

Rushy Knowe Woodland Creation Kielder Forest



North England Forest District



Summary of proposals

The project comprises afforestation of two areas of rough, agricultural grazing land called Rushy Knowe and Mounces at Kielder Forest in Northumberland. For the purpose of the application the entire site is referred to as Rushy Knowe.

There has been very little new forest created on the Public Forest Estate (PFE) at Kielder since the forest was planted between the 30's and 60's. Our proposal to plant circa 100ha of new productive woodland represents an exciting opportunity to create a modern-day well-designed and financially viable area of public forest. This will contribute towards supporting a diverse ecology; support local businesses and employment, from the establishment phase through to harvesting when the trees have matured; contribute toward climate change reduction targets by locking up carbon in the trees as well as promote and enhance priority species and habitats such as red squirrels and blanket bog.

The establishment of new productive woodlands have a defined set of standards that we must comply with including the UK Forest Standard and Environmental Impact Assessment (EIA) criteria. This document aims to provide consultees with sufficient information about the site so that they can respond to our proposals as part of the informed EIA process. Where necessary our proposals will be adjusted based on information gathered from further site surveys and responses submitted as part of this consultation.

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1. Background Information

Location

The site is located approximately half way along the southern side of Kielder Water (NY65018899) with an easterly aspect overlooking the reservoir. The scheme area comprises Rushy Knowe (west of the public highway (C200)) and Mounces (east of the C200 down towards the shoreline). The total scheme area is 145ha.



Current land use

Rushy Knowe is freehold, owned by Forest Enterprise and until recently has been managed as rough grazing land as an agricultural tenancy under Higher Level Stewardship.

The photographs below indicate the current condition and nature of the site:

Northern end of site showing Hawkfirst Burn



Mounces viewed from Leaplish



Upper south west extreme of Rushy Knowe



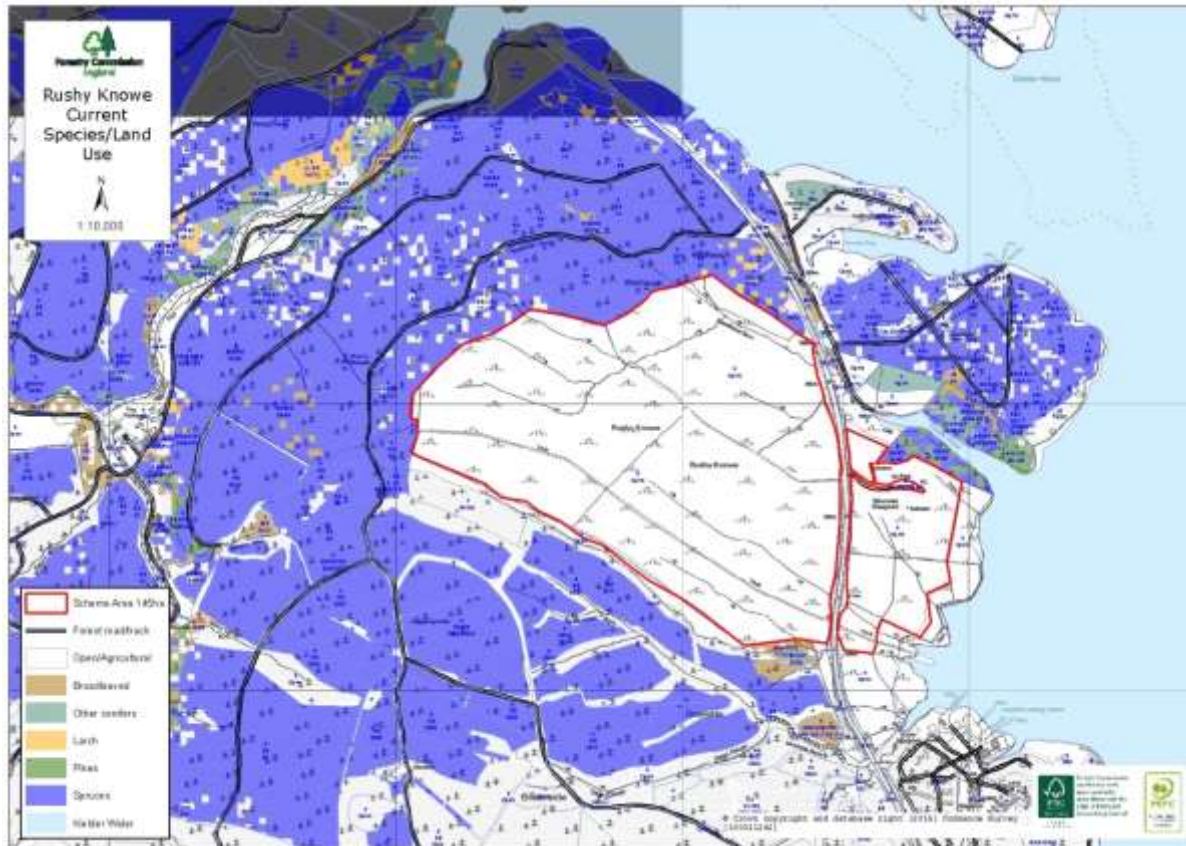
Rushy Knowe viewed SW from northern end of site



The adjacent public forest is managed according to an approved Forest Plan and consists predominantly of high forest with Sitka spruce as the principle component. The adjacent crops to the north of Rushy Knowe are managed under a Continuous Cover Management regime, to the south and west as clearfell and restock. A recently felled coupe to the south has been restocked in 2017 with Norway spruce.

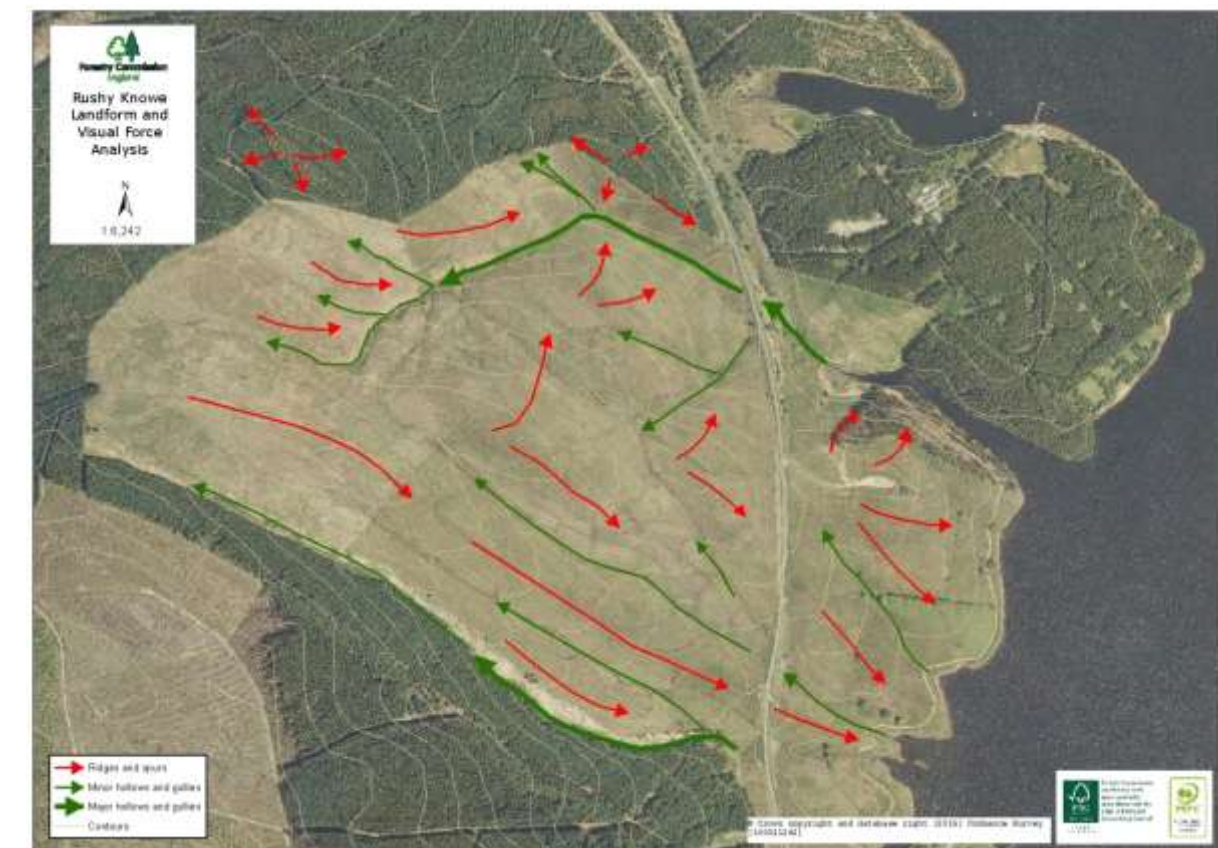
(east of the C200) the land falls away towards Kielder Water reservoir forming the upper edges of the 'in-bye land' for farms which are now under the water; the area thus representing characteristics of both moorland and 'in bye'. The upper slopes of Mounces are therefore more characteristic of the topography west of the C200.

Current Land Use



Visual force analysis

The technique of landform analysis is based on the concept of 'visual forces in the landscape'. It uses red and green arrows to express convexities and concavities in the landform (red arrows representing visual forces that 'draw the eye' down ridges and green arrows representing those that draw the eye up the valleys and gullies) as represented below for Rushy Knowe. Thickness of lines is used to indicate more dominant features such as Hawkthirst Burn at the northern end of the site.



Landform Analysis

The southern half of Rushy Knowe (west of the C200) slopes gently upwards from approximately 210m above sea level (asl) in the SE corner to 304m asl near the south west corner of the area and is entirely above the moorland line (the dividing line between 'in-bye' and moorland at around 200m). This area is dissected by two small watercourses, both of which issue from small areas of blanket bog. Both streams have moderately steep sides-slopes. The northern half of the area has a more complex topography and several tributaries of the Hawkthirst Burn run through this half, creating an area of ridges and steep burnside. For Mounces

Landscape Character Analysis

The site sits within the Northumberland County Council Landscape Character Assessment Areas 19a (Kielder and Redesdale Forests) and 19b (Kielder Water). The character of the forests landscape is dominated by rolling hills, rising from the relative shelter of the lakeside to the exposed moorland edges, with Deadwater Fell and Castle Hill prominent. Most of Kielder Forest is planted with conifers, primarily managed as a timber resource which has undergone significant restructuring in more recent years and on average more than a third of the planted area now comprises younger second rotation crops. Restocking is introducing greater species diversity as well as increasing the area of native broadleaved woodland. The landscape value of open areas such as Rushy Knowe is therefore less significant today within the wider forested landscape which incorporates a constantly evolving mosaic of open ground linked to the clear felling program.

As the landform is a dominant influence in the landscape the lines of visual force provide the main guidelines for achieving organic shapes of appropriate scale that relate to the landform character of the area. The scale and proportion of the planting will need to be tested and checked from different viewpoints.

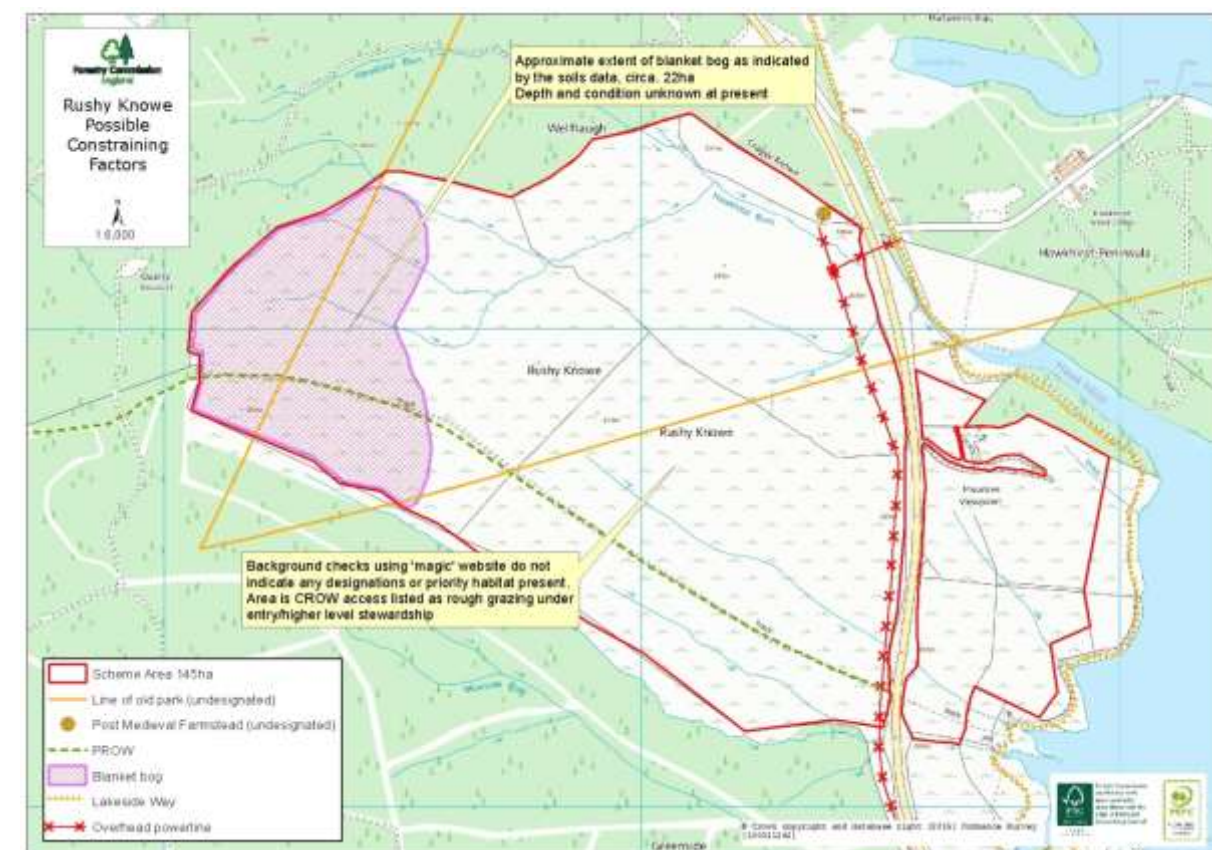
Historic Landscape

The area has a long history from ancient man through countless generations of ancestors who lived and worked in these hills with examples of bronze-age settlements, field systems and cairns and remains of iron-age settlements and hill forts found on the summits of many hills. The surviving remains from the medieval period, including deserted villages, bastles, field systems, shielings and enclosures, suggest a period of greater population and farming diversity prior to the 14th century. Being close to the Scottish border, this was 'frontier land' and centuries of royal wars between English and Scots and lawless feuding by the 'Border Reivers' contributed to an unstable and lawless region which drove people from the area. The wider area is crossed by ancient tracks and drove roads which, for centuries, were busy with herds of livestock being driven from Scotland to markets in the south. The Union of the Crowns in 1603 led to more settled conditions and from the late 17th century onwards large-scale commercial sheep farming began to emerge. Thus the rural landscape of the area has been transformed by human activity and in England one of the most striking locations of such anthropogenic change is Kielder Forest and Water. Since the 1930s a massive tree planting effort has created one of the largest man-made forests in Western Europe. During the

1970s the dam and reservoir were constructed in order to create a secure water supply for the industries at Teeside. As a result, Kielder has witnessed significant and dramatic environmental changes over the course of the twentieth century, as it was transformed from a pastoral, agricultural landscape, to that of a commercial forest and the addition of a large man-made lake. Although the significant 20th-century planting had a dramatic impact on the landscape this is now being reduced by more sympathetic rotation plans and the large-scale restructuring of forests as land management objectives shift towards the delivery of a wider range of ecosystem services.

The three main aspects of the design are a) determine the external shape as a whole in its landscape setting using the VFA, LCA and historic context, b) species design within the broad outline (to meet UKFS and principle project objectives) and c) plan open spaces (using other site information such as historic features, habitat, access and utilities).

Other site information



(Data source: Forestry Commission GIS local datasets)

Historic features – Two undesignated features are listed for the site: an enclosure on the northern boundary and two lines of an old deer park. Initial walk over assessment did not identify these features on the ground and clarification of existence is detailed in the Assessment of the Historical Environment.

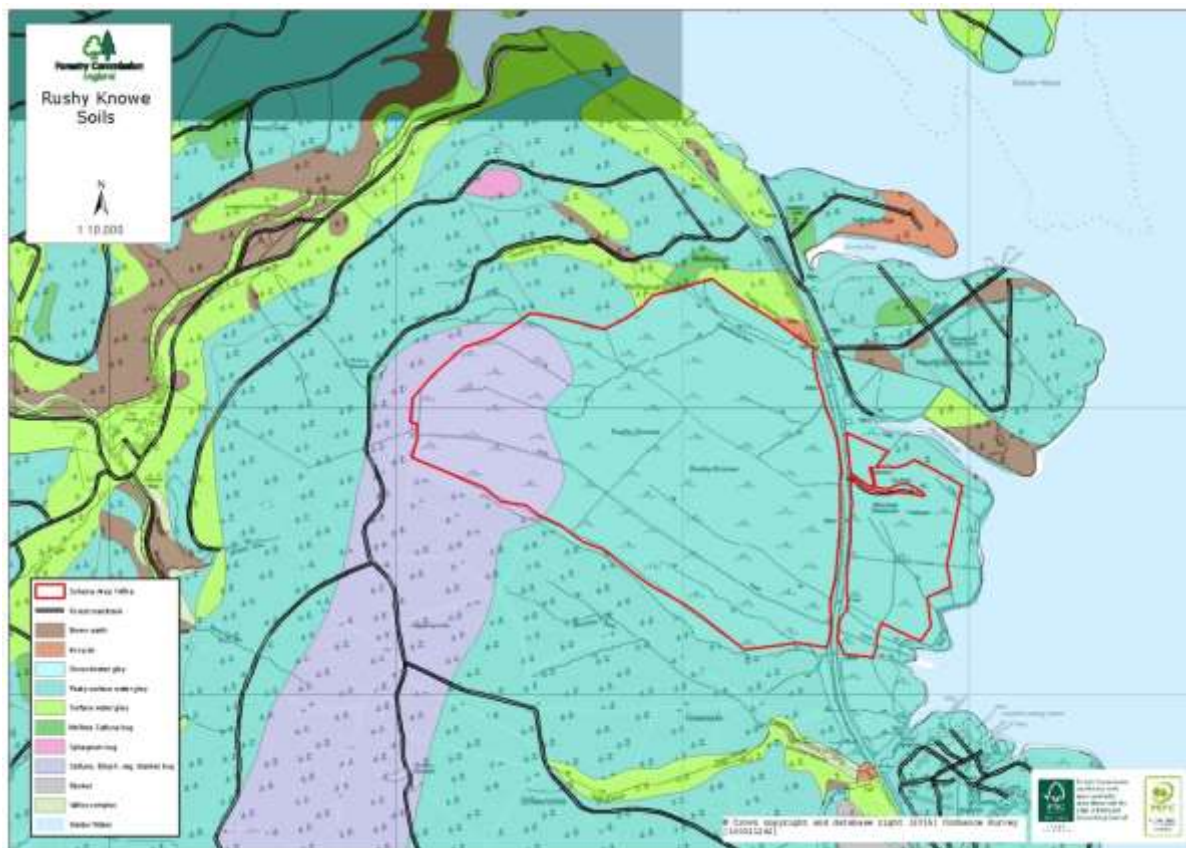
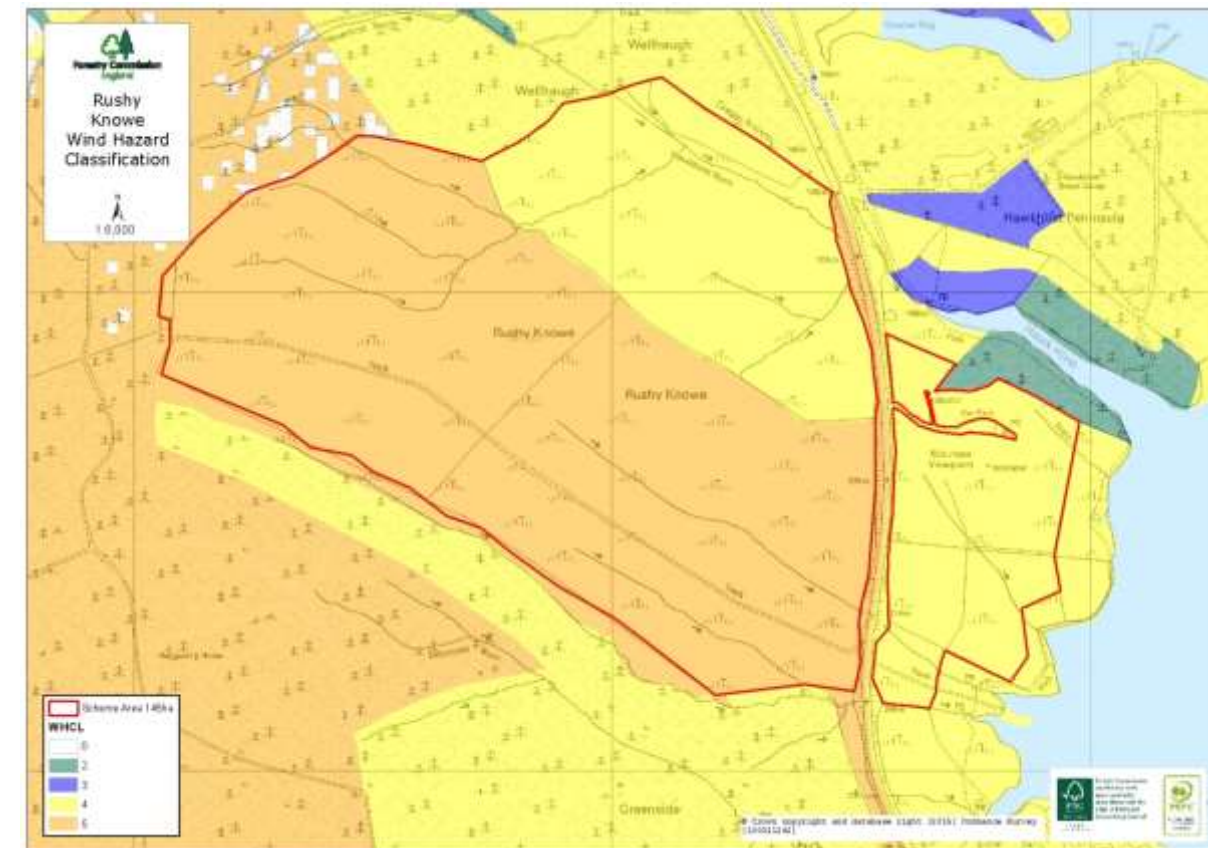
Access – Countryside Right of Access (CRoW) land listed previously as rough grazing under entry/higher level stewardship. A public footpath passes through the southern part of the site. The Lakeside Way, which follows the shoreline of Kielder Water, is also adjacent to the project area.

Services – An overhead powerline running parallel to the C200 passes through the eastern extreme of Rushy Knowe.

Habitats/ground conditions - The Forestry Commission soils dataset indicates peaty surface water gleys as the main soil type with an area of blanket bog across the west part of the site. Initial assessments suggest that the soils data does not correlate with the site habitat and therefore the accuracy of the data needs to be assessed. This is clarified in Section 3. There are no areas of statutory designation on site

Wind Hazard Classification (WHC) - is an indication of the windiness of the site. Areas of high scores above 4 are more restricted in forest management objectives such as the ability to thin or extend the rotation length of the crop. The entire site is in the higher 4 to 5 range which suggests non-thin clearfell and restocks as the most suitable management regime. However, local knowledge indicates that there may be more opportunity at Mounces east of the C200 and the lower eastern parts of Rushy Knowe for Lower Impact Silvicultural Systems in the future such as continuous cover management or long term retention.

Wind Hazard Classification



2. Plan Objectives

The primary objective of the proposal is to create a well-designed, productive and resilient area of public forest that delivers high natural capital value and is UKFS compliant.

The proposal will also promote and enhance the biological, ecological and historical values and features of the site and the wider landscape

3. Analysis

Requirements / Constraints / Issues / Considerations	Details
UKFS	<p>The UK Forestry Standard (UKFS) is the reference standard for sustainable forest management across the UK, and applies to all woodland, regardless of who owns or manages it.</p> <p>The standard ensures that international agreements and conventions on areas such as sustainable forest management, climate change, biodiversity and the protection of water resources are applied in the UK.</p> <p>The UKFS outlines the context for forestry in the UK. It sets out the approach of the UK governments to sustainable forest management by defining requirements and guidelines, and providing a basis for regulation and monitoring - including national and international reporting.</p> <p>The Standard covers key different elements of sustainable forest management:</p> <ul style="list-style-type: none">• biodiversity• climate change• historic environment• landscape• people

	<ul style="list-style-type: none">• soil• water <p>The planting proposal will comply with the requirements set out in the Standard including site design, composition and species %s.</p>
Priority habitats and species	The planting proposal will identify areas of priority habitat and species, consider their condition and requirements and will be designed with these considerations in mind, seeking guidance and advice from relevant bodies i.e FS and NE as required.
Historical features	The planting proposal will identify historical features on site, consider their condition and requirements and will be designed with these considerations in mind, seeking guidance from consultants and relevant bodies as required.
Landscape impacts (views)	The planting proposal will identify key landscape views both within the site looking out and outside the site looking in. The proposal will consider their condition and requirements and then will be designed with these considerations in mind, seeking guidance from consultants and members of the public / stakeholders as required.
Access – for public and operations	<p>Access to site will need to be considered during the concept design. Proposals should promote access where possible.</p> <p>The planting proposal will identify existing access infrastructure both within and adjacent to site. The proposal will consider their condition and requirements and will be designed with these considerations in mind, seeking guidance from colleagues and stakeholders.</p> <p>The planting proposal will also identify future operational access requirements to the site and include these in the design.</p>
Establishment / Protection	The planting proposal will identify the methods for establishment including ground cultivation, drainage and crop protection and consider any potential impacts

	that these could have on the features listed above. The proposal will be designed with these considerations in mind, seeking guidance from colleagues and relevant bodies i.e. FS.
Opportunities for improvements	The planting proposal will identify opportunities to make improvements / enhancements to features listed above. The proposal will be designed with these opportunities in mind where it is considered possible to deliver.

Summary of data searches and surveys

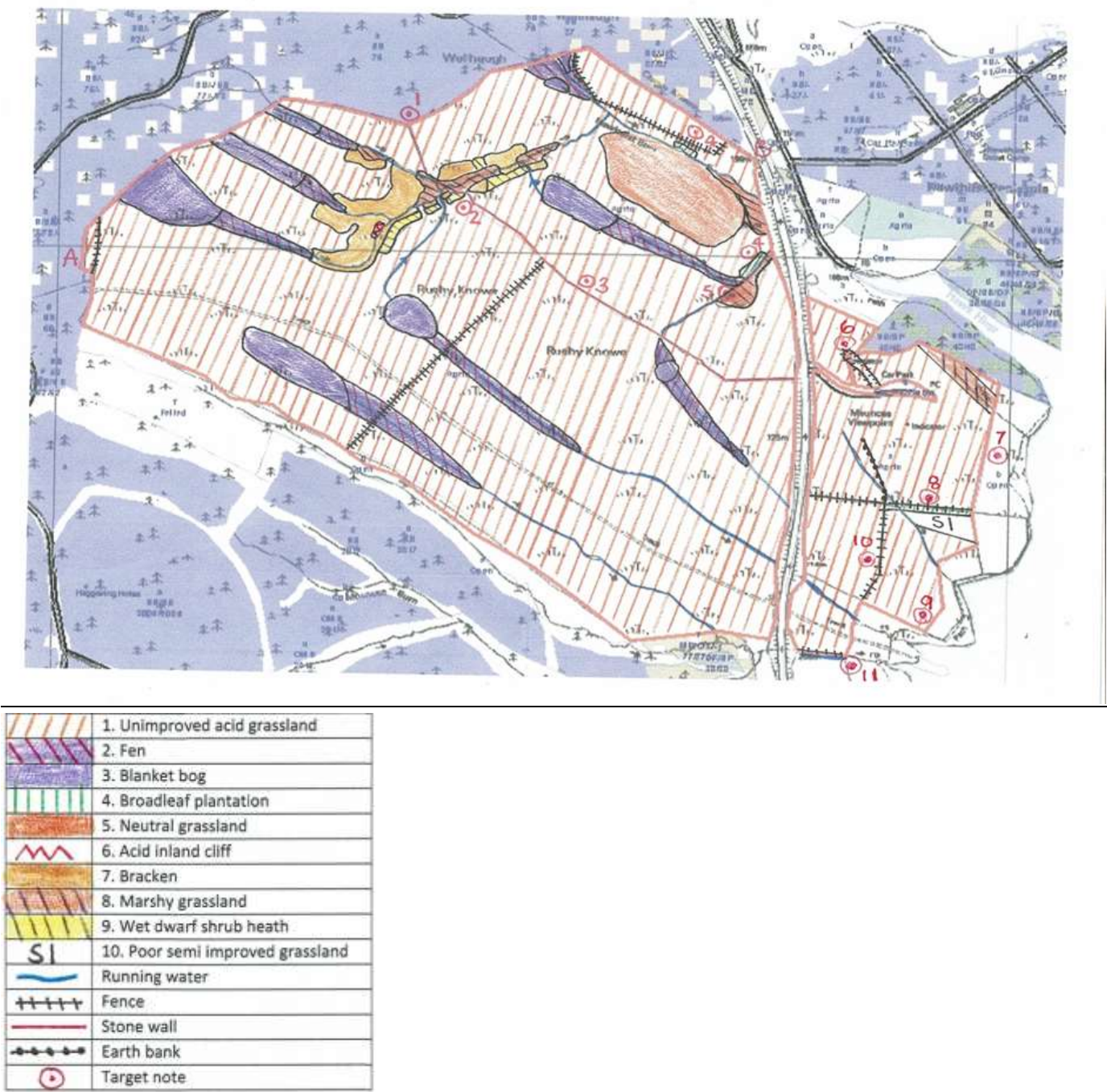
Feature	Details	Constraint	Opportunity
Scheme area	>50ha	EIA screening required	Demonstrator site
Sensitivity	Low		Consultation
Statutory designations	None		
Priority Habitat	Blanket bog	Deep peat >50cm cannot be planted	Habitat diversification
	Northern part of site (Hawkhirst Burn) identified in Countryside Stewardship as an area of high priority for woodland creation	Priority habitats cannot be planted	Phase 1 and vegetation survey to confirm presence and details Incorporate native broadleaved species into scheme where appropriate
Priority Species	Red squirrel reserve		Enhance reserve and increase connectivity
	Birds – snipe and black grouse listed as present (2005-2009 data) plus potential for other species	Presence of certain species could affect planting proposals	Bird survey, both spring/summer and winter to confirm presence and details Planting plan to consider populations present

Water Quality	Medium risk impact for water quality, surface water nitrate, sediment and phosphate issues. Low risk impact for surface water acidification and low spatial priority flood risk		UKFS compliant woodland that meets the requirements of industry best practice Forest and Water Guidelines has the potential to enhance the present site condition.
Historic features	Non-scheduled features identified from Northumberland Historic Environment Record	Presence of certain features could affect planting proposals	Historic environment survey to confirm presence and details
Public access	Public right of way	Keep 5m buffer unplanted along footpath	Opportunity for on-site interpretation of scheme
Survey	Phase 1, Vegetation Survey and soil depth transects	Blanket bog, deep peat lenses and fen habitat identified across site will not be available for planting. Area of 'neutral grassland' identifies native woodland remnant flora. The valley floor and flushes on the valley sides of the Hawkhirst burn contain good quality tall herb vegetation.	Habitat diversification Native woodland and species diversification Keep as open ground High percentage of the site area classified as unimproved acid

	Bird survey	Variety of birds found present on site including birds on Red and Amber species status list	<p>grassland is suitable for afforestation.</p> <p>Majority of species present are using existing trees/features which will be protected. Although certain species are on status list, they are fairly common in the context of Kielder Forest and benefit from the changing forest landscape which occurs</p> <p>Opportunities to improve / enhance habitats will be explored including:</p> <ul style="list-style-type: none"> - Creating shallow scrapes in fen areas to provide potential habitat for waders.
	Historic feature survey	Un-scheduled features present on site	<p>Features easily protected by keeping unplanted. Historic landscape recognised and incorporated into design</p>

Copies of full survey reports can be viewed on request

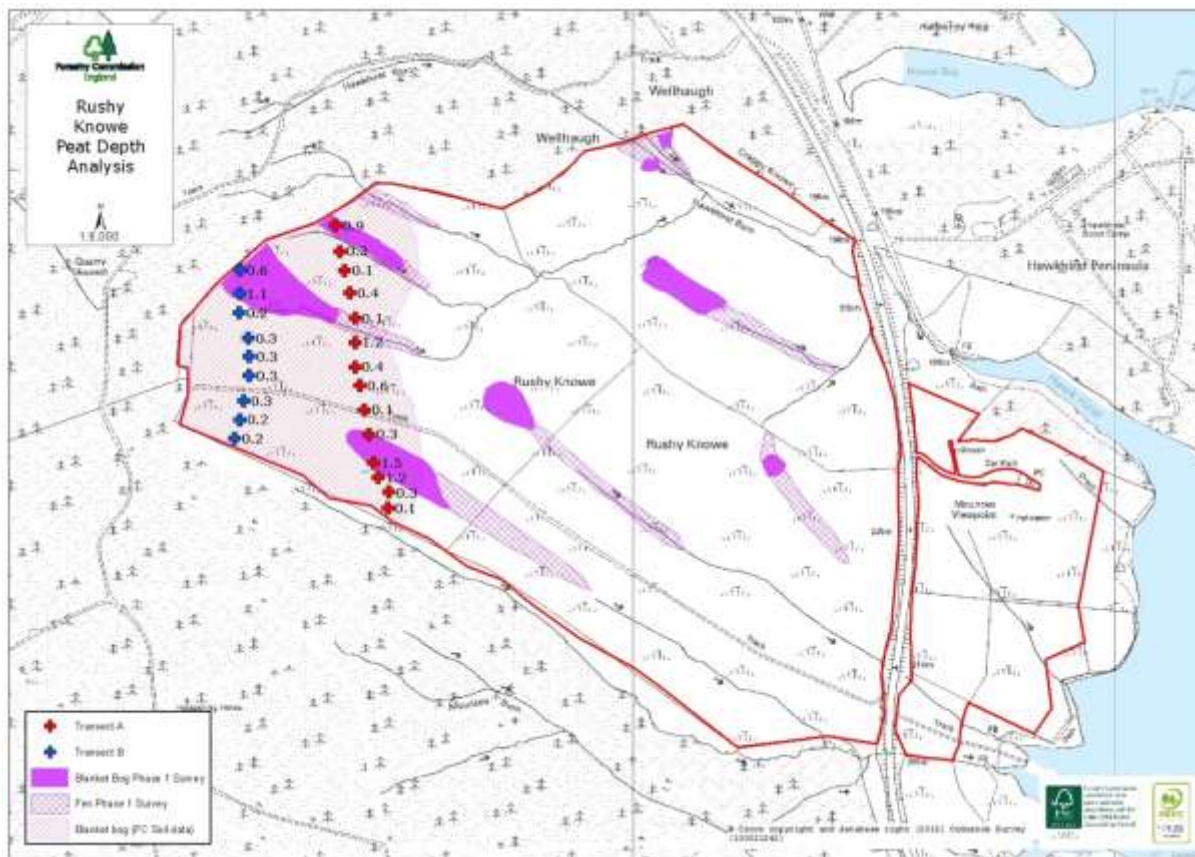
Phase 1 map (updated version following Vegetation Survey June 2018)



The most significant outcome of the Phase 1 survey was the disparity between the FC Soils data and the identified and mapped areas of priority blanket bog habitat. To confirm the integrity of the survey an additional overburden survey of the area identified in the soils data as blanket bog was undertaken, the results for which are shown below. Peat depth correlates with the Phase 1 survey confirming the

inaccuracy of the soils data in that specific area which is characteristic of the unimproved acid grassland found elsewhere on the site. The recorded priority blanket bog and associated downstream fen habitats have been used to identify appropriate areas of open ground in the draft planting proposals outlined below.

Overburden survey

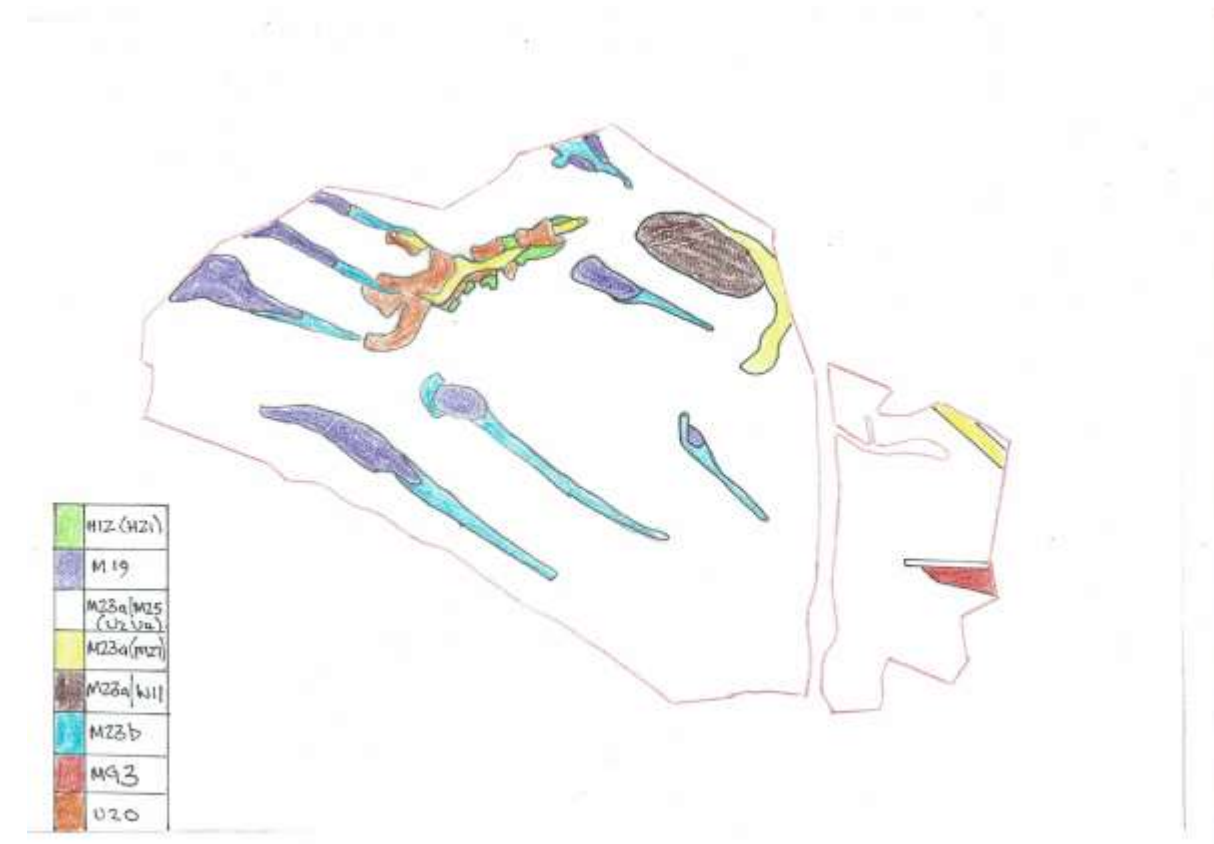


Further transect surveys were also carried out across the rest of the site to ensure there was confidence in the data which is held. As expected the transects showed deeper peats in the priority habitat areas and shallower peats / peaty gleys across the rest of the site

Additional transect surveys



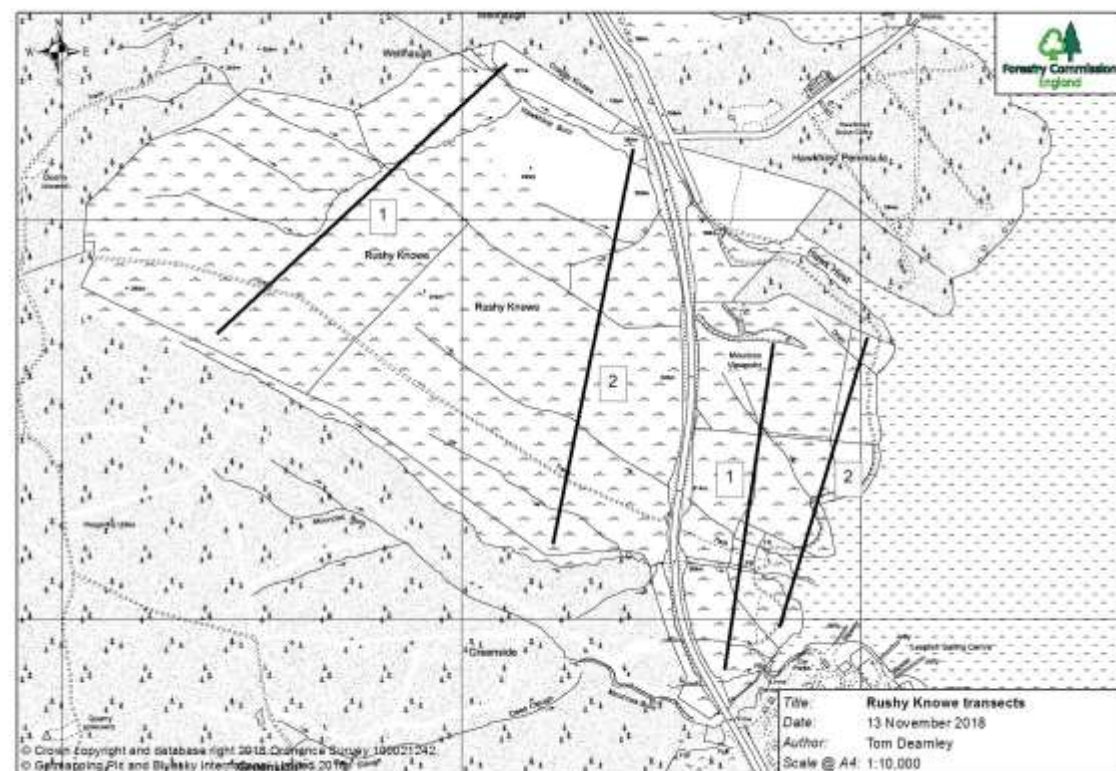
NVC survey map



A summary of the main recommendations is given below:

- The blanket bog deep peat lenses, should remain unplanted along with the fen areas which are linked hydrologically and act as natural soakaways from the deep peat. If budgets and logistics allow, using ground preparation machinery to block ditches on the bogs and fens will be a great help in improving the quality of the bogs.
- The valley floor and flushes on the valley sides of the Hawkthirst burn either side of the internal wall should left open as these areas contain good quality tall herb vegetation.
- The area mapped as neutral grassland has what appears to be a remnant woodland flora and would be worth planting with native broadleaves.

Bird Survey



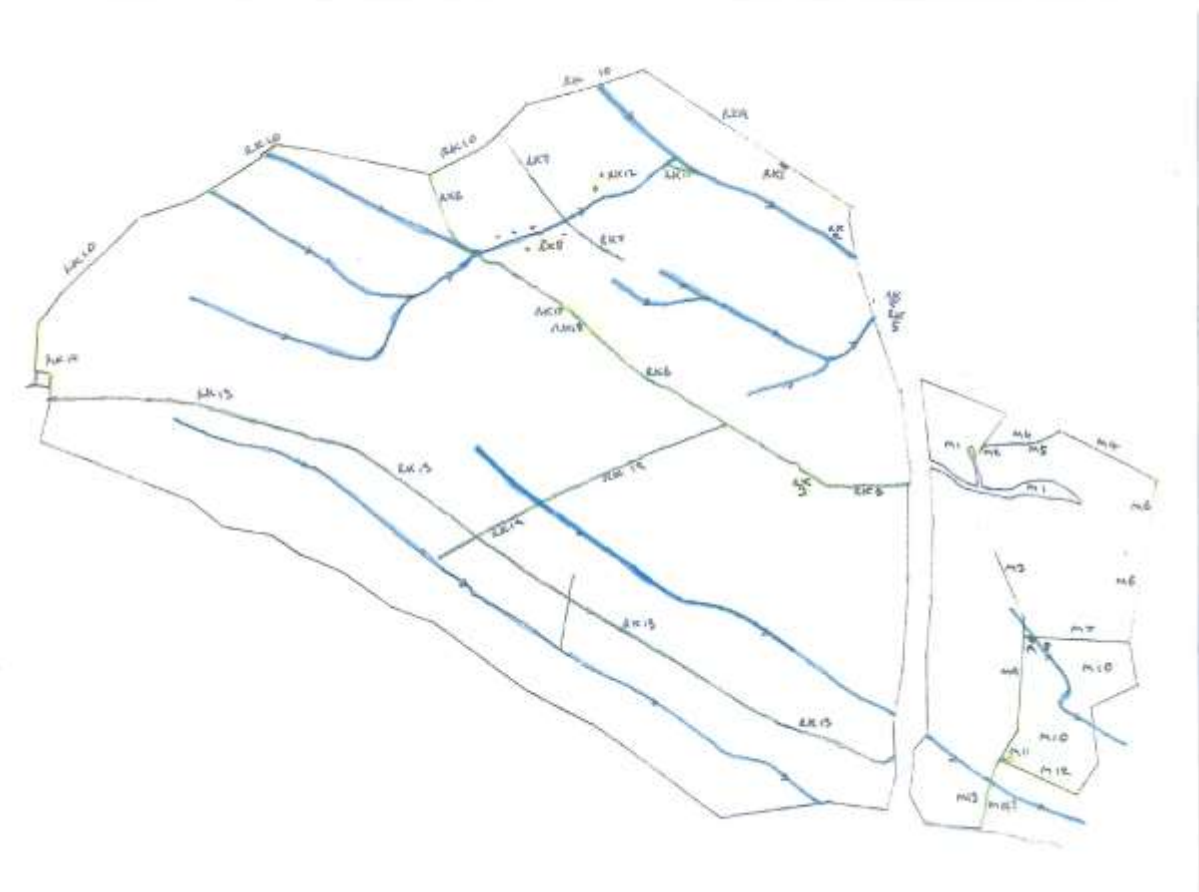
Summary – Rushy Knowe 2018 bird survey

Spring and summer bird surveys recorded a range of species which were expected to be present. The habitat has limited diversity, though the connection to a wide

range of other habitats outside of the Rushy Knowe area, ranging from semi-urban to forest and upland moor, ensures that birds such as hen harrier and osprey were also recorded.

The planting proposal would inevitably see a change in some bird species recorded as the farmland would gradually succeed to a mosaic of different woodland types and open habitat. Some species are likely to increase and others, such as skylark would reduce. However on the exterior of Kielder Forest, the dominant habitat type is the converse to forest, being largely moorland composed of acid grassland, heath and some in-bye land, where skylark will remain in reasonable numbers. Overall the survey recorded a range of species, many of which are reflective of the landscape as a whole than being highly depended on the specific habitat currently provided by Rushy Knowe.

Heritage Survey – Assessment of the historic environment interest of the scheme

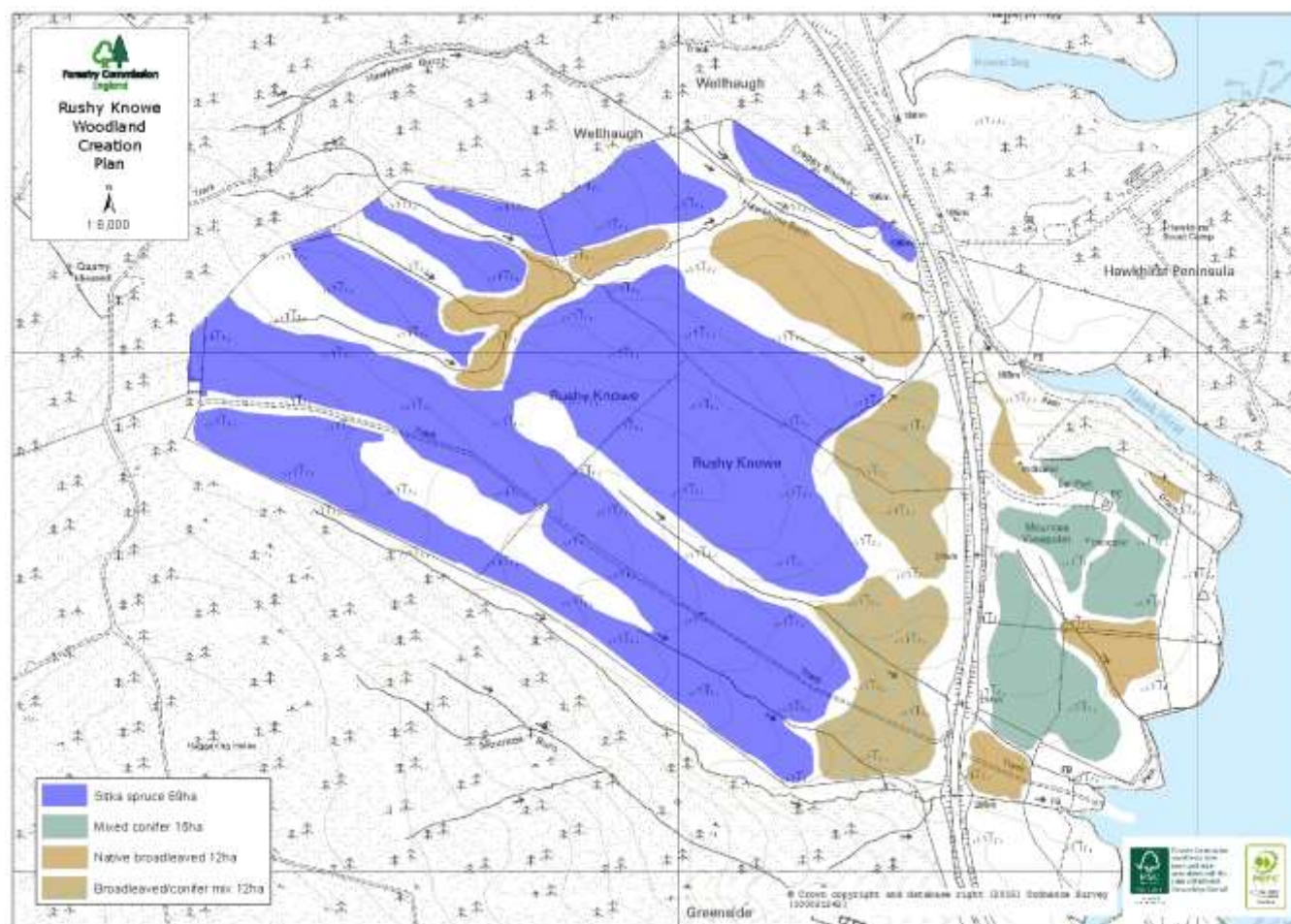


Recommendations

The walk-over survey and historic literature research identifies the main historic interests associated with the former Swinburne estate and the agricultural land

use. These non-scheduled features include some surviving field boundaries, old road (now the line of the public footpath), small scale coal workings and the former site of a post medieval farmstead (no longer visible on the ground). These features should not be absorbed by planting and remain open. The historic agricultural landscape character could be protected by incorporating areas of open space or open woodland habitat, particularly in the Mounces part of the scheme.

4. Initial design concepts



The initial design concepts are relatively simple in terms of species choice. This is to reflect the expansive landscape in which the scheme area sits, with spruce on the higher and mid elevation at Rushy Knowe, grading into mixed broadleaf and conifer species at the lower elevation towards the C200 with locally native broadleaf species adjacent to Hawkthirst Burn. The concept uses the visual force landscape design principle whereby broadleaves are focused on the rising hollows and gullies and conifers on the downward ridges and spurs. At Mounces a more

diverse mixture of conifer, native broadleaved species and open ground is proposed incorporating Scots pine, alternative spruces such as Norway and Serbian spruce and firs. The proportions are 65% Sitka spruce, 15% other conifers and 20% broadleaved which exceeds UKFS requirements. The Phase 1 and vegetation surveys plus NVC report have identified the appropriate areas for priority habitat protection and focus for native woodland planting and open space.

Species choice, stocking density, cultivation and protection

The main productive areas of Sitka spruce will be planted at a density of 2700/ha using appropriate ground cultivation. No protection required. The areas of mixed broadleaved and conifer will incorporate native broadleaves and mixed conifer species such as Scots pine at a 70(MB):30(MC) ratio. These areas will be protected by deer fencing. The mixed conifer areas east of the C200 will be established at 2700/ha using appropriate ground cultivation and protected by deer fencing. Ecological Site Classification (ESC) indicates suitable species could include Norway and Serbian spruce, Scots pine and Douglas fir. The areas of broadleaf planting will be clumpy blocks or widely spaced at a density of 600stems/ha and protected using tree shelters. ESC indicates native species could include birch, alder, willow, hawthorn and a small percentage of oak.

A suitable buffer around priority habitats and riparian corridors will be incorporated into the planting design. In places this will include the planting of scrub vegetation to enhance this habitat. Planting will be kept back a minimum of 5m from the public right of way and around the location of the historic features identified in the survey.

Feedback from initial consultation based on initial design

Consultee	Date consulted	Comments/issues	Our response
Kielder Water and Forest Park Partnership	18/6/18	<p>Hi Kevin, Sorry for the delay in getting back to you. I've now had chance to talk with David about your proposals, and we are happy with the proposal for planning to the west of the C200. However we wondered if you could look at the proposed planting layout of the smaller area to the east of the C200. Currently if you drive from Kielder Castle towards Kielder Waterside there are excellent open views across Kielder Water and we wouldn't want to lose these. Is there a way that the planting of this area could be adjusted to leave part of it clear so that the views from the C200 across the lake are unaffected? Let us know what you think. I'm happy to ask Heidi about putting this on the Board agenda for discussion- it would be helpful if I could share this at my pre-meeting with her, so she knows what is being proposed. Would this be ok? Best wishes, Lynn Turner</p>	<p>The final planting proposal has been changed to incorporate more open space and widely spaced open broadleaved habitat at Mounces to retain open views of Kielder water from the C200.</p>
Northumberland Water	30/8/18 – Peter Pattinson	<p>Informal meeting, general comments were:</p> <ul style="list-style-type: none">- very supportive of proposal- good link to future activity- only concern would be the view from the C200- Will take back to local team to discuss further	<p>The final planting proposal has been changed to incorporate more open space and widely spaced open broadleaved habitat at Mounces to retain open views of Kielder water from the C200.</p>
	13/9/18 – Local	<p>Hi Mark, Thanks for the opportunity to comment on your draft plan for Rushy Knowe. I've attached your</p>	<p>Final planting</p>

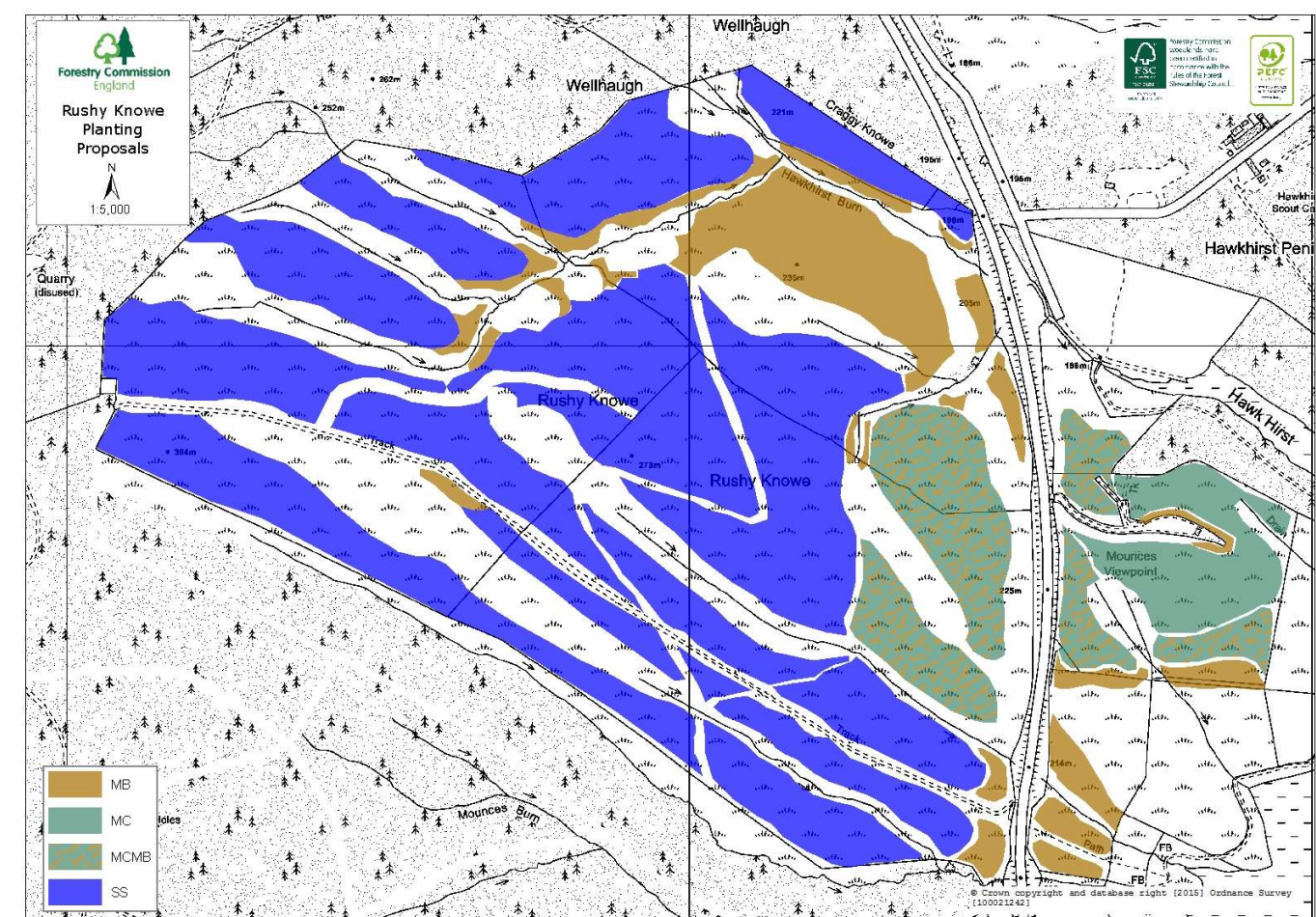
	NWL team	<p>plan with a few markups basically suggesting:</p> <ul style="list-style-type: none">• Avoiding where possible planting conifers along watercourses• Additional broadleaf planting to link up and create better connected broadleaved woodland – I think this will also create a better look along the eastern edge of the conifer compartments located on the east side of the road• Suggested conifer/broadleaf mix along one of the conifer blocks to improve aesthetic look (similar to views from south side of Kielder Waterside Park)• Measures to ensure existing hedge feature is protected (this might be an important historical hedge feature?)• Reduced broadleaf planting in one compartment to retain what should become sheltered south facing open grassland (good for reptiles/invertebrates) <p>Regards, Stuart</p> <p>Hi Mark,</p> <p>Gary has also commented:</p> <p>On the whole I am happy with the proposal and think it will create a more pleasing view for guests staying in the lodges. From an environmental view I am curious as to why the FC are planting either solidly broadleaf of conifer below the road. Aesthetically, I would be in favour to plant the area below the road with only broadleaf woodland, that way there is a greater are for a number of historical species to use the area for breeding etc. Additionally, the area already has mature broadleaf trees in which shows what that land used to be like. Finally the view onto that area in autumn would really be striking with yellows/oranges of autumn. There is an opportunity to open Mounce's car park as a viewpoint and also have some interpretation boards there explaining why the area has been planted and what the benefits are.</p>	<p>proposal has changed to avoid planning conifers directly along watercourses. The additional broadleaf areas have been recognised where they are within the scheme area. Other areas identified our outside of the scheme and land is managed by NWL</p>
Kielder Parish Council	3/9/18	<p>Meeting with Parish council. Generally happy with proposals, only concern was</p>	<p>The final planting proposal has been changed to</p>

		view from C200	incorporate more open space and widely spaced open broadleaved habitat at Mounces to retain open views of Kielder water from the C200.
Falstone Parish Council	4/9/18	Meeting with Parish council. Generally happy with proposals, only concern was view from C200. Also suggested other potential planting ideas linked to Christmas trees	The final planting proposal has been changed to incorporate more open space and widely spaced open broadleaved habitat at Mounces to retain open views of Kielder water from the C200. Site access and security not suitable for Christmas tree production. Plan will not include this.
Hawkhirst Scout Camp	10/8/18	Informal meeting, general comments were: <ul style="list-style-type: none"> - Very supportive of proposal - Good links to potential wildlife activities in the future - Would support community engagement where possible 	

Northumberland County Council	9/11/18		
Natural England	2/11/18		
Northumberland National Park	25/9/18	Informal meeting, general comments were: <ul style="list-style-type: none"> - Supportive of proposal - No issues at time. 	

5. Proposed design

Based on the analysis, surveys and feedback from the initial design consultation the current design proposal is



Requirements / Constraints / Issues / Considerations	How the proposed plan considers these factors
UKFS	<p>The Plan is fully compliant with UKFS requirements.</p> <p>The composition of the site is:</p> <ul style="list-style-type: none"> - 43% productive conifer (sitka spruce) - 36% open ground (inc priority habitat areas) - 10% native broadleaf (inc birch, rowan and willow) - 8% mixed woodland (70%BL / 30%MC) - 3% other productive conifer (inc Scots pine, Norway spruce and Douglas fir) <p>The design is sympathetic to the surrounding landscape utilising land form and identifying key habitats and areas of important landscape features.</p>
Priority habitats and species	<p>Priority habitats have been identified and have been kept clear of planting. An additional buffer around them has also been created. Drainage systems across the site, where possible, will be directed towards these features to enhance the habitat.</p> <p>Priority species have been identified and considered in site design, including habitat improvement</p>
Historical features	<p>Historical features have been identified and have been kept clear of planting. An additional buffer around them has also been created.</p>
Landscape impacts (views)	<p>Key landscape features have been identified and kept clear of planting. Designs have also been run through prospect 3d which gives a clear indication of how the site will develop and appear in the future.</p>
Access	<p>The PROW which runs through the site will be improved to enable its use for light vehicles during the creation stage. Sections of the route will also be upgraded so they are suitable to use for haulage in the future.</p> <p>A new link section of road will be created which will link the PROW to the main forest road network on the western boundary.</p> <p>A new section of road will also be created improving access from the PROW to the middle of the site.</p>

	The lakeside way should not be affected by the woodland creation.
Establishment / Protection	<p>The first operation will be to top the existing vegetation on site. The area will then be cultivated appropriately to the relevant planting designs (productive – 2700 stems/ha habitat/native approx 600 stems/ha but irregular spacing).</p> <p>Drainage and temporary access tracks will also be created to improve the establishment of the trees. Deer fencing will also be used around some of the mixed conifer/woodland elements to ensure their successful establishment.</p> <p>Ground cultivation and drainage will comply with UKFS guidelines and will be closely monitored during the operation.</p>
Opportunities for improvements	<p>During the operations listed above there will be opportunities to improve access and habitats.</p> <p>Opportunities for improvements include:</p> <ul style="list-style-type: none"> - Where possible, block old drains and create a series of shallow scrapes in areas of fen to enhance the hydrology and develop future standing water and transitional wetland habitat - Direct new on site drainage into the bog and fen habitat areas to ensure continued source of water - A significant area of native broadleaved woodland will be established adjacent to Hawkthirst Burn where remnant native woodland flora is present and in areas of bracken in the upper reaches of the burn - Some beech will also be planted next to the row of mature beech trees so that this feature will continue to exist into the future - Organically shaped coupes to create future wind firm edges give the potential for future continuous cover management systems - The site has good potential as a future water vole site following the successful release of water voles at Kielder in recent years

	<ul style="list-style-type: none">- A suitable buffer around priority habitats and riparian corridors will be incorporated into the planting design; in places this will include the planting of scrub vegetation to enhance this habitat- Access to the site will be improved through the upgraded track/PROW which will service the access requirements of the site as well as providing benefit to members of the public visiting the area- The important view of Kielder Water from the C200 will be maintained and enhanced with trees providing a “framed” effect of the view towards the dam and valve tower- The planting design will provide additional habitat for the iconic and protected species present in Kielder- The productive mixed woodland elements will provide a range of future products from traditional logs to biomass and wood fuel.
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