The Socio-Economic Impact of Forestry in Co. Leitrim

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Terms of reference and executive summary
The terms of reference for this study are as follows:

1. to assess the social impacts of forestry in County Leitrim including *inter alia* the attitudes to forestry of people living there. This assessment will be based on consultations locally with farmers, non-farmers and other interested parties;
2. to assess the economic impact of forestry for County Leitrim including total employment supported by the sector;
3. to assess the impact of forestry on farm incomes relative to other types of farming;
4. to consider the non-timber outputs of forestry in County Leitrim;
5. to assess the current state of environmental regulation of forestry in County Leitrim.

This report addresses these five terms of reference in five chapters (3 to 7). The first chapter provides a brief profile of the County of Leitrim. The second chapter provides an overview of the history of forestry in Ireland focussing on forest policy, it then presents an overview of the recent history of forestry development in Co. Leitrim. Chapters 3 to 7 then address the terms of reference.

The following is a summary of the key findings presented in the order they appear in the report:

1. The agricultural land use in County Leitrim is primarily grassland which is found on poorly drained soils of low fertility. Many of farms in the county are likely to include High Nature Value (HNV) farmland.
2. The percentage forest cover in Co. Leitrim in 2017 was 18.9%. This is the highest percentage forest cover among all counties and is substantially higher than the national level of 11.0%. Sitka spruce is the dominant species in the forests in the county, accounting for 61.3% of the total forest area. This is higher than the national figure of 51.0%. Native species account for 30.7% of the forest area in the county.
3. The growth rates of trees in the county are high; for Sitka spruce in private stands growth rates are estimated to be 20% higher than the average in private stands nationally.
4. One of the main aims of Government policy with respect to forestry is to expand the percentage forest cover in the entire country. It is currently 11% and the aim is to reach 18% nationally by the year 2046. Incentives in the form of establishment grants and annual premiums have been available to landowners since 1990 and higher premium payments have traditionally been available to farmers to encourage greater rates of farmer participation in afforestation. This situation changed in 2014, when farmers and non-farmers were deemed eligible for the same rate of premium payment for the first time.
5. An earlier study of forestry and land use in Co. Leitrim, the Leitrim Resource study, conducted in the 1970s, identified the potential of the land in the county for forestry. It also identified a very strong resistance amongst farmers in the county to selling land for afforestation. At the time afforestation was almost exclusively carried out by the State.
6. To find out more about the owners of forests in Co. Leitrim, a survey of a sample of owners was conducted as part of this study. The main findings are:
   - Just over two-thirds of owners of forests in Co. Leitrim had planted forests on their own land;
   - Twenty-six percent were investors (i.e. they bought land/forest purposely for investment);
   - Five percent had inherited their forest;
   - Just over 30% of the forest owners were not resident in Co. Leitrim (half of these were from neighbouring counties);
   - The average size of an individual forest plot was 6.92 hectares. Forty percent had planted more than one plot. The average total area planted per owner was 14.0 hectares.
   - Seventy-five percent of owners were farmers (full-time, part-time and retired).

7. The social impacts of forestry were addressed using qualitative research methods. The aim was not to achieve a demographically balanced and representative sample of the opinions of the population of Co. Leitrim, but instead to understand the range of opinions held by people regarding forestry in the county. The main source of the information came from interviews held with 23 interviewees who were selected purposively to capture a range of opinions. Information from a survey of forest owners and voluntary written submissions provided additional information. The issues that emerged from the interviews were later grouped into themes. The major themes include those relating to forestry as a land use, forestry’s role in the community, and forest policy. A strong divergence of opinion was noted for most of the themes.

8. The economic impact of forestry for Co. Leitrim (and the associated employment) was assessed. A base year of 2017 was chosen. The analysis estimated that a total of 50.3 full-time equivalent (FTE) jobs were generated for Leitrim residents as a result of forestry activity in the county in that year; a further 25.0 FTE jobs were generated for non-Leitrim residents. An additional 76.0 Co. Leitrim residents had employment in forestry outside of the county. Thus a total of 151.3 FTE jobs were generated as a result of forestry activity in Co. Leitrim in 2017. Wood processing in the county generated a further 158.0 full-time equivalents, half of whom were residents of Co. Leitrim. Thus, in total 309.3 FTE jobs were associated with forestry/wood processing in Co. Leitrim in 2017.

9. An estimate of the direct economic activity associated with forestry in Co. Leitrim in 2017 is €15.0 million. The economic activity associated with wood processing is €11.5 million in 2017, giving a total of €26.5 million economic activity associated with forestry/wood processing in 2017 in Co. Leitrim.

10. A comparative assessment of the relativity of forestry and farm incomes was undertaken, using a micro-simulation modelling approach and discounted cashflow analysis. Based on this approach, the estimated overall percentage of farms in Co. Leitrim where the return from forestry (on a per hectare basis) would be higher than that from agriculture is 67%.

11. The total carbon stock in Co. Leitrim forests is estimated to be 12,606,000 tonnes.

12. Several Coillte-owned, recreation forests are located in Co. Leitrim, but visitor numbers to these are not available. Private forests are generally not available for
public recreation. Our survey of forest owners indicated that some used their forests for recreation. A small percentage (16%) said they allowed others to recreate in their forests.

13. Available data on the biodiversity associated with forestry in Co. Leitrim is limited. The forest owners surveyed indicated that the following tree species were found in their forests: alder, ash, birch, oak, rowan, sycamore, beech, larch, Sitka spruce, Norway spruce, lodgepole pine, western red cedar, “cypress” and Douglas fir. Sitka spruce was by far the dominant species. The survey of forest owners also provided some information about the fauna within private forests. Forest owners reported sighting a variety of animal and bird species in their forest, most commonly rabbit/hares, badgers and pine martens.

14. Forests can have negative and positive effects on water quality. Water monitoring data from Co. Leitrim indicated that 36 water bodies have been identified as being at risk of not meeting their Water Framework Directive (WFD) status objectives. The most significant pressure leading to this “at risk” status is agriculture, accounting for 42.9% of the at-risk water bodies. Hydromorphology (16.3%), forestry (14.3%), invasive species (8.2%), anthropogenic pressures (6.1%), industry (4.1%), urban waste water (4.1%), urban run-off (2%) and extractive industries (2%) are also identified as significant pressures. Within the WFD, some water bodies are classified as having a high ecological status. Of the eight high status objective waterbodies in Co. Leitrim four are at risk and four are not at risk. Agriculture has been defined as the sole significant pressure for two of the sites, with peat (extractive industry) identified along with agriculture for another waterbody. The fourth waterbody has hydromorphology listed as a sole significant pressure. Hydromorphology includes sediment/drainage issues and thus may be a pressure as a result of forestry land use.

15. Since 1989, a condition for receipt of grant-aid for afforestation has been the compatibility of forestry development with the protection of the environment. Guidelines, which are now Regulations, were introduced in 1992 and were further expanded and replaced by Environmental Regulations with respect to Afforestation in 2016. The Regulations are extensive, but a key element is setbacks (or buffers in earlier versions). From 1992, forests had to be set back from public roads, houses, rivers and archaeological features. Setback distances have been expanded a number of times.

16. Since 2000, the issuing of felling licences was accompanied by the condition that the felling and planting that took place should be in accordance with the Guidelines that applied at the time. This implies that second (or more) rotation forests established since 2000 should have complied with the setback (buffer) distances specified in the guidelines at that time.

17. Inspections are carried out by Forest Service District Inspectors (DIs) to ensure compliance with regulations. All applications for afforestation licences are desk assessed by DIs. An estimated 61% of afforestation sites were visited in 2018 in advance of an afforestation licence being issued; a similar percentage was field inspected after stand establishment in that year and a slightly higher percentage, i.e. 67%, was field inspected before the final grant payment was made. Inspection rates for forests in Co. Leitrim are similar to these national rates. Field inspection rates for felling licences are much lower; nationally, 19% of all applications for felling licences in 2018 were field inspected by DIs. Inspection rates for felling licences in Co. Leitrim
were lower than the average. The county has the second highest number of applications for felling licences.

18. Since the Forestry Appeals Committee (FAC) was established in 2018, a total of 189 appeals have been submitted to it, 25% of these relate to Co. Leitrim. All bar one were third party appeals. With respect to afforestation appeals that have been heard to date, the decision in the majority of cases has been to uphold the decision of the Minister to grant the afforestation licence. For almost one third of the appeals, the FAC varied the conditions of the licence. Of the four decisions to date to cancel the granting of licences, one of these was a successful appeal made by an applicant against a decision not to grant an afforestation licence.
Chapter 1: Profile of Co. Leitrim

Leitrim County is situated in the north-west of Ireland. The northern half of the county is characterised by mesa (table-like) mountains, lakes and deep glacial valleys while the southern half of the county is characterised by a drumlin belt interspersed with small lakes and rolling hillocks (Leitrim County Council, 2015). Co. Leitrim has a number of large lakes including Lough Allen in the centre, Lough Melvin to the north-east of the county and Lough Gill to the west. The total area of the county is 1,558 km$^2$ (158,885 ha; 614 square miles).

Population
The population of Co. Leitrim was 32,044 people at the time of the last census (CSO, 2016). After a constant decline in population since the Famine, the total population has grown by 24% since 2001 (Figure 1). Among the 78 electoral divisions (EDs) that comprise the county, 56 experienced an increase in population during this period (2001-2016). The population density of the county is 21 persons per km$^2$, which is the lowest in the country. A large proportion of the population is within the young (<14 years) and older (65 years and above) age categories. Thus, the dependency ratio (2016) of 62.6% is the highest in the country (the national figure is 52.7% (CSO, 2016, p. 23)).

![Figure 1: Population of the five “Rural Areas” in Co. Leitrim 1961-2016](image)

Employment
Of the total labour force of 14,891$^1$ persons in Co. Leitrim in 2016, the total number employed was 12,728 (CSO, 2016). The health and social work sector accounted for the greatest percentage of employment (i.e. 13.5%). Almost 8.6% of people were employed in agriculture, forestry and fishing, which was almost double the percentage employed in these sectors nationally (CSO, 2016).

$^1$ Population aged 15 years and over in the Labour Force.
Climate, land use and soils
The mean annual precipitation within the county\textsuperscript{2} was 1306 mm over the period 2000-2018. The total agricultural area\textsuperscript{3} of Co. Leitrim is 104,927 ha (CSO, 2010) (Table 1), the majority of which is grassland.

Table 1: Land use in Co. Leitrim

<table>
<thead>
<tr>
<th>Land enterprise</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural area used</td>
<td>104,927</td>
</tr>
<tr>
<td>Commonage</td>
<td>12,772</td>
</tr>
<tr>
<td>Agricultural area used, excluding commonage</td>
<td>92,155</td>
</tr>
<tr>
<td>Rough grazing</td>
<td>9,824</td>
</tr>
<tr>
<td>Grass (excluding rough grazing)</td>
<td>82,272</td>
</tr>
<tr>
<td>Cereals</td>
<td>3</td>
</tr>
<tr>
<td>Other fruit and crops</td>
<td>57</td>
</tr>
</tbody>
</table>

Source: CSO, 2010

The soils of County Leitrim are dominated by gleys and peats, i.e. soils with poor drainage (Table 2) (AFT, 1973). The overall fertility of soils in the county was assessed by Teagasc over a seven-year period from 2007 to 2013. Only 2\% of the samples taken achieved a Good Overall Fertility Profile (Teagasc, 2015). Many of farms in the county are, however, likely to include High Nature Value (HNV) farmland, which has been defined as “areas where agriculture is a major (usually the dominant) land use and where agriculture supports or is associated with either a high species diversity or the presence of species of European conservation concern or both” (Anderson et al., 2003). Matin et al. (2016) mapped the likely distribution of HNV farmland in the Republic of Ireland based on the following five indicators: semi-natural habitat cover, stocking density, hedgerow density, river and stream density, and soil diversity. Co. Leitrim came out as one of the counties with a high likelihood of having this type of farmland. To date HNV is not an official designation and it does not attract higher levels of farm subsidy.

\textsuperscript{2} Data taken from Drumshambo weather station.

\textsuperscript{3} The agricultural area excludes the forest/woodland area.
Table 2: Soils of Co. Leitrim and their relative extent

<table>
<thead>
<tr>
<th>Great Soil Group</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Earths</td>
<td>0.14</td>
</tr>
<tr>
<td>Grey Brown Podzolics</td>
<td>0.20</td>
</tr>
<tr>
<td>Brown Podzolics</td>
<td>1.78</td>
</tr>
<tr>
<td>Podzols</td>
<td>0.45</td>
</tr>
<tr>
<td>Gleys</td>
<td>46.82</td>
</tr>
<tr>
<td>Rendzinas</td>
<td>0.90</td>
</tr>
<tr>
<td>Lithosols</td>
<td>0.45</td>
</tr>
<tr>
<td>Peats</td>
<td>26.03</td>
</tr>
<tr>
<td>Complexes</td>
<td>10.10</td>
</tr>
<tr>
<td>Association</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>94.18*</td>
</tr>
</tbody>
</table>

* 5.82% of the area comprises water and lakes

Source: AFT, 1973

Designated areas in Co. Leitrim

Under the Birds and Habitats Directives, introduced in 1979 and 1992 respectively, areas have been designated to protect threatened, rare and vulnerable species and habitats across Europe and to ensure their survival, including Special Protection Areas for Birds (SPAs) and Special Areas of Conservation (SACs). Collectively, SPAs and SACs form the Natura 2000 network of protected areas. The Habitats Directive and the Birds Directives were transposed into Irish law with S.I. 477 in 2011. Natural Heritage Areas (NHAs) are areas containing important wildlife habitat and often contain rare or threatened species. The NHA designation was transposed into Irish Law under the Natural Habitats Regulations (S.I. 94 of 1997), and received full statutory backing in Ireland with the passing of the Wildlife (Amendment) Act 2000. There are 8 SACs and 9 NHAs in Co. Leitrim. There is also one SPA (which straddles the Sligo/Leitrim border) for two birds, the Peregrine (*Falco peregrinus*) and the chough (*Pyrrhocorax pyrrhocorax*). Almost all the NHAs are blanket bogs.

Forestry in Co. Leitrim

The percentage forest cover in Co. Leitrim in 2017 was 18.9% (Table 3). This is the highest percentage forest cover among all counties and is substantially higher than the national level of 11%. Private forests account for just over half (51.3%) of the forest area in the county.

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*S.I. – Statutory Instrument.*
Conifers account for 70% of the total forest area in Co. Leitrim. Sitka spruce is the dominant species accounting for 61.3% of the total forest area. This is higher than the national figure of 51%. Native species\(^7\) account for 30.7% of the forest area in Co. Leitrim which is slightly higher than the national figure of 26.6% (Table 4).

A more detailed breakdown of the species composition of the forests in Co. Leitrim is given in Table 5. Birch, a native species, is the second most common tree species in Leitrim after Sitka spruce.

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\(^5\) Public: All state owned forests including Coillte forests.

\(^6\) Private (other): private forests not in receipt of grant-aid post 1980. Includes areas semi-natural forests that have regenerated naturally and other longstanding plantations on private estate holdings.

\(^7\) The following are the tree species that are native to Ireland (Forest Service, 2018) (not all are present in Co. Leitrim): alder, silver and downy birch, ash, sessile and pedunculate oak, Scots pine, hazel, holly, crab apply, aspen, wild cherry, eared willow, goat willow, rusty willow, rowan and yew.
Table 5: Detailed species composition of the forests of Co. Leitrim

<table>
<thead>
<tr>
<th>Species</th>
<th>Area '000 ha</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitka spruce</td>
<td>16.94</td>
<td>61.30</td>
</tr>
<tr>
<td>Scots pine</td>
<td>0.23</td>
<td>0.80</td>
</tr>
<tr>
<td>Other pines</td>
<td>0.94</td>
<td>3.40</td>
</tr>
<tr>
<td>Larch spp</td>
<td>0.96</td>
<td>3.50</td>
</tr>
<tr>
<td>Other conifers</td>
<td>0.32</td>
<td>1.10</td>
</tr>
<tr>
<td>Sessile and pedunculate oak</td>
<td>0.20</td>
<td>0.70</td>
</tr>
<tr>
<td>Beech</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>Ash</td>
<td>0.62</td>
<td>2.20</td>
</tr>
<tr>
<td>Birch spp.</td>
<td>2.95</td>
<td>10.70</td>
</tr>
<tr>
<td>Alder</td>
<td>1.34</td>
<td>4.80</td>
</tr>
<tr>
<td>Other broadleaves</td>
<td>3.18</td>
<td>11.5</td>
</tr>
</tbody>
</table>

Source: Forest Service, 2018

Forest management in Co. Leitrim

Forests in Ireland are generally managed under the clearfell system with the relatively high growth rates resulting in short rotations of 40-50 years (Ní Dhubháin et al., 2015). Standard practice within coniferous State forests is that thinning occurs for the first time when the stand is aged between 14 and 24 years (Forest Service, 2007) and continues thereafter at regular intervals until clearfelling occurs. During a clearfell operation, all stems are removed in the final harvest and reforestation (which is a legal requirement under the 2014 Forestry Act) generally takes place within a two-year period. This is the management approach that is used in the majority of the forests in Co. Leitrim. On the soil types that characterise the county, the risk of windblow (i.e. the uprooting and overturning of trees) in forest stands is high (Quine et al., 1995) especially if thinning operations are delayed (Hamilton, 1980).

The age at which a forest is clearfelled is influenced its growth rate/productivity. In Ireland and Britain, the most common measure of forest productivity is yield class, which is defined as the maximum mean annual increment (MMAI) that a particular stand of trees can achieve. A stand with a maximum mean annual increment of 14 m$^3$ha$^{-1}$an$^{-1}$ has a yield class of 14. The average yield class for Sitka spruce nationally is estimated by Farrelly et al. (2009) to be 17 m$^3$ha$^{-1}$an$^{-1}$. Farrelly (pers com) estimates the yield class of Sitka spruce in Coillte owned forests in Co. Leitrim to be slightly higher than the national average, i.e. 17.6 m$^3$ha$^{-1}$an$^{-1}$. The average yield class for Sitka spruce in private forests nationally is 21.2 m$^3$ha$^{-1}$an$^{-1}$ (Farrelly et al., 2009) and Farrelly (pers com) estimates that the figure for Co. Leitrim for private forests is higher than this, i.e. approximately 25 m$^3$ha$^{-1}$an$^{-1}$.

The clearfell (clear-cut) silvicultural system dominates in Ireland and is the most widely used silvicultural system in the world (Matthews, 1996). Alternatives to the clearfell system are sometimes referred to as Continuous Cover Forestry (CCF). CCF involves the use of
silvicultural systems whereby the forest canopy is maintained at one or more levels without clearfelling (Forestry Commission, 1998).

A survey conducted in Ireland in 2013 estimated that a total of 10,603 ha of forest nationally was managed under CCF, representing 1.5% (in 2013) of the total forest estate. The survey found that a total of 242 ha of forest in Co. Leitrim were managed under CCF, 153 ha in public forests (12 properties) and 89 ha (1 property) in private forests (Vítková et al., 2013).

In March 2019, funding for CCF was introduced by DAFM under the Woodland Improvement Scheme. This funding is for the conversion of existing forests to CCF over a 12-year transitional period and is paid in three instalments of €750 per hectare. Conversion to CCF has been shown to be most likely to be successful if started early (i.e. in relatively young stands) (Hale et al., 2004), as tree stability declines as an even-aged stand develops at a high density (Cremer et al. 1982).
Chapter 2: History of forestry in Ireland and Co. Leitrim

This chapter summarises the history of forest policy in Ireland. The latter part of the chapter focuses specifically on the history of forestry development in Co. Leitrim.

History of forest policy development in Ireland
At the time Ireland gained independence in 1922, forest cover had reached a nadir of 1%. Expanding the forest cover in Ireland has been a government policy aim since that time, with the early emphasis on afforestation by the State. Planting was typically on poor quality, high elevation sites because it was only such sites that the Forestry Division could afford to acquire, as the Department of Agriculture had set a limit on the price that the Forestry Division could pay to acquire land for afforestation. The objective of fixing such a price was to ensure that land suitable for agricultural purposes could not be bought for forestry (Neeson, 1991).

In 1948 a greatly expanded planting programme was announced and an annual planting target of 10,000 hectares for 40 years was set. The justification for this expansion was described in a Government White paper where it was stated that because of the depletion in the countries stock of softwood during the 2nd world war years, it was “imperative to engage in large-scale re-afforestation” (ERP, 1948, p. 22). State planting following the setting of this target increased (Figure 2) and it began to expand in the west, particularly on exposed blanket peats with developments in deep ploughing techniques facilitating this (Neeson, 1991).

State planting grants were available since 1928 to any private landowner who wished to afforest land. Uptake of these grants was limited. The first EU co-funded8 grant scheme was known as the Western Package Scheme. It was introduced in 1981 as part of a 10-year programme of development for the western region9. Under the conditions of this scheme a grant to cover 85% of establishment costs was available to farmers who afforested land, while non-farmers could get 70% of their establishment costs covered. Afforestation of land which was marginal for agriculture but suitable for forestry was the target. Uptake of the scheme among farmers was low; however, co-operatives, pension funds and private investors who were not deterred by the up-front cost, began to buy and afforest land in areas where agricultural productivity was marginal but forest productivity was high (Ryan et al., 2014). In the first six years of the Western Package scheme, almost 6,500 ha were grant-aided in western counties (Figure 2). In an effort to attract more farmers into afforestation the Farm Compensatory Allowance Scheme was introduced in 1987. It allowed farmers and farmer co-ops in receipt of livestock headage payments (these are subsidies paid to farmers per head of livestock) to claim a forestry headage payment for 15 years after planting to compensate for any reduction in livestock numbers experienced after planting.

The Forest Premium was introduced in Ireland in February 1990 (under Council Regulation (EEE) 797/85 as amended by Council Reg (EC) No 1609/89) and only farmers were initially

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8 Afforestation schemes were co-funded by the EU until 2005; since then they have been 100% Exchequer funded.
9 The region included eleven entire counties, Donegal, Sligo, Leitrim, Mayo, Roscommon, Longford, Cavan, Monaghan, Galway, Clare, Kerry as well as parts of Cork.
eligible for the Forest Premium. The latter differed from the Compensatory Allowance Scheme in that a reduction in livestock was not a requirement for receipt of the payment. The definition of farmer according to this scheme was one who:

- Practiced farming within the state;
- Resided within 70 miles of the plantation;
- Owned, leased or was in joint management of at least 3 hectares of an agricultural holding;
- Derived at least 25% of their income from farming in one of the 3 years prior to completion of afforestation.

This scheme included a stipulation that off-farm income could not exceed £11,000 per annum. Premiums were paid annually for 20 years for broadleaf planting; for conifer planting the duration was 15 years. A revised scheme introduced in 1992 resulted in the off-farm income limit being increased to £13,900. Part-time farmers and farmers with off-farm income (above the threshold) could now avail of the premium but at a value lower than that available to farmers.

Changes to the land type eligible for afforestation accompanied the Forestry Operational Programme (1989-1993). This programme made higher payments available for the afforestation of land that had been improved for agriculture. The afforestation scheme launched in 1991 distinguished between two types of land, unenclosed and enclosed land. Unenclosed land is land that was never improved and enclosed by man-made boundaries for agriculture and was used for nothing other than extensive grazing. Enclosed or improved land is land that was enclosed and improved for agricultural use by cultivation, and which is completely surrounded by man-made boundaries. Differential afforestation and premium rates were available, with unenclosed land attracting lower rates so as “to reduce pressure on unenclosed areas such as boglands, which are important from an environmental point of view and are generally the least productive for forestry purposes” (Forest Service, 1991, p. 45).

As part of a reform of the Common Agricultural Policy (CAP) in 1992 a revised afforestation grant and premium scheme was introduced under European Council Regulation 2080/92. Both grant and premium payments were significantly increased and for the first time 100% of establishment costs could be covered. Both farmers and non-farmers could avail of these 100% establishment grants. Similarly, farmers and non-farmers could avail of premiums, however the farmer rate of premium was significantly higher than that for non-farmers. Farmers received the premium for 20 years (irrespective of species), non-farmers for 15 years. The revised scheme continued to incentivise the planting of better quality land by providing greater premiums for non “less favoured areas” compared to payments available for “moderately/severely handicapped areas”. A productivity requirement was also introduced under the scheme introduced in 1992, i.e. afforestation grants would only be paid on land that was capable of growing to full rotation a commercial timber crop of Sitka spruce of yield class 14 or greater, based on one standard application of phosphorus at establishment. This did not mean that Sitka spruce had to be planted, instead once it was shown that the site could support yield class 14 Sitka spruce, other species, if proposed and approved for planting, could be planted even though they may not achieve the same level of production on the same site.
In 1996 the first formal statement of forest policy was published in Ireland, i.e. “Growing for the Future”. In it, a strategic plan for forestry was outlined and the overall aim of this plan was to “develop forestry to a scale and in a manner which maximises its contribution to national economic and social well-being on a sustainable basis and which is compatible with the protection of the environment” (DAFF, 1996, p.3). Among its many outputs was the setting of an afforestation target of 25,000 ha per annum to the year 2000 and 20,000 ha per annum thereafter until the year 2030. With such a level of planting, forest cover would reach 17% in the year 2030 and would lead to the generation of a “critical mass” of timber production, i.e. a minimum of 10 million per m³ per annum, which was consider a scale “large enough to make true competition and the operation of market forces possible and to support a range of industries” (DAFF, 1996, p.3). Private afforestation was to account for approximately 70% of this afforestation with “an emphasis on farm participation” (DAFF, 1996, p.30).

![Figure 2: Afforestation in Ireland, public and private (1922 – 2018)](source: DAFM (2019))

Targets regarding species diversification were also set in “Growing for the Future”: “Each grant-aided conifer afforestation project should in future be required to contain a minimum of two species, and a maximum planting of 85% of any one species, site and site area permitting; Sitka spruce is to be reduced to 60% of total annual afforestation; the afforestation of diverse conifers (e.g. Norway spruce, Douglas fir, Japanese larch, European larch, Scots pine) is to be increased to 20% of total annual afforestation” (DAFF, 1996, p. 33). The rationale for this policy was to “increase diversity of species in Irish forests, in order to achieve better timber quality, to extend the range of potential end-uses, to reduce risks associated with monocultures, and for environmental and landscape purposes” (DAFF,
The target of 20% broadleaf afforestation was not reached (broadleaf afforestation accounted for an average annual percentage of 15.6% between 1996 and 2003). Nevertheless under the Rural Development Plan (RDP) 2000-2006, the target was increased to 30% broadleaf afforestation by the year 2006 (Bacon and Associates, 2004).

Wider international events had a bearing on forest policy in Ireland from the 1990s. At the United Nations Conference on the Environment and Development (UNCED), held in Rio de Janeiro in 1992, a non-legally binding statement of principles for a global consensus on the management and sustainable development of all types of forests was agreed (Mulloy, 1997). Following on from this the concept of sustainable forest management was developed at a European level at a series of Ministerial Conferences which Ireland was party to. A definition of sustainable forest management was agreed at the Helsinki Ministerial Conference i.e. “The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and their potential to fulfil now and in the future, relevant ecological, economic and social functions at local, national and global scales, and that does not cause damage to other ecosystems” (Forest Europe, 2019). Following on from the Lisbon Ministerial Conference on the Protection of Forests in Europe, in 1998, Ireland was “committed, in perpetuity, to the sustainable management” of all its forests (Forest Service, 2000a, p.1). Following this commitment, the Irish National Forest Standard (Forest Service, 2000a) was launched. This Standard outlines the criteria and indicators relating to the national implementation of Sustainable Forest Management (SFM). The Code of Best Forest Practice (Forest Service, 2000b) was also launched to support the Standard. It “describes all forest operations and the appropriate manner in which they should be carried out to ensure the implementation of SFM” (Forest Service, 2000b, p.1). A revised suite of environmental guidelines was also launched in 2000 to support the implementation of sustainable forest management (see chapter 7).

A peak in afforestation occurred nationally in 1995 (Figure 2), thereafter afforestation rates declined. Coillte effectively ceased afforestation in the early 2000s; private afforestation rates also declined in the 2000s. In 2005 the Single Farm Payment (SFP) was introduced as part of a reform of the CAP to further decouple agricultural payments from production. The value of the SFP was based on the average historic livestock payments and the average land area farmed in the years 2000, 2001 and 2002. Afforested land was not eligible for the SFP although it was possible to plant up to 50% of the farm holding and “consolidate” the Single Payment onto the remaining land without losing SFP, but the land base eligible for future agricultural payments was reduced by the afforested area (Ryan et al., 2014). From 2009 onwards, land which was afforested in any year since 2009 was eligible for a Basic Payment Scheme (BPS) payment 10 provided it satisfied a number of conditions including that applicants, who plant part of their holding from 2009 onwards, must retain at least 10% of the eligible hectares declared in 2008 (by themselves or their predecessor) in an agricultural activity, subject to a minimum area of 3 ha, in order to continue to be regarded as an active farmer for the purpose of retaining eligibility for BPS (see Teagasc (2019) for a full list of conditions). Thus an individual can afforest up to 90% of his/her land, and be paid both the basic farm payment and the premium for the land afforested.

10 The Single Farm Payment became known as the Basic Farm Payment in 2015; the Basic Farm Payment is an income support provided to EU farmers.
Restrictions were introduced in 2010 on the afforestation of unenclosed land with a maximum being set on the percentage of unenclosed land in any application for afforestation at 20% of the total area (Forest Service Circular 10/2010). The following year, Forest service Circular 18/2011 listed specific land types not eligible for afforestation which included:

- infertile blanket and midland raised bogs;
- unmodified raised bogs;
- designated blanket and raised bogs; and
- plots with rock outcrop and associated shallow soils in excess of 25% of the plot area.

Further under Circular 18/2011, very poor sites where a standard application of phosphorus fertiliser (e.g. 350 kg/ha GRP) at the time of establishment was unlikely to provide sufficient phosphorus input to bring the forest to full rotation, were also deemed ineligible. These Circulars 10/2010 and 18/2011 combined to “preclude afforestation from considerable areas of land, typically upland and peat sites with a high sensitivity regarding water quality, habitats, species and landscapes” (Forest Service, 2015a, p. 80).

In 2016 “Land types for afforestation” was published followed by a revised version in 2017 (Forest Service, 2017). In this document the productivity requirement that had applied to Afforestation Scheme since 1992 was reiterated, i.e. that land must be capable of growing to full rotation a commercial timber crop of Sitka spruce of yield class 14 or greater, based on one standard application of phosphorus at establishment. Other species, if proposed and approved for planting, may not achieve the same level of production on the same site. Thus the potential eligibility of land for support under the Afforestation Scheme is set out, based on the capability of that land to produce a sustainable commercial crop of timber. Three separate land types apply, two of which are eligible for particular Grant & Premium Categories (GPCs) (see Table 6) under the Afforestation Scheme, i.e. Suitable land: GPC 2-12, Suitable Land: GPC 1, and Unsuitable land. The suitability of land for afforestation is determined using the plant species that are growing on the site as these provide an indication of the underlying combined R+N values (base rich substrates (R) + N (Nitrogen) values) which in turn indicate the potential productivity on that site. Sites with a peat depth of 50 cm or greater with an R+N score of 5.0 or less are classed as Unsuitable Land under the Afforestation Scheme (Forest Service, 2017).

The targets for afforestation set in 1996 have never been reached. Afforestation rates have declined since they were set and the target was reduced to 14,700 hectares per year in 2011 (DPER, 2011) (Figure 2). In 2014, a revised policy for Forestry was published in which targets of 10,000 ha per annum to 2015 and 15,000 ha per annum to 2046 were set (DAFM, 2014) leading to a forest cover of 18% by that year. The aim of this revised plan was expanded “To develop an internationally competitive and sustainable forest sector that provides a full range of economic, environmental and social benefits to society and which accords with the Forest Europe (2019) definition of sustainable forest management, i.e. “The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality, and their potential to fulfil now and in the future, relevant ecological, economic and social functions at local, national and global scales, and that does not cause damage to other ecosystems”. The contribution that forests make to climate change mitigation through carbon sequestration was emphasised, i.e. “The
afforestation policy... will not only support Ireland’s efforts to reach the demanding greenhouse gas emission reduction targets (which are anticipated to rise to 80% of the 1990 level by 2050) but will also reduce dependence on fossil fuels and support the transition to a low carbon economy”.

The Forestry Programme 2014-2020 removed the distinction between farmer and non-farmer and introduced a single rate of payment for both. The duration of this payment was reduced to 15 years and the value of the payment increased. This is the situation that prevails in 2019. The Mid-term Review of the Forestry Programme (2014-2020) (DAFM, 2018a, p. 24) states that the “Department continues to view the single premium approach as an important strategy in increasing forest cover in Ireland. Consequently there are no plans to revert back to an afforestation scheme that offers higher premiums to farmers than to non-farmers”.

In 2017, the European Investment Bank (EIB) announced it was teaming up with the Ireland Strategic Investment Fund (ISIF) to support a €112 million investment in privately-owned forests in Ireland by DASOS capital, a specialist European forestry investment fund. The EIB committed €28.5 million, the ISIF €55 million, providing a total investment of €200 million. The press release at the time indicated that “By supporting direct land acquisition, lease contracts, afforestation and other forms of land management the DASOS initiative intends to develop into a professionally managed portfolio of up to 15,000 hectares of forests across Ireland in the coming years. New forest management investment by DASOS across the country seeks to ensure a more predictable supply of wood including from previously subsidised forests where subsidies are coming to an end” (Irish Strategic Investment Fund, 2017).

**Current forestry grants and species composition - 2018**

The primary incentives used to encourage afforestation are grants and premiums. The current grant and premium categories are shown in Table 6. The current values of these grant and premium categories are shown in Table 7. Receipt of the afforestation grant requires compliance with plantation rules. These have changed over time to reflect forestry guidelines, in particular those relating to biodiversity. The current (July 2019) plantation rules are as follows:

- A proposed plantation is a plot or a number of plots on the same holding and contained in a single application, planted in a single planting season under a single Contract Number. Only plantations that comply with rules 1 and 2 below are eligible for grant-aid:
  - Rule 1: The plantation must contain a minimum of 15% broadleaves by area;
  - Rule 2: Each plot within the plantation must comply with the requirements of one of the Grant & Premium Categories (GPCs) listed in Table 6 below.

Thus:

- A maximum of 85% of an area is planted –15% of the area is left as open space or retained habitats (see chapter 7);
- The area planted must have at least 15% broadleaves and a maximum of 85% Sitka spruce.
Table 6: Grant and premium categories

<table>
<thead>
<tr>
<th>GPC no.</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPC 1</td>
<td><strong>Land Type ‘Suitable Land (GPC 1)’</strong>: See Forest Service document <em>Land Types for Afforestation</em>.</td>
</tr>
<tr>
<td>GPC 2</td>
<td><strong>Sitka spruce/Lodgepole pine</strong>: This plot comprises Sitka spruce and/or Lodgepole pine only. For landscape purposes, a small number of other species should be incorporated into this plot. A GPC 2 plot on its own is not eligible for grant or premium payment as it does not comply with Plantation Rule 1. It must therefore be a component of a larger afforestation project comprising other GPCs.</td>
</tr>
<tr>
<td>GPC 3</td>
<td><strong>10% Diverse Mix</strong>: This plot comprises an intimate mix of Sitka spruce and/or Lodgepole Pine together with a suitable diverse conifer. The diverse conifer content must be at least 10% of the total number of trees planted. This diverse species can be intimately mixed throughout the forest or planted in groups through the forest, or a combination of both (where silviculturally compatible with the main species). The requirement for 10% diverse conifers can be waived where the percentage of broadleaves planted along roadsides, external edges, aquatic buffer zones, etc. totals 10% of the total number of trees planted.</td>
</tr>
<tr>
<td>GPC 4</td>
<td>This plot comprises an acceptable conifer species other than Sitka spruce and Lodgepole pine.</td>
</tr>
<tr>
<td>GPC 5</td>
<td><strong>Broadleaf (Non Oak/ Beech)</strong>: This plot comprises acceptable broadleaves other than oak and beech. May also include ADBs.</td>
</tr>
<tr>
<td>GPC 6</td>
<td><strong>Oak</strong>: This plot comprises pure oak. Oak must be planted pure at a stocking rate of 3,300 stems/ha on all sites and at a spacing of 2.0 x 1.5 m². On large sites where additional shelter is required, an appropriate nurse species may be introduced, but there must be at least 10 lines of oak between each nurse species. All nurse species must be planted at a spacing of 2.0 x 1.5 m².</td>
</tr>
<tr>
<td>GPC 7</td>
<td><strong>Beech</strong>: This plot comprises pure beech. Beech must be planted pure at a stocking rate of 3,300 stems/ha on all sites and at a spacing of 2.0 x 1.5 m². On large sites where additional shelter is required, an appropriate nurse species may be introduced, but there must be at least 10 lines of beech between each nurse species. All nurse species must be planted at a spacing of 2.0 x 1.5 m².</td>
</tr>
<tr>
<td>GPC 8</td>
<td><strong>Alder</strong>: This plot comprises pure alder at 2,500 stems/ha. For species diversity, up to 10% of the trees planted may include other species intimately mixed or planted in groups.</td>
</tr>
<tr>
<td>GPC 9</td>
<td><strong>Native Woodland Establishment (Scenarios 1-3)</strong>: Applicants can apply to establish native woodland over the entire site (i.e. all GPC 9 and/or GPC 10 (see below)) or as a plot(s) within a larger afforestation project alongside other GPCs.</td>
</tr>
<tr>
<td>GPC 10</td>
<td><strong>Native Woodland Establishment (Scenarios 4)</strong>: Applicants can apply to establish native woodland over the entire site (i.e. all GPC 9 (see above) and/or GPC 10) or as a plot(s) within a larger afforestation project alongside other GPCs.</td>
</tr>
<tr>
<td>GPC 11</td>
<td><strong>Agroforestry</strong>: This plot is comprised of silvopastoral agro-forestry systems which combine forestry and pasture. A stocking rate of 400 – 1,000 trees/ha (equal spacing) is required, with a minimum eligible plot size of 0.5 ha and plot width of 20 m. Acceptable broadleaf species include oak, sycamore and cherry. Other species, including conifers, will be considered on a site-by-site basis.</td>
</tr>
<tr>
<td>GPC 12a</td>
<td><strong>Forestry for Fibre</strong>: This plot comprises eucalyptus and poplar established at specific stocking densities, for the production of fibre for energy and other wood product applications. Other species may also be considered.</td>
</tr>
<tr>
<td>GPC 12b</td>
<td><strong>Forestry for Fibre (Aspen)</strong>: This plot comprises aspen, for the production of fibre for energy and other wood product applications. As the required stocking density is less than that under GPC 12a, a lower grant rate applies.</td>
</tr>
</tbody>
</table>

Source: Forest Service, 2015b
Table 7: Afforestation Grant and Premium Rates

<table>
<thead>
<tr>
<th>GPC</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Grant € ha&lt;sup&gt;-1&lt;/sup&gt;</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Grant € ha&lt;sup&gt;-1&lt;/sup&gt;</th>
<th>Alternative Fencing Allocation (IS436) (140 m/ha) € ha&lt;sup&gt;-1&lt;/sup&gt;</th>
<th>Total Available Funding € ha&lt;sup&gt;-1&lt;/sup&gt;</th>
<th>Annual Premium Rate &lt; 10 ha € ha&lt;sup&gt;-1&lt;/sup&gt; yr&lt;sup&gt;-1&lt;/sup&gt;</th>
<th>Annual Premium Rate &gt; 10 ha € ha&lt;sup&gt;-1&lt;/sup&gt; yr&lt;sup&gt;-1&lt;/sup&gt;</th>
<th>Premium Duration years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Unenclosed</td>
<td>1605</td>
<td>535</td>
<td>600</td>
<td>2740</td>
<td>185</td>
<td>190</td>
<td>15</td>
</tr>
<tr>
<td>2 - Sitka spruce / LP</td>
<td>2330</td>
<td>775</td>
<td>600</td>
<td>3705</td>
<td>440</td>
<td>450</td>
<td>15</td>
</tr>
<tr>
<td>3 – 10% Diverse e.g. Sitka spruce and 10% broadleaves</td>
<td>2410</td>
<td>805</td>
<td>600</td>
<td>3815</td>
<td>510</td>
<td>520</td>
<td>15</td>
</tr>
<tr>
<td>4 – Diverse conifer e.g. Scots pine, Douglas fir</td>
<td>2785</td>
<td>925</td>
<td>600</td>
<td>4310</td>
<td>590</td>
<td>600</td>
<td>15</td>
</tr>
<tr>
<td>5 – Broadleaf e.g. sycamore</td>
<td>3960</td>
<td>1320</td>
<td>600</td>
<td>5880</td>
<td>605</td>
<td>620</td>
<td>15</td>
</tr>
<tr>
<td>6 - Oak/</td>
<td>4215</td>
<td>1405</td>
<td>600</td>
<td>6220</td>
<td>645</td>
<td>660</td>
<td>15</td>
</tr>
<tr>
<td>7 - Beech</td>
<td>4215</td>
<td>1405</td>
<td>600</td>
<td>6220</td>
<td>645</td>
<td>660</td>
<td>15</td>
</tr>
<tr>
<td>8 – Alder and birch</td>
<td>2695</td>
<td>900</td>
<td>600</td>
<td>4195</td>
<td>605</td>
<td>620</td>
<td>15</td>
</tr>
<tr>
<td>9 – Native Woodland Establishment (oak-holly-birch-hazel)</td>
<td>4215</td>
<td>1405</td>
<td>600</td>
<td>6220</td>
<td>665</td>
<td>680</td>
<td>15</td>
</tr>
<tr>
<td>10 – Native Woodland Establishment (alder-oak woodland)</td>
<td>3960</td>
<td>1320</td>
<td>600</td>
<td>5880</td>
<td>665</td>
<td>680</td>
<td>15</td>
</tr>
<tr>
<td>11 - Agro-forestry</td>
<td>4215</td>
<td>1405</td>
<td>600</td>
<td>6220</td>
<td>645</td>
<td>660</td>
<td>5</td>
</tr>
<tr>
<td>12 – Forestry for Fibre</td>
<td>2410</td>
<td>805</td>
<td>600</td>
<td>3815</td>
<td>510</td>
<td>520</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: DAFM, 2019a
History of forestry development in Co. Leitrim

The starting point for this overview of forestry development in Co. Leitrim is the late 1960s as statistics are available on the status of forestry in the county at that time. Furthermore, a series of studies, known as the Leitrim Resource study were carried out in Co. Leitrim in the 1970s which provide some insight into agriculture and forestry in the county.

In 1969, State forests occupied 6.4% of the area of Co. Leitrim (i.e. 10,117 ha); the area of private forestry was not known. In that year the Minister for Lands directed the Forestry Division "to make an all out drive to acquire land in Co. Leitrim, to plant it and thereby give employment to as many people as possible in that area" (AFT, 1975, p. 52). The response to the Minster’s direction was that over the following 3 years, 1736 ha of land were acquired by the Forestry Division for afforestation purposes. This rate of acquisition, measured as a percentage of the total area, was the highest in the State.

The Leitrim Resource study, which was undertaken by An Foras Taluntais (AFT) in the 1970, aimed to provide recommendations regarding alternative land use systems (including forestry) and to “bring about an overall improvement in the welfare of the people of the county” (AFT, 1973, p. v). The foreword to the study provides the rationale for it and also provides an overview of what life was like in Co. Leitrim at the time. The following section is taken directly from this foreword:

“For many years it has been recognised that some of the worst features of western decline are represented in Co. Leitrim. Controversy has surrounded the county with regard to the possible means by which this continuing decline could be halted and reversed. Farming in the county is beset by many problems arising from natural, technical, economic and social forces. The natural limitations of the county are those imposed mainly by a combination of heavy, poorly drained soils and a relatively wet climate. This dictates a predominantly grassland farming system which encounters serious problems such as poaching by grazing animals, short grazing season, the necessity for the conservation of large amounts of winter fodder, and poor trafficability for farm machinery. This latter problem is accentuated by the presence of many steep slopes associated with the predominant drumlin topography. It is not surprising, therefore, to find serious sociological problems associated with these conditions. Farm size is small, off-farm employment is scarce, and the resulting emigration has brought about a population structure dominated by the old and very young. This represents a very serious obstacle to economic development” (AFT, 1973, p. v).

Among the sociological challenges noted in the report were the following:

- Co. Leitrim had lost 50% of its population since 1926;
- Co. Leitrim’s net emigration rate among its young people was persistently higher than that for other counties;
- Co. Leitrim’s reliance on agriculture was higher than in any other county, with over 50% of its work-force engaged in agriculture compared to 24% nationally;
- 80% of the holdings in the county were smaller than 22.7 ha (AFT, 1973).

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11 Coillte Teo, took over the management of State forests in 1989 upon its establishment.
12 An inventory of private woodland undertaken in 1973 estimated the area of private forests in Co. Leitrim to be 644 ha (Purcell, 1973).
Soil resources and forestry potential were investigated. It found that 84% of the total area of the county had land of poor drainage. It further found that 74% of the county was “poorly suitable for grass production, because of poor drainage and poaching hazards” (AFT, 1973, p. 1). Thus, it was concluded that the land in Co. Leitrim was “difficult to farm and farm incomes are low” (AFT, 1973, p. 2). In contrast to the limitations that the soils posed for agriculture, the potential of the land for forestry was identified. The survey showed that 43% of the county was capable of very high yields of 24 to 26 $m^3 ha^{-1} an^{-1}$, 28% of high yields (20 to 22 $m^3 ha^{-1} an^{-1}$) and 16% of moderate yields (14 to 18 $m^3 ha^{-1} an^{-1}$) (AFT, 1973).

The attitudes of landholders to forestry were surveyed as part of the Leitrim Resource study. The key results were that:

- Almost all of those surveyed (96.0%) said they would not consider selling all or part of their holdings for forestry purposes under any circumstances;
- Over one-third (38.5%) indicated that they did not favour any further afforestation in the county;
- Half indicated only the most limited of land should be planted, i.e. mountain or cutaway bogland;
- Less than 10.0% were of the opinion that most of the land in Leitrim should be under forestry;
- The vast majority of landholders felt that their land was "too good for planting" and would not consider selling under any circumstances or "at any price" (AFT, 1975, p.54).

After 1972 the acquisition rate for land for forestry by the State declined sharply as Ireland joined the EU and prices for livestock and land rose. This caused the value of marginal agricultural land to increase and it was this type of land which would have been sold for forestry in past. The decline in acquisition rates and hence State afforestation was also attributed to the opposition among the farming community to forestry and to the acquisition of land for afforestation. Forestry as an alternative land-use to agriculture was described as "an emotive topic in Leitrim" (AFT, 1975, p. 4). During the five year period from 1975 to 1979 a total of 585 ha were planted by the State in Co. Leitrim.

Despite the aforementioned resistance to forestry, the introduction of the Western Package Scheme prompted an increase in private afforestation. During the first four years of the scheme it is estimated that 640 ha were planted in Co. Leitrim. Thereafter changes to the various afforestation schemes, private afforestation increased in Leitrim reaching a peak in 1995 (as was the situation nationally) (Figure 3). Furthermore, similar to the national situation, State/Coillte afforestation ceased in the county in 2005. In recent years annual private afforestation rates have fluctuated between 280 and 536 ha (Figure 3).

State forests were generally established in the northern part of the county on upland sites; private forests tend to be located in the southern part on less elevated sites (Figure 4). The age-class structure of the forests reflects the trends in planting; most of the private forests are less than 30 years of age (Figure 5).
Figure 3: Afforestation in Co. Leitrim, public and private (1975 to 2018)
Source: Forest Service, 1974 to date
Figure 4: Distribution of forest in Co. Leitrim
Source: Forest Service and DAFM statistics provided to the study
Private afforestation

In the early 1990s non-farmers were the dominant sector engaged in private afforestation in Co. Leitrim. This situation changed in 1995 when farmer afforestation expanded in the county and it remained the dominant sector in afforestation until 2015. In this year non-farmer afforestation began to increase again, most likely in response to the decision to allow non-farmers claim the same rate of premium as non-farmers in that year. In 2018 non-farmer planting exceeded farmer planting (Figure 6). The average area afforested by non-farmers during the period 2012 to 2018 was 7.2 ha; the respective figure for farm afforestation was 7.7 hectares. The most recent statistics (DAFM, 2019a) indicate that since 1980, 800 owners have planted 11,679 ha in Co. Leitrim (the split between farmer and non-farmer is not provided in the statistics). Further details of non-farmer planting was provided to the study by DAFM (Table 8) who estimate that investors\textsuperscript{13} accounted for 1.4% of afforestation in Leitrim in 2016; this increased in 2017 to 19.4% of the area afforested.

\textsuperscript{13} Investor was identified by DAFM from their database as any applicant with names that included the following: Plan, Ltd, Property, Estate, invest, trust, development, fund, foundation etc. Investors are identified at the time the first payment was made. Individuals who buy the land, plant it and then sell it on to an investor are not included in the figures above. It may also be the case that individuals who are non-farmers who live outside the county, buy the land for an investment in their own right. These individuals also are not reflected in the figures.
Figure 6: Farmer/non-farmer annual private afforestation in Co. Leitrim
Source: Forest Service/DAFM statistics provided to the study

Table 8: Investor and total private afforestation in Co. Leitrim (2012-2018)

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (ha)</td>
<td>433.8</td>
<td>536.2</td>
<td>298.7</td>
</tr>
<tr>
<td>Investor (ha)</td>
<td>6.1</td>
<td>104.0</td>
<td>8.1</td>
</tr>
<tr>
<td>Investor as % of total</td>
<td>1.4</td>
<td>19.4</td>
<td>2.7</td>
</tr>
</tbody>
</table>

Source: Data supplied by DAFM to the study

The composition of the forests planted in Co. Leitrim in recent years is reflected in the afforestation statistics categorised by grant and premium category (Table 9). Almost 88% of the area afforested in Co. Leitrim since 2012 was in the GPC 3 category which comprises mainly Sitka spruce (see Table 6 for a fuller description of GPC 3); with pure alder and pure oak stands comprising 3.24% of the total afforested respectively. The data in Table 9 also show that afforestation in Co. Leitrim accounted for between 4.2% and 9.1% of total annual afforestation during the period 2012 to 2018.
Table 9: Afforestation (ha) in Co. Leitrim by grant premium category 2012-2018

<table>
<thead>
<tr>
<th>Year</th>
<th>GPC1</th>
<th>GPC2</th>
<th>GPC3</th>
<th>GPC4</th>
<th>GPC5</th>
<th>GPC6</th>
<th>GPC7</th>
<th>GPC8</th>
<th>GPC9</th>
<th>GPC10</th>
<th>Total</th>
<th>% of national</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>6.21</td>
<td>0.00</td>
<td>202.30</td>
<td>8.66</td>
<td>23.69</td>
<td>20.11</td>
<td>0.00</td>
<td>16.80</td>
<td></td>
<td></td>
<td>277.77</td>
<td>4.2</td>
</tr>
<tr>
<td>2013</td>
<td>4.12</td>
<td>5.14</td>
<td>294.78</td>
<td>11.25</td>
<td>0.75</td>
<td>24.48</td>
<td>0.00</td>
<td>15.50</td>
<td></td>
<td></td>
<td>356.02</td>
<td>5.7</td>
</tr>
<tr>
<td>2014</td>
<td>2.67</td>
<td>0.00</td>
<td>248.67</td>
<td>3.65</td>
<td>0.55</td>
<td>7.60</td>
<td>0.00</td>
<td>8.77</td>
<td></td>
<td></td>
<td>271.91</td>
<td>4.4</td>
</tr>
<tr>
<td>2015</td>
<td>3.55</td>
<td>0.00</td>
<td>469.68</td>
<td>16.73</td>
<td>5.64</td>
<td>3.09</td>
<td>0.00</td>
<td>14.21</td>
<td>0.00</td>
<td>0.00</td>
<td>512.90</td>
<td>8.2</td>
</tr>
<tr>
<td>2016</td>
<td>0.53</td>
<td>0.00</td>
<td>385.17</td>
<td>15.70</td>
<td>0.00</td>
<td>21.32</td>
<td>0.00</td>
<td>6.87</td>
<td>0.90</td>
<td>3.29</td>
<td>433.78</td>
<td>6.7</td>
</tr>
<tr>
<td>2017</td>
<td>1.26</td>
<td>0.00</td>
<td>503.51</td>
<td>0.00</td>
<td>3.46</td>
<td>6.99</td>
<td>0.00</td>
<td>15.70</td>
<td>0.00</td>
<td>5.30</td>
<td>536.22</td>
<td>9.7</td>
</tr>
<tr>
<td>2018</td>
<td>0.70</td>
<td>0.00</td>
<td>258.88</td>
<td>13.67</td>
<td>0.00</td>
<td>3.52</td>
<td>0.00</td>
<td>9.36</td>
<td>9.01</td>
<td>3.52</td>
<td>298.66</td>
<td>7.4</td>
</tr>
<tr>
<td>Total</td>
<td>19.04</td>
<td>5.14</td>
<td>2362.99</td>
<td>69.66</td>
<td>34.09</td>
<td>87.11</td>
<td>0.00</td>
<td>87.21</td>
<td>9.91</td>
<td>12.11</td>
<td>2687.26</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>0.70</td>
<td>0.19</td>
<td>87.93</td>
<td>2.59</td>
<td>1.27</td>
<td>3.24</td>
<td>0.00</td>
<td>3.24</td>
<td>0.37</td>
<td>0.45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Data provided to the study by DAFM; note no planting in GPC 11 or 12 in Co. Leitrim
Survey of forest owners

To obtain more information on who are the private forest owners in Co. Leitrim and why they chose to afforest land, a survey of forest owners was conducted as part of this study. The survey was also intended to provide information on the extent of recreational usage of private forests (Term of reference 4) and an indication of the fauna found in private forests (Term of reference 4). A questionnaire was drafted to address these objectives (see Annex A).

Target and sample population

The target population for the survey was all owners of private forests in Co. Leitrim. DAFM (2019, p. 22) indicates that the size of this target population is exactly 800 (i.e. 800 individual owners who planted between the years 1980 and 2018). However, it was not possible to send the questionnaire to all these owners. Following the introduction of the General Data Protection Regulation (GDPR) only those owners who opted in to receive notifications (i.e. 413 owners, 128 of whom were not residents of Leitrim) were issued the questionnaire. Thus, it is this group that was the sampled population. The study team prepared the questionnaire and a cover letter, and these were sent to the list of 413 owners in late April 2019. By July 15th, 12614 completed questionnaires were returned indicating a response rate of 30%. This is much higher than the response rate to previous postal surveys of forest owners in Ireland (e.g. 13%, Ní Dhubhán and Wall, 1999; 17%, Ní Dhubháin and Greene, 2009).

Survey results

The average size of an individual forest plot was 6.92 hectares. However, as over 40% of respondents had planted 2 or more forests/plots, i.e. 230 plots in total (Table 10) the average area planted per respondent was 14.0 hectares. The forests ranged in age from 35 years to 1 year. Almost three-quarters of the forests were conifer dominated (i.e. > 50% conifer); 16% were broadleaf dominated (> 50% broadleaves); for 9% of the forests no species was specified. Sitka spruce was the most commonly represented species in the conifer forests typically representing 80% or more of the area of the forest.

Table 10: Number of forests/plots per forest owner

<table>
<thead>
<tr>
<th>Plots</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>One forest plot</td>
<td>75</td>
</tr>
<tr>
<td>Two forest plots</td>
<td>24</td>
</tr>
<tr>
<td>Three forest plots</td>
<td>10</td>
</tr>
<tr>
<td>Four forest plots</td>
<td>13</td>
</tr>
<tr>
<td>Five forest plots</td>
<td>1</td>
</tr>
<tr>
<td>Six forest plots</td>
<td>2</td>
</tr>
<tr>
<td>&gt; Six forest plots</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
</tr>
</tbody>
</table>

14 Although 126 questionnaires were returned not all questions were answered by all respondents. In the tables presented here “n” represents the number of respondents who answered the question.
The respondents were typically male (83%) and married (76%). The majority had planted forests on their own land (Table 11). A further 26% could be classed as investors (i.e. they had bought land/forest purposely for investment). Almost 70% of the respondents were resident in Co. Leitrim (note: all forests were in Co. Leitrim). The non-Leitrim residents were most commonly from neighbouring counties (i.e. Donegal, Cavan, Roscommon, Longford, i.e. 57%), the remaining non-residents were from Meath, Wexford, Mayo, Monaghan, Kildare and Wexford. Not surprisingly, the purchase of land for afforestation was most common among non-Leitrim residents.

**Table 11: Source of afforested land**

<table>
<thead>
<tr>
<th>Source</th>
<th>Leitrim residents (%)</th>
<th>Non - Leitrim residents (%)</th>
<th>All (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted on own ground</td>
<td>86 (n=87)</td>
<td>28 (n=39)</td>
<td>68 (n=126)</td>
</tr>
<tr>
<td>Planted on ground purchased for afforestation</td>
<td>4 (n=87)</td>
<td>56 (n=39)</td>
<td>21 (n=126)</td>
</tr>
<tr>
<td>Purchased established forest</td>
<td>4 (n=87)</td>
<td>8 (n=39)</td>
<td>5 (n=126)</td>
</tr>
<tr>
<td>Inherited forest</td>
<td>4 (n=87)</td>
<td>5 (n=39)</td>
<td>5 (n=126)</td>
</tr>
<tr>
<td>Other (not specified)</td>
<td>0 (n=87)</td>
<td>2 (n=39)</td>
<td>1 (n=126)</td>
</tr>
</tbody>
</table>

The average total area afforested by investors who planted land on ground purchased for afforestation was 24.4 ha (Table 12). The average number of plots owned by this group was 2.4 giving an average plot area of 10 hectares.

**Table 12: Area of afforested land**

<table>
<thead>
<tr>
<th>Source</th>
<th>Mean total area afforested (ha) (n=101)</th>
<th>Mean area of forest plots (ha) (n=230)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted on own ground</td>
<td>10.2</td>
<td>6.1</td>
</tr>
<tr>
<td>Planted on ground purchased for afforestation</td>
<td>24.4</td>
<td>10.0</td>
</tr>
<tr>
<td>Purchased established forest</td>
<td>10.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Inherited forest</td>
<td>28.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Other (not specified)</td>
<td>0.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Reasons for planting/purchasing forests**

Respondents were asked to rank in order of importance (1 is the most important, 2 the second most important etc.) their reasons for planting/purchasing forests. The mean rank assigned to each reason was calculated – the lower the mean the more important the stated reasons. Economic considerations were the main drivers to people planting (Table 13). A majority of people have planted or purchased forest to avail of grants and premiums or to use up poor land. Investment, having a pension plan and diversification of farm income were other popular reasons for planting.
Table 13: Reasons for planting/purchasing land

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Mean Rank* (n=123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avail of grants and premiums</td>
<td>4.3</td>
</tr>
<tr>
<td>Use up poor land</td>
<td>4.7</td>
</tr>
<tr>
<td>Investment</td>
<td>5.1</td>
</tr>
<tr>
<td>Pension plan</td>
<td>6.8</td>
</tr>
<tr>
<td>Diversifying farm income</td>
<td>7.0</td>
</tr>
<tr>
<td>Amenity and recreation</td>
<td>8.7</td>
</tr>
<tr>
<td>It would look nice</td>
<td>9.0</td>
</tr>
<tr>
<td>Shelterbelt (for livestock or dwelling)</td>
<td>9.3</td>
</tr>
<tr>
<td>Other</td>
<td>8.6</td>
</tr>
<tr>
<td>Don’t know-inherited land</td>
<td>9.6</td>
</tr>
</tbody>
</table>

* A rank of 10 was given to those respondents who did not provide a reason

Planned use of forests
Respondents were asked to rank the importance to them of a number of potential uses of their forests (1 is the most important, 2 the second most important, etc.). The mean rank is shown in Table 14. Commercial timber production is the most important use of the forests.

Table 14: Planned use of the forest

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Mean Rank (n=123)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce timber for sale</td>
<td>1.6</td>
</tr>
<tr>
<td>Produce timber for domestic use</td>
<td>6.6</td>
</tr>
<tr>
<td>Provide recreation for self/family</td>
<td>7.9</td>
</tr>
<tr>
<td>Provide cover for game for hunting</td>
<td>8.7</td>
</tr>
<tr>
<td>Other</td>
<td>9.2</td>
</tr>
<tr>
<td>Shelterbelt (for livestock or dwelling)</td>
<td>9.3</td>
</tr>
<tr>
<td>Provide a break/border between farms</td>
<td>9.6</td>
</tr>
</tbody>
</table>

* A rank of 10 was given to those respondents who did not provide a reason

Who are the owners of private forests in Leitrim?
Seventy percent of respondents classed themselves as full-time or part-time farmers before planting (Table 15). One quarter classed themselves as non-farmers. Following planting the number of full-time farmers fell while the percentage of retired farmers increased. These changes were caused by a number of full-time farmers classifying their occupation as part-time or retired farmer after planting (7 out of the 32 full-time farmers were part-time farmers after planting, 2 retired). In addition, out of 55 farmers who classed themselves as part-time before planting trees, 46 were still part-time after planting, 3 became full-time farmers, 5 classed themselves as retired.
**Table 15: Occupation of respondents**

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Before planting (%)*</th>
<th>After planting (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=124)</td>
<td>(n=124)</td>
</tr>
<tr>
<td>A full-time farmer</td>
<td>25.8</td>
<td>20.9</td>
</tr>
<tr>
<td>A part-time farmer</td>
<td>44.3</td>
<td>45.9</td>
</tr>
<tr>
<td>Retired farmer</td>
<td>4.8</td>
<td>10.4</td>
</tr>
<tr>
<td>Non-farmer (investment company)</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Non-farmer (other)</td>
<td>25.0</td>
<td>23.3</td>
</tr>
</tbody>
</table>

* Note the percentages are slightly higher than 100 as a very small number of respondents gave one than one occupation

Farmers were asked how afforestation had affected their agricultural output. For 56% of farmers no reduction in agricultural output was noted after planting (Table 16). For almost 10% of farm respondents agricultural production ceased following afforestation.

**Table 16: Reduction in agricultural output after planting**

<table>
<thead>
<tr>
<th>Reduction in agricultural output (%)</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>56.4</td>
</tr>
<tr>
<td>0 - 19</td>
<td>10.6</td>
</tr>
<tr>
<td>20 - 49</td>
<td>6.4</td>
</tr>
<tr>
<td>50 - 74</td>
<td>11.7</td>
</tr>
<tr>
<td>75 - 99</td>
<td>5.3</td>
</tr>
<tr>
<td>100</td>
<td>9.6</td>
</tr>
</tbody>
</table>

**Representativeness of the sample**

The response rate to our survey was 30%. Among the 413 forest owners who were sent the questionnaire 31% were not living in Co. Leitrim; in our sample a similar percentage were non-resident in Leitrim. Further DAFM (2019) statistics for forest ownership in Leitrim are that 800 owners have afforested 11,679 ha in Leitrim, i.e. an average of 14.6 ha per owner. The average area afforested based on those who completed the question was 14.0 hectares. Based on these two indicators we are confident that our sample is representative of the target population.
Chapter 3: Social impacts of forestry in Co. Leitrim

The first term of reference for this study was to assess the social impacts of forestry in Co. Leitrim, including *inter alia* the attitudes to forestry of people living there. This assessment is based on consultations held locally with farmers, non-farmers and other interested parties.

**Introduction**

A number of studies focusing on social aspects of forestry in Co. Leitrim have been conducted previously. In 2000, for example, South Leitrim was chosen as a case study in which to compare regional differences in attitudes to forestry (O’Leary et al., 2000). Part of the focus of the study was to assess the public’s awareness of and reaction to the then recently published Forestry Strategy for Ireland which had set a target national forest cover of 17% by the year 2046. East Wicklow was the other case study area chosen. The authors chose the two counties as case studies as they expected the relationship with forestry in Co. Leitrim would be negative, while in Wicklow it would be positive, and they wished to test this hypothesis. The main finding of the study was that the majority of those surveyed in Leitrim considered the level of coniferous forest cover in their county too high¹⁵ (52%) or adequate (21.6%) while only 10% thought the level of broadleaf cover was too high. While many (60%) of the Leitrim respondents felt that forests were an important part of the traditional Irish landscape, they nevertheless considered that forests occupied land which should otherwise be used for agricultural production. The authors outlined that “While the survival of rural communities such as those in Leitrim depends upon, among other things, maintaining a sustainable economy, the primary focus of afforestation as a means for resource production might possibly be regarded by those same communities as somewhat exploitational. Thus, a shift away from the sole focus upon timber production towards multifunctional ‘rural developmental type’ forestry may assist in allaying the fears of a high proportion of those who are not supportive of the current Government forestry strategy” (O’Leary et al., 2000, p.47).

In 2002, COFORD (The Council for Forest Research and Development) funded a study into the social and economic contribution of forestry in Ireland. The economic impacts were assessed at national and regional level while the social impacts were assessed at local level. One of the local areas investigated was an area of 20 km around the village of Arigna; while Arigna village is in Co. Roscommon, much of the case study area and its population were based in Co. Leitrim. This study too noted local resistance to afforestation with the history of land tenure, the institutional means by which afforestation had been conducted, the tree species used, and the aesthetic appearance of the forest stands once established as areas of concern. Underlying all of this was an apparently widespread local perception that forestry has benefited outsiders more than locals (Flechard et al., 2007).

Forestry in Co. Leitrim and in Western Australia was the focus of a study as to whether small-scale afforestation was associated with less social conflict than large-scale afforestation, where the former referred to farm forestry and the latter was private forestry

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¹⁵ Note the actual forest cover in the case study is not mentioned in the article, however, in a further publication that the total cover (conifer and broadleaf) was given as 6.7% (Elands and Wiersum, 2003).
(plantations) undertaken by businesses or agencies (Schirmer, 2007). The findings of the study were that small-scale afforestation was less commonly associated with conflict. The scale of ownership rather than the physical scale was also important, as afforestation undertaken by farmers was consistently associated with positive perceptions in both case studies. Schirmer (2007, p. 30) indicated that the emphasis on ownership appears to reflect the common cultural conceptualisation of rural landscapes as belonging to farmers. She highlights that “the rural ideal of a landscape, managed by farming families, ... is being challenged on a range of fronts – and certainly not only by the expansion of large-scale forestry. Conflict over large-scale afforestation is one of the ways in which some members of rural communities resist these challenges to the rural ideal”.16

**Methods**

We employed qualitative rather than quantitative research methods to address the social impacts of forestry. We did this as our aim was not to achieve a demographically balanced and representative sample of the target population, but instead to understand the range of feelings/opinions held by people regarding forestry in Co. Leitrim. We combined two samplings methods. We used maximum variation sampling which is a method used when the aim is to select study units which represent a wide range of variation in dimensions of interest (Miles et al., 2013). We also used snowball sampling. This is used when a researcher accesses interviewees through contact information that is provided by other interviewees; such an approach is useful in assisting researchers in obtaining and accessing information from ‘hidden populations’ (Noy, 2008). First, we identified potential interviewees by reviewing recent media coverage on the topic of forestry in Leitrim focusing on those who lived in Co. Leitrim. These led us to other interviewees. Interviews and sampling stopped when no new information or insights were being revealed. The final number of people interviewed was 23 (Table 17). We grouped interviewees according to the groups shown in Table 17 to retain their anonymity particularly when using quotes from their transcripts to illustrate themes17. A number of the interviewees were involved in other organisations including the Save Leitrim group.

**Table 17: Interviewees in social impact study**

<table>
<thead>
<tr>
<th>Interviewee group</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>eNGOS</td>
<td>2</td>
</tr>
<tr>
<td>Foresters</td>
<td>5</td>
</tr>
<tr>
<td>Forest owner (investor)</td>
<td>1</td>
</tr>
<tr>
<td>Forest owner (farmer)</td>
<td>4</td>
</tr>
<tr>
<td>Forest owner (non-farmer)</td>
<td>2</td>
</tr>
<tr>
<td>Non-forest owner (non-farmer)</td>
<td>4</td>
</tr>
<tr>
<td>IFA</td>
<td>4</td>
</tr>
<tr>
<td>Worker in local wood-using firm</td>
<td>1</td>
</tr>
</tbody>
</table>

16 During the course of this study a report on a public consultation of forestry activities in Co. Leitrim was published by Leitrim PPN which is a network of community/voluntary, social inclusion and environmental organisations, based in County Leitrim.

17 Note: the quotes used were transcribed verbatim.
One-to-one, in-depth, semi-structured interviews were held with the interviewees (see below for the questions used). We purposefully avoided bias in our questions, i.e. rather than asking what was good or bad about the forests, we focussed on the interviewee’s feelings/opinions.

The questions asked were as follows:

- What is your social role in the rural community or in the rural environment of Leitrim? Who are you in this community?
- How do you feel about forests in the area you live in? - in general, and when you think of the way forests are managed?
- When you think of others either involved in or affected by forestry in Leitrim, who shares your feelings? Who doesn’t? Can you tell me more about it?
- Was there a particular event that sparked your feelings about forests in Leitrim? If not, where else is your perception rooted in? E.g. have you felt like this for a long time, or did something happen recently that has changed your feelings?
- Based on the current forestry situation, what would you like to see more of in the context of forestry / like to see developed?
- Do you think that the feelings of the people living in Leitrim are different towards forestry than the feelings of people from other counties?
- Is there anything else that you would like to add regarding this topic?
- Is there anyone you think I should also talk to?

The duration of the interviews varied from 9 to 92 minutes. All interviews were audio recorded with the consent of the interviewees and transcribed verbatim. The data were analysed qualitatively by following so-called open coding. Here, every line of the interviews was analysed according to the question “What is it about? What issue within the forestry context is being raised here?” Hence, the issues, positive or negative, emerged from the interviews and were later grouped into conceptual categories, i.e. themes. The result is a description of the spectrum of opinions of forestry in Leitrim.

The interviews were intended to be the main source of information regarding “attitudes” to forestry. We set up a website shortly after the study was launched (https://leitrimforestrystudy.ucd.ie/), its primary aim was to invite people to inform us of any studies or information relating to forestry in Co. Leitrim that might be relevant to the study. However, some people used the website to submit their opinion on aspects of forestry in the county. An article was published on 22 May 2019 in the Leitrim Observer in which the Co. Leitrim Irish Farmer’s Association chairperson, Des McHugh, “urged farmers
and local communities to make their views heard as part of a study in the county into forestry”. This article directed people to the web address of the study. Forty-four (from 53) submissions were received after this article was published. Overall, we received nine written submissions (one from the IFA; one from the Save Cavan Group and from 7 individuals living in Co. Leitrim). We also received email submissions (44). The Executive of Leitrim County Council invited the study team to meet at the Council offices in Carrick-on-Shannon on 31st May at which it presented the team with relevant planning documents and provided an overview of the range of feelings about forestry that were expressed to the council. The team were also invited to a meeting on 1st July at which the Leitrim County Councillors gave their views on forestry in the county.

Another source of information regarding opinions related to forestry came from the survey of forest owners conducted as part of this study (see chapter 2). While the aim of the forest owners’ survey was to address some of the other terms of reference, the final question asked respondents “Is there anything else you wish to add”. A total of 45 of the 126 respondents completed this section, many giving their opinions on their decision to afforest and/or on forestry in general in Co. Leitrim.

Opinions about forestry in Co. Leitrim

Interviews, survey comments and written submissions from people living and/or working in Co. Leitrim were analysed in relation to their feelings and opinions about forestry in the county. Those feelings and opinions (including emotions, views and judgements) were grouped into categories, i.e. themes, and are presented below. It is very important to note that the detailed outline of themes does not represent what the majority of people felt, but instead describes the spread of opinions that emerged during interviews and submissions. Thus, a theme and/or opinion is presented regardless of whether they were raised by one person or twenty. Furthermore, they may not represent scientific facts, but rather are the personal opinions and feelings of the interviewees about the positive and negative ways forestry is affecting individuals, the community and the environment in Leitrim.

The following themes emerged during interviews, in written submissions and survey comments.

Re forestry as a land resource:
1 Land use
2 Forest models
   - Tree species
   - Timber harvesting
   - Other alternative forest models
3 Climate change and carbon sink
4 Environmental impacts
5 Impact on productivity of surrounding farmland

Re forestry in the local community:
6 Societal challenges in and vision for rural Ireland
7 Farming vs. forestry as a culture / Forest model for agroforestry
8 Jobs and local economy  
9 Public benefits / Forest model for recreation  
10 Individual benefit  
11 Selling and buying land for forestry  
   - Land price  
   - Investment companies  
12 Road damage and access  
13 Mental well-being  
   - Emotional threshold  

Re forestry policy:  
14 Regulations and their implementation  
   - Forest planning permission  
15 National vision for forest industry  
   - Incentives to drive the vision  

Other:  
16 Misinformation  
17 Local political agenda  

1 Land use  

A broad range of opinions were expressed about what land in Leitrim can or should be used for and what the value of that land is, including:  
- The land has an environmental value that should be acknowledged (i.e. for biodiversity, to protect rare species, as high nature value land, as a carbon sink (e.g. bog, natural woodland));  
- The land and the way it is currently being farmed should be considered as part of the traditional landscape which has a value in itself (i.e. traditional landscape);  
- The land should be used for recreational purposes, especially tourism (i.e. traditional landscape, recreational areas in broadleaf forests or mixed forests);  
- The land should be used for food production;  
- The land should be used to provide renewable energy crops (e.g. biomass, firewood);  
- The land should be acknowledged for its economic value (i.e. financial revenue from farming or from timber sales; forest premiums and timber sales to compensate farming or another local business).  

Emerging during interviews was the opinion that forests are seen as part of the mix of land uses. However, depending on which was the interviewee’s preferred land use, the opinions differed as to what kind of trees and forests were wanted. When land is used to plant trees primarily for economic purposes, the opinion was that Sitka spruce is the most suitable species; when the main interest is in any other type of land use forests other than monoculture Sitka spruce models are preferred.
It was additionally highlighted that forestry as a land use should not be the only choice available to people when making a decision about the viability of their land. However, the opinion expressed was that the generous financial incentives available for afforestation were eliminating other land uses from being a viable option. In turn, forestry as a land use eliminates other options in the future, due to the obligation to keep the land planted with trees.

Abandoned land, i.e. unmanaged land, and unfarmable land (i.e. poor land), is of no value and any other land use would be more valuable than unmanaged land was an opinion expressed. ’Good’ land, i.e. farmable land, on the other hand, should not be planted with trees. In relation to this, the work of the former Land Commission in organising the swapping of poor and good land between owners was highlighted and the reintroduction of something similar was regarded as a possible way to satisfy the various preferences with regard to land use.

“And I regretted now I didn’t plant every piece of land that I bought. I’d be sitting on millions today. But I was brought up with farming and it’s in your blood. It’s like being into racehorses or into machinery or cars or motorbikes, it’s in our blood; farming. But the odds are against us with the poor land. But there is money to be made. I don’t believe in planting up to a person’s door or planting good land, but where I live it’s all pretty poor land.” (Farmer forest owner)

“I think people at the moment aren’t given many other options of what to be doing with their land. I think if there [were] other government initiatives of how to actually use land positively for long term carbon sequestration and long term positive environmental effects. I don’t think people are selling to forestry because they really want the forestry … Of course, they want to make money. I think they would make it some other way if it was available, it doesn’t have to be forestry. Let’s give the people another option and one that allows communities to continue living here.” (Non-farmer non-forest owner)

2 Forest models

A range of opinions were expressed about the current forest model of using fast growing conifers, as to why such a model is used and the need to add new types of forest models. The range of opinions is presented in the following under a number of subheadings.

Tree species
The opinion was expressed was that when it comes to financial investment Sitka spruce is the most suitable species to create the expected financial return given the soil types present in Leitrim. Another opinion was that Sitka spruce is the species that negatively affects people’s mental well-being and the environment most. Another opinion was that Sitka spruce would be acceptable in a balanced mixed forest where different species are interspersed, rather than other species being planted around a block of Sitka spruce. It was also considered that native trees, such as Scots Pine, would root deeper than other conifers and would be more stable.
Various opinions on broadleaves were expressed. One was that broadleaves would not grow quickly or well enough in Leitrim for people who are interested in a commercial output. Another was that slow-growing hardwoods, despite not being the best species for short-term financial revenues, could still act as a financial investment for the next generations. A further opinion was that the slower growth of broadleaves would not matter when the main interests in forests are environmental health or recreation and amenity.

It was suggested that a mixed forest could fulfil both economic and environmental/recreational expectations, it could have amenity areas as well as timber production and, if well managed, provide biodiversity, landscape aesthetics and carbon sequestration.

“There are some very, very good examples and there are some very, very good conscious farmers who have planted land who tended it very well and hopefully at the end of the day they can reap the rewards of that and take out a very good crop at the end of it. But also, they can reap the rewards of biodiversity that is not impacting their local community. But the current forest structure I suppose to critique it is it’s allowed an attitude or maybe fostered a slightly plant it and walk away approach.” (Worker in local wood-using firm)

“I had a sort of romantic notion of forestry. Well, [what] I thought forestry was all about, 10 years ago, isn’t at all what it’s about. Thinking of an idyllic walk through the Phoenix Park, you can’t walk through this … It is not what I thought it was. It’s a money-making racket and there’s pros and cons.” (Investor)

In relation to the end product of the plantation, an opinion expressed was that the question of which species should be planted depends on the market the forest owner is aiming for. There was diversity of opinion regarding the value of the timber of various species. One was that the timber of Sitka spruce grown in Leitrim is valuable and can be sold as roof timber, another is that the timber of Sitka spruce is of much lower quality and is mainly used as biomass.

Timber harvesting
An opinion expressed about harvesting was that the currently prevalent clearfell system causes not only environmental but also social problems, particularly the appearance of the clearfell site and the disturbance for neighbouring residents during the clearfelling process. Another opinion was the clearfell system is what is expected in the forestry industry, but that a timber industry can exist without clearfelling and with selective harvesting, i.e. using continuous cover forestry (CCF) instead. Relating to CCF, an opinion was that more wide-ranging advice for CCF is needed as it can be a risky venture when older plantations have never been thinned. At the same time, CCF can transform plantations into something that is more appreciated by the public.

Opinions were expressed about the use of harvesting machines, i.e. that they are the quickest way to harvest trees but that they also cause the most damage to the soil. Further, harvesting machines cannot operate on soft ground and as a result, plantations established
on such ground may not be thinned using these machines; thus, thinning may be economically unviable.

Other alternative forest models
Apart from the forest models outlined above, the following alternatives were suggested as alternatives to the current model used in Leitrim:

- Agroforestry: more on this system under the theme “farming vs. forestry as a culture”;
- Community forests: to provide domestic firewood for the community;
- Forests producing non-timber forest products, such as berries, apple trees, nut trees;
- Natural regeneration: use natural regeneration rather than planting as the former will lead to more stable trees.

3 Climate change and carbon sinks

There were divergent opinions expressed as to whether broadleaves are better carbon sequesters compared to conifers such as Sitka spruce. Also, bogs were described as important carbon sinks and as land that should not be replaced by forest plantations. A further opinion expressed was that machines and trucks involved in the processing of timber emit carbon; because the relationship between carbon sequestration and emission is unclear, it was questioned whether forests that were planted for carbon sequestration should be harvested at all.

“I think that more woodland all over Ireland actually would be a really good idea. We used to be covered in woodland. And I think that native hardwoods that are suitable to particular areas should be replanted. And I think it would do a lot for our carbon sequestration, I think it would be a really good idea.” (Non-farmer non-forest owner)

“I feel betrayed by the people that are saying that the purpose of the forestry is carbon sequestration, because it’s false, because when you look at the amount of diesel used in the trucks to plant, harvest transport, process the trees. The amount of carbon been given out from them, the amount of carbon that’s then lost to the processing. And so, I do feel lied to, that we are all being lied to about the purpose of these trees being here.” (Non-farmer non-forest owner)

The issue of equity regarding carbon sinks was raised. An opinion voiced was that there is an unfairness associated with trees being planted in Leitrim, potentially by farmers in other counties, to offset their intensive agricultural practices.

“But then even the climate argument, which is being used to force conifer plantations onto communities, that we have to do this to offset the people who are making profits in other areas. I mean from a social point of view, I imagine that’s a very hard pill to swallow.” (eNGO)
4 Environmental impacts

The opinions regarding conifer forests and biodiversity ranged from one which considered that conifer plantations did not allow biodiversity to thrive in any way to one which considered that conifer plantations did support biodiversity but biodiversity that was different to that found in deciduous forests. There were opinions expressed that agricultural intensification, monoculture plantations and land abandonment all put pressure on biodiversity, and that forest models other than conifer monocultures would support biodiversity in various degrees. The structure and age-class of the stand and the type of trees all influence biodiversity.

“The balance between age classes of forestry, the management of forestry, the type of trees you are planting all that kind of stuff - the knowledge is there and we do have a lot of data where you can say that forestry can coexist with these species.” (eNGO)

In relation to the legal protection of certain species, the opinion was expressed that two of the pressures that threatened protected species are the lack of implementation of current environmental guidelines and the design and management of forests. The opinion was that if environmental guidelines are implemented and if the current and prevalent forestry model were adapted, then forestry, protected species and environmental health could coexist.

There was an opinion that forestry had a negative effect on the quality of drinking water, and on rivers and lakes and this arose through harvesting operations and through the use of chemicals in forests. It was suggested that water testing from forests was not carried out whereas water testing from farms was.

“Yes, so the pollution from the forestry and then of course we have aerial fertilisation in the forest and the spraying of ‘roundup’ totally uncontrolled, whereas farmers have to fill out a sheet and do everything. There needs to be a level playing pitch on this.” (IFA)

5 Impact on productivity of surrounding land

The opinion was expressed that a neighbouring plantation can have a negative impact on the productivity of the adjoining farmland. A plantation would leave the adjoining land wetter and darker because of the shadow cast, which ultimately affects the economic output of that farmland.

6 Societal challenges in rural Ireland and the vision for the future

The societal challenges that face Leitrim were raised. The opinion was expressed that the population in rural villages is declining while the population in large towns is increasing and that the population in Leitrim is characterised by mainly old and very young people; the age
group in between is leaving the county for education and/or employment. If individuals or families decide to move back to Leitrim, they are facing two obstacles: many of those people cannot settle because they are either not granted planning permission for a house or forest plantations occupy land or surround it.

Opinions were expressed about the other challenges associated with living in Leitrim, i.e. the lack of a working internet in the county; the absence of governmental support to local businesses; and that those business owners typically need additional income to be able to make a living.

As part of this wider view of the changes that the county is experiencing, there was the feeling that plantations emphasise this struggle and are a symbol of neglect for people living in Leitrim.

“We have a very changed place for Leitrim, it’s urbanising, its traditional systems are going, changing, land use is changing, economic circumstances and there is a lot of issues with that. No more here than anywhere else indeed. But I suppose in a way Leitrim has always been the what would you call it, I suppose in the mining business you bring the bird cage down into the mine, and when there is a build-up of gas the bird dies and everybody gets out. So, it's the first indicator of a problem. So, I think Leitrim has had that traditional role in Ireland that the effect of change is first seen in places like this. Because they are very rural, very dependent and the change impacts very quickly, it might be hidden in other places.” (Non-farmer non-forest owner)

“Forestry is the product, largely I think is the product and the issue is rural decline and farm succession are the drivers of it, forestry is just a symbol of it unfortunately. But it’s getting a bad name.” (Worker in local wood-using firm)

In relation to life in rural Ireland, the opinion was expressed that there is a lack of a clear strategy behind rural development policies, i.e. what is the vision for rural Ireland from a policy perspective, and how do these policies support people living in rural Ireland.

“Maybe there isn’t a national conversation around about our rural development policies, like how is rural Ireland changing, what do we want rural Ireland to look like? And then how do the individual sectors within rural Ireland help to achieve that vision. ... So, what kind of farmers do we want, what kind of land owners do we want to see viable. Do we want just larger farmers, and then forestry? Or do we want to try and maintain the level of small holdings that we have in Ireland?” (eNGO)

Divergent options were expressed as to the contribution that forestry makes to supporting rural life. An opinion was that by benefitting individuals economically, forestry allowed people to stay in Leitrim as it allowed them to continue to farm. It also provides the opportunity for people to come back to live in Leitrim. Forestry was also described as supporting not only individuals but the whole rural community by strengthening the local economy with local timber businesses, and by providing recreational areas.
“I inherited my forestry from my father. I am so grateful for it because the income I received from it gave me the opportunity to move back to Leitrim. The income from the first thinning meant I could start my ... business. My business has grown and hopefully the final clearfell will give me the means to buy my own premises which will give security to my business and my forestry. Without this forestry I would never have been able to live in the county that I love.” (Forest owner surveyed)

The alternative opinion was expressed, i.e. that forestry makes rural life more difficult. Farmland that is converted to forests cannot be used to expand existing farms or to start a new generation of farmers. Once abandoned houses are replaced by forests, they cannot be taken over by people who plan to move (back) to Leitrim anymore. An opinion expressed was that the currently prevalent Sitka spruce plantations in the region would not, even under the current guidelines, contribute to the vision that local people have for their community, but that other ways of managing forests would. A further opinion was that there was a lack of public consultation and it was proposed that the local public’s vision for the local communities should be combined with the governmental goals for rural areas.

“I think we need the forestry as it’s going to be an increasingly important land use and a sector within rural Ireland. And it has to be, the way that we envisage how that is going to work, has to be part of a bigger strategy of what we want rural Ireland to look like in the future. And I think that has to be driven by the Irish people.” (eNGO)

7 Farming vs. forestry as a culture / Forest model for agroforestry

There was divergence of opinion as to whether forestry can become a traditional land use and whether forestry and agriculture can coexist. One opinion is that this cannot happen once forests take up agricultural land which decreases the number of farms and farmers in Leitrim. However, a variety of opinions were given as to how they can coexist. One was that farming and forestry can compensate each other through the income from forestry premiums and timber sales. Premiums would give farmers more economic stability by diversifying their income. A plantation on the poor parts of the farmland would also improve the viability of the farm as the poor land for agriculture can then be productively used for trees. Another opinion was that most farmers are part-time farmers and that additional part-time or seasonal employment in the local forestry industry could complement the farming income. Yet another opinion about a possible coexistence of a farming and forestry culture was that the model of agroforestry could provide such a positive relationship. In this model, land would not have to be separated into farmland and woodland but would be combined into one symbiotic land use.

“It’s a cultural thing. It’s new to our culture. It’s very much a rural small-scale farm and keep this culture up in our neck of the woods. Forestry hasn’t really been a part of the picture. It’s becoming a part of the picture and of course culture is very resistant to change and then add that to the attitude seen as
failure. I think because it’s new and because it’s a culture change.” (Worker in local wood-using firm)

“But I would say that if you build people’s understanding, relationship and knowledge and capacity, then there certainly can be sustainable forestry living alongside and within farms and communities. ... There is no reason why it shouldn’t happen. But that requires an effort and it requires investment, it requires a plan that doesn’t seem to be there.” (Non-farmer non-forest owner)

“Well, looking at other models of forestry where once the trees have grown that livestock can actually roam in there ... And that’s just a symbiotic relationship that could work very well, where those things could work together, and I don’t see why not. But with the current way it’s managed it’s not possible and there is no undergrowth for the animals to roam and eat up anyway. But surely it could be done differently.” (Non-farmer forest owner)

8 Jobs and local economy

There were divergent opinions about the benefits of forestry to the local economy. One opinion is that the majority of trees harvested in Leitrim leave the county for further processing and are not used for any local forestry industry. On the other hand, several local sawmills and wood-using firms were named during interviews; however, the extent of the capacity of those firms, i.e. how much timber they can process and how many employees they have, was not clear to interviewees.

Another opinion was that the local economy benefits when local forest owners, such as farmers, spend their income gained from forestry premiums and/or timber sales locally. A further view was that every time the forestry premiums and/or revenues from timber sales allow a farmer to continue farming, it benefits the local economy.

“It’s a low value commodity effectively, the timber or the trees. They are wheeled out, shipped out in trucks. So, the only value that’s in it, is the haulage and some activity locally, where there is one or two mills and businesses operating. But the vast majority of the quantity is moved out.” (Non-farmer non-forest owner)

“The key thing with biomass is to keep it local. Particularly wood chip. ... If you start transporting it, you’re putting huge cost per tonne, per gigajoule against it and it just doesn’t really suit. So, it has to be kept local and that is the same for pulp coming in ... You are keeping the money locally as well as backing up the farmer who’s growing the stuff so it’s a whole little circular economy locally. So, you’re trying to develop something that’s really doing good for your area.” (Worker in local wood-using firm)

“If I think our own farm at home for example, when we planted some of our land, we actually ended up doing more farming, because we planted the weaker
bit around. With the premiums that we got from doing that, we went off and bought a bit of better ground somewhere else. And we actually ended up with more stock numbers than we had in, that was a decision we made at home. And there is no reason why other people couldn’t do that as well.” (Forester)

There were also divergent views as to the number of jobs available in the local forestry industry, the regularity of employment, and the locality of employment. One view was that the management gap between planting and the first thinning in individual forests means there is no employment during that period. The opposing opinion was that as there are many different forests in a region and these forests are at different stages of growth, and forest workers move from forest site to site, this means that forests in Leitrim do create sustainable employment. A further opinion was that the management of broadleaf forests requires more attention than conifers and thus this forest model would create more jobs.

In terms of the regularity of employment, an opinion was that employment in the forest industry is mainly irregular, i.e. part-time and/or seasonal. On the one hand, this was described as something negative; on the other hand, however, it was also pointed out that seasonal or part-time work would be advantageous for part-time farmers and other people involved in part-time jobs.

In relation to the third aspect, i.e. the locality of employment, the question was raised as to how many people employed in forestry are living in Leitrim. Some interviewees knew of local people employed in forestry, others did not. This may be, as one interviewee pointed out, because the work of forest companies is not limited to one particular county but covers areas all over the country.

“Sure, you have some of the figures probably on the amount of contractors that are living in the area doing work. There are also contractors living in Leitrim working in other counties. And I think it swings around a bit yes. Some of the guys that are doing work for me, I suppose maybe they might not be from Leitrim but they could be from north Cavan or Longford or Roscommon, the industry is very movable, anyone that’s involved in it, you can’t really be rigidly stuck in one place. So, there is probably that bit of swing around the place as well.” (Forester)

“They are jobs that are there. They are on the ground. They are supporting, a lot of these guys are part-time farmers themselves. You look at Masonite, ballpark there about 150 employed and how many of them are part-time farmers. It suits what’s in the region, so they are very important jobs.” (Worker in local wood-using firm)

9 Public benefits / Forest model for recreation

The benefits forests provide to local communities were raised as an issue. The opinion was expressed that there was a conflict between the individual financial benefits for forest owners from forests and public social benefits. Multi-functional management was suggested
as a solution to this conflict, i.e. that a forest plot could provide recreational areas for the public, the expected aesthetics for the community, educational purposes and local employment, as well as individual economic benefit from timber harvestings. It was further pointed out that only a mixed woodland with various species, including Sitka spruce, can provide such a space; plantations with Sitka spruce as the only tree species would only support the financial aspect.

Positive opinions were expressed about Coillte’s recreational forests. However, there was a feeling of regret expressed that more of such forests have not been established in Leitrim, and doubt expressed that forests for recreational purposes could be created in the private sector.

10 Individual benefit

Various opinions were given as to why farmers plant (the marginal) part of their farmland and these included the farmers’ need to increase their income, diversify their income and/or secure their pension. The additional income would be provided mostly by the premiums rather than by any revenues gained from timber sales, as the marginal land area planted is described as being too small to create sustainable income.

Interviewees also expressed their views as to why whole farms are being planted. These included:

- The profitability of trees compared to livestock;
- Heirs of an abandoned farm deciding to plant the otherwise unused land, or sell it to someone who does;
- When forestry premiums provide a higher income than the lease the landowner receives from renting out the land.

However, opinions in relation to forestry and its economic benefit did not only refer to local farmers; foreign investors and large farmers in other counties also benefit economically through the combination of low land prices in Leitrim, forest premiums, and the favourable market situation for Sitka spruce. The opinions raised in relation to forestry investors from outside Leitrim were generally negative, for reasons that are outlined in detail under the theme “Selling and buying land for forestry”.

When the primary interest in forestry is a financial return, the opinion was that Sitka spruce is planted. Broadleaves, with their slower growth rates and longer rotations, would be generally planted because of non-economic reasons. The market situation for broadleaves was raised; the opinions in this regard were that a developed market for hardwood is missing in the industry, and that this would influence the selection of species in plantations.

“I know none of the farmers around here are on a living wage. They all have to work outside farming ... So, why would anybody, why would a farmer plant oak trees that are not going to mature for 100 years? They won’t do it.” (Non-farmer forest owner)
11 Selling and buying land for forestry

Various opinions were expressed about who is buying land for forestry and on the reasons why land is being sold for forestry. Various scenarios were put forward by interviewees as to the circumstances surrounding the sale of land for forestry, including:

- established forests being sold after the eligibility for forestry premiums expires;
- land being sold unplanted but in combination with a valid planting licence, which would increase the value of the land;
- derelict land that is offered for sale would also often be planted as no agricultural use would be viable anymore;
- farmers who are retiring and who have no farm successor;
- land inherited by heirs who have no use for it.

The view was held that all sellers aim for the best market price for the land and that because of the current government incentives, it is people who plan to plant the land that can offer the best price. The opinion in this regard was that other incentives would encourage other buyers and eventually other land uses.

Interviewees provided various opinions as to who was buying land in Leitrim and their reasons for doing so. These included:

- Local farmers interested in neighbouring land in order to expand their farm;
- Local farmers or residents interested in land in order to plant trees;
- People outside Leitrim interested in land in order to plant trees where there is no local resident interested in buying the land;
- People outside Leitrim interested in land in order to plant trees; land which local farmers are interested in buying to expand their farm but who cannot compete with the subsidised price.

The biggest issue highlighted by interviewees referred to the last listed scenario and is therefore outlined in more detail in the following.

Land price

In relation to land prices, an opinion raised during interviews was that farmers who need land to expand and make the farm viable, or to enter farming, are not able to compete against a bidder whose monetary power is increased through the availability of forest premiums. Furthermore, banks won’t give farmers a loan to purchase land for farming but will do so (for the same land) if the farmer intends to plant it.

“Finally then you mentioned, well it’s the price of the land as ... mentioned 3000 against 5000 approximately it’s artificial, it’s been hiked up, due to advantage that the cheque book has. And it’s definitely not a level playing field.” (IFA)

Various solutions for this issue were proffered by those who had raised it: the land buyer could swap land with the farmer according to its productivity and location but also to the affect that planting the land would have on the community. Another proposed solution was the introduction of a new regulation which would only allow farmers to plant their land, with the forestry premiums helping them to sustain the farm. However, an opposing opinion to this was that if investment companies would not be allowed to buy land anymore, it would interfere with the market and could lead to a devaluation of land. Instead of
removing investors from the market, alternative grant-awaids should be made available to farmers to help them compete with the land price, or to make the farm viable without the need to expand it, for example through environmental schemes or grants for hardwood trees planted in hedgerows.

Investment companies
As highlighted during interviews, Leitrim is an attractive county in which to invest in forestry because the land prices are lower than in other counties and the growing conditions for trees are very good. Thus, there was the opinion that a considerable proportion of the planting that was occurring in Leitrim was being carried out by investors. What defined an “investor” varied according to the interviewees. They included: large-scale farmers from other counties, regional forestry companies, Irish, European and international funds or companies (sometimes referred to as vulture funds), as well as a group of schoolteachers in Canada. An opinion was that as foreign investors are absent and not connected to the community, they would not be aware of the social and cultural effects that their plantation causes. In addition, as the local community often does not know who owns the plantation, people cannot get in touch with the owner to inform them about the problems caused.

“But I wouldn’t plant this because I feel it would impose on the whole view of the countryside you know. And that’s the difference in me as a farmer planting it, and I’m farming here 40 years, and just an investor involved with a forestry company. Like just grab up a chunk of land, it doesn’t matter where it is, it’s below in Leitrim. That’s the problem in my view, that’s the problem. And that’s not an easy problem to sort out.” (Farmer forest owner)

“I mean I’m sure they haven’t a clue what they are investing in! And they would probably be horrified to know ... I mean if I was a Norwegian and I was investing in forestry in Ireland ... you might not be told what the practice is. You might think it’s nicely laid out. ... Not that I have ever made an investment in my life, but if my portfolio investment somebody said to me is pine forestry in Ireland, I would imagine something with butterflies!” (Non-farmer forest owner)

12 Road damage and access
A range of opinions were expressed regarding the damage that timber lorries cause to roads, especially small roads, and who pays for such damage. One opinion was that the county council had to pay for the damage caused by timber lorries. Another opinion was that there was a lack of awareness among people that the forest companies who work regularly in Leitrim, consult and work with the county council in regard to haulage and that forestry companies either funds the cost of repairing roads if the lorries cause damage or upgrade the road proactively in advance of the timber being hauled. A further opinion was that the issue of leaving a damaged road behind is more prevalent when the haulage companies and/or the forest owners are not local.
Another issue that was raised during interviews in relation to roads was the lack of road access to forest plantations, and that, due to that, lorries would drive over other people’s land.

13 Mental well-being

Opinions were expressed about the influence of forestry on people’s mental well-being. An opinion was that broadleaves, as opposed to conifers, have a therapeutic affect and that this is why people feel good and well in such an environment.

Other, negative forestry-related consequences on people’s mental well-being were expressed as well: that with tree growth comes darkness, and that a fully-grown plantation also means disconnection and isolation from the neighbours, which was not only described as being a social issue but also as an issue of security. Forests can generate concerns regarding safety, i.e. people feel unsafe when trees are hanging over roads or have already fallen. And lastly, clearfelled sites were brought up in this regard, as being not only unpleasant to look at when passing by, but the clearfelling process itself being truly upsetting when living in the immediate neighbourhood.

“When they clear cut all around us, we have forestry all up to every part of our boundary, and the process of when it became the industrial commercial zone over night. ... where there was trucks coming at 3 in the morning, 6 in the morning. There were lights shinning into our bedroom windows, big industrial lights at 6 in the morning. The house would shake when they would come to harvest. So, it was no longer, we were no longer living in a rural place, we were living in an industrial zone. ... it was very, very emotionally distressing. So, we thought, would we have to move because it was very horrible ... and suddenly having that place so drastically changed for a profit industry rather than for anything else.” (Non-farmer non-forest owner)

Emotional threshold

During interviews and submissions, it emerged that people interviewed and surveyed have an emotional threshold for the amount of plantations in Leitrim. An opinion expressed was that the scale of plantation has increased over time due to single parcels of various owners joining up, and because single owners of big parcels of land plant their land in stages over time.

In addition, the opinions of interviewees suggested different emotional thresholds for different types of forests in terms of tree species and location. A lower threshold was expressed for Sitka spruce monocultures than for mixed forests, and for plantations in areas where people live rather than for plantations on hilly non-residential areas.

Opinions raised in this regard also pointed out that because the numerous lakes and bogs in Leitrim limit the land available for houses, agriculture and plantations, the current forest cover of 19% in Leitrim would feel higher to people.
“We just feel like it’s enough of it now. Any more is just going to start getting devastating impacts. But other than that, if we had maybe a mix of culture, a mix of trees. Nobody would mind that so much. Maybe in smaller amounts. Like some of these plantations are huge.” (Non-farmer non-forest owner)

### 14 Regulations and their implementation

The issue of old and new guidelines for afforestation was raised. During interviews examples of ‘bad’ past planting practice were referred to; others considered that quite recent examples of ‘bad’ planting could be found. The issue had not per se so much to do with the guidelines currently in place, but rather the weak implementation of them.

“Poor level of inspections on reforestation sites that have been clearfelled. This is leading to a repeat of the old mistakes as regards setbacks off roads / houses / rivers plus non-enforcement of biodiversity spaces / broadleaf areas” (Forest owner surveyed)

“Just in regard to the protest there. What we notice is they are probably using photos that are been generated from maybe times where the policies, the Department of Agri policies weren’t as strong, where you would have had planting up next to roads. So those photos are being put forward, even though that problem has been resolved.” (Farmer forest owner)

Other issues raised in relation to regulation were:

- That while the obligation to replant after clearfelling makes sense from an industry point of view, it is a major discouragement for farmers to plant their land;
- The bureaucracy involved in obtaining road grants results in delays in thinning forest stands;
- Current regulations regarding distances from houses are inadequate in the context of a fire breaking out in an adjacent forest.

#### Forest planning permission

An opinion expressed was that, despite forests being a permanent land change and growing “as tall as houses”, no planning permission is required for forests under a certain scale. And although planning permission is required for larger plantations, the opinion was that some owners of those large-scale plantations have avoided the requirement for planning permission by planting smaller parts of the land in stages. Owners of large plantations also avoid the process of planning permission when they buy either adjoining established forests from various landowners, or adjoining unplanted land where the planting licence has already been given to the former landowner. The issue raised is that without planning permission being required for small or large plantations, the public has no opportunity to address the effects that the plantation has on them or the environment.
15 National vision for the forest industry

The issue of what was the national vision for the forest industry was raised. Several opinions emerged during interviews about what that vision is and how it contradicts or complements people’s vision for the forestry industry.

First, the view was expressed that the main reasons why the government is driving forestry is to mitigate carbon emissions from agricultural intensification and to support economic development in the country. In terms of the former, there was a recognition that trees are important carbon sequesters. However, the opinion was voiced that the government is focused on agricultural intensification and they are looking for any land that cannot be farmed intensively to be planted to sequester carbon. There is a feeling that the government does not seem to see any other role for extensive farms.

In relation to the development of a timber industry to strengthen the national economy, the opinions raised by interviewees vary. One view was that the development of the timber industry was important. Another was that this was the only vision for forestry in the country. In addition, as public money is involved in the forestry industry, the public’ expectation from forestry should also be taken into account in the governmental vision for forestry.

Incentives to drive the vision

During interviews, incentives were described as the means used by the government to achieve a particular goal or vision in the country. However, there was a view that the national vision has various regional impacts. Therefore, if incentives are given for a variety of ways to support that vision, it would enable people to make more choices and adapt to the regional circumstances.

“The government can say it’s on an ad-hoc basis, people are free to choose to afforest or not. But the way rural policy works is, you have a carrot and stick. So, if you don’t want something to happen you make it illegal to happen or you constrain it in some ways. And if you want something to happen, you incentivise it usually through structural supports. So, whether it’s supporting farming or certain activities or whether it’s like forestry sort of tax breaks, financial incentives. So, I would think the people kind of see that there is a policy there and it’s going to get them to a certain place. And they don’t want to go there. They want to go in a different direction.” (eNGO)

16 Misinformation

The opinion was expressed that information being spread about forestry in Leitrim is without evidence or is proven as not true. This misinformation was being seen and heard on social media, local newspapers, local radio stations and public meetings. The opinion was that those working in the local forestry industry feel that they are left in a situation where they have to defend themselves, their work and the actual facts, in order to be able
to carry out their work, as well as to inform people about the more multifaceted situation regarding forestry.

“From what I can find, a lot of the information that’s been portrayed is highly inaccurate, it’s very misleading ... The ideas that are left, it’s not nice to be working ... We’re trying to deliver something that’s good for the region ... You are keeping the money locally as well as backing up the farmer who’s growing the stuff so it’s a whole little circular economy locally. So, you’re trying to develop something that’s really doing good for your area and then on the other side you’re connected with this and this whole thing is getting a bad name.” (Worker in local wood-using firm)

“What’s even more disappointing ... is the lack of positive information about forestry, which there is loads [of] both economically and environmentally ... So, the misinformation being spread ... begins to be accepted as truth by the public. If the misinformation is not being questioned, then it becomes propaganda and that’s always bad.” (Email submission)

17 Local political agenda

Regarding county councillors, the opinion was expressed that because of the councillors’ role to represent the local public, they would only focus on the people’s opinion on forestry but neglect the facts, which, if they took them into account, would lead to a more complete discussion of the issue.

There are also opposing opinions on whether groups dedicated to the forestry situation in Leitrim are politically driven or community driven. An opinion was expressed that farming associations should represent the views of all their members in the forestry discussion, including members with forest plantations.

A further opinion expressed was that people whose views are not represented by any of those formal and informal groups would not be heard in the public discussion around forestry.

“And they would have members who have plantations on their land. So, I suppose our view on that is that they wouldn’t be representing all of their members if they actually are becoming involved in these pickets and protests that are, I think, are being put on individual farmers.” (Farmer forest-owner)
Chapter 4: The economic impact of forestry for County Leitrim

The forest industry in Co. Leitrim comprises Coillte, private forest owners, forestry companies, timber harvesting, extracting and haulage contractors, and primary processors including sawmills and wood-based panel manufacturers. This definition of the forest industry is similar to that used by Munday and Roberts (2001). The economic impact of forestry for Co. Leitrim (and the associated employment) therefore has a number of components. The first is the employment and economic activity associated with forestry in Co. Leitrim and arises from the establishment, maintenance and management of forests in the county, as well as the harvesting and haulage of timber from these forests. It also refers to the economic activity and employment arising from the processing of timber in Co. Leitrim. The second component of economic impact is employment (and economic activity) generated for Leitrim residents associated with forestry and wood processing outside Co. Leitrim.

Employment in forestry and wood processing

Estimating official employment statistics for forestry and wood processing in Ireland poses a number of challenges. These relate to how official employment statistics are recorded and how the industry is structured. Employment is measured in Ireland by the Labour Force Survey (LFS). The industry that a person is assigned to relates to the main activity of the business/organisation where they work. The main activity is then assigned a numeric code, referred to as a NACE Rev. 2 code, in line with EU requirements. The NACE Rev. 2 business activity categories are each given a different letter and subdivided further into 2-digit, 3-digit and 4-digit NACE Rev. 2 codes. Forestry is included in the business activity agriculture, forestry and fishing (A). Within this business activity, the forestry and logging elements of forestry are accounted for and these are further categorised by 3 and 4-digit NACE Rev. 2 codes. Published LFS data do not separate forestry from agriculture and fishing. Furthermore, LFS data are produced at NUTS 3 region level and are not available at a county level due to methodology and sample size issues.

The population census also classifies the population at work by industrial group. The population census publishes the numbers at work in the country as a whole in forestry and logging (NACE Rev. 2 02), but at county level these are combined with agriculture and fishing (activity A). Similarly, the wood processing activity, i.e. NACE Rev. 2 16, is not released at county level, instead total figures for all manufacturing industries are presented (activity C). Thus it was not possible to obtain forestry and wood processing employment in Co. Leitrim from official Central Statistics sources.

Another challenge associated with estimating forestry employment is associated with how employment is assigned to business activity. As highlighted above, the NACE Rev. 2 code that a business activity is assigned to determines which category the employment associated with that business activity is allocated to. This results in some of the employment

18 Leitrim is part of the Border NUTS 3 region which includes County Cavan, County Donegal, Country Leitrim, County Monaghan and County Sligo (https://ec.europa.eu/eurostat/web/nuts/background).

19 As per email from labour@cso.ie on 22/2/19.
associated with forestry not being assigned to forestry in the official statistics. For example, haulage of timber is accounted for in NACE Rev. 2 code 4941 “freight transport by road”. Some of the mounding and road building works in forests are undertaken by agricultural contractors and therefore their employment would be assigned to agriculture rather than forestry. Thus, even if employment data were available at a county level, determining the employment associated specifically with forestry from such data would be challenging.

Approach adopted in this study
To estimate the economic impact (and employment) of forestry for Co. Leitrim in light of the issues above, a multi-method approach was adopted. First, a survey of forestry companies, forestry contractors and wood processing companies in the county was conducted. Results from this survey were triangulated with data from DAFM, including the area afforested in Co. Leitrim and grants paid, to ensure as accurate an estimate as possible of the economic activity is derived. The steps involved are outlined in more detail below.

Survey of forestry firms
All major forestry companies were contacted and if operating in the Co. Leitrim area in 2017 they were invited to complete a detailed questionnaire. Coillte also completed the questionnaire. The firms engaged in timber processing were also surveyed. The general structure of the questionnaire was similar to that used in previous studies of economic impacts of forestry (e.g. Ni Dhubháin et al., 2006) (Annex B). A slightly different version was drafted for the processing industries. The overall aim of this survey was to capture the following information:

- Total amount of forestry work done in Leitrim (i.e. afforestation, maintenance, reforestation, harvesting, etc.);
- Total number of employees by residence (Leitrim, adjacent counties, the rest of Ireland);
- Total number of contractors by residence (Leitrim, adjacent counties, the rest of Ireland);
- Percentage of inputs purchased by source (Leitrim, adjacent counties, the rest of Ireland);
- The total expenditure on the various inputs including labour.

A base year of 2017 was chosen. This year was chosen rather than 2018 to ensure that companies surveyed would have comprehensive accounts available to consult to complete the questionnaire. Of the 12 major forestry companies contacted, 7 completed the questionnaire and one indicated that it was not engaged in forestry activities in Co. Leitrim. The remaining one third did not reply.

Survey of contractors
Previous studies (e.g. Ni Dhubháin et al., 2006) identified that much of forestry operational work is undertaken by contractors. Typically, forestry companies will be contracted by forest owners. These companies in turn will subcontract much of the on-the-ground work to a range of contractors. Through the surveys of the forestry companies, a number of contractors were surveyed. Contractors were categorised as follows:
Establishment – engaged in planting, fencing and maintenance;
Establishment – engaged in mounding and drainage;
Roading – engaged in building and repairing forest roads;
Harvesting – engaged in harvesting timber;
Haulage – engaged in haulage of timber.

To avoid double counting, each establishment contractor that completed the questionnaire was asked to identify (where relevant):

- the area (i.e. afforestation area) they planted and fenced;
- the forest area maintained (ha);
- the ground preparation area (ha), i.e. the forest area mounded, ripped, etc.;
- the area (ha) reforested.

For each of the above, they were asked who they had done the work for, e.g. Coillte, private forest owners, etc. In addition, each harvesting contractor contacted was asked to identify the total volume harvested (m³, or tonnes in the case of pulpwood) in Co. Leitrim forests, while the roading contractors were asked to identify the length (m) of road constructed/repaired and or upgraded in Co. Leitrim.

While the questionnaires did not ask whether contractors/employees also were part-time farmers, during the face-to-face/phone surveys conducted many of the contractors indicated that they were part-time farmers.

**Estimating employment**

The information provided in the survey allowed us to link activity (e.g. area afforested, volume harvested, etc.) with the labour input, i.e. number of man-hours. Once we had information on the level of activity, we applied these activity/labour ratios to estimate the number of FTEs associated with that activity. Some management time was included with each of the activities outlined below.

Only in the case of afforestation was the actual level of activity known, i.e. 537 ha, as official DAFM statistics show this to be the area afforested privately in Co. Leitrim in 2017. For all the other areas of activity, we relied on the information provided in the questionnaires that were returned. Where possible these were cross-referenced with other sources. Note no afforestation was undertaken by Coillte in 2017.

Maintenance of afforestation sites is conducted annually following afforestation until at least year 4 following planting, to ensure the successfully establishment of the forest. This typically involves some vegetation management and some filling in of trees that have failed. An estimate of the area of afforestation that maintenance was carried out on in 2017 was provided by DAFM statistics on the area a second instalment grant had been paid on in 2017, i.e. 592 hectares. This was cross-checked with data from the surveys of the contractors who generally indicated that the area they afforested was similar to the area they maintained in the year of survey. Thus the figure 592 ha seems a reasonable estimate.
The estimate of the reforestation area, i.e. 257 ha, was derived from the questionnaire. No other figures were available to cross-check this number; however, as we did not capture all the activity in the completed surveys, this is a conservative estimate.

In the case of the volume of timber thinned or clearfelled, we were able to calibrate the estimates from the questionnaires submitted by forestry companies (who provide this service to private forest owners) and Coillte with that provided by the sawmill/processors surveyed that were based in Co. Leitrim. This was supplemented with an additional email/phone survey of all of the major timber processors in the west of Ireland who were asked to indicate the volume of timber they had harvested/purchased (either as thinnings or clearfellings) from forests in Co. Leitrim in 2017. This generated estimates of 21,000 m$^3$ harvested as thinnings and 90,600 m$^3$ harvested in clearfells.

For haulage it was assumed the estimate of volume hauled was the same as the total volume harvested, i.e. 111,600 m$^3$.

Roading refers to the construction of new roads, as well as repairing and upgrading existing ones. Estimates from the surveys were that a total of 22,726 m of roading was undertaken in 2017 (this included new road construction, as well as road upgrade and repair).

As highlighted at the start of this chapter, the economic impact of forestry for Co. Leitrim has two components. The employment captured above refers to the first component, i.e. the employment which is associated with forests in Co. Leitrim. The second component relates to the employment generated in Co. Leitrim arising from forestry activity that occurs outside of the county, i.e. people who live in the county but who work in forestry outside of the county. With regard to the latter, the surveys we conducted provided us with some estimates of this level of employment. We also used a pilot study of employment in forestry in Co. Leitrim conducted in March 2018, the results of which were published in the Irish Farmers’ Journal on March 2018. The data from our surveys were used to validate a sample of these estimates.

Economic activity
We used a combination of the information from the surveys and information provided by DAFM to estimate the economic activity, i.e. the money circulating in the economy that is associated with forestry. The following is a brief summary of the methodology used.

The estimate of economic activity associated with afforestation was provided by the value of the first instalment grant payment that DAFM paid in relation to the afforestation of the 536 ha in 2017. Afforestation grants are paid in two instalments, the first immediately after planting, the second can be claimed no sooner than 4 years after planting has been completed. In 2017, a total first instalment grant-aid of €1,481,452 was paid. The value of the grants is fixed and covers the costs, so the figure of €1,481,452 is a measure of the money spent on inputs used, including labour.
The estimate of the economic activity associated with maintenance of afforestation was provided by the value of the second instalment of the grant payment, i.e. €474,985 in Co. Leitrim in 2017. Note that this payment relates to 592 hectares.

For thinning and clearfell and haulage, the estimates of the payments to contractors on a per cubic metre basis were obtained from the questionnaires. Similarly, the industry provided estimates of the cost of reforestation and the maintenance of reforestation sites.

Aside from the economic activity outlined above there is also the income from premiums and timber sales. Premium payments amounting to €2,758,626 were paid to 467 owners of forests in Co. Leitrim in 2017. To estimate the value of the timber harvested and to avoid double counting, standing sale prices were used. For the timber harvested in Coillte stands, Coillte timber prices from standing sales were used; prices from the wood price quarterly were used for private sales (ITGA, 2017). Again these prices refer to standing sales for conifers. The estimate of average tree size used in the analysis was 0.6 m³ for clearfell and 0.15 m³ for thinnings.

**Processing of timber**

There are three companies engaged in timber processing in Co. Leitrim. Crowes Sawmill is the only sawmill in the county. It is a family owned business that was established in Mohill in 1907. Locally (from Co. Leitrim) grown Sitka spruce accounts for the majority of wood processed at the mill; a smaller percentage of larch and Douglas fir from forests outside the county is also processed. All the timber is kiln dried and pressure treated. The spruce is used primarily for fencing. A total of 12 people are employed in the sawmill.

Masonite Ireland is located on a 60-ha site at Annaduff, 8 km south of Carrick-on-Shannon. The plant was established in 1997 and manufactures high density fibreboard which is moulded to generate FSC certified door skins for use in the door industry. Its main raw material is wood chips (i.e. the residues) generated from the processing of roundwood in sawmills. It also uses pulpwod generated from forest thinnings along with bark and sawdust to power its biomass heat energy plant. It has 141 employees.

McCauley Wood Fuel is a family firm producing wood fuels, including firewood logs, as well as WFQA certified wood chip for commercial heat users. It is based in Mohill and two are employed in the business.

**Description of the processing of the timber**

The vast majority of the timber that is harvested in Co. Leitrim is Sitka spruce. Moore (2011, p.27) gives an overview of the physical and mechanical properties of British grown Sitka spruce wood and states that “The wood properties of Sitka spruce mean that it is suitable for a wide range of products including structural timber, pallets, fencing, structural poles, panel products and paper”. Moore (ibid, p.3) further indicates that the properties of Irish grown Sitka spruce are similar to those of British grown spruce. Irish (and British) grown
Sitka spruce has a lower density and lower strength values than other conifers grown in Ireland (and Britain) (Cahalan, 1987).

The timber that is harvested is categorised by assortment. The assortments result from cross-cutting the felled stems into sections or logs. In Ireland there are typically three assortments, pulpwood, palletwood and sawlog. Sometime a stake assortment is also used. Assortments are determined by the diameter of the log and its length. In a first thinning in a conifer stand, typically all the volume harvested will be pulpwood. In later thinnings, more of the larger assortments, pallet and/or sawlog, will be present. The final harvest, i.e. the clearfell, will comprise mostly sawlog.

In Leitrim, the pulpwood that is harvested goes to a variety of destinations including McAuley Wood Fuels in Mohill, Masonite in Carrick-on-Shannon and Smartply Europe Ltd., an oriented strand board (OSB) mill in Waterford. A small proportion of the palletwood and sawlog is processed by Crowes sawmill in Mohill, the vast majority is processed by sawmills situated outside of the county, including Balcas located in Co. Fermanagh and ECC and Murrays both located in Co. Galway. The palletwood is processed by sawmills into pallet boards. The sawlog is converted into a number of products in sawmills. First approximately 48% of sawlog is converted into sawn timber (Knaggs and O'Driscoll, 2018). The remainder (residues) comprises bark (~10%), chips (~32%) and sawdust (~10%). Bark is usually sold by sawmills for garden mulch. The chips are used in Masonite in the manufacture of their door skins, but they also go to Medite in Clonmel to produce medium density fibreboard (MDF) and they are also used by Bord na Móna as fuel for power generation. The sawdust can be used to produce pellets, or again used by Bord na Móna for power generation. Bark and dust are also used in the sawmills for heating the kilns.

Nationally around 22% of sawn timber is used for fencing; 24% for pallets, 1% goes to other markets including firewood and the remainder (53%) gets converted into sawn timber for structural use (Knaggs and O’Driscoll, 2018) (Figure 7). Softwood timber that is used for structural use must be strength graded into strength classes according to a common European standard, i.e. EN 338. The class indicates the characteristic value of the bending strength, and for softwoods the range is from C14 to C50 (Moore, 2011). Strength grading is done by machine in the major sawmills in Ireland. In Ireland and Britain the machines are set for a C16 grade; in other words, each board is tested by machine to see if it meets the C16 grade, if so, it is classed as C16, otherwise it is classed as a reject. For the C16 grade, yields in excess of 90% have been achieved for British grown Sitka spruce (Moore, 2011), and Picardo (2000) noted similar yields for Irish grown Sitka spruce. One of the mills that purchases and processes Sitka spruce timber grown in Co. Leitrim was contacted and a representative indicated that the yields for C16 for Sitka spruce were in excess of 90%.

Representatives from the sawmills that purchase Sitka spruce timber from Co. Leitrim indicate that C16 Sitka spruce timber is used in a range of applications, including timber frame housing, roof joists, rafters, and joisting. Other products from Sitka spruce include pallets, packaging and fencing. Sitka spruce fencing components require preservative treatment to achieve the required service life when used in exterior situations (Moore, 2011).
Employment and economic activity associated with forestry

A total of 50.3 full-time equivalent jobs were generated for Co. Leitrim residents in 2017 as a result of forestry activity in the county in that year; a further 25 FTE jobs were generated for non-Leitrim residents. An additional 76 Co. Leitrim residents had employment in forestry outside of the county. Thus a total of 151.3 full-time equivalent jobs were generated as a result of forestry activity in Co. Leitrim. The economic activity associated with forestry in Leitrim was €7.11 million in 2017 which includes labour inputs and, for some activities, material inputs (i.e. only in the case of afforestation and afforestation maintenance is the value of material inputs included as these figures are based on DAFM grant values which include both). Note this is a conservative estimate as we were unable to capture all forestry activity in the county in 2017. An additional €7.9 million is income from premiums and timber sales. Based on the results of our survey we can assume that 30% of the value of the premiums and a smaller proportion of the value of the timber sales (as almost half of the timber sales were from Coillte forests) were received by non-Leitrim residents.

Employment and economic activity associated with processing

Masonite, Crowes and McAuley collectively employ 155 people (Table 18). Half of these are resident in Co. Leitrim and almost all of the remainder are from the counties bordering Leitrim. The combined wages and salaries of the companies in 2017 was approximately €8.0 million, half of which was earned by Leitrim residents. Along with the wages and salaries, the firms purchased approximately €2.9 million of their inputs from suppliers based in Co. Leitrim. A further €655,000 was paid in rates to Leitrim County Council giving a total figure of €11,550,000 for economic activity associated with processing. It is important to note that this figure does not include all of the economic activity associated with the companies, i.e. it does not include the economic activity generated in other parts of Ireland as a result of the inputs the companies buy. It also does not include the activity associated with the purchase

Figure 7: Average breakdown of products from sawlog
Source: Based on data from Knaggs and O’Driscoll, 2018
of roundwood and residues as these have already been accounted for in the forestry element. An additional 3 FTE jobs are held by Co. Leitrim residents in sawmills in neighbouring counties.
<table>
<thead>
<tr>
<th>Forestry</th>
<th>Activity</th>
<th>Leitrim residents</th>
<th>Non-Leitrim residents</th>
<th>Economic activity</th>
<th>Leitrim residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment</td>
<td></td>
<td>537 ha</td>
<td>8.8</td>
<td>2.2</td>
<td>1,481,452</td>
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<td>Maintenance for afforestation</td>
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<td>592 ha</td>
<td>9.4</td>
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<td>Reforestation</td>
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<td>1.5</td>
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<tr>
<td>Maintenance of reforestation</td>
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<td>257 ha</td>
<td>5.0</td>
<td>2.1</td>
<td>565,400</td>
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<tr>
<td>Roading (new roads, upgrade/repairs of roads)</td>
<td>22,726 m</td>
<td>2.5</td>
<td>1.0</td>
<td>357,040</td>
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</tr>
<tr>
<td>Haulage</td>
<td>111,600 m³</td>
<td>9.2</td>
<td>1.0</td>
<td>1,116,000</td>
<td></td>
</tr>
<tr>
<td>Harvesting (thinning and clearfell)</td>
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<td>3.8</td>
<td>5.7</td>
<td>1,821,000</td>
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<tr>
<td>Management</td>
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<td>8.0</td>
<td>9.0</td>
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<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td><strong>50.3</strong></td>
<td><strong>25.0</strong></td>
<td><strong>7,112,677</strong></td>
<td><strong>76.0</strong></td>
</tr>
</tbody>
</table>

**Income from forestry**  
- **Premiums** : 2,758,626  
- **Sale of timber** : 5,151,614  
- **Sub-total** : 7,910,240

**Processing**  
- **77.0**  
- **78.0**  
- **11,555,000**  
- **3**

**Total**  
- **127.3**  
- **103.0**  
- **26,577,917**  
- **79.0**
Considerations

It is important to note that the employment and economic activity shown here is for the year 2017. Forestry activity varies from year to year. For example, afforestation rates in 2017 were double what they were in 2018 which implies a reduction in 2018 for that activity. Those completing the surveys indicated that harvesting in the public sector in 2017 was almost half of what it was the following year, i.e. 2018, hence employment associated with this element was higher in 2018. Indeed, timber production forecasts for Co. Leitrim suggest an increase from an estimated 140,000 m$^3$ in 2019 to 351,000 m$^3$ in 2035 (Phillips et al., 2016). This increase will be associated with the private sector, as forests planted in the 1990s and 2000s mature and are harvested (Figure 8).

![Figure 8: Forecast of timber production in County Leitrim, 2019-2035](image)
Source: Phillips et al., 2016

The results clearly indicate that forestry and wood processing in Co. Leitrim generates employment for Leitrim residents and residents from neighbouring counties; similarly, Leitrim residents gain employment in forestry outside the county. This finding is not unique to forestry and has been shown to occur for employment as a whole across the county. In the Economic Strategy for County Leitrim published June 2015, Central Statistics Office (CSO) POWCAR (Place of Work, School or College- Census of Anonymised Records) data based on the 2011 Census of Population showed that 69% of the 8,042 (fixed location) jobs in County Leitrim are held by people living in the country – the remaining 2,493 were inbound commuters. In addition, there were a further 3,771 people who live in the county but commuted outside Leitrim for work. Thus, inbound and outbound commuting is a feature of employment in general, and as noted in the County Economic Strategy “the comparably high inbound commuter rate reflects the importance of the wider region to the local economy of County Leitrim and the general principle that what is good economically for the county’s neighbours is also good for Leitrim, and visa-versa” (Leitrim County Council, 2015, p. 4).
The employment presented here is direct employment. Additional employment (i.e. indirect) employment is created in firms supplying the forestry sector in Co. Leitrim. These include, for example, quarries supplying stone for roading and garages supplying diesel. Indirect employment associated with an industry can be estimated using an appropriate multiplier. However, the most recent multiplier for forestry in Ireland was generated almost 7 years ago at a NUTS2 level and thus would need to be updated to account for structural changes in industry and the wider economy over the last decade. More importantly, multipliers are likely to vary by county and region based on location of upstream suppliers and downstream processing and thus the use of a regional multiplier at county level would be inappropriate.
Chapter 5: Farm and forestry incomes

The third term of reference of this study is to assess the impact of forestry on farm incomes relative to other types of farming.

The returns from forestry and from agriculture in isolation are first examined. The returns to forestry are generated on the basis of an assessment of the theoretical return from planting a mainly conifer forest on the typically highly productive forest sites in Co. Leitrim. Average annual agricultural returns by farm system are presented separately based on Teagasc National Farm Survey data at a national and regional level.

Second, this report requires a comparative assessment of the relativity of forest and farm incomes. However, meaningful comparisons between farm and potential forest incomes require data at individual farm (micro) level in relation to farm system, size and environmental productivity constraints, in order to be able to assess the financial impact of planting land on farm income across individual farms (on a hectare by hectare basis). In addition, the long-term nature of forestry means a comparison of the returns from a forestry enterprise with those from agricultural enterprises requires the use of some form of discounted cash flow analysis. This comparative analysis is undertaken at an individual farm basis at both national and county level.

Generalised income comparison for a hypothetical forest

Teagasc has developed a Forest Investment Valuation Estimator (FIVE) as a decision-support tool, using Discounted Cash Flow (DCF) analysis to model indicative financial returns for forestry land-use options. The MS Excel Model provides indicative analysis and decision support, particularly in relation to reviewing pre-planting options and comparing criteria such as species, yield classes and rotation lengths according to landowners’ preferences and objectives.

Potential timber revenues are generated by the FIVE tool through the selection of stand characteristics and management regimes. A range of variables are used as inputs in a typical analysis, including species, site productivity, rotation length, relevant premium payments, establishment and on-going management costs, thinning and clearfell timber volumes and revenues potentially attainable. The FIVE tool has been used in previous studies of forestry and agricultural incomes (e.g. Ryan et al., 2014, 2016).

Future cost and revenue streams from forestry are generated in FIVE which are then discounted to present day values and presented as net present values (NPVs):

\[
NPV = \sum_{t=0}^{T} \frac{R_t - C_t}{(1 + i)^t}
\]

where: \( R \) = Revenue; \( C \) = Cost; \( t \) = year the cost/revenue is experienced and \( i \) = discount rate (in decimals).
The NPVs refer to the net returns to forestry over one (or more) forest rotation(s), whereas agricultural income streams are reported on an annual basis. Thus, in order to compare forestry with other farm enterprise options, the FIVE tool allows different forest crop rotations to be expressed on an annual per hectare basis. This can be done by presenting the NPV of a forestry plantation enterprise as a series of equal cash flows over the forest rotation, known as the Annual Equivalised NPV Value (AEV). This AEV figure (€ ha\(^{-1}\) an\(^{-1}\)) can provide indicative comparisons with farm income (€ ha\(^{-1}\) an\(^{-1}\)) for other farming enterprises.

In chapter 2 of this report it was noted that GPC 3 is the typical grant and premium category established in Co. Leitrim. Here the FIVE tool is used to generate the costs and revenues from a hypothetical GPC afforestation scenario, i.e. GPC 3, which comprises the afforestation of a mix of 85% Sitka spruce and 15% broadleaves in the stocked area. The model also factors in appropriate areas for biodiversity enhancement (ABE) which comprise biodiversity features such as retained hedgerow and habitats, open areas, environmental setbacks and future access routes. The following is a brief summary of how the revenues and costs are calculated, as well as the assumptions employed in the model.

Revenues
The revenues from forestry arise from the sale of timber and the annual forest premium. Yield models are typically used to forecast the volume of timber (i.e. the yield) that can be expected from a site once the tree species, age, yield class, stocking, proposed rotation length and thinning treatments are known. As highlighted previously (see chapter 2), the average yield class for Sitka spruce in private forests nationally is 21.2 m\(^3\) ha\(^{-1}\) an\(^{-1}\) (Farrelly et al., 2009) and Farrelly (pers com) estimates that the productivity figure for Co. Leitrim for private forests is higher than this, i.e. approximately 25 m\(^3\) ha\(^{-1}\) an\(^{-1}\). Hence in this analysis we run a number of scenarios for both yield class 20 and 24\(^{20}\). Timber yields for existing forests can be forecasted using dynamic yield models which have been produced based on Irish data for tree species growing in Ireland (Broad and Lynch, 2006). However, in forecasting the returns from hypothetical forests, the Forestry Commission Yield models for Forest Management based on data from British stands are used for forest growth and yield modelling in Irish forests for various species and management regimes (Edwards and Christie, 1981). The yield models predict thinning and felling volumes over a given rotation based on an assumed management regime; volumes may then apportioned into timber assortments (sawlog, pallet and pulp) using the stand assortment tables provided by Matthews and Mackie (2006). The FIVE tool utilises the Edwards and Christie model to forecast hypothetical forest returns on a per hectare basis.

Once the predicted thinning and felling volumes are calculated and the average tree size estimated by FIVE based on the model, FIVE calculates the economic value of the timber produced using timber price size curves. The price size curves employed in FIVE are based on conifer standing prices published by Coillte; prices averaged over a 3, 5, 7, 10 or 15 year period are utilised in FIVE. The revenue stream is calculated for each harvesting operation by multiplying the timber volume, once appropriate deductions for harvest loss and stocking have been made, by the relevant price. These revenue streams are then discounted to give their present value.

\(^{20}\) We used yield class 24 rather than 25 as models are only available in units of 2.
Costs
The costs associated with the forestry enterprise include establishment and management costs. FIVE assumes that the costs of establishment are covered by the grant. Costs that occur post establishment can be entered into the model with the year (or number of years) that they occur.

Key outputs from FIVE include Net Present Value (NPV), Total Revenue and Total Costs (all non-discounted). The model converts the NPV to an Annual Equivalised NPV based on rotation, current age and discount rate. It also produces cashflow (non-discounted) estimates.

FIVE allows the user to select the discount rate to be used in the analyses. Here we use a discount rate of 5%. This is the most commonly used discount rate when comparisons between the relative value of different long-term agricultural land use options are being made (e.g. Clinch, 1999; Phillips et al., 2013). FIVE also allows for the timber valuations to be adjusted (upwards or downwards) according to the site and timber quality, to take account of factors such as location, proximity to markets, suitable access, and uniformity of site.

Scenarios tested
A number of scenarios were tested. For all scenarios the following stand details apply:

Area: 1 ha
GPC3: Sitka 85%; Sycamore 15% - as this is for long-term retention a yield class is not assigned.
Stocking: 85%.
Rotation: Varies according to the yield class; for yield class 20, rotation length was 36 years; for yield class 24, it was 34 years.
Thinning year: Varies according to the yield class; for yield class 20, first thinning year was year 20; for yield class 24, it was year 18;
Roading year: The year prior to first thinning.

Costs
The costs are common for all scenarios (Table 19).

<table>
<thead>
<tr>
<th>Operation</th>
<th>Cost</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection paths</td>
<td>€60/ha once-off</td>
<td>Year 17 (Scenarios 1-2); year 15 (Scenarios 3-4)</td>
</tr>
<tr>
<td>Inventory</td>
<td>€40/ha once-off</td>
<td>Year 18 (Scenarios 1-2); year 16 (Scenarios 3-4)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>€30/ha annual</td>
<td>Year 5 to clearfell year</td>
</tr>
<tr>
<td>Insurance</td>
<td>€50/ha annual</td>
<td>Year 1 to year 20</td>
</tr>
<tr>
<td>Roading cost net of grant</td>
<td>€8/m; 18 m/ha once-off</td>
<td>Year 19 (Scenarios 1-2); year 17 (Scenarios 3-4)</td>
</tr>
<tr>
<td>Road repairs</td>
<td>€1.50/m</td>
<td>After each harvest event</td>
</tr>
<tr>
<td>Reforestation</td>
<td>€3000/ha</td>
<td>Each after clearfell</td>
</tr>
</tbody>
</table>
Revenue

Premiums
15 years @ €510/ha

Timber Volumes and Revenues
Timber prices: Average 10-year or 7-year prices, depending on scenario.
Timber quality adjustment: 0%.
Cost of sales: 15% of thinning revenues and 5% of clearfell revenues.
Harvest losses Include:
14% for 1\textsuperscript{st} thin; 12% for 2\textsuperscript{nd} thin; 8% for 3\textsuperscript{rd} and subsequent thin; 5% for clearfelling (all percentages refer to estimate of merchantable volume provide by the yield models)

Discount rate: 5%.

A summary of the scenarios tested is shown in Table 20.

Table 20: Scenarios tested

<table>
<thead>
<tr>
<th>Scenario</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield class</td>
<td>20</td>
<td>20</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Average timber price period (years)</td>
<td>7</td>
<td>10</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

Results of the NPV analysis

The analysis shows that the NPV from the GPC 3 for the four scenarios ranges from €6,700 to €7,808 per ha (Table 21). The annual equivalised NPVs range from €405 to €482 per hectares. It is important to note that revenues from the timber and costs occur at irregular intervals with the income in the form of the premium payments being received in the first 15 years. In this analysis it is assumed that three thinning operations are conducted yielding net income in the latter two following by the income from clearfell. The cashflow from scenario 1 is shown in Figure 9. The results show the sensitivity of the forestry returns to the yield class of the forest and in turn to the environmental conditions (i.e. climate, soils, etc.) of the site which dictate site productivity (yield class).

Table 21: Results of NPV analysis

<table>
<thead>
<tr>
<th>Scenario</th>
<th>NPV (€ per ha)</th>
<th>Annual Equivalised Value (€ per ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6937</td>
<td>419</td>
</tr>
<tr>
<td>2</td>
<td>6700</td>
<td>405</td>
</tr>
<tr>
<td>3</td>
<td>7808</td>
<td>482</td>
</tr>
<tr>
<td>4</td>
<td>7454</td>
<td>460</td>
</tr>
</tbody>
</table>
Farm incomes by farm system and size

In this section the returns from agriculture are examined in isolation, before examining the impact of forestry on farm incomes across different types of farms. Aside from the Census of Agriculture, which is only published on a 10-year cycle, the main source of economic data relating to farming is the Teagasc National Farm Survey (NFS), which is a component of the EU Commission Farm Accountancy Data Network (FADN). The NFS is conducted on an annual basis by Teagasc. A random, nationally representative sample of between 1,000 and 1,200 farms (depending on the year) is selected annually in conjunction with the Central Statistics Office (CSO). Each farm is assigned a weighting factor so that the results of the survey are representative of the national population of farms (Dillon et al., 2018); these results are published annually.

National average farm incomes

Family Farm Income (FFI) is the principal income measure that is used in the Teagasc NFS where FFI is defined as the return from farming for family farm labour, land and capital. It is calculated by subtracting costs (both direct and overhead) from gross output (including direct payments). The lowest FFI values at national level have been recorded for sheep farms and cattle farms, with tillage and dairy recording the highest values (Table 22). Results for two years are presented to show that FFI values vary over time.
Table 22: Family Farm Income (FFI, €/hectare), by farming system, for 2018 and 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Dairy</th>
<th>Cattle rearing</th>
<th>Cattle other</th>
<th>Sheep</th>
<th>Tillage</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>1047</td>
<td>270</td>
<td>391</td>
<td>276</td>
<td>675</td>
<td>541</td>
</tr>
<tr>
<td>2015</td>
<td>1112</td>
<td>329</td>
<td>424</td>
<td>323</td>
<td>546</td>
<td>578</td>
</tr>
</tbody>
</table>

Source: Hennessey and Moran (2015); Dillon et al. (2018)

As is the case with forestry returns, the returns from agriculture are influenced by the environmental conditions. This is evident from the variation in the regional FFI values (Table 23).

Table 23: Family Farm Income (FFI, €/hectare) for Cattle rearing, by region (2018)

<table>
<thead>
<tr>
<th>Region</th>
<th>FFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>North/West*</td>
<td>271</td>
</tr>
<tr>
<td>East/Mid</td>
<td>230</td>
</tr>
<tr>
<td>South</td>
<td>290</td>
</tr>
</tbody>
</table>

* Co. Leitrim is part of this region
Source: Dillon et al. (2018)

Direct payments
Direct payments contribute significantly to farm incomes. For cattle rearing (suckler system) nationally they account for 158% of FFI (Table 24).

Table 24: Contribution of direct payments to FFI

<table>
<thead>
<tr>
<th>System</th>
<th>Contribution to FFI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>34</td>
</tr>
<tr>
<td>Cattle rearing (sucklers)</td>
<td>158</td>
</tr>
<tr>
<td>Cattle other (finishers)</td>
<td>111</td>
</tr>
<tr>
<td>Sheep</td>
<td>143</td>
</tr>
<tr>
<td>Tillage</td>
<td>55</td>
</tr>
<tr>
<td>All</td>
<td>74</td>
</tr>
</tbody>
</table>

Source: Hennessey and Moran (2015); Dillon et al. (2018)

Relative returns from agriculture and forestry, nationally and on a county basis
While the Teagasc NFS is the ‘gold standard’ of farm level economic data in Ireland, the survey represents 90% of agricultural output and focuses on farms that generate greater than €8,000 standard output (SO). The CSO estimated that in 2013 there were 52,300 Small Farms in the country (37% of all farms) down from 72,830 in 1991 with over 32,000 (62%) of these located in the Border, Midland and West (BMW) region. Many small farms are not represented in the Teagasc NFS survey, yet these farms have low farm incomes (Dillon et al., 2017) and could potentially earn more from forestry. In addition, the Teagasc NFS does not publish farming statistics at county level.
Thus, in order to examine agricultural returns nationally and at county level, it is necessary to use an alternative approach, which allows for the inclusion of small farms in the analysis, while also enabling comparisons between the national and local Leitrim contexts. The complexity of modelling the agricultural and forest policy environment is complicated by the heterogeneity of farm systems and environmental conditions, particularly across the distribution of cattle farmers (Ryan et al., 2018). A suitable modelling approach is provided by O’Donoghue et al. (forthcoming) who use a micro-simulation model, SMILE\(^{21}\), and apply it to the NFS data from 2014 and the CSO data on small farms to generate a modelled micro-dataset from which statistics on agricultural returns are derived for the entire population of farms nationally and for county Leitrim.

Micro-simulation modelling is a simulation-based tool that can be used for ex-ante analysis. The methodology is of particular use where there is a dearth of data, data are not complete, or to assess the ex-ante impacts of policy changes. It is a micro-based methodology, utilising micro-units of analysis such as individuals, households, firms and farms, using surveys or administrative datasets (O’Donoghue, 2014).

Micro-simulation modelling has previously been used in the farm forestry context by Ryan and O’Donoghue (2019) who used a static micro-simulation approach to provide a better understanding of the life-cycle relativity of forestry and agricultural incomes, using Ireland as a case study. In general, farm level spatial micro-simulation models use sampling or re-weighting techniques to create a synthetic spatial farm dataset based on existing micro farm data. The sampling methods for spatial farm level micro-simulation models may involve sampling or weighting farms from one particular agronomic condition and making them representative of another agronomic circumstance. However, they do not fully incorporate geographically varying agronomic and environmental variables (Hynes et al., 2009; Morrissey et al., 2008). For instance, one farm from a national distribution can be sampled to represent a local distribution. However, that ‘representative’ sample may not accurately reflect local environmental contexts.

To improve the environmental accuracy of the farm level spatial microsimulation model, ‘SMILE-Env’ (O’Donoghue et al., forthcoming) has been developed, building on the SMILE model (O’Donoghue et al., 2013), to take into account the local agronomic context, increasing the accuracy of farm output measurement. In this study, the SMILE-Env model was used to generate comparative statistics for agricultural returns at national level and at individual county (Leitrim) level.

In addition, these returns are then compared with the forest returns generated by the Ryan and O’Donoghue (2019) forest micro-simulation model, which also takes into account the soil productivity of farms based on the Teagasc NFS soil codes for individual farms and FIVE model outputs. The results are presented on the basis of farms where the potential return to forestry is greater than or less than the actual return from agriculture.

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\(^{21}\) Simulation Model of the Irish Local Economy (SMILE) (O’Donoghue et al., 2013).
Share of farm systems and farm incomes for Co. Leitrim and the State
Cattle rearing and cattle other are the most common farm types in Co. Leitrim, accounting for 71.2% of all farms (Table 25). The proportion of such farms in Leitrim is greater than in the State. Dairy and tillage systems are rare in Leitrim.

### Table 25: Share (%) of farm types in Co. Leitrim and in the State

<table>
<thead>
<tr>
<th></th>
<th>Dairy</th>
<th>Cattle Rearing</th>
<th>Cattle Other</th>
<th>Sheep</th>
<th>Tillage</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leitrim</td>
<td>1.3</td>
<td>35.8</td>
<td>35.4</td>
<td>16.3</td>
<td>0.8</td>
<td>10.4</td>
<td>100.0</td>
</tr>
<tr>
<td>State</td>
<td>12.9</td>
<td>21.5</td>
<td>37.7</td>
<td>12.9</td>
<td>5.5</td>
<td>9.5</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: SMILE-Env

Family Farm Income
The average FFI for all farm systems except dairying is lower in Co. Leitrim than nationally. In particular, the average FFI for cattle other is less than half of the FFI nationally for this system (Table 26). Cattle systems comprise the majority of farms in Leitrim (Table 25) and hence generate the greatest proportion of FFI in Leitrim.

### Table 26: Ratio of Family Farm Income in Co. Leitrim versus that in the State, by Farm Type

<table>
<thead>
<tr>
<th></th>
<th>Dairy</th>
<th>Cattle Rearing</th>
<th>Cattle Other</th>
<th>Sheep</th>
<th>Tillage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leitrim/State</td>
<td>1.08</td>
<td>0.69</td>
<td>0.49</td>
<td>0.69</td>
<td>0.44</td>
</tr>
</tbody>
</table>

Source: SMILE-Env

Economic viability of farms in Co. Leitrim
Teagasc defines a farm business as being economically viable if FFI is sufficient to remunerate family labour at the minimum wage and provide a 5% return on the capital invested in non-land assets, i.e. machinery and livestock (Dillon et al., 2018, p. 27). An estimated 10% of farms in Co. Leitrim are economically viable based on this definition of viability (Table 27). Only 5% of the cattle other farms in Leitrim are viable. In the State, 25% of all farms are viable.

### Table 27: Farm Viability Rate (%) by Farm Type, for Co. Leitrim and the State

<table>
<thead>
<tr>
<th></th>
<th>Dairy</th>
<th>Cattle Rearing</th>
<th>Cattle Other</th>
<th>Sheep</th>
<th>Tillage</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leitrim</td>
<td>73.0</td>
<td>11.1</td>
<td>5.3</td>
<td>19.2</td>
<td>36.0</td>
<td>10.4</td>
</tr>
<tr>
<td>State</td>
<td>66.1</td>
<td>15.4</td>
<td>18.4</td>
<td>18.7</td>
<td>58.2</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Source: SMILE-Env

---

22 Note: while the proportion of viable farms reported in the Teagasc NFS is in the region of one third, as the dataset used for this analysis also includes small farms, the viability rate is lower nationally.
Comparison of the returns from forestry with agriculture

A brief overview of the methods used to compare the returns from agriculture with those from forestry is provided here. The SMILE-Env model compared forestry returns for each individual farm with the actual costs and incomes from that farm to determine the opportunity cost foregone when planting one hectare of it. The forestry micro-simulation component of the modelling infrastructure (Ryan and O’Donoghue, 2019) generates forestry returns based on the soil classes for each individual farm, and Farrelly et al.’s (2011) estimate of the yield of Sitka spruce for that soil class. The forestry returns were generated using broadly the same assumptions as the FIVE outputs shown above. The return from forestry was classed as greater than that from agriculture if the AEV from forestry was greater than the return from the agricultural system currently being practised (taking into account the agricultural income foregone (as a result of planting) as an annual opportunity cost). It assumes that the land once afforested still attracts the basic farm payment.

The estimated percentage of farms in Co. Leitrim where the return from forestry (on a per hectare basis) would be higher than that from agriculture is 67%, while in 74% of the cattle rearing farms the returns from forestry would be higher (Table 28). Among all counties (Table 29), Co. Leitrim has the highest percentage of farms where the return from forestry would be higher. This can be explained by the physical and environmental context that prevails in the county, in that the soils that limit agricultural production are unusually good for tree species that thrive on poorly drained mineral soils. From an agricultural perspective, as shown previously in this report, the climate and the wet soils limit livestock density numbers and pose challenges for land交通ability.

Table 28: Percentage of farms where the return from Forestry would be higher than from Agriculture, by Farm System, for Co. Leitrim and the State

<table>
<thead>
<tr>
<th></th>
<th>Dairy</th>
<th>Cattle Rearing</th>
<th>Cattle Other</th>
<th>Sheep</th>
<th>Tillage</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leitrim</td>
<td>2.7</td>
<td>73.7</td>
<td>69.6</td>
<td>64.3</td>
<td>10.1</td>
<td>67.1</td>
</tr>
<tr>
<td>State</td>
<td>1.8</td>
<td>56.8</td>
<td>57.0</td>
<td>56.3</td>
<td>23.6</td>
<td>47.5</td>
</tr>
</tbody>
</table>

Source: SMILe-Env

These results help explain why so much afforestation has taken place in Co. Leitrim compared to in other counties. From a purely financial perspective, forestry is a better option for many farms in Leitrim. However, as has been so clearly shown in many other studies, farmers’ values and beliefs about farming are much wider than financial considerations (Duesberg et al., 2013).

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23 While assumptions used are broadly the same, the models are not directly comparable; however, they both generate similar qualitative conclusions.

24 The assumption in the scenarios provided is that the forests are well and sustainably managed, with uniform and productive growth in stocked areas, reflecting the general favourable growing conditions in Co. Leitrim.
Table 29: Percentage of farms where the return from Forestry would be higher than from Agriculture, by Farm System, for all counties

<table>
<thead>
<tr>
<th>County</th>
<th>%</th>
<th>County</th>
<th>%</th>
<th>County</th>
<th>%</th>
<th>County</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carlow</td>
<td>39.6</td>
<td>Kerry</td>
<td>48.1</td>
<td>Louth</td>
<td>34.2</td>
<td>Waterford</td>
<td>35.6</td>
</tr>
<tr>
<td>Cavan</td>
<td>49.3</td>
<td>Kildare</td>
<td>46.9</td>
<td>Mayo</td>
<td>51.6</td>
<td>Westmeath</td>
<td>53.3</td>
</tr>
<tr>
<td>Clare</td>
<td>59.0</td>
<td>Kilkenny</td>
<td>37.5</td>
<td>Meath</td>
<td>43.1</td>
<td>Wexford</td>
<td>30.7</td>
</tr>
<tr>
<td>Cork</td>
<td>36.5</td>
<td>Laois</td>
<td>40.2</td>
<td>Monaghan</td>
<td>39.9</td>
<td>Wicklow</td>
<td>49.0</td>
</tr>
<tr>
<td>Donegal</td>
<td>50.0</td>
<td>Leitrim</td>
<td>67.1</td>
<td>Roscommon</td>
<td>62.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dublin</td>
<td>42.2</td>
<td>Limerick</td>
<td>43.1</td>
<td>Sligo</td>
<td>59.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galway</td>
<td>52.9</td>
<td>Longford</td>
<td>57.7</td>
<td>Tipperary</td>
<td>40.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: SMILE-Env
Chapter 6: The non-timber outputs of forestry in County Leitrim

In this chapter non-timber outputs of forestry in Leitrim are addressed. Forests not only produce timber but they also generate other products, known as non-timber forest products, and they also provide a range of ecosystem services. These include carbon sequestration and storage, recreation, biodiversity and water. In this chapter a number of these outputs/services are examined.

Carbon sequestration and storage

Forests act as carbon sinks though their ability to sequester and store atmospheric carbon. The rate of sequestration is affected by many factors including species, yield class, soil type as well as management activities, such as harvesting and fertilisation, and previous land use (Byrne and Black, 2003). The lower the rate of growth of the trees (i.e. the lower the yield class), the slower the uptake of carbon (Dewar and Cannell, 1992).

Based on the latest National Forest Inventory data (Forest Service, 2018), the total carbon stock in Leitrim forests is estimated at 12,606,000 tonnes (Table 30). In 2017, the C sequestration value for Ireland in the greenhouse gas (GHG) inventory submissions to the UNFCCC was 3.4 MtCO₂ (EPA, 2019). Forests in Co. Leitrim account for 3.9% of the total forest area of Ireland. Based on the assumption that the forests in Leitrim are representative of the whole forest estate, the forest area in Co. Leitrim represents 3.9% of this sequestration (0.13 MtCO₂ per year). However as shown previously the proportion of Sitka spruce in Leitrim forests is 61% compared to a national figure of 51%; the age-class distribution of Leitrim forests is skewed to slightly younger age-classes than in the whole forest estate, and yield classes in Leitrim are higher than the average for the estate as a whole, hence the figure of 0.13 MtCO₂ per year is likely to underestimate the contribution of Leitrim’s forest to the C sequestration value in 2017.

Harvested wood products are an important carbon pool (Donlan et al., 2012). The importance is influenced by the use to which the harvested timber is put. The carbon in wood products is fixed until they decay or are burned. Thus the carbon in timber used in construction is locked up for decades (Bullock et al., 2016).

Table 30: Total carbon stock by ownership and carbon pool in Co. Leitrim forests

<table>
<thead>
<tr>
<th>Stock type</th>
<th>Public (grant aided)</th>
<th>Private (other)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'000 tonnes</td>
<td>%</td>
<td>'000 tonnes</td>
</tr>
<tr>
<td>Tree above ground</td>
<td>912</td>
<td>12.8</td>
<td>525</td>
</tr>
<tr>
<td>Tree below ground</td>
<td>192</td>
<td>2.7</td>
<td>100</td>
</tr>
<tr>
<td>Deadwood</td>
<td>116</td>
<td>1.6</td>
<td>6</td>
</tr>
<tr>
<td>Litter</td>
<td>133</td>
<td>1.9</td>
<td>81</td>
</tr>
<tr>
<td>Soil</td>
<td>5,781</td>
<td>81.0</td>
<td>3,397</td>
</tr>
<tr>
<td>Total</td>
<td>7,134</td>
<td>100</td>
<td>4,109</td>
</tr>
</tbody>
</table>

Source: Forest Service, 2018
Recreation
Increasing numbers of people are spending their leisure time in forests (Burgin and Hardiman, 2012). The benefits from forest recreation include improved mental and physical health and tourism revenue (Cordell et al., 2002; Martin, 2008). The recreational activities that can take place in forests range from mainly passive forms (e.g. rest, relaxation, reinvigoration, solitude and escape) to more active forms (e.g. mountain biking, climbing and running), the latter forms are increasing in popularity (Burgin and Hardiman, 2012).

Increased demand for recreational opportunities has been noted in Ireland (Hynes et al., 2007). In 1999, Clinch estimated that Coillte’s forests attracted over 8 million visitors annually. Fitzpatrick Associates (2005) estimated the approximate usage of Irish forests to be 18 million visitors per year with much of this recreation occurring in the public (Coillte) forest estate, where an open forest policy applies (see below). In contrast to other European countries where the “right to roam” policy prevails, the public do not have the right to access private lands, including private forests. There is, however, a requirement for public access (limited to the forest road and not the forest) under the Forest Roads Scheme. Thus, private forest owners who have availed of grant-aid under the Forest Roads Scheme are required to provide and facilitate public access to the forest road25. In the following section the recreational opportunities in Leitrim’s forests are outlined.

Recreation in Coillte Forests in Co. Leitrim
Coillte operates an open forest policy allowing free access on to forest land on foot for recreation. Other recreational uses such as mountain biking, hunting and horse riding require a permit from Coillte. In 2017, a total of 11 recreational licences were issued for Coillte forests in Leitrim. These include 7 for bird stalking, 2 for deer hunting and 2 for organised walks.

There are a number of recreation areas within the Coillte estate in Co. Leitrim. The majority of these sites are official recreation sites and are managed internally by Coillte. These are described below26.

Derrynahimmirk
The Derrynahimmirk recreation site at Derrynahimmirk - Fowley’s Fall, Rossinver, was a joint venture between Coillte and neighbouring landowners and others. Unfortunately, due to storm damage and landslides, the riverside trail is currently damaged and closed.

Glencar Waterfall and Wood
Glencar Wood is situated 10 km west of Ballinamore. It comprises ash, oak, holly, sycamore, hazel, birch and beech. The wood includes a walk and toilet and picnic facilities. There is access to Glencar waterfall for disabled persons.

25 DAFM (2015) outlines that it is a basic principle of the Forest Roads Scheme that any funded infrastructure should be open to the public for recreational use without charge. However, such access may be restricted for a specified period where it is necessary to protect sensitive areas, or where vandalism or dumping is an issue, or to ensure the proper and safe use of the infrastructure. Where measures have been taken to protect any infrastructure from animal trespass, pedestrian access must be provided by a gate or stile or other means. Public access does not confer any permanent rights to individual members of the public and does not extend to access off the forest road.

26 Some of the information on the recreation areas in the Coillte estate was taken from www.coillte.ie.
**Derrycarne Wood**
Derrycarne wood is situated 14 km south-east of Carrick-on-Shannon on the banks of Lough Boderg (Magner, 2011). This woodland is situated in an area that was previously part of the Derrycarne Demesne. The main tree species present on the site are oak, ash, yew, sycamore and beech, along with Douglas fir, Sitka spruce and Lawson cypress. There is a picnic site close to the lake and an estimated 4 km of walks within the wood (Magner, 2011). Facilities also include a car park and access to the Shannon.

**Glenfarne Wood**
Glenfarne Wood lies on the shore of Lough Macnean. The wood forms part of what was once the Tottenham Estate, that existed from 1780 to 1919. A feature of the trails is the presence of a number of sculptures which form a section of the Lough Macnean sculpture trail. There are also a number of other features along or adjacent to the trails, notably the Ladies Rest, Myles Big Stone and the badgers well. The species composition is predominately Sitka spruce but other species such as Scots pine, birch, larch and alder are also present. There is a picnic site and a boat quay on the site (Magner, 2011).

**Milltown Wood**
Milltown Wood is situated 1 km northwest of Manorhamilton. It has a small car park and picnic site close to Milltown Bridge (Magner, 2011). The forest is mainly coniferous and includes Sitka spruce, Norway spruce and Japanese larch. Beech and oak are also present, as well as ash, holly, sycamore, hazel and birch.

**Scardan Waterfall**
Scardan Waterfall is a viewing point, with views of Lough Allen and Slieve Anierin, located at the edge of a Coillte forest.

**Cartron – Trolls Wood**
Cartron or ‘Trolls Wood’ as it is known locally, is a natural wooded ravine, close to Lough Gill. There is a looped trail approx. 3.5 km up through the ravine and back around by the upper eastern side. It is unsuitable for commercial forestry given the steepness of the site.

Recreation in Private Forests Co. Leitrim
As outline above, there is no right of public access to private forests. However, private forests may be used for recreation by the owner and their family and/or others if the owner permits this. In the survey of forest owners a number of questions were included to get an estimate of the recreational use of private forests.

Of the 126 forest owners who replied to our survey, 32 gave recreation as one of the uses (or planned uses) for their forest (see Table 14 in chapter 2). However, only 4 listed it as their most important use, a further 14 listed it as their second use. For those who listed it as their most important use, their forests comprised pure broadleaves (one owner) or broadleaf-conifers mixes (2 owners), while one of the owners did not provide details of the species in their forest. For the owners that ranked recreation as their second most
important use (planned use), eight had forests that were dominated by Sitka spruce (i.e. > 50%), two had pure broadleaf forests.

As a further means of determining the extent to which the owners of private forests engaged in some form of recreational activity in their forests, we asked how many days per year they (or their families) engaged in a range of activities (Table 31). They were required to provide this information on an individual forest basis, i.e. where respondents had planted more than one forest area, we asked them to complete the information for each forest separately to allow us to determine the link between the species composition of the forest and the type of activities owners engaged in that plot. The average number of days spent walking by all forest owners surveyed was 22.7 days; 40% reported spending at least one day per annum (Table 31). Very few of the respondents engaged in hunting. Typically those owning broadleaf plots spent more time in their plots engaging in a range of recreational activities.

<table>
<thead>
<tr>
<th>Activity</th>
<th>All plots</th>
<th>Conifer plots</th>
<th>Broadleaf plot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of plots</td>
<td>Average number of days per year</td>
<td>% at least once (%)</td>
</tr>
<tr>
<td>Walking</td>
<td>193</td>
<td>22.7</td>
<td>40</td>
</tr>
<tr>
<td>Having picnics</td>
<td>193</td>
<td>0.41</td>
<td>4</td>
</tr>
<tr>
<td>Wildlife viewing</td>
<td>193</td>
<td>10.8</td>
<td>15</td>
</tr>
<tr>
<td>Hunting</td>
<td>193</td>
<td>0.6</td>
<td>6</td>
</tr>
<tr>
<td>Bird watching</td>
<td>193</td>
<td>10.7</td>
<td>20</td>
</tr>
<tr>
<td>Enjoying solitude</td>
<td>192</td>
<td>14.2</td>
<td>24</td>
</tr>
<tr>
<td>Monitoring progress of trees</td>
<td>192</td>
<td>33.0</td>
<td>77</td>
</tr>
</tbody>
</table>

* Note for some forests the tree species were not given; they are included in the overall value but are excluded when the plots were categorised by conifer/broadleaf

We asked also asked forest owners whether they allow non-family members to spend time in their forests and if so, to specify what activities these non-family members engaged in. Sixteen percent indicated that they do allow non-family members spent time in their forests, either for hunting or walking.
Biodiversity

Biodiversity has been defined by the UN Convention on Biological Diversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (Cropper, 1993). Ireland is a signatory to this Convention and undertook to “promote the conservation and sustainable use of biological diversity” (DAHG, 2014, p.4). With respect to biodiversity and forests, Ireland made commitments to maintain and enhance biodiversity in Irish forests at the second Ministerial Conference on the Protection of Forests (MCPFE). These international commitments are now enshrined in Irish forestry policy and practice, through the adoption of the Irish National Forestry Standard (Forest Service, 2000a) and its associated Environmental Regulations (DAFM, 2016). These Regulations are described in chapter 7. They recognise the influence that tree species selection has on the habitat value and biodiversity of a forest and recommend that broadleaf species be favoured as much as possible, subject to site conditions. Under the current afforestation scheme there is a requirement that 15% of each afforestation proposal comprises broadleaves. In addition 15% of the forest area must be treated with particular regard for biodiversity. These so-called “Areas for Biodiversity Enhancement” comprise open spaces and retained habitats and can include inter alia hedgerows, scrub and archaeological sites. Another initiative that aims to recognize and enhance biodiversity in Irish woodlands is the Native Woodland Scheme (see Table 6).

The species and age composition, the land use replaced by forests and the management of the forest all influence biodiversity within a forest stand. Native forests support higher species richness in Ireland (e.g. Irwin et al., 2013) and elsewhere (e.g. Lindenmayer and Hobbs, 2004) relative to plantation forests (be they conifer or broadleaf) (O’Callaghan et al., 2017). Nevertheless, Coote et al. (2012) noted that plantations had the potential to support high numbers of plants. They compared plant communities of mature Sitka spruce, Norway spruce, Japanese larch and ash plantations in Ireland with those of semi-natural oak and ash woodlands. They found that “plantations and semi-natural woodlands can support similar species assemblages, but also can differ quite markedly”. Mixed species planting can be positive for biodiversity, but Oxbrough et al. (2012) found such a benefit was not evident when the additional canopy species comprised less than 40% of the mix. Colonisation by forest species progresses as forests age, therefore more species tend to have established in older plantation forests (Barlow et al., 2009). Older aged stands are generally beneficial for spiders through the provision of suitable habitat in the form of a high cover of bryophytes and conifer litter (Oxbrough et al., 2005). As canopy closure occurs, forest use by open habitat species declines, and these are replaced by more generalist species (Wilson et al., 2009). The land use that preceded the establishment of a forest is an important consideration when making comparisons between biodiversity (Brockerhoff et al., 2008). The biodiversity value of improved grasslands is low (Reidsma et al., 2006) leading O’Callaghan et al. (2017) to conclude that afforestation of improved grasslands with exotic conifers is likely to result in a net increase in biodiversity. In contrast, O’Callaghan et al. (2017) state that wet grassland afforestation has a negative impact on biodiversity, particularly for species that prefer wet conditions. The management of a stand is also important. Positive links have been found between thinning intensity and vascular plant
species richness, although heavier thinning negatively impacts bryophyte and lichen species richness as these require heavy shaded conditions (Iremonger et al., 2006).

Biodiversity in Leitrim Forests

With respect to floral diversity in Leitrim forests, the national forest statistics in Table 4 indicate that Sitka spruce comprises 61.50% of the forest area, with a further 30% of the forest area comprised of native species. A further source of information is provided by the forest owner survey (see chapter 2) which showed the tree species recorded in the forests owned by those who responded to our survey included: alder, ash, birch, oak, rowan, sycamore, beech, larch, Sitka spruce, Norway spruce, lodgepole pine, western red cedar, “cypress” and Douglas fir. The survey of forest owners also provided us with some information about the fauna within private forests. Forest owners reported sighting a variety of animal and bird species in their forest (Table 32). Most commonly rabbit/hares were noted, followed by badgers and pine martens. A number of the species were more likely to be sighted in the broadleaf forests. It is acknowledged that this is a very crude indicator of the biodiversity in the forests, however, it was the only information available to the study.

Table 32: Percentage of forest owners noting a range of animals and bird species in their forests

<table>
<thead>
<tr>
<th>Species</th>
<th>All forests (%)</th>
<th>Conifer forests (%)</th>
<th>Broadleaf forests (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rabbit/hare</td>
<td>68</td>
<td>70</td>
<td>71</td>
</tr>
<tr>
<td>Badger</td>
<td>56</td>
<td>57</td>
<td>64</td>
</tr>
<tr>
<td>Bird species</td>
<td>50</td>
<td>48</td>
<td>64</td>
</tr>
<tr>
<td>Pine marten</td>
<td>47</td>
<td>52</td>
<td>50</td>
</tr>
<tr>
<td>Red squirrel</td>
<td>34</td>
<td>31</td>
<td>53</td>
</tr>
<tr>
<td>Deer</td>
<td>32</td>
<td>31</td>
<td>50</td>
</tr>
<tr>
<td>Bats</td>
<td>27</td>
<td>28</td>
<td>32</td>
</tr>
<tr>
<td>Grey squirrel</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Other animal species</td>
<td>11</td>
<td>9</td>
<td>21</td>
</tr>
</tbody>
</table>

* Note: for some forest the tree species were not given; they are included in the overall value but are excluded when the plots were categorised by conifer/broadleaf

Forests: water quality and quantity

Forestry can potentially affect the amount and the quality of water available to other users (Willis, 2002). There is decreased runoff from areas under forestry compared with areas under shorter crops (Calder, 2006), as leaves/needles/stems of trees intercept rainfall which in turn is evaporated by the wind before it reaches the ground (Nisbet, 2005). The interception values for conifers range from 25 to 40% of annual rainfall, while for broadleaves they range from 10 to 25% (Nisbet, 2005) while for grassland the values can range from 14-19% (The Open University, 2019) draw water through roots which is then evaporated from leaves/needles through the stomata in a process known as transpiration (Nisbet, 2005). Annual transpiration losses due to forests are estimated to be 300-350 mm and these are not influenced by tree species. For every 10% of a catchment covered by a
closed conifer canopy, there would be a 1.5-2.0% reduction in water yield (Nisbet et al., 2011). On drier lowland sites, this could increase to 7-10% per 10% forest cover. Forests and woodland can also slow down run-off and reduce downstream flooding (McCulloch and Robinson, 1993).

Forests can influence water quality through a number of processes. Conifers capture airborne pollutants and can increase the risk of acidification in soft-water streams that drain areas which receive heavy loads of atmospheric pollutants (Harriman and Morrison, 1982). In Ireland, increases in stream acidity have been found in afforested catchments in the east and west of the country, although plantation forests in the south of Ireland have not been found to lead to acidification and related problems (Giller and O’Halloran, 2004). While the atmospheric driver for acidification has reduced, high DOC concentrations due to forestry planted on peat soils are a source of acidification on base-poor geology (Feeley et al., 2013). Forests can also lead to contamination of water ways through the application of fertilizer or herbicides although the amount of fertiliser and pesticides forests receive compared to arable land or managed grassland is very small resulting in a relatively minor risk of diffuse pollution (Nisbet et al., 2011). Indeed, woodlands in riparian zones can reduce the risk of direct contamination by adjacent agricultural activities and help trap and retain nutrients and sediment in polluted run-off (Nisbet et al., 2011). Ground disturbance arising from forestry operations can lead to increased sediment delivery, turbidity and downstream siltation (Marks and Leeks, 1998). Tree harvesting and windrowing have been shown to result in elevated episodic inputs of nutrients (mainly phosphorus) and sediment to watercourses (Kelly-Quinn et al., 2016). Kelly-Quinn et al. (2016, p. xi) noted that “with careful design, sediment traps and aquatic buffer zones might reduce sediment exports but phosphorus retention on peaty soils is more challenging”.

To address the potential negative impacts of forests on water quality, the Forest Service published Forestry and Fisheries Guidelines in 1992 (Forest Service, 1992a); these were subsequently augmented by the Code of Best Forest Practice (Forest Service, 2000b), Forestry and Water Quality Guidelines (Forest Service, 2000c), Forest Harvesting and Environmental Guidelines (Forest Service, 2000f) and the Environmental Regulations for afforestation (DAFM, 2016) and introduction of statutory regulations on aerial fertilisation. Further details of these regulations are outlined in the following chapter.

The positive impacts of forests on water courses are being promoted in Ireland with the targeting of the establishment of native woodlands beside water courses under the Woodland for Water measure introduced in 2018 (DAFM, 2018b. p. 3). It is expected that a wide “range of significant water-related ecosystem services can be realised by applying the Woodland for Water measure, including:

- Reduction in sediment mobilisation and runoff into water courses;
- Interception of nutrient runoff into water courses;
- Bank stabilisation;
- Food input into the aquatic ecosystem;
- Shading/cooling;
- Regulation of floodwater;
- Riparian restoration”.

81
Monitoring of Water Quality

Monitoring of water quality in rivers and lakes has been carried out in Ireland since 1971 in a programme run by the Environmental Protection Agency (EPA). Over 2,888 sites (rivers and lakes) are sampled for biology, half of these are also sampled for physical and chemical parameters (EPA, 2019). Any changes in the river flow or in the physical structure of the river are also recorded. The biology is recorded every three years while the physical and chemical parameters are measured several times a year depending on the classification of the site as an operational or surveillance site. Leitrim County Council also undertakes investigative monitoring programmes. Inland Fisheries Ireland (IFI) monitors fish status at some surveillance sites and this is fed into the overall ecological status assigned by the EPA. 

Since the European Union Water Framework Directive (WFD) was transposed into Irish law in 2003, the information from the water monitoring programme has been used to classify the ecological and chemical status of the water bodies into five categories ranging from high to bad. The WFD aims to prevent the deterioration of the status of surface waters and groundwater and to protect/enhance all waters (surface, ground and coastal waters) with the aim of achieving at least ‘Good Status’ generally and to retain ‘High’ and ‘Good’ Status where such already exists. The trends in water quality noted from the monitoring programme, along with assessments of catchment pressures and expert knowledge are used to identify water bodies that are “at risk” of not achieving their objectives under the WFD, i.e. to achieve ‘Good Status’ generally and to retain ‘High’ and ‘Good’ Status where such already exists.

Local Authority Waters Programme (LAWPRO)

In 2016, the Local Authority Waters Programme (LAWPRO) was established to support and coordinate the efforts of public bodies working in areas connected with water quality. The programme has two elements:

*The Communities Team* has 12 Community Water Officers working from various local authority offices across the country. It has been the main tool for engagement and consultation on the second cycle of the River Basin Management Plan (RBMP) and will play a key role in the preparation for cycle 3. It supports and activates communities and stakeholders in the delivery of local water projects and initiatives. The team also works with river trusts and catchment partnerships which are developing across the country. It provides an essential link between active communities and various funding streams such as LEADER and Local Agenda 21.

*The Catchments Assessment Team* is an interdiscipliary team of 36 scientists (established in mid-2018) to provide the local evidence base to put the ‘right measure in the right place’. This involves on-the-ground local catchment assessments and collaboration with communities, landowners, and public bodies to develop and implement workable solutions. LAWPRO sits within a three-tier governance structure with the Department of Housing Planning and Local Government (DHPLG) at tier 1 which sets policy, the EPA at tier 2 and the local authorities at tier 3. The local authorities have put in place management and

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27 Under the Water Framework Directive the Government is required to produce a river basin management plan.
operational committees in each of 5 regions to ensure co-ordinated implementation of the River Basin Management Plan. All relevant public bodies with responsibilities or an interest in the WFD sit on the operational committees in each region.

The RBMP 2018-2021, sets out the targets and measures Ireland will implement to achieve the objectives of the WFD. One of the key measures to address the decline in high status objective waterbodies is the setting up of the Blue Dot Catchments Programme and associated Steering Group to specifically target the protection and restoration of high-status waterbodies. The Programme is directed by a Blue Dot National Steering Group which had its inaugural meeting in January 2019. A draft work programme is currently in preparation by the Steering Group and will be finalised by the end of 2019. One of the key differences between good status waters and high-status waters is the significant pressures profile. For good status, agriculture is the number one significant pressure nationally, while for high status waters, forestry is the number one significant pressure. This is largely due to the age profile of forestry in high status catchment, many that were planted pre-1990.

Assessment of water bodies in Leitrim under the WFD
In Co. Leitrim 36 water bodies (22 rivers and 14 lakes) have been identified as being at risk of not meeting their WFD status objectives (www.catchments.ie). The most significant pressure leading to this “at risk” status is agriculture, accounting for 42.9% of the at-risk water bodies. Hydromorphology 28 (16.3%), forestry (14.3%), invasive species (8.2%), anthropogenic pressures (6.1%), industry (4.1%), urban waste water (4.1%), urban run-off (2%) and extractive industries (2%) are also identified as significant pressures (www.catchments.ie). In Co. Leitrim 28 waterbodies are review waterbodies so additional local assessment is needed there to determine the significant pressure.

Of the eight high status objective waterbodies, four are at risk and four are not at risk. Agriculture has been defined as the sole significant pressure for two of the sites, with peat (extractive industry) identified along with agriculture for another waterbody. The fourth waterbody has hydromorphology listed as a sole significant pressure. However, it is worth noting that hydromorphology includes sediment/drainage issues and most drainage (which carries sediment to the river) is carried out for the purposes of either agriculture or forestry, thus hydromorphology as a pressure could be as a result of forestry land use (LAWPRO, 2019). In Co. Leitrim, forestry, industry, urban run-off, urban wastewater and invasive species are not significant pressures on any water bodies with high ecological status (www.catchments.ie).

Further monitoring and characterisation under the WFD
The WFD runs in 6-year cycles. Nationally, 190 priority areas for action have been identified, covering 726 water bodies where water quality improvements are required. There are 10 such priority areas for action fully within or partially within Co. Leitrim (Lough Melvin and Drowes, Lough Allen, Yellow (Ballinamore), Upper Bonet, Kilukin/Shannon, Duff, Lough Gill, 28 Hydromorphology takes into account the physical character and water content of water bodies; hydromorphological pressures include abstraction, impoundment, channelization and embankments (www.catchments.ie)
Glencar, Cullies, and Lough Rinn). Forestry has been identified as a significant pressure in 6 of these.

LAWPRO catchment assessment teams carry out local catchment assessments within the priority areas for action. The aim of these assessments is to further characterise the catchments, refine the significant pressures and to identify the right measure in the right place. These measures are in addition to those statutory measures that are already in place. Within each priority area for action the catchment assessment team will complete a desk study, this will then in most instances be followed by a community information meeting prior to the commencement of local catchment assessments. To date community information meetings have been held in the Lough Melvin & Drowes, the Cullies, Lough Rinn & Forbes and the Duff priority areas for action. Local catchment assessments are underway in the Lough Melvin and Drowse, the Cullies, Lough Rinn and Forbes and in the Yellow (Ballinamore) catchments.
Chapter 7: The current state of environmental regulation of forestry in County Leitrim

In this chapter legislation relating to forestry is presented focussing primarily on aspects relating to the environment. Current legislation is outlined first, a timeline of legislation is then given focusing on legislation relating to environmental impact assessment and consultation as it pertains to forestry. The second part of the chapter provides an overview of current environmental regulation with respect to forestry. A timeline is also given for environmental regulation. The legislation and environmental regulation that is described in this chapter applies to the country as a whole. However, where available, Leitrim specific data are presented in a further section. The chapter concludes by addressing how compliance with the law and environmental regulation is assessed and describes the penalties associated with non-compliance.
Forestry and the law
Since the foundation of the Irish State, forestry has been governed by a number of Forestry Acts. The 1928 Forestry Act, which came into force in 1930, introduced the concept of a felling licence. Only if a felling licence was issued by the Minister responsible could felling lawfully go ahead. The requirement to have a felling licence to cut down (non-exempt) trees was also in the 1946 Forestry Act and the attaching of a replanting condition was associated with the issuing of these licences. This replanting requirement was introduced due to the extent of deforestation by the early 20th century. Since then, “legally-binding, international environmental agreements and ‘carbon accounting’ (e.g. the United Nations Convention on Climate Change) have also necessitated a policy that in general requires reforestation or alternative afforestation to replace trees felled” (DAFM, 2017, p.5). The Forestry Act, 1956, was an amending Act, which clarified parts of the 1946 Act dealing with land acquisition (Maguire, 2001); the 1988 Forestry Act set out the legislative basis for the establishment of Coillte Teo.

Forestry Act 2014 and Forestry Regulations 2017
In 2014 a new Forestry act, the 2014 Forestry Act was passed and was commenced by the Forestry Regulations S.I. 191 of 2017. In the following section some of the key elements of this Act and the Regulations29 are outlined focussing on those that relate to environmental regulation.

The Act states the requirement for consent, by way of licence, from the Department of Agriculture, Food and the Marine for some forestry activities, i.e. it is an offence to undertake the following forestry activities unless a licence is obtained first from the Department:

- Tree Felling – a Felling Licence is required to uproot or to cut down any tree (subject to certain exemptions);
- Aerial Fertilisation – an Aerial Fertilisation Licence must be obtained before a person can use an aircraft to apply fertiliser to a forest;
- Afforestation – an Afforestation Licence is required for all afforestation projects where the area involved is greater than 0.10 ha;
- Forest Road Construction – a licence is required to construct a forest road. If a forest road construction project includes the provision of access to a public road, planning permission for the access may also be required (DAFM, 2019c).

Tree felling
The Forestry Regulations require those who have been granted a felling licence to erect a site note at the entrance to the land to which the licence relates advising the public that tree felling is being carried out.

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29 Note for a thorough review the reader should consult the Act and Regulations.
Aerial fertilisation

The Forestry Regulations outline the application process for a licence for aerial fertilisation, including required details of the site, type, formulation and concentration of fertiliser as well as proposed application rate (see Annex C). The Regulations state that aerial fertilisation shall not be carried out:

- within—
  - (a) 100 metres of the abstraction point of a source of water intended for human consumption,
  - (b) 50 metres of an aquatic zone,
  - (c) (i) 60 metres of a dwelling house, or
    - (ii) 30 metres of non-forested land unless with the written permission of the owner or occupier of the dwelling or land as the case may be,
  - (d) 60 metres of a European Site unless with the written permission of the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs,
  - (e) 15 metres of a road, or
  - (f) 20 metres of a recorded monument or place to which section 12 of the National Monuments (Amendment) Act 1994 (No. 17 of 1994) refers. (4) A person engaged in aerial fertilisation shall not, in respect of the application of fertiliser exceed the parameters set out in Schedule 2.

Consultation

The Forestry Regulations outline the consultation process that is associated with applications for afforestation, forest road works and aerial fertilisation. The Regulations distinguish between consultation with “consultation bodies” and public consultation.

Consultation with consultation bodies

Upon receipt of an application for afforestation, forest roads works or aerial fertilisation the Minister undertakes a screening process (see below) and on the basis of that consults with a range of consultation bodies who have 40 days to respond:

Where the Minister receives an application for afforestation, forest road works and aerial fertilisation and it appears to him or her that the proposed development—
(a) may cause an adverse impact on the environment,
(b) may have a significant impact on—
  - (i) human health,
  - (ii) nature conservation, or
  - (iii) an archaeological site or feature,
(c) is situated in an area of special amenity under an order made under section 202 of the Act of 2000, or
(d) is located in or likely to have a significant effect on—
  - (i) a European site,
  - (ii) land established or recognised as a nature reserve under sections 15 or 16 of the Act of 1976, as amended by sections 26 and 27 of the Wildlife (Amendment) Act, 2000 (No. 38 of 2000),
  - (iii) land designated as a refuge for flora or fauna under section 17 of the Act of 1976,
(iv) an area the subject of a notice under section 16(2)(b) of the Act of 1976,
(v) land subject to a natural heritage area order under section 18 of the Wildlife (Amendment) Act 2000, or
(vi) compliance with the quality standards set out in the European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009)

the Minister shall consult with any consultation body that the Minister believes may have an opinion on the proposed development.

Public consultation
Under the Regulations the Minister has to publish a notice that an application for a licence for afforestation, forest road works and/or aerial fertilisation has been made and the public can make a submission within 30 days of the notice. In addition a site notice for afforestation and forest road works must be erected at the entrance from the public road to the land where the application refers to.

Environmental Impact Assessment
An environmental impact assessment is to be carried in respect of an application for a licence for:

(a) afforestation which would involve an area of 50 hectares or more,
(b) forest road works which would involve a length of 2000 metres or more,
(c) afforestation which does not exceed an area of 50 hectares but which the Minister considers likely to have significant effects on the environment taking into account the criteria set out in Schedule 3,
(d) forest road works which does not exceed a length of 2000 metres but which the Minister considers likely to have significant effects on the environment taking into account the criteria set out in Schedule 3.

An Environmental Impact Assessment (EIA) may be required for applications below the threshold outlined above. The criteria which are considered in determining whether a sub-threshold EIA is required are outlined in Schedule 3 of the Act (see Annex D).

Appropriate Assessment
Two key pieces of environmental legislation are the Birds and Habitats Directives, introduced in 1979 and 1992 respectively. These were designed to protect threatened, rare and vulnerable species and habitats across Europe and to ensure their survival. Under these Directives, Special Protection Areas for Birds (SPAs) and Special Areas of Conservation (SACs) have been identified and these collectively form the Natura 2000 network of protected areas. The Habitats Directive and the Birds Directives were transposed into Irish law with S.I.477 in 2011. Under these Directives, the possible nature conservation implications on a Natura 2000 site of any plan or project is considered before a decision is taken to allow that plan or project to proceed (referred to as ‘appropriate assessment’ as described in Article 6 of the Habitats Directive).
In the Forestry Regulations the Appropriate Assessment Procedure (AAP) for all forest related activities requiring a Forest Service licence since 2017, i.e. afforestation, forest road construction, felling (thinning and clearfell/replanting) and aerial fertiliser application, is outlined. This procedure involves a screening to assess whether or not the project (alone or in combination with other plans or projects) is likely to have a significant effect on a SAC or SPA (referred to as European sites in the Act and Regulations). Where, having reviewed the application, the Minister is of the opinion that the project will have a significant effect on a European site or is unable to determine the likely effects of the proposed development he/she will require the submission of a Natura Impact Statement (NIS) from the applicant. On receipt of the NIS, the Department will carry out an Appropriate Assessment and make a decision as to whether the plan or project should be approved.

Forestry Appeals Committee
The Forestry Appeals Committee (FAC) is an independent statutory body set up in February 2018. Its function is to decide on appeals in relation to specific licence decisions taken by the Minister or the Minister’s officials under the Forestry Act, 2014. The Forestry Act 2014 included an amendment to the Agriculture Appeals Act 2001 by providing for a new appeals process for Forestry licensing applications including felling, planting, forest roads and aerial fertilisation. The Forestry Act was not commenced until May 2017 and the Department established the Forestry Appeals Committee in February 2018. Appeals can emanate from licence applicants or third parties, and the appellant, applicant or the Department can request an oral hearing of the appeal – as can the FAC decide an oral hearing is required. The FAC’s decision and the reasons for it are notified to the parties in writing when determined, per the primary legislation the FAC decision is final subject to an appeal to the High Court on a point of law.
Timeline regarding legislation relating to environmental impact assessment and consultation pertaining to forestry

The requirement for those intending to afforest land to complete an environmental impact statement was introduced in 1989; the threshold at the time was set at 200 hectares. Since then the threshold has been reduced (Table 33). The current thresholds were outlined in the previous section of this chapter and will not be repeated here.

Table 33: Environmental impact assessment with respect to forestry (1989-2010)

<table>
<thead>
<tr>
<th>Year</th>
<th>Legislation</th>
<th>Key elements</th>
</tr>
</thead>
</table>
  a) afforestation of ≥ 200 ha;  
  b) replacement of ≥ 10 ha of broadleaf high forests with conifers. |
| 1996 | S.I. 100/1996 | • Environmental Impact Statement required for:  
  a) afforestation ≥ 70 hectares;  
  b) afforestation of ≥ 70 ha of aggregate afforestation within a three-year period by a single owner. |
| 2001 | S.I. 538/2001 | • Prior approval of Minister required for afforestation.  
  • Environmental Impact Statement required for afforestation ≥ 50 hectares.  
  • Provided for the possibility of sub-threshold EIA, where a project is likely to have significant effects on the environment. |
| 2010 | S.I. 558/2010 | • Prior approval of Minister required for forest road construction projects.  
  • Reaffirmed that the approval of the Minister is required for all afforestation and forest road construction projects, whether grant aided or not.  
  • Environmental Impact Statement required for:  
    a) initial afforestation of ≥ 50 ha;  
    b) forest road works involving a length of ≥ 2000 m.  
  • All afforestation and forest road construction projects below the mandatory thresholds must be screened for an EIA by the Forest Service and, where a proposed sub-threshold development is considered likely to have a significant environmental effect, the Minister will request the developer to submit an EIS to enable an EIA to be undertaken. |
Consultation both with the public and other bodies with respect to afforestation has had a legal basis since 2001 (Table 34).

### Table 34: Consultation with respect to forestry (2001-2010)

<table>
<thead>
<tr>
<th>Year</th>
<th>Legislation</th>
<th>Key elements</th>
</tr>
</thead>
</table>
| 2001 | S.I. 538/2001 | • Gave a legal basis to the process whereby the Forest Service consulted with prescribed bodies (e.g. the EPA, the Fisheries Board, The Arts, Heritage, Gaeltacht and the Islands etc) regarding afforestation proposals. Such bodies had 4 weeks to make an observation on a proposal.  
  • Public consulted if proposed afforestation site:  
    o fell within a NHA, SAC, SPA or National park, or  
    o if the area contained an archaeological site or feature with intensive public usage, or  
    o if the area was within a prime scenic area in the County Development Plan or within an area listed in the Inventory of Outstanding Landscape.  
  Details were to be published in a newspaper circulated in the district where the land is situated. Members of the public could make a submission/observation within three weeks from the date of publication of the notice. The Forest Service when considering the application would, *inter alia*, have regard to this submission or observation. Where the Forest Service disagreed with the objection and recommended the site for planting, the objector was made aware of this outcome and could appeal. |
| 2010 | S.I. 558/2010 | • Placed a statutory obligation on the Minister to notify the public of all afforestation applications received and allow the public a minimum of 4 weeks in which to make a submission.  
  • A notice of the application must be published in at least one newspaper circulating in the district in which the land to which the proposed afforestation relates is situated.  
  • The public could make an observation on the proposal in writing to the Minister. The Minister in turn would inform such applicants of the decision. |
Other legislation

Other environmental legislation relating to forestry is summarised in Table 35.

Table 35: Overview of other environmental legislation relating to forestry (2003-2012)

<table>
<thead>
<tr>
<th>Year</th>
<th>Legislation</th>
<th>Key elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>S.I. 296/2009</td>
<td>• Minister for Environment, Heritage and Local Government is required to have sub-basin management plans with programmes of measures prepared to achieve environmental water quality objectives established for Natura 2000 sites designated for the protection of Freshwater Pearl Mussel populations.</td>
</tr>
<tr>
<td>2011</td>
<td>S.I. 477/2011</td>
<td>• Habitats Directive and the Birds Directives were transposed into Irish law.</td>
</tr>
<tr>
<td>2012</td>
<td>S.I. 125/2012</td>
<td>• Aerial fertilisation of forests in Ireland requires a licence from the Forest Service.</td>
</tr>
</tbody>
</table>
Environmental regulations for afforestation

In December 2016, Environmental Requirements for afforestation were published (DAFM, 2016); these consolidated and updated the environmental safeguards relating to afforestation previously contained in the various published environmental guidelines (i.e. water quality, archaeology, landscape, biodiversity and harvesting). However, the latter guidelines still apply to other Forest Service regulated activities, as specified in any approval consent or licence issued (DAFM, 2016). “Any statutory approval (with or without grant-aid) for afforestation is conditional on adherence to the measures set out in the Environmental requirements for afforestation”(DAFM, 2016, p. 2). In addition, adherence to the measures described in the Code of Best Forest Practice is also a condition of all grant schemes (Forest Service, 2015b.

It is not the intention to repeat verbatim the measures set out in the Environmental Requirements. It is instead intended to highlight the key elements of the Requirements and to use the Tables from DAFM (2016) to provide the detail.

Water

The Requirements identify a variety of measures to be undertaken to protect water and aquatic habitats during afforestation and throughout the remainder of the rotation. These include establishing water setbacks, which are areas of defined width, positioned adjoining the water feature which are left largely undisturbed during afforestation and throughout the entire rotation. The sizes of the setbacks vary from 10 m to 25 m (Table 36). The water features that require setbacks are shown in Annex E.

Drainage and cultivation are typically used on afforestation sites. The Requirements highlight the importance of correct drain alignment and deployment of sediment traps. New drains must terminate in sediment traps outside the water setback – and new drains must not enter or transverse the water setback.

The requirements that must be adhered to if a water feature has to be crossed for site development works or ongoing maintenance are outlined. These include, inter alia:

a) Only working in an aquatic zone between the period May to September inclusive;
b) Designing crossings to minimise disruption;
c) Consulting with Inland Fisheries Ireland at least 6 weeks before constructing any cross in an aquatic zone.
Table 36: Water setback and corresponding minimum setback distance and additional design requirements

Note, all setbacks are measured in metres horizontally. **WATER SETBACK**

**Purpose:** To create at the outset, a buffer of natural ground vegetation positioned between defined water features and the forest crop and associated operations, in order to protect water quality and aquatic ecosystems from possible sediment and nutrient runoff from the site at afforestation and throughout the remainder of the forest rotation.

**Minimum setback width, as measured from the nearest bank / edge of the water feature, as observed on-the-ground (setback applies to each side of the water feature, e.g. to both banks of an aquatic zone):**

**Aquatic zone** (as per Table 48):

<table>
<thead>
<tr>
<th>Slope leading to the aquatic zone (apply as appropriate, where slope varies over the site)</th>
<th>Setback width</th>
<th>Setback width for peat soils and for sites within the catchment area of high status objective waterbodies (see note opposite)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate (even to 1-in-7 / 0-15%)</td>
<td>10 metre</td>
<td>20 metre</td>
</tr>
<tr>
<td>Steep (1-in-7 to 1-in-3 / 15-30%)</td>
<td>15 metre</td>
<td>25 metre</td>
</tr>
<tr>
<td>Very steep (1-in-3 / &gt;30%)</td>
<td>20 metre</td>
<td>25 metre</td>
</tr>
</tbody>
</table>

**Additional design:**
- Widen the water setback at various points along its length, to include adjoining wet hollows and other low-lying areas where water gravitates towards as it drains from the land.
- Based on the immediate landform / topography, vary the setback to avoid artificial lines and to create a naturally undulating forest edge.

**Note,** if the afforestation site is within the catchment area of a high status objective waterbody, the required setback width (as per the 3rd column opposite) can be reduced by 10 metres (from the landward side) if an appropriate GPC9 or GPC10 plot is included instead of this 10 m strip. For example, where a 25 m setback applies, this can be reduced to 15 m by applying the following sequence: aquatic zone → 15 m unplanted water setback → GPC9 or GPC10 plot.

**Relevant watercourse:** 5 metre

**Hotspot:** 5 metre

**Drinking water abstraction point:** 20 metre

Source: DAFM, 2016
**Biodiversity**

The Requirements aim to ensure that afforestation does not have a negative impact on designated conservation areas, protected habitats, or protected species of fauna and flora. To this end the Requirements outline the legal situation regarding afforestation in conservation areas, protected habitats etc. and the likely outcome to an afforestation application that may potentially affect these areas (Table 37).

In addition the Requirements aim to enhance the biodiversity value of the new forest. In all afforestation sites, 10-15% of the area must be treated with particular regard to biodiversity, comprising a combination of open space and retained habitats. These are referred to as Areas for Biodiversity Enhancement (ABEs) and there is a range of site features that are considered eligible (and ineligible) to be considered as an ABE. Any existing hedgerows on the sites must be retained and not broken. A habitat setback (5 m minimum) is suggested for hedgerows, depending on the quality of the hedgerow.
Table 37: Various scenarios that may apply regarding protected habitats and species, and the likely outcome of the proposed afforestation application

<table>
<thead>
<tr>
<th>1. Is the plot(s) within a Special Area of Conservation (SAC), Special Protection Area (SPA), a Natural Heritage Area (NHA) or proposed NHA, a Nature Reserve, a National Park, or a Refuge for Flora and Fauna?</th>
<th>If ‘Yes’, the Forest Service may require an ecological report demonstrating how the project can take place in a manner compatible with the ecological objectives of the designation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>These sites are designated for the conservation of habitats and species. For example, SACs are designated under the Habitats Directive to create a coherent European ecological network in order to ensure the restoration or maintenance of habitats (Annex I) and animal and plant species (Annex II) of Community interest at a favourable conservation status.</td>
<td>- In relation to NATURA sites (SACs and SPAs), the Forest Service will undertake screening and where necessary, appropriate assessment, and can only approve the project if it is satisfied that it will not adversely affect the integrity of the NATURA site, either alone or in combination with other plans or projects. See the Forest Service Forestry Standards Manual for details of this Appropriate Assessment Procedure.</td>
</tr>
<tr>
<td>Relevant legislation: EU Habitats Directive; EU Birds Directive; Wildlife Act 1976; Wildlife (Amendments) Act 2000; European Communities (Birds and Natural Habitats) Regulations 2011 (SI477 of 2011)</td>
<td>- Do not submit any area of a habitat listed as a qualifying interest of the SAC.</td>
</tr>
<tr>
<td>- The Forest Service is not in a position to approve afforestation applications within Hen Harrier SPAs, pending the completion of the Threat Response Plan.</td>
<td>- In relation to proposed afforestation within NHAs, the Forest Service requires the submission of a completed Notifiable Action Form (which documents National Parks &amp; Wildlife Service consent) with the initial Afforestation Application (Form 1).</td>
</tr>
<tr>
<td>2. In non-designated areas, is there a habitat listed in Annex I of the Habitats Directive, known to be present or observed within the plot(s)?</td>
<td>If ‘Yes’, the Forest Service may require an ecological report assessing the habitat and its extent and identifying mitigation measures capable of ensuring that the project can take place in a manner compatible with the maintenance or restoration to a favourable conservation status of that habitat.</td>
</tr>
<tr>
<td>See SUPPORTING DOCUMENT for a list of Annex I habitats (and the corresponding Fossitt (2000) habitat classification) that may occur on afforestation sites.</td>
<td>NOTE, at a site level, the Forest Service will not approve the afforestation of a non-designated Annex I habitat that is deemed to be a favourable condition, based on an assessment of its area, structure and function, and future prospects. Such habitat must be excluded from the application or incorporated as a retained habitat. In both cases, an appropriate habitat setback will also be required so as not to impact on future prospects.</td>
</tr>
<tr>
<td>Relevant legislation: Habitats Directive.</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 3. Is the plot(s) within one of the Priority 8 Freshwater Pearl Mussel (FPM) Catchments (as listed in the SUPPORTING DOCUMENT)? | If ‘Yes’, afforestation approval is dependent *inter alia* upon the submission and subsequent evaluation by the Forest Service, of a Form A (Site Assessment) and Form B (Mitigation Measures) from the *Forestry & Freshwater Pearl Mussel Requirements*. The Forest Service may also request a NATURA Impact Statement (NIS).  
Note that, if approved, afforestation within these catchments is likely to be limited to native woodland establishment under GPC9 and GPC10. |
| FPM is a freshwater shellfish that is highly vulnerable to siltation and nutrient runoff and other water impacts, and is a highly threatened species of European importance.  
The *Strategy for Conservation of the Freshwater Pearl Mussel* (September 2011) prioritises the conservation of FPM populations within 8 sub-basin catchments.  
See the SUPPORTING DOCUMENT for details.  
*Relevant legislation*: Habitats Directive; European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (S.I.296 of 2009) |
| 4. Is the plot(s) within the 6 km zone of any other Freshwater Pearl Mussel Catchment listed in the SUPPORTING DOCUMENT? | If ‘Yes’, afforestation approval is dependent *inter alia* upon the submission and subsequent evaluation by the Forest Service, of a Form A (Site Assessment) and Form B (Mitigation Measures) from the *Forestry & Freshwater Pearl Mussel Requirements*. The Forest Service may also request a NIS.  
For details of FPM, see above.  
*Relevant legislation*: Habitats Directive; European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. |
| 5. Is there an Annex IV species or its habitat (if in the species range) known to be present or observed within the plot(s)? | ➢ If ‘Yes’ for otter, follow the requirements set out in the Forest Service *Forestry & Otter Guidelines*.  
 ➢ If ‘Yes’ for Kerry slug, follow the requirements set out in the Forest Service *Forestry & Kerry Slug Guidelines*  
 ➢ If ‘Yes’ for any other Annex IV species, the Forest Service may require an ecological report demonstrating how the project can and will be designed and implemented in a manner compatible with the protection of the species and its habitat. |
| Species listed in Annex IV of the Habitats Directive are strictly protected. It is an offence to deliberately disturb the species or damage or destroy its breeding or resting places wherever it occurs, whether inside or outside designated areas.  
Annex IV species include otter, Kerry slug and bats.  
*Relevant legislation*: Habitats Directive. |
### 6. Is there an Annex II species and / or its habitat known to be present or observed within the plot(s)?

Species listed in Annex II of the Habitats Directive are animal and plant species of Community interest whose conservation requires the designation of SACs. Outside of SACs, these species are protected against damage that impacts their favourable conservation status (or ability to achieve that status) (for example, damage that reduces the natural range of the species). There are a number of Annex II species, included the Killarney Fern, Yellow Marsh Saxifrage and River Lamprey.

**Relevant legislation:** Habitats Directive; Environmental Liability Directive; European Communities (Environmental Liability) Regulations 2008 (S.I.547 of 2008).

If ‘Yes’, the Forest Service may require an ecological report confirming the presence of the species or its known habitat, a determination regarding whether or not the project would impact on the species’ favourable conservation status (or its ability to achieve that status), and if so, required mitigation.

### 7. Is the application located on sandstone geology in West Cork or Kerry, as illustrated in Figure 1 of the Forest Service Forestry & Kerry Slug Guidelines?

As an Annex IV species under the Habitats Directive, the Kerry slug (*Geomalacus maculosus*) is strictly protected wherever it occurs. It is an offence to deliberately disturb the species or damage or destroy its breeding or resting places wherever it occurs, whether inside or outside designated areas. It is also an offence under national legislation (Wildlife Act 1976, Wildlife (Amendment) Act 2000) to deliberately destroy or damage the slug or its habitat.


If ‘Yes’, follow the decision path set out in the Forest Service Forestry & Kerry Slug Guidelines. Detail both the outcome of this process and any resulting amendments to forestry operations required (as set out in these Guidelines) in the proposed application for afforestation.

### 8. Is there a population of a species protected under the Flora (Protection) Order 2015 (S.I.356 of 2015) known to be present or observed within the plot(s)?

The Flora (Protection) Order 2015 protects various plants (see SUPPORTING DOCUMENT). It is an offence (save under a licence granted under Section 21 of the Wildlife Act 1976) to (inter alia) wilfully alter, damage, destroy or interfere with the habitat or environment of these plants. This applies to wherever the plants are found, whether inside or outside designated areas.


If ‘Yes’, the Forest Service may request the submission of an ecological report confirming the presence (or otherwise) of the species, and required mitigation.

**Note regarding species of animal protected under the Wildlife Act 1976 and the Wildlife (Amendment) Act 2000**

Mammal, amphibian, reptile and invertebrate species protected under the Wildlife Act 1976 and the Wildlife (Amendment) Act 2000 (see SUPPORTING DOCUMENT for list) are protected from injury, or from disturbance / damage to their breeding or resting place, wherever these occur. The majority of these species are considered by other scenarios listed above. Further cover is provided by specific Forest Service requirements for Kerry slug and otter and guidance for bat species. Therefore, to avoid duplication, the above does not contain a specific question dealing directly with the Wildlife Act 1976 and the Wildlife (Amendment) Act 2000.
Archaeology and built heritage
The Requirements aim to ensure that proposed afforestation development does not adversely impact on archaeological sites and monuments. Where an approved afforestation sites is near known archaeological sites and monuments, measures to avoid, reduce or mitigate adverse impacts include, *inter alia*:

- Avoidance of areas of known as suspected elevated archaeological potential;
- Incorporation of appropriate archaeological setbacks (Table 38);
- Provision of access routes;
- Leaving lines of site unplanted;
- Arranging for in-works supervisory safeguards such as archaeological monitoring;
- Sensitive design of the forest edge adjoining archaeological setbacks.

Landscape
The Requirements aim is to ensure that the proposed forest is designed so that it is visually acceptable and in keeping with landscape and amenity sensitivities. A series of measures are outlined in Requirements that can be applied to achieve this aim. These are reproduced verbatim from the requirements below. Details of the landscape setbacks are shown in Table 39.

- The Registered Forester should consult with the relevant County Development Plan (both Draft and Final Plans), which will identify areas of particular landscape sensitivity and important views;
- The Registered Forester should also view the site from various vantage points and approaches, to identify how best to design the forest (*);
  (* Within sensitive landscapes, it may be advisable for Registered Foresters to submit a series of photographs of the site, as viewed from various approach roads and local vantage points, together with an OS Discovery map indicating where each photo was taken. This will enable to Forest Service to assess how the afforestation will fit into the landscape, as viewed from these positions. Some digital cameras and smartphones have a function to take panoramic photographs, which are ideally suited for this purpose);
- Overall straight or horizontal lines and geometric or regular shapes should be avoided, where possible. These are often imposed by property boundaries, but can be mitigated by landscape setbacks;
- The planting of single, small groups and irregular belts of native species (e.g. birch, rowan, oak and Scots pine, as site conditions allow) along the forest edge or within any environmental setback will also add visual interest;
- On hillsides, planting should conform to the overall pattern in the landscape, whether natural landforms or field patterns, and follow the same rounded or irregular shapes;
- Large open landscapes are more suited to relatively large forested areas, while smaller and more regular shapes fit in better within a lowland pattern of fields and hedgerows;
- Avoid abrupt margins between the forest and open ground, between different species and between different Grant & Premium Category (GPC) plots;
- On sites approaching the skyline, the upper margin should be in line with the predominant landscape characteristics, be they irregular or smooth. Avoid leaving a narrow parallel band of open ground near the skyline. The open ground should reflect the scale of the hill or ridge. At lower points, planting can be carried right over the skyline;
- In upland areas, long straight vertical boundaries should be avoided. Instead, a diagonal trend should be maintained;
• Along highly visible forest margins, localised areas of spruce and pine trees towards the outer 10-15 metres of the forest can be planted at wider and irregular spacing. This measure, when used in conjunction with forest edge planting, can promote the sense of a natural tree line, therefore softening the external margin;
• In lowland areas, straight boundaries can be acceptable where they reflect the agricultural field pattern;
• On lower margins, plantations can be blended into the agricultural landscape by introducing and extending broadleaf plots and additional broadleaves upwards in amongst conifer plots, especially following hollows in the landform;
• Diversity can be promoted by using a variety of species and by incorporated and reinforcing open spaces and retained habitats;
• Too much variety, however, should be avoided. It is usually desirable that one species dominates by about two-thirds;
• To be considered eligible under the Afforestation Scheme, the proposed plantation must have a minimum of 10% broadleaves, either as plots of minimum width and / or as single, small groups and irregular belts of additional broadleaves;
• Promote an interlocking pattern along the margin between plots of different species;
• Avoid creating long rows of single species or rows or blocks of alternate species;
• Avoid species boundaries crossing the skyline;
• Plot outlines and group planting should follow ground vegetation patterns – this will help maintain a natural appearance;
• Reinforce the outline of retained woody habitats, by planting broadleaves in adjoining tongues or groups;
• The planting of single, small groups and irregular belts of native species (e.g. birch, rowan, oak and Scots pine, as site conditions allow) along the forest edge or within any environmental setback will add visual interest (DAFM, 2016).
### Table 38: Archaeological setbacks and corresponding minimum setback distance and additional design requirements

**ARCHAEOLOGICAL SETBACK**

Purpose: To physically separate the archaeological site or monument or other important built heritage structures or features from afforestation works, the emerging forest, and future forest operations.

<table>
<thead>
<tr>
<th>Site, monument, building, structure</th>
<th>Minimum setback from the outermost extent of the archaeological site, monument, important built heritage structures or features, as evident onsite</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Designated’ archaeological sites and monuments (see note opposite)</td>
<td>20 metre exclusion zone</td>
</tr>
</tbody>
</table>
| ‘Designated’ buildings and structures or parts thereof which form part of the architectural heritage and which are of special interest (see note opposite) | 30 metre exclusion zone for upstanding structures (e.g. building)  
Otherwise, 20 metre exclusion zone |
| Non-designated built heritage structures, e.g. lime kilns, sheep folds, creamery stands, stiles, pumps and pump houses, mill ponds, and derelict dwellings / farm buildings | 10 metre unplanted setback (demarcating fencing not required)  
Where there is a cluster of such structures (e.g. a ruined dwelling and a number of out-buildings, often enclosed in a yard or by a boundary wall), the 10 metre unplanted setback to be measured from the enclosing boundary wall, or edges of the outermost buildings.  
Where there are associated features such as boundary walls, mill races, or historic foot paths, 5 metre unplanted setbacks may also be applied to those features. Similarly for townland boundaries. |

**NOTE,** for designated archaeological sites and monuments and for designated buildings and structures (as defined in Section 2.6), the following applies:

- It is essential that the full extent (i.e. the outermost extent) of these features is known, so that the exclusion zone can be correctly identified. Where there is any doubt, the Registered Forester should seek advice from the relevant designating authority or the Forest Service Archaeologist.
- The boundary of the exclusion zone must be clearly demarcated by fencing, and pedestrian access routes must also be maintained or established (see Section 3.5.1 for details).
Table 39: Landscape setbacks and corresponding minimum setback distance and additional design requirements

<table>
<thead>
<tr>
<th><strong>UTILISED BUILDING SETBACK</strong></th>
<th>Purpose: To prevent encroachment and isolation, the blocking of light and the curtailment of views in relation to dwellings, associated buildings, and roofed farm buildings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum setback, as measured from the outer wall of the roofed building:</td>
<td>Additional design:</td>
</tr>
<tr>
<td><strong>Dwelling houses:</strong></td>
<td>➢ Setback distance is most critical when a building is surrounded by forest on two or more sides.</td>
</tr>
<tr>
<td>➢ 60 metre minimum</td>
<td>➢ Based on the immediate landform / topography, vary the setback to avoid artificial lines and to create a naturally undulating forest edge.</td>
</tr>
<tr>
<td>➢ Smaller setback allowable (to a minimum of 30 metre), if written agreement of the neighbouring dweller is provided at Form 1 stage</td>
<td>➢ Consider retaining locally important views from the dwelling, by introducing open spaces through the forest. Also introduce open spaces that highlight natural features visible from the dwelling.</td>
</tr>
<tr>
<td><strong>Roofed farm buildings:</strong></td>
<td>➢ In relation to setbacks from dwellings, setback planting is encouraged within the 30 m to 60 m zone, if agreed to by the neighbouring dweller.</td>
</tr>
<tr>
<td>10 m</td>
<td></td>
</tr>
<tr>
<td><strong>Temporary buildings (e.g. timber sheds, kennels &amp; buildings less than 25 m²):</strong></td>
<td>No setback required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>LANDSCAPE SETBACK</strong></th>
<th>Purpose: To disrupt artificially straight lines and sharp angles along other visible sections of the plantation's outer perimeter, and to create stronger visual 'tie-in' with adjoining hedgerows and other semi-natural / natural features.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setback and design as appropriate. Will vary, depending on site details</td>
<td></td>
</tr>
</tbody>
</table>
**PUBLIC ROAD SETBACK**

**Purpose:** To ensure adequate clearance to prevent tunnelling along the public road, to retain sightlines, and to create visual diversity for road users.

**Minimum setback, as measured from the surfaced edge of the public road:**

10 metre (average, within any one application) (For conifer plots, note the additional requirement regarding edge planting – see Section 3.5.3.)

**Additional design:**

- Based on the immediate landform / topography, vary the setback to avoid artificial lines and to create a naturally undulating forest edge.
- Provisions for future extractions should be planned and associated open spaces retained along the forest edge. Retain locally important views from the public road, by introducing open spaces through the forest. Also introduce open spaces that highlight natural features visible along the roadside.
- Increase setback, where appropriate, to allow for greater visibility at bends in the road.
Setback planting
The Environmental Regulations outline the treatment of setbacks and distinguish between forest edge planting and environmental setback planting.

Forest edge planting refers to the planting of native species (e.g. birch, rowan, oak and Scots pine, as conditions allow) along the edge of conifer plots. Such forest edge planting is mandatory within conifer plots adjoining utilised building setbacks created for dwellings and public road setbacks, where the strip 10 m to 20 m from the road must be planted with broadleaf trees.

Environmental setback planting refers to the planting of native species (e.g. birch, rowan, oak and Scots pine) within an environmental setback. Agreement in advance for such planting in water setbacks has to be obtained from Inland Fisheries and (where relevant) the NPWS. The expectation is that strategic planting in water setbacks may help to deliver direct in-stream ecosystem services such as bank stabilisation, cooling / shading, and food drop into the aquatic ecosystem (DAFM, 2018b, p. 14).

Environmental regulation with respect to reforestation
In May 2017, DAFM published its felling and reforestation policy. Its aim was to provide a consolidated source of information on the legal and regulatory framework relating to tree felling. Information on the felling licence application process is also described. The legal aspects associated with felling and the requirement to have a felling licence granted by the Minister for Agriculture, Food & the Marine are outlined in the section titled Forestry and Law. As a reminder here under the Forestry Act 2014 to fell or otherwise remove a tree or trees and to thin a forest for silvicultural reasons a licence is required. Almost always reforestation is a requirement of the grant of a felling licence and a forest owner wishing to apply for a felling licence is required to specify on the felling licence application and accompanying map the reforestation objective(s) s/he is proposing to pursue for the next rotation. The objective(s) must be indicated on the application, and not sought retrospectively. A list of potential reforestation objectives are given in DAFM (2017) and prescriptions provided as to how the chosen objective should be delivered on. These prescriptions require that unplanted setbacks be established alongside aquatic zones, archaeological features, dwellings, public roads and non-forest habitats have to be identified.

DAFM’s felling and reforestation policy document states there is no legal limit to the size of felling couple and indicated that forest policy with respect to felling coupes is outlined in the Code of Best Forest Practice – Ireland (Forest Service, 2000b) which states the following:

In Ireland, a general distinction is made between coupes under 25 ha and coupes over 25 ha. When felling coupes are extended, consideration should be given to scheduling clearfells so that adjoining reforestation areas are well-established. Other issues to be considered are wind risk on adjoining stands and potential edge effects, particularly with Norway spruce.
Large felling coupes over 25 ha may be acceptable on flat terrain or valley bottoms where visual impact is minimised. Felling in very sensitive landscape areas should be limited to 5-15 ha. While broad guidelines on coupe size are to be considered, size limits should not be absolute but relate to the size of the forest or water catchment unit. In the latter case, the coupe size will influence the likelihood of nutrient pollution. This would be an important issue if a catchment contributes to a drinking water supply.

Since the year 2000 the granting of a felling licence was accompanied by the following condition:

“The licensee shall ensure that all felling and planting operations are carried out in accordance with Forestry and Water Quality, Forest Biodiversity, Forest Harvesting and the Environment, Forestry and Archaeology, Forestry and the Landscape and Forestry and Aerial Fertilisation guidelines and the Code of Best Forest Practice - Ireland and the Irish National Forest Standard published by the Department.”

This would suggest that from the year 2000 that the requirements under these guidelines applied to reforestation, e.g. that second rotation forest stands would not be planted immediately adjacent to rivers and the setbacks that applied to afforestation at that time would be adhered to.

The Appropriate Assessment Procedure (AAP) operated by the Forest Service since 2011 applies *inter alia* to felling (thinning and clearfell/replanting).
A timeline of environmental regulation
The environmental requirements shown previously apply currently. However, since 1989, a basic condition of grant-aid for afforestation has been the compatibility of forestry development with the protection of the environment (Forest Service, 1991, p. 43). In Tables 40 to 43 below a summary of the key elements of the various guidelines is given and the date they applied from. Compliance with these guidelines was a condition of grant assistance for afforestation.

Table 40: Environmental Guidelines with respect to forestry (1992)

<table>
<thead>
<tr>
<th>Year</th>
<th>Guidelines</th>
<th>Main features</th>
</tr>
</thead>
</table>
| 1992 | Forestry and Fisheries Guidelines (Forest Service, 1992a) | • Buffer zones beside aquatic areas required.  
• Larger buffers for “designated sensitive areas” (i.e. areas with important fisheries and low buffering capacity).  
• Within these buffer zones, no ground preparation, fertiliser application or chemical or herbicide application was to take place. |
| 1992 | Forestry and Archaeology (Forest Service, 1992b) | • Applications for afforestation must be checked against the sites and monuments record map and Office of Public Works (OPW) consulted.  
• If the OPW deemed the site to be of archaeological importance, it could be formally registered as such and no planting would be allowed or a rescue excavation would be carried out by an archaeologist. If the site was considered to be of “possible” interest, pre-planting work could proceed provided care was taken.  
• A buffer zone would have to be established around the archaeological site and planting would not be allowed in this area. |
| 1992 | Forestry and the Landscape (Forest Service, 1992c) | • Planting had to be kept back a minimum of 30 m from occupied buildings and associated dwellings.  
• Planting had to be kept back at least 10 m from the paved surface of public roads.  
• Planting should conform to the overall pattern in the landscape.  
• “Overall straight or horizontal lines and geometric or regular shapes should be avoided” (Forest Service, 1992c, p. 3).  
• The scale of planting should reflect the landscape. |
Table 41: Environmental Guidelines with respect to forestry (1996-2000)

<table>
<thead>
<tr>
<th>Year</th>
<th>Guidelines</th>
<th>Main features</th>
</tr>
</thead>
</table>
| 1996 | DAFF, 1996 | • Distance from dwellings that afforestation could take place increased to 60 m except with the agreement of the owner, where the existing 30 m setback continued to apply.  
• Conifer plantations had to be at least 20 m from public roads, broadleaves 10 m. |
| 2000 | Forestry and Water (Forest Service, 2000c) | • Minimum size of a buffer zone to an aquatic zone increased to 10 m; ranged from 10 m to 25 m depending on slope and erodibility of soils.  
• Within these buffer zones, no ground preparation, fertiliser application or chemical or herbicide application could take place. |
| 2000 | Forestry and Biodiversity (Forest Service, 2000g) | • If non-native species are to be used, at least two species had to be included in the mix, with the dominant species not accounting for more than 80%.  
• Targets for deadwood retention in stands were set.  
• Fifteen percent of the total area proposed for afforestation was not to be planted and set aside as Areas of biodiversity enhancement (ABE) introduced for areas greater than 10 ha; these could include 5-10% open space and/or 5-10% retained habitats. For sites less than 10 ha, the open space element should be designed in conjunction with neighbouring land-use and the extent may be reduced. |
| 2000 | Forestry and archaeology (Forest Service, 2000d) | • The requirement to have an exclusion zone around the archaeological site reiterated.  
• Boundaries of these zones must be clearly marked and access to the site for pedestrians maintained. |
| 2000 | Forestry and Landscape (Forest Service, 2000e) | • Distance from dwellings that afforestation could take place increased to 60 m except with the agreement of the owner, where the existing 30 m setback continued to apply.  
• Conifer plantations had to be at least 20 m from public roads, broadleaves 10 m. |
| 2000 | Forestry and Harvesting (Forest Service, 2000f) | • Procedures for developing a harvest plan to minimise environmental disturbance outlined.  
• Machines should not enter buffer and exclusion zones  
• Suggests using the opportunity afforded by harvesting to impose buffer and exclusion zones and other open spaces in relation to public roads, dwelling, habitats if they don’t already exist.  
• Forest road construction guidelines outlined. |
## Table 42: Environmental Guidelines with respect to forestry (2001-2009)

<table>
<thead>
<tr>
<th>Year</th>
<th>Guidelines</th>
<th>Main features</th>
</tr>
</thead>
</table>
| 2001 | Forestry and Aerial Fertilisation Guidelines (Forest Service, 2001)        | - Procedures for aerial application of fertilisers given.  
- Consultation process, approval procedures and operational requirements associated with aerial fertilisation (AF) outlined.  
- Unsuitable sites for AF identified: all SACs, SPHs, and pNHAs unless with the written agreement the NPWS; waterlogged sites; sites whose drainage systems could facilitate unacceptably high rates of surface water run off.  
- Identified exclusion zones where no aerial fertiliser application allowed, i.e. 100 m around points of abstraction of all drinking water and reservoirs; 50 m exclusion zones from aquatic zones and 30 m exclusion zones from SACs, SPAS, pNHAs, National parks, dwelling houses, all experimental plots and unforded land. Fifteen metre exclusion zones from public private roads and archaeological sites and monuments were to be maintained.  
- Applications for aerial fertilisation approval would only be considered on sites where mechanical or manual application was not practical. |
| 2002 | Forest Protection (Forest Service, 2002)                                  | - Gave guidelines for the use of pesticides in Irish Forests where pesticides include insecticides and herbicides.  
- Guidelines state that “Aerial application of pesticides is not envisaged nor permitted by these guidelines and is not Irish practice” (p. 26).  
- Areas where pesticides should not be applied identified (ie. exclusion zones): buffer zones of aquatic zones and sources of water supply; exclusion zones from neighbouring property; or exclusion zones around archaeological sites and areas and features of biodiversity importance. |
| 2009 | Forestry and Otter Guidelines (Forest Service, 2009a)                    | - Guidelines presented for forestry operations where the otter (*Lutra lutra*) an Annex IV species protected species under the Habitats Directive is present. |
| 2009 | Forestry and Kerry Slug (Forest Service, 2009b)                          | - Guidelines presented for forestry operations where the Kerry slug (*Geomalacus maculosus*) an Annex IV species protected species under the Habitats Directive is present. |
Table 43: Environmental Guidelines with respect to forestry (2010-2015)

<table>
<thead>
<tr>
<th>Year</th>
<th>Guidelines</th>
<th>Main features</th>
</tr>
</thead>
</table>
| 2015 | Aerial Fertilisation Requirement* | • Published in light of S.I. 125 2012 which introduced the legal requirement to obtain a licence for aerial fertilisation.  
• Listed the information required in application for a licence.  
• Reiterated that the Forest Service will not license aerial fertilisation in areas where manual fertilisation is practical.  
• Aerial fertilisation must only take place between 1 April and 31 August. |

* See Annex C for further details.

To address the problem of acidification of waters in acid sensitive catchments from afforestation a protocol was agreed between the Department of Environment, Heritage and Local Government, the Forest Service, the Environmental Protection Agency and COFORD in 2001 for dealing with grant-aid applications in acid sensitive areas. All applications received by the Forest Service for grant-aid for afforestation in areas identified as being acid-sensitive were checked for acid buffering capacity as determined by alkalinity levels in run-off water (Forest Service, 2003).
Forestry Law and Regulation in Co. Leitrim
In this section available information that is specific to Co. Leitrim on elements of the Forestry law and regulation is presented.

Forestry Appeals in Co. Leitrim
Since it was established, a total of 189 appeals (as of 15 August 2019) have been submitted to the FAC, 25% of these relate to Co. Leitrim. All bar one were third party appeals. With respect to afforestation appeals that have been heard to date, the decision in the majority of cases has been to uphold the decision of the Minister to grant the licence (Table 44). For almost one third of the appeals the FAC varied the conditions of the licence. These variations typically involved extending set back distances and requesting that the broadleaves that were planted be concentrated in certain areas of the proposed site. Of the four decisions to date to cancel the granting of licences, one of these was a successful appeal made by an applicant against a decision not to grant an afforestation licence.

Table 44: Forestry appeals in Leitrim

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Total</th>
<th>No decision yet</th>
<th>Decision Upheld</th>
<th>Decision Cancelled</th>
<th>Decision Varied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afforestation</td>
<td>43</td>
<td>20</td>
<td>12</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Felling</td>
<td>3</td>
<td>2</td>
<td></td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Road</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Source: DAFM, 2019b

Environmental Impact Assessment
Information provided by DAFM to the study is that there has been no application for which an Environmental Impact Assessment was carried out in relation to forestry in Co. Leitrim, neither has a sub-threshold EIS been sought.

Aerial fertilisation
Since the requirement for a licence for aerial fertilisation was introduced in 2012 there have been two applications for such licences in Co. Leitrim, neither of which was granted.
Compliance with environmental regulation

The previous section outlined the main features of environmental regulation with respect to forestry that prevail in Ireland. Adherence to the measures set out in the Environmental Requirements is a condition of statutory approval. The process of how compliance with such environmental regulation is monitored is outlined below with respect to afforestation.

Applications for afforestation licences and associated inspection levels

The following is a summary of the stages involved in applying for an afforestation licence and for grant-aid.

- Applications for an afforestation licence are carried out on what is known as a “Form 1”. This form also acts as the application for grant-aid. A registered forester is required to complete this form and must address a suite of silvicultural and environmental requests. These forms are submitted electronically via an online facility known as iNET.
- A site notice for afforestation is erect at the time of application. This site notice must be left on the land for at least 5 weeks from the date the licence is applied for.
- All FORM 1 applications are sent to the relevant Forest Service District Inspector (DI). DAFM (2018, p. 46) indicated that 100% of applications for afforestation licences are desk inspected. If there are any environmental considerations identified, the application is simultaneously referred to one or more statutory consultees (primarily the National Parks & Wildlife Service, Inland Fisheries Ireland, the relevant Local Authority and An Taisce), as detailed in Table 45.
- As part of the process, further information may be sought relating to the project, via a ‘Further Information Required’ letter from the Forest Service. This might range from revised maps to the submission of a NATURA Impact Statement, based on concerns regarding a possible impact on a NATURA site.
- DAFM confirmed to the study that in 2018 site visits were made by DIs to 61% of proposed afforestation sites (i.e. FORM 1s) before any work was done to assess whether the site was silviculturally and/or environmentally suitable.\(^{30}\)
- Notice of all licence applications is published on the Department’s website, and any member of the public or environmental non-governmental organisation may make a submission on the proposed development within 30 days.
- Following receipt of responses from referral bodies and following a site visit if deemed necessary to be undertaken, an afforestation licence may be granted (typically with conditions) issued.
- Following receipt of an afforestation licence operations may not commence for 28 days to allow for appeals. If the project is grant-aid an application for

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\(^{30}\) Sites chosen for field inspection can include *inter alia*: those where shell marl exists; SACs, SPAs, NHAs, pNHA Designated sites; very exposed sites; sites where flooding/ high water tables are possible; sites where substantial areas of the proposed species are site demanding for the location proposed e.g. broadleaf species; etc.
financial approval must be made, again, before operations can commence. Once approval has been received operations can be undertaken as per the conditions of the licence overseen by a registered forester. Upon completion of this an application is made for 1st Instalment of the Grant and 1st Premium (i.e. a Form 2 is submitted).

- Form 2 applications are desk assessed with field inspection as required by the district inspector to ensure standards/conditions are met before payment is issued. DAFM confirmed to the study that field visits were made by DIs to 62% of afforestation sites.

- Payment of the 2nd instalment grant under the Afforestation Scheme can be claimed not earlier than 4 years after the completion date of the initial formation of the plantation, subject to the plantation being successfully established and maintained. Applications for the 2nd instalment may be subject to a site inspection by a Forestry Inspector to ensure that the plantation has been established and managed to the required standard. DAFM confirmed to the study that field visits were made by DIs to 67% of sites.

- Successful applicants for an afforestation licence may apply for a premium payment which is paid for 15 years under the 2014-2020 Forestry Programme. In previous programmes, the premiums were made for a period up to 20 years. All premiums after the 1st premium are applied for using the Department’s online services portal (www.agfood.ie). Forest Service (2015b, p. 7) states that “At the time of application for payment, the plantation must be to the standard required under the Afforestation Scheme”. Forest Service (2015b, p. 8) further states that “The Forest Service carries out random forest inspections for the purpose of premium payments”. At form 4 level, approximately 110-120 applications of all active subsequent premium applications are selected randomly on an annual basis for mandatory field inspection. In addition, ad-hoc inspections can be initiated by both the inspectors and administration. In 2018, 278 subsequent premium applications were field inspected.

- After payment of the 11th premium, all applicants under the Afforestation Scheme under the 2014-2020 Forestry Programme must submit a Forest Management Plan to cover the period from Year 12 to the end of the rotation and final harvesting, for any plantation which is 5 ha or greater. Forests established under previous Affor Schemes must submit a 10 year Management Plan after payment of the 11th premium for (i) broadleaved plantations >5ha and (ii) for all plantations >10 hectares.
Felling and reforestation inspections
Field inspection rates nationally for felling licence applications are lower than those for afforestation, i.e. 19%. Furthermore, reforestation inspections take place intermittently across the public and private forest estate. The area visited varies and is largely dependent on resources available at the time. In recent years the following reforestation inspections have been undertaken: 2016 (435 hectares) and 2017 (2,635 hectares).

Inspection rates in Co. Leitrim
The field inspection rate in Co. Leitrim in 2018 for afforestation was 68%. For felling licence applications it was 6%. It should be noted that it was also the County with the second highest level of felling licence applications i.e. 128.
Table 45: Environmental Considerations, as set out on the afforestation pre-approval Form 1, Page 3, together with relevant referral bodies and referral periods. The corresponding referral structure for the Forest Road Scheme and the Reconstitution Scheme is also shown.

<table>
<thead>
<tr>
<th>Environmental Consideration</th>
<th>Afforestation Scheme</th>
<th>Referral for other schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Referral body</td>
<td>Referral period</td>
</tr>
<tr>
<td>1. WATER QUALITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Is the area designated potentially acid sensitive?</td>
<td>Subject to protocol which specifies consultation with the EPA in certain cases.</td>
<td></td>
</tr>
<tr>
<td>1.2 Is the area &gt;5 ha and sensitive for fisheries?</td>
<td>Inland Fisheries Ireland</td>
<td>4 weeks</td>
</tr>
<tr>
<td>1.3 Is the area non-sensitive for fisheries and &gt;40 ha?</td>
<td>Inland Fisheries Ireland</td>
<td>4 weeks</td>
</tr>
<tr>
<td>1.4 Is the area &gt;10 ha and within a catchment area of a Local Authority designated water scheme?</td>
<td>Local Authority</td>
<td>4 weeks</td>
</tr>
<tr>
<td>2. DESIGNATED HABITATS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Is the area within a NHA, pNHA, SAC, SPA or National Park?</td>
<td>NPWS</td>
<td>6 + 2 weeks</td>
</tr>
<tr>
<td>Specify site code(s)</td>
<td>Local Authority</td>
<td>4 weeks</td>
</tr>
<tr>
<td></td>
<td>Inland Fisheries Ireland</td>
<td>4 weeks</td>
</tr>
<tr>
<td></td>
<td>An Taisce</td>
<td>4 weeks</td>
</tr>
<tr>
<td>2.2 If the area is within a NHA, is a completed Notifiable Action Form / Action Requiring Consent Form (consent from National Parks &amp; Wildlife Service) included?</td>
<td>NPWS</td>
<td>6 + 2 weeks</td>
</tr>
<tr>
<td>2.3 If the area is within a Hen Harrier SPA, will operations occur between the 1st April and 15th August inclusive?</td>
<td>NPWS</td>
<td>6 + 2 weeks</td>
</tr>
<tr>
<td>2.4 If the area within a NPWS referral zone for a NHA, pNHA, SAC or SPA of National Park?</td>
<td>NPWS</td>
<td>6 weeks</td>
</tr>
<tr>
<td>2.5 Is the area within 3 km upstream of a NHA, pNHA, SAC or SPA of National Park?</td>
<td>NPWS</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Specify site code(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.6 Is the area within a Freshwater Pearl Mussel 6 km zone? If 'Yes', the Forestry &amp; Freshwater Pearl Mussel Requirement Forms A and B should be included with the application.</td>
<td>NPWS</td>
<td>6 + 2 weeks</td>
</tr>
<tr>
<td>2.7 Is the area within a Freshwater Pearl Mussel catchment?</td>
<td>NPWS</td>
<td>6 + 2 weeks</td>
</tr>
<tr>
<td>2.8 Does the area contain a current REPS plan habitat?</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>
Table 45 continued

<table>
<thead>
<tr>
<th>3. ARCHAEOLOGY</th>
<th>NMS</th>
<th>2 months</th>
<th>2 months</th>
<th>2 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Does the area contain an archaeological site or feature with intensive public usage?</td>
<td>Local Authority</td>
<td>4 weeks</td>
<td>4 weeks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>An Taisce</td>
<td>4 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NMS</td>
<td>2 months</td>
<td>2 months</td>
<td>2 months</td>
</tr>
<tr>
<td>3.2 Does the area contain or adjoin a listed archaeological site or monument?</td>
<td>Local Authority</td>
<td>4 weeks</td>
<td>4 weeks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>An Taisce</td>
<td>4 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NMS</td>
<td>2 months</td>
<td>2 months</td>
<td>2 months</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. LANDSCAPE</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Is the area within a prime scenic area in the County Development Plan?</td>
<td>Local Authority</td>
<td>4 weeks</td>
<td>4 weeks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>An Taisce</td>
<td>4 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.2 Are there any other High Amenity landscape considerations?</td>
<td>Local Authority</td>
<td>4 weeks</td>
<td>4 weeks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>An Taisce</td>
<td>4 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NMS</td>
<td>2 months</td>
<td>2 months</td>
<td>2 months</td>
</tr>
</tbody>
</table>

| 5. SIZE FOR NOTIFICATION TO LOCAL AUTHORITY | | | |
|----------------|----------------|----------------|----------------|----------------|
| 5.1 Is the area greater than 25 ha? | Local Authority | 4 weeks | N/a | |

| 6. OTHER ENVIRONMENTAL CONSIDERATIONS | | | |
|----------------|----------------|----------------|----------------|----------------|
| 6.1 Specify | As necessary | 4 weeks | 4 weeks | |

Note: The Department has agreed a referral matrix with NPWS (see Forest Service Circular 2 of 2013) whereby applications adjoining or upstream of designated area can be assessed without automatic referral to NPWS.

Note: If present, all items listed may require the Forest Service to consult with prescribed bodies. Consultation is dependent on the type and scale of the operations proposed and determined on a case-by-case basis. Referral periods listed are the minimum applicable. Other schemes may be subject to the referral process described above, on a case-by-case basis.

Source, DAFM, 2016

Other auditing

Environmental risk assessment in Coillte

An Environmental Risk Assessment (ERA) is conducted as part of Coillte’s internal planning for all forms of forest activities. Areas where forestry activity is planned are assessed according to their environmental sensitivity based on set rules for different environmental receptors (e.g. Soil and Water, Biodiversity, Archaeology). ‘Green’ sites are those where standard practices and safeguards are deemed to be sufficient, ‘Blue’ sites are those considered to be of a higher sensitivity. The latter then undergo a further of assessment by Coillte staff, including a site visit by an Environmental Officer, to identify potential impacts on receptors and to provide the necessary level of detail regarding environmental sensitivities and operational safeguards, appropriate for onsite operators and supervisors. This process is supported by contractor training, contingency planning and input and oversight by assigned Environmental Managers and Quality Assessors within Coillte (DAFM, 2018).

Forest certification

Forest certification is an additional form of auditing / forest management oversight. It is an independent, voluntary, market-driven initiative that assesses the quality of management against a pre-defined standard. The core principle of forest certification is to promote and encourage Sustainable Forest Management and it has been recognised for many years by the Food and Agriculture Organisation (FAO) as important mechanisms for promoting sustainable production and consumption of forest-derived goods and services. Once the management practices applied to the forest have been certified, the timber must be chain-of-custody certified in order to
deliver a certified product to consumers. There are two global certification schemes, FSC and PEFC, both of which are active in Ireland.

Certified forests are subject to regular auditing to ensure that the criteria as defined by the certification scheme is being applied as required. The costs associated with certification are borne by the forest owner and include the direct cost of the auditing process and any indirect costs for example, staff training, consultation, re-aligning business practises, etc. While the advantages were originally seen as a ‘rubber stamp’ of environmental approval and creating a niche market that might attract higher prices for certified products, in many markets, certification is now the norm and is considered a necessity to ensure market access. The certificates issued are usually valid for a period of five years with yearly ‘surveillance audits’; infringements of the standard can result in ‘nonconformities’ which if left unaddressed, may lead to the suspension of the certificate.

There are four FSC forest management certificates in Ireland – Coillte, the Irish Forestry Unit Trust, the North East Forestry Certification Club and the Forest Owners Co-operative Society (the latter two are as a result of a Government funded pilot scheme for certification for private forest owners). Currently, only Coillte has PEFC forest management certification.

Sanctions and penalties
If conditions of the licence have breached sanctions and/or penalties may be imposed.

Sanctions
DAFM (2016) outlines that breaches of licence conditions may elicit sanctions or penalties, depending on their nature and extent. This may entail one or more of the following measures:

- The withholding of grant and premiums until appropriate remedial work is carried out to the satisfaction of the Department;
- The application of financial penalties under the Department’s Forest Service penalty system;
- The revoking of forestry licences issued;
- Established sanctions under the DAFM’s Registered Forester system, including an increased site inspection regime applied to projects involving the Registered Forester in question, or his / her removal from the list of Registered Foresters and consequential exclusion from future work;
- Incidences of unlicensed afforestation, forest road construction and tree felling are pursued through the provisions set out in the Forestry Regulations and the Forestry Act 2014. These provisions include the reinstatement of the site to its original condition, and criminal prosecution;
- There are related sanctions under relevant environmental legislation including the European Communities (Birds & Natural Habitats) Regulations 2011, and the European Communities (Environmental Liability) Regulations 2008 (S.I.547 of 2008).
Penalties
DAFM operates a penalty system in relation to breaches of the terms and conditions of the various schemes it operates. Full details are set out in the Department’s document *Forestry Scheme Penalty Schedules* (Edition 2/2015) (2015).

Imposition of penalties
The following information was provided to the study by DAFM with regard to the imposition of penalties.

Under the 2014-2020 programming period, so far, 114 afforestation penalties have been issued. Penalties would be spread across the country and no specific data are available for Co. Leitrim.

Refusals at both payment stages are issued in cases that are defined in the scheme terms and conditions, such as submission of false documentation by applicants, expiry of contract term, general failure to abide by the terms and conditions of the scheme (without the possibility for remedial action), etc.

It should be noted that all payment-related decisions can be appealed (to the Agriculture Appeals Office) by the applicant, following the request of an internal review by the applicant.
Acknowledgements

We would like to thank everyone that responded to our surveys, sent in comments and agreed to be interviewed. We would like to thank Dr. Mary Ryan, Rural Economy and Development Programme, Teagasc and Prof. Cathal O'Donoghue Dean, College of Arts, Social Sciences and Celtic Studies, NUIG for sharing their SMILE-ENV model. In addition, we would like to thank Mr. Tom Houlihan, Forestry Specialist at Teagasc for assistance and advice regarding the use of the FIVE model and Dr Kevin Black for information regarding carbon sequestration. Many people at DAFM and the Local Authority Waters Programme were available to provide additional consultations. Our colleagues at UCD; in particular Prof. Martin Nieuwenhuis and Ms. Marie Doyle along with Mr. Charles Harper, Prof. Conor O’Reilly, and Dr. Brian Tobin, offered useful edits and suggestions. It was also helpful to meet with the Leitrim County Council executive team and the County Councillors. We appreciate everyone that gave us tours of the farms and forests in Leitrim, sawmills, and other wood processing businesses.
References


Duesberg, S., O’Connor, D. and Ní Dhubháin, A. 2013. To plant or not to plant—Irish farmers’ goals and values with regard to afforestation. *Land Use Policy*, 32: 155-164.


experimental methods to enhance biodiversity in plantation forests. BIOFOREST Project Final Report.


LAWPRO, 2019. Email received from LAWPRO, 21/8/19.


Annex A: Questionnaire used in survey of forest owners

Section 1

In this section I would like to get some information on the forests you own in Leitrim, your reasons for owning forests in Leitrim and get some insight into what the forests are being used for.

1. Please describe your forest(s). If you own more than one forest/plot in County Leitrim please describe each one.

<table>
<thead>
<tr>
<th>Plot 1</th>
<th>Plot 2</th>
<th>Plot 3</th>
<th>Plot 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species 1 (Give name and %*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species 2 (Give name and %)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species 3 (Give name and %)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planting year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area (hectares)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location (nearest town/village)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPC** (if known)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* % of the plot the species comprises; ** Grant and premium category

2. Did you plant/buy the forest?

1. Planted it on own ground
2. Planted it on ground purchased for afforestation
3. Purchased established forest
4. Inherited forest

Tick as appropriate

3. Are you living in Leitrim?

Yes   No

Please indicate where your residence (nearest town/village) is.
4. **What were your main reasons for planting/purchasing forests? For the reasons you choose please rank in order of importance where 1 is the most important and 2 the second most important etc.**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avail of grants and premiums</td>
<td></td>
</tr>
<tr>
<td>Use up poor land</td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td></td>
</tr>
<tr>
<td>Amenity and recreation</td>
<td></td>
</tr>
<tr>
<td>Pension plan</td>
<td></td>
</tr>
<tr>
<td>It would look nice</td>
<td></td>
</tr>
<tr>
<td>Shelter-belt (for livestock or dwelling)</td>
<td></td>
</tr>
<tr>
<td>Diversifying farm income</td>
<td></td>
</tr>
<tr>
<td>Don’t know – inherited land</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

If other ticked above please specify: ____________________

5. **What are you using/planning to use your forest for? For the uses you choose please rank in order of importance where 1 is the most important and 2 the second most important etc.**

<table>
<thead>
<tr>
<th>Use</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce timber for sale</td>
<td></td>
</tr>
<tr>
<td>Produce timber for domestic use</td>
<td></td>
</tr>
<tr>
<td>Provide recreation for self/family</td>
<td></td>
</tr>
<tr>
<td>Provide cover for game for hunting</td>
<td></td>
</tr>
<tr>
<td>Provide a break/border between farms</td>
<td></td>
</tr>
<tr>
<td>Shelter-belt (for livestock or dwelling)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

If other ticked above please specify: ____________________
6. **How often do you visit your forest?**

<table>
<thead>
<tr>
<th>Frequency of visit</th>
<th>Tick as appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td>Weekly</td>
<td></td>
</tr>
<tr>
<td>Monthly</td>
<td></td>
</tr>
<tr>
<td>Once a year</td>
<td></td>
</tr>
<tr>
<td>Once every five years</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td></td>
</tr>
</tbody>
</table>

7. **How many days per year on average do you (and/or your family) spend engaging in the following activities in your forest? If you own more than one plot (see question 1) indicate in which plot you engage in the activity.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Plot 1 (number of days per year)</th>
<th>Plot 2 (number of days per year)</th>
<th>Plot 3 (number of days per year)</th>
<th>Plot 4 (number of days per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having picnics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife viewing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hunting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bird watching</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjoying solitude</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring progress of trees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other ticked above please specify: _______________________________________

8. **Do you allow non-family members to spend time in your forest?**

   *Yes*  *No*  

   *If yes, what activities do they participate in/ how do they use the land.*

   ________________________________________________________________
9. Which of the following animals/birds are found in your forest? Tick as appropriate. If you own more than one plot (see question 1) indicate which plot the animal/bird is found in.

<table>
<thead>
<tr>
<th>Animal/bird</th>
<th>Plot 1</th>
<th>Plot 2</th>
<th>Plot 3</th>
<th>Plot 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red squirrel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grey squirrel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rabbit/hare</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badger</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pine marten</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bird species - please specify</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other - please specify</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 2

In this section I would like to get some information about you.

10. Gender – (Please tick as appropriate)

Female
Male

11. What is your marital status? (Please tick as appropriate)

Married
Living with partner
Single
Widow/widower
Divorced/separated

12. How many children do you have? (Please fill in appropriate number)

Younger than 18 years
18 years or older
No children
13. What is the highest level of education or training (full- or part-time) you completed to date? (Please tick as appropriate)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td></td>
</tr>
<tr>
<td>Vocational agricultural training</td>
<td></td>
</tr>
<tr>
<td>Trade based qualification</td>
<td></td>
</tr>
<tr>
<td>Third level or above</td>
<td></td>
</tr>
</tbody>
</table>

14. What is your occupation? (Please tick as appropriate)

<table>
<thead>
<tr>
<th></th>
<th>Before planting</th>
<th>Currently</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A full-time farmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. A part-time farmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Retired farmer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Non-farmer (investment company)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Non-farmer (charity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Non-farmer (other) please specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THE FOLLOWING FIVE QUESTIONS APPLY ONLY THOSE WHO WERE/ARE CURRENTLY FARMING

15. What are your farm activities (in percentage) ?

<table>
<thead>
<tr>
<th></th>
<th>Before planting (%)</th>
<th>Currently (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dairying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Dairying + other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Cattle rearing (suckler cows)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Cattle other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Sheep</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Mixed cattle and sheep</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Tillage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Mixed tillage + grazing livestock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Other, please specify:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
16. Did planting land with trees reduce your agricultural output?
   If yes please indicate whether it was a (Please tick one as appropriate):

   1. 100% reduction in agricultural output
   2. 75-99 reduction in agricultural output
   3. 50-74 reduction in agricultural output
   4. 20-49 reduction in agricultural output
   5. > 0-19 reduction in agricultural output

17. Did planting land with trees reduce the number of livestock on your farm?
   If yes please indicate whether it was a (Please tick one as appropriate):

   1. 100% reduction in livestock numbers
   2. 75-99 reduction in livestock numbers
   3. 50-74 reduction in livestock numbers
   4. 20-49 reduction in livestock numbers
   5. > 0-19 reduction in livestock numbers

18. How did planting land with trees affect your agricultural income (excludes forestry income) (tick as appropriate) ?

   Total farm income | Income per ha

   1. Reduced by more than 75%
   2. Reduced by 50-74%
   3. Reduced by 0-49%
   4. Stayed the same
   5. Increased by 0-49%
   6. Increased by 50-74%
   7. Increased by more than 75%

19. What is the total area of your farm? Hectares
ALL RESPONDENTS

20. *Is there anything else you wish to add?*

__________________________________________________________________

THANK YOU!
Annex B: Questionnaire for forestry firms and contractors for economic activity

Name of the Company: ______________________________________

Address of the Company:
_________________________________________________________
_________________________________________________________

Name of Respondent: ________________________________________

Telephone Number: _________________________________________

Fax Number: ______________________________________________

Email: _____________________________________________________

Section 1 – Description of Business

1.1- Is your company a limited company?
Yes: ☐ No: ☐

1.2- Where is your head office located?
____________________________________________________________________

1.3- What percentage of shares is owned by persons or organisations
   Within Leitrim _____________%
   Outside Leitrim _____________%
   Not relevant : ☐
____________________________________________________________________

1.4- Where does the owner of the company live?
   Within Leitrim: ☐ Other Counties: ☐

1.5- What year is covered by your return? From ___/___/___
Questionnaire

Section 2- Description of the Activities in Leitrim

2.1 - Please indicate (in %) what are the main activities your company is concerned with (for year covered by this return):

- Forest establishment: ____________ %
- Forest management and maintenance: ____________%
- Forest harvesting ____________%
- Reforestation ____________% 
- Roading ____________%
- Others (please specify):
  __________________,, ___ %
  __________________,, ___ %
  __________________,, ___ %

2.2 - What proportion of your total customers is represented by:

- Farmers: ____________ %
- Non-farmers: ____________%
- Coillte ____________% 
- Companies (e.g. pension funds etc) ____________%
Section 3- Employees and Contractors
**Employees/Contractors:**

Section 3. Please give the following information with reference to activities carried out by your company in 2017

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Total volume of activity in 2017</td>
<td>Total number of man-hours required for each activity listed in A in 2017</td>
<td>% of activity in A carried out in Leitrim</td>
<td>% of activity in Leitrim (D) carried out by employees</td>
<td>% of activity in Leitrim (D) carried out by contractors</td>
<td>% of employees engaged in activity in Leitrim forests (E) that are resident in Leitrim</td>
<td>% of contractors engaged in activity in Leitrim forests (G) that are resident in Leitrim</td>
</tr>
<tr>
<td>Forest Establishment</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• Site preparation</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• Planting</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>• Fertilisation</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>• Fencing</td>
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<tr>
<td>Forest Maintenance</td>
<td></td>
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<tr>
<td>• Filling in</td>
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</tr>
<tr>
<td>• Vegetation cleaning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pruning</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• Shaping</td>
<td></td>
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</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Reforestation</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Site preparation</td>
<td></td>
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</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Activity</th>
<th>Total volume of activity in 2017</th>
<th>Total number of man-hours required for each activity listed in A in 2017</th>
<th>% of activity in A carried out in Leitrim</th>
<th>% of activity in Leitrim (D) carried out by employees</th>
<th>% of activity in Leitrim (D) carried out by contractors</th>
<th>% of employees engaged in activity in Leitrim forests (E) that are resident in Leitrim</th>
<th>% of contractors engaged in activity in Leitrim forests (G) that are resident in Leitrim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Column 1</td>
<td>Column 2</td>
<td>Column 3</td>
<td>Column 4</td>
<td>Column 5</td>
<td>Column 6</td>
<td>Column 7</td>
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<tr>
<td>Planting</td>
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</tr>
<tr>
<td>Fertilisation</td>
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</tr>
<tr>
<td>Forest Harvesting</td>
<td></td>
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<tr>
<td>Thinning</td>
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<tr>
<td>o Felling</td>
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<tr>
<td>o Extraction</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Clear felling</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>o Felling</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Extraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Transport/Haulage</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Road construction</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>List any other activity not included above:</td>
<td>A) e.g. Planning, Supervision</td>
<td>B)</td>
<td>C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Section 4- Purchases from Suppliers for Current Production Purposes**

4.1- The purpose of this question is to determine the nature and extent of your company’s linkages in terms of purchases from other sectors in the region and beyond.

From which of the following sectors does your company purchase products/services. A detailed description of each sector is provided at the end of this questionnaire for your convenience. We are interested in all purchases made by your company and used for production of the products/services sold during the year. This includes purchases for production, distribution and administrative purposes. *Note bordering counties include Sligo, Roscommon, Longford, Cavan, Fermanagh and Donegal

<table>
<thead>
<tr>
<th>Sectors of Suppliers</th>
<th>% Purchased in Ireland from:</th>
<th>% Purchased outside Republic of Ireland</th>
<th>Total Purchase Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>County Leitrim</td>
<td>Counties bordering Leitrim*</td>
<td>Elsewhere in Ireland</td>
</tr>
<tr>
<td>Agriculture &amp; Fishing</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Forestry Products</td>
<td>A Roundwood</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>B Reproductive Materials, i.e., PLANTS</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>C Others</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Petrol Products &amp; Natural Gas e.g DIESEL</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Other Energy</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Metal &amp; Metal Products (FENCING)</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Mineral Products</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Chemical Products (i.e. fertiliser, herbicides etc)</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Agricultural/Industrial Machinery</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Office Machine</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>10</td>
<td>Electrical Goods</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>11</td>
<td>Motor Vehicles &amp; Other Transport Equipment</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>12</td>
<td>Wooden Products &amp; Furniture, i.e. (Wooden Stakes)</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>13</td>
<td>Paper/Printing Products</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>14</td>
<td>Other Manufactured Products</td>
<td>A</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>TOTAL:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Purchases from Private/Public Services Sectors

<table>
<thead>
<tr>
<th>Sectors of Services</th>
<th>County Leitrim</th>
<th>Counties bordering Leitrim*</th>
<th>Elsewhere in Ireland</th>
<th>% Purchased outside Republic of Ireland</th>
<th>Total Purchase Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Building &amp; Construction</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td>16 Repair/Scrap Services</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td>17 Road &amp; Rail Transport</td>
<td>A Road</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td></td>
<td>B Rail</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td>18 Other Transport Services</td>
<td>A Maritime</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td></td>
<td>B Others</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td>19 Communication Services</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td>20 Credit &amp; Insurance Services</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td>21 Financial/Legal &amp; Computing Services</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
<tr>
<td>22 Professional Consultancy</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>€</td>
</tr>
</tbody>
</table>
### Services

<table>
<thead>
<tr>
<th>Services</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent of Dwellings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Authority Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Public Services</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**TOTAL:**

|   |   |   |   |   | € |

### 4.2 - Please indicate the total cost to your company for each of the following expenses:

<table>
<thead>
<tr>
<th>Expenses</th>
<th>€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wages and Salaries (incl. Income taxes)</td>
<td></td>
</tr>
<tr>
<td>Other Taxes (VAT/exercise/corporation taxes)</td>
<td></td>
</tr>
<tr>
<td>Income Taxes</td>
<td></td>
</tr>
<tr>
<td>- Employers PRSI</td>
<td></td>
</tr>
<tr>
<td>- Employees PRSI</td>
<td></td>
</tr>
<tr>
<td>- Employees USC</td>
<td></td>
</tr>
<tr>
<td>Depreciation Allowance</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>

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Section 5 – Sales to Customers

5.1- The purpose of this question is to determine the nature and extent of your company’s sales linkages with other sectors in the region and beyond

Please indicate your main sources of incomes from sales

<table>
<thead>
<tr>
<th>Sources of Incomes</th>
<th>Leitrim residents (€)</th>
<th>Bordering counties (€)</th>
<th>Rest of Ireland (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment contracts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvesting contracts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reforestation contracts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td>€</td>
<td>€</td>
<td>€</td>
</tr>
</tbody>
</table>
Annex C: Aerial fertilisation requirements 2015

In 2015, aerial fertilisation requirements were published in light of SI 125 2012, which introduced the legal requirement to have a licence from the Forest Service of DAFM for aerial fertilisation. These requirements outline the information that is required in an application for a licence and indicated that once licence is approved the various requirements outlined in SI 125 of 2012 and the conditions of the licence must be adhered to. The guidelines identify that aerial fertilisation “should not be regarded as a substitute for appropriate early manual fertilisation. Fertilisation needs should be identified early in the rotation and carried out manually preferably. Generally, the Forest Service will not license aerial fertilisation in areas where manual fertilisation is practical” (Forest Service, 2015c, p. 1). Aerial fertilisation must only take place between 1 April and 31 August.

A visual assessment by the registered forester followed by foliar analysis by an accredited laboratory is used to confirm whether a nutrient deficiency exists. S.I. 125 outlines the restrictions regarding permissible fertiliser types, concentration and applications for aerial fertilisation (Table 46).

Table 46: Restrictions regarding permissible fertiliser types, concentrations and application rates for aerial fertilisation (as set out under S.I. 125 of 20122)

<table>
<thead>
<tr>
<th>Element</th>
<th>Acceptable formulations</th>
<th>Maximum permissible concentration (%)</th>
<th>Maximum permissible application rate (kg) per single net hectare (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus (P)</td>
<td>Granulated Rock Phosphate</td>
<td>11-12</td>
<td>350</td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>Granulated Urea</td>
<td>46</td>
<td>350</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>Muriate of Potash</td>
<td>50</td>
<td>250</td>
</tr>
</tbody>
</table>

* As set out under S.I. 125 of 2012, total hectarage for aerial fertilisation is the total area of forested land subject to an application for an aerial fertilisation licence that does not include exclusion zones and untreated areas, i.e. the total area of the proposed fertiliser ‘drop zone’, after the various exclusion zones and untreated areas have been excluded.

Source: Forest Service (2015c)

The guidelines outline how environmental sensitivities are assessed. S.I. 125 of 2012 sets out particular features on and adjoining the site that require prescribed exclusions zones (See Table 47).
Table 47: Aerial fertilisation exclusion zones, based on the European Communities (Aerial fertilisation) (Forestry) regulations 2012 (S.I. 125 of 2012)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Minimum exclusion zone (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstraction point of a source of water intended for human consumption</td>
<td>100</td>
</tr>
<tr>
<td>Aquatic zone (defined as a permanent or season river, stream or lake shown on an Ordnance Survey 1: 5,000 scale map)</td>
<td>50</td>
</tr>
<tr>
<td>Special Area of Conservation (SAC), Special Protection Area (SPA), Natural Heritage Area (NHA)</td>
<td>30 (unless with the written permission of the Minsters of Arts, Heritage and the Gaeltacht)</td>
</tr>
<tr>
<td>A dwelling house</td>
<td>30 (unless with the written permission of the owner or occupier)</td>
</tr>
<tr>
<td>Non-forested land</td>
<td>30 (unless with the written permission of the owner or occupier)</td>
</tr>
<tr>
<td>Roads (public, private or forest)</td>
<td>15</td>
</tr>
<tr>
<td>At or on a recorded monument or place to which Section 12 of the National Monuments (Amendment) 1995 (No.17 of 1994) refers. [Note, good forestry practice generally requires an exclusion zone of 20 m or greater from the outer edge of the archaeological sites.]</td>
<td>Source: Forest Service (2015c)</td>
</tr>
</tbody>
</table>

The following environmental sensitives (and how they are addressed) are outlined:

- An appropriate Assessment Procedure applies to the licensing of aerial fertilisation;
- The Forest Service must ensure that the licence is consistent with the objectives under the Water Framework Directive;
- Licences will not be issued in the following Freshwater Pearl Mussel Cathchments: Bundorragha (Mayo), Currane (Kerry), Dawros (Galway), Caragh (Kerry), Kerry Blackwater (Kerry), Ownagappul (Cork), Owenriff (Galway), and Glaskeelan (Donegal);
- For applications for aerial fertilisation in a Hen Harrier SPA during the breeding season (1 April to 15 August inclusive) that includes an area that lies within a Red Area, an Natura Impact Statement must be submitted – other requirements regarding Hen Harrier SPAs are also outlined in the guidelines.

The guidelines specify the operational details that apply to aerial fertilisation. The main points are highlighted below:

- only helicopter operators who have expertise in the area of aerial fertilisation should be used;
- aerial fertilisation should not take place in exclusion zones (see Table 47);
- aerial fertilisation should not take place during a 48-hour period before predicted heavy rain; during heavy rain, or in a 48-hour period following heavy rain. Similarly, it should not take place during high winds.
Annex D: Schedule 3 of the Forestry Regulations 2017

The circumstances under which a project which is below the threshold (e.g. 50 ha with respect to afforestation) should be subject to an environmental impact assessment:

CRITERIA TO DETERMINE IF A SUB-THRESHOLD PROJECT SHOULD BE SUBJECT TO AN ENVIRONMENTAL IMPACT ASSESSMENT

1. Characteristics of projects
The characteristics of projects must be considered with particular regard to:
(a) the size and design of the whole project;
(b) cumulation with other existing and approved projects;
(c) the use of natural resources, in particular land, soil, water and biodiversity;
(d) the production of waste;
(e) pollution and nuisances;
(f) the risk of accidents, and disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge;
(g) the risks to human health;

2. Location of projects
The environmental sensitivity of geographical areas likely to be affected by projects must be considered, with particular regard to:
(a) the existing and approved land use;
(b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;
(c) the absorption capacity of the natural environment, paying particular attention to the following areas:
   (i) wetlands, riparian areas, river mouths;
   (ii) coastal zones and the marine environment;
   (iii) mountain and forest areas;
   (iv) nature reserves and parks;
   (v) areas classified or protected under national legislation; Natura 2000 areas designated by Member States pursuant to Council Directive 92/43/EC1 and Directive 2009/147/EC2;
   (vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;
   (vii) densely populated areas;
   (viii) landscapes and sites of historical, cultural or archaeological significance.

3. Type and characteristics of the potential impact
The likely significant effects of projects on the environment must be considered in relation to criteria set out in points 1 and 2 of this Schedule with regard to the impact of the project on the factors specified in Article 3(1) of the EIA Directive, taking into account:
(a) the magnitude and spatial extent of the impact;
(b) the nature of the impact;
(c) the transboundary nature of the impact;
(d) the intensity and complexity of the impact;
(e) the probability of the impact.
(f) the expected onset, duration, frequency and reversibility of the impact;
(g) the cumulation of the impact with the impact of other existing and approved projects;
(h) the possibility of effectively reducing the impact.
Annex E: Water features requirement water setbacks

Table 48: Water features requiring water setbacks

<table>
<thead>
<tr>
<th>Type of water feature</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Aquatic zone          | Any natural river, stream or lake (but not an artificial drain) illustrated on an Ordnance Survey 6 inch map.  
(Note: The EPA water layer on iNET may not capture all aquatic zones onsite.) |
| Relevant watercourse  | Any other watercourse that has the potential to act as a pathway for the movement of significant amounts of sediment and/or nutrients from the site to an aquatic zone.  
Relevant watercourses are often artificial, and include existing drains and channels and other potential pathways that may contain flowing water during and immediately after rainfall.  
Note: not every watercourse is a 'relevant watercourse'. For example, a well-vegetated agricultural drain or ditch draining a small area of moderately sloping ground may not be a relevant watercourse, as there will be little or no potential for it to carry significant amounts of sediment/nutrients. |
| Hotspot               | An area that is a potential source of sediment and/or nutrient loss during afforestation works and/or future harvesting. Examples include pockets of soft wet ground, flushes and springs. |
| Abstraction point     | An abstraction point of any surface water, borehole, spring or well used for drawing water for human consumption in a water scheme. |

Source: Forest Service Circular 12, 2017
Annex F: Summary of Forestry and Fisheries Guidelines introduced in 1992

Table 49: Summary of Forestry and Fisheries Guidelines introduced in 1992

<table>
<thead>
<tr>
<th></th>
<th>Designated Areas</th>
<th>Non-designated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forest Establishment</strong></td>
<td>&gt; 5 ha and includes an aquatic zone. Consult with Regional Fisheries Board</td>
<td>&gt; 40 ha and includes an aquatic zone. Consult with Regional Fisheries Board</td>
</tr>
</tbody>
</table>
| **Ground preparation** | • Don’t plough within 10 m of an aquatic zone  
• Don’t deep plough within 50 m of an aquatic zone  
• Construct cut-off drains and silt traps at least 10 m from aquatic zone  
• If tunnel ploughing, insert cut-off drains at a spacing not greater than 40 m  
• Cross an aquatic zone only in locations agreed with Regional Fisheries Board | • Don’t plough within 10 m of an aquatic zone  
• Construct cut-off drains and silt traps at least 10 m from aquatic zone  
• If possible, do not have drains entering the areas within 10 m of an aquatic zone; otherwise construct silt traps as far as possible from the aquatic zone |
| **Planting**          | • Don’t plant conifers within 10 m of an aquatic zone  
• Do not plant broadleaves within 5 m of an aquatic zone  
• If possible and if silviculturally advisable, remove any conifers planted within 10 m of an aquatic zone | • Don’t plant trees within 5 m of an aquatic zone  
• If possible and if silviculturally advisable, remove any conifers planted within 5 m of an aquatic zone |
| **Fertilizer application** | • Don’t apply fertilizer within 10 m of an aquatic zone  
• Only apply during months April to June | • Don’t apply fertilizer within 5 m of an aquatic zone  
• Don’t apply fertilizer mechanically within 10 m of an aquatic zone |
| **Chemicals and herbicides** | • Don’t apply within 10 m of an aquatic zone | As for designated |
| **Thinning and harvesting** | • Don’t extract by forwarder within 10 m of an aquatic zone | As for designated |
| **Roads and bridges etc** | • Don’t build roads within 50 m of an aquatic zone | As for designated |

Source: Forest Service (1992a)