flooding may have occurred in the past.

4.3.3 OPW Past Flood Event Mapping

To identify those areas as being at risk of flooding, OPW's Past Flood Event mapping (www.floodinfo.ie) were consulted.

No recurring or historic flood incidents are recorded within the Proposed Wind Farm Site. There are some recurring floods in the lowlands that surround the Proposed Wind Farm Site, the closest of which is located ~0.85km to the northwest, within the flood zone of the River Nore (ID: 2657). The Laois Western Area Engineer – Minutes[2] dated 28/09/2005 states that the River Nore overflows its banks upstream of Tally Ho Bridge after heavy rainfall every year. More recurring floods are seen upstream and downstream of this point. There is a recurring flood zone located ~1.15km north of the Site in the townland of Durrow (ID:2676), The Laois Western Area Engineer – Minutes dated 28/09/2005 states that the Low lying land floods after heavy rainfall every year. The flooding has been exacerbated by recent development. The road is liable to flood and 1 no. property is affected. Water gushes into property from the road. There

[2] Meeting with Tom'OCarroll Area Engineer for Borris-in-Ossory 29/09/05

is also a recurring flood zone located ~2.2km downstream of the Proposed Wind Farm Site in the townland of Ballyragget within the flood zone of the River Nore (ID: 2813).

There are two historical flooding events mapped in townlands of Durrow Townparks located ~1.8 km north of the Proposed Wind Farm site dated 22/11/2017 (Flood ID: 13585) and 01/12/2015 (Flood ID: 13313). There is another historical flooding event mapped ~2.2km downstream of the Proposed Wind Farm Site in the townland of Ballyragget dated 06/11/2000 (Flood ID: 4803).

Historic and recurring flood events in the vicinity and downstream of the Site are shown on **Figure E** below.

No areas within the Proposed Wind Farm Site are mapped as an OPW Drainage District (i.e. an area where drainage schemes to improve land for agricultural purpose) or as Benefiting Lands (i.e. land identified by the OPW as potentially benefitting from the implementation of Arterial (Major) Drainage Schemes and an indicator of land subject to flooding and poor drainage).

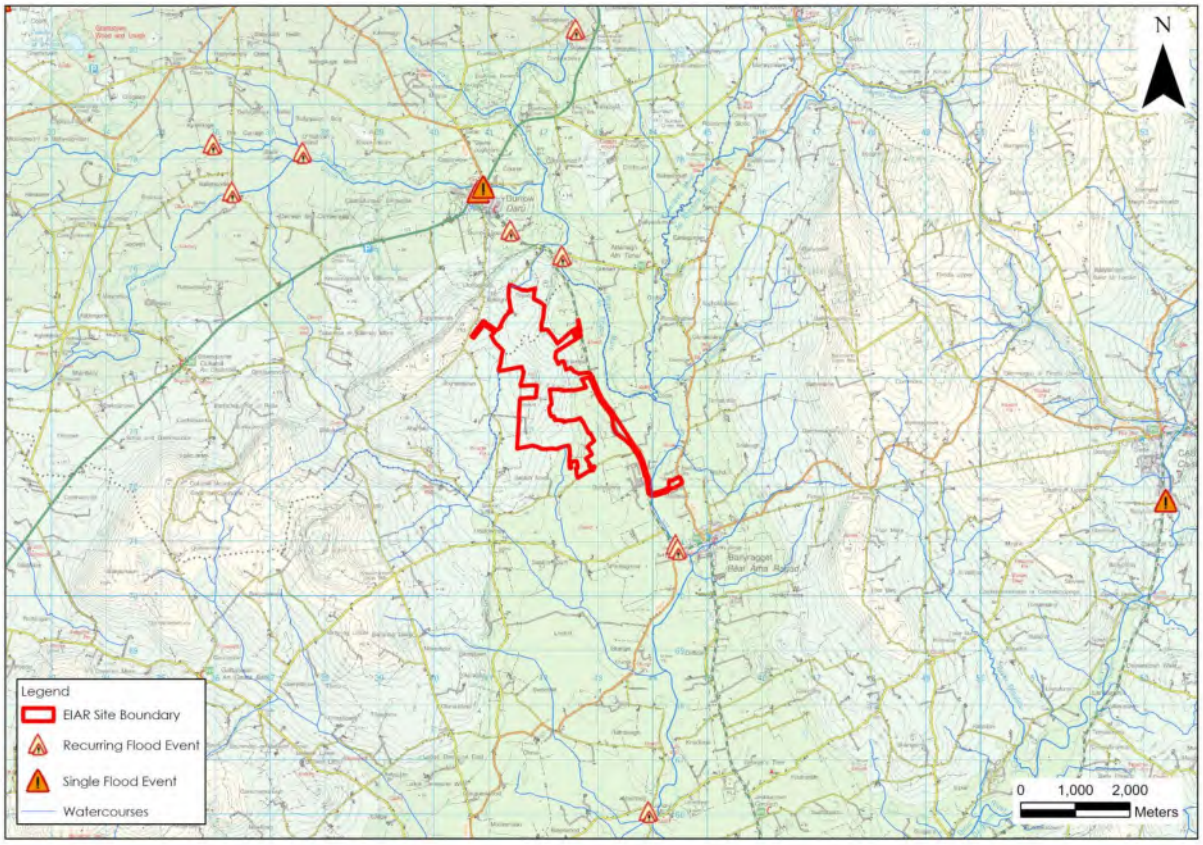


Figure E: OPW Past Flood Event Map

4.3.4 GSI Winter (2015/2016) Surface Water Flood Mapping

The GSI Winter (2015/2016) Surface Water Flooding Map[3] shows areas of fluvial and pluvial flood extents during the Winter 2015/2016 flood event, which was the largest recorded flood event in many areas.

The GSI Winter (2015/2016) Surface Water Flooding Maps do not show any areas within the Proposed Wind Farm Site as susceptible to flooding. The closest GSI Winter Surface Water

[3] GSI *Historical flood mapping principally developed using Sentinel-1 Satellite Imagery from the European Space Agency Copernicus Programme as well as any available historic records (from winter 2015/2016 or otherwise)*

Flooding is along the River Nore in the east of the Proposed Wind Farm Site. (Refer **Figure F** below). There is a very small area of historic groundwater flooding located along the western edge of the N77, however this is not noted on any past flood event mapping (refer to **Figure E**).

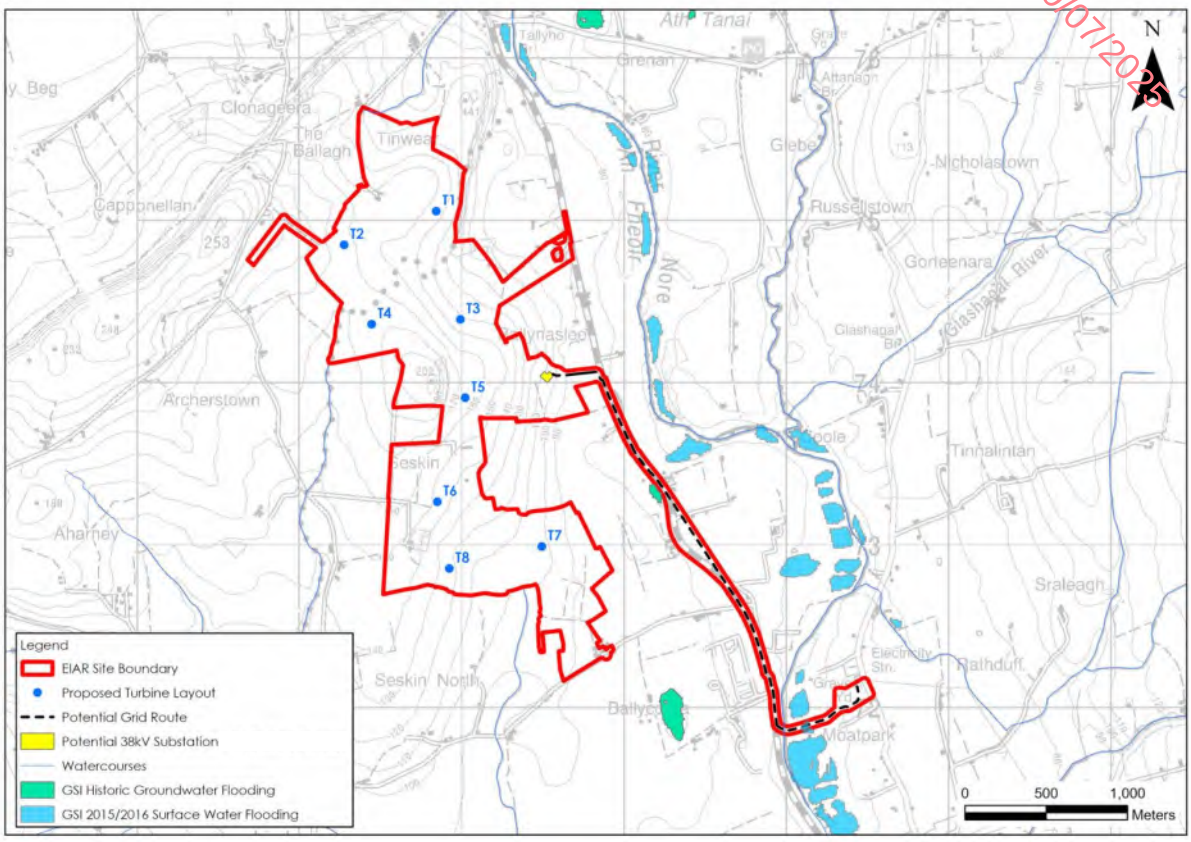


Figure F: GSI Winter 2015/2016 Surface Water Flood and Ground Water Flood Mapping

4.3.5 CFRAM Mapping – Fluvial and Pluvial Flooding

Catchment Flood Risk Assessment and Management (CFRAM)[4] OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the previous PFRA maps.

CFRAM mapping has not been completed for the area of the Proposed Wind Farm Site. The closest CFRAM mapping to the Proposed Wind Farm Site has been completed to the east along the River Nore, which runs adjacent to and downstream of the Proposed Wind Farm Site. There is no CFRAM area mapped in the majority of the Proposed Grid Connection route expect for the area crossing the Nore River, where CFRAM fluvial flood zone is mapped.

4.3.6 National Indicative Fluvial Flood Mapping

National Indicative Fluvial Mapping (www.floodinfo.ie) shows probabilistic fluvial flood zones for catchments greater than 5km^2 for which flood maps were not produced under the CFRAM Programme.

[4] *CFRAM is Catchment Flood Risk Assessment and Management. The national CFRAM programme commenced in Ireland in 2011 and is managed by the OPW. The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.*

The Present-Day Scenario has been generated using methodologies based on historic flood data and does not consider the potential changes due to climate change. The potential effects of climate change on flooding have been separately modelled (see **Section 4.3.9** below).

For the Present-Day Scenario, no medium (1 in 100) and low probability (1 in 1,000) fluvial flood zones have been mapped as encroaching upon the Proposed Wind Farm Site. The Proposed Wind Farm Site is mapped entirely within Fluvial Flood Zone C. The closest NIFM Fluvial flood zone is mapped ~1.2km east of the Proposed Wind Farm Site along the River Nore (EPA Code: 15N01).

A map showing the National Indicative Fluvial Mapping for the present-day scenario is included as **Figure G** below.

Based on the combined CFRAM and NIFM fluvial flood zones, the Proposed Wind Farm Site and the majority of the Proposed Grid Connection route are located in Fluvial Flood Zone C, where the probability of fluvial flooding is low (less than 0.1%) with a small area of the Proposed Grid Connection Route mapped in Flood Zone A and B, where it crosses the River Nore.

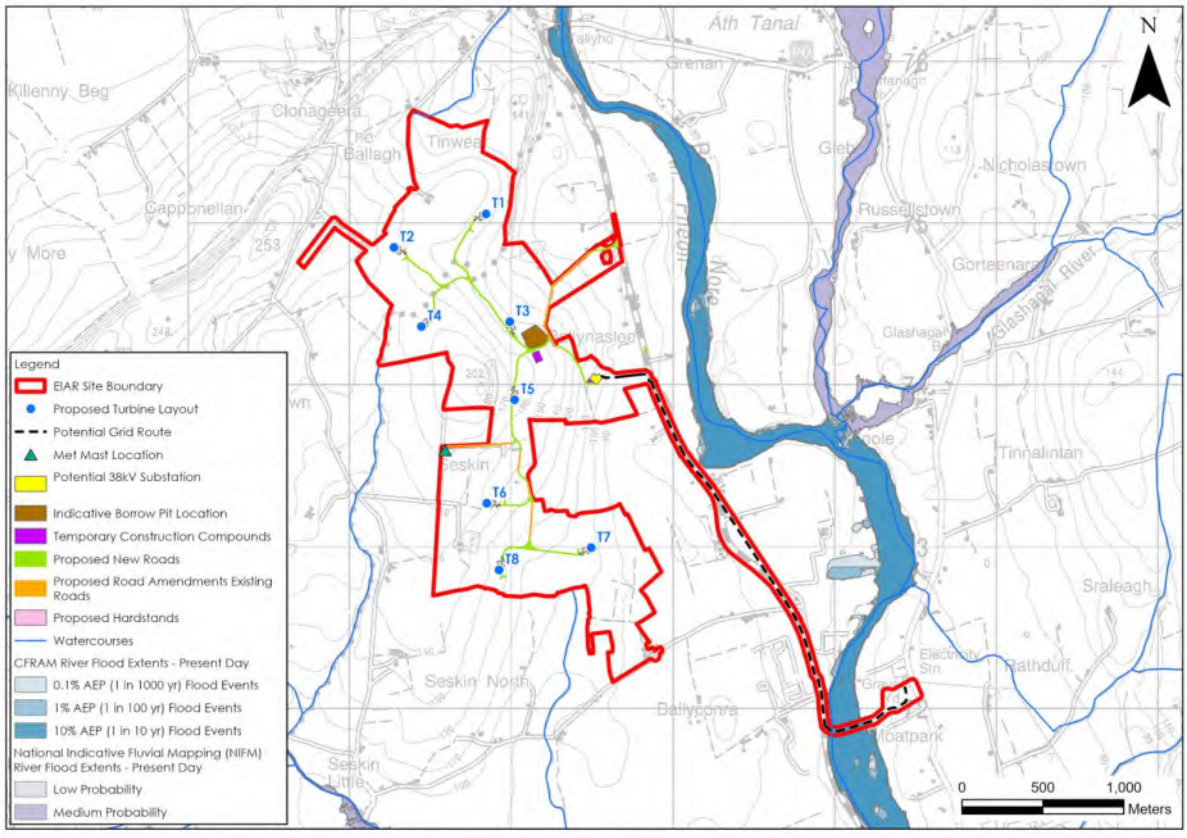


Figure G: OPW National Indicative Flood Mapping

4.3.7 Groundwater Flooding

The GSI Historical Groundwater flood map and the modelled groundwater flood extents map (www.floodinfo.ie) do not show the occurrence of any groundwater flooding within the Proposed Wind Farm Site or along the Proposed Grid Connection Route.

The closest historic and modelled groundwater flood extents are located ~1km northeast of the Proposed Wind Farm Site in the townlands of Grenan.

4.3.8 Coastal Flooding

The Site is located at elevations of ~150-200mOD and is ~70km from the coast. Therefore, the Proposed Development is not at risk of coastal (tidal) flooding.

4.3.9 Climate Change

Fluvial flood modelling has also been completed to consider future climate scenarios where the potential effects of climate change can increase rainfall.

The National Indicative Fluvial Flood Mapping Mid-Range Future Scenario models flood extents based on a 20% increase in rainfall. Similarly, the National Indicative Fluvial Flood Mapping High-End Future Scenario models flood extends based on a 30% increase in rainfall. Both of these modelled flood extents show similar flood zones to the Present Day Scenario discussed above in **Section 4.3.6.** Therefore, flood zones at the Proposed Wind Farm Site are unlikely to be significantly impacted by future climate change.

The CFRAM flood mapping has also been completed for the Mid-Range and High-End Future Scenarios. Both of these modelled flood extents show similar flood zones to the Present Day Scenario discussed above in **Section 4.3.5**. Therefore, flood zones at the Proposed Wind Farm Site are unlikely to be significantly impacted by future climate change.

4.3.10 Summary – Flood Risk Identification

Based on the information gained through the flood identification process it is apparent that the Proposed Wind Farm Site and the Proposed Grid Connection Route is located in Fluvial Flood Zone C except for the small area of the Proposed Grid Connection Route along the River Nore, where the Grid Connection crosses the river, which is mapped as Flood Zone A and B.

4.4 INITIAL FLOOD RISK ASSESSMENT

4.4.1 Site Survey and Drainage

Detailed walkover surveys of the Site and the surrounding areas was undertaken by HES between November 2024 and April 2025.

The Proposed Wind Farm site is drained by several first or second order streams which emerge from within the development landholding. These streams include the Ballyconra Stream, and Archerstown Stream, which ultimately discharge to the Lisdowney Stream

Three rounds of surface water flow monitoring were carried out at the main streams draining the wind farm site and the results are shown in **Table B** below. The measured flows are typical of seasonal flows for first/second order.

Table B: Surface Water Flow Monitoring

Location/Date	01/11/2024	09/04/2025
	Flow (l/sec)	Flow (l/sec)
SW1	1	Dry
SW2	1.5	0.5
SW4	1	Dry

4.4.2 Hydrological Flood Conceptual Model

Potential flooding in the vicinity of the Proposed Wind Farm Site and the Proposed Grid Connection Route can be described using the Source – Pathway – Receptor Model ("S-P-R"). The primary potential source of flooding in this area, and the one with most consequence for the Proposed Wind Farm Site and the Proposed Grid Connection Route, is fluvial. The primary potential pathways, in the most likely order of significance, would be overbank flooding of the River Nore and its tributaries during significant rainfall events. The potential receptors in the area are infrastructure and land as outlined below.

4.4.3 Summary – Initial Flood Risk Assessment

Based on the information gained through the flood identification process and Initial Flood Risk Assessment process, flooding is unlikely to be problematic at the Proposed Wind Farm Site or downstream. The potential sources of flood risk for the Proposed Wind Farm Site are outlined and assessed in **Table C**.

Table C. S-P-R Assessment of Flood Sources for the Proposed Wind Farm Site.

Source	Pathway	Receptor	Comment
Fluvial	Overbank flooding of the rivers and streams that are close to some of the wind farm infrastructures and the rivers and streams that flow throughout the Proposed Wind Farm Site	Land & infrastructure	The Proposed Wind Farm Site and the majority of the Proposed Grid Connection Route is located in Fluvial Flood Zone C with some areas of the Proposed Grid Connection Route mapped in Fluvial Flood Zones.
Pluvial	Ponding of rainwater on Proposed Wind Farm Site	Land & infrastructure	There is very little risk of pluvial flooding within the Proposed Wind Farm Site as drainage moves relatively freely due to the site recharge rates and the sloping topography of the Proposed Wind Farm site. CFRAM have no pluvial flood areas mapped at the Proposed Wind Farm Site.
Surface water	Surface ponding/ Overflow	Land & infrastructure	Same as above (pluvial).
Groundwater	Rising groundwater levels	Land & infrastructure	Based on local hydrogeological regime and GSI mapping, there is no risk of groundwater flooding at the Proposed Wind Farm Site.
Coastal/tidal	Overbank flooding	Land, People, property	The Proposed Wind Farm Site is located ~70km inland from the sea. So no coastal flooding will be possible.

4.5 REQUIREMENT FOR A JUSTIFICATION TEST

The matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test[5] is shown in **Table D** below.

It may be considered that the Proposed Wind Farm Site can be categorised as "Highly Vulnerable Development". However, as stated above, the Proposed Wind Farm Site and the majority of the Proposed Grid Connection Route is located in Flood Zone C (Low Risk) except for a small area on the Proposed Grid Connection Route which is located in Flood Zone A and B, where the Grid Connection route crosses the River Nore.

Based on the above, a Justification Test will be required if any infrastructure associated with the Proposed Wind Farm Site or the Proposed Grid Connection Route is to be located within the mapped flood zones. If required, this Justification Test will be presented in subsequent iterations of this FRA.

Table D: Matric of Vulnerability versus Flood Zone

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	**Justification test**	**Justification test**	**Appropriate**
Less vulnerable development	Justification test	Appropriate	Appropriate
Water Compatible development	Appropriate	Appropriate	Appropriate

Note: *Taken from Table 3.2 (DoEHLG, 2009)*
Bold: *Applies to this project.*

Box 5.1 (Table E: Format of Justification Test for Development Management) of "The Planning System and Flood Risk Management Guidelines" (PSFRM Guidelines) outlines the criteria required to complete the "Justification Test".

Table E: Format of Justification Test for Development Management

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

[5] *A 'Justification Test' is an assessment process designed to rigorously assess the appropriateness, or otherwise, of particular developments that are being considered in areas of moderate or high flood risk, (DoEHLG, 2009).*

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: *this table has been adapted from Box 5.1 of "The Planning System and Flood Risk Management Guidelines", (2009).*

Referring to Point 1 and Points 2 (i) to (iv) inclusive:

The Proposed Wind Farm Site and majority of the Proposed Grid Connection Route is not located in mapped fluvial flood zones except for small area of the Proposed Grid Connection Route along the Nore River.

No displacement of floodwaters will result from the emplacement of the Proposed Grid Connection Route. This will be achieved by directional drilling and there will be no in-stream works or alteration of the existing hydromorphological regime.

During the construction phase, works at these locations may be postponed in the event of flooding.

1. The Proposed Wind Farm Site and the Proposed Grid Connection Route has been the subject of a flood risk assessment (this report) and the following has been determined:

   i. Due to the relatively small footprint of the Proposed Development (~7ha) and given that the only portion of the Proposed Grid Connection Route that is located within modelled flood zones is at an a proposed horizontal directional drilling watercourse crossing location (river Nore), the Proposed Development is predicted to have no impact on flood water levels downstream. No increase in downstream flood risk will occur.
   ii. All proposed turbines and all other site infrastructure are located outside of the flood zones. These measures will mitigate against any potential disruption to the natural hydrology of the Proposed Wind Farm site. No increase in flood risk to people, property, the economy or the environment during extreme flood events as a result of the Proposed Development is predicted due to the appropriate design measures which will result in unmeasurable/imperceptible upstream and downstream effects;
   iii. The Proposed Grid Connection Route crossing of the River Nore is located within the modelled flood zone, but this will not have an effect on flood levels. This crossing will be achieved by horizontal directional drilling. Therefore, there will be no displacement of flood waters;
   iv. The Proposed Development is compatible with the wider planning objectives of the area, including the provision of wind energy developments at appropriate locations and the proper planning and sustainable development of the area.

5. FLOOD IMPACT PREVENTION AND DRAINAGE MANAGEMENT

5.1 RELEVANT LOCAL AUTHORITY GUIDANCE AND POLICIES

The following policies are defined in the Kilkenny City and County Council Development Plan (2021-2027) (**Table F**) and Laois County Council Development Plan (2021-2027) (**Table G**) in respect of flooding, and we have outlined in the column to the right how these policies are provided for within the Proposed Wind Farm Site design:

Table F: Kilkenny Development Management Requirements on flooding and reference to relevant sections of this FRA report

Section	Development Management Requirements	Response
10.2.6.2	Where flood risk may be an issue for any proposed development, a detailed flood risk assessment should be carried out appropriate to the scale and nature of the development and the risks arising. In particular, any area within or adjoining flood zone A or B, or flood risk area, shall be the subject of a site-specific Flood Risk Assessment appropriate to the type and scale of the development being proposed. This shall be undertaken in accordance with the Planning System and Flood Risk Management – Guidelines and the Strategic Flood Risk Assessment accompanying this Plan.	As outlined in this FRA
10.2.6.2	If a Site specific FRA demonstrates an unmanageable level of flood risk and/or impacts to 3rd party lands, development cannot proceed.	Not applicable as there is no such risk anticipated
10.2.6.2	Proposals for mitigation and management of flood risk will only be considered where avoidance is not possible and where development can be clearly justified with the Guidelines' Justification Test.	As outlined in this FRA and **Section 4.5 above**.

Table G: Laois CDP Policy on flooding and reference to relevant sections of this FRA report

CDP Policy Number:	Policy	Response
FRM 1	Ensure that flood risk management is incorporated into the preparation of all local area plans through the Preparation in accordance with the requirements of the Planning System and Flood Risk Management – Guidelines for Planning Authorities (DoEHLG 2009)	As outlined in this FRA
FRM 2	Ensure that all development proposals comply with the requirements of the Planning System and Flood Risk Management - Guidelines for Planning Authorities' (DEHLG 2009) and to ensure that the Justification Test for Development Management is applied to required development proposals and in accordance with methodology set out in the guidelines and new development does not increase flood risk elsewhere, including that which may arise from surface water runoff.	As outlined in this FRA
FRM 3	Support the implementation of recommendations in the CFRAM Programme to ensure that flood risk management policies and infrastructure are progressively implemented.	As outlined in this FRA, the Proposed Wind Farm Site is not located in the CFRAM
FRM 4	Support the implementation of recommendations in the Flood Risk Management Plans (FRMP's), including	As outlined in this FRA

	planned investment measures for managing and reducing flood risk	
FRM 5	Consult with the OPW in relation to proposed developments in the vicinity of drainage channels and rivers for which the OPW are responsible, and to retain a strip on either side of such channels where required, to facilitate maintenance access thereto.	As outlined in this FRA and **Section 4.3.3** no area of the Proposed Wind Farm Site is mapped as OPW drainage district
FRM 6	Assist the OPW in developing catchment – based Flood Risk Management Plans for rivers in County Laois and have regard to their provisions/recommendations.	As outlined in this FRA and **Section 4.3.3**, no area of the Proposed Wind Farm Site is mapped as OPW drainage district
FRM 7	Protect and enhance the County's floodplains and wetlands as 'green infrastructure' which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defenses in the future, subject to normal planning and environmental criteria	As outlined in this FRA the Proposed Wind Farm Site is not located in any flood plains and there is no flood risk.
FRM 8	Protect the integrity of any formal (OPW or Laois County Council) flood risk management infrastructure, thereby ensuring that any new development does not negatively impact any existing defense infrastructure or compromise any proposed new infrastructure	As outlined in this FRA the Proposed Wind Farm Site is not located in vicinity of the flood risk management structure.
FRM 9	Ensure that where flood risk management works take place that the natural and cultural heritage, rivers, streams and watercourses are protected and enhanced	Will be ensured
FRM 10	Ensure each flood risk management activity is examined to determine actions required to embed and provide for effective climate change adaptation as set out in the OPW Climate Change Sectoral Adaptation Plan Flood Risk Management applicable at the time	As outlined in this FRA and **Section 4.3.9**
FRM 11	Consult, where necessary, with Inland Fisheries Ireland, the National Parks and Wildlife Service and other relevant agencies in the provision of flood alleviation measures in the County	Not applicable
FRM 12	Prioritise plans for flood defence works in the towns as indicated in the Strategic Flood Risk Assessment in order to mitigate against potential flood risk	As outlined in this FRA
FRM 13	Ensure new development does not increase flood risk elsewhere, including that which may arise from surface water runoff.	As outlined in this FRA
FRM 14	Protect water sinks because of their flood management function, as well as their biodiversity and amenity value and encourage the restoration or creation of water sinks as flood defence mechanisms, where appropriate.	Not applicable

5.2 PROPOSED DRAINAGE

The site drainage system was designed integrally with the wind farm layout as a measure to ensure that the proposal will not change the existing flow regime across the site, will not deteriorate water quality and will safeguard existing water quality status of the catchments from wind farm related sediment runoff.

Runoff control and drainage management are key elements in terms of mitigation against effects on the underlying groundwater aquifer and surface water courses. Two distinct methods will be employed to manage drainage water within the Proposed Development. The

first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage and recharge patterns. The second method involves collecting any drainage/runoff waters from works areas within the Wind Farm site that might carry silt or sediment, and nutrients, to route them along collector drains within which recharge can occur, and outfall to infiltration areas and subsequent infiltration through the subsoil, or where infiltration to ground is not suitable, to route them towards new proposed silt traps and settlement ponds (or stilling ponds) prior to controlled diffuse release into the existing drainage network. There will be no direct discharges to the existing hydrological features (agricultural drains or natural watercourses).

The resultant diversion of clean water runoff will ensure that the treatment system will only need to deal with construction related runoff. The treatment system consists of a series of settlement ponds that are located at each works site and at intervals along the access roads. The outflow from the settlement ponds will be allowed to disperse across vegetation and will become diluted through contact with the clean water runoff in the buffer areas before entering the downstream watercourses.

5.3 PROPOSED ON-SITE RUNOFF ATTENUATION

The creation of impermeable areas within a development site has the effect of increasing rates of runoff into the downstream drainage system and this may increase flood risk and flood severity downstream. This applies particularly to urban areas that drain to closed pipe systems which do not have the capacity to cater for increased hydraulic loads. The proposed Seskin Renewables Wind Farm development is located within a large rural catchment with an open drainage system. The footprint of the impermeable areas and the associated increase in runoff rate is very small in the context of the catchment size and therefore represents a negligible increase in downstream flood risk. Notwithstanding the low increase in flood risk due to the development, the drainage system has been designed to prevent any increase in discharge rates above that which already exist in the undeveloped site.

Due to the high recharge rate in existence at the site, and the dominance of groundwater recharge over surface water runoff, the effect of impermeable surfaces is expected to be limited, with pathways for surface water runoff being only several metres over the relatively impermeable surfaces, before this runoff can effectively infiltrate to ground through the drainage process described in **Plate A**.

5.4 FLOOD IMPACT SCREENING FOR DESIGNATED SITES

Table H provides a flood impact screening for local designated sites.

Table H: Flood Impact Screening for Local Designated Sites

Name	Site Code	Flood Risk Screening
River Barrow and River Nore SAC	002162	No increased flood risk, small development footprint and attenuation proposals outlined above.
River Nore SPA	004233	No increased flood risk, small development footprint and attenuation proposals outlined above.
River Nore/Abbeyleix Woods Complex pNHA	002076	No increased flood risk, small development footprint and attenuation proposals outlined above.
Lisbigney Bog SAC/pNHA	000869	No increased flood risk, small development footprint and attenuation proposals outlined above.
Cullahill Mountain SAC/pNHA	000831	No increased flood risk, small development footprint and attenuation proposals outlined above.
River Shannon and Fergus Estuary SAC	004077	No increased flood risk, small development footprint and attenuation proposals outlined above.

6. REPORT CONCLUSIONS

- A flood risk identification study was undertaken to identify existing potential flood risks associated with the proposed Seskin Renewables Wind Farm. From this study:
    - No instances of historical flooding within the Site were identified in historic OS maps;
    - No instances of recurring or historic flooding were identified on OPW maps within the Site;
    - No instances of recurring flood incidents were identified on OPW maps immediately downstream of Site;
    - The proposed development site is not identified within the OPW/CFRAM Flood Zones; and,
    - The Proposed Wind Farm is not located within any National Indicative Fluvial Flood Zones. There is a small section of the Proposed Grid Connection Route located within mapped Flood Zones A & B, where the Proposed Grid Connection cross the River Nore. This has been addressed and justified within Section 4.5 and in Section 5 above.
- During the walkover surveys and flow monitoring at the site there was no evidence of out of bank flow from within the various stream/river channels. No widespread or even localized flooding was observed during these site visits;
- The Proposed Wind Farm can be categorised as "Highly Vulnerable Development", however, the proposed infrastructure is located outside of areas mapped as Flood Zones and therefore the Proposed Development is appropriate from a flood risk perspective;
- The overall risk of flooding posed at the Site is estimated to be very low. A low risk would typically relate to the probability of being impacted by a 1000-year flood (*i.e.* the entire area of the Proposed Development footprint is located in fluvial Flood Zone C). The flooding risk at the Site has an estimated AEP of <0.1%.
- In addition, the risk of the Proposed Development contributing to downstream flooding is also very low, as the long-term plan for the site is to retain and slow down drainage water rates prior to release . Robust drainage measures on the site will include swales, silt traps, check dams, settlement ponds and buffered outfalls. Please refer to the Chapter 9 of the EIAR for further details.

* *

7. REFERENCES

DOEHLG	2009	The Planning System and Flood Risk Management.
Natural Environment Research Council	1975	Flood Studies Report (& maps).
Cunnane & Lynn	1975	Flood Estimated Following the Flood Studies Report
Cawley, A.	1990	*The Hydrological Analysis of a Karst Aquifer System*. B.E., National University of Ireland.
CIRIA	2004	Development and Flood Risk – Guidance for the Construction Industry.
OPW	Not Dated	Construction, Replacement or Alteration of Bridges and Culverts. A Guide to Applying for Consent under Section 50 of the Arterial Act, 1945.
Institute of Hydrology	1994	Flood Estimation in Small Catchments.
Fitzgerald & Forrestal	1996	Month and Annual Averages of Rainfall for Ireland 1961 – 1990.
Met Eireann	1996	Monthly and Annual Averages of Rainfall for Ireland 1961-1990.
Kilkenny County Council	2021	Kilkenny City and County Council Development Plan (2021-2027)
Laois County Council	2022	Laois County Council Development Plan (2021-2027)

22 Lower Main Street, Dungarvan, Co. Waterford, X35 HK11
T: +353-(0)58-441 22 **F:** +353-(0)58-442 44 **E:** info@hydroenvironmental.ie

www.hydroenvironmental.ie