

# Oweninny Wind Farm

Oweninny Power Ltd.

Environmental Impact Statement

Chapter 15

Forestry

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## 15. FORESTRY

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### 15.1 INTRODUCTION

Forest plantation within the Oweninny site is owned by Coillte Teoranta Ltd and by private individuals (Corvoderry area mainly). Coillte forests within the site boundary are located on lands owned by Bord na Móna. The development of the Oweninny wind farm will require some key hole and linear clearfelling of Coillte forest plantation along proposed access trackways and around wind turbine foundation and crane hardstands. There will be no requirement for clear felling of private forest plantation within the site. This section has been prepared by ESBI in consultation with Coillte and reviews the potential impact of the development on forest plantation within the Oweninny site and also the potential impacts and mitigation associated with forest clear felling.

### 15.2 APPROACH AND METHODOLOGY

Data and information has been extracted from the Coillte Shannetra Forest Management Plan which covers forest management in the Oweninny area.

Consultation has taken place with Coillte and data has been provided by Coillte with respect to species and year of planting.

The following documents were also consulted:

- Western river Basin District River Basin Management Plan River 2009 - 2015<sup>1</sup>.
- Forest and Water Programme of Measures, 2008<sup>2</sup>.

### 15.3 RECEIVING ENVIRONMENT

#### 15.3.1 Forest Management Plans

Coillte's estate is divided into forests for management purposes. Each forest has a forest management plan (FMP) that summarises the management plans for the forest in question over a five year period. The current plans cover the period 2011 – 2015. These plans outline the criteria under which each forest will be managed, such as the proportion of the forest assigned to timber production or biodiversity purposes and details on the harvesting, restocking, species diversification and crop restructuring plans over the stated period.

- Forest plantation within the proposed Oweninny wind farm is within the Coillte Management Plan - MO05- Shannetra<sup>3</sup>. The current FMP for this area covering the period 2011 to 2015 can be obtained from the Coillte website (<http://www.coillte.ie/index.php?id=1875>).

Coillte's estate is managed on a multi-objective basis, where a balance is sought between

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<sup>1</sup> Western River Basin District, River Basin Management Plan 2009 – 2015, 30<sup>th</sup> April 2010  
[http://www.wfdireland.ie/docs/1\\_River%20Basin%20Management%20Plans%202009%20-%202015/WRBD%20RBMP%202010/](http://www.wfdireland.ie/docs/1_River%20Basin%20Management%20Plans%202009%20-%202015/WRBD%20RBMP%202010/)

<sup>2</sup> Forest and Water Programme of Measures, 23/12/2008. [http://www.wfdireland.ie/docs/22\\_ForestAndWater/](http://www.wfdireland.ie/docs/22_ForestAndWater/)

<sup>3</sup> Coillte, Forest Management Plan, Shanetra Forest, Forest Code MO05 Period covered 2011 - 2015

the pursuit of economic returns, environmental protection and enhancement and social returns like landscape protection and employment. Rather than attempting to achieve a perfect balance on every site it is recognised that some sites have a greater potential than others in pursuing different objectives. To this end, a principal objective is nominated for each site.

Approximately 82% of the total Shannetra plantation area has a timber production management objective. However, approximately 18% of the total Shannetra forest area is managed for biodiversity. Much of this biodiversity relates to the blanket bog restoration project, at Corravokeen and Shanvolahan properties which are outside the Oweninny site area and which was completed in 2007. The aim of the forest management in Shannetra is to remove all conifers from the riparian zones within the forest, and restore to a more natural zone, dominated by a mixture of open peatland habitat, natural scrub and planted native broadleaves. Table 15-1 shows the areas by management objectives for Shannetra Forest.

**Table 15-1: Areas by Management Objectives for Shannetra Forest**

Biodiversity (hectares)	Timber Production (hectares)	Total (hectares)
611	2529 ha	3140 ha

### 15.3.2 Local Context

The proposed development lies within Coillte's MO05 Shannetra forest management area, which is situated in North Mayo between the N59 in the south and Shannetra Hill in the North and east along the R315. The southern boundary lies from the town of Crossmolina to the east and the village of Bellacorick to the west. Forest plantations within Shannetra extend to approximately 3,140 ha. Shannetra is made up of 18 forest properties, four of which are within the Oweninny wind farm boundary and include Shanvodinnaun, Corvoderry, Croaghaun and Moneynierin, see Figure 15-1. Note that Coillte forest property names do not always follow townland names.

Shannetra forest is dominated by commercial conifer plantation of Sitka Spruce (*Picea sitchensis*) and Lodgepole pine (*Pinus contorta*). The forest properties within the Oweninny site were planted between 1974 and 1998, see Table 15-2.

**Table 15-2: Planting year and area**

Planting Year	Area (hectares)
1974	6.1
1984	47.1
1985	20.3
1989	132.2
1990	100.5

Planting Year	Area (hectares)
1991	33.3
1998	12.4
Total	351.9

The FMP indicates that a felling licence is required prior to any harvesting operations and consultation with key stakeholders such as NPWS and Inland Fisheries Ireland will be undertaken. Replanting by the conventional cultivation technique- mounding/drainage - will, it is hoped, be carried out on only 50% of area for the next rotation. The cultivation for the remainder, which produces lodgepole pine crops will consist only of windrowing the brash from the previous crop. No fertilizer will be applied, ensuring minimum impact on fish life and general water quality in the river catchments. Native broadleaves such as birch, rowan, alder and the conifer Japanese Larch will be planted in riparian zones in the next rotation.

According to the current FMP 19 hectares of forest plantation will be felled between 2016 and 2020 in the Corvoderry area. Further felling within the forest properties inside the Oweninny site boundary is not scheduled to take place until after 2020. Predicted felling within these areas is shown in Table 15-3.

**Table 15-3: Coillte felling schedule**

Coillte forest plantation	Indicative areas to be felled post 2020 (hectares)
Corvoderry	24
Croaghaun	104
Moneynieran	126
Shanvodinnaun	75
<b>Total</b>	<b>329</b>

Source: Coillte Forest Management Plan Shannetra 2011 to 2015

Note: Not all forest plantation within the Oweninny boundary will be felled under the proposed felling schedule

### 15.3.3 Sustainable Forest Management

The forest at Oweninny, like all of Coillte's forests, is being managed under the principles of Sustainable Forest Management (SFM) and is certified by the Forest Stewardship Council (FSC), which along with the Programme for the Endorsement of Forest Certification Schemes (Pan-European Forest Certification -PEFC) is one of Europe's two most active forest certification schemes. FSC is an international, non-profit association whose membership includes environmental and social groups and progressive forestry and retail companies working in partnership to improve forest management. Coillte's forests and forest operations have been FSC certified since 2001, demonstrating that they

are managed in accordance with strict environmental, social and economic criteria. The FSC certificate is issued for a duration of five years and in 2011, Coillte successfully retained its FSC certificate following a full audit for a subsequent five year period. In the interim years, an annual supervisory audit is conducted by the FSC to ensure compliance with FSC standards.

Coillte's commitment to FSC principles and criteria is further demonstrated by its active participation in the developing of a new Irish forest certification standard. This initiative has resulted in the adoption of a new FSC national standard for Ireland that comes into force from the start of 2013 onwards.

As a strong advocate and practitioner of SFM, Coillte is committed to:

- Developing its forests in a way that is environmentally sensitive, socially beneficial and economically sustainable.
- Choosing to independently verify that SFM is being practised in its forests through the Forest Certification Process.
- Undertaking to work, with its stakeholders, towards full compliance with Irish Forestry standards.
- Complying with applicable legal requirements and the FSC's International Principles and Criteria as embodied in the FSC Irish Forestry Standard.
- Striving to achieve full compliance with the Standard at the earliest possible date with the resources available.
- Abiding by the Forest Service Code of Best Forest Practice and related guidelines on Archaeology, Fisheries, Landscape, Biodiversity among others.
- Striving for continuous improvement of forestry practices.

Coillte demonstrates its commitment to responsible forest management throughout its estate, which now offers the following:

- Approximately 15% (88,000 ha) of Coillte's estate is managed with biodiversity as the primary objective.
- Over 2,000 km of walking and cycling trails across some of the most beautiful Irish landscape.
- More than 150 recreation sites and 10 forest parks maintained by the company.
- Habitat restoration projects (blanket bog, raised bog and priority woodland - EU LIFE co-funded projects, more than 3,000 ha of SAC successfully restored to date).

#### **15.3.4 Effect of Trees**

The presence of trees in close proximity to the wind turbines can in general impact on performance and reduce their efficacy but this is dependent on turbine hub height, spacing of wind turbines and forest height and density. Potential effects of trees can occur as follows:

- The fact that trees sway in the wind indicates that they are absorbing energy from the wind, energy that could 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 (such as grass or moorland). This increased roughness has a consequent negative impact on energy outputs from the wind farm.
- On sites where trees are not all clear felled at the same time, as is the case in most Irish commercial forests, the copse edges can create substantial edge effects with large wind eddies and even reverse circulations. These can both create larger still boundary layers and also induce turbulence. These can affect both turbine yield and blade and power train life.

In the case of Oweninny only 10% of wind turbines are located within forest plantations or close to their boundaries. The effect of trees on the performance of these turbines will be minimal given that the hub heights will be up to 120m which is almost 6 times the height of the conifer plantations.

### **15.3.5 Forest Management at Oweninny**

#### **15.3.5.1. Tree Felling Methodology**

At Oweninny new access tracks will pass through forest plantation areas which will require clear felling of a corridor through Coillte plantation areas and around turbine bases and hardstands, see Figure 15-2. A harvester or processor, as shown in Plate 15-1, will be used for harvesting operations, which incorporates the felling of trees, de-branching, and cutting them into required lengths. Processing is the term used to describe de-branching and cross-cutting. The harvesting machine operator controls the harvesting head which is located on the front arm of the machine. The harvesting head contains the saw, wheels for moving and de-branching the tree, measuring devices for measuring the length and diameter along the tree, and the urea applicator.

The harvester will fell four rows of trees at each side of the machine, resulting in a total of 8 rows of trees within the reach of the machine, being cut. As the rows of trees are generally planted 2 m apart, a harvester can cut up to a 16 m wide strip through the standing forest. Therefore, the harvesting routes (otherwise known as racks), laid down as the harvester moves forward, can be up to 16 m apart.



**Plate 15-1: Typical example of a Forest Harvester (Courtesy of Coillte)**

The harvesting or extraction rack is the path used by timber harvesting and extraction machinery. It is normally formed by the harvesting machine during the cutting of the timber using the branches and crown of the tree (otherwise known as lop and top). The covering of branches on the extraction rack is also called a brash mat. Brash mats are used to protect the underlying soil from damage and will be well maintained and functional throughout the harvesting operation. Double-wheeled machinery and close poling (laying timber or logs side by side perpendicular to the direction of travel) to spread the load across a low bearing surface will be used as necessary where the bearing capacity of the ground is poor.

Each tree is normally cut at its butt as close to the ground as possible. The tree will then be de-branched and processed into a number of lengths of log which are dependent on the tree diameter and its length. Timber will be sawn into different lengths based on its diameter and quality. These categories are standard across the timber industry. Each category or product size is segregated and stacked at roadside for removal by lorry and crane. The minimum useable diameter is generally 7 cm. The harvesting machine is calibrated to make maximum use of each tree to avoid unnecessary wastage. Tree roots are generally left in situ and the area subsequently replanted.

The processed logs will be dropped in piles beside the extraction rack, the different categories of logs being grouped together to facilitate forwarder extraction.

A forwarder, a typical example of which is shown in Plate 15-2 is a mechanically propelled machine which uses a hydraulic arm to gather timber logs before stacking them onto the body of the machine. It has a rotating operating area which allows it to be operated efficiently going forward or backward along the racks previously laid down by the

harvester.

The forwarder will transport the timber logs from the forest to a predetermined roadside stacking area.



**Plate 15-2: Typical example of a forest forwarder (Courtesy of Coillte)**

Each category of logs will be separately transported (otherwise known as forwarding) and stacked at a collection area in separate piles in a stable and safe condition. The timber is then transported to a sawmill for processing into wood products dependent on its size and quality. All marketable timber felled to facilitate the development will be used commercially.

Before any harvesting works commence on site, all personnel, particularly machine operators, will be made aware of the following and have copies of relevant documentation:

- The felling plan, surface water management plan, construction management plan, emergency and any contingency plans.
- Environmental issues relating to the site.
- The outer perimeter of all buffer and exclusion zones.
- All health & safety issues relating to the site.

The harvester represents the first point of contact between machinery and the ground and therefore the layout of the extraction racks is critical. The racks laid down by the harvester will be the extraction racks that are travelled many times by the forwarder. The layout of extraction racks or routes will follow the proposed access track routes and will:

- Avoid streams or other watercourses.

- Be as short as possible.
- Avoid any areas of poor crop or bare areas where brash to carry the machine is in short supply.
- Generally extract to existing site access track with the extraction racks laid out at right angles to the road to prevent water flowing down wheel ruts.

Dense, fresh brash mats are the most important part of a felling site as they serve to avoid soil damage, erosion and sedimentation. They will be replenished where they become heavily used or worn. Where damage or serious rutting has started to occur, extraction will be suspended immediately. Relocation of the extraction rack or additional brashing will be used to remedy the situation. Operation of all machinery will be suspended during and following heavy rainfall periods.

Post harvesting and during wind farm access track, turbine foundation and crane hardstand construction in deep peat areas surface brash together with excavated peat material will be removed to the proposed peat repository area where deemed necessary by the geotechnical engineer or construction supervising engineer.

## 15. 4 IMPACT OF THE DEVELOPMENT

### 15.4.1 Timber harvesting

Forest harvesting along proposed access roads and proposed turbine locations will begin ahead of the wind farm construction. Clean cut-off drains will be installed at the same time as the timber harvesting operations. The wind farm drainage system along the site access roads will be constructed in advance of road construction.

Pre-construction site works will be as follows:

- In advance of access track construction, a 50 m wide corridor will be cleared of trees.
- The trees will be removed by forming racks which will be located at approximately 16m apart.
- Trees will be cut ahead of the track construction and extracted along the racks.
- Clean cut off drains are proposed to divert runoff around areas disturbed during construction. These drains are designed to replicate the natural drainage patterns and will discharge within the same catchments allowing runoff to ultimately drain to the same watercourses as per existing pre development conditions.

The proposed extent of tree felling for this development will be the minimum necessary to construct the turbines and associated infrastructure and will follow a keyhole felling pattern. A clearfell corridor 50m in width will be required for access track development (25m each side of the centre line of the proposed access track). Additionally, an area extending 50m around the turbine foundation base and the crane stand area will also be clearfelled.

The approximate area of tree clearing required for the wind farm will be 36 ha, comprising about 28 ha in the Moneynierin and Croaghaun forest properties and 8 ha in the Corvoderry and Shanvodinaun property areas. This represents about 10% of the forest plantation within these property areas or approximately 0.7 % of the total site area. Ten of

the 112 proposed turbines are situated within areas of commercial forest plantation.

Clear felling of these areas will not be required until Phase 3 of the development proceeds to construction, the timing of which is dependent on the development of Grid West. Hence clear felling is unlikely prior to 2020 and is likely to dovetail with the projected harvesting period for the respective Coillte property areas set out in the Shannetra FMP.

Tree felling will be subject to a felling licence from the Forest Service and will be in accordance with the conditions of such a licence. A limited Felling Licence will be put in place prior to any works commencing on site.

To ensure the forest harvesting reduces the potential for sediment and nutrient runoff, the construction methodology will adhere to the Forest Service Forestry and Water Quality Guidelines (2000) and Forestry Harvesting and Environmental Guidelines (2000).

The loss of 36ha of forest plantation is of minimal significance in the context of the site area and the Coillte Shannetra Forest Management Plan area, with 2,529 hectares of forest managed for timber production. It represents just 1.4% of the total Shannetra area.

There will be no impact on private forest plantation areas.

The various wind turbine manufacturers have different requirements with respect to the area of forest harvesting required around turbine locations; primarily related to commercial considerations including equipment performance warranties. It will be a matter for the chosen turbine supplier to determine exact felling requirements at Oweninny but that indicated is representative of typical requirements. However, the extent of tree felling undertaken will be the minimum necessary to construct the turbines and associated infrastructure.

#### **15.4.2 Replanting**

The area clear felled to facilitate the development will be replanted with the exception of the infrastructure footprint. The replanting will occur in accordance with the relevant Shannetra FMP prevailing at the time and will be in a similar manner to silvicultural clear fells which have occurred in the area.

#### **15.4.3 Potential Site Impacts**

The key potential impacts from the proposed development relate to changes in the hydrological regime of forested catchments, water quality and ecology and are associated with the felling and construction of the proposed wind farm.

#### **15.4.4 Change in Local Hydrology**

The rate of absorption of rainfall on a felled site, and therefore the rate of run-off, is slightly higher than that of a forested site. Mature forest has a high evapo-transpiration rate due to interception of rainfall by the forest canopy, increased evaporation due to roughness of the canopy and transpiration losses due to the deep root system. The removal of mature forest plantation results in more rainfall reaching the surface and running off directly into local watercourses, thereby causing both increased potential for soil erosion and high sediment loadings within those watercourses. This can lead to reduced flow capacity, can create the potential for sediment blockages and can increase the consequential risk of flooding. Deposition of coarse woody debris from the mechanised felling into these channels can also have major effects on channel geomorphology and maximum flow rates. Given the limited amount of mature forest that will or could potentially be removed, any changes to local hydrology due to any felling that

may take place are however likely to be extremely small.

#### **15.4.5 Water quality - nutrient enrichment**

Decaying brash and tree stumps arising from the felling have the potential to lead to an increase in nutrients, particularly phosphorus in surface water run-off, which could impact on the water quality and aquatic ecology of the Muing river and its tributaries. This river drains the Moneynierin and Croaghaun forest properties. It is likely that forest plantation drainage in these areas has direct connectivity to the river system due to the establishment years of the plantation. Post 1995 water quality mitigation measures, such as introducing riparian buffer strips and drainage curtailment, were included in establishment operations. Water quality issues arising from clear felling in the Corvoderry and Shanvodinaun properties are less likely to occur as there is no major river system draining these areas. The potential impacts on water quality are discussed in detail in Chapter 10.

#### **15.4.6 Water quality - increase in suspended matter**

Felling operations, if not properly managed, can lead to increases in silt runoff and harvesting debris entering waters leading to increased suspended solids. However, the risk of soil and harvesting debris entering watercourses arising from the wind farm development is no different to that arising from the regular harvesting of these stands. Provided the appropriate guidelines are employed and their use enforced during harvesting and extraction, there should be no additional problems associated with any felling that may take place. Again potential impacts are discussed in Chapter 10.

#### **15.4.7 Loss (or Change) of Habitat**

The effects on loss or change of habitat are considered in Chapter 6 – Terrestrial Ecology. However, the following observations are made:

- The trees at the site are a commercial stock whose lifecycle comprises felling and replanting for commercial exploitation. 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.

#### **15.4.8 Noise Disturbance During Felling**

Areas that may be identified to be cleared of trees are a minimum of 800m distance from the nearest properties. Noise disturbance that may arise is not considered to be a significant issue, given that it will be temporary, short-lived and will occur only during daytime. In addition, any noise impacts resulting from the felling of trees would have occurred at some point during the commercial operation of the forest site.

#### **15.4.9 Increase of Extraction Road Traffic**

Forest harvesting will 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. It is noted that in reality these are not additional traffic movements, since they would take place in any event, albeit at another time.

## 15.5 CUMULATIVE IMPACTS

The planning approved Corvoderry wind farm is located within the eastern section of the Oweninny site and is entirely within a private forest commercial pine plantation. The EIS for the wind farm indicates that a total of 160 hectares will be clear felled to facilitate this development. Within the Oweninny site the total cumulative area of forest plantation to be clearfelled, combining Corvoderry and Oweninny, will be 196 hectares. It is likely that the Corvoderry plantation will be felled within the same time-frame as Oweninny phase 3. The forest plantation clearfell will be subject to a Forest Service Felling Licence.

Keyhole felling of approximately 146 hectares of forest are proposed for the Coillte Cluddaun wind farm to the north of the Oweninny site. Again this clearfell is likely to occur during phase 3 of the development and will be subject to a felling license from the Forest Service also.

## 15.6 MITIGATION

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 licensed extraction activities in order to minimise traffic and noise disturbance. However, it will only be possible to achieve this if the scheduled felling of the planted areas coincided reasonably closely with that required for the development of Phase 3 of the wind farm.
- Harvesting extraction routes will be the shortest possible and avoid the crossing of watercourses where possible. Felling and extraction of timber will only be permitted by experienced and fully trained operators.
- Where feasible, felling and extraction will be undertaken outside of the bird breeding season.
- Physical exclusion techniques will be employed where deemed necessary by the designated site ornithologist to prevent colonisation of potential nest site areas prior to forest harvesting extraction and construction.
- Brash mats will be used as necessary on any off-road harvesting routes to minimise soil damage and disturbance and will either be removed and transported to the peat repository area for the Muing river area or windrowed at least 20m from any watercourse.
- Branches, logs or debris will not be allowed to accumulate in aquatic zones (permanent or seasonal river, stream or lake shown on an Ordnance Survey 6 inch map) and will be removed as soon as possible.
- It is proposed to provide clean water cut off drains to stop water running across construction areas and to discharge these to local water courses. Drainage channels will collect runoff from the construction and development areas. These drainage channels will discharge to dedicated Sedimentation Ponds or Settlement Ponds throughout the site. These ponds will hold water in order to reduce turbulence thus allowing solid particles of sediment or silt to settle out.

Further to the above, all construction of forest roads, including the creation of buffer zones and roadside drainage, will adhere to Forest Service Guidelines:

- Forestry and Water Quality Guidelines
- Forest Harvesting and Environmental Guidelines

## **15. 7 CONCLUSIONS**

With the implementation of the mitigation measures as outlined and considering that the level of forest harvesting required to facilitate the proposed development is small, no significant residual impacts are expected.

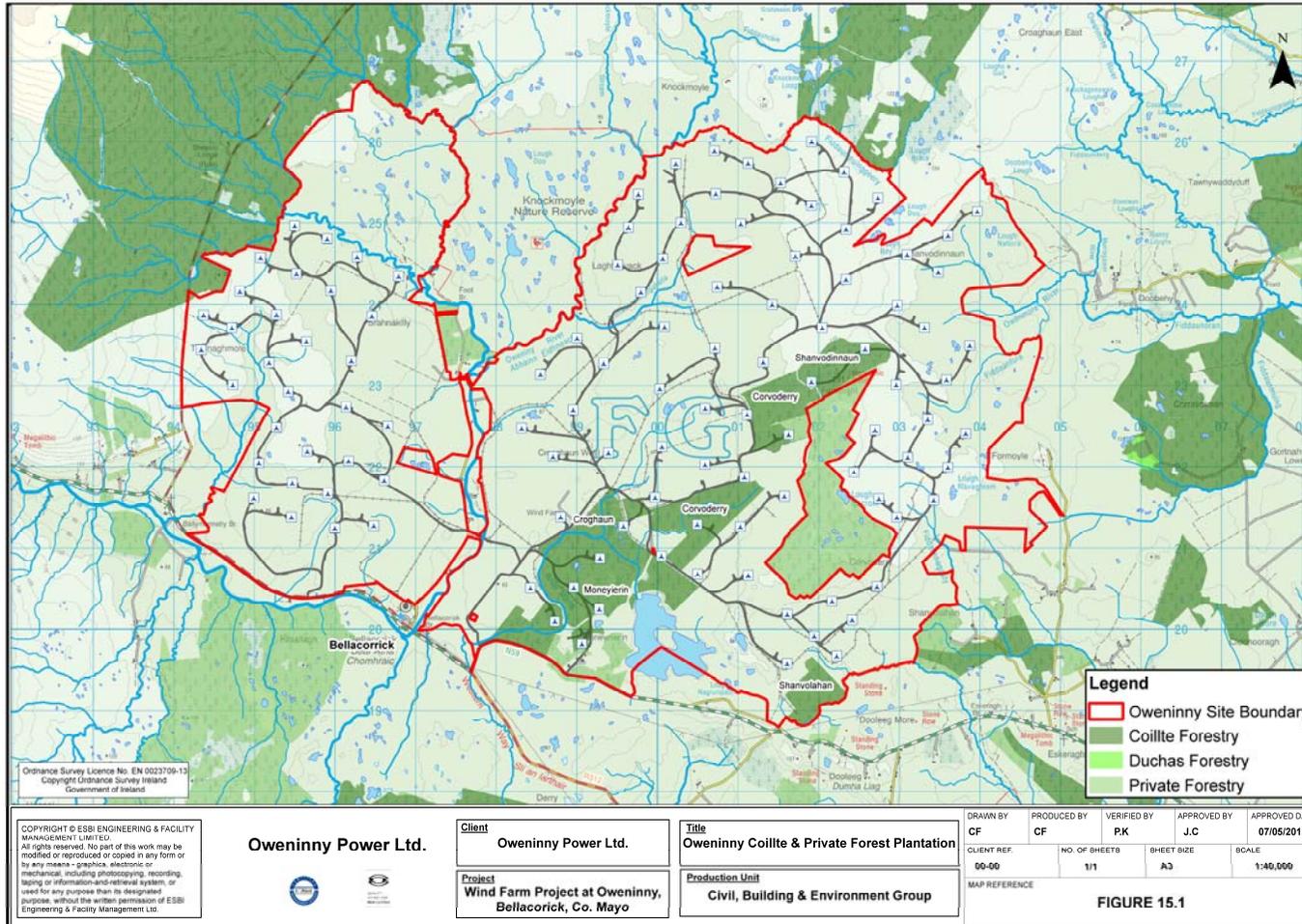
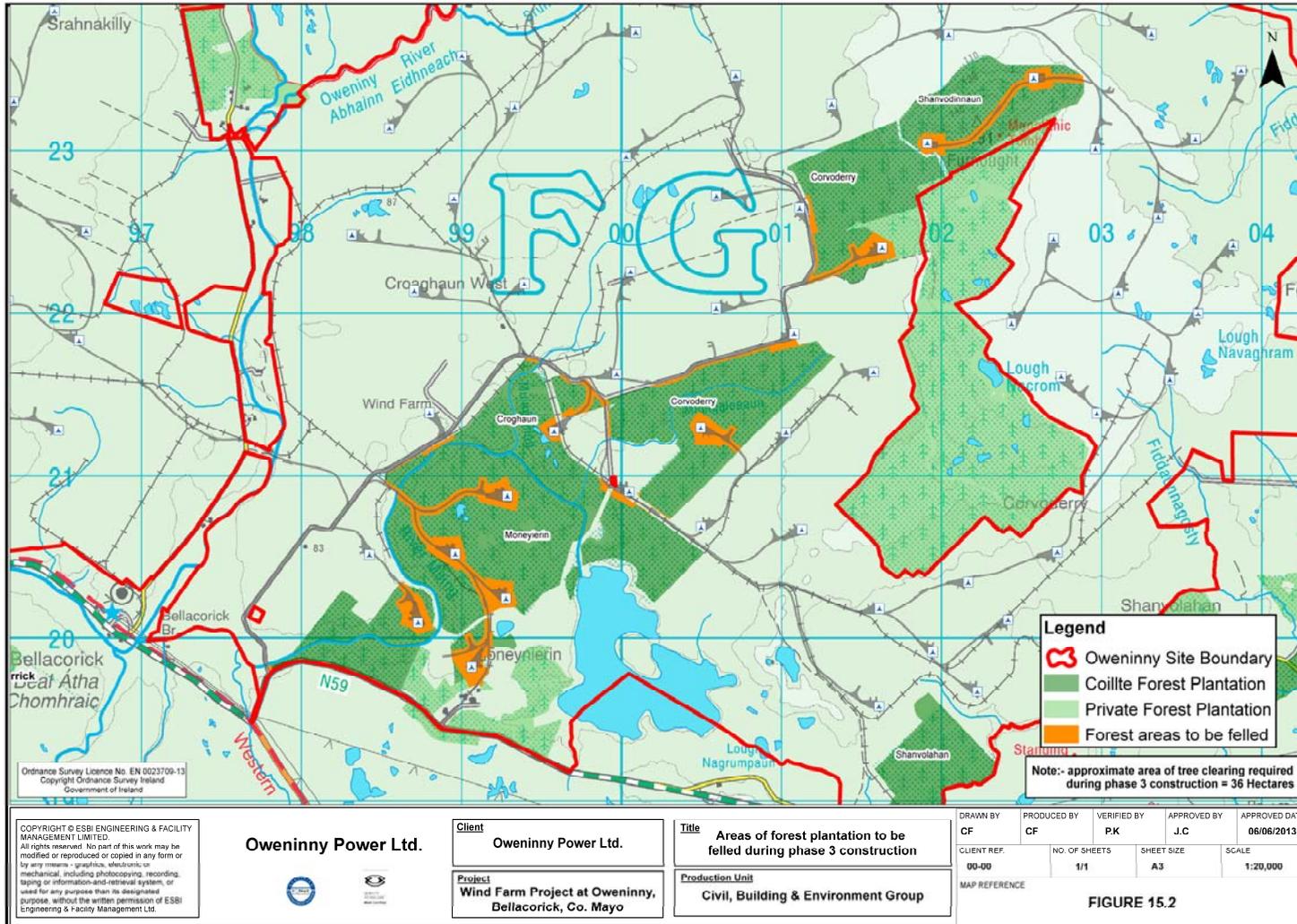


Figure 15-1: Oweninny Coillte and Private Forest Plantation



**Figure 15-2: Forest Plantation areas to be felled**