ENVIRONMENTAL STATEMENT

PROPOSAL FOR MIXED WOODLAND

JERAH FARM
STIRLINGSHIRE AND
CLACKMANNANSHIRE

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PREFACE

This Environmental Statement has been prepared to inform a proposal for the establishment of productive mixed woodland on Jerah Farm some 6km north west of Stirling.

The Environmental Statement includes a Non-Technical Summary (NTS) which provides an "executive summary" of the statement and its findings and which is presented in a non-technical manner. This Environmental Statement comprises the following documents:

- Non-Technical Summary
- The Environmental Statement

In addition to these, the Environmental Statement is supported by the following Technical Annexes which contain detailed technical information which has informed the findings presented in the ES:

- Technical Annex A: Archaeological Walk-Over Survey
- Technical Annex B: Landscape and Visual Impact Assessment
- Technical Annex C: Ecological Evaluation
- Technical Annex D: Habitat Survey
- Technical Annex E: Ecological Site Classification
- Technical Annex F: Breeding Bird Survey
- Technical Annex G: Hydrology
- Technical Annex H: Protected Species Survey
- Technical Annex I: Management of Woodland Edge Habitats

The Environmental Statement may be viewed at the following locations during the statutory consultation period:

Dumyat Centre
Main Street East
Menstrie
FK11 7BA
Tel: 01259 769439

UPM Tilhill
1 Duckburn Park
Stirling Road
Dunblane
Perthshire
FK15 0EW
Tel: 01786 821666

Further copies of the Environmental Statement are available for £200 per hard copy or £10 for CD-ROM from:

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NON-TECHNICAL SUMMARY

This Environmental Statement (ES) covers the potential impacts arising from a proposal to establish productive mixed woodland over a net area of 640 hectares on Jerah Farm, Strirling/Clackmannanshire. The land is currently used for extensive hill grazing with some limited inbye around Jerah Farm (NGR NS838992) and to the north west corner of the site at NN827015.

The following Non-Technical Summary gives brief findings from the Jerah Farm Environmental Statement 2013.

The land on which this proposed woodland is to be planted has been acquired by a new owner who is considering the option to afforest the land, to sequester carbon and produce renewable raw material, as opposed to farming it - given the very difficult economic climate for upland sheep farming. Farming would require resources which are not justified in terms of current and likely future agricultural circumstances.

Jerah Farm lies within an area that is defined, in agricultural terms, as being "severely disadvantaged". The site is composed of a range of upland vegetation types including extensive areas of acid grassland (499.09 hectares or 49.69%), blanket bog (139.8 ha/13.9%), marshy grassland (127.6 ha/12.7%), and wet heath/acid grassland mosaic (83.53 ha /8.32%). Other habitats include 36 hectares of bracken, 99 hectares of semi-improved acid grassland, and 54 hectares of improved acid grassland and some 15 hectares of semi-natural broadleaf woodland. All of the habitats recorded on Jerah Farm are common in an upland fringe setting and the open ground habitats have been modified by long-term grazing and drainage impacts.

Within the total area of some 1002 hectares, 640 hectares is proposed for afforestation with 364 hectares retained as open ground. Retention of open ground has been planned to help safeguard areas of archaeological and ecological value, to protect water resources, to provide for internal and external landscape design and to accommodate deer management.

Of the total area of proposed afforestation, 507 hectares is classed as productive in a commercial sense and 130 hectares will be semi-natural broadleaved woodland complementing the existing riparian woodlands.

The owner’s objective is to establish a productive woodland, with the right species on the right soil, that maximises sequestration of carbon through maximising timber production.

Within this broad objective, every effort has been made to minimise or offset adverse impacts on the archaeological, landscape, ecological and hydrological resources of the site.

Jerah Farm is serviced by public roads to the north. A weak bridge will be by-passed by installing a dedicated bridge over the Wharry Burn, to allow access for timber extraction. A proportion of the proposed forest road formation will be constructed to create safe site access, otherwise a network of rides will be left for future forest road installation, to ultimately create a road network that efficiently services the whole extent of the site and which connects with the public road to the north. The existing farm track which accesses the south end of the property (from Menstrie) will be retained for light vehicle use and public access.

The woodland design submitted for consultation, allows 100 hectares of mixed and native woodland types plus open ground, at the southern end of the property. This will be designed for public access and landscape enhancement and integrate with a network of retained open space (archaeology, desire-line paths and viewpoints) with a range of woodland types and species.

Elsewhere on site, open space allowance has also been made for deep peat, land above the 450m contour required for landscape design and a combination of steep slopes, roads, outcrops and archaeology.

The productive conifer woodland will be dominated by improved Sitka spruce, silviculturally suited to the soils and exposure of the site. The better and most sheltered soils will be planted with a broader range of conifer species including Douglas fir and Norway spruce, both for landscape variety and timber production.

The Environmental Statement has been informed by a number of surveys including an archaeological walk-over survey, landscape and visual impact assessment, Phase I Habitat Survey/National Vegetation Classification Survey, breeding bird survey and a protected species survey.

A wide ranging consultation process took place. This included the formal Screening Meeting of 16th January 2013. As the proposals developed, consultation continued thereafter with Forestry Commission Scotland, Friends of the Ochils and the local communities.

The Screening Meeting, chaired by Forestry Commission Scotland, described the outline proposals and provided the opportunity for comment and feedback. Following this meeting, all attendees, and those who were unable to be present, were invited to make

further comment and these were incorporated into the formal Screening Report which provided the scope and direction for the Jerah Farm Environmental Statement 2013.

The overall objective of the Environmental Statement is to:

- Identify the main, or significant, environmental issues relating to the proposed woodland development.

- Identify the nature and scale of the environmental effects that are likely to result from the establishment of mixed woodland.

- Identify areas where adverse impacts are minimised and positive impacts maximised.

The primary aims of the scheme are:

- To establish multi-purpose mixed woodland on previously grazed hill land for wood and fuel production and to help underpin a sustainable forest products industry, as an alternative to upland sheep farming.

- To enhance the landscape and maintain and extend the existing areas of semi-natural woodland.

- To provide community benefits through new opportunities for responsible public access, recreation and interpretation of the cultural resource.

- To create a carbon sink and improve Scotland's greenhouse gas balance.

The area statement below is based on the total (gross) area of the proposal which is 1,002 hectares.

Jerah Farm: Area Statement

TOTAL PROJECT AREA	1002.48	100%
EXISTING WOODS – SEMI-NATURAL	15.61	1.55
EXISTING WOODS – CONIFER	6.48	0.65
DOUGLAS FIR	36.95	3.69
MIXED BROADLEAVES	81.63	8.15
MIXED BROADLEAVES LOW DENSITY	48.56	4.85
MIXED CONIFERS/MIXED BROADLEAVES	34.28	3.42
NORWAY SPRUCE	13.26	1.32
SCOTS PINE	3.51	0.35
SITKA SPRUCE	403.27	40.24
LOW DENSITY SITKA SPRUCE (UPPER MARGINS)	19.07	1.90
OPEN GROUND – UNPLANTED (PLUS ROADS)	339.46	33.88

Following the Screening Meeting and subsequent meetings, the main issues, or sensitivities, were identified. These potential issues are:

- impacts on cultural heritage, particularly those relating to sites of regional and local archaeological importance, their landscape setting and interpretation;

- landscape impacts from key viewpoints, particularly those relating to the conversion of open ground to woodland;

- impacts on the ecology of the site, particularly those relating to the loss of open ground habitats and associated impacts on the breeding bird assemblage and protected species;

- impacts of drainage and afforestation on the hydrology of the site and the potential for exacerbating flood risk;

- socio-economic impacts in terms of change of employment from agriculture to forestry;

- impacts of future transport of timber and timber products from the forest particularly those relating to the public road system;

- impacts on the extant deer population and in particular the requirement to exclude deer from certain areas and the need for any compensatory cull;

- impacts on public access, particularly those relating to access across the site for quiet enjoyment, organised events or paragliding.

This Environmental Statement, requested by Forestry Commission Scotland in their letter dated 30 November 2012, addresses the above issues and submits the following conclusions:

Cultural heritage effects.

The Cultural Heritage Chapter considers the likely impacts on the archaeology and built heritage (historic environment assets) of the proposed woodland scheme. The assessment has been carried out by CFA Archaeology Ltd (CFA), informed by comments and information provided by Historic Scotland and Stirling and Clackmannanshire Council Archaeologist.

The assessment was designed to identify and evaluate any historic environment assets within the proposed development site through examination of desk-based sources, detailed field reconnaissance, a targeted metal detecting survey, and to identify historic environment assets within 2km of the proposed development site boundary that could have their settings affected.

Fifty-four historic environment assets have been identified within the proposed development site several of which were not identified in previous archaeological surveys. The majority of these are associated with 17-18th century agrarian activity. Whilst individually the separate assets surviving within the proposed development site are not unusual for the periods that they represent and are individually judged to be of no more than local importance, collectively they constitute part of a more extensive relict post-medieval farming landscape which survives within Menstrie Glen. Such farming remains are not unique to Menstrie Glen and are found throughout the Scottish landscape in varying degrees of preservation, nevertheless, taking into consideration the extent and overall good preservation of the relict farming remains, coupled with the surviving post-medieval historic documentation that can be directly linked to the settlement in the glen, it is considered that collectively the assets are of regional historic importance.

There is little evidence for prehistoric or early-medieval settlement and activity within the

proposed development site, although the remains of a dun at Myreton Hill could relate to occupation during the later Iron Age or early historic period. A study by the Royal Commission on Ancient and Historical Monuments in 1997 concluded that post-medieval cultivation had effectively removed any trace of settlement and land-use from before 1600. It is therefore considered that the potential of as yet undetected buried remains of prehistoric and early historic sites surviving within the proposed development site is low.

The majority of the historic environment assets surviving within the proposed development site would be preserved either within open areas or as upstanding remains within the proposed woodland, but due to the nature of the proposed forestry works there would be a direct impact on areas of former cultivation remains which would be lost through pre-forestry ploughing and drainage works. Much of the rig and furrow within the proposed development site is no longer prominently visible as upstanding remains and much of the former cultivation pattern is best appreciated through examination of post-war vertical aerial photographs. Only a small proportion of the overall pattern of former cultivation remains would be directly affected, with those cultivation remains which survive on the western side of the Menstrie Burn and outwith the proposed development site boundary being un-affected by the development. There would though be an effect on the integrity of the surviving historical farming landscape pattern as a whole and taking this into consideration the impact on the cultivation remains is considered to be of moderate significance. Mitigation measures are proposed to offset the loss of the archaeological resource that could occur as a result of the proposed development.

Indirect impacts rising from the proposed development on the setting of historic environment assets within the wider landscape are considered to be not significant.

In summary, the most important upstanding and historically significant remains can be preserved by accommodating, managing and interpreting them within the open space design of the woodland. However, the impacts on the land cultivation interest are judged to be adverse, irreversible and significant.

Landscape effects.

Assessments have been undertaken for all of the viewpoints identified as significant at the Screening Meeting and subsequent correspondence with consultees. These viewpoints were assessed in terms of current landscape character and the appropriateness of the proposals within the context of landscape character, scale of the landscape, adherence to best practice forest design guidelines and overall effect on these significant views. The views varied between distant glimpses of the proposed forestry scheme and high impact views, where the scene would be transformed from an open character to a forested one.

On the whole, the commissioned Landscape and Visual Impact Assessment concluded that the scheme had been designed sympathetically and met current landscape design principles, but that amendments were required to reduce the upper planting line, provide better integration of the species mix, improve broadleaf corridors to tie the scheme together, soften planting boundaries thus enabling a better response to landform.

Views looking toward the southern edge of the proposed planting, to the area currently designed as a community woodland, were considered to have a low overall effect on the landscape. The design of the planting area for this portion of the scheme is scattered and dispersed, mirroring the diverse, vegetated character of the southern escarpment, revealing the craggy rock outcrops and responding well to the underlying landforms. Care has been taken within amendments to the design to avoid perched blocks appearing within views of this southern edge and planting margins have been dropped below the skyline where appropriate. The commissioned Landscape and Visual Impact Assessment (LVIA) concluded that the woodland would be sympathetic to the character of this part of the Ochils and would not result in adverse effects upon the viewpoints identified nor on the Area of Great Landscape Value (AGLV).

Views which revealed part or all of the main area of the planting scheme, including the larger blocks of Sitka Spruce, were considered by the LVIA to have potential for negative effects, with regard to the transformation of a currently open and exposed landscape to a forested one. However, the design itself adheres to best practice guidelines, works well with the underlying landform where broadleaf areas enable a breaking down of larger blocks, provide the opportunity to reveal the location of watercourses and work with the lie and shape of the hills. This is particularly evident in the view from the summit of Dumyat where the strong open and rolling character of the hills is reflected well in the design of the proposed planting scheme, to reveal the existing character of the hills within the mature planting. The LVIA recommended amendments to both this view and the view from Sheriffmuir, to further respond to landform and in particular the top boundaries, where the open hill tops are revealed. In view of this, the upper planting boundaries were lowered particularly around Colsnaur while the addition of diffuse spruce planting or graded edges will assist in the softening of the upper planting boundary in what otherwise would be an abrupt edge of the productive conifers. The addition of diffuse broadleaf planting, aimed at further softening the upper edge and providing biodiversity enhancements, was removed during the design process to avoid creating a “pelmet effect” when the conifers are felled below the broadleaf planting areas. These amendments are also aimed at improving the long distance view from Stirling Castle, where a strong horizontality of planting blocks was evident in the original planting design, albeit as a very small portion of a very busy view.

Further beneficial effects were identified within the internal landscape of the scheme, with the introduction of recreational access into the forest area and sensitive treatment of the cultural heritage features. It was determined by the LVIA that these elements would enhance the experience of exploring the history of the site, through interpretive facilities and management of the setting of the archaeological features.

The overall landscape impact of this project is judged to be long-term, both positive and negative, irreversible and significant.

Ecological effects

The main ecological impact of the proposed scheme is the loss of open ground habitats to mixed woodland habitat with concomitant effects on species that require open ground for all, or part of, their life cycle.

Habitats

The proposed project has been subject to a full habitat survey and ecological assessment. Existing information and field work were used to evaluate the current, or baseline, ecological value and assess the potential impacts of planting mixed woodland.

The ownership captures 5 hectares of the Craig Leith and Myretoun Hill Site of Special Scientific Interest (SSSI) but no woodland establishment development is proposed within the SSSI area.

The area has historically been managed as extensive hill grazing land. The dominant vegetation type, occupying some 49.7% of the area (499 ha) is species-poor acid grassland which has been ecologically over-grazed. This is composed of unimproved and semi-improved acid grasslands.

Blanket bog (140 ha), marshy grassland (127 ha) and wet heath/acid grassland mosaics (83 ha) are also extensive across the site. Again, these are species-poor as a result of modification by long sustained sheep grazing. FDM Ecology (Fairbairn 2011) concluded that “a long history of heavy grazing and drainage on site has degraded these habitats”.

Acid grassland, marshy grassland, wet heath and blanket bog are priority habitats within the UK Biodiversity Action Plan. The extent of these habitats within Clackmannanshire was assessed as part of the Clackmannanshire Habitat Audit (Theil et al 1999) so the impact of this project can be assessed within the context of the Clackmannanshire Local Biodiversity

Action Plan (LBAP) process.

Within the Clackmannanshire LBAP, acid grassland falls within the unimproved grassland heath mosaic action plan. This mosaic is dominated by species-poor acid grassland "of generally low nature conservation value as a result of long-term and intensive sheep grazing" (Clackmannanshire LBAP 2003-2008).

Acid grassland is one of the most widespread and common habitat in the uplands – most having been derived from the ecological over-grazing of dwarf shrub-heath. It has been estimated that within this proposal some 330 hectares (73%) will be subject to afforestation leaving a residual area of 169 hectares.

The ecological significance of this change is considered to be low on account of the widespread nature of this habitat and the low ecological value of the Jerah examples.

Marshy grassland is a more limited habitat within the uplands compared to acid grassland. Jerah has 103 hectares (81%) potentially subject to afforestation leaving a residual area of 24 hectares. The ecological significance of afforestation on this habitat is therefore considered to be significant at the regional scale on account of its more limited extent and the higher species richness compared to acid grassland.

Upland heath is a complex mix of habitat types: 83.5 hectares of wet heath/acid grassland mosaic, 15.4 hectares of dry shrub heath and 6.4 hectares of dry heath/acid grassland mosaic. These mosaics have a high proportion of acid grassland and, in part, are a reflection of grazing induced conversion from heath to acid grassland. Of the total area of 105.4 hectares 99.7 hectares will be subject to afforestation leaving a residual area of 5.7 hectares. The ecological significance of afforestation on this habitat is therefore considered to be significant at the regional scale.

There is some 140 hectares of blanket bog occurring on the site. All areas of blanket peat (>50cms deep) will be retained as open ground habitat.

There is 15.6 hectares of extant semi-natural woodland on the site. All such areas will be managed to maintain and enhance their nature conservation value through a programme of expansion by natural regeneration and planting to enhance the semi-natural woodland habitat network.

The planting plan will ensure that 36% of the site will remain as open ground resulting in the retention of the current range of vegetation types at Jerah.

The impact of this project on the open ground habitats is deemed to have a medium magnitude impact. For acid grasslands this is deemed to be significant at the local scale and for wet grassland and upland heath at the regional scale over the medium to long-term.

Birds

An ornithological evaluation of Central Scotland published by the Joint Nature Conservation Committee in 1993 classed the area around Jerah as being of moderate to high interest. However, it is likely that in the 20 years since classification, the value of the site has decreased in terms of conservation value, with some breeding species no longer present or present at low density.

The project area has been subject to a breeding bird survey to help forewarn of potentially negative impacts which afforestation might have on species of bird presently occupying open hill ground. This revealed that a number of species of conservation concern use the site for part of their life cycle.

The breeding bird survey consisted of a total of 13 visits over the 2011 and 2012 breeding seasons. A total of 50 species were recorded on site. Of these, nine species of conservation concern that breed on site could potentially be displaced by afforestation (four Red List species: Grasshopper Warbler, Lapwing, Linnet and Skylark; and five Amber List species: Curlew, Meadow Pipit, Reed Bunting, Wheatear and Whinchat). Of these, eight are Local Biodiversity Action Plan (LBAP) species and six further classify as UK Biodiversity Action Plan species (UKBAP), suggesting a site of high local and moderate regional importance.

The most significant impact of loss of open ground relates to those species where the background population trend is one of decline. The possible displacement from the site of a proportion of the breeding population of nationally declining species of: Lapwing (1 pair), Curlew (2 pairs), 136 Meadow Pipit, Skylark (46 pairs) and Whinchat (4 pairs) is a significant adverse impact at a local scale. However, it should be noted that each of these species are present at very low density on Jerah, with none making up more than 0.001% of the Scottish population or 0.0001% of the UK population of that species. This probably reflects a

homogeneous habitat long modified and simplified by hill grazing.

Project implementation is likely to result in birds of the open hill benefitting from short-term habitat changes following the removal of sheep grazing. However, abundance is likely to decline as the canopy of planted conifers closes in approximately 10 years. The adverse effects of afforestation range from reduced breeding performance to loss or displacement of birds. Direct effects involve loss of feeding and breeding areas. Indirect effects of afforestation may occur due to wider-scale influences such as edge effects resulting in increased nest predation by crows and foxes.

The retention of 380 hectares of open space (34% of the 1002 hectare site) should help to reduce displacement effects. The inclusion of low density spruce and native broadleaves on the upper plantation/moorland edge is likely to provide habitat for a number of species of conservation concern, particularly Black Grouse, Skylark, Meadow Pipit, Whinchat, Reed Bunting and Grasshopper Warbler.

The impact of this project on birds requiring open ground habitats is considered to be negative, irreversible and significant at the local scale over the medium to long-term.

Ecology – protected species

The site was subject to an otter and water vole survey using a standard methodology. This covered all water courses that were crossed by the proposed track system or where the proposed tracks fell within 250 metres of watercourses.

The aim of the survey was to identify places of shelter which may potentially be impacted by the building of tracks. There was no evidence of water voles using the site. Evidence of otter, including temporary resting up sites and spraints, was recorded on Menstrie Burn and the Old Wharry Burn. No temporary resting up sites were recorded within 30 metres of the existing or proposed tracks and no natal/juvenile sites were recorded within 250 metres of the existing or proposed tracks.

To reflect the presence of otters within the site, all operatives will be briefed using the UPM Tilhill Otter Toolbox Talk. This requires that all works stop in the vicinity of otter sightings or other evidence to suggest the presence of otter. Contact will be made with one of the UPM Tilhill ecologists in order to assess the situation and take action to ensure compliance with

the Habitats and Species Directive. All water courses will be buffered to ensure that diffuse pollution does not compromise water quality.

The impact on otter arising from the project is judged to be neutral but with the potential to have medium to long-term benefits.

Hydrology

Water quality can be adversely affected by ground preparation, forest road construction and chemical use if best practice guidance is not applied. The proposed methods of woodland establishment including mounding, screefing and shallow ploughing will have minimal effects on soils and water. For example, continuous mounding disturbs in the region of 15-20% of the ground surface and because there are no continuous breaks in the soil profile will result in minimal disturbance to the rate of water run-off. The approach to ground preparation has been informed by the existing vegetation types, degree of slope and existing agricultural drainage and will be subject to a Method Statement to be agreed with FCS and SEPA prior to any project implementation.

All riparian zones within the project area will have defined buffer zones where no drainage, ground preparation or chemical use will occur. This includes sensitive treatment of all water courses emanating from Jerah.

Water quantity may also be affected by woodland establishment. Short-term risks are associated with the potential for increased speed of run-off and therefore an increased flooding risk. Application of legal requirements and best practice will ensure that the new drainage system will address the existing drains which are not compliant with current best practice. All drains will be buffered meaning that they will not connect to existing watercourses. Ground preparation will break up the dense turf dominant over much of the site which sheds water quickly downslope. This will allow for greater water storage capacity over the current baseline.

In the medium to longer-term, the proposed new woodland will dampen extreme variations in water run-off and the creation of semi-natural riparian woodland will boost biological productivity of water courses.

The impacts on water quality and quantity arising from the project are judged to be neutral in the short-term but beneficial and significant over the medium to long-term.

Social and economic impacts – employment

A comparison of rural employment has been made between the current agricultural baseline and the proposed change to woodland. The result of the proposals, in terms of rural employment, is predicted to be positive in relation to the agricultural baseline situation.

Overall, a comparison of the baseline agriculture employment with the forestry option shows that a net employment gain can be anticipated by the proposed land use change. With an assumed average rotation length (length of time from planting to felling) of 35 years for the first conifer crop at Jerah (ranging from 30 to 40 years in practise) it is predicted that project implementation will result in 4.93 FTE/year over 45 years. The baseline agricultural equivalent is 1.45

Employment in the local forestry sector will, typically, be boosted during the capital works and harvesting phases. Ground preparation, roading, fencing, planting, maintenance and deer stalking will all be completed by contractors local to the area, many of whom live and work within 30 miles of the site.

Timber harvesting and haulage is also completed by local contractors and a significant proportion of the timber grown in this locality services local processing markets – sawlogs to James Callendar (Falkirk), small roundwood to Norbord (Cowie), small sawlogs to Perthshire Timber (Dunkeld). Local biomass markets are continuously developing and likely to increase the potential for local employment.

Overall, the impact of this project in relation to rural employment is deemed to be positive in the short, medium and long-term and significant.

Timber haulage

The potential impacts of timber haulage, should this scheme proceed, include an increase in timber traffic levels leading to disruption and inconvenience to the local community. It can also lead to damage to an already fragile road network.

Timber haulage will be from the north of the site across a new crossing of the Wharry Burn and then on to the Sheriffmuir Road. This is a Consultation Route which runs west to Dunblane or north to the A9. The Sheriffmuir Road to the south is classified as an Excluded

Route. The Consultation Route already services timber haulage for large areas of plantation forestry on Kippendavie and other estates along the route.

The projected timber production from Jerah is expected to be 8,700 tonnes per annum for fifteen years commencing around 2047. A typical harvesting unit currently produces around 600 tonnes of timber per week and as such an annual harvesting programme would involve 362 trucks (24 tonnes per load) per annum or four wagons per day over 20 weeks. Without mitigation, all of this timber would currently pass through the southern edge of Dunblane before accessing the A9.

By way of mitigating potential impacts, discussions will take place with the Local Authority as required by the Consultation Route process prior to any timber harvesting operations. These will cover mitigation options such as management of timber traffic to avoid peak times and use of Central Tyre Inflation (CTI) technology. CTI equipped timber lorries reduce the adverse impacts of timber transport on weaker rural roads, allowing timber to be hauled without damaging the road surface.

Currently, discussions are taking place with Scottish and Southern Energy exploring the option for all local landowners to use the pylon upgrade road between the A9 at Greenloaning and Sheriffmuir for future timber haulage, in effect, bypassing the minor public roads. Whilst in principle, four of the five landowners concerned have expressed outline support, there are still both practical and planning issues to be resolved, which are outwith the control of the Jerah owner.

The impact of this project on public road access is deemed to be negative and significant at the local scale.

Other issues:

Public access impacts

A project of this nature can result, if poorly planned, in the loss of, or impeded, public access as a result of deer fencing and establishment of closed canopy woodland. Further, viewpoints from the site can be lost as a result of woodland establishment.

A wide ranging public consultation programme took place and this has ensured that the access requirements of key users have been fully taken into account in the design of the

proposed planting scheme. Access availability to the site was, by far, the most common issue raised during the public consultation process.

There are no Rights of Way or Core Paths within the project area. However, it is anticipated that recreational users will increase as a result of project implementation. The change of ownership and direction of land management has created an opportunity to encourage responsible public access along existing defined routes and as a result of track creation.

Further, there is scope within the proposal to introduce new formal access opportunities, where none currently exist, within the planted area utilizing the new forest track system. Over time, as other access developments in the locality move forwards (e.g. Kippendavie Estate), the prospect of being able to walk or cycle from Menstrie to Dunblane, almost entirely off-road, has been welcomed by members of the public engaged through the consultation process.

Specific design amendments have been incorporated to maximise the utility of the site for public access, including;

- maintaining paraglider flight lines and take off/landing areas,
- consideration of internal informal paths and viewpoints from within the most frequently accessed southern end of the site,
- key longer distance routes to maintain access to the Ochils plateau,
- access to and interpretation of the protected archaeology remains.

With regard the potential impact of loss of viewpoints from within Jerah Farm, it should be noted that the altitudinal planting limit is circa 450 metres OD. This will ensure that the hill tops remain open both as areas of public resort and maintenance of views from the site.

Deer fencing has the potential to impede public access. The preferred option is to deer fence the whole of Jerah Farm to effect successful woodland establishment. Styles and gates will be incorporated into the fencing design following consultation and agreement with the local authority Access Officer.

Overall there is no anticipated loss of public access to the estate or surrounding hills, no loss of views from hill tops and enhanced access opportunities resulting from track creation. To fully realize the benefits of the latter further consultation with the local community and the Access Officer is required prior to project implementation.

The impact of this project on public access is deemed to be positive and significant at the local scale.

1 INTRODUCTION

1.1 An option agreement to purchase Jerah Farm was agreed in 2012 subject to the potential new owner receiving permission to convert the farm to plantation woodland. This proposed change of ownership represents a change of direction with regard to the future management of the farm. The prospective owner proposes to establish mixed woodland on a gross area of 1002 hectares of open hill ground. The primary aims are to:

- Establish 640 hectares of multi-purpose mixed woodland on previously grazed hill land for wood and fuel production and to help underpin a sustainable forest products industry, as an alternative to upland sheep farming.

- Enhance the landscape and maintain and extend the existing areas of semi-natural woodland.

- Provide community benefits through new opportunities for responsible public access, recreation and interpretation

- Create a carbon sink and improve Scotland's greenhouse gas balance.

1.2 A Screening Meeting was held on the 16th January 2013. The proposal to develop a mixed woodland estate was presented to statutory consultees and the local community (see Other Annexes/Screening Meeting/Screening Meeting Report). Prior to this meeting, Forestry Commission Scotland (FCS) requested in their letter dated 30 November 2012 (see Other Annexes/Screening Meeting/FCS Determination Letter) that an Environmental Statement (ES) be prepared to assist the process of Environmental Assessment (EA), in accordance with Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999 and from this the key issues to be addressed were identified:

- potential impacts of the project on archaeological remains, particularly those relating to sites of regional and local archaeological importance, their landscape setting and interpretation;

- potential landscape impacts of the project resulting from conversion of open ground to woodland particularly from agreed viewpoints;

- potential impacts on public access, particularly those relating to access across the site for quiet enjoyment, organised events or paragliding;

- potential impacts of drainage and afforestation on the hydrology of the site and the need to maintain good water status and consider the potential for exacerbating flood risk;

- potential impacts of future transport of timber and timber products from the forest particularly those relating to the public road system;

- potential impacts on the ecology of the site, particularly those relating to the loss of open ground habitats and associated impacts on the breeding bird assemblage;

- potential impacts of the proposals on the extant deer population and in particular the requirement to exclude deer from the site and the need for any compensatory cull.

Following the Screening Meeting, other meetings were convened with interested parties to take them through the development of the project and in particular the progress of the forest design to reflect the range of site sensitivities. A drop-in day for the local community in Menstrie was organised as were presentations to the relevant Community Councils.

These meetings were as follows:

Table 1.1 Jerah Farm Meeting Schedule

Date	Attendees
22/08/12	Local authority archaeologist.
12/10/12	Pre-screening meeting, Friends of the Ochils
17/11/12	Menstrie Community Council
18/12/12	Dumyat Centre – Menstrie Community Drop-In
2/10/12	Stirling Council Roads
27/11/12	Ochils Paragliding Club
16/1/13	Screening Meeting
21/2/13	Blairlogie Community Council
30/8/13	FCS to review draft ES
14/10/13	Dumyat Centre – Menstrie Community Drop-In

With a view to maintaining dialogue with key parties, a meeting will be convened prior to or at the start of the ES statutory consultation period in which the key members of the ES team (archaeologist, landscape architect and ecologist) will be available to discuss their assessment of potential impacts and proposed mitigation measures. This meeting took place on the 15/10/13.

The outcome of the Screening Meeting and subsequent Screening Report is summarised below:

Table 1.2: Screening Meeting Summary

Issue	Description of potential impact	Importance H/M/L	Comments
1. Archaeology- 18th century farming landscape	Potential for damage or loss of remains via site preparation and growth of trees. Also their landscape setting, access to and interpretation.	High	Archaeological desk-study and field survey required to assess the need to accommodate the archaeological remains within the project proposals plus assessment of their landscape setting.
2. Landscape	Impact of woodland development over the medium to long-term including cultivation and fencing.	High	Landscape and visual impact assessment required of proposed woodland development. Principle viewpoints agreed with consultees.
3. Ecology	Loss of open ground habitats and potential impacts on birds, and protected species.	High	Assess the impacts on vegetation communities; breeding bird assemblage and protected species.
4. Hydrology	Flood risk and impacts on water quality and quantity.	Medium	Assess downstream flood risk and maintenance of Water Framework Directive 'good' water status of the Menstrie Burn.

5. Social and economic	Loss of farming employment.	Medium	Assess impacts of scheme on the long-term employment trends.
6. Timber transport	Increased traffic movements as a result of harvesting operations resulting in damage to road infrastructure and disruption to road users.	Medium	Assess impact of scheme on timber haulage in relation to baseline.
7. Public access	Impact of woodland establishment on opportunities for responsible public access.	Low	Ensure responsible access within the context of the Scottish Outdoor Access Code.

1.3 The ES seeks to identify and evaluate the key adverse and beneficial environmental impacts of this project. It will also illustrate how the woodland design and implementation of associated works will take these impacts into consideration seeking to mitigate adverse impacts and enhance those deemed to be of a beneficial nature. Of the sensitivities listed above, archaeological and landscape issues have had the most influence on the final design of the proposed woodland compared to the original Concept Map (see Maps/Concept Map) presented at the Screening Meeting.

1.4 Consultations

This Environmental Statement has been prepared after consultation with Forestry Commission Scotland, Stirling and Clackmannanshire Councils, Scottish Environment Protection Agency, British Trust for Ornithology, Menstrie and Blairlogie Community Councils, Friends of the Ochils and surrounding neighbours. Consultation with these organisations, groups and individuals established the “scope” of the ES.

The information and views provided through these consultations have been incorporated, where appropriate, into the overall woodland development proposals for the site. Table 1.3 shows the Screening Matrix for this project.

Table 1.3: Jerah Farm Screening Matrix

SCOPING MATRIX: JERAH FARM	1. Cultural/Archaeology	2. Landscape & Visual	3. Ecology	4. Hydrology	5. Social and economic	6. Timber transport	7. Public access
Friends of the Ochils							
Community Councils							
Scottish Natural Heritage							
BTO							
SEPA							
Local Authority							

1.5 Project Team

A project of this nature and scope necessitated a diverse range of experience and expertise. The main contributors are summarised below:

Table 1.4: Project Team

Area of expertise	Adviser
Archaeology	Mhairi Hastie, CFA Archaeology Ltd
Landscape and Visual	Kelda Platt, Munro Landscape Ltd
Ecology: Habitats and vegetation	John Gallacher, Ecologist UPM Tilhill
Ecology: Birds	Dr Jenny Owen, Ecologist UPM Tilhill
Ecology: Protected species	Ann-Marie McMaster, Lutra Consulting
Ecology: Ecological Site Classification	John Gallacher, Ecologist UPM Tilhill
Hydrology	Andrew Vaughan, District Manager, UPM Tilhill
Timber transport	Andrew Vaughan, John Gallacher
Employment	Andrew Vaughan,
Public access	Andrew Vaughan, John Gallacher

During the formulation of this woodland development proposal, and the subsequent preparation of this ES, useful advice was provided by Forestry Commission Scotland (FCS), Clackmannanshire Council and Friends of the Ochils. The ES gratefully acknowledges their contribution and advice.

1.6 The ES follows the format recommended in Preparing an Environmental Statement (FC 2001) and concentrates on the issues raised at pre Screening Meetings, the formal Screening Meeting of 16 January 2013 and in subsequent meetings and correspondence.

1.7 A summary of the assessment of the potential environmental effects, both positive and negative, arising from this project for the establishment of mixed woodland is given in Table 1.4. A full assessment of these effects is covered in Section 5.

2.0 ENVIRONMENTAL ASSESSMENT METHODOLOGY

2.1 Introduction

This section outlines the role of EIA and describes the approach adopted in preparing the Jerah Farm Environmental Statement.

2.2 The Role of Environmental Impact Assessment

The EIA process aims to ensure that the likely significant effects of new developments on the environment are fully considered and used to inform the decision-making process. In this case the design and implementation of a project to establish woodland.

Systematic analysis and clear presentation of information in a form which enables the importance of predicted effects, and the scope of mitigating them, to be properly evaluated is the key to the EIA process.

Good practice suggests that the EIA process should be treated as an iterative process rather than a single post-design environmental appraisal. This ensures that the findings of the EIA can be used to inform the overall woodland design and thus achieve a "best fit" within the environment. This approach was used for Jerah Farm. Where potentially significant effects have been identified, every effort has been made to incorporate appropriate mitigation measures within the evolving woodland design process.

Taking full account of the various environmental constraints and opportunities has therefore allowed the proposals to be adapted accordingly and in close consultation with the key consultees including Forestry Commission Scotland, Clackmannanshire Council and Friends of the Ochils.

All developments however must, by their nature, have some impact on the environment, no matter how slight. Afforestation schemes are no different. Even following an extensive mitigation process of prevent, reduce and offset there must be a net environmental change, the residual impact.

The overall residual impact, and the significance of this impact, is used to judge whether the proposed development should proceed or not, i.e. is a measure of the environmental cost against the benefit of the development. This is a decision for Forestry Commission Scotland as the competent authority in relation to proposed afforestation schemes.

2.3 Scope of the Environmental Impact Assessment

The ES for the planting proposals at Jerah Farm has been prepared in accordance with Schedule 4 (Part 11) of the EIA (Scotland) Regulations 1999, and includes the following information:

- a description of the physical characteristics of the whole development area and the land use requirements during the woodland establishment phase and subsequent site works;

- a description of the proposed planting scheme, comprising information about the site and the design, size and scale of the proposals;

- the data necessary to identify and assess the main effects which the proposed scheme is likely to have on the environment;

- a description of the likely significant effects, direct or indirect, on the environment of the scheme, explained by reference to its possible impact on the:

  - archaeological resource, its significance and its landscape setting

  - landscape and visual amenity from key viewpoints

  - ecological resource including habitat change and impacts on associated species

  - potential for increased flooding risk and potential impacts on water quality

  - social and economic infrastructure of the area

- transport of timber in circa 2048

- deer resource and the need for control to effect woodland establishment

- access for the public in line with the Scottish Access Code.

- where significant adverse effects are identified, with respect to any of the foregoing, a description of the measures envisaged in order to avoid, reduce or remedy these effects; and

- a summary in non-technical language of the information specified above.

3. SITE DESCRIPTION

3.1 Location, Land Use, Local Forestry and Woodland Strategy and Planning Context

3.1.1 Location

Jerah Farm lies some 3 kilometres east of the city of Dunblane and adjacent and due north of the village of Menstrie. Map 1 (see Maps/Location Map) shows the location and boundaries of the proposed scheme.

3.1.2 Land use, habitats and designated sites

The area has historically been managed as extensive hill sheep grazing land. The dominant vegetation type, occupying some 50% of the area (500 ha) is species-poor acid grassland of two main NVC types: U5a *Nardus stricta-Galium saxatile* grassland and U6 *Juncus squarrosus-Festuca ovina* grassland in damper areas. Much of this community has been modified and simplified by long-term grazing impacts.

Blanket bog occupies some 140 hectares (13.9%) of the site and has been classified as NVC M17 *Scirpus cespitosus-Eriophorum vaginatum* mire. Of this, 101 hectares is classed as dry modified bog and is typical of blanket bog subject to heavy grazing, burning and draining.

Marshy grassland also occurs across the site covering 12.7% (127.6 ha) and includes NVC types M25 *Molinia caerulea-Potentilla erecta* mire and M23 *Juncus acutiflorus-Galium palustre* mire. Again, both are species-poor as a result of modification by long-sustained sheep grazing.

Wet heath, at 8.3% or 83.5 hectares of the project area, is mainly composed of NVC M15 *Trichophorum cespitosum-Erica tetralix* wet heath. It is closely associated with, and grades into, blanket mire NVC M17. Other heathland types include mosaics of dry heath with acid grassland.

Other vegetation types include semi-natural woodland associated with the Menstrie and Inchna Burns (15.5 ha) much of which is thought to be of ancient semi-natural origin (NCC Ancient Woodland Inventory). There are

also stands of bracken (38 ha) and areas of improved or semi-improved grassland accounting for 54 and 99 hectares, respectively.

One statutory nature conservation designation, Craigleith and Myretoun Hill Site of Special Scientific Interest (SSSI), occurs within Jerah Farm (see Other Annexes/SSSI map and citation). The project area captures 5 hectares of the SSSI notified for its calcareous grassland habitats and associated species.

Some 5.6 hectares of the site also lies within the Sheriffmuir Road to Menstrie Burn Geological Conservation Review (GCR) site which demonstrates features of the volcanic and volcanistic rocks of the Lower Old Red Sandstone (see Maps/Geological Conservation Review site).

The site also captures the western edge of the Ochils Area of Great Landscape Value (AGLV; see Maps/Ochils AGLV).

Part of Jerah Farms falls within the designated Sheriffmuir Historic Battlefield Site (see Maps/Sheriffmuir Battelfield Site).

3.1.3 Local Forestry and Woodland Strategy

The site falls between two local authority planning areas; Stirling Council and Clackmannanshire Council. A joint Stirling and Clackmannanshire Forestry and Woodland Strategy (SCFWS) is currently at the Consultation Draft stage. This *"provides the strategic framework for the development and expansion of a variety of forest and woodland types across Stirling and Clackmannanshire"*

Jerah Farm falls within the zone defined as "potential". This means there is *"considerable potential to accommodate future expansion of a range of woodland types, but where at least one significant sensitivity exists. The extent to which specific proposals in potential areas will be permissible will depend on how well sensitivities can be addressed within the proposals. The design of schemes in such areas will require careful consideration" (SCFWS).*

The key planning documents are the Stirling Council Local Development Plan and the Clackmannanshire Council Local Development Plan. In relation to

forestry and woodland issues, both plans will be supported and guided by the Stirling and Clackmannanshire Forestry and Woodland Strategy (SCFWS).

The key challenges and themes of the SCFWS are summarised below:

Table 1.5: SCFWS Key Challenges and Themes – only those most relevant to Jerah are listed.

PRIORITY	KEY CHALLENGE	KEY THEME
Highest	Providing opportunities for climate change adaptation.	Climate Change
Highest	Strengthening the links between woodlands, forests and tourism.	Business Development
Highest	Strengthening opportunities for woodlands in and around towns.	Community Development Access and Health
Highest	Contributing to floodplain management options.	Environmental Quality
Aspirational	Using woodlands as an educational resource.	Community Development
Aspirational	Strengthening the links between woodlands, forests and well-being.	Access and Health
Supporting	Recognising the contribution that woodlands and forests make to carbon sequestration.	Climate Change
Supporting	Promoting woodlands as a source of renewable energy.	Climate Change
Supporting	Supporting the development of the rural economy and timber industry.	Timber and Business Development
Supporting	Adding, creating and retaining value by more local processing and utilisation of the area's timber resources.	Timber and Business Development
Supporting	Encouraging agricultural diversification.	Business Development
Supporting	Protecting and enhancing local landscape character, built, natural and cultural heritage.	Environmental Quality
Supporting	Meeting UK, Scottish and local biodiversity objectives.	Biodiversity

Highest priority = of specific importance /to action over the short-medium term

Aspirational = of significant relevance/to action over the medium-longer term

The Strategy notes that *"the overarching principal is that woodland expansion should be looked upon favourably in Stirling and Clackmannanshire, but subject to appropriate scale, type, objective and overriding constraints. Furthermore, and to reflect the recommendations set out in the Report of the Woodland Expansion Advisory Group, it is an aspiration of the SCFWS that woodland expansion should be more integrated, more diverse, more inclusive, more productive, more resilient and more positive*; *thus contributing to the delivery of multiple economic, social and environmental benefits".*

While Jerah falls within the potential category for woodland expansion, this does not mean *"that any proposal would proceed"*. Rather, *"current regulatory, approval, assessment and monitoring processes and industry recognised good practice"* would have to be followed including compliance with the UK Forestry Standard (FC 2011) and associated Guidelines as well as consideration of local sensitivities.

The categories are summarised below:

Table 1.6: Sensitivity rating for potential afforestation schemes

Category	Description
Preferred	Land which offers the greatest scope to accommodate future expansion of a range of woodland types. Within preferred areas sensitivities are, in general, likely to be limited, and it should be possible to address any particular site specific issues within well designed proposals that meet the UK Forestry Standard.
Potential	Land will be that which offers considerable potential to accommodate future expansion of a range of woodland types, but where at least one significant sensitivity exists. The extent to which specific proposals in potential areas will be permissible will depend on how well sensitivities can be addressed within the proposals. The design of schemes in such areas will require careful consideration.
Sensitive	Land where a combination of sensitivities means there is limited scope to accommodate woodland expansion.

Source: Stirling and Clackmannanshire Forestry and Woodland Strategy

There are four sensitivities identified within Potential areas:

- Inventory battlefield sites
- Land capability for agriculture class 2-3.2,
- Local landscape designations, and
- Sensitive historic/archaeological landscapes

Of these, the most relevant to Jerah is the cultural heritage associated with the 18th century farming landscape and the need to accommodate the sensitivity of the landscape including the AGLV. Both these issues are identified as being of high importance within Table 1.2.

For the other two sensitivities listed under Potential, Jerah falls with land capability zones 5 to 6 which means land classed as suited to improved grassland and/or rough grazing and thus falling outwith the sensitivity rating within Potential areas. Further, the Sheriffmuir Battlefield site (to the north of the project area) has been considered as part of the commissioned archaeological assessment and on this basis is not considered to be a significant issue.

3.1.4 Local and National Planning Context

The Stirling and Clackmannanshire Structure Plan (2002) covers a number of themes and related policy issues directly related to afforestation proposals:

Archaeology

Policy ENV6 covers the Historic and Built Environment whereby the Local Authority will seek to ensure that cultural heritage resources are recognised, recorded, protected and enhanced as appropriate, and that new development respects and contributes to the character and quality of the area.

Any afforestation proposal within the relevant local authority area must identify the historic assets that might be affected, define the setting of each historic asset and assess how any new development would impact upon this.

There are no Scheduled Monuments within Jerah Farm. Nonetheless, there is a requirement to appraise the potential impact of the proposed development on the cultural heritage of the site including unscheduled sites of archaeological importance whereby these will be expected to be retained, protected and preserved *in situ* in an appropriate setting. In view of this, the site was subject to a full walk-over archaeological survey (see Technical Annex A) which assessed the significance of the cultural heritage resource on areas proposed for afforestation. This assessment considered both the direct physical impacts on the cultural heritage features and any potential impacts on their setting. Setting is considered to be important to the way in which historic structures are understood, appreciated and experienced. In view of this, the archaeological and landscape team worked closely together with a view of developing a mitigation plan for the cultural remains and their landscape setting.

Landscape

Policy ENV2 covers protected landscapes, including Areas of Great Landscape Value (AGLV), where development will only be permitted if it satisfies the requirements of Policy ENV2 and can be accommodated without adversely affecting the overall quality of the designated landscape area.

The landscape of the Ochils is sensitive to a range of development impacts. It is therefore important that landscape considerations are taken into account early in the design of new planting schemes. In particular, the impact of the planting proposals on the Ochils AGLV (see Maps/Ochils AGLV) must be fully

assessed and evaluated from key viewpoints outwith and within the proposed development. In view of this, this current proposal has been subject to a full Landscape and Visual Impact Assessment (see Technical Annex B).

Nature conservation

Policy ENV1 covers the protection and conservation of wildlife, wildlife habitats and other natural features.

Development which will impact adversely upon the identified conservation interest of a designated or proposed area of international or national importance for nature conservation will not be permitted unless it is demonstrated that the objectives of designation and overall integrity of the area will not be damaged or that there is no alternative solution and there are overriding public interest imperatives.

Development which may affect a site of local importance for nature conservation (including non-designated sites, and habitats and features listed in Annex 1 of the EU Habitats Directive) will only be permitted if it can be demonstrated that it will have no significant adverse impact on the conservation interest of the site, habitat or feature.

All development proposals will be considered in the light of the recommendations and findings of the Local Biodiversity Action Plan. Where there is, in the planning authority's opinion, a potential adverse effect upon local biodiversity, an ecological appraisal of the development will be sought and considered before the proposal is determined.

There is one statutory nature conservation designation within Jerah Farm – Craig Leith and Myretoun Hill SSSI (See Other Annexes/Map and Citation). There are no non-statutory nature conservation designations affecting the project area.

Jerah Farm has been subject to a number of surveys including vegetation, breeding birds, peat depth, otter and water vole to ensure both the above requirements are met and that nature conservation sensitivities are fully taken into account during the development of the proposal and the various

iterations of the proposed planting design (see Technical Annexes C, D, F and I).

Forestry

Policy ENV8 covers forestry whereby the Local Authority will support forestry and woodland activities consistent with the Stirling and Clackmannanshire Forestry and Woodland Strategy. In particular, afforestation proposals must be consistent with the objectives and targets specified in the LBAPs and accord with the key strategic aims of the appropriate landscape character area as defined by the landscape character assessments.

Further, afforestation proposals are expected to enhance native and riparian woodland, promote sustainable forest and woodland based recreation and public access, including agricultural diversification, and create new woodland in and around settlements.

3.1.4 National Planning Policy and Advice

The most relevant to this project is NPPG 5 “Archaeology and Planning” and NPPG 14 Natural Heritage.

NPPG 5

NPPG 5 provides the framework for the management of the archaeological heritage, which is finite, fragile and non-renewable. Within the framework provided by NPPG 5, the key to the future protection and preservation of the great majority of archaeological sites and historic landscapes lies in co-operation between local authorities and site owners and developers.

Planning authorities should ensure that archaeological factors are as thoroughly considered as any other material factor in both the development planning and the development control processes.

Forestry developments are noted within NPPG 5 as having the potential to have particularly significant consequences for archaeological remains. This has been considered in the Consultative Draft of the Stirling and

Clackmannanshire Forestry and Woodland Strategy, the requirement of FCS under the UK Forestry Standard and the associated guidelines (e.g. Forests and Historic Environment).

NPPG 14

NPPG 14 provides guidance on how the Government's policies for the conservation and enhancement of Scotland's natural heritage should be reflected in land use planning. Natural heritage embraces the combination and interrelationship of landform, habitat, wildlife and landscape and their capacity to provide enjoyment and inspiration. It therefore encompasses both physical attributes and aesthetic values and has important cultural and economic dimensions. The NPPG states:

"The protection of natural heritage may sometimes impose constraints on development. However, conservation and development can often be fully compatible and, with careful planning, the potential for conflict can be minimised".

3.1.5 Scottish Ministers have set a target of generating 50% of Scotland's electricity from renewable sources by 2020. Scottish Planning Policy SPP 6, 'Renewable Energy', sets out how the planning system should manage the process of encouraging, approving and implementing renewable energy proposals when preparing development plans and determining planning applications. Woodland development is a key component of Scotland's renewable energy approach (Woodfuel Taskforce).

3.1.6 Forestry and Woodlands

The draft Stirling and Clackmannanshire Forestry and Woodland Strategy fully recognises the importance of woodlands and trees. They *"provide multiple benefits; they create places for recreation, help to promote health through cleaner air and provide habitats in which wildlife can thrive and a diverse environment can flourish.*

Perhaps most importantly of all, our forests absorb much of the carbon generated in other parts of the economy and so provide an increasingly important way of mitigating climate change".

They also contribute "*to the economy both directly and indirectly. They span the complete lifecycle of wood, encompassing the growing of tree seedlings, the planting, managing and harvesting of forests, manufacturing activities such as sawmilling, pulp and paper production, panel and board manufacturing, and the development and production of higher value goods such as engineered wood products.*

3.1.7 National Forestry Policy

An expansion of woodland area is one of the 40 UK Indicators of Sustainable Forestry.

The strategic vision for Scottish forestry is contained in the Scottish Forestry Strategy 2006 and the subsequent implementation plans. The Strategy has an aspiration to increase forest cover from 17.1% to around 25% of Scotland's land area by the second half of this century.

The Strategy identifies a number of woodland creation priorities for Scotland with the most relevant to Jerah Farm being highlighted:

- **Helping to tackle greenhouse gas emissions.** (Carbon sequestration, timber and fuel production).
- **Restoring lost habitats and adapting to climate change.** (Forest habitat networks and new native woodlands).
- Helping to manage ecosystem services. (Sustainable flood management and protection of soil and water resources).
- **Underpinning a sustainable forest products industry.** (Consistent and reliable timber supply for timber processing and wood fuel investments).
- **Supporting rural development.** (Supporting rural businesses and farm diversification).
- **Providing community benefits.** (Provision of welcoming and well-managed woodlands in and around communities).
- **Enhancing urban areas and improving landscapes.**

Woodland expansion is a key objective of the Scottish Government to help meet strategic objectives, particularly in relation to counteracting climate change and to stimulate economic development.

Woodland is a significant carbon sink with woodland creation offering a practical and readily achievable way to improve Scotland's greenhouse gas balance. Woods also provide a sustainable source of near carbon-neutral raw materials. The Scottish Forestry Strategy (2006) states that *"forest management should contribute to climate change mitigation over the long-term through the net capture and storage of carbon in the forest ecosystem and in wood products".*

The Scottish wood-chain now sustains 38,500 jobs and currently represents Gross Added Value (GVA) of some £1.67 billion, or 1.8% of the total Scottish economy (SCFWS). Within Stirling/Clackmannanshire "*the forest and timber resource and associated businesses are important contributors to the rural economy with estimates indicating that these represent some £35 million of GVA to the area through primary and secondary processing, manufacturing, distribution and other downstream woodland related economic activity – equivalent to some 2% of the area's GVA*" (SCFWS).

Creation of new timber producing forests over the next ten years would have a significant positive impact in sustaining timber production and providing long-term confidence for continued investment in the timber processing and wood fuel sector.

Forestry development supports rural development especially in areas where land use options are limited. Forty-four percent of forestry and timber processing related businesses are rurally based, with 15% based in areas categorised as remote rural or very rural (Scottish Government Urban Rural Classification Maps). There is long-term potential to further increase the local economic contribution of forestry in remote rural areas.

3.2 Land Use Balance

"Reasonable balance" may be defined as the appropriate integration of the range of land uses in the area to ensure their ability to continue to develop sustainably. Perceptions of what is an "appropriate" balance may vary

between different interest groups. For the purposes of the Jerah Farm proposal, land use balance has been considered within the draft Woodland Strategy area. Figures abstracted from this indicate the following change in woodland cover at this level should this project be implemented:

Table 3.1: Current woodland cover within the Stirling and Clackmannanshire Forestry and Woodland Strategy area and the effect of Jerah being planted.

Area	Total strategy area (ha)	Proposed net area of Jerah planting as %of total strategy area	Total area of forest cover (ha)	Proposed net area of Jerah planting as %of total woodland cover
Strategy area	125,210	Total planting = 640 ha/0.5%	21,350	3.0%

Source: Stirling and Clacks Forestry and Woodland Strategy

No significant new planting has taken place within the Ochils since the establishment of native woodland by the Woodland Trust at Glen Quey and Glen Sherup between 2001 and 2005. Prior to this, the most significant expansion of commercial forestry occurred in the late 1970's and early 1980's (House, 1995). At this time, the design guidelines and management objectives were very narrow – focussed on maximising the area of productive, commercial forest. The resulting forests are now in the process of being restructured, with phased felling and replanting incorporating modern design guidelines which incorporate all aspects of multiple objective management.

House (1995) quotes a figure of 15,000 hectares of woodland in the Ochils which is about 20% of the land cover.

3.3 Geology, Soils and Land Capability for Agriculture and Forestry

Solid geology

The Ochil Hills are composed of rocks of the Devonian age (410-360 million years ago) (Brown et al, 1993). The oldest rocks are the early Devonian Ochil Volcanic Formation. These comprise over 2000 metres of basaltic and andesitic lavas. These crop out on the prominent scarp formed by the Ochil Fault which is a major feature of the Ochils Area of Great Landscape Value.

Soils

Soil information, based on the Soil Survey of Scotland map for South East Scotland, categorises the prevailing soil types as part of the Sourhope Association derived from Old Red Sandstone intermediate lavas. The range of soil types include brown forest soils on the lower ground, peaty podzols on the mid slopes grading to blanket peat on the higher ground (Gallacher 1981; Grieve 1994). As part of the site assessment process, soil nutrient analysis was commissioned. This shows soil pH to be very low and typically below pH 5. Levels of phosphorus, potassium, magnesium and calcium are also very low across the site this being a reflection of the underlying geology and loss of nutrient status though leaching and long-term grazing impacts.

Permanent pasture is the dominant land use. Peaty podzols on loamy drifts have a semi-natural vegetation of heather moor and *Nardus* grassland and these soils, according to Grieve, “are of limited value for grazing”.

Land capability for agriculture

The MLURI Land Capability Classification for Agriculture confirms the land is suited to rough grazings with low grazing values characterising the area. There are some small areas of improved grazings amounting to 54 hectares or 5.3% of the project area.

Land capability for forestry

The MLURI Land Capability Classification for Forestry indicates Jerah has limited flexibility for the growth and management of trees. Species choice is limited to conifers, such as spruces, larches and pines, and to birch, alder or other hardy broadleaves.

Windthrow Hazard Class (WHC)

A survey was conducted to assess the potential WHC across the site. Fourteen points were assessed using the DAMS system for assessing exposure. Soils at these points were either relatively firm podzols/brown earths or peaty podzols/shallow peats on the higher points. The south section

above Menstrie is sheltered from the prevailing wind by Dumyat and higher ground to the north and west giving it a low WHC of 2. The surrounding ground is more exposed and grades into WHC 3 on the middle elevations around 200-300m. WHC 4 extends from higher elevations of 300-400m south side of Big Hunt Hill to the lower elevations on the less sheltered north side of Big Hunt Hill and Kidlaw Hill. The upper extremities of these two hills have a WHC of 5 on the south side of the hills and 6 on the north side. The lower fields on the very north of the property are sheltered by existing plantation shelterbelts so have a lower WHC of 2.

3.4 Topography

The property extends from the edge of Menstrie (50 metres OD) at the south, northwards to include the eastern half of the Menstrie Glen, climbing to the higher elevations of Colsnaur Hill and Myreton Hill which form the eastern boundary (600m). To the north, the topography grades to the rounded, open plateau and hill summits of the Ochils, which include Big Hunt and Little Hunt Hill, then falls away, northwards, towards the northern boundary of the Wharry Burn.

The tributaries of Menstrie Burn dissect the site leaving three distinct south facing landforms with deep gullies between. These landforms meet at the higher elevation, around 500m.

Thus, the site is generally south facing, dominated by the “bowl” shape of the watershed of the Menstrie Glen, and the steep, long slopes falling northwards to the Wharry Burn.

Three distinct topographical features of note are:

- the prominent escarpment face over-looking Menstrie – visible throughout the Central Belt.
- the Menstrie Burn cuts through a narrow gully immediately above Menstrie, which with the escarpment face, means that only a small proportion of the site is locally visible.
- the most prominent view of the site is from Dumyat Hill, which lies to the immediate west of Menstrie Glen.

3.5 Hydrology

Menstrie Burn defines the western boundary of the property and is classed as having good ecological status according to data held by SEPA. The priority for SEPA is to maintain good status by ensuring that management practices do not lead to a downgrading of water quality.

With past land use, the property has been subject to extensive hill grazing, mainly sheep but also cattle, and many of the flatter, wetter sections have been modified by drainage. This drainage pattern does not comply with current best practice with drains connecting directly to watercourses. The result is that this makes the site more prone to the risk of high levels of surface water run-off, particularly during periods of extreme rainfall and snowmelt. This is evidenced by two recent cases of flooding in Menstrie where the Menstrie Glen Burn burst its banks.

3.6 Vegetation

A full vegetation survey has been undertaken and forms part of a separate report (see Technical Annex D). The vegetation survey was undertaken in two phases. In 2011, a survey was commissioned to inform a proposed windfarm development to include the land north of Colsnaur Hill. In order to complete the vegetation survey for the whole farm unit, a second vegetation survey covered the land to the south of Colsnaur Hill and was completed in October 2012.

Table 3.2 below is a summary of the main vegetation types found on the site and the percentage area they cover:

Table 3.2: Main vegetation types on Jerah Farm

PHASE I CODE	NVC TYPE	PHASE I HABITAT	AREA (Ha)	AREA %
A1.1.1	W4b (W17 W11b)	WOODLAND BROADLEAVED SEMI-NATURAL	15.5	1.54
A1.2.2	-	WOODLAND CONIFEROUS PLANTATION	10.36	1.03
A2.1		SCRUB DENSE/CONTINUOUS	11.68	1.16
B1.1	U5a, U6b, U6d	ACID GRASSLAND UNIMPROVED	400.09	39.83
B1.2		ACID GRASSLAND SEMI-IMPROVED	99	9.86
B3.1		CALCAREOUS GRASSLAND UNIMPROVED	4.58	0.45

B 4	MG7, MG1	IMPROVED GRASSLAND	54.01	5.34
B 5	M6d, M25, (M23)	MARSHY GRASSLAND	127.6	12.70
C.1.1	U20	BRACKEN CONTINUOUS	36.33	3.62
D 2	M15, H12a, (H18a, H21a)	DWARF SHRUB HEATH	15.41	1.53
D 5		DRY HEATH/ACID GRASSLAND MOSAIC	6.42	0.64
D 6		WET HEATH/ACID GRASSLAND MOSAIC	83.53	8.32
E1.6.1	M17c	BLANKET BOG	38.81	3.86
E 1.8		DRY MODIFIED BOG	100.99	10.05
TOTAL			1004.31	100

Source: Jerah Vegetation Surveys, 2011/2012

Jerah Farm is composed of a range of upland vegetation types including extensive areas of unimproved acid grassland (400.09 hectares or 39.83 %), blanket bog (139.8 ha/13.9%), marshy grassland (127.6 ha/12.70%), semi-improved acid grassland (99 ha/9.86%) and wet heath/acid grassland mosaic (83.53 ha/8.32%).

Other incidental habitats include 15.5 hectares of semi-natural woodland, 15.41 hectares of dwarf-shrub heath and 11.68 hectares of gorse scrub. All of the habitats recorded at Jerah are common in an upland fringe setting and all have been heavily modified by long-term grazing impacts.

Overall, the majority of the site comprises unimproved but species-poor acid grassland dominated by mat grass (*Nardus stricta*) and heath-rush (*Juncus squarrosus*) derived from former blanket bog and wet heath. The site is considered to be "*heavily grazed*" (FDM Ecology, Fairbairn 2011).

Grassland

As noted in the FDM Ecology report (Fairbairn 2011), *"the majority of the open hill pasture is dominated by unimproved but species-poor acid grassland of the Nardus-Galium variety. This is co-dominated by mat grass (Nardus stricta) and heath-rush (Juncus squarrosus) often with wavy hair-grass (Deschampsia flexuosa), sweet vernal grass (Anthoxanthum odoratum), common bent grass (Agrostis capillaris), tormentil (Potentilla erecta) and heath bedstraw (Galium saxatile*)".

Where soils are damper & peatier, heath rush can become dominant creating tussocky swards of the *Juncus-Festuca* grassland. This has been derived from former blanket bog or wet heath vegetation through intensive drainage and persistent grazing.

Marshy grassland

A mix of purple moor-grass (*Molinia caerulea*), soft rush (*Juncus effusus*) and sharp-flowered rush (*Juncus acutiflorus*) marks out marshy areas particularly to the south and south-west. Much of this, especially where dominated by *Molinia*, is derived from wet heath vegetation which is converting to acid grassland through heavy grazing. Other species commonly occurring include tufted hair-grass (*Deschampsia cespitosa*), common sedge (*Carex nigra*) and occasional patches of bottle sedge (*Carex rostrata*).

Dwarf-shrub heath

FDM Ecology (Fairbairn 2011) noted that *"historically much of the more steeply sloping ground would have supported some form of dwarf-shrub heath. The majority of this has now been converted to acid grassland through heavy grazing. However, remnants patches of Trichophorum-Erica wet heath can be found e.g. Little Hunt Hill. Generally dominated by purple moor-grass and heath-rush, there can be a little deergrass (Trichophorum germanicum), cross-leaved heath (Erica tetralix) and Sphagnum capillifolium reflecting the habitat's heathy origins"*

Blanket bog

A mix of active and modified *Calluna-Eriophorum* blanket bog covers the summit plateaus to the east of the site. This supports hare's-tail cottongrass, heather (*Calluna vulgaris*), crowberry (*Empetrum nigrum*), blaeberry (*Vaccinium myrtillus*), deergrass, wavy hair-grass, the lichen *Cladonia portentosa* and *Sphagnum capillifolium*. Few peat building *Sphagna* were noted so it is unlikely peat formation is still active.

Acid neutral flush

Where there is some active water movement through the *Juncus* dominated habitats, acid flushes occur, typically along watercourses. They are dominated by soft rush with abundant *Polytrichum commune*, *Sphagnum fallax* and star sedge (*Carex echinata*), common sedge (*C. nigra*) and bottle sedge (*C. rostrata*).

Overall botanical interest

The vegetation surveys of 2011 and 2012 found no species of high botanical interest defined as being species that are rare or vulnerable or appearing on the Local Biodiversity Action Plans. Further, the habitats are common in an upland fringe setting. However, within this general pattern of vegetation at Jerah, there are some areas of higher botanical interest. These include grasslands along the Wharry Burn (Fairbairn 2011) which display a degree of base-enrichment with the appearance of quaking grass (*Briza media*), purging flax (*Linum catharticum*) and heath grass (*Danthonia decumbens*) in the sward. Blake (1976) records the presence of Dovedale moss (*Saxifraga hypnoides*) as being "locally abundant in the upper reaches of the Wharry Burn". Mitchell (1994) recorded a calcicolous flora on the old limestone workings along Glen Tye including hairy stonecrop (*Sedum villosum*), grass of Parnassus (*Parnassia palustris*), early marsh orchid (*Dactylorhiza incarnata*) and northern marsh orchid (*D. purpurella*).

The Inchna Burns also hold botanical interest in the form of semi-natural woodland with a mesotrophic ground flora. The woodland is akin to the NVC W23 *Ulex europaeus-Rubus fruticosus* scrub. The associated grassland is predominantly mesotrophic (NVC MG9 *Holcus lanatus-Deschampsia cespitosa* grassland) with extensive stands of bracken (NVC U20). Localised flushes provide areas of higher ecological interest and includes NVC M10 *Carex dioica-Pinguicula vulgaris* mire with *Briza media* and *Triglochin palustris.*

3.7 Fauna

3.7.1 Birds

As part of the EIA process, a breeding bird survey was undertaken in two phases. The first, commissioned as part of a proposed windfarm development and to the north of Colsnaur Hill, was carried out in 2011 (Moore 2011; Technical Annex F). Further survey was undertaken in 2012 for the area of the farm lying to the south of Colsnaur Hill (Owen 2012; Technical Annex F).

Breeding Birds

Brown and Shepherd (1993) survey methodology was used to target bird species requiring open ground during the 2011 and 2012 breeding bird surveys. A total of 50 species were recorded over the 13 site visits during the breeding season (Appendix 1, Technical Annex F; Moore 2011; Owen 2012). Of these, 19 species utilise open ground as part of their life cycle and may be affected by afforestation, 15 of which are species of conservation concern (Red or Amber listed, Eaton *et al*. 2009; Table 3.3).

Table 3.3: Target species (birds that utilize open ground) recorded during the 2011/12 breeding bird surveys.

Species	**Conservation status**
Lapwing *Vanellus vanellus*	Red
Curlew *Numenius arquata*	Amber
Black Grouse *Tetrao tetrix*	Red
Kestrel *Falco tinnunculus*	Amber
Red Kite *Milvus milvus*	Amber
Lesser Black-backed Gull *Larus fuscus*	Amber
Meadow Pipit *Anthus pratensis*	Amber
Skylark *Alauda arvensis*	Red
Linnet *Carduelis cannabina*	Red
Whinchat *Saxicola rubetra*	Amber
Wheatear *Oenanthe oenanthe*	Amber
Reed Bunting *Emberiza schoeniclus*	Amber
Grasshopper Warbler *Locustella naevia*	Red
Starling *Sturnus vulgaris*	Red
Swallow *Hirundo rustica*	Amber

Refer to Birds of Conservation Concern 3 (Eaton *et* al. 2009) for conservation status criteria.

Significant species

Using data from the 2011 and 2012 Breeding Bird Surveys, significant species are defined as *those of conservation concern most at risk from loss of open ground habitats*. In this regard, Lapwing, Curlew, Meadow Pipit, Skylark, Linnet, Whinchat, Wheatear, Reed Bunting and Grasshopper Warbler are considered to be the most vulnerable to loss and fragmentation of open ground habitats, being species that breed on site. The significance of these species in relation to their conservation status is summarised below:

Table 3.4: Bird species of conservation concern breeding at Jerah most at risk from loss of open ground habitats.

Species	**Annex 1[1]**	**Schedule 1[2]**	**UK BAP[3]**	**Scottish Biodiversity List[4]**	**LBAP[5]**	**BoCC[6]**
Lapwing *Vanellus vanellus*			•	•	•	Red
Curlew *Numenius arquata*			•	•	•	Amber
Meadow Pipit *Anthus pratensis*						Amber
Skylark *Alauda arvensis*			•	•	•	Red
Linnet *Carduelis cannabina*			•	•	•	Red
Whinchat *Saxicola rubetra*					•	Amber
Wheatear *Oenanthe oenanthe*					•	Amber
Reed Bunting *Emberiza schoeniclus*			•	•	•	Amber
Grasshopper Warbler *Locustella naevia*			•	•	•	Red

[1]Species included on Annex 1 of Directive 2009/147/EC on the conservation of wild birds (codified version) (the 'Birds Directive')
[2]Species protected by Schedule 1, Part 1 of the Wildlife & Countryside Act 1981 (as amended)
[3]Priority species in the UK Biodiversity Action Plan (JNCC 2007)
[4]Species listed in the Scottish Biodiversity List (SNH 2004)
[5]Priority species listed in Stirling or Clackmannanshire Local Biodiversity Action Plan (http://ukbars.defra.gov.uk/)
[6]Species conservation status listed as red or amber in Birds of Conservation Concern 3 (Eaton *et al.* 2009)

Species most at risk from loss of open ground habitats are fairly typical of a historically grazed open acid grassland/moorland mosaic.

3.7.2 Mammals

As part of the EIA process, protected species surveys were undertaken. The accompanying reports are included in Technical Annex H.

Otter

There is an historic record of otter on the Old Wharry Burn at Sheriffmuir to the west of the site boundary (JNCC Scottish Otter Survey Database 1991-1995 on NBN Gateway). FDM Ecology (2011) found no evidence of otter using the land to the north of Colsnaur Hill. However, it is highly likely that otters will be using this burn for foraging and/or commuting.

As part of the afforestation proposal, the site was subject to a focussed otter survey in May 2013 covering the proposed water crossing points and where proposed tracks came within 250 metres of a water course as described in Technical Annex H.

Otter evidence (temporary resting up sites and spraint) was recorded on the 2 main burns within the boundary of Jerah. Larger water courses are generally considered to provide more suitable riparian habitat for places of shelter and are highly likely to provide suitable prey species, especially salmonids which were observed at the time of survey. As no natal/juvenile sites were recorded and the 4 temporary resting up sites identified were more than 30 m from the existing or proposed tracks, no exclusion zones are required.

Water vole

The desk top survey did not reveal any historic records of water vole within Jerah Farm.

As part of the afforestation proposal, the site was subject to a focussed water vole survey covering the proposed water crossing points and where proposed tracks came within 250 metres of a watercourse as described in Technical Annex H. There is no evidence from the protected species survey of 2013 that water voles use the site.

Red squirrel

There are historic records of red squirrel from the north west of Jerah Farm around Sheriffmuir (SWT red squirrel database 1998-1999, 2007, on NBN Gateway). It is possible red squirrels may occasionally forage in the strips of conifer plantation within the farm unit but no feeding signs or dreys were noted.

Expansion of woodland cover, including mixed conifer and broadleaf, would benefit the longer-term prospects of this species.

Badger

The desktop survey did not reveal any records of badger within the site boundary or immediate vicinity. Discussions with the previous owner, and results from the protected species and other surveys, indicate that there is no evidence of badger setts on this site.

Deer

Roe deer are present within and around the proposed woodland development area but numbers are generally low. Red deer are present elsewhere in the Ochils, and would be potential transient visitors during winter months.

3.8 History of Land Use and Archaeology

The project area was subject to an archaeological archive search and walk-over survey (2013) which forms a separate report (see Technical Annex A).

The proposed planting area includes 72 examples of archaeology, mostly concentrated on the west and south sides of the site. In 1997 a survey of this cultural heritage was undertaken by the Royal Commission on the Ancient and Historical Monuments of Scotland resulting in the publication of 'Well Sheltered and Watered'. This was paired with similar work in Glen Devon around the same period. The evidence included both documentary, dating from the 15th century onwards, and *in situ* archaeological evidence surviving in the glen which confirms a human presence in the Ochils since the

Mesolithic period.

There are many examples of upland marginal agricultural land that was in use in the 17th and 18th centuries in the Ochils and since abandoned, as confirmed by the survey of Glen Devon. What makes Menstrie Glen so uncommon amongst this number is the wealth of documentary evidence available, particularly on the west side of the glen for which the Wright of Loss papers provide an insight into the development of the west side of the glen. Under the ownership of James Wright from 1730 to 1769, all aspects of his land husbandry were documented. He created policies around Loss in the 1750's and 1760's, evidenced by the trees still standing today. This area lies adjacent to the proposed planting area.

The RCAHMS publication explains that the survey "changed its character, almost entirely due to the quality of the surviving manuscript sources relating to the glen". This is based on the strength of the quality and completeness of the Wright of Loss papers.

There are no Scheduled Monuments within the project area. The commissioned desk and walk-over surveys identified a number of archaeological features in several distinct areas of the proposed woodland development area. These features relate to early land use of the region and include cairns, rig and furrow, enclosures and sheilings.

Forests and Historic Environment (FC 2011) notes that *"it is important that all significant heritage features, and not just designated ones, are protected and that consideration is given to the preservation and enhancement of cultural and historic landscapes"*. All areas worthy of archaeological conservation, as agreed with the Local Authority Archaeologist, will be buffered and protected from disturbance by proposed forestry operations. Access and interpretation of cultural remains and their landscape setting has been fully considered in the commissioned archaeological report. This approach seeks to comply with the requirement of Forests and Historic Environment which states: *"steps should be taken to ensure that historic features, which may be adversely affected by forestry, are known and evaluated on an individual site basis, taking advice from the local historic environment services".*

3.9 Landscape

The Jerah Landscape and Visual Impact Assessment (Technical Annex B) provides a detailed appraisal of landscape character and the effect planting Jerah will have on this key receptor. It makes recommendations on the nature of planting which might be appropriate within specific landscape types.

Within the Central Region Landscape Character Assessment the proposed scheme forms part of the Ochil Hills landscape type. This landscape character type is typified by dramatic contrast between steep scarp slope and extreme flatness of adjoining carselands, the punctuation of escarpment line by north-south, steep sided glens, distinctive large scale topography of rounded upper slopes and hill summits within predominantly uninhabited landscape.

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The Landscape and Visual Impact Assessment has informed the design of the proposed woodland, particularly when seen from the agreed viewpoints, and is a key part of the iterative woodland design process.

The shape of external and internal boundaries have been altered during the design process to better reflect the broad topography of the area and respond to the agreed viewpoints. The design plan specifies areas of open space to further diversify the external woodland edge and respond to more small scale landform pattern. Areas of broadleaf stocking have also been incorporated to develop graded and varied upper margins and to reinforce existing areas of semi-natural woodland especially along the Inchna Burns.

The proposed establishment of an upper margin of low-density conifer will provide both landscape mitigation and nature conservation benefits. For the landscape, this zone is intended to soften visually intrusive edges evident in the concept design for Jerah. For nature conservation, this zone will create a graded edge and ensure the continuation of pre-thicket woodland through the full forest rotation.

Internally, areas of light stocking and open ground have been left relating to landform pattern and to archaeological, ecological and hydrological features as noted in the relevant Technical Annexes. These areas of open ground have been given natural shape and graded margins. They create spatial

variety within the woodland, benefiting visual diversity and habitat provision (by increasing internal woodland edge).

4. DESCRIPTION OF THE PROPOSAL

As intimated above, the development of the planting design is an iterative process. The design of the proposed afforestation scheme has undergone a number of iterations to reflect the results of the various surveys and consultations. The provisional planting design, as presented as part of this ES process, therefore differs from the original concept design (see Maps/Concept Map) which was produced to take into account the full range of site constraints known at that time and formed the basis of the consultation process including the Screening Meeting held at Dunblane on the 16th January 2013.

The original concept design was produced prior to site specific archaeological, landscape, ecological and other assessments. All site surveys have been used to inform the provisional planting design. The iterative process to derive this provisional design has been fully discussed with consultees during the course of project development.

The provisional planting design map is appended to this ES (see Maps/Provisional Planting Design). The objective is to establish productive woodland incorporating extensive areas of open space. The area statement is as follows:

Table 4.1: Area statement

TOTAL PROJECT AREA	1002.48	100%
EXISTING WOODS – SEMI-NATURAL	15.61	1.55
EXISTING WOODS – CONIFER	6.48	0.65
DOUGLAS FIR	36.95	3.69
MIXED BROADLEAVES	81.63	8.15
MIXED BROADLEAVES LOW DENSITY	48.56	4.85
MIXED CONIFERS/MIXED BROADLEAVES	34.28	3.42
NORWAY SPRUCE	13.26	1.32
SCOTS PINE	3.51	0.35
SITKA SPRUCE	403.27	40.24

LOW DENSITY SITKA SPRUCE (UPPER MARGINS)	19.07	1.90
OPEN GROUND – UNPLANTED (PLUS ROADS)	339.46	33.88

The provisional planting design is planned to reflect best practice in woodland establishment as enshrined in the UK Forestry Standard and to ensure a sympathetic response to archaeology, landform, hydrology and nature conservation values as identified in the relevant Technical Annexes.

4.1 Purpose of Development

The new owner of Jerah Farm wishes to establish circa 640 hectares of mixed woodland over a gross area of 1002 hectares of former agricultural grazings. This represents some 64% of the whole estate. The aims of the project are summarised below:

- Establish multi-purpose mixed woodland on previously grazed hill land for wood and fuel production and to help underpin a sustainable forest products industry.

- Enhance the landscape and maintain and extend the existing areas of semi-natural woodland.

- Provide community benefits through new opportunities for responsible public access, recreation and interpretation of the archaeological remains.

- Create a carbon sink and improve Scotland's greenhouse gas balance.

4.2 Land Use

The main historic land use has been the grazing of domestic stock. Agricultural improvement, to increase the carrying capacity of the land, has included hill drainage and pasture improvement to create areas of improved pasture around Jerah and to the north of the holding.

4.3 Alternatives to the current proposal

The new owner recognises the inherent limitations of the natural resources of this site. He considers that the only alternative to the present proposal is to keep the land under open grazings in a very uncertain and difficult economic climate for upland sheep farming and within an area classified as agriculturally suited to rough grazings. The availability of inbye (easily accessed lower ground of good fertility) on Jerah Farm is severely limited with only 54 hectares of improved inbye and 99 hectares of semi-improved inbye included within the ownership. While this might be extended, by purchasing additional land, separate to Jerah, it would require resources which he considers not to be justified in terms of current and likely future agricultural circumstances.

An alternative explored by the farmer was the potential for windfarm development.

4.4 Establishment Techniques

4.4.1 Drainage and ground preparation

Drainage

The historic drainage pattern at Jerah was imposed in an attempt to improve the agricultural productivity of the farm. This drainage pattern, which has been mapped, does not comply with current best practice with drains being unbuffered and discharging directly into watercourses.

A new drainage pattern will be imposed which will meet current legal and best practice requirements and is planned to ensure that all drains are buffered thus minimising the potential for diffuse pollution. Historic drains will also be buffered by blanking them off so that they no longer connect directly with watercourses.

Ground preparation

Establishment will be assisted by a combination of shallow ploughing and

mechanical mounding. Where this is not possible, for technical reasons, hand screefing or hand-turfing will be employed. These works provide suitable planting positions and ensure good early establishment and growth. Ploughing will be in short runs and will ensure that all watercourses are buffered to minimise the risk of diffuse pollution.

Drainage and ground preparation Method Statement

All proposed drainage and ground preparation works will only be undertaken after a site specific Method Statement is agreed with FCS and SEPA to ensure that the risk to surface waters from diffuse pollution and flooding is minimised by the application of the General Binding Rules and Forests and Water (5th Edition).

The approach to the final ground preparation methods to be employed will be informed by analysis of the current drainage pattern, slope analysis (see Technical Annex G) and the need to control the potential for diffuse pollution. A method statement for ground preparation will be agreed with FCS and SEPA prior to implementation.

Water crossings

All proposed water crossings will comply with the Water Framework Directive, General Binding Rules and the need for SEPA consultation, registration and licenses as appropriate.

Riparian zone management

All riparian zones will be managed as a mixture of open ground and/or semi-natural broadleaves according to site type. No drainage or ground preparation will take place within 20 metres of the main water courses and for smaller watercourses buffer zones will be maintained in accordance with Forests and Water.

4.4.2 Fencing

There are a number of options to control the adverse impact of deer on

woodland establishment from a mix of deer exclosures on vulnerable broadleaves and conifers combined with tree guards; full perimeter deer fencing and/or crop protection through deer culling. In reality, the final option may be a mix of protection measures. The current thinking is that Jerah will be perimeter deer fenced in order to effect successful tree establisment and reduce the potential for adverse visual impacts resulting from the use of many thousands of tree guards.

The final line of the proposed deer fencing will be discussed and agreed with the Local Authority Access Officer to ensure potentially adverse impacts on public access are minimised through careful siting. Bird strike will also have to be addressed as will the need for any compensatory deer cull to minimise impacts outwith Jerah.

4.4.3 Fertilisers and pesticides

Ground rock phosphate will be applied as a directed application by hand , if necessary, at 150 grams per tree to aid conifer establishment but this will be outwith the buffer zones defined to protect surface waters. This will only be undertaken after full consultation with SEPA and will be informed by the soil analysis data, the impact of cultivation in alleviating soil constraints and the condition of the developing trees.

Chemical weeding will be carried out if considered necessary to achieve satisfactory establishment. Again this will be done outwith the defined buffer zones.

4.4.4 Deer management

A Deer Management Plan, based on the SRDP template, is currently not considered necessary or beneficial in order to achieve the objectives of woodland establishment. This is based on the fact that deer numbers in the area are generally low, although they are anticipated to respond to both sheep removal and woodland creation. The impact of deer browsing will be monitored and a crop protection policy implemented if required.

Sitka spruce, the most prevalent species, is less prone to deer browsing as it

establishes quickly, is less palatable and the tree leader is generally above Roe deer browse height within three seasons. Other conifer species are more vulnerable, as they tend to be more palatable, slower establishing and therefore at greater risk of browsing and fraying damage.

Broadleaves are the most vulnerable species and will therefore be protected by fencing rather than individual tree guards which would have had considerable visual impact. The southern section of the site, with more sheltered rocky knolls and scrub, is designed as a mixed amenity woodland, and is therefore highly vulnerable to deer browsing (and also rabbit browsing). Thus, this area is intended to be protected by several deer exclosures which will include rabbit fencing.

The site will be patrolled on a regular basis for the first 5 years of establishment by a dedicated professional deer stalker, with cull returns submitted annually. Deer sightings, movements and browsing/fraying levels will be constantly assessed and cull levels established and maintained to reduce damage to acceptable levels.

Deer movements are very much dependant on season, prevailing weather, control efforts on adjoining land, available cover and population dynamics. Thus, it is anticipated that a deer management plan would only be merited once the population dynamics and damage patterns are established.

4.4.5 Coniferous woodland

The site has been assessed using the Ecological Site Classification system to prescribe the main commercial species of which Sitka spruce will form 65% of the proposed planted area. This will comprise two thirds seed-orchard material and one-third full sibling MOO material. The planting will also include Norway spruce and Douglas fir and Scots Pine together accounting for 8.4%. Some 3.42% is classed as mixed conifers and broadleaves.

The area will be managed through the establishment period to achieve a minimum average stocking density within the productive conifers areas of 2,500 trees per hectare at year five and maintained at this level until the end of the contract period.

4.4.6 Semi-natural woodland

Semi-natural broadleaves will account for 20% of the planted area. The minimum requirement of the UK Forestry Standard and UK Woodland Assurance Standard being 5%. This will include 48 hectares of low density planting in order to create graded woodland edge habitat.

Choice of semi-natural woodland types is dependent on the pre-existing open ground NVC types as per guidance given in Forestry Commission Bulletin 112 Creating New Native Woodlands (Rodwell et al 1994). The native woodland elements of this proposal are intended to establish a number of native woodland types using NVC design principles by employing the Ecological Site Classification Decision Support System (Technical Annex E). This will ensure species choice reflects site type.

The principal woodland National Vegetation Classification (NVC) types that would be silviculturally possible at Jerah, as predicted by ESC, are:

Table 4.2: Main NVC woodland types proposed for Jerah

NVC TYPE	LOCATION
NVC W4 Downy birch with purple moor-grass	Wetland/marshy grasslands and treeline areas. The latter to include birch, rowan, juniper, eared willow.
NVC W7 Alder-ash woodland	Riparian woodlands e.g. Inchna Burns.
W17 Birch with oak and rowan	To include high proportion (>60%) of birch (*Betula pubescens*).The scope for oak may be limited to bracken areas where the soils are likely to be more suitable.

Source: Technical Annex E

All trees for the semi-natural woodland areas will be sourced from seed of local upland provenance. Plants grown from seeds collected from Native Seed Zone 203 will be utilised as far as possible with plants from zone 202 being used in the absence of zone 203 stock. However, given the altitude and climate of this site, other adjacent provenances from further west (wetter climate) and north (more exposed and shorter growing season) would be considered appropriate, particularly for the upper reaches of the site.

4.5 Associated Works

4.5.1 Forest roads

The proposed forest roads at Jerah will be developed in two phases covering forest roads (establishment) and forest roads (harvesting). The proposed route of the forest road system is shown on the planting plan map (see Maps/Proposed Tracks).

Forest roads (establishment)

Initially, proposed tracks (see Maps/Proposed tracks) will be used to mark out the site and to safely service ground preparation, planting, maintenance and wildlife management objectives. These will be for light vehicles and quad bikes and have a total proposed length of 7,690 metres and an average width of 4 metres. These would comprise an as-dug sub-base for ATV access, subsequently surfaced with crushed rock quarried on site to form surfaced roads. The primary road will run from the new bridge over the Wharry Burn, up over the hill to connect with the existing farm track at Jerah to establish the principle access route. Note that existing firm, dry sections may need no initial formation or surfacing. A full specification for tracks is provided at Other Annexes/Track Specification.

Roadside ditches would drain through the formation, using silt traps and culvert pipes to control the risks associated with diffuse pollution. As with all ditches or drains, these will not connect with watercourses but will be buffered to allow water to filter through the vegetation. The gradient of the roadline has been surveyed and allowed for in the forest design, with an optimum gradient of 10 % and a maximum gradient of 20%.

As part of the required access works (establishment), a new bridge will be required on the Glen Tye Burn, upstream of the existing weak bridge. This would require separate planning permission. Initial discussions have already taken place with the Local Authority Roads Department who did not raise any concerns at this stage. From this 840 metres of forest road (harvesting) and a turning circle will be constructed to allow machinery access onto site.

Forest roads (harvesting)

The forest roads (harvesting) line is intended to follow the forest road (establishment) line. However, at this stage it is indicative only and has been designed around current harvesting practices. Upgrading the forest road (establishment) route to a standard capable of carrying timber traffic being

gradually undertaken as the forest approaches production circa 2048. The roading proposals may therefore be modified in line with prevailing practice and will go through whatever regulatory process is current at that time.

The existing access from Menstrie will not be used for the transportation of timber but will continue to be used for management access.

All water crossings will be discussed with SEPA including the need for registration or licensing. Water crossings pose a risk to otters and therefore all crossing points have been the subject of an otter survey (see Technical Annex H).

Construction of roads will utilise stone excavated from borrow pits as close to the roadline as possible. All work will be carried out in accordance with current guidelines following consultation with the relevant agencies.

Responsible public access will be facilitated by the new forest road system. While there are no proposed Core Paths within Jerah, discussions have taken place with the Local Authority Access Officer to ensure that existing routes are integrated into the planting design. This is fully discussed under Section 5.9.

5. ASSESSMENT, IMPACT PREDICTION AND MITIGATION

As mentioned in Section 1, there are seven sensitivities which were identified at the Screening Meeting, in FC's EIA determination letter dated 30/11/2012 and in subsequent correspondence, which could detrimentally be affected by the proposal to afforest part of Jerah Farm.

On the basis of the FC EIA determination letter, three are considered to be of high importance: archaeology, landscape and ecology; three of medium importance: hydrology, socio-economic and timber transport and one of low importance: public access. These are summarised in Table 1.2.

This section addresses the potential impacts of the proposed afforestation scheme on these identified sensitivities, assesses the degree of significance and any mitigation measures required.

5.1 Key Issue 1: Cultural heritage

This section should be read in conjunction with Technical Annex A.

The specific objectives of the cultural heritage study were to:

- identify the cultural heritage baseline within the proposed development area;
- assess the importance of the landscape setting of the cultural heritage resource;
- assess the proposed development site in terms of its archaeological and historic environment potential, within the context of relevant legislation and planning policy guidelines;
- consider the potential and predicted effects of the proposed development on archaeological sites within 2km of the proposed development boundary; and propose measures, where appropriate, to mitigate any predicted significant adverse effects.

5.1.1 Potential impacts

- Loss or damage of archaeological remains by ground preparation, planting, quarrying and forest road construction.

- Loss, damage or obscuring of archaeological remains by tree growth including the landscape setting of the cultural heritage resource.

5.1.2 Baseline information and field survey

Baseline

Desk-based assessment and walk-over survey of the project area by CFA Archaeology (UK) Ltd.

Sources for desk-based assessment included:

- Historic Scotland Data Warehouse (Historic Scotland 2013).

- Stirling Council Sites and Monuments Record (SMR).

- Royal Commission on the Ancient and Historic Monument of Scotland database (RCAHMS 2013).

- Historic maps held by the Map Library of Scotland including First and Second Edition Ordnance Survey Maps.

- Aerial photos held by RCAHMS including 1946 sorties between 1946 plus modern aerial photography.

- Historic Land-Use Assessment Data for Scotland (HLAMap) (RCAHMS) was consulted for information on the historic land use character of the site.

- The Scottish Palaeoecological Database (SPAD).

- Bibliographic sources, including the published results of a detailed field survey and documentary research project conducted by RCAHMS at Menstrie Glen in 1997.

Field surveys

A metal detecting survey was undertaken on the 8th May 2013 near the Wharry Burn and within the designated Sheriffmuir Historic Battlefield site where there is a proposed water crossing point.

A systematic reconnaissance walk-over field survey of the proposed development area took place on the 9th, 10th and 14th May 2013. This targeted those sites identified by the desk-study including those identified in the 1997 RCAHMS study. It provided an assessment of their current base-line conditions and assessed the importance of their landscape setting.

5.1.3 Description and assessment of the cultural heritage resource.

A detailed gazetteer of the cultural heritage resource within the project area and within a 2 km buffer zone is included in Technical Annex A.

There are no Scheduled Monuments within the proposed afforestation scheme. The northernmost part of the site does however fall within the nationally important Sheriffmuir Historic Battlefield Site setting.

Fifty-four historic environment assets were identified within the proposed development area. These comprise principally of 17th-18th century farmstead remains with associated field systems and other agrarian features. Forty-seven of these assets, including former farmstead remains, shieling huts, field systems, a dun and former mining remains, are considered to be individually of local importance as they are historical features that contribute to the present character of the landscape; while seven further assets, including a bridge, two clearance cairns, a quarry scoop, several fragmentary trackways (or holloways) and a mineral exploration trench are all considered to be of lesser heritage importance. Whilst individually the separate sites and features are not unusual for the periods that they represent, collectively they constitute part of a more extensive relict post-medieval farming landscape

which survives within Menstrie Glen. Taking into consideration the extent and overall good preservation of the relict farming remains, coupled with the surviving post-medieval (principally 17th-18th century) historic documentation that can be directly linked to the settlement in the glen, it is considered that collectively the sites and features are of regional importance.

5.1.4 Assessment of predicted impacts on the cultural heritage reasource.

This section addresses the potential direct and indirect impacts of the project on the cultural heritage of the site both in terms of site preparation works and subsequent woodland development. It also includes an assessment of potential impacts on the landscape setting of the cultural heritage resource.

Direct impacts

Ground preparation, forest road construction and machine tracking can damage or destroy archaeological remains as can the development of tree cover which can obscure and/or prevent access to cultural heritage sites.

The impact assessment methodology is fully described in Technical Annex A. It defines the significance of the cultural heritage resource (national, regional, local, lesser) and also defines the predicted magnitude of impacts (high, medium, low, imperceptible, none). These two criteria are combined to provide an overall assessment of whether an impact is considered to be significant or not. High and medium impacts are considered to be significant in EIA terms.

The nature of the proposed forestry works, as described in Section 4.4, means that there would be a direct impact on areas of former agricultural cultivation, including areas of former rig and furrow cultivation, cultivation terraces and poorly-preserved fragments of field banks which would be lost through pre-forestry ground preparation and planting activity. The former cultivation remains form part of a well-preserved 17-18th century agrarian landscape that survives along Menstrie Glen (Technical Annex A, Figure 2). Much of the rig and furrow on the east side of the Menstrie Burn, within the proposed development site, is no longer prominently visible as upstanding remains and much of the former cultivation pattern is best appreciated

through examination of post-war vertical aerial photographs; although, some small sections of rig are visible on the ground, these principally being along steep slopes around the Inchna Burns. It is also recognised that there is some potential that buried remains of rigs and furrows still survive in areas of former cultivation. These cultivation remains are not however unique in the Scottish landscape and are considered to be of local heritage importance.

Cultivation remains still occur elsewhere in the vicinity, outwith the property boundary, including those on the western side of Menstrie Burn, around Lossburn Reservoir and on Loss Hill. There would however be an effect on the integrity of the surviving historical farming landscape pattern as a whole from the proposed afforestation scheme. This has been assessed as a high magnitude impact of moderate significance.

No potential impacts are predicted for the Sheriffmuir Battlefield Site as it lies outwith the proposed development footprint.

Indirect impacts

No significant impacts on the settings of cultural heritage assets within the wider landscape are predicted as a consequence of the proposed afforestation proposal.

5.1.5 Mitigation

To mitigate any potential for damage during site preparation or loss of interest through tree establishment, all significant upstanding archaeological remains have been identified and mapped.

All mitigation works would take place prior to operational works and following discussion with, and approval by, the Local Authority Archaeologist.

The specific mitigation measures listed below have been incorporated into the Provisional Planting Design.

Upstanding remains

Key upstanding elements of former farmsteads and other settlement remains, along with the majority of upstanding remains of associated relict field systems would be preserved *in-situ* (Technical Annex A, Figure 1):

- The remains of a possible prehistoric or early medieval Dun (1111) would be retained, along with the remains of a 19th century Calcite Mine (2077) that survive immediately south-east of the Dun at Myreton Hill. These features would be preserved *in situ* in open areas in the woodland.
- The former farmstead ruins and earthworks at 'Jerah' (1468), 'Red Brae' (4848), 'Little Jerah' (3031), 'Inchney' (NS89NE56.01) and two unnamed farmsteads at Myreton Hill (3048/3091, and 4690) would be retained in open woodland areas, along with all surviving shieling groups (3023, 3467, 4603, 4597 and 5200), and other earthwork structures including huts (1109, 1111.02, 3033, 3034.01, 3051, 3090, 3469.01, 4596, 4598.02, 4667.01 and 4668) and examples of sheepfolds (buchts) (3034.02, 3036.01, 3036.04, 4595 and 4598.01), other animal pens (111.03 and 4602) and enclosures (CFA 008, 2853, 3036.02, 3468, 3469.02 and 4667.02).
- Discrete and well-preserved examples of farmland remains, including earthwork remains of field banks and enclosures surrounding farmstead remains, would be retained in open spaces: at 'Jerah' (1468), at Myreton Hill (3948/3091), and around a shieling group (4597) at the Third Inchna Burn.
- The well-preserved remains of the former head-dyke(s) and other field system remains, including field banks, small turf enclosures would be avoided during ground preparation works and preserved *in situ* within woodland rides.
- Proposed new access tracks and pathways will be routed so as to avoid the upstanding remains, including the large penannular enclosure (CFA008) at Big Hunt Hill.
- Peat deposits over 0.5m deep would be excluded from the woodland planting scheme and will be preserved *in situ.*

Where appropriate, sites would be fenced-off or otherwise demarcated to prevent avoidable, accidental damage occurring to the remains during forestry activities in their vicinity. Fencing would be hi-visibility temporary

fencing and a buffer of 20m devoid of planted trees around areas/features to be retained in open areas would be maintained beyond the outmost recognised feature of each site to avoid damage from tree throw and root networks. A 2m - 3m stand-off buffer will be preserved around other field system remains (field banks, small enclosures, etc) which would be preserved *in situ* within the woodland.

Any drains required will be at least 30m from the perimeter of defined significant archaeological sites to avoid inadvertently drying out sites that may contain waterlogged deposits.

The ground preparation operators will be closely supervised by the site manager and both will hold a copy of the archaeological sensitivities map and UPM Tilhill's Toolbox Talk on protecting archaeological remains (see Other Annexes/Toolbox Talks and Other Guidance).

Any additional potential archaeological remains identified by the site manager during the course of marking out or by the machine operator during the course of site preparation operations, will be identified on the ground and the Local Authority Archaeologist consulted with a view to assessing the significance of such sites.

Archaeological trail and interpretation

Those elements of the surviving historic landscape that would be preserved *in situ* within the proposed woodland, including the dun (1111), the former farmsteads (1468, 4848, 3031, NS89NE 56.01, 3091/3048 and 4690), the shieling huts (3023, 3467, 4603, 4597 and 5200) and the calcite mine (2077), would be linked by a network of footpaths and access tracks (Technical Annex A, Figure 1). The trail will be designed to promote awareness of the former farming landscape along the Menstrie Burn and to provide information on the preserved archaeological remains.

Interpretation media, such as interpretation panels at key locations, downloadable apps for smart phones and publicly available leaflets/booklets, would be designed for and integrated with the trail, providing information on the remains to be found preserved within the woodland and linking these remains with the results of the detailed historical and survey research that

has been carried out for the Menstrie Glen and local area.

The aim of the 'archaeological trail' is to facilitate public access to and increase public awareness and knowledge of the Menstrie Glen landscape, linking the past land-use of the glen with the present development, disseminating the detailed historical research to a wider public audience and to enhance the public experience. The 'archaeological trail' would be linked with other public footpaths running from Lossburn Reservoir, to the east of the development site, and the Sheriffmuir Battlefield Site, to the north, allowing greater access to and from the local area.

Visual links

Maintaining visual links between the cultural heritage resource is also a key part of the mitigation strategy. Viewpoints at strategic locations within the proposed woodland, for example at 'Jerah' (1468) and 'Little Jerah' (3031) and 'Inchney' (NS89NE 56.01), would be created to provide open views out to the well-preserved farming remains visible on the western side of the Menstrie Burn and to the wider landscape.

5.1.6 Statement of significance

Standing remains:

The majority of the historic environment assets surviving within the proposed development site would be preserved either within open areas or as upstanding remains within the woodland and there would be no direct impact predicted on these sites.

Historic farming landscape

The nature of the proposed forestry works means that there would be a direct impact on areas of former cultivation, including areas of former rig and furrow cultivation, cultivation terraces and poorly-preserved fragments of field banks which would be lost through ground preparation and planting activity. Only a small proportion of the overall pattern of former cultivation remains would be directly affected, with those cultivation remains (and field systems)

which survive on the western side of the Menstrie Burn and around Lossburn Reservoir and Loss Hill being un-affected by the proposed development. There would nevertheless be an effect on the integrity of the surviving historical farming landscape pattern as a whole.

5.2 Key Issue 2: Landscape and visual impact assessment

This section should be read in conjunction with Technical Annex B: Landscape and Visual Impact Assessment (LVIA), which contains maps and illustrations explaining the design process and the iterative development of the provisional planting design.

5.2.1 Potential impacts

- Change to landscape and visual character through conversion of open ground to woodland and scrub.

- Landscape/visual impacts due to construction of forest roads.

5.2.2 Baseline information and survey.

Central Region Landscape Character Assessment.

Clackmannanshire Landscape Character Assessment.

Stirling and Clackmannanshire Forestry and Woodland Strategy.

Landscape and Visual Impact Assessment (see Technical Annex B)

Jerah is considered to lie in a relatively sensitive location and incorporates a small part of the Ochils AGLV. In view of this, a full landscape and visual impact assessment was commissioned to inform the iterative woodland design process and to meet with the request by Forestry Commission Scotland in their letter of 30 November 2012 to conduct a full landscape assessment in line with their Forests and Landscape Guidelines.

5.2.3 Landscape character and context

The Ochils form an abrupt boundary to the Forth Valley and beyond the scarp form a distinctive rolling character, with smooth rounded tops divided by regular deep gullies created by the cutting back of watercourses. They are predominantly open in character this being maintained by stock grazing. The

semi-natural vegetation cover on the Ochils contrasts sharply with the highly productive Forth Valley plain.

To the north of the site, the landscape becomes more wooded, with the addition of coniferous shelter belts and plantations, among the gentler topography of Sheriffmuir. It is within this area that the Stirling and Clackmannanshire Forestry and Woodland Strategy identifies the potential for forestry. The southern part of the site is identified as sensitive within this document, as reflected by the AGLV designation.

The site falls into two Landscape Character Assessments: Central Region Landscape Character Assessment (SNH, 1999) and the Clackmannanshire Landscape Character Assessment (SNH, 1998), with both assessments defining the Jerah Farm site as within the landscape character type 'Hills, Ochil Hills'.

Key characteristics of this landscape character type include:

- Dramatic contrast between steep scarp slope and extreme flatness of adjoining carselands.
- Punctuation of escarpment line by north-south, steep sided glens.
- Distinctive large scale topography of rounded upper slopes and hill summits.
- Ease of recreational use due to proximity of western end of range to dense population concentration.
- Predominantly uninhabited landscape.
- Incongruity of existing coniferous woodland, due to geometric forms and low species diversity within open landscape.

A significant feature of the landscape is due to the farming practices of the 17th and 18th Century, to create a post mediaeval farming landscape, which, although subtle in its impact on the landscape as a whole, is well documented and forms a clear picture of agrarian workings throughout this area during that time period. Features visible include field systems, rig and furrow, field banks and enclosures, small turf buildings, sheilings and shepherd's huts. These have been fully documented in Technical Annex A.

5.2.4 Landscape baseline

The commissioned Landscape and Visual Assessment (LVIA) divided Jerah into four main landscape character zones. These were used as a basis to

assess the afforestation proposals during the iterative design process.

These zones are:

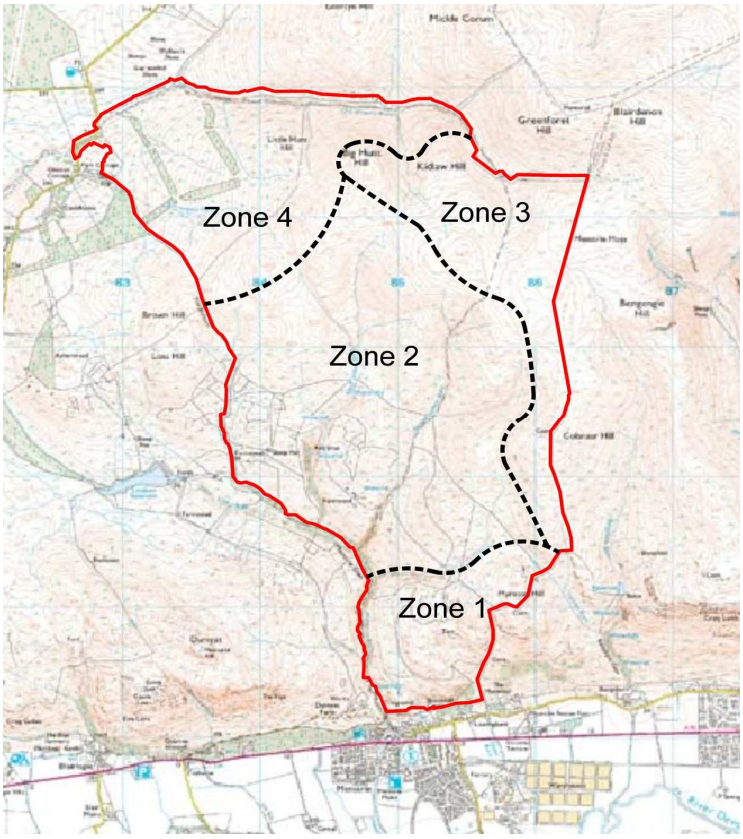
- Landscape Character Zone 1: Dramatic escarpment of the southern edge of Ochils. Rising above Menstrie and the Forth Valley, displaying craggy outcrops and scattered mixed woodland and scrub vegetation above scattered townships. A medium scale landscape, increasing in scale with elevation.

- Landscape Character Zone 2: Deeply gullied hillsides beneath rolling tops. Remnant ancient, semi-natural mixed woodland follows watercourses up hillsides, reinforcing the incised character of the landscape. Landcover is open and exposed, with occasional features of historic human settlement in evidence.

- Landscape Character Zone 3: Open moorland hill tops. Open plateau of Ochils with extensive views across Forth Valley and beyond. Landcover consists of peaty ground with grass and heather moorland, no afforestation or habitation. Landscape scale large and expansive.

- Landscape Character Zone 4: Transition to gentler topography of Sheriffmuir. Improved farmland with scattered plantation and shelterbelts in evidence as Ochils ridge slopes down to Sheriffmuir, with boldly geometric forms. A mix of modern traditional farm cottages are situated along this western edge.

Jerah Landscape Character Zones



Source: Jerah LVIA Jerah Farm (Platt 2013)

5.2.5 Visual baseline

The visibility of the afforestation proposal is a key section of the LVIA. This covers visibility of proposals in relation to the wider context of landscape, the number of people likely to be affected from viewpoints and the prominence of views in terms of the experience of the viewer.

The visibility of proposals in relation to the wider context of landscape varies across the site and is closely related to the defined Landscape Character Zones. So for example, the southern escarpment has a high prominence within the landscape and can be seen from several heavily visited attractions including Stirling Castle and the Wallace Monument.

Within Landscape Character Zones 3 and 4 the proposal will be highly visible as a contrast to the rolling character of the landscape. In Landscape Character Zone 4, the contrast will be less marked as there is existing forestry and shelterbelts.

5.2.6 Viewpoints

During the scoping and public consultation phases of project development several viewpoints were identified as significant. These would require assessment as part of the LVIA process. These viewpoints take into account the panoramic views of the scarp edge of the Ochils, the significant tourist hot spots which offer a vantage point across this escarpment and the views within the Ochils themselves, which allow the viewer the chance to experience the open expanses of the rolling hillsides.

5.2.7 Iterative woodland design process

Design of the afforestation proposals have been assessed following the UK Forestry Standard Guidelines – Forests and Landscape (Forestry Commission 2011), which details approaches to ensure sensitive and appropriate design for proposed afforestation projects.

The LVIA considered three options: a “do nothing” option and two proposed planting designs (see Maps/Provisional Planting Design). The proposed design while meeting current best practice (Version 8 of the iterative design process) was further revised to respond to comments and input from the consultation process and in particular the Forestry Commission Landscape Architect. Following the on-going project development process, a Version 16 has been derived that incorporates all the issues raised in the relevant Technical Annexes and in particular the archaeological and visual assessments. This is the full mitigation planting design.

For each option, designs were assessed to determine the appropriateness for the visual impact on the viewpoints identified, assisted by computer generated images and photo-montages of the proposals. Assessment also took into account other sensitive receptors within the internal landscape of the site. It was determined that the most sensitive view of the site was from the summit of Dumyat, and this was used primarily to closely revise the design for greater sensitivity.

Assessment of the Version 8 proposed planting design from Dumyat included shape, landform, scale, diversity, unity and Genius Loci. From this assessment the LVIA concluded that Version 8 did not fully meet the Forests and Landscape Guidelines.

Version 16 reflects the feedback given from the Archaeologist and Landscape Architect with regard to amendments required to respond more sensitively to the historical remains found on site and to fully meet the Forests and Landscape Guidelines in terms of forest design. In particular, a more naturalistic upper margin has been developed to help grade the forest into the surrounding semi-natural vegetation and to provide further buffering of the archaeological remains. Species diversity has also been enhanced. Care has also been taken within amendments to the design to avoid perched blocks appearing within views of this southern edge and planting margins have been dropped below the skyline where appropriate.

The result is a scalloped top edge, which moves away from the contour line. This edge is also buffered by low density conifer planting, which creates both a softer interface with the wider moorland and habitat in an area with little existing cover. Mixed broadleaf planting has been increased to lower areas and around archaeological remains to break up the conifer planting further and maintain a buffered area around sensitive cultural remains. These key remains will also be linked by an interpretive trail to ensure that the experience of exploring the history of this area is retained and enhanced where possible.

To the southern scarp edge of the site, the broken planting blocks are retained, with some softening of the Scots Pine planting. The overall result is to provide variety and diversity alike to the surrounding scarp face, to integrate the proposals well into the existing landscape. Rocky outcrops are retained as open to reinforce the character of the craggy escarpment and access will be provided for local users and visitors alike to access the hill above Menstrie and into the wider forest.

Version 16 has been fully assessed from the seven main viewpoints identified at Screening. From this process the LVIA concludes that the provisional planting design (Version 16, see Maps/Provisional Planting Design) sufficiently meets the Forests and Landscape Guidelines and responds sensitively to the site and its features.

5.2.8 Identification and evaluation of landscape effects

Afforestation of open hill land has the potential to have significant adverse effects upon the landscape character of the area. The contribution that the proposal may have to the landscape may still be judged to be positive, even if the proposals are in direct contrast to the existing landscape character, by virtue of good design. Although existing plantation woodland in this area of the Ochil Hills is deemed to have negative effects on the landscape, there is potential for well-designed forestry schemes to enhance and contribute to the wider landscape and become an integral part of the landscape character of the area.

Within the LVIA, three of the viewpoints identified (Dumyat, Tullibody and Sheriffmuir) within the Visual Baseline were used to represent the Landscape Character Zones found within the site. These viewpoints were used to determine the effects of the proposals on the landscape character including the nature and significance of these effects.

The LVIA concludes that the proposals will have both positive and negative effects upon the landscape character and will be permanent and of major and moderate significance. The introduction of afforestation into an open landscape is a major and permanent change, both positive and negative, but to counter this is the addition of diversity in terms of habitat, which will also bring major and permanent positive change. The addition of broadleaves in particular, strengthens existing sparse woodland corridors and have been located to assist visual integration of the proposed design.

Infrastructure within the forest is deemed to have permanent and both positive and negative effects, with the potential for good management to allow beneficial use for public recreation, alongside the positive effects attained by sensitive treatment and additional interpretation facilities related to historical features (see Maps/Archaeology Trail).

5.2.9 Identification and evaluation of visual effects

The effects on views and visual amenity have been assessed within the LVIA against the outcomes of the Visual Baseline. The effects on three viewpoints (Dumyat, Tullibody and Stirling Castle) representing key tourist destinations,

busy transport routes and key recreational viewpoints have been assessed. These viewpoints also give a representative view of the different aspects of the site visible at varying degrees of proximity.

The LVIA concludes that the proposals will have both positive and negative effects upon views and visual amenity and will be permanent and of major and moderate significance. Increase in diversity in the landscape, with the introduction of woodland planting will be permanent and of major and moderate significance and will counter the loss of open character, which will be negative, permanent and of major significance. The potential to integrate existing unnatural forms into the landscape is positive, permanent and of moderate significance.

5.2.10 Mitigation

The design of the afforestation proposals for Jerah Farm have evolved within the context of the overall EIA process to encompass mitigation measures to prevent and avoid detrimental effects upon the landscape and other key sensitivities. The final design proposals (Version 16) include the final outcomes of both public and consultee input into required and requested mitigation measures, and which address the design issues of earlier versions of the design proposals (e.g. Version 8).

In addition to mitigation measures developed as part of the design process, further on-going and implementational mitigation measures are recommended and are fully detailed in Technical Annex B.

5.2.11 Summary and conclusions

The landscape character of Jerah Farm was examined using maps, aerial photographs, existing reports and site visits. The proposals to plant a large area of the site will affect a regionally important landscape, which, although undesignated as a whole, has a portion of ground within an AGLV, resulting in a landscape of varied sensitivity.

The landscape history of the site highlighted the importance of the scarp edge portion of the site, and the regional importance placed on the main hill areas,

where the recording of undesignated historical features, provides a landscape asset to be treated with sensitivity. The scarp edge feature forms a part of a key topographical element of the landscape for this area and has an intricate landscape, which has been little altered by human activity.

An assessment of the Landscape Baseline produced 4 main character zones within the site, which are also representative of the character of the landscape found in the areas surrounding the site.

An assessment of the Visual Baseline identified the site as being highly visible in some portions, notably the south scarp edge, and by high numbers of people. More restricted views were identified for the internal portions of the site, albeit, these views were still likely to be frequently seen and changes to the landscape experienced by significant numbers both by local residents and visitors to the area.

A design assessment was undertaken for 3 alternatives approaches to Jerah Farm, with reference to the UK Forestry Standard Guidelines, Forests and Landscape (Forestry Commission 2011). Design option 2 (Version 16) reflected changes made in order to fully meet forest design standards and other site sensitivities and constraints.

The landscape and visual effects of design option 2 were assessed and evaluated, with the assistance of computer generated and photo-montages of the proposals. The conclusions from this assessment were that loss of open hillside character could be deemed as negative change, both permanent and major, but that the appropriate design and implementation of woodland planting could bring a change both positive and negative and also permanent and major. The introduction of diversity of woodland and habitat within the landscape was determined to be a positive, permanent and major / moderate change, with further positive effects brought about by treatment of historical remains, integration of existing unnatural forms and enhancement of public access.

5.2.12 **Statement of significance**

The overall landscape impact of this project is judged to be long-term, both positive and negative, irreversible and significant.

5.3 Key Issue 3a: Ecology – Habitats

This section should be read in conjunction with Technical Annex C: Ecological Evaluation and Technical Annex D: Habitat Survey. Potential effects on birds are assessed separately under Key Issue 3b/Technical Annex F. Potential effects on protected species are assessed separately under Key Issue 3c/Technical Annex H.

5.3.1 Potential impacts

- Loss and fragmentation of open ground habitats.
- Reduction in extent of acid grassland, wet grassland and upland heath.

5.3.2 Baseline information and survey.

Phase I/NVC vegetation survey 2011 and 2012.

Species data, including legally protected, UK BAP, LBAP, Nationally rare/scarce and RDB species from National Biodiversity Network databases covering the project area.

Clackmannanshire Local Biodiversity Action Plan 2003-2008; 2012-2017.

Other sources of botanical information including back issues of the Forth Naturalist and Historian.

5.3.3 Assessment of impacts on acid grassland, wet grassland, upland heath and blanket bog

UK BAP context

Blanket bog, wet heath and marshy grassland are UK interest features listed on the UK Biodiversity Action Plan (BAP) and Annex 1 of the EC Habitats Directive. Local councils therefore have an obligation to protect significant areas of these habitats.

Wet grassland

Wet grassland, under the generic title of purple moor grass and rush pastures (*Molinia-Juncus*), is subject to a costed UK Habitat Action Plan. The UK Steering Group Report states that the total extent of the habitat in the UK is about 56,000 ha though this figure should perhaps be treated with caution given that survey work has not been extensive (or consistent) in some areas. Certain key communities of purple moor grass vegetation fall within Annex I of the Habitat and Species Directive (e.g. *Molinia* grasslands on calcareous soil). This refers to species-rich mixtures of purple moor-grass and sharp-flowered rush in fen meadow situations, so the areas of acid *Molinia* dominated habitat at Jerah is not included.

Upland wet heath

Upland heath is subject to a UK Habitat Statement. There is approximately 2,514,000 hectares of this habitat in Scotland, much of it forming intergrades with acid grassland as a result of long-term grazing impacts. The recommended conservation direction is to “maintain the extent, enhance the quality and restore upland dwarf-shrub heath as part of upland mosaics and transitions of semi-natural habitats……”.

Local Biodiversity Action Plan (LBAP) context

Jerah Farm is split between two LBAP areas: Stirlingshire and Clackmannanshire. For the purposes of this analysis, the Clackmannanshire LBAP will be used as Jerah Farm falls within the Ochils biogeographic unit and shares many of the ecological features of the wider Ochil Hills both in terms of vegetation types and long-term management impacts.

The Clackmannanshire LBAP recognises the importance of the upland area but also recognises that the Ochil Hills have “been overgrazed and much of the habitats degraded”. Within the upland zone the LBAP lists three broad habitat types: blanket bog, upland grassland and upland heathland. All three broad categories occur within Jerah Farm.

Blanket bog

Blanket bog within the Ochils is largely confined to two distinct areas: Alva Moss (circa 300 ha) and Menstrie Moss (circa 5 ha). Much of this resource has been severely modified by grazing, burning and drainage and within the LBAP is described as a habitat that is "comparatively rare in the Ochil Hills within Clackmannanshire".

Within Jerah there is some 140 hectares of blanket bog of which 39 hectares are considered to be active and 101 hectares to be dry modified bog.

Acid grassland

Within the context of the Ochil Hills, upland grassland typically refers to species-poor acid grassland dominated by fescue grasses (*Festuca rubra, F. ovina*), bent grasses (*Agrostis capillaris, A.canina, A.vinealis*) and mat grass (*Nardus stricta*). No figures are given for the area of acid grassland within the LBAP 2012-2017 however the LBAP 2003-2008 states that "within Clackmannanshire there is 2,881 hectares of acid grassland occupying 20.1% of the land area". Overall, it is described "as the largest habitat type in the Ochils" (Clacks LBAP 2012-2017). Within Jerah Farm there is some 400 hectares of unimproved acid grassland and 99 hectares of semi-improved acid grassland.

Base-rich grassland

There are limited areas of base-rich grassland along the Ochils escarpment and mostly within the boundary of the Craigleith and Myretoun SSSI (see Other Annexes for SSSI map and citation). Some 5 hectares of a 176.6 hectare SSSI falls within Jerah. The vegetation is described by Robertson et al (1991) as NVC CG10 *Festuca ovina- Agrostis capillaris-Thymus praecox* grassland and NVC M6 *Carex dioica-Pinguicula vulgaris* mire. Notable species include *Pimpinella saxifraga, Briza media, Parnassia palustris and Helianthemum nummularium.* The latter is the foodplant of the Northern Brown Argus though it is largely confined to Alva Glen (Gallacher 2007).

Mitchell (1994) also describes a base-rich grassland on the relict limestone quarries within Glen Tye.

Upland heath

Upland heath is described in the LBAP as being “relatively rare in the predominantly grassy Ochil Hills” and “much is fragmented and heavily grazed”. With Clackmannanshire there is thought to be some 272 hectares which is about 2% of the Scottish total. Within Jerah three broad Phase I categories were identified: dwarf shrub heath (15 ha), dry heath/acid grassland mosaic (6.42 ha) and wet heath/acid grassland mosaic (83 ha). The mosaics with acid grassland are likely to reflect the conversion of heathland to acid grassland as a result of long-term grazing impacts.

Within the combined areas of Clackmannanshire and Falkirk there has been an estimated 57% loss of upland heathland (Mackey et al, 1998) mainly as a result of long-term grazing impacts (LBAP 2003-2008).

Upland fen, flush and swamp

Within the acid grassland and upland heath habitats described above, the LBAP also recognises upland fens, flushes and swamp. No figures are available for this habitat type within the LBAP area. “The extent of this habitat in Clackmannanshire is difficult to assess because the habitat has not been comprehensively surveyed in many areas and tends to occur in small, sometimes numerous stands” (Clacks LBAP).

Within the vegetation survey for Jerah, this habitat is captured under the marshy grassland category of which there is some 127 hectares.

Ochil Glens

Within the Clackmannanshire LBAP 2003-2008 there was a Glens Action Plan which identified the glen habitats along the southern escarpment of the hills as being of particular conservation value including Menstrie Glen and the associated Inchna Burns. They are essentially a habitat mosaic of semi-natural woodland, grassland, heathland and flush and “ecologically the glens link lowland carse with upland plateaux and provide an important habitat corridor” (LBAP 2003-2008).

The vegetation of Menstrie Glen, and its associated feeder burns, is described by Heritage Woodlands (1999) in a report to Friend of the Ochils. The woodland is akin to the NVC W23 *Ulex europaeus-Rubus fruticosus* scrub. The associated grassland is predominantly mesotrophic (NVC MG9 *Holcus lanatus-Deschampsia cespitosa* grassland) with extensive stands of bracken (NVC U20). Localised flushes provide areas of higher ecological interest and include NVC communities M10 with *Briza media* and *Triglochin palustris.*

Jerah context - vegetation communities and predicted impacts

According to the FDM Ecology report (Fairbairn 2011) "a long history of heavy grazing and drainage on site has degraded these habitats and it is unlikely any of the remaining blanket bog is active. Similarly, the wet heath is heavily degraded and converting to acid grassland". Of the 140 hectares of vegetation mapped as blanket mire only 38 hectares is considered to be active.

Table 5.1: UK BAP habitats occurring on site

Phase 1 Habitat	**UK BAP Habitat**	**EC Habitats Directive UK Interest Feature**	**Notes relevant to site**
B1.1 Acid grassland unimproved.	Acid grassland	N/A	400 ha of species-poor acid grassland; highly modified by long-term grazing impacts.
B.5 Marshy grassland.	Rush pasture	N/A	127 ha of species-poor *Juncus* dominated grassland.
E1.6.1 – Blanket Bog	Blanket bog	Blanket Bog (active only).	101 ha classed as dry modified bog; 39 ha classed as active. All areas of blanket bog, irrespective of their hydrological status, are excluded from the proposed afforestation proposals.
D2 – Wet Heath	Upland heath	Northern Atlantic wet heaths with *Erica tetralix*	The majority of the wet heath on site is modified and degraded through heavy grazing and unlikely to qualify in its current condition. It is converting to acid grassland as a result of grazing impacts.

The predominant open ground vegetation types subject to proposed

afforestation are acid grassland, wet/marshy grassland and upland heath. Areas of blanket bog are not included in the outline planting map nor are areas of species-rich calcicolous grassland (see Maps/Provisional Planting Design).

This section therefore addresses the potential impact of afforestation on acid grassland, wet/marshy grassland and upland heath, assesses the magnitude and degree of significance and any mitigation measures required using protocols developed by the Institute of Ecology and Environmental Management (IEEM) as described in Technical Annex C Ecological Evaluation.

Acid grassland

The dominant vegetation type, occupying some 40% of the area (400 ha) is species-poor acid grassland of two main NVC types: U5a *Nardus stricta-Galium saxatile* grassland and U6 *Juncus squarrosus-Festuca ovina* grassland in damper areas. It also includes 99 hectares of semi-improved acid grassland. Much of this community has been derived from wet heath as a result of long-term grazing impacts (Fairbairn 2011). These communities are "very often a secondary vegetation type, strongly encouraged by particular kinds of grazing and burning treatments" (Rodwell 1992).

Acid grassland has declined as a result of agricultural intensification and afforestation with a 21% loss recorded between 1940 and 1980 (National Countryside Monitoring Scheme). However, according to the Habitat Statement within Biodiversity: The UK Steering Group Report (Volume 2: Action Plans), it is “one of the most extensive semi-natural habitats in Britain……estimates suggest that there is in excess of 1,200,000 hectares of acid grassland in the uplands”. In the uplands “much acid grassland is often of low biological interest and is the product of poor management of other priority habitats, such as dwarf-shrub heath”. Indeed Averis et al (2004) note that NVC U5 and U6 are “regarded as a conservation problem rather than an asset”.

The Clackmannanshire Local Biodiversity Action Plan 2003-2008 suggests that there is 2881 hectares of acid grassland within the plan area. The Jerah examples therefore represent 17.3% of the resource within the LBAP area.

While acid grasslands are typically species-poor, the examples at Jerah (NVC types U5a, U6b and U6d) have been further reduced in species diversity by long-term stock grazing as noted in the vegetation survey and the LBAP. Further impacts include agricultural improvement of the lower elevation examples (e.g. around Jerah and to the north of the site) to create 54 hectares of improved/semi-improved (NVC MG6) grassland.

The following ecological evaluation statement is based on Technical Annex C Ecological Evaluation:

Acid grasslands at Jerah are considered to be of moderate ecological importance at the local scale.

Wet grassland

Wet grassland occurs across the site covering 12.7% (127.6 ha) and is mainly M23 *Juncus acutiflorus-Galium palustre* mire with some NVC types M25 *Molinia caerulea-Potentilla erecta* mire.

M23 and M25 blend in and out without discrete boundaries and share several of the main associate species. These vegetation types are typically plagioclimax types produced and maintained by stock grazing (Rodwell, 1992).

The area of wet grassland (NVC M23/M25) within the Clackmannanshire LBAP is not known with any confidence due to problems of definition and lack of data so no estimate can be given of the area the resource at Jerah represents within an LBAP context. However, taking the UK estimate, it is thought that regionally it covers a smaller area than acid grassland.

Like acid grasslands, wet grasslands have declined in extent and quality as a result of agricultural modification, drainage, reclamation and afforestation. Indeed, Averis et al (2004) note that “mires of this type contribute to the diversity of flora and vegetation structure around the upland fringes”.

The following ecological evaluation is based on Technical Annex C Ecological Evaluation:

The wet/marshy grasslands at Jerah are more species-rich and cover a smaller area than acid grassland which, in view of their UK HAP status, have high local importance and moderate regional importance.

Wet heath

The upland heath on Jerah is mainly composed of NVC M15 *Trichophorum cespitosum-Erica tetralix* wet heath. The M15 is typified by *Trichophorum cespitosum, Erica tetralix, Calluna vulgaris,* and *Sphagnum capillefolium*.

Within Jerah, pure stands of dwarf shrub heath account for 15.41 hectares (1.53%) with 83.53 hectares (8.32%) of wet heath/acid grassland mosaic. The mosaic is typically converting to acid grassland as a result of long-term grazing impacts.

The area of upland heathland within the Clackmannanshire LBAP is thought to be 272 hectares. It is an extensive habitat in a Scottish context with the examples at Jerah showing little species or structural diversity as a result of grazing intensity.

Upland heath has declined in extent and quality as a result of agricultural modification, drainage, reclamation and afforestation. However, it remains a very extensive habitat in Scotland.

The following ecological evaluation is based on Technical Annex C Ecological Evaluation:

The area of wet heath at Jerah is considered to have high local importance and moderate regional importance.

Predicted changes

Changes within these habitats as a direct result of afforestation can be approximated as follows:

Table 5.2: Predicted changes within acid grassland, wet grassland and upland heath as a consequence of afforestation at Jerah.

Habitat	Current area (Ha)	Current habitat condition	Predicted area following afforestation	Predicted habitat condition	Approx change (Ha)	Nature of change
Acid grassland (U5, U6)	499.09	Ecologically over-grazed, low species diversity	169	169 ha ungrazed, rank. 40 ha under broadleaves ungrazed, rank	- 330ha	Significant at local scale only
Marshy grassland (M23/25)	127.40	Modified by grazing and drainage	24.5	24.5 ha ungrazed, rank.13 ha under broadleaves also ungrazed/rank	- 103	Significant at regional scale
Wet heath (M15); wet heath/acid grassland mosaic; dry heath/acid grassland mosaic	105.4	Modified by grazing and drainage	5.7	5.7 ha ungrazed, rank; 6.9 ha under broadleaves also rank/ungrazed	- 99.7	Significant at regional scale

The above table predicts the likely significant effects on acid grassland, wet grassland and upland heath should this project proceed. The draft planting plan has excluded the areas of blanket bog.

In summary:

- The area of acid grassland (NVC U5, U6c/U6d) will be reduced from 499.09 hectares to 169 hectares. The area of marshy grassland (NVC communities M23/M25) will be reduced from 127.40 0 hectares to 24.5 hectares. The area of heath and associated mosaics will be reduced from 105.4 hectares to 5.7 hectares.

- The distribution of acid grassland, marshy grassland and wet heath will be reduced and fragmentation increased.

- The area and distribution of blanket mire (M17) will be unaffected.

Partial mitigation of the predicted impacts is provided by the current planting concept map whereby some 36% of the site remains unplanted. Of the affected habitats this allows for the retention of acid grassland, marshy

grassland and upland heathland.

The structure and species composition of retained examples is likely to differ from the current baseline conditions as a result of stock removal. This is likely to encourage a more rank sward to develop and the possibility of natural regeneration of semi-natural broadleaves from self-seeding. However, deer browsing in the longer-term may help in maintaining plagioclimax conditions on the remaining open ground habitats.

Further, acid grassland, marshy grassland and upland heath communities will be retained as a ground layer within the proposed broadleaved woodland areas which accounts for 130 hectares.

5.3.4 Predicted impacts of afforestation on main open ground habitats

- Loss or change in structure and composition of substantial areas of acid, marshy grassland and upland heath.

- Fragmentation of acid, marshy grassland habitats and upland heath.

5.3.5 Mitigation of predicted impacts

- Planting plan to ensure retention of 36% open space to include 169 hectares of acid grassland, 24.5 hectares of marshy grassland and 5.7 hectares of upland heath and upland heath/acid grassland mosaic.

- Ungrazed acid, marshy grassland and upland heath NVC types will be retained as a ground layer below the areas of proposed semi-natural woodland.

5.3.6 Statement of significance

The impact of this project, on the open ground habitats is deemed to have a high magnitude impact. For acid grasslands this is deemed to be significant at the local scale and for marshy grassland and upland heath at the regional scale over the medium to long-term.

5.4 Key Issue 3b: Ecology – Birds

This section should be read in conjunction with Technical Annex C: Ecological Evaluation and Technical Annex F: Breeding Bird Survey 2011 (Moore 2001) and Breeding Bird Survey 2012 (Owen 2012).

5.4.1 Potential impacts

- Displacement of birds of open ground habitat by woodland establishment.

- Disturbance to breeding birds during site planning, ground preparation, planting and other forest operations.

5.4.2 Baseline information and survey.

Breeding bird survey of northern (upper) section of site, amounting to 9 survey visits in 2011.

Breeding bird survey of southern (lower) section of site, amounting to 4 survey visits in 2012.

Records of current and historic Black Grouse leks (RSPB data).

Clackmannanshire Biodiversity Action Plan 2012-2017.

Stirling Council Biodiversity Action Plan – draft species list.

Local information from BTO (John Calladine)

5.4.3 Assessment of impacts on birds.

This section addresses the potential impacts of the project on birdlife in terms of habitat change and operational disturbance. It assesses the magnitude and significance of impacts and also assesses any mitigation measures that might be required.

The negative impacts, should this project be implemented, relate to two factors: direct impacts due to loss of open ground habitats and/or indirect impacts as a result of operational disturbance.

This assessment is based upon results from two breeding bird surveys conducted at Jerah. The first, commissioned as part of a proposed windfarm development and to the north of Colsnaur Hill, was carried out in 2011 (Moore 2011). Further survey was undertaken in 2012 for the area of the farm lying to the south of Colsnaur Hill (Owen 2012). The accompanying reports are included in Technical Annex F.

For assessment of the site as a whole, the maximum count for each species recorded in the north in 2011 has been added to the maximum count for each species in the south in 2012. Birds recorded in the 500m buffer zone outwith the Jerah site during the 2011 survey have not been included.

Direct Impacts: Breeding Birds

Species requiring open ground were targeted during breeding bird surveys using Brown and Shepherd (1993) survey methodology (see Technical Annex F).

A total of 50 species were recorded over 13 visits to the site during the breeding season (Appendix 1, Technical Annex F; Moore 2011; Owen 2012). Of these, 15 species of conservation concern require open ground as part of their life cycle, nine of which exhibited breeding behaviour on site (Table 5.3). With the exception of Meadow Pipit and Skylark, abundance of species of conservation concern was generally low.

Table 5.3: Target species (birds that utilize open ground) of conservation concern recorded during the 2011/12 breeding bird surveys.

Species	Total (individuals)	Breeding on site	Conservation status
Lapwing *Vanellus vanellus*	2	✓	Red
Curlew *Numenius arquata*	6	✓	Amber
Black Grouse *Tetrao tetrix*	1		Red
Kestrel *Falco tinnunculus*	2		Amber
Red Kite *Milvus milvus*	2		Amber
Lesser Black-backed Gull *Larus fuscus*	4		Amber
Meadow Pipit *Anthus pratensis*	262	✓	Amber
Skylark *Alauda arvensis*	101	✓	Red
Linnet *Carduelis cannabina*	3	✓	Red
Whinchat *Saxicola rubetra*	7	✓	Amber
Wheatear *Oenanthe oenanthe*	10	✓	Amber
Reed Bunting *Emberiza schoeniclus*	4	✓	Amber
Grasshopper Warbler *Locustella naevia*	1	✓	Red
Starling *Sturnus vulgaris*	15		Red
Swallow *Hirundo rustica*	6		Amber

Refer to Birds of Conservation Concern 3 (Eaton *et* al. 2009) for conservation status criteria.

Two wader species were recorded in the north of the site: Lapwing and Curlew. No waders were recorded in the south of the site. A single Black Grouse male was recorded on two separate survey days in June, although no breeding (lekking) behaviour was recorded. Kestrel, Red Kite and Lesser Black-backed Gulls were recorded in flight over the site and it is possible that these species nest in the vicinity.

Meadow Pipit and Skylark were by far the most abundant breeding species on the site. Stonechat, Linnet, Whinchat, Wheatear, Reed Bunting and Grasshopper Warbler all occupied breeding territories but were only present in low abundance.

In terms of ornithological value, habitats within and around Jerah have, in the past, been classified as moderate to high (NS89 and NN80; Bates *et al*. 1994). This assessment, determined in 1994 by JNCC to inform the Regional Indicative Forest Strategy, identified areas of importance for birds of

open ground within Central Scotland and evaluated how future commercial afforestation may affect distribution and abundance. The level of ornithological interest within each 10km square was determined using the relative species richness of the square and the proportion of the British population of each open ground species within it. It is likely that some open ground species present in the 1994 assessment are no longer present or their abundance has declined locally, possibly due to predation (Calladine, pers. comm.). For example, studies conducted in NN80 in 1987 reported the presence of breeding Golden Plover (Calladine *et al*. 1987), a species now unlikely to be breeding in that area. The abundance of breeding waders, e.g. Curlew and Lapwing has also decreased to just a few pairs. However, areas of the site remain suitable for breeding Whinchat (Calladine, pers.comm.).

Nevertheless, the presence of 9 bird species of conservation concern (four Red List species and five Amber List species; Eaton *et al*. 2009) breeding on site that may be negatively affected by afforestation, six of which are UK BAP species and eight are further classified as LBAP species (Table 5.4), suggests a site of moderate local importance (see Technical Annex C).

Table 5.4: Bird species of conservation concern breeding at Jerah most at risk from loss of open ground habitats.

Species	Annex 1[1]	Schedule 1[2]	UK BAP[3]	Scottish Biodiversity List[4]	LBAP[5]	BoCC[6]
Lapwing			•	•	•	Red
Curlew			•	•	•	Amber
Meadow Pipit						Amber
Skylark			•	•	•	Red
Linnet			•	•	•	Red
Whinchat					•	Amber
Wheatear					•	Amber
Reed Bunting			•	•	•	Amber
Grasshopper Warbler			•	•	•	Red

[1]Species included on Annex 1 of Directive 2009/147/EC on the conservation of wild birds (codified version; the 'Birds Directive')
[2]Species protected by Schedule 1, Part 1 of the Wildlife & Countryside Act 1981 (as amended)

[3]Priority species in the UK Biodiversity Action Plan (JNCC 2007)
[4]Species listed in the Scottish Biodiversity List (SNH 2004)
[5]Priority species listed in Stirling or Clackmannanshire Local Biodiversity Action Plan (http://ukbars.defra.gov.uk/)
[6]Species conservation status listed as red or amber in Birds of Conservation Concern 3 (Eaton *et al.* 2009)

Taking the current area of open ground habitats at Jerah at 980 hectares (1002 minus 22 hectares of existing semi-natural and conifer woodland) the projected conversion of 640 hectares (65%) to woodland will leave an area of 340 hectares (or 34%) of open ground.

To indicate potential displacement of breeding species requiring open ground, the concept planting map (see Maps/Concept Map) can be transposed onto mapped bird territories (Technical Annex F). The resulting estimate of individual birds and bird pairs likely to be displaced with project implementation is summarised in Table 5.5.

Table 5.5: Predicted impact of project implementation on birds of conservation concern (BoCC3 Red or Amber list species; Eaton *et al*. 2009) breeding at Jerah.

Species	**Baseline population (no. of individuals)**	**Predicted impact (no. of individuals)[#]**	**Baseline population (no. of pairs)**	**Predicted impact (no. of pairs)[#]**
Lapwing	2	-2	1	-1
Curlew	6	-4	2	-2
Meadow Pipit	262	-136	-	-
Skylark	101	-49	92	-46
Linnet	3	0	1	0
Whinchat	7	-7	4	-4
Wheatear	10	-5	1	-1
Reed Bunting	4	-4	3	-3
Grasshopper Warbler	1	-1	1	-1

[#]Assumes birds recorded in the location of areas to be afforested will be displaced. Meadow Pipit pairs not estimated.

Displacement of species would take place over the medium to long-term.

The significance of this potential displacement should be set within the known population trends of these species:

- **Lapwing**: UK population estimate in 2009: 430,000 breeding territories (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: 71,500 – 105,600 pairs (Forrester *et al*. 2007).

  Lapwing is one of the most strongly declining bird species in Europe. The BBS map of change in relative density between 1994-96 and 2007-09 indicates that decreases have been strongest in lowland regions and southern Britain but that increases may have occurred in some upland and northern regions of Britain (BTO 2012). In Scotland, Lapwing abundance decreased by 48% between 1995 and 2010 (Baillie *et al*. 2013).

- **Curlew**: UK population estimate in 2009: 68,000 breeding pairs (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: c.58,800 pairs (Forrester *et al*. 2007).

  Across the UK, Curlew have declined between 1995 and 2005. The BBS map of change in relative density between 1994-96 and 2007-09 indicates that decreases have been concentrated in south western Scotland, Wales and parts of northern England, with increases in a few regions of Cumbria and the Pennines (BTO 2012). Between 1995 and 2010 in Scotland, Curlew abundance decreased by 16% (Baillie *et al*. 2013).

- **Meadow pipit**: UK population estimate in 2009: 2 million pairs (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: 1 – 1.6 million pairs (Forrester *et al*. 2007).

  The BTO BBS map of change in relative density between 1994-96 and 2007-09 indicates that the species has decreased throughout the core of its UK range in Scotland, Northern Ireland and northern England but that numbers have increased in some southern regions. Between 1995 and 2010, the Scottish population decreased by 32% (Baillie *et al*. 2013).

  If each Meadow Pipit recorded at Jerah was deemed to represent a pair, density would be in the region of 26 pairs/km^2. Although an over-estimate, this density estimate would still be at the lower end of the range given for acid moorland habitats in the UK (18-55 pairs/km^2; BWP 2004).

- **Skylark**: UK population estimate in 2009: 1,500,000 breeding territories (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: 290,000 – 557,000 pairs (Forrester *et al*. 2007).

  Skylark declined rapidly from the mid 1970's to the mid 1980's, when the rate of decline slowed. BBS data show further decline, recently extending to Scotland. The BTO BBS map of change in relative density between 1994-96 and 2007-09 indicates that decrease has been severe in Northern Ireland and eastern England but that numbers rose in Scotland in that period, especially in the northwest. Despite a 9% decrease in population size between 1995 and 2010 (Baillie *et al*. 2013), the Scottish population has remained relatively stable since 1994. However, the particularly harsh winter of 2010 resulted in Skylark abundance decreasing by 25% (BTO 2012).

  At present, Skylark density at Jerah is in the range of 9.2 pairs/km^2. In 1997, the average breeding density of Skylark in Britain in moorland habitats was 12.95 pairs/km^2 (Browne *et al*. 2000). In 2004, the overall density of Skylark in Britain was estimated to be between 5-10 pairs/km^2 rising to 75 pairs/km^2 in optimum habitat (BWP 2004).

- **Linnet**: UK population estimate in 2009: 430,000 breeding territories (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: 70,000-90,000 pairs (Forrester *et al*. 2007).

  Linnet abundance fell rapidly in the UK between the mid 1970's and mid 1980's but has remained relatively stable since. The BTO Breeding Bird Survey as it relates to Scotland suggests a continuing population increase of 8% over the period 1995-2010 (Baillie *et al*. 2013).

- **Whinchat**: UK population estimate in 2009: 47,000 breeding pairs (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: 15,000 – 20,000 pairs (Forrester *et al*. 2007).

  Whinchat were formerly a widespread species, however habitats in the uplands have become somewhat restricted sandwiched between intensive agriculture at lower levels and higher land unsuitable for

breeding (Calladine and Bray 2012). Between 1995 and 2010, the UK population decreased by 57% (no Scottish data available).

- **Wheatear**: UK population estimate in 2009: 240,000 breeding pairs (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: 35,000 – 95,000 pairs (Forrester *et al*. 2007).

  BTO BBS data between 1994 and 2011 show wide fluctuations in the UK abundance of Wheatear, with little indication of directional change (Baillie *et al*. 2013). Between 1995 and 2010, abundance in Scotland increased by 6% (Baillie *et al*. 2013).

- **Reed Bunting**: UK population estimate in 2009: 250,000 breeding territories (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: 15,000 – 30,000 pairs (Forrester *et al*. 2007).

  Following rapid declines in the 1970's, Reed Bunting abundance has remained relatively stable in the UK. The BTO Breeding Bird Survey as it relates to Scotland suggested a population increase of 31% over the period 1995-2010 (Baillie *et al*. 2013). From 2010, abundance has declined in Scotland, remaining stable in England.

- **Grasshopper Warbler**: UK population estimate in 2009: 16,000 territories (Musgrove *et al*. 2013). Population estimated to be breeding in Scotland in 2007: 900 – 3,700 pairs (Forrester *et al*. 2007).

  Following a rapid decline between the mid 1960's and mid 1980's, numbers became too low for annual monitoring (Marchant *et al*. 1990). The BTO BBS shows wide fluctuations in abundance since 1994, but overall a strong increase. Between 1995 and 2005, the UK population increased by 59% (no Scottish data available).

  The Scottish population trends are summarised below (Table 5.6):

Table 5.6: Bird population trends in Scotland 1995-2010.

Species	Trend
Lapwing	-48%
Curlew	-16%
Meadow Pipit	-32%
Skylark	-9%
Linnet	+8%
Whinchat	-57% (UK figure)
Wheatear	+6%
Reed Bunting	+31%
Grasshopper Warbler	+59% (UK figure)

Trend data from BTO Breeding Bird Survey 1995-2010 (Baillie *et al*. 2013)

The most significant impact of loss of open ground relates to those species where the background population trend is one of decline. In the case of Jerah, the possible displacement of a proportion of the population of nationally declining species from the site: Lapwing, Curlew, Meadow Pipit, Skylark and Whinchat, is a significant adverse impact at a local scale. However, it should be noted that each of these species are present on Jerah at low relative abundance, with none making up more than 0.001% of the Scottish population or 0.0001% of the UK population of that species. This probably reflects a homogeneous habitat long modified and simplified by hill grazing.

Project implementation is likely to result in birds of the open hill benefitting from short-term habitat changes following the removal of sheep grazing. However, abundance is likely to decline as the canopy of planted conifers closes in approximately 10 years. Breeding productivity of birds on remaining adjacent open ground may then be affected by the presence of mature trees, which can provide lookouts and nest sites for predators such as raptors and corvids.

Woodland and woodland edge species are likely to consolidate and increase their tenure on the site. Species of conservation concern or national interest recorded in the 2011 and 2012 breeding bird surveys likely to benefit from woodland expansion include three Red List species (Song Thrush, Starling and Tree Pipit; Eaton *et al*. 2009), four Amber-list species (Dunnock, Green Woodpecker, Willow Warbler and Bullfinch; Eaton *et al*. 2009), and two

Scottish Biodiversity List species (Robin and Siskin; SNH 2004). Woodland expansion may provide future nest sites for Buzzard, Kestrel (Amber List species) and Red Kite, an internationally important Annex 1 and Schedule 1 species, which has recently been moved from the Red to Amber List following a substantial recovery in numbers (Eaton *et al.* 2009). These species are not known to breed at Jerah at present, but are likely to breed in the vicinity. Whilst raptors may benefit from additional nest site opportunities, it is likely that foraging opportunities may decrease with afforestation, although edge effects are likely to offset these to a degree.

Woodland establishment of the type proposed also has the potential to benefit Black Grouse, a nationally declining Red List species (Eaton *et al*. 2009). While some of this benefit will be temporary in nature, the development of graded woodland edges, internal open space and the planting of semi-natural broadleaves, known to benefit Black Grouse, will allow for longer-term benefits.

The inclusion of low density spruce and native broadleaves on the plantation/moorland edge is likely to provide suitable habitat for a number of species of conservation concern, particularly Black Grouse, Whinchat, Reed Bunting and Grasshopper Warbler. Moorland passerines such as Skylark and Meadow Pipit could also benefit from shrub habitat through enhanced foraging opportunities, and an increase in the abundance of alternative prey items associated with shrub habitats for their predators (Calladine *et al*. 2013). Areas of scattered trees and shrubs interspersed with grassland may attract Tree Pipit, Stonechat, Yellowhammer, Song Thrush, Willow Warbler, Linnet and Bullfinch.

Indirect Impacts

Operationally it is important to ensure that the timing of site planning, ground preparation, planting and road construction avoids any potential impacts on breeding birds. The advice contained in Forest and Birds (FCS Guidance Note 32 Forest Operations and Birds 2006) should be adhered to with regard to timing of operations and required buffer zones.

Particular scrutiny must be given to proposed operations during the breeding

period between March and August. To ensure compliance with the Wildlife and Countryside Act 1981 and the Nature Conservation (Scotland) Act 2004, UPM Tilhill will apply their own environmental controls under their accredited and externally verified Environmental Management System.

5.4.4 Predicted impacts on birds

Direct Impacts

- Displacement of one Lapwing pair, two Curlew pairs, 136 Meadow Pipits, 46 Skylark pairs, four Whinchat pairs, one Wheatear pair, three Reed Bunting pairs and one Grasshopper Warbler pair. Of these, Lapwing, Curlew, Meadow Pipit, Skylark and Whinchat are the most significant against a backdrop of a declining Scottish population trend.

  Given the nature conservation status and relative abundance of these species on site, the magnitude of impact of the planting proposal is deemed to be **Medium** and of **Low** significance, i.e. loss of nature conservation value at the local scale (see Technical Annex C).

- Increase in birds of woodland and woodland edge habitat.

Indirect Impacts

- Potential for operational disturbance to breeding birds.

5.4.5 Mitigation of impacts

- Retention of 340 hectares of open space (34% of the 1002 ha site) allows for mitigation to predicted displacement effects.

- Planting of low density spruce and native broadleaves on the upper plantation edges should provide habitat for Black Grouse and a number of passerine species of conservation concern.

- Follow advice in Forest Operations and Birds (FCS, 2006) to help avoid operational disturbance at the temporal and spatial level.

5.4.6 Statement of significance.

The impact of this project, even with mitigation, on birds requiring open ground habitats is considered to be negative, irreversible and significant at the local scale over the medium to long-term.

5.5 Key Issue 3c: Ecology – Protected Species

This section should be read in conjunction with Technical Annexes C and H.

This section addresses the potential impacts of the project on otter in relation to operational disturbance and habitat modification caused by woodland development. It includes an assessment of the degree of significance and mitigation measures required.

5.5.1 Potential impacts

- Disturbance to a European Protected Species as a result of ground preparation, planting and water crossings/bridge construction in riparian zones.

5.5.2 Baseline information and survey

An otter survey was undertaken between on the 31 May and 2nd of June 2013. This included survey for signs of water vole.

5.5.3 Assessment of impacts on protected species

Otters are termed European Protected Species (EPS) and are listed on Annex IV of EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ("The Habitats Directive") as species of European Community interest and in need of strict protection.

For any EPS animal the legislation makes it an offence to deliberately or recklessly capture, kill or disturb any such animal. It is also an offence to damage or destroy their "breeding sites" or "resting places" (this does not have to be deliberate, reckless or intentional for an offence to have been committed). Therefore holts are protected even when there are no otters present, provided it can be demonstrated that they use them some of the time.

EU case law has removed the previous exception to the above offences whereby an offence is not committed if it can be shown that the unlawful act was the incidental result of a lawful operation or other activity which could not

reasonably have been avoided. This means that anyone who *'damages or destroys a breeding site or resting place'* of an otter will not have the '*incidental result'* defence to rely upon and may be liable to prosecution, even if the damage or disturbance was an accidental result of an otherwise lawful activity or operation such as ground preparation, tree planting or bridge construction.

Taking reasonable precautions and following best practice advice is key to protecting EPS and their habitats. This approach starts with surveying the site for otter activity. In the case of Jerah, a systematic search was undertaken for evidence of otter in all suitable areas of habitat including rivers, burns and associated riparian habitats falling with 250 metres of the existing and proposed track network and described in Technical Annex H.

No evidence of water vole was found. Evidence of otter includes four temporary resting places along the main burns- Menstrie and Old Wharry Burns. None of the four temporary resting up sites were located within 30 metres of the existing or proposed track network. Further, no potential natal/juvenile sites were recorded within 250 metres of the existing or proposed track network.

Burn riparian zones will be managed in accordance with best practice guidelines. This is fully discussed in Section 5.6 below.

Semi-natural woodland establishment according to site type along these riparian zones is likely to improve the prospects for otter providing more cover and improving the biological productivity of water courses over the current baseline.

5.5.4 Predicted impacts

Creation of semi-natural riparian woodland will provide enhanced breeding and feeding opportunities for otter.

5.5.5 Mitigation of impacts

Emergency procedures will be in place should a protected species or place of shelter be encountered during operations. This approach is captured in the

Otter Toolbox Talk. Briefing of contractors will ensure that work stops and advice sought where there is evidence of otter. Specialist advice will be sought to determine any mitigation requirements, i.e. suitable set-backs or buffer zones, and consultation with SNH may be required.

5.5.6 **Statement of significance.**

The impact on otter arising from the project is judged to be neutral but with the potential to have medium to long-term benefits

5.6 Key Issue 4: Impacts on hydrology.

This section should be read in conjunction with Technical Annex G.

This section addresses the potential impacts of the project on water quality and quantity. It includes an assessment of the degree of significance and mitigation measures required.

5.6.1 Potential impacts

- Reduced water quality caused by sediment release from ground preparation, drainage or track construction or chemicals used to assist tree establishment.

- Increased risk of flooding as a result of site drainage.

5.6.2 Baseline information

- Literature review.

- General Binding Rules.

- Forests and Water (2011).

- Mapping of current drainage pattern.

- Mapping of topography to provide a slope map.

5.6.3 Assessment of impacts on water quality

Water quality has the potential to be adversely affected by the following operations:

- Ground preparation and drainage techniques, as described in Section 4.4.1, are required for early and effective woodland establishment. A combination of shallow ploughing and mechanical mounding is proposed. Where this is not possible, for technical reasons, hand

screefing or hand-turfing will be employed.

- Use of fertilisers, as described in Section 4.4.3, may be required to address poor soil fertility and herbicides may be required to control weed growth.

- Construction of access tracks, as described in Section 4.5.1, will be required at the establishment and harvesting phases. For the purposes of this assessment only the forest roads (establishment) will be considered plus the 840 metres of forest road (harvesting) required for machine access to the site. The establishment roads will be used to mark out the site and to service ground preparation, planting, maintenance and wildlife management objectives. These will be for light vehicles and quad bikes. These would comprise an as-dug sub-base for ATV access, subsequently surfaced with crushed rocked quarried on site to form surfaced roads. The forest road (harvesting) is a full specification forest road and will be some 6 metres wide and fully armoured with hardcore.

All of the above proposed operations pose a risk in terms of diffuse pollution. The design and implementation of the project must ensure that the Menstrie Burn is particular is maintained in "Good Status" as required by the EU Water Framework Directive. This will be achieved using the buffer zone approach and application of the General Binding Rules and Forests and Water (2011).

5.6.4 The buffer zone approach

Forests and Water state that "water quality can be maintained or enhanced through good forest planning and management, and in particular through the identification and management of buffer areas. These areas, which will include the riparian zones next to watercourses, are set aside to help buffer any potentially adverse effects of adjacent land management".

The recommended minimum width of buffer areas, from forest edge to water's edge, to protect the aquatic zone are as follows:

Table 5.7 Defined buffer zones where ground preparation, drainage, fertilisers, herbicides or establishment of productive conifers will not occur.

Buffer width	Situation
10 m	Along all permanent watercourses with a channel < 2 m wide.
20 m	Along watercourses with a channel > 2 m wide and around all deep peat areas.
50 m	Around abstraction points for all private water supplies

Source: Adapted from Forests and Water (2011)

All the riparian zones will be managed as a mixture of open ground and/or semi-natural broadleaves according to site type. No ground preparation will take place within 20 metres of the main water courses and for smaller watercourses buffer zones will be maintained in accordance with Table 5.7.

If a consensus on establishing broadleaves within the above buffer zones by direct planting can be agreed with consultees then this will be pursued by the applicants as part of the overall project outputs. This will be a mix of open space with native woodland planted according to site type (see Technical Annex E) without the need for ground preparation, fertilisers or herbicides. The aim would be for 50% canopy cover within riparian zones which is thought to provide the best combination of shade and shelter for bankside morphology and for protected freshwater habitats and species (Forests and Water, 2011).

Ground preparation/drainage

The proposed planting at Jerah has been designed around the above buffer zone requirements. Over and above this, the following guidance will be applied as part of a ground preparation/drainage prescription:

- All drains & watercourses as far as practical will be marked with canes and orange marker tape prior to planting.
- Pre-existing agricultural drains do not meet current best practice. Some may be steeper than normal and should not be maintained. Rather, the new drainage system should be diverting water away from such drains and into buffer zones.
- Contractors will only dig drains highlighted on maps provided.
- Drains will be aligned to run at a maximum gradient of 2º (3.5%) and led towards the heads of valleys.
- Grass/vegetation will be left in drains where possible to allow filtration.
- Silt traps will be placed at the end of each drain.

- No drain to flow directly into any water course and appropriate buffer zones applied as discussed above.

All ground preparation and drainage requirements will only be undertaken after a site specific Method Statement has been agreed with FCS and SEPA. This will ensure that the risk to surface waters from diffuse pollution and flooding is minimised by the application of published best practice. The approach to the cultivation requirements of this site, to effect successful woodland establishment, have been informed by an analysis of slope and the current drainage pattern on site (see Technical Annex G). These will be used to help determine the appropriate ground preparation technique as shown in the draft Ground Preparation Map in Technical Annex G.

Overall, the proposed methods of woodland establishment including mounding, screefing, shallow ploughing and track construction will have minimal effects on soils and water. For example, continuous mounding disturbs in the region of 15-20% of the ground surface and because there are no continuous breaks in the soil profile will result in minimal disturbance to the rate of water run-off.

Fertilisers/herbicides

Ground rock phosphate will be applied, if necessary, at 150 grams per tree to aid conifer establishment but this will be outwith the buffer zones defined to protect surface waters (see Table 5.7). This operation will only be undertaken after full consultation with SEPA and will be informed by the soil analysis data and the condition of the developing trees.

Roading

Roadside ditches will drain through the formation, using silt traps and culvert pipes to control the risks associated with diffuse pollution. The gradient of the roadline has been surveyed and allowed for in the forest design, with an optimum gradient of 10 % and a maximum gradient of 20%.

Burn crossings will be piped where possible, otherwise bridged. These will be subject to the necessary SEPA registration or licensing procedures.

In summary, the diffuse pollution risk from ground preparation/drainage, fertilisers/herbicides and track construction will be controlled/mitigated by the following measures:

Table 5.8: Measures to control the risk of diffuse pollution at Jerah

Technique	**Control/mitigation measures**
Ground preparation/drainage	Apply: • General Binding Rules 9, 20 and 21 • Forests and Water (2011) • Ground Preparation/Drainage Method Statement – to be agreed with SEPA. Managers to read: • UPM Tilhill Forest Drainage Operational Control Procedure. • UPM Tilhill New Planting Operational Control Procedure • UPM Tilhill Guidance Note 12 Otter Recorded briefings for contractors using: • Toolbox Talk 11 Water Pollution Prevention • Toolbox Talk 18 Water Crossings • Toolbox Talk 38 Controlling Sediment Release to Water Courses. • Toolbox Talk 67 Diffuse Pollution Pictorial Guide • Toolbox Talk 10 Otter • Toolbox Talk 9 Water Vole All ground preparation and drainage operations will be subject to a Method Statement to be agreed with SEPA.
Fertilisers/herbicides	Apply: • General Binding Rule 18 and 23 • Forests and Water (2011) Managers to read: • UPM Tilhill Fertiliser Application Operational Control Procedure
Track and bridge construction	Apply: • General Binding Rule 6, 9 and 22 Managers to read: • UPM Tilhill Road and Bridge Construction Operational Control Procedure • UPM Tilhill Guidance Note 12 Otter Recorded briefings for contractors using: • Toolbox Talk 11 Water Pollution Prevention • Toolbox Talk 18 Water Crossings • Toolbox Talk 38 Controlling Sediment Release to Water Courses. • Toolbox Talk 10 Otter • Toolbox Talk 9 Water Vole

5.6.5 Assessment of impacts on water quantity

Short-term

In FCs EIA Determination letter dated 30 November 2012, they note that "Menstrie in the recent past has been subject to two significant flood events". There is clearly a risk of exacerbating these flood events by inappropriate catchment management as a result of this project being implemented. Cultivation and drainage operations as described above have the potential to increase peak flows. However, Forests and Water notes that this effect tends to decrease with increasing storm size and is difficult to detect for large flood events.

The rationale for any forestry drainage scheme, is to manage the hydrology of the site to ensure that (a) large quantities of surface water do not build up and (b) water flows off the site in a managed and controlled (slow) manner. Drains no longer connect to water courses as was previous practice. Rather, drains are defined as such where they are blanked off and do not connect to existing water courses (SEPA pers comm). Forests and Water (FC 2011) notes that a legal requirement of sustainable forest management is that "forest drainage should be planned and, where necessary, existing drains should be realigned to ensure that water is discharged slowly in buffer areas and not directly into watercourses".

The legal requirements and best practice approach of any forest drainage scheme will be captured in the draft Ground Preparation and Drainage Method Statement which will be agreed with FCS and SEPA prior to project implementation.

Medium to Long-term

The proposed change of land use from open ground to mixed woodland potentially runs the risk of reducing average stream runoff (via interception and transpiration losses) in the medium to longer term (Price, 1996). Some reduction in run-off is therefore anticipated. Nisbet and Thomas (2006) highlighted three mechanisms whereby trees could help alleviate flooding; by their greater water use, due to the higher infiltration rates of woodland soils,

and by the greater hydraulic roughness of floodplain and riparian woodland.

Water yields from upland catchments containing significant proportions of closed-canopy conifer forest have lower water yields than either moorland or grassland catchments (Forests and Water, 2011). Research quoted in Forests and Water suggests there may be a 1.5-2% reduction of potential water yield for every 10% of a catchment under mature conifer forest.

Ultimately the proposed new woodland will dampen extreme variations in water run-off and the creation of semi-natural riparian woodland will boost biological productivity of water courses while enhancing siltation and sediment retention. The proposed mixed nature of the woodland at maturity (including extensive open space) is likely to result in less interception losses compared to that which might arise from a purely mature conifer plantation.

The minimal methods for tree establishment and the application of agreed buffer zones should not have any measurable affect on downstream fisheries. In the longer term, a continuous cover of native woodland along watercourses might contribute to reduced erosion (concomitant with reduction of grazing pressures), and dampen extreme variations of run-off.

This proposal will improve the biological productivity of running waters and, by implication, improve the prospects for otter and fresh water fish. Indeed, autumn leaf fall from deciduous trees provides one of the most important food resources to the freshwater ecosystem - a process that has been well documented (MacKenzie 1996). Further, vegetated riparian areas keep the main channel confined and fallen trees in the stream provide important summer and winter salmonid habitat (MacKenzie 1996).

Despite there being a lack of information regarding broadleaved afforestation and stream water quality (Doake et al 2001) there are many benefits of riparian native trees for freshwater ecosystems such as stabilising river banks; creating in stream shelter and shade, especially for fish; introducing structural habitat diversity; introducing nutrients in complex forms into aquatic ecosystems (via falling leaves and invertebrates) rather than simple forms (enriched runoff) which can stimulate eutrophication responses".

"Planting of scattered broadleaf trees and scrub along watercourse can greatly benefit salmonid fisheries by reducing acidification and erosion whilst increasing food supply and creating shade" (SNH 2001).

5.6.6 Predicted impacts on the hydrology of the project area

"Overall, research suggests that the contrasting effects of the different stages of the forest cycle (cultivation, drainage, road construction, forest growth and harvesting) will even out at the catchment level, especially as forest areas become more diverse in age. As a result, upland forests are unlikely to adversely affect downstream flood risk" (Forest and Water, 2011).

Water quality:

- Low risk to water quality where best practice is applied including described buffer zone approach.

- Improved biological productivity and channel structure of watercourses will have positive implications for otter and salmonids.

Water quantity:

- Low risk of increasing short-term water quantity as long as legal requirements (GBRs) and best practice (Forests and Water) are adhered to.

- Reduced run-off in medium to long-term compared to baseline.

- Extreme variations in run-off will be dampened i.e. reduced number and intensity of spates.

5.6.7 Mitigation of hydrological impacts.

- Ground preparation, chemical use, road construction and burn crossings will comply with Forests and Water, the Water Framework Directive and associated General Binding Rules.

- All water courses and areas of deep peat (>50cms) to be protected from mounding by implementation of buffer zones.

5.6.8 Statement of significance.

Overall, the impact of this project on the hydrology of the site is deemed to be neutral in the short-term but beneficial and significant over the medium to long-term.

5.7 Key Issue 5: Socio-economic impacts - employment.

5.7.1 Potential impacts

- Loss of hill grazings
- Loss of agricultural employment
- Gain of forestry employment
- Gain of downstream timber processing employment

5.7.2 Agricultural baseline compared to proposed forestry project

One of the key decisions for the farming occupant was that livestock production was not economically or physically sustainable, as costs have been increasing year-on-year and income falling (in real terms). Consideration was given to extensification, reducing stocking rates and inputs to increase profitability, but this raised animal welfare issues. In addition, the owners are ageing, finding the hill livestock management increasingly difficult to manage and wish to pursue other farming options on better quality ground. Thus, woodland creation was identified as one of the few viable exit options, that would generate capital for investment in other land to support the retained arable and cattle farming interests.

Jerah has, over recent years, been running up to 50 cattle and 1,000 ewes for part of the year, employing one person full-time when stock are present and has been almost totally reliant on subsidy payments for generating a net profit. Based on an average occupancy of 4 months per annum (summer/autumn grazing), this equates to an average stocking rate of 0.3 per hectare.

These figures are comparable with the WEAG 28 paper, December 2012, which analysed land livestock stocking rates across Scotland. This identified weighted average stocking rates for East Central Scotland of 0.37 (LCA land 5.1-5.3) and 0.18 (LCA 6.1-7). Given that Jerah is classified as class 6.1 and 6.2 land, suggesting an average expected stocking rate of 180 ewes, the actual average stocking density of 0.3 per hectare (300 ewes) reflects both the inherent fertility of the site and the intensity of management invested.

Based on the Scottish average of 252 ewes per holding, generating 1.45 FTE, Jerah averages 300 ewes, employing one person for 70% of the year. Assuming when other employment benefits are taken into account (eg feed suppliers, hauliers, shearers, auctioneers), then the it is not unreasonable to assume that Jerah employs a similar 1.45 FTE.

By comparison, on average, land under forestry produces 1.0 FTE per 101.59ha planted (Brian Pack Enquiry 2012). Thus, for Jerah (501ha), this suggests an average of 4.93 FTE – substantially more than sheep farming.

The employment generated by forestry is loaded towards planting and harvesting/processing, at either end of the life-cycle of the forest. For years 1-10, the average is calculated at 8.17 FTE, decreasing to 1.35 FTE for the mid rotation maintenance period (yrs 11-30) and increasing again to 11 FTE during the harvesting phase (yrs 30-40).

Local employment (to Jerah) in woodland creation and maintenance supports a number of local businesses in roading, ground preparation, fencing, planting, weeding, maintenance, supervision and management. The local UPM Tilhill office sponsors 36 contractor businesses employing an average of 4 staff, supplying 7,540 days work annually (equivalent to 32.7 FTE). In the course of the first five years of establishment, Jerah will provide 15.89 FTE alone (64 FTE in year 1).

Jerah timber harvesting and wood processing is an important component of the potential employment provision, involving harvesting, extraction, haulage, sawmilling and processing of the potential total of 175,000 tonnes of utilisable wood.

James Callander & Son, Falkirk, are an important local market (20 miles road distance) for high quality softwood sawlogs, utilising 140,000m3 per annum and employing 90 FTE directly. Norbord, Cowie, are the largest timber processing employer in the locality (15 miles by road), employing 300 staff at their MDF and particleboard plant. Both end-user businesses rely on the sustainable production of locally sourced timber, currently forecast to decrease beyond 2025.

For data analysis see Other Annexes/Rural Employment.

5.7.3 Assessment of impacts on employment

This section considers the social and economic impact of the proposals on local employment compared to the previous farming enterprise.

In view of this, a comparison of rural employment has been made between the current agricultural baseline and proposed change to woodland. The result of the proposals, in terms of rural employment, is predicted to be positive in relation to the agricultural baseline situation. Deer stalking has not been factored into the predicted employment figures as no decision has been taken by the owner on this matter.

Overall a strict comparison of the baseline agriculture employment with the forestry option shows that a net employment gain can be anticipated by the proposed land use change. With an assumed average rotation length (length of time from planting to felling) of 35 years for the first conifer crop at Jerah (ranging from 30 to 40 years in practise) the following table summarises the baseline employment figures and projected employment resulting from project implementation.

Table 5.7: Employment comparison over a 45 year period

Baseline	Average Man Years over 45 year period
Sheep 218 ewes (per WEAG)	1.06
Sheep 333 ewes (per occupant use)	1.0
Mixed Woodland	
Woodland establishment/management	4.93
Residual agriculture	Not factored in
Deer stalking	Not factored in

Source: The figures for woodland establishment and management have been produced by UPM Tilhill and are included in the Employment Analysis under Other Annexes.

NB Source of figures for agriculture from WEAG Paper on Impact of Woodland Expansion on Farming. Average grazing stocking level for East Central is 0.18 sheep/hectare for rough grazing and 0.37 sheep/ha for improved. For Jerah, at 200ha improved and 800ha rough, this equates to 218 sheep. Average number of ewes/farm is 205 average. FTE employment per sheep unit is therefore 1.06.

Afforestation proposals, by their nature, have varying employment requirements throughout the crop rotation. This requirement is relatively high

in the first five years which represents the "establishment" phase. This is followed by a quiescent period of growth before thinning begins around year 18. Thinning will normally continue at regular intervals until harvesting and replanting begins around year 30 (or earlier) in the faster growing crops.

The proposed commercial forest area at Jerah will be managed to provide a sustained yield of high quality timber thereby maintaining, in conjunction with other forests in the area, stable employment and a sustainable rural industry. The Stirling and Clackmannanshire Forestry and Woodland Strategy 2012 notes that “the economic impact of the timber and forest industries has seen considerable growth over the past decade , currently representing Gross Value Added (GVA) of some £1.67 billion, or 1.8% of the total Scottish economy, and it accounts for circa 38,500 direct and downstream jobs”.

The importance of the forestry sector to the economy within the area defined by the Stirling and Clackmannanshire Forestry and Woodland Strategy concludes that forestry is an important contributor to the local economy. “Estimates indicate that forestry represents some £35 million of GVA to the area through primary and secondary processing, manufacturing, distribution and other downstream woodland related economic activity – equivalent to some 2% of the area’s total GVA. Wider economic benefits accrue from tourism and recreational activities ”.

5.7.4 **Predicted impacts**

Positive with regard to rural employment.

5.7.5 Mitigation of impacts

None required.

5.7.6 **Statement of significance**

Overall, the impact of this project in relation to rural employment is deemed to be positive in the short, medium and long-term and significant.

5.8 Key Issue 6: Timber Haulage

This section should be read in conjunction with the Stirling and Tayside Timber Haulage Route Map (see Maps/Timber Haulage Route Map).

This section addresses the potential impacts of timber haulage on the local road infrastructure and local community as required by FCSs EIA determination letter dated 30 November 2012. It includes an assessment of the degree of significance and mitigation measures required.

5.8.1 Potential Impacts

- Increase in timber traffic levels particularly at time of harvesting leading to disruption and inconvenience to the local community.
- Damage to fragile road network.

5.8.2 Baseline Information

- Stirling and Tayside Timber Transport Group Agreed Routes Map.
- Consultation with Local Authority Local Roads Services.
- Consultation with the local communities within which Jerah lies.

5.8.3 Assessment of impacts

The Timber Haulage Route Map shows the location of Jerah and how it is served by the existing county road network.

Should this scheme proceed, timber haulage will be from the north of the site across a new crossing of the Wharry Burn and then on to the Sheriffmuir Road. This is a Consultation Route which runs west to Dunblane or north to the A9. The Sheriffmuir Road to the south is classified as an Excluded Route.

The Consultation Route already services timber haulage for large areas of plantation forestry on Kippendavie and other estates along the route.

The proposed establishment of new commercial woodland at Jerah extends to circa 501 hectares of productive conifer and should come into production

around 2047 yielding approximately 8,700 tonnes of timber per year on average over a 15 to 20 year period. This is equivalent to about 7 lorry loads of timber per week over 50 weeks. In reality this is more likely to be 4 loads of timber per day 5 days per week for about 20 weeks of the year.

5.8.4 Predicted impacts

Road infrastructure

The Sheriffmuir Road Consultation Route has been well-used by timber lorries within the last five years. Its surface had deteriorated resulting in a resurface in early 2013. In its current condition, the road would deteriorate if it was used on an all year round regular basis by heavy timber traffic.

Consultation with Stirling Council Roads Services, during the EIA Screening Process, identified the condition of the Sheriffmuir road as being an important issue when the time comes to harvest timber.

Timber traffic from any harvesting operations on Jerah would affect residents along the Sheriffmuir Road but this is unlikely to occur for another 35 to 40 years.

The projected timber production from Jerah is expected to be 8,700 tonnes per annum for fifteen years commencing around 2047. A typical harvesting unit currently produces around 600 tonnes of timber per week and as such an annual harvesting programme would involve 362 trucks (24 tonnes per load) per annum or four wagons per day over 20 weeks. Without mitigation, all of this timber would currently pass through the southern edge of Dunblane before accessing the A9.

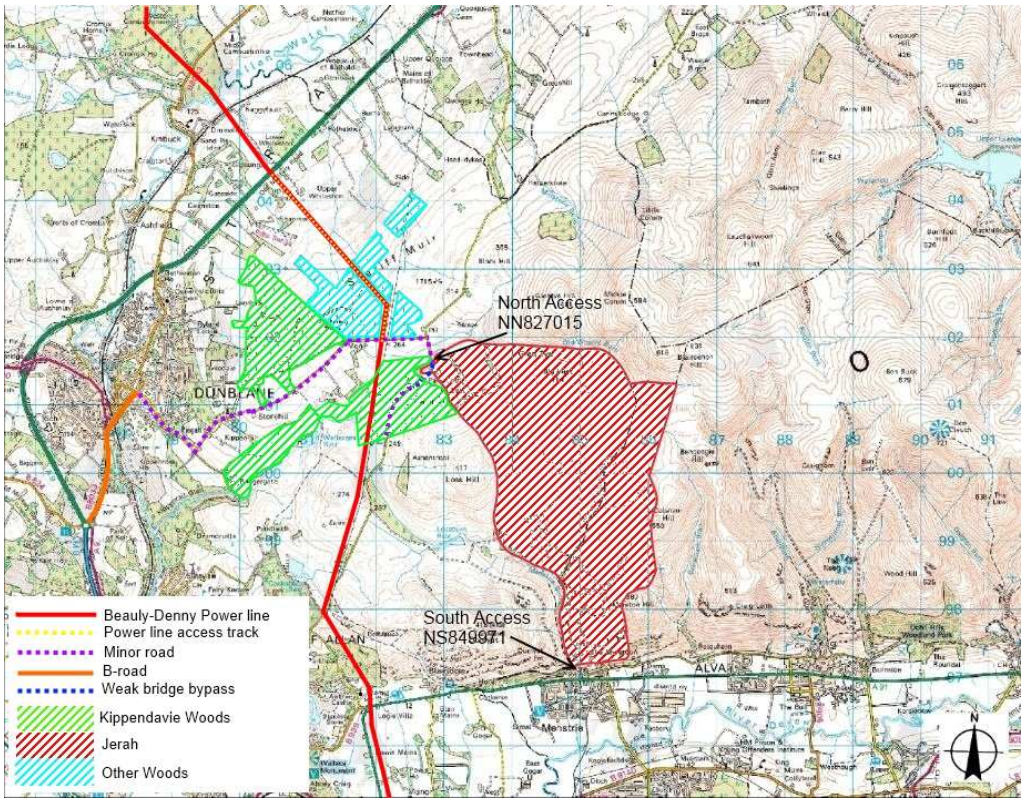
5.8.5 Mitigation of Impacts

Prior to felling operations, discussions will take place with the Local Authority as required by the Consultation Route process. These will cover mitigation options such as management of timber traffic to avoid peak times, and limit vehicle movements to mitigate the likelihood of damage to the road infrastructure and also improve the interface with other road users and those

living on the public road.

The impact of timber transport on public roads can be mitigated by the use of Central Tyre Inflation systems (CTI). Pioneering work was carried out on weak infrastructure in Caithness at Kinbrace. This study has been embraced by Timber Transport Groups and now a significant part of the Scottish timber transport fleet is using CTI. This has since allowed timber to be harvested and hauled with minimal damage along fragile country roads which, previously, would almost certainly have resulted in road surface damage and expensive maintenance repairs.

The use of CTI together with other mitigating tools such as air suspension and road friendly wheel, axle and vehicle configurations will be used, together with other advances that will be made over the coming years to reduce impact on Infrastructure. It should also be noted that the existing woodland owners would be expected to consult the local authority and to deploy similar technical developments to mitigate the risk of damage from their own timber haulage operations.Discussions have taken place with Scottish and Southern Energy who are currently constructing a temporary access track between the A9 south of Greenloaning to Sheriffmuir to facilitate the Beauly to Denny pylon upgrade. These discussions have been channelled through the Timber Transport Forum with a view to addressing the issues surrounding timber transport on the current Consultation Route – ideally retaining this route as an alternative to the public road. This would require each land owner to apply for full planning permission for the retention of the track, to undertake to make this available for future timber transport and to agree maintenance terms based on use.



UPM Tilhill has been actively involved in the construction of a number of timber haul routes around Scotland. In Argyll, UPM Tilhill manage the Dunoon Timber Haul Route to avoid the need to haul timber through Dunoon town centre and has recently been awarded a contract to create a timber haul route at Dalmally to divert timber away from fragile roads and the village centre. The Company also established the Eskdalemuir haul road and other public road improvements to reduce timber traffic impact in a region where 30,000ha is in full production. This work has reduced the potential for friction between timber traffic and other road users and local residents.

All these schemes have involved multiple forest owners and the Forestry Commission in partnership with substantial grants from the Strategic Timber Transport Fund. These routes are essential to alleviate the local timber haulage issues.

The longer-term use of the SSE route will be actively pursued with a view to alleviating the predicted impacts when the time comes to harvest timber at Jerah. However, this will require the engagement and willing cooperation of other parties, not all of whom have an interest in tackling this potential problem. For example, Stirling Council Roads department have identified the

issue, but their planning colleagues have not yet supported the case for retaining the SSE route.

5.8.6 Statement of Significance

The impact of timber haulage on the infrastructure of the Sheriffmuir Road Consultation Route is likely to be adverse in terms of impacts on infrastructure and disruption to other road users though this can, in part, be mitigated by use of CTI and transport logistics.

5.9 Subsidiary Issue 1: Public Access

This section addresses the potential impacts on public access as a result of establishing woodland on previously open hill ground. It assesses the degree of significance and any mitigation measures required.

In their letter of 30 November 2012, Forestry Commission Scotland noted that “the proposed site is very popular with walkers and is also one of the favoured sites in Scotland for paragliding. The impact of the proposals on the use of the site by members of the public needs to be assessed and proposals to improve visitor management infrastructure, if appropriate, described”.

5.9.1 Potential impacts.

- Loss of, or impeded, public access within Jerah Farm and to surrounding hills as a result of deer fencing and establishment of closed canopy woodland.

- Loss of viewpoints from the site as a result of woodland establishment.

- Creation of more formalised access, sharing new management access routes.

5.9.2 Baseline information/survey.

- Site visits.

- Core Paths database.

- Liaison with the Local Authority Access Officer.

- Liaison with key users and Community Councils.

5.9.3 Assessment of impacts on public access.

This section addresses potential impacts of the project on public access within and beyond Jerah Farm.

To clarify the historic public use of the site, contact was made with the Local Authority Access Officer. There are no Rights of Way or Core Paths within the project area.

The currently used paths have been mapped in consultation with Menstrie Community Council, the Ochils Paragliding Club and other interested parties.

The most frequent use of the site is by dog and casual walkers from Menstrie up and along the site access track. The majority of the most regular, almost daily, users rarely walk further than 2km into the site. A smaller proportion of walkers continue on the track to Jerah farmstead and complete a circular loop back to Menstrie across the Loss Estate. Other users include the Ochils Paragliding Club (who access Myreton Hill from the northwest), Ochil Hill Runners (who traverse the site east to west) and other hill walkers (accessing the Ochils plateau). Almost no users currently traverse the site from north to south.

The access across the property west to east is important to walkers and runners heading from Dumyat to Blairdenon Hill. The original planting proposal map did not lend enough significance to these routes and since then the plan has been changed to incorporate routes along the significant ridges almost following the original trails (see Maps/Public Access).

For most users consulted, the creation of a management access track, effectively from Menstrie to Sheriffmuir, will provide a significant access resource, which with other access network opportunities on Kippendavie Estate, could allow users to travel from Menstrie to Dunblane almost entirely off-road. This received almost unanimous support from members of the public.

The designed access paths will be unplanted routes at least 6m across, but generally varying from 6m to 20m width. Those paths that can offer views have designed open vistas in consideration of the concerns the local community has to losing some of the views available on the site at present. In addition, the species design has been amended to include a greater proportion of broadleaved trees, to avoid “conifer tunnels” along these path

routes.

From the time the proposed ATV tracks and new bridge over the Wharry Burn are finished, the north of the site will be much more accessible to users and it is anticipated that recreational usage of this part of the property will increase. Access will be further improved when the tracks are upgraded to forest roads.

A further network of paths has been designed into the forest to allow access to the standing archaeological remains and the Local Authority Archaeologist has suggested that Clackmannanshire Council may provide and install interpretation boards. This will also create an interpretation resource on-site, encouraging users to explore an archaeology trail round the woodland.

The site of the Battle of Sheriffmuir is nearby and visible from Big Hunt Hill. The increased accessibility of the site through the roads may present an opportunity for an interpretation board taking in the wider landscape of the battlefield.

The Ochil Paragliders Club have requested Myreton Hill be left unplanted along with other parts of the south side of the property, in amongst the planned mixed amenity woodland areas. This has been taken into account and most of these have been facilitated to the point where there is mutual agreement regarding the provisional planting design (see Maps/Provisional Planting Design).

Overall, the change of ownership and direction of land management has created an opportunity to encourage responsible public access along existing defined routes and as a result of track creation.

With regard to the potential impact of loss of viewpoints from within Jerah Farm it should be noted that the altitudinal planting limit is circa 500 metres OD. However, prominent ridges and large lengths of the upper planting edge have been amended to include significant areas of diffuse shrub planting (clumps set within 50% open space). This will ensure that the upper edge of the woodland grades with the open hill in respect of distant landscape views of the site, but also that the hill tops remain open - both as areas of public resort and maintenance of views across the wider landscape.

Styles and gates will be incorporated into the fencing design following consultation and agreement with the Local Authority Access Officer. The proposed deer/rabbit fence enclosing the amenity planting area will be sited to avoid disrupting the skyline and to avoid creating a hazard to paragliders.

5.9.4 Predicted impacts on public access.

- No loss of public access to estate or surrounding hills.
- No loss of views from hill tops.
- Enhanced access and interpretation opportunities.

5.9.5 Mitigation of impacts on public access.

- Ensure access provision is taken into account in the iterative planting design process
- Accommodate access requirements by further consultation with the local community and the Local Authority Access Officer.

5.9.6 Statement of significance.

The impact of this project on public access is deemed to be positive and significant at the local scale.

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7. MAPS

7.1 Location Map

7.2 Concept Map

7.3 Provisional Planting Design

7.4 Proposed tracks

7.5 Aerial Photo

7.6 Archaeology – proposed planting design in relation to RCAHMS survey

7.7 Public Access

7.8 Geological Conservation Review site

7.9 Ochils AGLV

7.10 Sheriffmuir Historic Battlefield Site

7.11 Timber Haulage Route Map

7.12 Open ground and non-commercial woodland

8. TECHNICAL ANNEXES

- Technical Annex A: Archaeological Walk-Over Survey
- Technical Annex B: Landscape and Visual Impact Assessment
- Technical Annex C: Ecology
- Technical Annex D: Habitat Survey
- Technical Annex E: Ecological Site Classification
- Technical Annex F: Breeding Bird Survey
- Technical Annex G: Hydrology
- Technical Annex H: Protected species surveys
- Technical Annex I: Management of woodland edge habitats

Technical Annex A: Archaeological Walk-Over Survey

TECHNICAL ANNEX B: LANDSCAPE AND VISUAL IMPACT ASSESSMENT

TECHNICAL ANNEX C: ECOLOGY

TECHNICAL ANNEX D: HABITAT SURVEY

TECHNICAL ANNEX E: ECOLOGICAL SITE CLASSIFICATION

TECHNICAL ANNEX F: BREEDING BIRD SURVEY

TECHNICAL ANNEX G: HYDROLOGY

TECHNICAL ANNEX H: PROTECTED SPECIES SURVEYS

TECHNICAL ANNEX I: MANAGEMENT OF WOODLAND EDGE HABITATS

9. OTHER ANNEXES

9.1 Screening Meeting Report

9.2 SSSI Map and Citation

9.3 Employment Analysis

9.4 Toolbox Talks and other guidance

9.5 Area of vegetation types and impact of afforestation proposals

9.1 Screening Meeting Report

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