Forestry Report

Proposed Windfarm at Ballykett, Co. Clare.

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Contents

Definition of Terms

- **Afforestation**
  The establishment of a forest in areas where the preceding vegetation or land use was not forest.
- **Age Class**
  The age range of tree crops divided for classification or use. Also pertains to the trees included in such an interval.
- **Brash Matts**
  Using heavy machinery during harvesting may compact the soil and limit seedling regeneration. Remaining woody debris from harvested trees (brash) can be used to cover the ground and form mats. This may spread out the weight of heavy machinery and decrease soil compaction.
- **Buffer Zones**
  An effective buffer zone is an area where forest operations are curtailed and which is managed for environmental protection and enhancement. Regarding watercourses, within the required aquatic buffer zone (see the Forestry & Water Quality Guidelines).
- **CCF**
  Continuous Cover Forestry is an approach to the sustainable management of forests whereby forest stands are maintained in a permanently irregular structure, which is created and sustained through the selection and harvesting of individual trees. CCF does not equate specifically to any one particular silvicultural system but is typified by selection systems.
- **Check**
  Meaning the trees are showing signs of stunted growth.
- **Clearfell**
  Clearfelling should be viewed here as the final stage in the forestry crop cycle, where an entire standing crop of trees is removed from an. area or harvested (also called clear-cutting, clearfell logging, clearcut logging).
- **Collector Drains**
  Collector drains (which collect water from mound drains, plough furrows, mole drains etc.) should not be greater than 80 metres apart and should run at acute angles to the contour. These acute angles should be no greater than 2 degrees (1 in 30) on slopes greater than 3 degrees (1 in 20). They should be excavated to a depth not greater than 10-15cm below the depth of mound drains. Where collector drains have to be extended into erodable material, ‘mini’ silt traps should be placed appropriately by deepening the drains in places. They 49 should discharge via sediment traps and/or an interceptor drain (see below) into the buffer zone or in flat sites into the aquatic zone via sediment traps.
- **Critical height**
  What height it is envisaged trees are at risk of blowing down.
- **Cubic metre (cubic metres)**
  The form of timber measurement commonly used in Ireland. It is used to calculate the volume of both roundwood and of forest products.
- **DBH (Diameter Breast Height)**
  Standard measure of a tree’s diameter, usually taken at 1.3m above the ground.
- **Even-Aged Management**
  A stand in which the age difference between the oldest and youngest trees is minimal. Even-aged stands are perpetuated by cutting all the trees within a relatively short time period.
- **Filling In**
  The replacement of newly planted trees which have died. Even with the best planting and management, a percentage of trees will not survive the first season.
- **Grant Premium Category (GPC)**
  Rates of payment paid by the Department of Agriculture based on ground conditions and species selected to plant. The Afforestation Grant and Premium Scheme incorporates 12

separate Grant and Premium Categories (GPCs), providing options including productive conifers, broadleaf species, native woodland initiatives as well as agroforestry and forestry-for-fibre options.

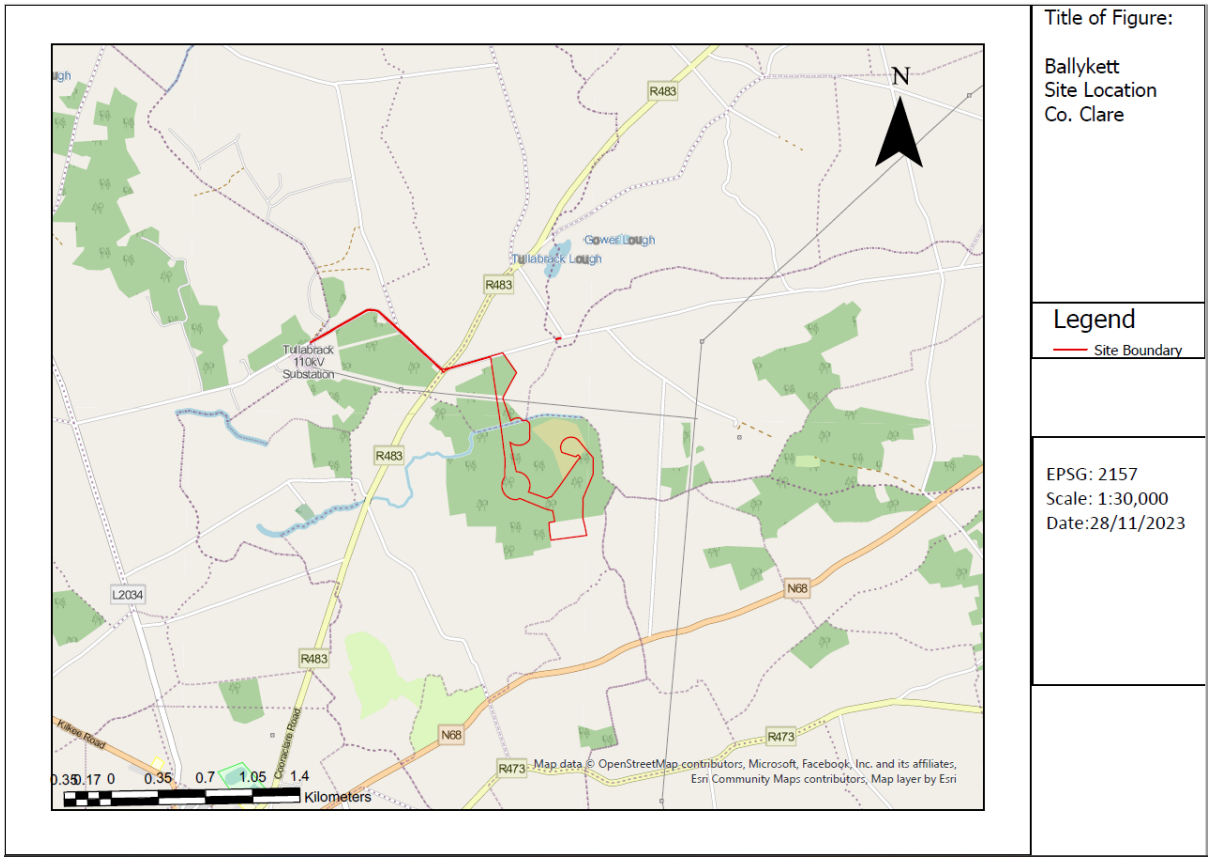
- **Hard Pan**
  A dense layer of soil, usually found below the uppermost topsoil layer. There are different types of hardpan, all sharing the general characteristic of being a distinct soil layer that is largely impervious to water.
- **Hardwood**
  A general term denoting broadleaf and deciduous trees.
- **Hydrochloric Acid (HCL)**
  Deposits of marl and calcareous materials can be found at varying depths beneath peats. Soil with this present will react with dilute 10% hydrochloric acid.
- **Hectare**
  A unit of land area equal to 10,000 square metres, or 2.4711 acres.
- **Nurse species**
  A nurse species is usually a faster-growing tree that shelters a small, slower-growing tree or plant. The nurse tree can provide shade, shelter from wind, or protection from animals who would feed on the smaller plant. The nurse trees are usually removed from the forest as it matures.
- **Mound Drains**
  It involves an excavator digging drains at regular intervals and heaping the soil in mounds. The trees are then planted into the mounds which provides an elevated vegetation free zone.
- **Plantation**
  A manmade forest or tree crop established by planting saplings or seedlings.
- **Ride lines**
  This is an unplanted area within the forest boundary that is >3 m and
- **Rotation**
  The period of years required to establish and grow a timber crop to a specified condition of maturity, when it may be harvested, and a new tree crop started.
- **Silviculture**
  The art and science of producing and tending a forest: the theory and practice of controlling forest establishment, composition, growth, and quality of forests to achieve the objectives of forest management.
- **Shell Marl**
  Shell-marl is a highly alkaline material, containing small snail shells which normally occurs under peat. Soil containing high levels of shell-marl were known to be unsuitable for commercial forestry. Deposits of marl and calcareous materials can be found at varying depths beneath peats.
- **Softening of Edges**
  The most effective solution is to break down the angular geometry of the forest plot through recessing and curving corners, leaving some areas unplanted and softening edges by incorporating ‘outliers’, i.e. outlying groups and single trees. Angular shaped compartments defined by, for example, straight ride lines, should also be avoided. Where possible, ride lines should run along the contour and should not be in line with the main view.
- **Stand**
  An aggregation of trees occupying a specific area and uniform enough in composition (species), age and arrangement to be distinguishable from the forest on adjoining areas and considered a homogenous unit for management purposes.
- **Thinning**
  A partial cut in an immature forest of overstocked tree stands used to increase the remaining stand’s value by growth and value by concentrating on individual trees remaining with the best potential to reach clearfell.

- **Windblow**
  The uprooting of trees by wind.
- **Yield Class (YC)**
  This is defined as the potential growth rate or yield of a forest, expressed as cubic meter per hectare per year. The higher the YC the quicker the forest is growing, in Ireland YC usually ranges from YC 14 (poor growth) up to YC 24 + (very good growth).

Forest overview

Forest Location

The forest is located approximately 3 km northeast of Kilrush, County Clare. There is 1 potential entry road accessing the forest in this study area from the north, this will gain access from the main regional public road R483. There is no gateway onto the public road at present. The geographic location presents restricted access to the harvesting network of timber buyers nationwide as the location of the site is isolated in the west of Clare.

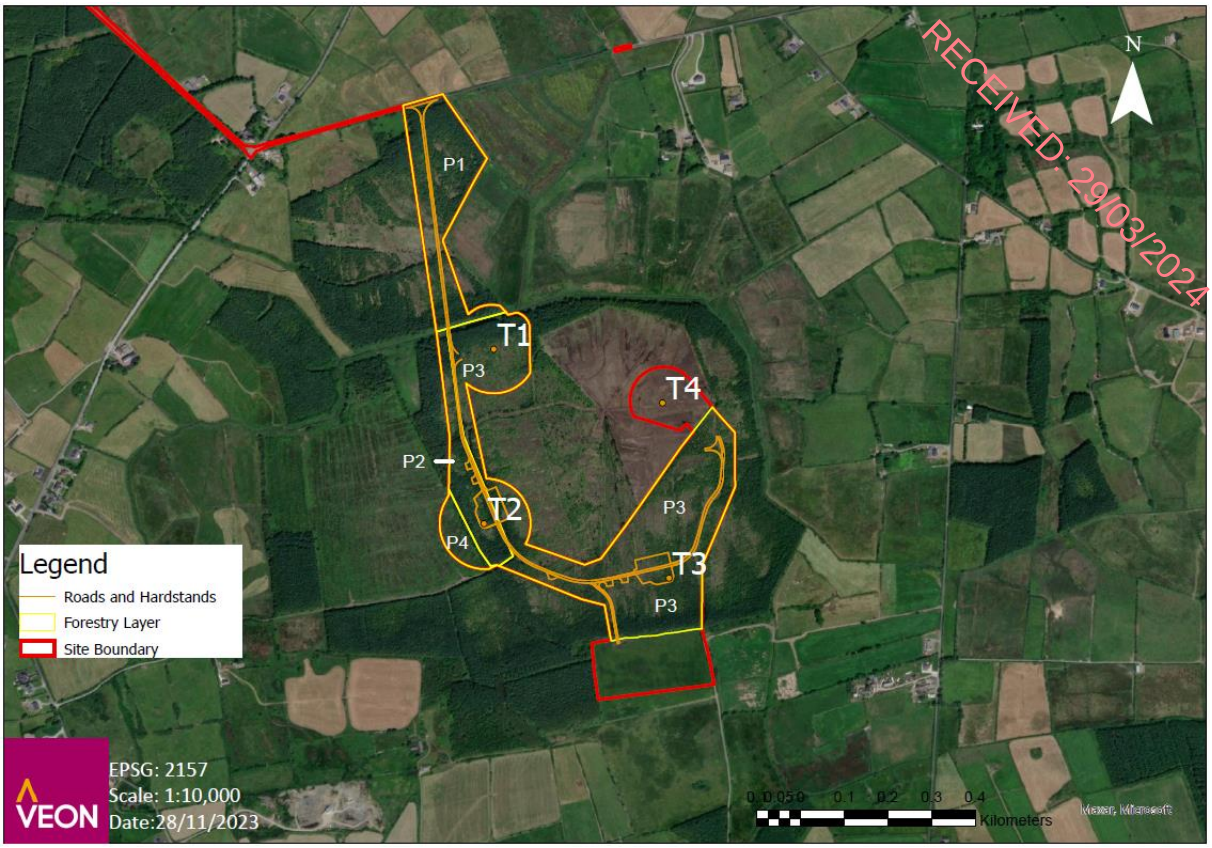


Map 1 illustrates the location of the site.

Forest Description

The proposed site contains approximately 28.50 ha of forestry. The majority of which would be classed as very low yield class commercial forestry, with a very small percentage having good quality timber. The maps below illustrate the locations of all forestry growing within the proposed site layout. All the forestry within the study area is privately owned, and each owner has been mapped separately.

The paragraphs below will detail and illustrate the woodland present where the development proposes turbine locations. The potential impacts and mitigation measures are dealt with later in the report.



Contract: **Ballykett WF** Scale 1:10000

Map 2 and 2a illustrates the forestry plots located within the study area; it also illustrates the approx. location of the turbines in relation to the forestry.

The proposed windfarm infrastructure layout affects forestry for 3 of the 4 proposed turbine locations and also access to the proposed substation. A summary of the affected forestry is broken down in the following table, with access roads also cutting through the plots.

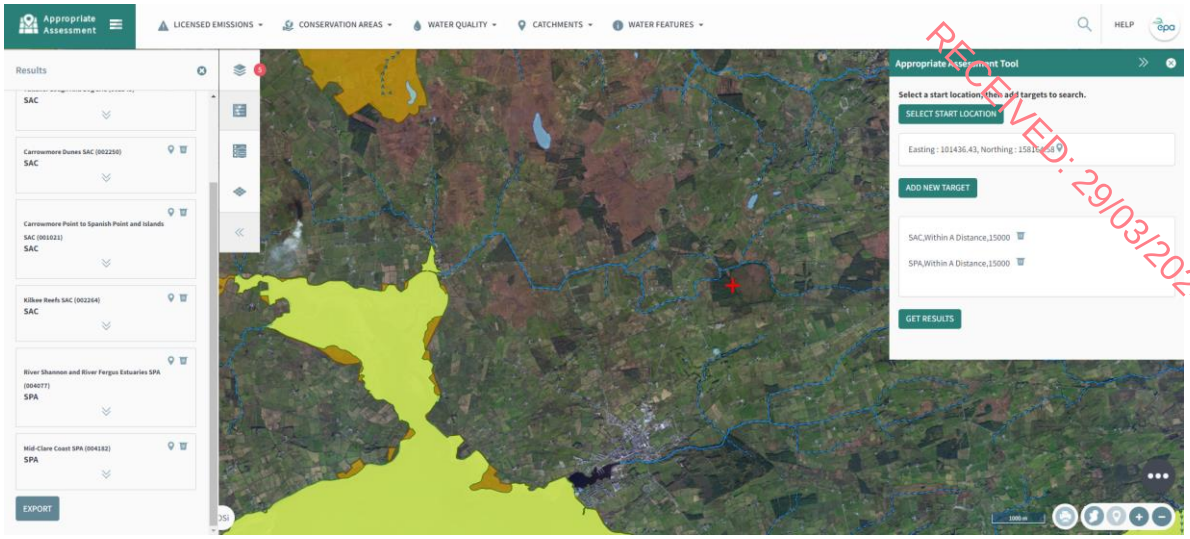
Infrastructure	Forestry Plot	Species Mix	Plant Year	Yield Class	Estimated Fell Year
T1	Plot 1 + 3	Sitka Spruce	Circa 1994/5	8/6	2055
T2	Plot 2 + 4	Sitka Spruce	Circa 1994/2019	8/18	2055/NA
T3	Plot 3	Sitka Spruce	Circa 1995	6	2055
T4	NA	Bog	NA	NA	NA
Compound	Plot 1	Sitka Spruce	Circa 1994	8	2055
Access Roads	Multiple	Sitka Spruce	Circa 1994	8	2055

The forestry within the proposed layout is of very poor quality with low yield class productivity and will produce a low-quality timber product at the end of the rotation. The forest is on a blanket peat with rock outcrops and associated mineral soils. The trees are at a maximum height of 10-12 meters.

The site was previously mounded in some areas but deep ploughed in the majority, as illustrated below in photos 1, 2 and 3, at ground cultivation stage for establishment, with no mounds or mound drains used. This can lead to windblow problems in future management, as the trees are more susceptible to wind sweep by domino effect as all roots a lying the same direction.

Photos 1, 2 and 3 illustrate the mounding and ploughing cultivation method used in parts of the site.

The site is also located within 15 km from 2 SPAs and 5 SACs as illlustrated on map 3 below, and is hydrologically connected by water courses running through and around the site area.



Map 3 illustrates the locations of SACs and SPAs in relation to the project area and also relevant watercourses around the site.

Photo 4 illustrates the open track between plots 2 and 3, this area will most likely be used as an access road between T1 and T2 heading for T3, Photos 5 and 6 illustrate the poor-quality trees located at T1s location, it also shows the poor vegetation growing at this location due to the quality of the soils and poor drainage. The trees have not formed a full canopy and will not be thinned or ever make a final crop.

Photos 7, 8 and 9 illustrate the poor-quality trees located at T2s location, it also shows the poor vegetation growing at this location due to the quality of the soils and poor drainage.

Photos 10, 11 and 12 illustrate the poor-quality trees at low stocking rates at T3s location, it also shows the poor vegetation growing at this location due to the quality of the soils and poor drainage. The trees have not formed a full canopy and will not be thinned or ever make a final crop.

Photo 13 illustrates the open bog area where T4 is proposed.

Beyond basic timber production, the range of benefits that these forests cover is limited but would encompass some biodiversity, wildlife conservation, environmental protection, rural development, carbon sequestration. All compartments of the forest will be managed under a no thin management regime and a clearfell option may not be possible for the majority of the forest within this project areas, due to the low growth rates and also the ground conditions.

Felling Methodology

Felling or harvesting, as it can be called, is the cutting and extraction of timber to roadside, usually during thinning or clearfelling. For independency the following information about harvesting is taken from the national forestry advisors Teagasc (https://www.teagasc.ie/crops/forestry/advice/timber-harvesting/) and Forestry Focus websites (https://www.forestryfocus.ie/growing-forests-3/) .

Different types of harvesting

Thinning is the removal of inferior trees, increasing the quality and size of those remaining. It is generally undertaken 2 to 5 times over a forest rotation. In conifers, first thinning usually removes lines of trees within the crop as well as selected inferior trees in between these lines. This provides access for subsequent selective thinnings. Thinnings in broadleaf forests involve the periodic selective removal of competing trees to favour higher quality stems.

Clearfelling is the harvesting of all marketable trees at the end of a forest rotation, generally between age 30 and 50 in conifer forests and later for broadleaves.

Continuous Cover Forestry is an alternative approach to clearfelling where some trees may be periodically removed but the canopy is continually maintained.

Harvesting operations

Harvesting operations may involve the felling of selected trees, the removal of branches, cross-cutting of stems into size categories, stacking along tracks in the forest and extraction to roadside.

Timber felling

Up to the early 1990s, felling was carried out mainly using **chainsaws**. Manual felling is still an option in smaller forests or where machine access is limited. **Tractor-mounted timber processors** are used to a limited extent in Ireland and may have applications in small harvests. Some systems require trees to be manually cut before being fed by winch or crane to the processing unit. Processors can debranch, cross-cut and stack timber assortments in the forest.

Most felling now involves the use of specialised harvesting heads, either fitted to standard excavators or purpose built '**harvesters**', as illustrated in photo 14 below. These machines comprise a base machine with a harvesting head mounted on a hydraulic arm that can fell a tree, remove the branches and section the stem into the desired lengths in less than a minute. The operator in the cab controls the movement of the machine and the onboard computer system can be programmed to cut the felled trees to the size and length specified by the customer.

The harvester can be a modified low ground pressure machine that can work in multiple site conditions. It has options to have tyres, tracks or chains, depending on ground conditions, to minimise ground disturbance.

The harvester will process trees down to 7 cm and the remainder of the tree will be placed on the track (rack) in front of the harvester, along with the branches, to act as a brash matt for the harvester and forwarder to travel on, minimising soil disturbance.

The processed logs are placed to the side of the rack where the forwarder can access them easily following the harvester. The harvester also threats the cut stump as it cuts the log with urea, preventing butt rot disease (Heterobasidion annosum) in the future. This is a condition of a felling licence unless the trees are within an aquatic buffer zone.

Timber extraction options

Horses were commonly used in the past to extract timber to roadside. This option may still be suitable in small scale forestry or in environmentally sensitive forest areas. **Quad-based extraction systems** may be an option for small scale operations where soil conditions are good. **Tractor 'skidders'** provide further extraction options. The timber is winched to the metal plate mounted on the back of a tractor and skidded on the ground to roadside. **Tractor forwarders** with grapple loaders are used to a limited extent in Ireland where soil and ground conditions are favourable. **Cable extraction systems** are expensive but may have applications in environmentally sensitive forest areas. **Specialised forwarding machines** are the most common extraction system in Ireland. Similar to harvesters, forwarders can be fitted with tracks or chains and can remove on average 9-12 tonnes per journey, as illustrated in photo 15 below.

The forwarder has a similar base machine to the mechanical harvester but has a powered trailer fitted with a hydraulic grapple arm to load the felled timber. A forwarder usually follows a harvester to collect and extract the timber to the roadside.

Harvesting Environmental Considerations

Harvesting, of all the forest operations, has the potential to have an impact on the forest environment and the wider landscape. Strict Forest Service Guidelines, as detailed below in the mitigation section, have therefore been developed to ensure best practice in harvesting operations in order to protect the soil, waterways, wildlife, the landscape, and ancient sites.

Harvesters and forwarders are designed to minimise soil damage, with large soft tyres to spread their weight over a wide area. In addition, standard practice is to place the branches of the felled trees under the wheels or tracks of the harvesters to form a thick carpet of foliage which supports the machines and further protects the soil from compaction and rutting.

Harvesting operations are scheduled according to the nature of the soil with sites being categorised into winter and summer sites depending on ground conditions. Also, best practice is to suspend mechanised harvesting operations during and immediately after periods of particularly heavy rainfall.

Waterways are particularly vulnerable to the effects of harvesting as silt from the movement of machinery can enter streams and rivers causing blockage of gravels which affects insect and fish life. Also nutrients released from decaying branches, particularly from large clearfelled sites, can cause enrichment of the waters which in turn causes pollution. To counteract these effects careful planning is required in carrying out harvesting operations. Some of the measures taken to avoid impacts include:

a. Limiting the size of the areas to be felled which reduces the amount of nutrients and silt released.

b. Minimising the crossing of drains and streams, but where necessary installing temporary structures (log bridges, pipes etc) to avoid machines entering the water;

c. Establishing buffer zones around waterways from which machines are excluded.

Similarly, 20 metre buffer zones are left around all known archaeological sites for their protection. Sometimes an unrecorded archaeological site or artefact is discovered and the area is excluded from the harvesting operation and left undisturbed and the relevant authorities notified.

The noise and impact of harvesting operations can have a major impact on wildlife habitat. Therefore in planning felling operations care must be taken to ensure that important wildlife habitats are retained and protected. Due regard must be given to the breeding and nesting seasons of important species and associated features such as badger setts and heronries. The timing of harvesting may be delayed until after the nesting season is completed, to minimise damage to bird life.

Deadwood is also left in situ, in the form of standing dead stems or naturally fallen trunks, or as logs deliberately left behind on the forest floor. As these decay, they provide habitat for fungi and insects which in turn supports other animal and bird life.

The effects of clearfelling, where entire forest stands are removed in one operation, can have a significant impact on the landscape unless carefully carried out. In Ireland, afforestation (establishment of new forests) has resulted in many adjacent conifer plantations being established within a 2-3 year period creating a large uniform areas of forest which require harvesting at the same time. Foresters are now re-structuring these forests to create greater diversity in the next rotation. The phased felling of small felling coupes and replanting with more diverse species will, over time, reduce the visual and environmental impacts and ensure that succeeding rotations do not inherit the same undesirable structure. Staggered felling/reforestation also benefits biodiversity and the landscape by introducing structural and age diversity.

Forest Certification

All of the forests impacted by this windfarm are privately owned and are not currently being managed under forest certification.

Potential Impacts

The Impact of Trees on Wind Turbines

The presence of trees has a number of effects on wind turbine performance. As trees sway in the wind, it indicates that they are absorbing energy from the wind, energy that would otherwise be available for turbine operation.

Where wind turbines are sited in mature forestry and where the canopy is closed, the canopy height creates a false ground level that effectively reduces the hub height of the turbine by the height of the trees. There is a consequent reduction in energy yield.

The above effect is compounded by the fact that the surface of the tree canopy is not smooth or uniform, leading to increased roughness. The result of this is a thicker boundary layer of disturbed airflow over the canopy than would otherwise occur over more open ground.

The Impact of the Wind Farm on Trees

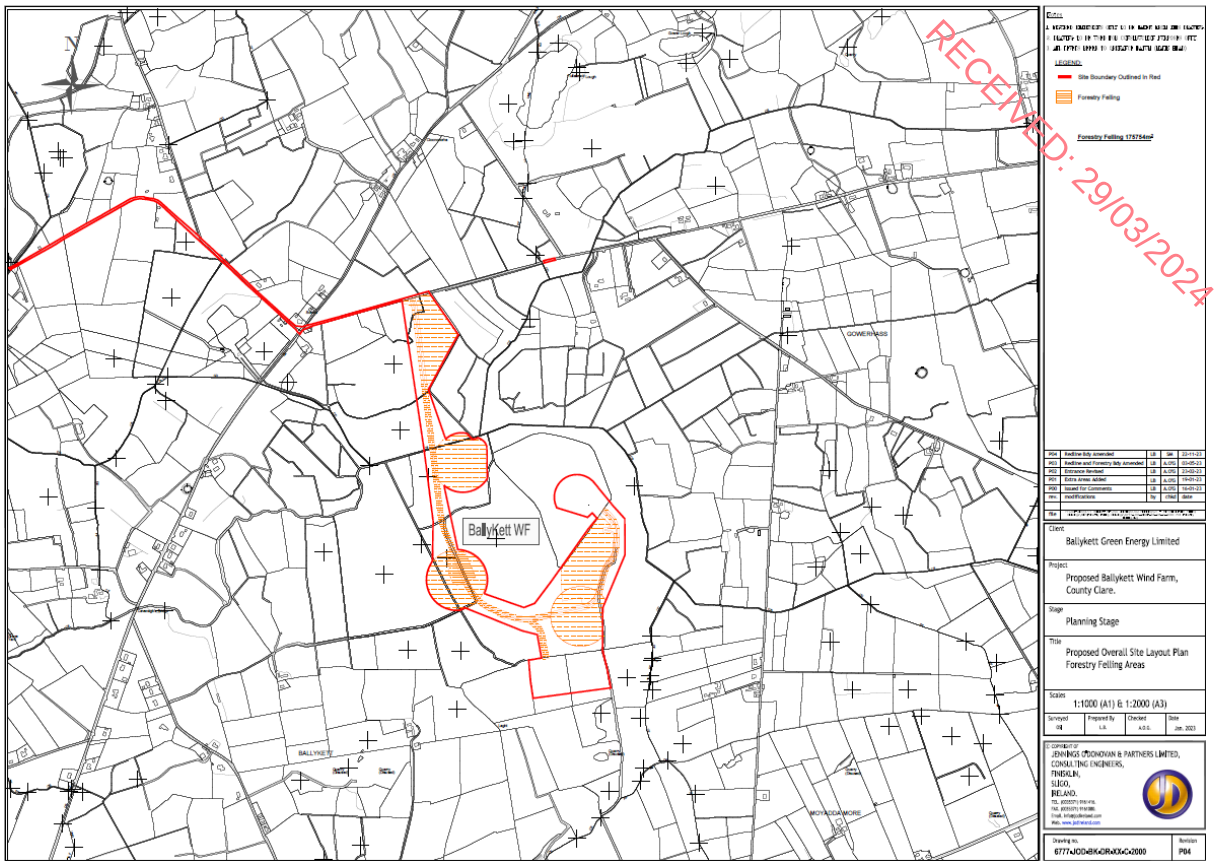
The removal of sections of forestry to accommodate the turbines, including hardstands, access roads and bat buffers etc. has the potential to impact on the remaining forestry and environment in the area. These impacts include encouragement of encroaching windblow, drainage disturbance to existing drains, damage to surrounding trees during harvesting operations, leakage of sediment from the site, soil erosion/compaction.

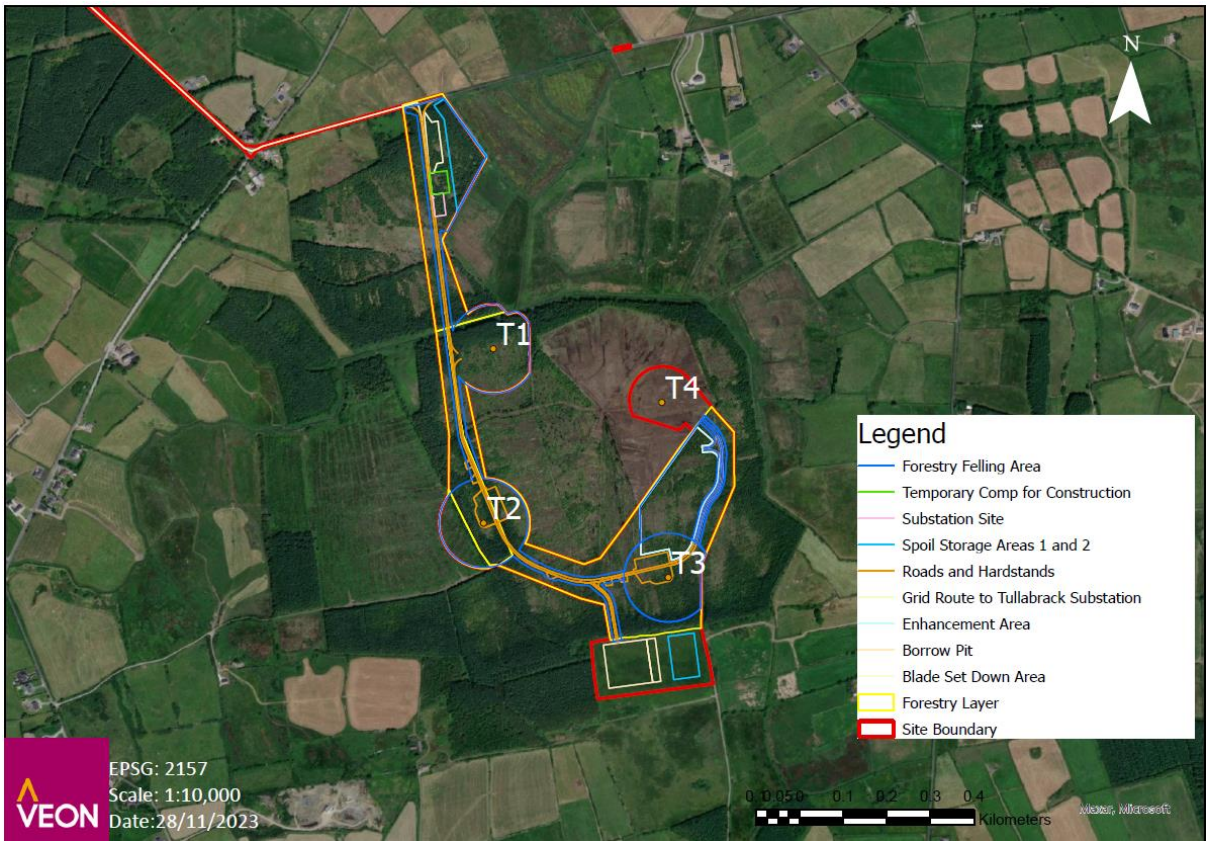
With clearing areas of trees, the remaining forest can sometimes be disturbed depending on a number of factors (aspect, elevation, remaining tree shelter etc.). Opening areas of the forest for structures and tracks etc. may lead to some trees becoming unstable and prone to windblow. This section of the report will state what the impact will be on the surrounding forest when the tree felling is completed.

To facilitate the access roads, civil works, site compounds, borrow pits, and turbine hardstands approximately 17.58 ha will need to be clearfelled. This wind farm proposal plans to develop access into the forest infrastructure, the proposed turbine layout means the additional access roads will be built through the forest area. Tracks that are to be installed new for vehicles should be available for future forestry operations so that timber lorries can also use these roads. Roads constructed for wind farm developments will be built to a higher specification than that normally required for timber haulage.

The wind farm development intends to utilise, where possible, the existing forest infrastructure. As there is already a foundation it will require less intrusion and disturbance to the soil and remaining trees, as it will require some widening and building up of the existing road network which will minimise impacts on habitats.

All turbine, access roads, substations and compound locations are illustrated on Maps 4 and 4a below. Map 4 shows all areas of forestry to be removed in orange, Map 4a shows an orthophoto layer where the forestry on which each turbine is located is illustrated. As detailed above, the windfarm access is creating new paths through the forest creating new forest edges not previously exposed to wind.


RECEIVED: 29/03/2024
Ballykett WF
Site Boundary Outlined In Red
Forestry Felling
Ballykett Green Energy Limited
Proposed Ballykett Wind Farm, County Clare.
Planning Stage
Proposed Overall Site Layout Plan Forestry Felling Areas
1:1000 (A1) & 1:2000 (A3)
JENNINGS O'DONOVAN & PARTNERS LIMITED, CONSULTING ENGINEERS, FINISKLIN, SLIGO, IRELAND.


N
T1
T2
T3
T4
Legend
Forestry Felling Area
Temporary Comp for Construction
Substation Site
Spoil Storage Areas 1 and 2
Roads and Hardstands
Grid Route to Tullabrack Substation
Enhancement Area
Borrow Pit
Blade Set Down Area
Forestry Layer
Site Boundary
EPSG: 2157
Scale: 1:10,000
Date:28/11/2023
VEON
0 0.05 0.1 0.2 0.3 0.4
Kilometers

The forestry present in the proposed locations for all turbine locations in this project area are relatively poor and uncommercial, meaning the tress are small in height and size. Any clearance or removal of trees this size is far less intrusive or potentially damaging to the surrounding forestry. Removing areas to facilitate the turbines and roading infrastructure should not increase the risk of extensive windblow as the trees will have time to stabilise before the risk of windthrow materialises.

This area is however located on wet peat soils and as the trees are of such a low yield class and quality, from a cost benefit analysis point of view the cost to extract the trees post harvesting would not seem advantageous. By not extracting the timber to the roadside this will allow the harvesting machine to use more brash under the machine when harvesting, while also eliminating the need for forwarding machinery to enter the site to further traverse the brash matts to extract timber. This will reduce the risk of soil erosion and impaction.

For mature timber on moderately sloping ground, the harvesting method employed for any clear-felling programme would be expected, in the main, to comprise machine harvesting, and extraction by wheeled forwarder, as illustrated below. Harvesting broadleaves would be expected to be completed by chainsaw. These methods are discussed further in the next section.

Photo 14 illustrates a harvesting machine in action and Photo 15 a forwarder machine.

Felling of forestry has the potential for a number of impacts:

Loss (or Change) of Habitat - The effects on loss or change of habitat are considered in the Biodiversity chapter of the EIAR. However, the following observations are made:

- The trees on the site are a commercial stock whose lifecycle comprises felling and replanting for commercial use. Earlier felling of areas is a temporary change, rather than a fundamental change of use.
- The total area removed from existing land use within the forestry will be a small proportion of the available forestry habitat in the vicinity of the site and in the region.

Noise Disturbance During Felling - Areas that may be identified to be cleared of trees are at a significant distance from the nearest properties. Noise disturbance that may arise is not considered to be a significant issue, given that it will be temporary and short lived. Additionally, it will occur only during daytime.

Increase of Extraction Road Traffic - The felling of trees would require timber lorries to remove the timber off site. The volume of additional traffic is likely to be low and the increase on that arising from any existing felling plans is likely to be minimal and the impacts insignificant.

Increased Soil or Wood Waste Entering Watercourses - Issues relating to potential water pollution from construction activities are dealt with in the Biodiversity, Soils and Water Chapters of the EIAR. The risk of soils and wood waste entering watercourses arising during wind farm development is no different to that arising from the regular harvesting of these crops. Provided the appropriate guidelines are employed and their use enforced during extraction, there should be no additional problems associated with any felling that may take place.

A felling licence granted by the Minister for Agriculture, Food & the Marine provides authority under the Forestry Act 2014 to fell or otherwise remove a tree or trees and to thin a forest for silvicultural reasons. This Act prescribes the functions of the Minister and details the requirements, rights and obligations in relation to felling licences. The principal set of regulations giving further effect to the Forestry Act 2014 are the Forestry Regulations 2017 (S.I. No. 191 of 2017).

Where a licence for the felling of trees is granted on or after 24th May 2017, the licensee shall erect a Site Notice, seven days prior to the commencement of and remain in place for the duration of harvesting operations

Mitigation

Concerning the proposed development, maximum use of existing forestry infrastructure has been considered during the planning out of the project, thereby minimising the areas of existing forestry to be removed for the construction of access roads etc. Existing forestry within the development area was planted originally as part of a silvicultural rotation that would have been planned to be harvested in the future as a commercial crop, as stated in the rules of the Department of Agriculture's Afforestation scheme these forests were planted in, irrespective of whether a wind farm is being implemented or not.

As the trees are of such a low yield class and quality, from a cost benefit analysis point of view the cost to extract the trees post harvesting would not seem advantageous. This will allow the harvesting machine to use more brash under the machine when harvesting, while also eliminating the need for forwarding machinery to enter the site to further traverse the brash matts to extract timber. This will reduce any risk of soil erosion and impaction. Felling and extraction, if economical, of timber will, as far as possible, be undertaken at the same time as currently licensed extraction activities in order to minimise traffic and noise disturbance.

Although the changes in felling and replanting plans are considered not to be significant, a number of steps will be taken to minimise any potential adverse impacts.

Mitigation measures during associated harvesting operations

In advance of harvesting operations commencing on the development site, there are several mitigative measures to be implemented to ensure the local environment is protected.

General considerations

a. All associated operations (e.g. the construction of forest tracks; the creation of environmental setback areas and roadside drainage; harvesting operations) must be conducted in strict accordance with the following standards and guidelines, which have been developed by the DAFM/Forest Service:

    1. Forest Protection Guidelines
    2. Forestry and Water Quality Guidelines
    3. Forest Harvesting and Environmental Guidelines
    4. Forestry and Freshwater Pearl Mussel Requirements **-** Site Assessment and Mitigation Measures
    5. Forest Biodiversity Guidelines
    6. Forestry and The Landscape Guidelines
    7. Forestry and Archaeology Guidelines
    8. Code of Best Forst Practice – Ireland
    9. Irish National Forest Standard

b. It will be a condition of the felling licence to treat all conifer stumps with urea immediately upon tree felling where the soil type is mineral soil or where a peat soil is less than 25cm (excluding the litter layer) in depth. Treatment is not required where a conifer stand is being replanted with broadleaves, where conifers within a broadleaf stand are being removed or where broadleaf species constitute more than 85 % of a stand. The correct solution mixing rate is 1 kg of fertiliser grade urea, five litres of water and one bottle of dye. Urea should not be applied to stumps within any exclusion areas required by the

'Forestry and Water Quality Guidelines' or the 'Forestry and Freshwater Pearl Mussel Requirements'.

c. It will be a condition of the felling licence that within each boundary land parcel, any tree felling carried out under the authority conferred by said licence must be in accordance with the specification for the harvest type within the felling licence schedule. The felling licence will provide a schedule with the specification of each harvest type.

d. It will be a condition of the felling licence that each land parcel must be replanted in accordance with the replanting requirement for each harvest unit type. The felling licence will list the specific details of the replanting required under the replanting condition. Where the minister through the authority granted under this licence is consenting to deforestation or to the permanent removal of single trees within and land parcel that is subject of the licence, but the Minister requires replanting of an alternative site, the replanting condition shall be replaced with a condition called alternative planting condition. In such circumstances, the alternative planting condition will be specific in the felling licence with the other conditions attached to the licence and it shall specify the requirements for the alternative site.

e. It will be a condition of the licence to, until the expiration of eleven years from the date on which the authority conferred by the licence ceases to be exercisable or ten years from the date of planting, whichever is the later, preserve, in accordance with good forest practice, the trees planted as instructed in Schedule 3 and shall for that purpose maintain in good repair and effective condition all fences and other protection necessary to protect such trees from being injured or destroyed by the trespass of any animals.

f. During the harvesting phase, works should only be conducted by experienced and fully competent operators. Operators must don all appropriate P.P.E. while working on-site.

g. A safety statement must be issued to ensure that any dangerous or sensitive areas are well known to all relevant individuals. Additionally, the responsible forester will also walk the site with all contractors to highlight any prominent site risks or any sensitive habitats that are present.

h. Up-to-date contingency plans will be designed according to section five of the 'Felling and Reforestation Standards' and will be triggered if necessary.

i. Specific harvest plans should be designed for all associated harvesting operations. These should outline access points, setback areas, timber extraction routes, fuelling and chemical storage areas, log stacking areas, drain crossing points and include a Hazard Identification and Risk Assessment (HIRA).

j. If deemed economically viable, the felling and subsequent extraction of timber should—as far as possible—be conducted at the same time as currently licensed extraction activities to minimise the risk of increased local traffic and noise disturbance.

k. Any drains crossed during the extraction phase must be kept clear of any residues/debris to ensure no drainage issues arise for the remaining trees: which can be a major attributor to windblow.

Water protection

a. The CEMP should be consulted by all on site operators before any work is completed.
b. In advance of any works, a ten-metre machinery exclusion area must be created from the edge of any aquatic zone (i.e. river, stream, or lake) that overlaps with the harvesting area. An additional five-metre setback area must be created back from the edge of any relevant watercourse present on-site (or both edges if within the site boundary). DAFM describes a relevant watercourse as any other watercourse that has the potential to act as a pathway for the movement of significant amounts of sediment and/or nutrients from the site to an aquatic zone.

Silt traps in a forest managed by Veon.

c. To capture and control suspended sediment, silt traps must be installed within relevant watercourses. These should be constructed along and towards the point of outflow of mound drains, where a firm bank exists, and a ten-metre 'buffer zone' containing sufficient vegetation (e.g. grasses, reeds, and shrubs) to filter out any remaining sediment and nutrients can be implemented. Figure 4.1 illustrates a silt trap, comprising a timber structure and a geotextile membrane attached which has been anchored securely in place. Silt traps must be cleared out periodically to ensure they remain fully functional. The build-up of sediment should be emptied onto a level section of the forest floor several metres from any relevant watercourses.

d. To further reduce the risk of run-off and sediment mobilisation, felling and extraction of timber should, as far as possible, be conducted during periods of dry weather.

e. The refuelling and chemical/fuel storage area on-site must be sited in a dry, sheltered, flat location, at least fifty metres from any aquatic zones and twenty metres from relevant watercourses.

f. Where it is necessary to cross relevant watercourses/drains during harvesting operations, temporary crossing points are required. These may comprise logs lined lengthwise and overlaid with a geotextile membrane and brash to capture falling soil from machinery wheels. The condition of temporary crossing points must be carefully monitored throughout operations, and these should be cleaned out and supplemented (as necessary). For aquatic zones, such crossings should be avoided as far as possible. Where it is necessary to cross an aquatic zone, a clear span log structure must be implemented.

Soil protection

a. Where timber extraction is required, the extraction route should be directed away from watercourses wherever possible, and the associated harvesting machinery must not encroach upon any established exclusion areas. Brash mats must be placed along all extraction routes to preserve soil quality. Additional brash layers should be deployed to reinforce short sections of soft ground which are subject to high levels of machinery passage. Brash mats must be replenished as soon as they exhibit signs of wear.

b. Once harvesting of timber begins, harvesting operators must only use the designated extraction routes and loading/stacking areas marked on a harvest map. While harvesting operations are ongoing, every effort should be made to avoid any damage to the site. Operators should be reminded to regularly monitor any extraction routes for signs of soil damage and encouraged to use extra brash (where available) to pre-empt the risk of soil rutting on-site. Should ground conditions begin to visibly deteriorate, a new track must be promptly established containing a new brash mat layer (Standards for Felling and Reforestation 2019).

Brash layer on harvesting rack

c. Timber must only be stacked in the designated stacking areas marked on a harvest map. Stacking must not occur within any setback areas and should be located greater than 100 metres from residential dwellings wherever possible.

d. Load sizes should be carefully monitored during the timber extraction phase to further reduce the risk of soil compaction or rutting.

Protection of the local environment

Habitats

Felling associated with a wind farm development can lead to fragmentation and a loss of commuting or foraging habitats for wildlife species. Careful consideration must be afforded to the presence of mammal or bird species within the development area, and protective measures should be prescribed for any wildlife features identified within the project area (e.g. an exclusion area for a badger sett).

a. Hedgerows on-site should be retained and protected during harvesting as an important habitat for local fauna.

b. Old and windfirm broadleaf trees should be retained where possible, especially where these contain deeply fissured bark, cavities, woodpecker holes etc.

c. Deadwood should be left in situ following harvesting operations, which may comprise standing dead trees, logs deliberately left behind on the forest floor, or naturally fallen branches or stems.

Archaeology

All guidelines concerning forestry and archaeological features must be strictly adhered to.

a. A twenty-metre (minimum) exclusion area must be created around any listed archaeological monument/site (SMR) within the development area. Machinery passage and timber stacking must strictly be avoided within this exclusion area.

b. Harvesting operators should be reminded to remain vigilant throughout felling operations for any undiscovered monuments/sites that may be present on-site. In the event such a feature is discovered, the appropriate authorities (i.e. National Museum of Ireland; the

Garda Síochána; National Monuments Service) must be immediately notified, and a twenty-metre buffer area (minimum) must be implemented around the feature until the significance of the find has been investigated.

Service features

All overhead and underground utility lines (e.g. electricity; water; gas) must be identified prior to works commencing.

a. Works that are scheduled to occur proximate to ESB powerlines should be conducted according to chapter seven of the 'Forestry Standards Manual' (DAFM, 2015). Where it is necessary to direct harvesting operations across unplanted powerline corridors, overhead goalposts and safety signage must be erected to ensure safe machinery passage beneath the lines.

Replanting Obligations

Where the permanent removal of trees is envisaged, Forest Service policy is outlined for different tree removal scenarios. As outlined in their Felling and reforestation Policy document which can be found on their website: https://www.gov.ie/en/publication/19b8d-tree-felling-licences/

The permanent removal of trees and forests is permitted in certain circumstances. Mitigating measures form part of the decision-making process, including the afforestation of alternative lands and / or the refunding of grant and premium payments already paid by the Forest Service. The table below summarises the six main scenarios where tree removal is permitted, and whether or not alternative afforestation and / or the repayment of grants and premiums are generally required.

Note that Scenarios 1, 2, 3, 4 and 6 require the submission of a felling licence. Tree felling shall not commence until the Forest Service notifies the applicant that the permanent removal of trees is licensed.

Scenarios	Felling Licence application required?	Alternative afforestation required? (See Note 1)	Refunding of grant & premiums required? (See Note 2)
1. Overriding environmental considerations (e.g. to protect habitats and species listed as qualifying interests within SACs and SPAs)	Yes	No	No
2. Supporting renewable energy and energy security (e.g. windfarm installation)	Yes	See Table 6	See Table 6
3. Commercial development (e.g. development of an industrial park)	Yes	Yes (see Note 3)	Yes
4. Conversion to agricultural land (see Note 4)	Yes	Yes	Yes
5. Public utilities (e.g. erection of an electricity power line)	No (see Note 5)	No	Yes
6. Other land use change (may be considered on a case-by-case basis, on application)	Yes	Case-by-case	Case-by-case

Note 1 If 'YES', the alternative site must be of an area equivalent in size. Section 5.7 in the above reforestation policy sets out the procedures required. If the forest area proposed for permanent removal is still in receipt of premiums and / or is still in contract under the Afforestation Grant & Premium Scheme, the alternative site may be eligible under the Afforestation Grant & Premium Scheme.

Note 2 If 'YES', the refunding of any afforestation grant and premiums already paid out by the Forest Service is required if the forest area proposed for permanent removal is still in receipt of premiums and / or is still in contract under the Afforestation Grant & Premium Scheme. In addition, if premiums are still being paid, premium payments on the area will cease.

Note 3 Alternative afforestation is required except in relation to small community-focused projects and for the purpose of building a home for an immediate family member – see Section 5.4 for details.

Note 4 The Forest Service may consider conversion to agricultural land in limited instances, having regard to the scale and character of the area proposed for deforestation.

Note 5 Exemptions may apply to various public authorities from the requirement to apply for a Felling Licence – See Section 5.6.

Table 6 Requirements for each category of felling associated with wind farm development, regarding reforestation, alternative afforestation, and the refunding of grant and premiums.

Category of tree felling		Reforestation of felled area required?	Alternative afforestation required? (See Note 1)	Refunding of grant & premiums required? (See Note 2)
Infrastructure felling		No	Yes	Yes
Construction felling		Yes	No	No
Turbulence felling	≤20 ha	Yes	No	No
	>20 ha	Yes	Yes, 10% turbulence fell area – see Section 5.3.2.4	No

Note 1 If 'YES', the alternative site must be of an area equivalent in size. Section 5.7 sets out the procedures required. If the forest area proposed for permanent removal is still in receipt of premiums and / or is still in contract under the Afforestation Grant & Premium Scheme, the alternative site may be eligible under the Afforestation Grant & Premium Scheme.

Note 2 If 'YES', the refunding of any afforestation grants and premiums already paid out by the Forest Service is required if the forest area proposed for permanent removal is still in receipt of premiums and / or is still in contract under the Afforestation Grant & Premium Scheme. Also, if 'YES' or 'NO', if premiums are still being paid, premium payments on the area will cease.

Infrastructural felling relates to trees that are permanently removed from the site in order to make way for infrastructure associated with the wind farm, such as access roads and turbine bases. For infrastructure felling, the afforestation of alternative land and the repayment of grant and premium payments are required. In addition, where the infrastructure fell area is still in receipt of premiums, then premium payments will cease, i.e. the felled area will not continue to receive premium payments.

During the construction phase of the wind farm development, there are forest areas that require the temporary removal of tree cover to facilitate construction, e.g. 'borrow pits' for stone. Once construction is completed, the land is reforested. For temporary construction felling, the afforestation of alternative land and the repayment of grant and premium payments are not required.

To facilitate the access roads, the compound and turbine hardstands approximately 17.58 ha of coniferous forestry, as detailed on page 7 above, made up of mostly Sitka spruce, will need to be clearfelled.

All of this area will need to be replaced and suitable replacement land will be sourced, and a planting licence will be applied for to the Department of Agriculture for non-grant aided approval.

Turbines	Area of forestry lost (Ha)	Area of Replacement land Required (Ha)	Species present
T1, 3, 4, 5, 7	8.56	8.56	Sitka spruce
Permanent Infrastructure	1.23	1.23	Sitka spruce
Temp Construction Areas	1.39	1.39	Sitka spruce
Access roads	3.78	3.78	Sitka spruce
Enhancement area	2.69	2.69	Sitka spruce
Total	**17.58 ha**	**17.58 ha**	

In the various tree felling situations described above, the planting of alternative land(s) is stipulated as a requirement by the Forestry Act 2014. The following applies in relation to such afforestation:

1. The proposed afforestation of alternative land must be evaluated and (if deemed suitable) approved by the Forest Service under the Forestry Act 2014 and associated Regulations, before the associated felling licence can be granted.
2. The proposed alternative land should be submitted for afforestation approval as early as possible, ideally at the same time as the felling licence application is submitted.
3. Afforestation approval must be applied for using the Afforestation Pre-Approval Form (Form 1) or electronically via INET.
4. If the forest area proposed for permanent removal is still in receipt of premiums and / or is still in contract under the Afforestation Grant & Premium Scheme, the alternative site may be eligible under the Afforestation Grant & Premium Scheme.
5. The standard procedures regarding the evaluation of afforestation applications generally will apply, regarding referrals, protocols (e.g. acid sensitivity protocol), AA Screening, EIA determination, etc.
6. It will be a condition on the felling licence (if issued) that the alternative land approved for afforestation is planted and managed as forest land, in accordance with the relevant standards set out in the Forestry Standards Manual (see www. agriculture.gov.ie/media/migration/forestry/grantandpremiumschemes/2015/ forestrystandardsandproceduresmanual231214.pdf).

The Forest Service may require the developer to report on the potential loss of soil and biomass CO2, and the reduction in productivity of the forest area associated with different wind farm forest management and landscape plans.

While the impacts of the felling activities are considered at this application stage it is noted the felling of trees at the site for the purposes of the wind farm is subject to and can only occur following the grant of a felling licence by the Forest Service. Planning permission for the project may not be granted or, if granted, may have amendments introduced by condition(s). Therefore, the extent of felling required to be licensed for the purpose of giving effect to the windfarm project can only be determined once planning permission for the windfarm project has been granted.

Furthermore, it will be a condition of the felling licence that an equivalent area of land required to be felled shall be replanted as per Forest Service Felling and Reforestation Policy. Thus, the extent of the lands required for afforestation can also only be known once planning

permission has been granted for the windfarm project. In these circumstances, the application for the licence can, in practical terms, only be made once planning permission has been granted.

It is, in any event, environmentally prudent to progress the felling and afforestation licences closest to the time when the proposed felling activities are required, rather than long in advance during the wind farm planning submission stage, when the project programme remains uncertain and the exact areas cannot be fully confirmed. If a licence was obtained prior to seeking and/or obtaining planning permission, it is highly likely that any licencing approvals sought from the Forest Service would have expired before it could be taken up due to the time required for the planning processes and post-planning delivery preparations. The Forest Service Afforestation Licences expire after 3 years from when they are consented.

Critically given the dynamic nature of the receiving environment, the identification and licensing of alternative afforestation lands at a later point in time (post planning consent) has the added benefit of ensuring that the licensing process fully reflects current legislative requirements, and, more importantly, the most up-to-date environmental information and that the cumulative / in-combination assessment considers the wider environmental impacts at that point in time.

In addition, the developer commits to not commencing any work within forested areas of the project until both a felling and afforestation licence(s) is in place and therefore (as discussed above) this ensures the afforested lands are identified, assessed and licenced appropriately by the relevant consenting authority.

The first step of this process involves sending a **Non-Grant** aided afforestation licence application, for the replacement land, and a felling licence application to the Department of Agriculture. This will outline everything proposed for the site, from the areas proposed for felling and the species to be planted, to the fencing and fertilizer required to the drainage and ground preparation required to establish the trees.

Below is an application checklist for energy projects involving tree felling licence applications:

a. A fully completed Tree Felling Licence application as per DAFM Circular 1 of 2021.

b. Where possible, a single felling licence application for all felling required in respect of the renewable energy or energy infrastructure project. The licence application form should list all landowners and include all relevant folio information and include, where applicable consents from those landowners. The tree felling licence maps should also clearly identify folio's and associated landowners (where applicable).

c. Certified Species Map(s) (scale 1:5000) including the felling areas consistent with the project area and tree felling areas identified in maps and documents granted in the planning permission.

d. Harvest Plan and Map (scale 1:5000) as per DAFM Circular 11 of 2019.

e. Copy of the approved planning permission(s) and any historic related planning grants relating to the renewable energy or energy infrastructure project involving tree felling which require a felling licence(s) (to be submitted via email to felling.forestservice@agriculture.gov.ie and/or by supplying a url to an online secure document repository which includes the relevant planning documents), if planning is secured at the time of application. DAFM can receive the felling licence and process it

to a certain extent e.g. registration, digitising, referrals, FIRS etc. However, under current policy DAFM do not issue a felling licence until the grant of planning issues from the first authority (Local Authority or An Bord Pleanála).

f. EIAR & NIS and any related further information, environmental reports or other information submitted to the first Consent Authority (Local Authority and/or An Bord Pleanála) (to be submitted via email to felling.forestservice@agriculture.gov.ie and/or by supplying a url to an online secure document repository which includes the relevant planning documents).

    a. The EIAR, NIS and other planning documents are required by DAFM to assess the licence.

    b. DAFM is the second authority in the case of such granted developments where felling is involved. DAFM, acting as the consenting authority for felling activity, can take account of the content in the related EIA and NIS for the primary project and use this information to determine if there are any potential impacts resulting from the felling activity.

g. Spatial database of footprint of the felling areas (polygon shapefile in the Irish Transverse Mercator Coordinate System) consistent with grant of planning for the associated energy development (to be submitted via email to felling.forestservice@agriculture.gov.ie).

h. A Tree Felling Licence application cover letter which identifies a dedicated point of contact and relevant contact details for any technical queries that DAFM may have in respect of the application, related planning documents or spatial data submitted i.e. postal and email addresses and telephone numbers.

i. Where applicable a new NIS that includes any proposed tree felling operations not already considered in the EIAR & NIS for the parent project.

j. The alternative lands need to be approved for afforestation by DAFM before we can issue the felling licence. The alternative lands must also be in the ownership of the licensee seeking the felling licence (i.e. the wind farm developer).

Conclusion

The proposed wind farm development at Ballykett, Co. Clare, requires the removal of trees through mechanised timber harvesting to facilitate various components of the wind farm infrastructure. With the proviso that the proposed mitigation measures are adopted and considering that the level of tree removal required is considered insignificant, no significant residual impacts are hereby expected. Through prudent planning and monitoring of the related harvesting operations, the required trees can be removed from the development area without negative implications for the local environs.