Appendix 3.4

Forestry Report

Coolglass Wind Farm

Coolglass Wind Farm Limited

SLR Project No.: 501.V00727.00006

29/05/2023

Forestry Report

Proposed Windfarm at Coolglass, Co. Laois

Prepared for: -
Crystal Leiker
SLR Consulting Ireland
7 Dundrum, Business Park,
Windy Arbour, Dublin.

Prepared by: -
Joe Codd
Veon Limited
1 Leopardstown Business Centre,
Ballyogan Road,
Dublin 18.

May 2023

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.

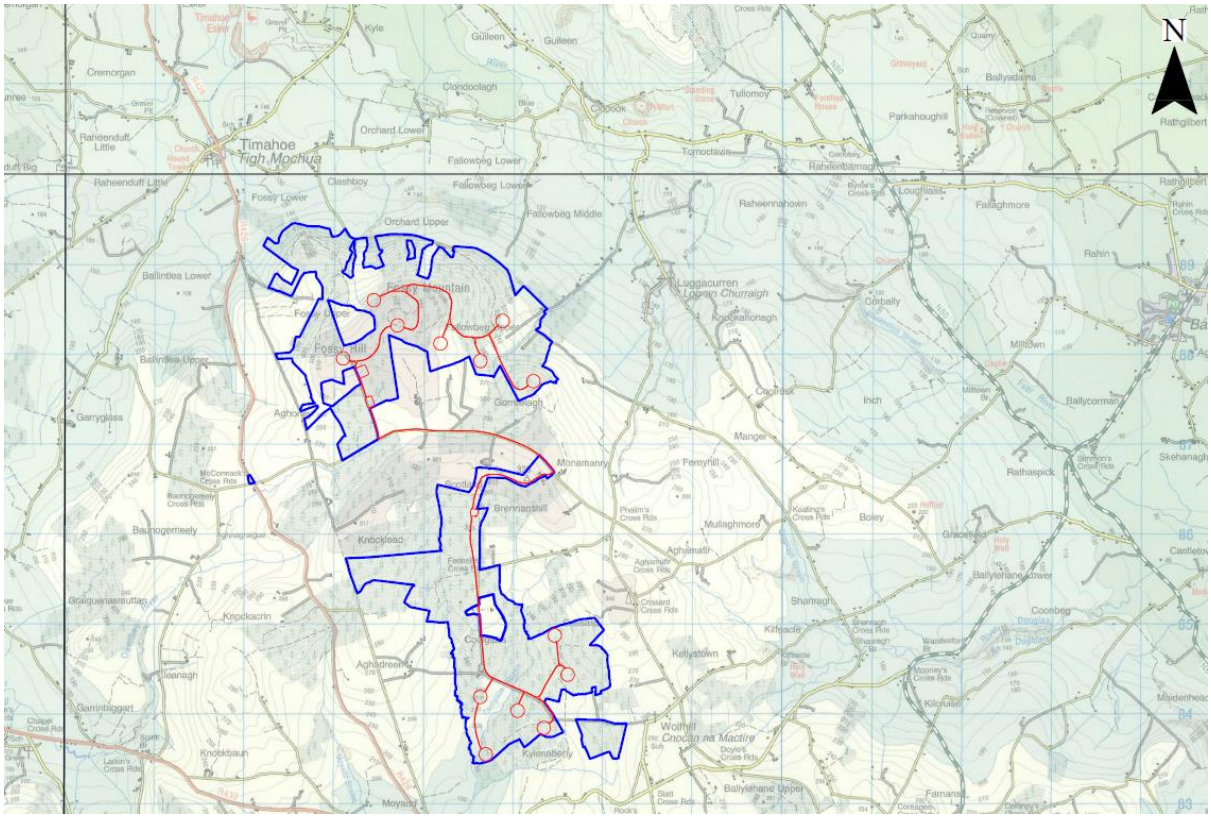
- **Hard Pan**
  A dense layer of soil, usually found below the uppermost topsoil layer. There are different types of hardpan, all sharing the general characteristic of being a distinct soil layer that is largely impervious to water.
- **Hardwood**
  A general term denoting broadleaf and deciduous trees.
- **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

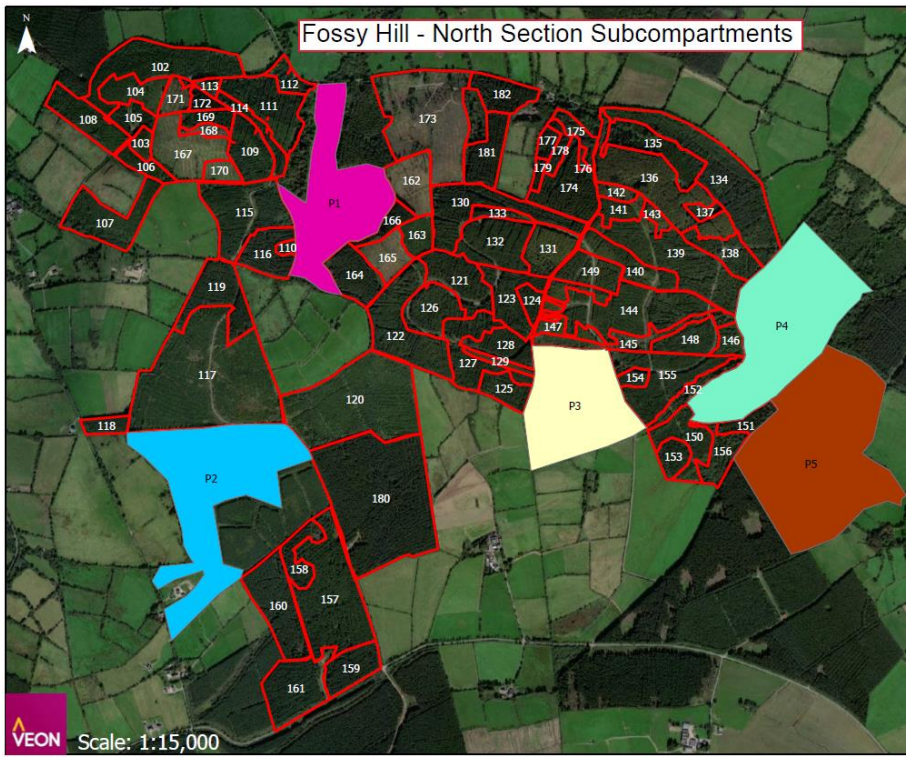
Forest Location

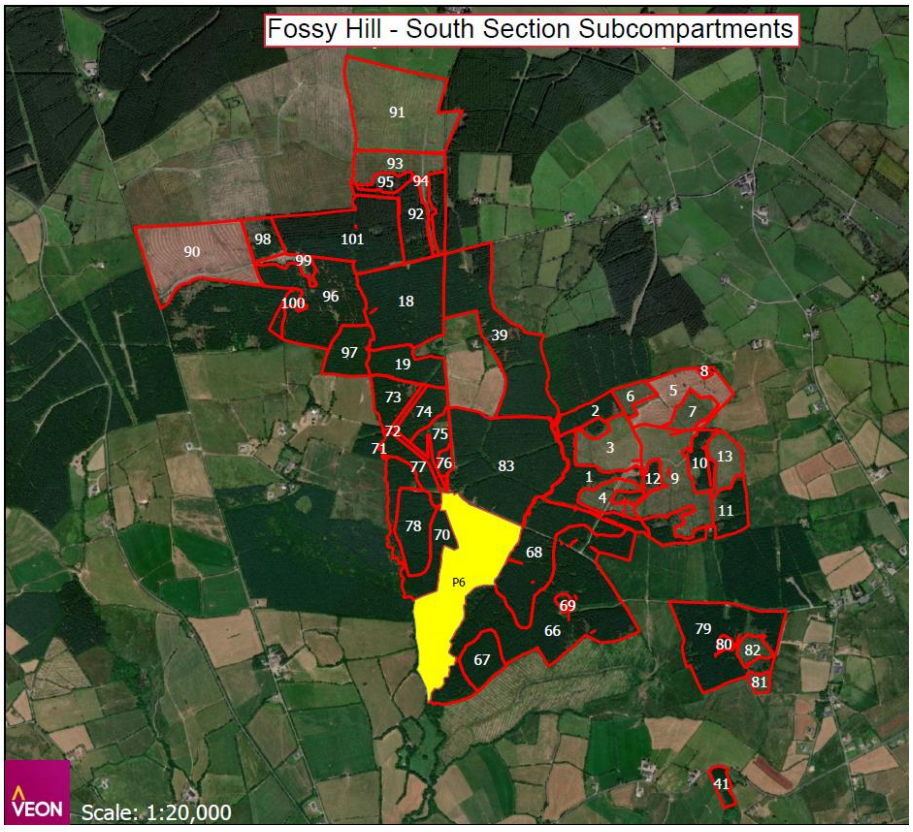
The forest is located approximately 5 km south of Timahoe, County Laois. There are numerous county and forest roads accessing the forests in this study area. Forest barriers are present at most access points. The geographic location presents good access to the harvesting network of timber buyers nationwide being only 30 minutes from the M7 motorway.



Forest Description

The proposed site contains approximately 653.86 ha of forestry. The majority of which would be classed as commercial forestry, with a high percentage also having very good growth rates (yield class) and having good quality timber. The maps below illustrate the locations of all forestry growing within the proposed site boundary.





The forestry highlighted in colours are owned by private individuals, 50.04 ha, all other forests highlighted with a red boundary are owned by Coillte, 603.82 ha.

The proposed windfarm infrastructure layout affects forestry for all the 13 turbine locations, as illustrated on the maps on page 20 of this report. A summary of the affected forestry is broken down in the following table, with access roads also cutting through some of the plots.

Infrastructure	Coillte Forestry Plot	Species Mix	Plant Year	Yield Class	Estimated Proposed Fell Year
T1	P117 & P120	Sitka spruce Sitka spruce	2012 2008	18 18	2042 2038
T2	P164 & P165	Sitka spruce Sitka spruce	1977 2018	14 20	2024 2050
T3	P122 & P126 & P127	Sitka spruce Sitka spruce Sitka spruce	1996 1996 1989	18 18 14	2026 2026 2034
T4	P144 & P145 & P147	Sitka spruce Alder Larch	2005 2005 2005	28 6 12	2033 NA 2033
T5	Plot 146	Douglas Fir	2003	12	2050
T6	P150 & P153	Sitka spruce Sitka spruce	2003 1996	22 16	2040 2031
T7	IFUT (P5)	Sitka spruce	1997	26	2030
T8	Plot 4,9 & P12	Sitka spruce Sitka spruce	2017 2022	24 24	2047 2052
T9	Plot 2 & 6	Sitka spruce	2017	24	2047
T10	Plot 70 and Private (P6)	Sitka spruce Sitka spruce	1987 2012	22 28	2023 2040
T11	Plot 66 & 67 & Private (P6)	Sitka spruce Sitka spruce	1987 2012	22 28	2023 2040
T12	Plot 66 & P68	Sitka spruce Sitka spruce	1987 1987	22 20	2023 2024
T13	Plot 66	Sitka spruce	1987	22	2023

The forestry within the affected areas is mixed in relation to quality of timber, the majority of the forestry being affected by the proposed layout is of good quality with high yield class productivity and will produce a high-quality timber product at the end of the rotation. There are certain areas where the forestry consists of native trees and is not commercial. Areas such as these are very important however as buffers and biodiversity.

Photo 1 showing the plot 180 in the north section in folio LS9202 where UCD and Coillte have a research trial set up, this area is to not to be harvested. Photo 2 shows evidence of windblow in plots 157 and 158 in an area of forest just south of T1s location.

Photo 3 shows the area where the access road between T1 and T3 enters into plot 20 from T1. Photo 4 shows the agricultural field where T1 is to be located and in the background also the private forestry north of plots158/160 which is not included in the proposed layout, this forest is circa 16 years old and due its first thinning.

Photo 5 illustrates the high elevation of the forestry and the potential damage from wind it exposed to. Photo 6 illustrates the level of windblow possible taken in plot 116.

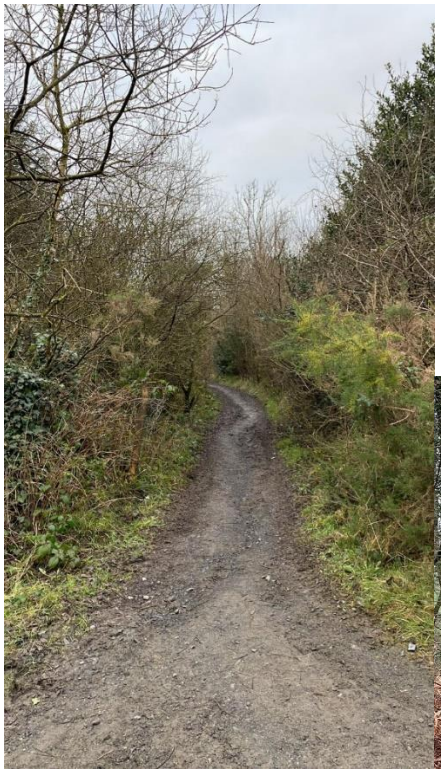



Photo 7 illustrates a highly used walking track between plots 115 and 119 coming east from the R426. There is a riding school located on this walking track. Photo 8 shows the mature beech and mixed broadleaves within plot 113, this area should be avoided if possible.


Photos 9 and 10 show the good condition of the internal forest roads through the northern section.


Photos 11 and 12 show replanted areas in plots 104 and 167 following harvesting in recent years these plots however have been replanted with Western hemlock and Western red cedar, which is not a species usually planted in Ireland, these plots should be avoided if possible.

Photo 13 illustrates the location of T2 within plot 165 looking northwest with plot 166 in the background. Photo 14 illustrates the route the access road is to take from T2 to T4 through plot 163. There is a steep slope north to south in plot 165 preventing the access road coming up to the existing road to the south through plot 122.

Photo 15 shows some weaker areas of trees in plot 122 where the access road between T1 and T3 is proposed through plot 120. Photo 16 illustrates the proposed location of T3 in plot 122, harvesting has taken place within these plots in recent years and further harvesting operations with occur within the next 5 years under good silvicultural management.

Photo 17 shows good quality timber in plot 123 with good dry ground conditions, harvesting operations will be due within the next 5 years. Photo 18 illustrates again large, good quality timber in plots 125 and 127, these plots are more exposed to the south-westerly winds.


Photo 19 illustrates the location of T4 in the grass field, Photo 20 illustrates where the access road from T4 heading for T3 could come out on the forest road at the northeast corner of the agricultural field it is located in into plot 145 and follow the forest road up through 144.


Photos 21 and 22 illustrate the poor access road condition from T5 south to T6, this is a wet area with crossing aquatic zones that are being damaged by quad use. Photo 22 also illustrates the location of T6 on the right-hand side within the Sitka spruce trees in plot 150.

Photo 24 illustrates plot 136, a large stand of mature beech, if possible, no infrastructure should affect this plot. Photo 25 illustrates the good condition of the forest roads in this northern section.

Photo 26 illustrates the private forest where T7 is located. This forest has just been thinned and will be due another thinning in 4 years' time with clearfell due over the next 10 years. Photo 27 illustrates the heavy rutting and tracks from the harvesting machinery during thinning, indicating heavy ground conditions.

Photos 28, 29 and 30 illustrate large timber and some windblow evident throughout plot 101. Ground conditions in this area are wet.

Photo 31 illustrates the potential location of T8 in plot 9, where the forest was cleared 4 years ago and has been replanted. Photo 32 illustrates plot 9 with a newly clearfelled plot 12 in the background. Plot 12 has been prepared and was ready for planting in 2022.


Photo 33 illustrates the potential location for T9 in plot 2. Plot 2 has wet ground conditions present with a lot of surface water, there is a water course to the west and south of the plot. Photo 34 illustrates the recently clearfelled plot 5, this plot has been prepared and is now ready for planting this year.


Photo 35 illustrates the potential location of T10 in plot 70, with the young private forest on the left (plot P6) and more mature Coillte forestry on the right. The turbine is located on the edge of the Coillte forest, plot 70. Photo 36 illustrates the large size of the trees in plot 70, keyhole felling may induce windblow into the stand, however bat buffers may restrict this.

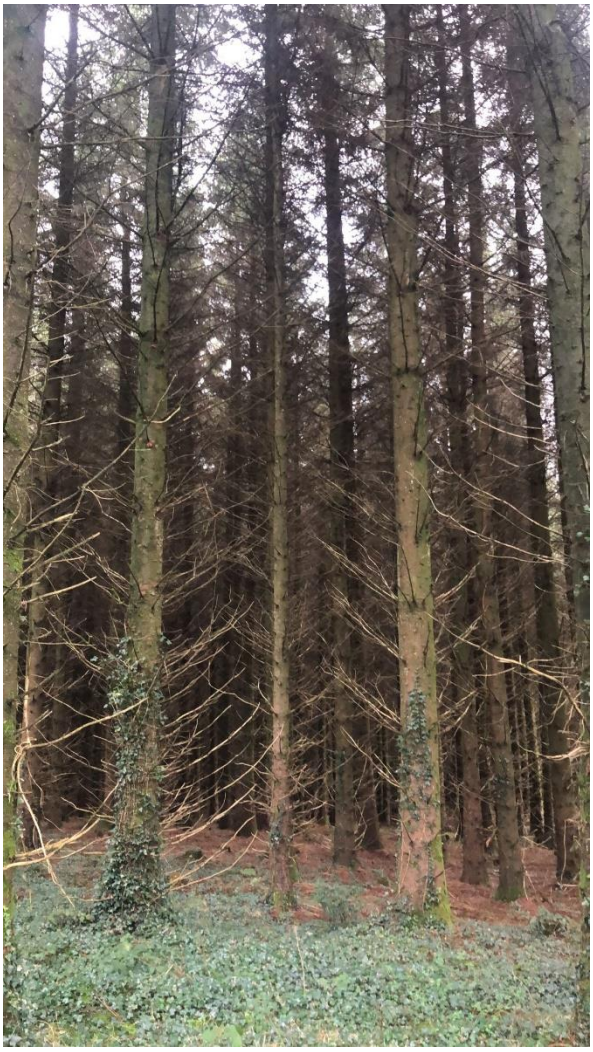


Photo 37 illustrates the type of timber present in plots 66, 67 and 68 where the potential areas for T11, T12 and T13 are located. The forest to the south of these plots has recently been cleared, leaving these plots vulnerable to windblow

Throughout the entire project area, the forests are being actively and extensively used for motorbike, quad and horse riding. The horse riding is not damaging the property; however, the quad and motor biking is causing serious rutting and siltation.



Photo 40 illustrates a quad bike track accessing the northern property at plot 117 while photo 41 illustrates damaging rutting at the northern entrance barrier at plot 112 in a sensitive area and photo 42 illustrates heavy quad usages at plots 103. 106 and 167.

Photo 43 illustrates further rutting and siltation through an aquatic area caused by quad bikes through plot 122 into 165.

Beyond basic timber production, the range of benefits that these commercial forests cover is limited but would encompass levels of biodiversity, wildlife conservation, environmental protection, rural development, public amenity and carbon sequestration. Although not present on any of the maps or EPA layers there are drains and water courses passing through the site that will need protection during forest operations.

Forest Certification

The majority of the forests impacted by this windfarm are managed under forest certification. Coillte is committed to carrying out its operations in full compliance with all applicable laws, directives and regulations, as well as voluntary external accredited forest certification schemes to which Coillte subscribe. Coillte comply with two forest management certification schemes, namely FSC® [1] (Forest Stewardship Council®), and PEFC™ [2] (Programme for the Endorsement of Forest Certification).

Both FSC and PEFC forest management certification schemes are independent schemes which audit and inspect forest managers to ensure their work meets strict forest management standards against social, economic and environmental criteria.

Forest certification is a means by which the quality of forest management is judged against a set of agreed standards and how forest monitoring, tracing and labelling timber, wood products and non-timber forest products is carried out.

Forest Certification is made up of two processes:

1. Assessing forests to see if they are being managed according to an agreed set of standards, known as Forest Management Certification.
2. This involves an independent third-party assessment of forest owners' management practices according to a set of pre-determined standards. These practices are set out in a forest management plan.
3. Labelling wood that has been harvested from a well-managed forest, known as Chain of Custody (CoC) Certification. This involves independent third-party chain of custody inspection to trace wood harvested in certified forests through all stages of transport, processing and marketing.

Certification of Coillte's forest estate is an independently verified way in which we demonstrate to stakeholders and customers that its natural resource management practices are economically, socially and environmentally responsible. Coillte is audited each year for the following certifications:

- FSC (Forest Stewardship Council) certification of responsible forest management
- PEFC (Programme for the Endorsement of Forest Certification) certification of sustainable forest management
- ISO 45001 certification for Coillte's Health and Safety Management System.

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.

On sites where coups are not all clear felled at the same time, as is the case in most Irish commercial forests, the coup edges can create substantial edge effects with large wind whirls and even reverse circulations. These can create both larger still boundary layers and induce turbulence which can affect both turbine yield but also blade and power train life. These effects have been taken into account when designing the turbines to cope with these conditions, the turbulence losses would have been taken into account during the financial modelling of the windfarm also.

The Impact of the Wind Farm on Trees

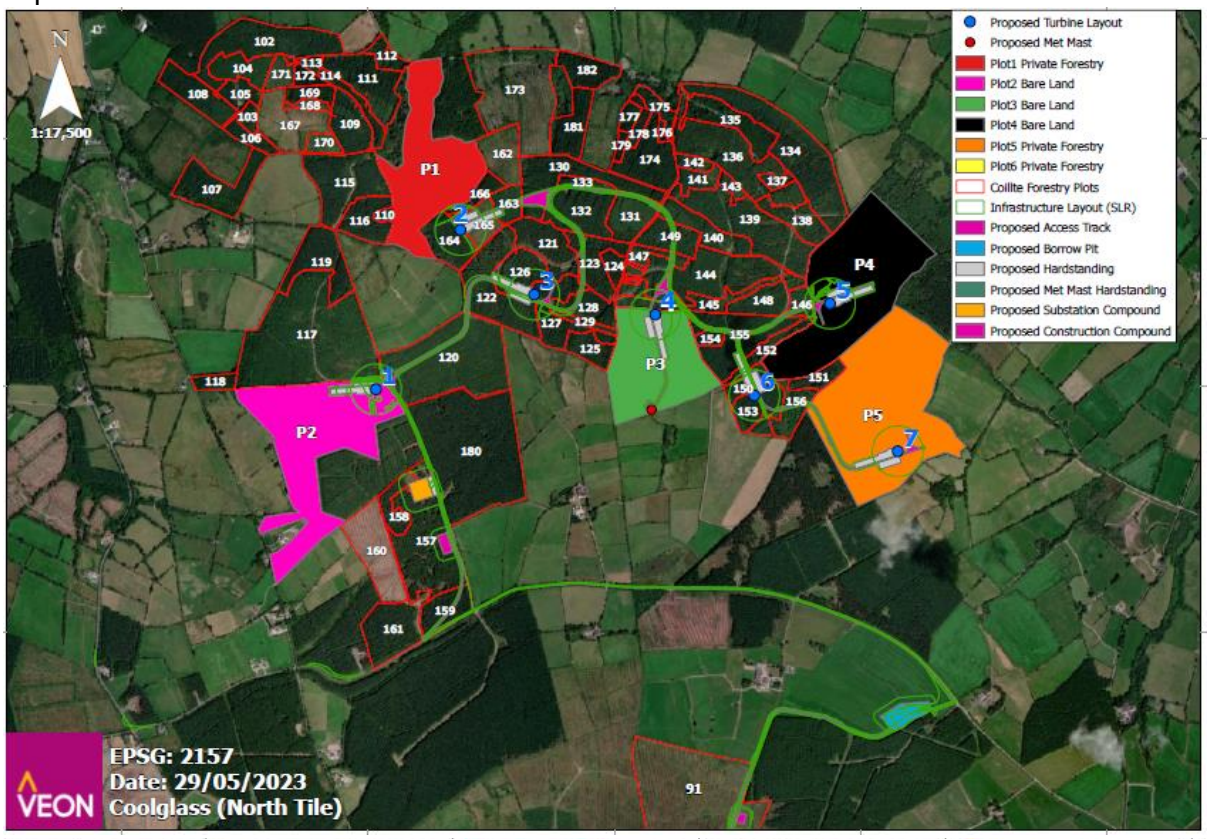
The removal of sections of forestry to accommodate the turbines, including hardstands and access roads and bat buffers etc. has the potential to impact on the remaining forestry and environment in the area. These impacts include encouragement of encroaching windblow, drainage disturbance to existing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

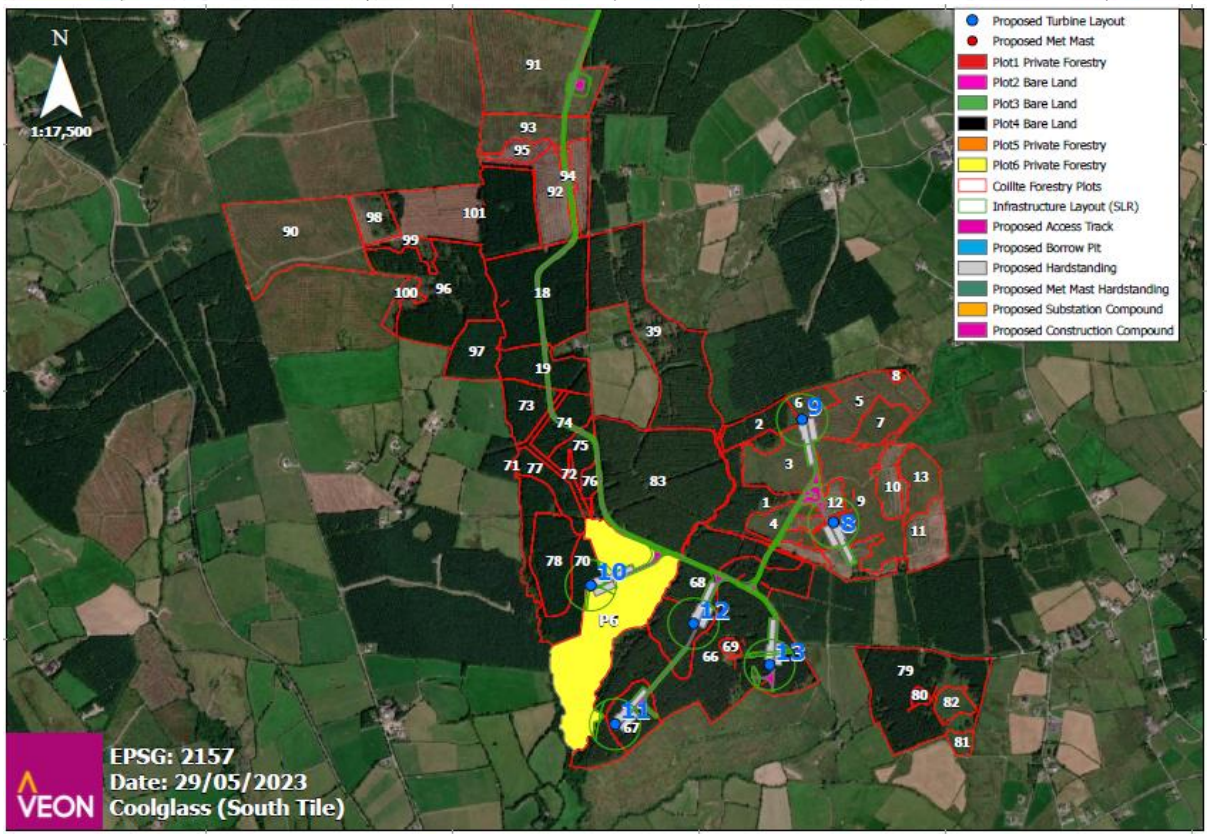
With clearing areas of trees the remaining forest can sometimes be disturbed depending on a number of factors (aspect, elevation, remaining tree shelter etc.). Opening areas of the forest for structures and tracks etc. may lead to some trees becoming unstable and prone to windblow.

To facilitate the access roads, civil works, bat buffers and turbine hardstands etc approximately 52.78 ha of forestry will need to be permanently clearfelled. There will also be 1.58 ha of forestry temporarily lost to allow the construction phase of the project. 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 much of the existing forest infrastructure. The turbine layout seeks to maximise use of the existing forestry access tracks and fire lines already present. 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 and access road locations are illustrated below, as detailed above, the windfarm access is creating new paths through the forest creating new forest edges not previously exposed to wind.





Proposed turbine locations T1 and T4 are located outside of the forest, however the bat buffer restrictions will require areas of forestry to be felled for these turbines. The forestry surrounding the proposed turbine locations of T2, T3, T5, T6, T7, T8, T9, T10, T11, T12 and T13 will potentially be directly affected by the proposed development.

The affected forestry present in the proposed locations for T1, T2 (apart from a small area for a bat buffer), T4, T8 and T9 is relatively young, meaning the tress are small in height. 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.

Where the proposed turbine locations are situated in more mature forested areas where the trees have a very high growth rate (T3, T5, T6, T7, T8, T10, T11, T12 and T13) clearfell harvesting operations will most likely to be scheduled in advance of any wind farm development being built, meaning the large trees will not be present. Infrastructure arrangements should be kept in mind at replanting stage to allow for developments.

Where the proposed substation and compound are located in Plots 157 and 158 the trees are mature already, and have become unstable due to windblow, as illustrated in photo 2 on page 9 above. As with the turbines mentioned in the above paragraph, clearfell harvesting operations will most likely to be scheduled in advance of any wind farm development being built, meaning the large trees will not be present. Infrastructure arrangements should be kept in mind at replanting stage to allow for developments. The compound area may be cleaned on development completion and replanting done on site.

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. This method is discussed further in the next section.

Photo 44 illustrates a harvesting machine in action and Photo 45 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 temporal 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

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 and Forestry Focus websites.

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 44 above. 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 45 above.

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:

- Limiting the size of the areas to be felled which reduces the amount of nutrients and silt released.
- Minimising the crossing of drains and streams, but where necessary installing temporary structures (log bridges, pipes etc) to avoid machines entering the water;
- 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.

Mitigation

The maximum use possible has been made of existing forest tracks and firelines, thereby minimising the areas of forestry that will be lost in the construction of access tracks. 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, including:

- Felling and extraction 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.
- Felling and extraction of timber will only be permitted by experienced and fully trained operators.
- All Forest Service guidelines, as detailed below, will be adhered to during all harvesting activities.
- As with any forest harvesting operations, harvest site plans including extraction routes, fuelling areas, stacking areas, turning areas and drain crossings etc. and HIRA will be designed and implemented during all harvesting operations.
- All drains crossed during extraction, if necessary, will be cleared of any debris to ensure no drainage issues will occur for the remining trees, which can be a major attributor to windblow.
- Felling and extraction of timber will be undertaken in dry weather conditions.

All timber harvesting, construction of forest tracks, including the creation of buffer zones and roadside drainage, will take into consideration the following specifications, which have been developed by the Forest Service:

- Forest Protection Guidelines (published 2002)
- Forestry and Water Quality Guidelines (published 2000)
- Forest Harvesting and Environmental Guidelines (published 2000)
- Forestry and Freshwater Pearl Mussel Requirements **-** Site Assessment and Mitigation Measures
- Forest Biodiversity Guidelines (published 2000)
- Forestry and The Landscape Guidelines (published 2000)
- Forestry and Archaeology Guidelines (published 2000)

Conclusion

With the proviso that the proposed mitigation measures are adopted and since the level of additional tree extraction is considered insignificant, no significant residual impacts are expected.

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/

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). The main provisions of the Act in relation to felling are outlined in this policy document.

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 construction felling, the

afforestation of alternative land and the repayment of grant and premium payments are not required.

To facilitate the access roads, the borrow bit, substation, bat buffers, the compounds and turbine hardstands approximately 54.37 ha of coniferous forestry, as detailed on page 12 above and the table below, made up of mostly Sitka spruce will need to be clearfelled. All this area will need to be replaced apart from a borrow pit area and temporary road widening nodes and site compounds, as when the construction phase is complete, these areas will be replanted again. Suitable replacement land has been 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**	**Species present**
T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14	35.47	35.47	Sitka spruce, Additional broadleaves
Temporary Site Compounds	1.47	0.00	Sitka spruce, Additional broadleaves
Substation	2.26	2.26	Sitka spruce
Temporary road nodes	0.11	0.00	Sitka spruce
Temporary Borrow Pit	0.01	0.00	Sitka spruce, Additional broadleaves
Access roads	15.05	15.05	Sitka spruce, Additional broadleaves
Total	**54.37 ha**	**52.78 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.

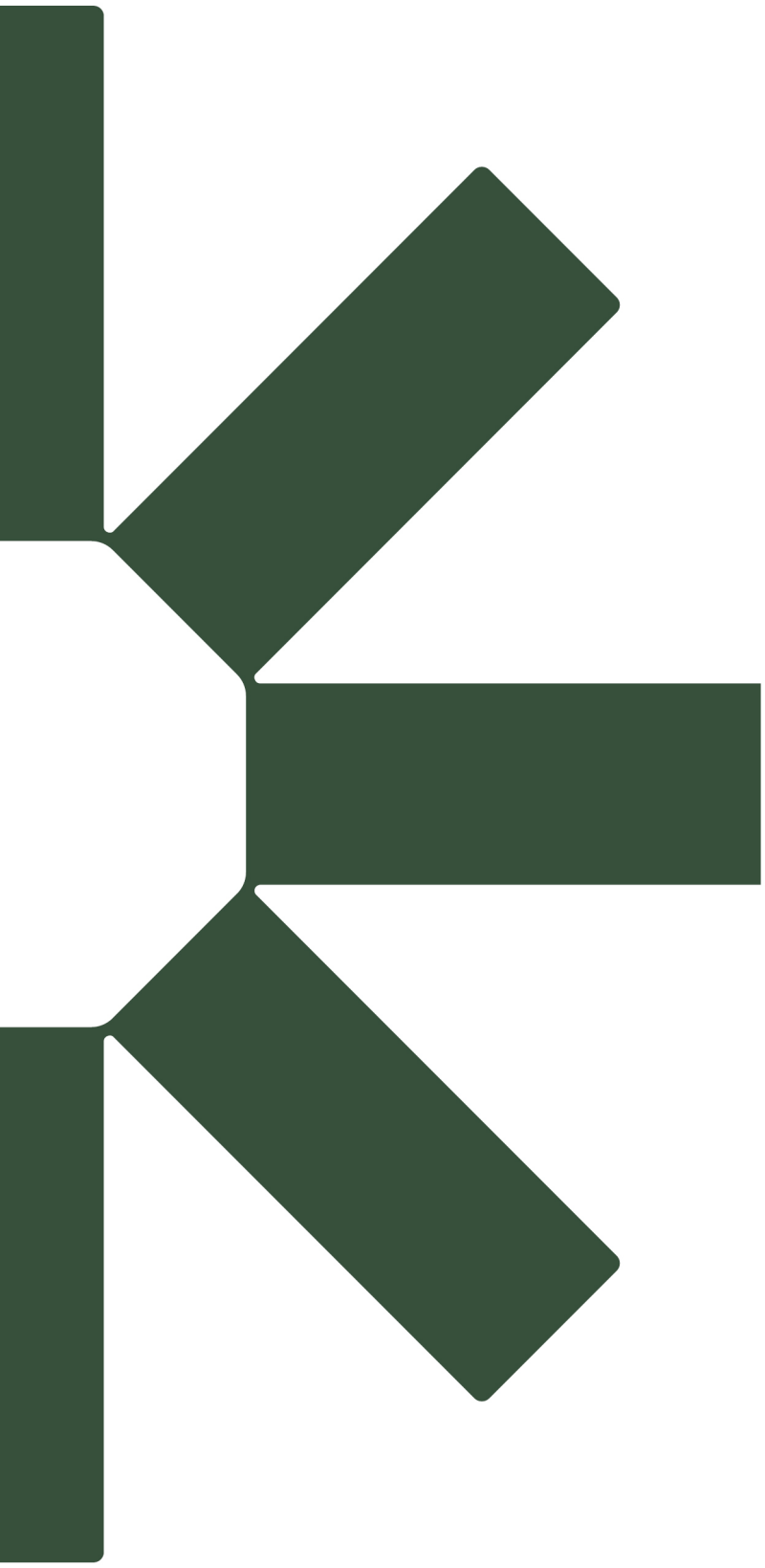
Furthermore, it will be a condition of the felling licence that an equivalent area of land required to be felled shall be replanted as per Forest Service Felling and Reforestation Policy. Thus, the extent of the lands required for afforestation can also only be known once planning permission has been 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 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 application on the replacement land to the Department of Agriculture. This will outline everything proposed for the site, from the species to be planted, to the fencing and fertilizer required to the drainage and ground prep required to establish the trees.



Making Sustainability Happen