

FORESTRY MANAGEMENT REPORT

Proposed Windfarm at Cummeennabuddoge, Co. Kerry

Prepared for:
Gavin & Doherty Geosolutions (GDG)
Unit A2, Nutgrove Office Park,
Rathfarnham,
Dublin 14, D14 X627



Prepared by:
Conor Daly & Alasdair Dunnett
The Forestry Company
East Park House,
Marina Commercial Park,
Cork, T12P9TP



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1. Introduction

The Site is primarily commercial forestry and subject to the usual associated crop rotation patterns. It is under the stewardship of Coillte CGA.

The assessment will consider the existing Coillte data, inventories and plans relating to the forestry sub-compartments, crop development stages, species and will describe the existing forestry and discuss the anticipated impacts of development on the forest.

This report will include proposed plans for keyhole felling, forest management practices, and resultant forestry waste and management.

In line with the Forest Service's published policy on granting felling licenses for wind farm developments, areas permanently cleared of forestry for turbine bases, access roads, and any other wind farm-related uses will have to be replaced by the planting of forestry at an alternative location. For information pertaining to replant approach, refer to Appendix 4-4 of the EIAR.

2. Methodology and Guidance

This assessment has been carried out in accordance with the principles contained within the following guidance documents:

- Forestry Regulations 2017 (S.I. No. 191 of 2017).
- Felling and Reforestation Policy, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2017).
- Land Types for Afforestation, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2023).
- Environmental Requirements for Afforestation, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2023).
- Forestry Standards Manual, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2023).
- Forestry Act 2014.
- 'Forestry and Water Quality Guidelines, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2000).
- Forestry and the Landscape Guidelines, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2000).
- Forestry and Archaeology Guidelines, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2000).
- Forestry Biodiversity Guidelines, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2000).
- Forestry Protection Guidelines, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2002).
- Forestry Harvesting and Environmental Guidelines, Forest Service, Department of Agriculture, Food & the Marine, Ireland (2000).
- Forest Road Manual. Guidelines for the design, construction, and management of forest roads. COFORD, Dublin (2004).

3. 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 Mats

- 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 must be extended into erodible material, 'mini' silt traps should be placed appropriately by deepening the drains in places. They should discharge via sediment traps and/or an interceptor drain 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 period.

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 hardpans, 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.

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.

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.

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 30 + (very good growth).

Figure 4-2 and Figure 4-3 display all sub-compartments within the Cummeennabuddoge Coillte Estate with regards the Proposed Development, based on data provided by Coillte. The proposed clear fell extents are shown in these figures also.

These sub-compartments are mostly Conifer High Forest (CHF), with a small percentage of unplanted bare land left for bio-diversity reasons. The sub-compartments affected will only be partially cleared or have keyhole felling carried out to reduce the overall impact on the site.

The total area needed to accommodate the 17 turbines and associated infrastructure is c. 152 ha, not including existing forest road infrastructure. This is further delineated in the Proposed Keyhole Felling section.

The forestry within the affected sub-compartments is mixed in relation to timber quality. There are areas of poor quality with low yield class productivity that will produce a low-quality timber product at the end of the rotation. Also, there are areas that are growing relatively well and will produce high quality sawlog at the end of the rotation. Over the proposed site area, the range of Yield Class for Sitka spruce is Yield Class 18 down to Yield Class 8. Due to the risk of windblow the majority of the forestry has been managed to date under a no thin policy.

A summary of the forestry information that relates to the areas of Proposed Development is provided in Table 4-1.



FIGURE 4-2 SITE ACCESS TRACK SHOWING THE SUB-COMPARTMENTS (GREEN OUTLINE) AND THE AREAS REQUIRED TO BE CLEAR OF TREES PRIOR TO DEVELOPMENT (YELLOW OUTLINE)

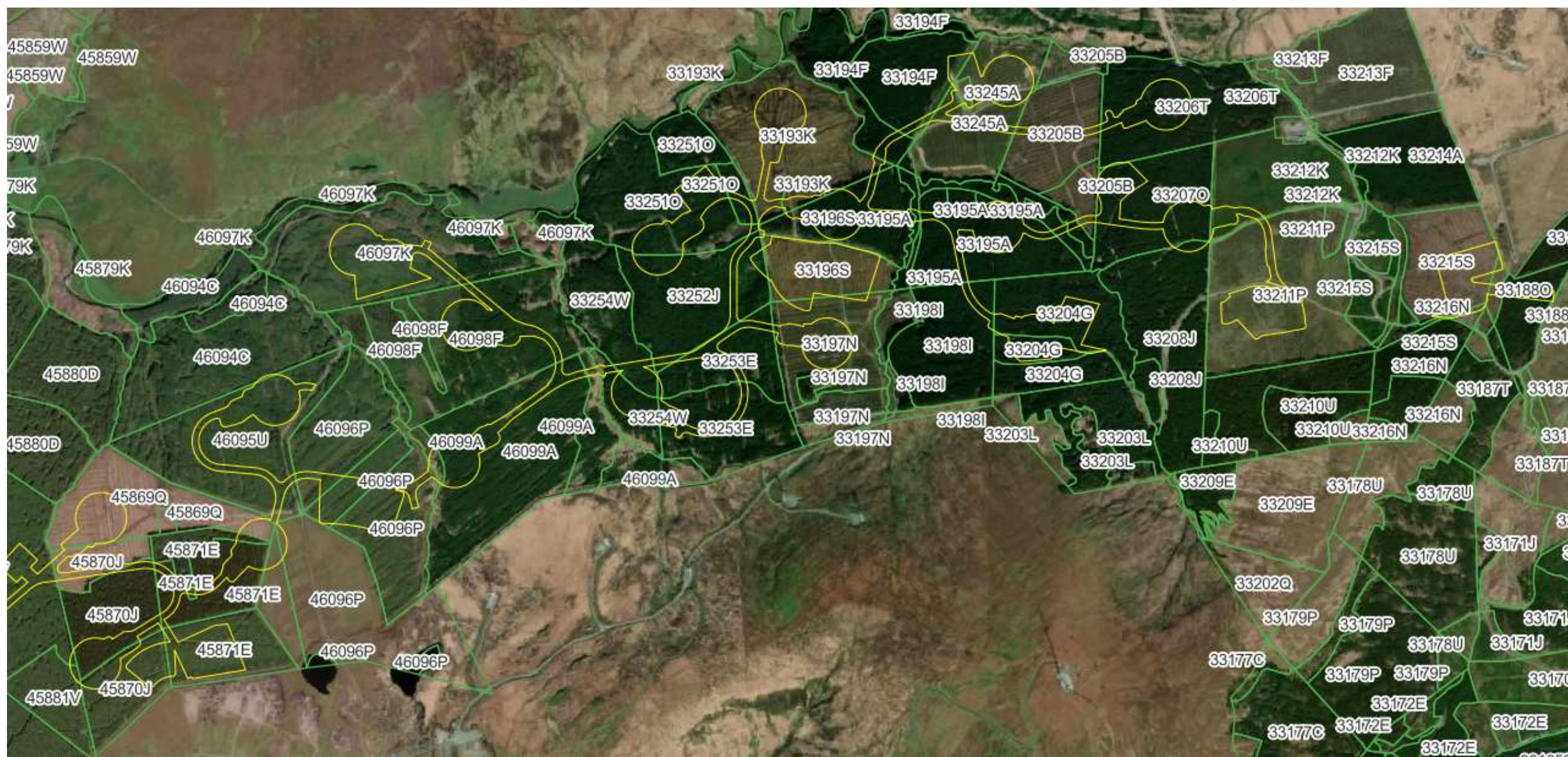


TABLE 4-1 SUMMARY OF THE SUB-COMPARTMENTS DIRECTLY AFFECTED BY THE PLACEMENT OF THE TURBINES

Infrastructure (Turbine)	Coillte Forest	Compartment	Sub No.	Species Mix	Plant Year	Timber Yield Class (main Species)	Proposed Fell Year
T1	KY15	33207O	1	Felled	–	–	–
		33208J	1	SS / LPS	2020	18	–
		33212K	1	SS / ALD	2007	16	–
T2	KY15	33206T	1	SS	2021	16	–
T3	KY15	33204G	1	SS / LPS	1972	12	2026
		33204G	3	SS / LPS	1972	16	2033
T4	KY15	33195A	1	SS / LPS	1972	12	2025
T5	KY15	33245A	1	SS	2015	16	–
T6	KY15	33197N	2	SS	2018	16	–
T7	KY15	33193K	1	SS / LPS	2020	16	–
		33193K	4	BI	2020	6	–
		33196S	1	Felled	–	–	–
T8	KY15	33193K	1	SS	2020	16	–
T9	KY15	33253E	1	SS	1977	12	2030
		33253E	2	SS / LPS	1978	12	2031
		33254W	1	SS	1977	8	2034
T10	KY15	33254W	2	SS	1977	10	2028
		33251O	1	SS	1977	10	2028
		33252J	1	SS	1977	10	2028
T11	KY15	46096P	5	SS / LPN	1990	12	2030
		46099A	1	SS / LPN	1990	10	2052
		46099A	4	LPN	1990	4	–
T12	KY15	46098F	1	SS / LPN	1989	10	2039
T13	KY15	46097K	1	SS	1989	10	2039
T14	KY15	45869Q	1	SS	2021	16	–
		45871E	2	LPS	1977	8	2023
		45871E	3	SS	1977	12	2024
		45871E	4	Unplanted	–	–	–
		46095U	1	SS	1988	12	2028
T15	KY15	46095U	1	SS	1988	12	2028
		46095U	1	SS	1988	12	2028
		46095U	1	SS	1988	12	2028
T16	KY15	45870J	1	LPS	1977	8	–
		45870J	2	SS	1983	10	2045
		45881V	1	SS	1979	12	2046
		45881V	2	SS	1983	12	2026
T17	KY15	45869Q	1	SS	2021	16	–
		45870J	3	SS	2020	16	–

The following figures have been taken at each turbine location to demonstrate the current and varied stages of the forestry (sub-compartments) affected. There are also figures illustrating other existing onsite features both infrastructural and topographical.



FIGURE 4-4 A & B: SUB-COMPARTMENT 33207O-1
FELLED 2022 – SITE PREPARED FOR RESTOCKING
TURBINE LOCATION NO.1



FIGURE 4-5 A & B: SUB-COMPARTMENT 33206T-1
PLANTING YEAR 2021 SITKA SPRUCE C. 1.0 M
TURBINE LOCATION NO. 2



FIGURE 4-6 A & B: SUB-COMPARTMENT 33204G-1&3
PLANTING YEAR 1972 SITKA SPRUCE & LODGEPOLE PINE C. 26-28M
TURBINE LOCATION NO. 3



FIGURE 4-7 A & B: SUB-COMPARTMENT 33195A-1
PLANTING YEAR 1972 SITKA SPRUCE & LODGEPOLE PINE C. 21-23M
TURBINE LOCATION NO. 4



FIGURE 4-8 A & B: SUB-COMPARTMENT 33245A-1
PLANTING YEAR 2015 SITKA SPRUCE C. 2.8M
TURBINE LOCATION NO. 5



FIGURE 4-9 A & B: SUB-COMPARTMENT 33197N-2
PLANTING YEAR 2018 SITKA SPRUCE C. 2.6M
TURBINE LOCATION NO. 6



FIGURE 4-10 A & B: SUB-COMPARTMENT 33196S-1
FELLED 2022 AWAITING SITE PREPARATION FOR RESTOCKING
TURBINE LOCATION NO. 7



FIGURE 4-11 A & B: SUB-COMPARTMENT 33193K-1
PLANTING YEAR 2020 SITKA SPRUCE C. 1.4M
TURBINE LOCATION NO. 8

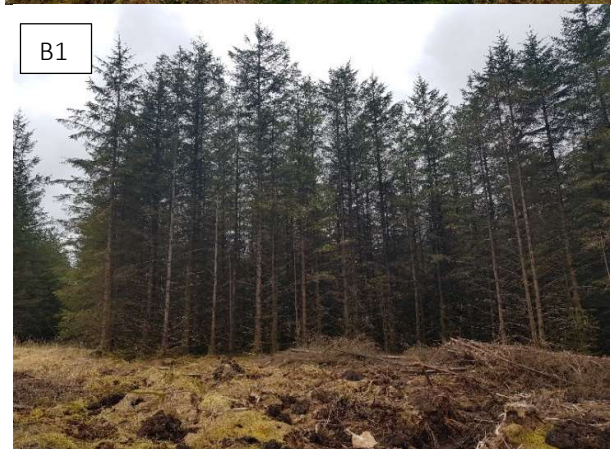


FIGURE 4-12 A1 & A2: SUB-COMPARTMENT 33253E-2 FELLED 2022 SITE PREPARED FOR RESTOCKING
 B1 & B2: SUB-COMPARTMENT 33254W-1 PLANTING YEAR 1977 SITKA SPRUCE C. 17M
 TURBINE LOCATION NO. 9



FIGURE 4-13 A & B: SUB-COMPARTMENT 332510-1
 PLANTING YEAR 1977 SITKA SPRUCE C. 17M
 TURBINE LOCATION NO. 10



FIGURE 4-14 A & B: SUB-COMPARTMENT 46099A-1
 PLANTING YEAR 1990 SITKA SPRUCE C. 11M
 TURBINE LOCATION NO. 11



FIGURE 4-15 A & B: SUB-COMPARTMENT 46098F-1
PLANTING YEAR 1989 SITKA SPRUCE & LODGEPOLE PINE C. 12M
TURBINE LOCATION NO. 12



FIGURE 4-16 A & B: SUB-COMPARTMENT 46097K-1
PLANTING YEAR 1989 SITKA SPRUCE & LODGEPOLE PINE C. 12M
TURBINE LOCATION NO. 13



FIGURE 4-17 A1 & A2: SUB-COMPARTMENT 45869Q-1 PLANTING YEAR 2021 SITKA SPRUCE C. 0.9M
 B1 & B2: SUB-COMPARTMENT 45871E-2 PLANTING YEAR 1977 LODGEPOLE PINE C. 14M
 TURBINE LOCATION NO. 14



FIGURE 4-18 A & B: SUB-COMPARTMENT 46095U-1
 PLANTING YEAR 1988 SITKA SPRUCE C. 10-12M
 TURBINE LOCATION NO. 15



FIGURE 4-19 A1 & A2: SUB-COMPARTMENT 45870J-2 PLANTING YEAR 1983 SITKA SPRUCE C. 14M
 B1 & B2: SUB-COMPARTMENT 45871E-2 PLANTING YEAR 1977 LODGEPOLE PINE C. 14M
 TURBINE LOCATION NO. 16



FIGURE 4-20 A1 & A2: SUB-COMPARTMENT SUB-COMPARTMENT 45869Q-1
PLANTING YEAR 2021 SITKA SPRUCE C. 0.8M
TURBINE LOCATION No. 17



FIGURE 4-21: FOREST ROAD SUB-COMPARTMENT 33194F-3



FIGURE 4-22: SUB-COMPARTMENT 33196S-2 ADJOINING FOREST ROAD DRAIN



FIGURE 4-23: SUB-COMPARTMENT 33196S-2 ADJOINING FOREST ROAD DRAIN SEDIMENT TRAPS USING LOGS AND GEO-TEXTILE



FIGURE 4-24: RIVER FLESK (KERRY)_010 NORTH OF SUB-COMPARTMENT 33196S-2



FIGURE 4-25: RELEVANT WATER COURSE RUNNING NORTH OF SUB-COMPARTMENT 46097K-1



FIGURE 4-26: EXAMPLE OF GRASSY / VEGETATED DRAIN SITUATED BELOW SUB-COMPARTMENT 46097K-1



FIGURE 4-27 A & B: EXAMPLE OF EXISTING CROSSING POINT FOR STREAM



FIGURE 4-28 A & B: PERMANENT CROSSING POINT OVER STREAM - UNNAMED AQUATIC ZONE (EPA RWB CODE: IE_SW_22F020010).

Forest Certification

The forestry affected by the development is managed by Coillte under 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, environmental, and health and safety criteria.

These formal audits are carried out by independent auditors based in Ireland, the UK, or continental Europe. Any opportunities for improvement or non-compliances with the relevant standards are identified throughout the audit process and corrective action requests can be raised to drive improvement opportunities. These improvement opportunities or non-compliances are addressed through the development and/or updating of existing policies/procedures and implemented into practice.

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

5. Felling Methodology

Felling or harvesting, as it can be called, is the cutting and extraction of timber to roadside, usually during thinning or clearfelling operations.

Different types of Felling

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. Due to the risk of windblow at Cummeennabuddoge the forestry has been managed to date under a no thin policy.

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. Based on the forestry dataset, site walkover and review of satellite imagery, this appears to be the main forestry felling approach.

Continuous Cover Forestry is an alternative approach to clearfelling where some trees may be periodically removed but the canopy is continually maintained. This approach has not been observed at the Cummeennabuddoge site.

Windfarm Related Felling where felling is necessary, there are two main approaches:

- **turbulence felling** – this is where areas of forestry are cleared around each turbine or across the whole site
- **keyhole felling** – the only felling that takes place is that required to construct the turbines and associated infrastructure. The concept is to avoid forestry loss wherever possible and where this is not possible, to have the smallest possible keyhole and associated felling within afforested areas. The size of the keyhole is dependent on several factors relating to the crop, turbine selection and other site related factors. This type of felling does not follow the traditionally practised on-site silvicultural system where the main objective is timber production. Any forestry within the keyhole will be removed and is not dependent on the phase of forestry (e.g. immature, semi-mature and mature forestry).

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, crosscut 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 Figure 5-1. 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.



FIGURE 5-1 HARVESTER

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. This is important as Soils with a high moisture content such as peatland, are more sensitive to soil damage and compaction. Mechanized forest operations can cause detrimental impacts when soil strength is low. For the site, the harvester will be set up to work in peat bog, therein be modified to ensure low ground pressure exertion and reduced impact on the peat soils.

The harvester will process tree stems down to 7 cm in diameter (dbh) and the remainder (top) of the tree will be placed on the extraction rack in front of the harvester, along with the branches, to act as a brash matt for the harvester and forwarder to travel on further minimising soil disturbance and compaction. The processed logs are placed to the side of the rack where the forwarder can access them easily following the harvester. Any brash that in the infrastructure areas will be removed following completion of forestry operations to allow for access track / road construction.

In areas where it is not feasible to cut the trees by harvester due to the trees being too small (i.e. <7cm DBH) an excavator with tree shears will be sufficient to cut and stack trees to the side for collection by the forwarder. Recently reforested areas with planted trees less than c. 2m will also be cleared manually by hand using pruning saws.

Machine exclusion zones will be located on all aquatic zones adjoining areas to be felled. These areas will be clearly marked on the ground. Trees within the exclusion zone will be felled by reaching in the harvester boom head into the exclusion zone and felling and removing the tree. Processing will take place outside the exclusion zone. Trees outside the reach of the harvesting boom will be felled by chainsaw to within reach of the harvesting machine boom for removal and processing, to be collected by forwarder. Trees that cannot be felled within reach of the harvester boom will be felled to waste.

Felled trees extraction

Specialised forwarding machines are the most common extraction system in Ireland. Like harvesters, forwarders can be fitted with tracks or chains depending on ground conditions, to minimise ground disturbance and can remove on average 9-12 tonnes per journey, as illustrated in Figure 5-2 below. As with the harvester, the forwarders will be set up to exert low pressure on the ground at the Proposed Development. 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 then follows a harvester to collect and extract the timber to the roadside.

An estimated summary of the amount of timber expected to be extracted is displayed below in table 4.2. A site average YC 12 was used in the calculation of the estimated expected tonnage. Also, any tree under 7cm DBH was not included in the estimation as the overall volume expected from these trees would be minimal overall. Usually they would not be processed and left as brash to be windrowed under normal harvesting conditions.

TABLE 4.2 – SUMMARY OF ESTIMATED TONNAGE TO BE EXTRACTED FOR KEYHOLE FELLING AREAS 10YRS+ USING SITE AVERAGE YC12 FOR UNTHINNED SITKA SPRUCE

Age in 2028	Area to be felled for wind farm (ha)	YC12 Top Height Estimation (m)	Mean Vol / tree / m ³	Vol m ³ / Ha	Tonnes / Ha	Estimated tonnage
10	10.1	3.0	0.005	12	11	110
13	6.0	4.0	0.008	21	19	115
15	5.8	5.1	0.01	27	25	142
21	1.1	8.1	0.04	94	85	94
37	2.0	16.3	0.20	414	376	753
38	12.5	16.8	0.21	439	399	4989
39	13.0	17.2	0.22	464	422	5484
45	7.8	19.9	0.31	585	532	4148
46	2.9	20.3	0.32	598	544	1577
49	3.0	21.5	0.37	637	579	1737
50	1.8	21.9	0.39	650	591	1064
51	6.3	22.3	0.41	663	603	3797
56	2.0	24.1	0.48	723	657	1315
57	0.1	24.4	0.52	734	667	67
Total	74.4					25390



FIGURE 5-2 FORWARDER

6. Felling Considerations

Of all the forest operations, felling (harvesting), has the potential to have the greatest impact on the forest environment and the wider landscape. Strict Forest Service Guidelines have therefore been developed to ensure best practice in harvesting operations to protect the soil, waterways, wildlife, the landscape, and any listed sites or monuments that may be present or unearthed during site works.

Biodiversity

Loss of habitat - The effects on loss or change of habitat are considered in the Chapter 8: Biodiversity and Chapter 9: Ornithology of the EIAR.

The site area is also within the range of the Kerry Slug, an Annex IV species under the Habitats Directive, it is strictly protected wherever it occurs. The presence of the Kerry Slug is discussed in detail in Chapter 8: Biodiversity of the EIAR, with mitigations provided therein. A derogation license will be in place prior to commencement of the harvesting / development works.

Soil Damage & Watercourses

Felling of trees may cause enhanced erosion of soils from increased exposure to weathering and removal of root structures, resulting in increased sediment release via surface water runoff. It may also result in increased mobilisation and transportation via surface water runoff of dissolved and / or sediment-bound nutrients / phosphate fertilisers from the disturbed soils into the wider water environment.

Watercourses (aquatic zones) 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. It's also important to note that ongoing water

quality monitoring during normal harvesting operations, carried out by Coillte using standard industry guidelines and mitigation measures, do not show any notable exceedance of Environmental Quality Standards.

These impacts are discussed and mitigated in the Chapter 10: Soils, Geology and Hydrogeology, and Chapter 11: Hydrology of the EIAR, however it is noted that the risk of soils and wood waste entering watercourses arising during the felling phase of the wind farm development is no different to that arising from the regular harvesting of these crops under normal management practices. As part of typical felling practice, harvesters and forwarders are designed to minimise soil damage, with large soft tyres, or chains used 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 depending on ground conditions. Also, best practice is to suspend mechanised harvesting operations during and immediately after periods of particularly heavy rainfall.

Noise

The noise of harvesting operations can also have an 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.

With regards impact on human receptors, with exception to the site access/entrance, the areas within the 152ha parcel of land 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, even at the site entrance/site access. Additionally, it will occur only during daytime.

Archaeology

There are no recorded monuments (Irish National sites and Monuments) within the Cummeennabuddoge windfarm site boundary, and therefore no associated buffers are required in this regard (see Chapter 14: Cultural and Archaeological Heritage).

Measures to be employed at the Proposed Development site with regards the keyhole felling shall be employed to avoid impacts, as per typical harvesting circumstances are provided in the Felling Mitigation Measures section.

Windblow / Windsnap

As the forest is elevated at up to 500m on sloping ground and exposed facing the prevailing south-westerly winds, opening areas of the forest for structures and tracks etc. may lead to some trees becoming unstable and prone to windblow. Damage constitutes uprooting (windthrow/windblow) or breakage (windsnap) of trees, which can lead to significant financial losses and pose a health and safety risk to site users.

Certain areas of the forestry in this plantation are poor in nature due to the quality of the soil it is planted on. Many of the trees are small in height in relation to age and due to low yield class. Removing these areas to facilitate the turbines and associated infrastructure will not increase the risk of extensive windblow in these areas as the trees will have time to stabilise before the risk of windthrow

materialises. The same can be said for the areas of recent clearfell that have been replanted and are still immature or semi-mature.

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. This method is discussed further in the next section.

Traffic

Issues relating to potential increase in site traffic from harvesting activities are dealt with in Chapter 7: Traffic and Transport of the EIAR.

Provided the appropriate guidelines are employed, the EIAR mitigation measures are adhered to, and their use enforced during extraction, there should be no significant impacts associated with any felling that may take place.

7. Proposed Keyhole Felling

To facilitate the necessary infrastructure 152ha of forestry land will need to be free of trees, necessitating keyhole felling operations in areas where forest is present in the months preceding official commencement of construction of the Proposed Development, as shown in the yellow outline in Figure 4-2 and Figure 4-3. The breakdown of felling with regards various infrastructure components is provided in Table 4-, and with regards turbines alone in Table 4-1.

The tree felling activities required as part of the Proposed Development will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (S.I. 191/2017).

The Forest Service Policy requires that a copy of the planning permission for the wind farm be submitted with a felling license application. Therefore, the felling license cannot be applied for until planning permission is received for the proposed project site.

The license will include the provision of relevant replant lands to be planted in lieu of the proposed tree felling on the site as discussed in Replanting Obligations (see Appendix 4-4: Afforestation Information of the EIAR). It should be noted that the forestry within the proposed wind farm site was originally planted as a commercial crop and will be felled and replanted in the coming years should the project proceed or not.

The felling / clearance area associated with the Proposed Development has been carefully assessed as part of the overall design and is necessary to construct the proposed project.

It is important to note that at time of writing (December 2023) c. 57 Ha of the proposed felling area (equivalent to approximately 38% of the total proposed) has been recently felled by Coillte as part of current onsite commercial operations.

Areas of proposed Coillte felling between now and 2028 are shown in Figure 7-1 and Figure 7-2. The Copernicus satellite imagery from May 2023 is presented in Figure 7-3 and Figure 7-4 to provide an indication of those areas currently free of forestry.

Although replanting will occur in these areas, based on a 2028 construction commencement, 5-year old trees will not incur such significant felling operations as required for mature forestry (see felling methodology above), as the trees will be small in size (c.2m), as opposed to larger size (c.18m+). It is

known that further felling shall be undertaken as normal forestry practice within the area of required clearfell between present day and the start of the Proposed Development, therefore, further reducing the area of true keyhole felling required. The Coillte felling plan is provided in Figure 7-5.

TABLE 4-3 – SUMMARY OF ON-SITE INFRASTRUCTURE

Component	Length / Area
New Access Tracks (Founded)	19.04 km
Upgrade Of Existing Access Tracks	6.99 km
Turning Heads (5 No.)	2,945 m ²
Turbine Foundation (17 No.)	22 m diameter foundation 6,461 m ² total
Crane Hardstanding (17 No.)	185,842 m ²
Met Mast Height	110 m
Met Mast Hardstand Area	625 m ²
Length of Internal Grid Connection Cables	89.7 km (laid within access tracks), based on 4 arrays with 4 cables each.
Grid Connection Route to National Grid	3.6 km
Onsite Substation	8,411 m ²
Peat Repository 1	30,586 m ²
Peat Repository 2	19,948 m ²
Peat Repository 3	32,264 m ²
Peat Repository 4	10,254 m ²
Peat Repository 5	16,333 m ²
Peat Repository 6	17,460 m ²
Borrow Pit 1	16,952 m ²
Borrow Pit 2	45,357 m ²
Borrow Pit 3	35,832 m ²
Borrow Pit 4	38,866 m ²
Temporary Construction Compound 1	7,500 m ²
Temporary Construction Compound 2	7,500 m ²
Temporary Construction Compound 3	4,878 m ²

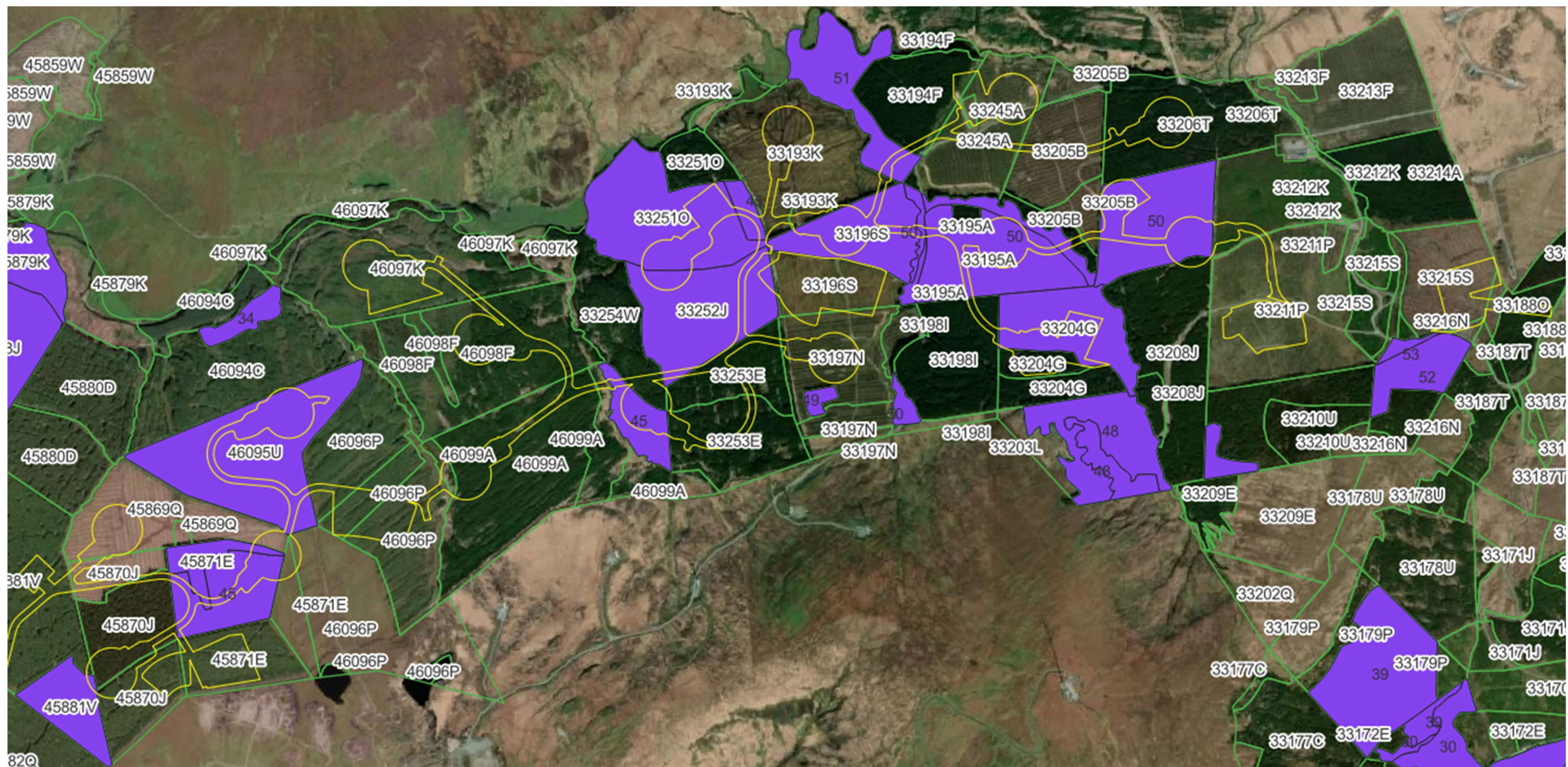




FIGURE 7-3 COPERNICUS SATELLITE IMAGERY (MAY 2023) SHOWING LARGE SWATHES OF THE 152HA AREA CURRENTLY FREE OF FORESTRY (APPROX. 57HA)

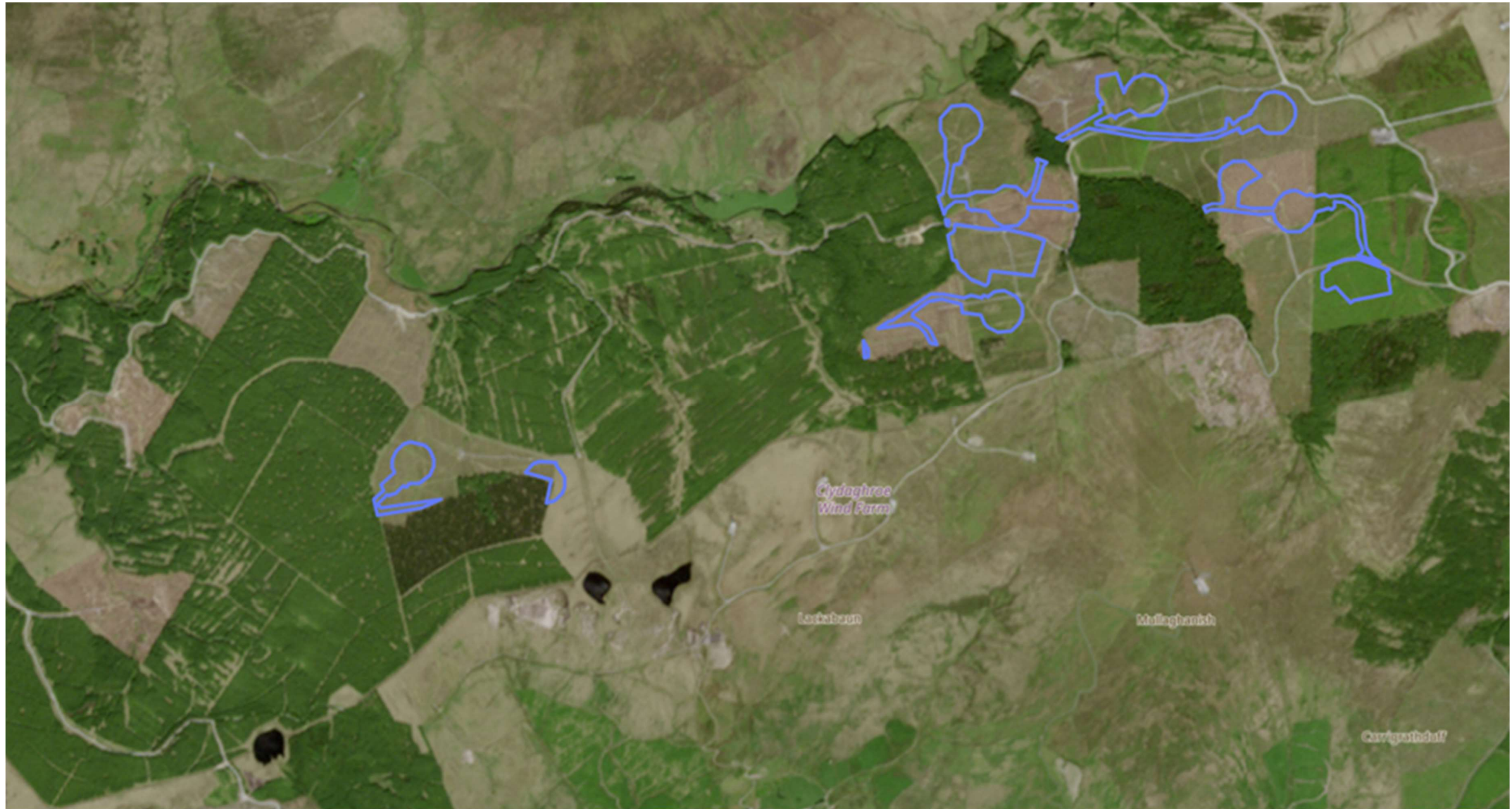


FIGURE 7-4 AREA OF RECENT FELLING ONLY C.57HA

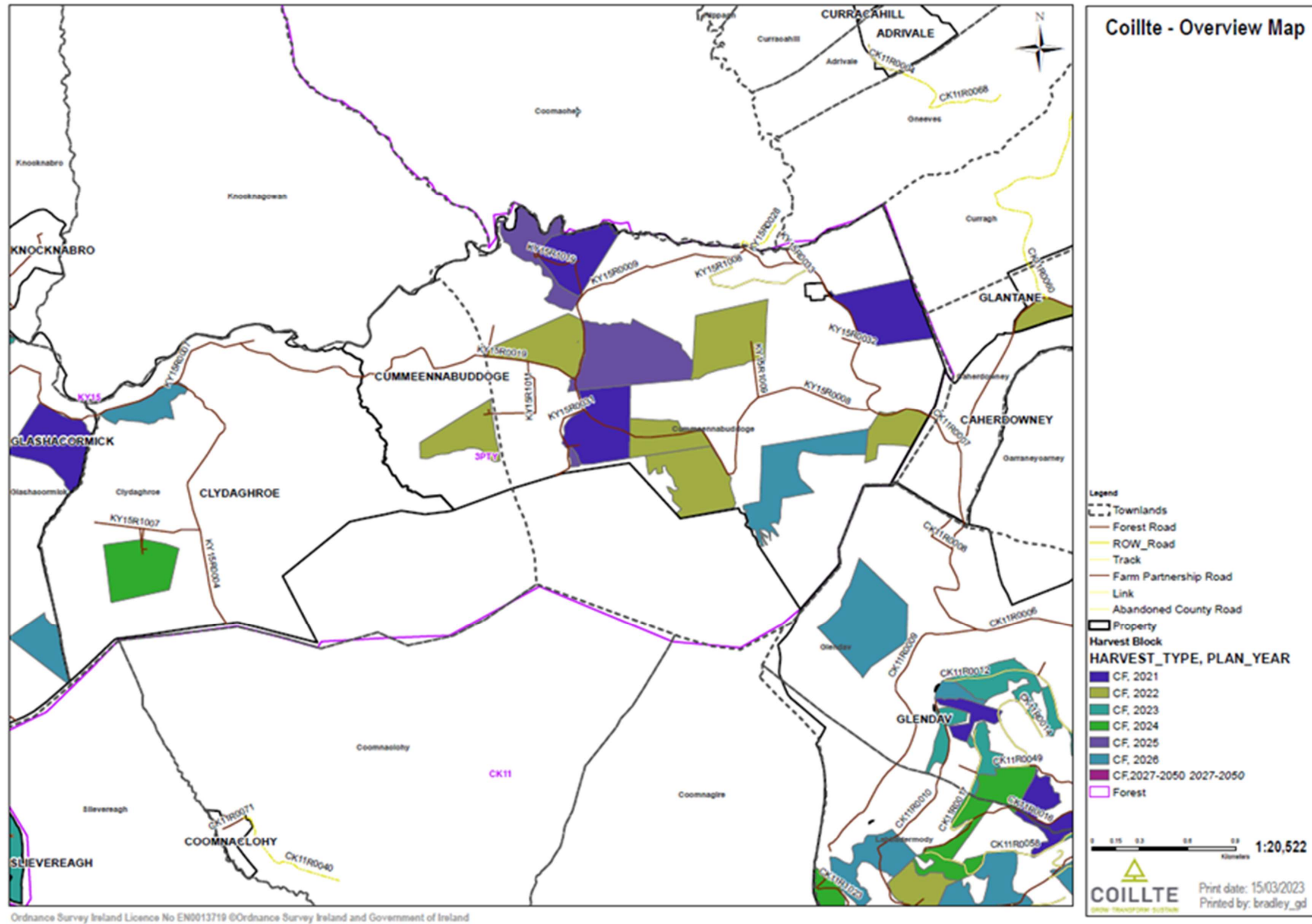


FIGURE 7-5 COILLTE ON-GOING PHASED FELLING PLAN FOR CUMMEENNABUDDOGE

8. Felling Operations

The forestry within the proposed wind farm site is comprised of commercial coniferous forestry. In advance of the construction phase, clearance felling will commence on site and be carried out. The felling is forecast to be done in three phases, with the ultimate schedule is to dictated by the water quality monitoring as outlined in the Water Quality Monitoring Plan, Appendix 11-3 of the EIAR. Where water quality monitoring shows favourable results (i.e. silt or nutrients running off the site remain below the trigger levels), keyhole felling will continue (within the confines of the licence) and potentially undertaken in less than three phases. It is expected that the felling will be completed within a six month period.

Coillte felling will not be undertaken during the keyhole felling/construction period of the wind farm development.

Three Harvesters and three forwarders will be utilised for areas of forest deemed mature ($\geq 7\text{cm DBH}$), whilst younger trees ($\leq 7\text{cm DBH}$) will be removed by either by hand using a pruning saw or two excavators with shears for larger trees under 7cm DBH between 2-6m and two forwarders.

The construction methodology will follow the specifications set out in:

- Felling and Reforestation Policy
- Standards for Felling and Reforestation
- Forest Protection Guidelines
- Forestry and Water Quality Guidelines
- Forest Harvesting and Environmental Guidelines
- Forestry and Freshwater Pearl Mussel Requirements - Site Assessment and Mitigation Measures
- Forest Biodiversity Guidelines
- Forestry and The Landscape Guidelines
- Forestry and Archaeology Guidelines

Key steps will be taken to minimise any potential adverse impacts in the context of the environment and wider commercial forest during the keyhole felling operation, and in conjunction with measures detailed in the EIAR:

- Felling and extraction of timber will be undertaken in suitable weather conditions e.g., avoiding sustained rainfall (any foreseen rainfall event longer than 4-hour duration) and/or any yellow or greater rainfall warning ($>25\text{mm/hour}$) issued by Met Éireann
- Felling and extraction, if economical, of timber will, as far as possible, be undertaken at the same time as currently licensed extraction activities to minimise traffic and noise disturbance.
- Felling and extraction of timber will only be permitted by experienced and fully trained operators.
- All drains, mound drains, culverts, crossed during extraction, if necessary, will be cleared of any debris to ensure no drainage issues will occur for the remaining trees, which can be a major contributor to windblow.
- Before harvesting operations commence, a minimum 25m wide exclusion zone along the edge of all significant watercourses will be in place, based on the Forestry and Water Quality Guidelines which show this as the “worst case” aquatic buffer. Machine traffic and timber stacking will not within these zones. Long reach harvesters may be used to reach into the buffer but will not track through these zones. The remainder of the forest within the aquatic buffers

outside the reach of the harvester will be felled by hand to within reach of the harvesting machine boom for removal and processing.

- Restrict machine activity (felling) to brashed extraction racks and haulage routes.
- Direct crossing over watercourses/aquatic zones is not permitted. Where needed, any necessary crossing shall be via an existing forestry track watercourse crossings.
- Timber will be stacked in dry areas, and outside a the EIAR determined 60m watercourse buffer.
- Straw bales and check dams will be emplaced on the down gradient side of timber storage sites.
- Brash mats will be used to support vehicles on soft ground (e.g., during trenching and drainage construction), reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place before they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall.
- All felling and extraction and other machine operations onsite will cease during and after periods of rainfall which result in the possibility of the surface mobilisation of silt.
- Implementation of the Surface Water Management Plan (SWMP), provided in Appendix 11-4 of the EIAR.
- Forestry / felling works shall also be subject to separate felling licencing which includes ensuring mitigation of risk to watercourses due to felling and associated plant movements.
- Temporary drainage measures in advance of earthworks may include:
- Temporary silt fences erected in areas where risk of pollution to watercourses has been identified e.g., watercourse crossing locations and areas where tracks or other infrastructure lie within watercourse buffer zones.
- Watercourses, drains, natural flow paths and cut-off drain outlet locations should be identified and charted.
- Suitable prevention measures should be always in place to prevent the conveyance of silts to receiving watercourses.
- Implementation of a robust Water Quality Monitoring Plan (WQMP), provided in Appendix 11-3 of the EIAR. The purpose of the WQMP is to expand on mitigation proposed in the associated Environmental Impact Assessment Report (EIAR) submitted in support of the planning application, it will:
 - Provide early indication of potential deterioration of water quality that may be attributable to on- site works (i.e., pre-construction felling, construction activities) as to initiate any necessary response measures;
 - Demonstrate that the mitigation measures and construction-phase surface water management plan is performing as designed;
 - Provide validation that the in-place mitigation measures are not having an adverse effect upon the environment; and
 - Indicate the need for additional mitigation measures to prevent, reduce or remove any effects on the water environment.
- All Forest Service guidelines will be adhered to during all harvesting (felling) activities.

9. Replanting Obligations

For discussion on and approach to replanting refer to Appendix 4-4: Afforestation Information of the EIAR.