A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010059

6.7 Ancient Woodland Strategy (Clean)

Rule 8(1)(c)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

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Infrastructure Planning

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The A1 in Northumberland: Morpeth to Ellingham

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Ancient Woodland Strategy (Clean)

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CONTENTS

FIGURES

APPENDICES

EXECUTIVE SUMMARY

This Ancient Woodland Strategy has been prepared in response to impacts to ancient woodland habitat as a result of Part A of the proposed A1 in Northumberland: Morpeth to Ellingham scheme (the Scheme). Part A includes approximately 6.1 km online widening and approximately 6.5 km of new offline highway between Morpeth and Felton. The aim is to improve journey times and safety along the route.

The DCO application for the Scheme was accepted by the Planning Inspectorate for examination on 4 August 2020 on behalf of the Secretary of State for Transport. The Scheme proposes a new bridge over the River Coquet, which would result in the loss of ancient woodland (both designated and adopted, as detailed within this strategy).

The Ancient Woodland Strategy has been updated to address a comment received by the Examining Authority during DCO hearings in February 2021 relating to the term 'Overseeing Organisation' with regards to monitoring and management, which has now been removed to be consistent with the Environmental Statement. The Ancient Woodland Strategy has also been updated to confirm that the proposed woodland creation would be retained in perpetuity, following a comment from Natural England.

The Scheme has been designed to avoid, as far as possible, the loss of ancient woodland. However, no suitable alternative has been identified to completely avoid impacts. In addition, mitigation through Scheme design and construction methods/actions would only partially address the impacts to ancient woodland. As such, compensation to address impacts to ancient woodland is required. It is acknowledged that compensation is considered a last resort, that ancient woodland is irreplaceable, and the quality of the compensation habitat would be inferior and would take years to establish.

Several limitations have been identified to achieving the objectives of this strategy. These are detailed within this document and have been considered during the development of the strategy.

In total, 0.68 ha of ancient woodland (of which 0.27 ha is designated and 0.41 ha is adopted, as detailed within this strategy) would be impacted by the Scheme and 8.16 ha of woodland planting (including rides and glades) is proposed ('Woodland Creation Area'), a 12:1 ratio in terms of planting to loss. There is no set ratio for woodland compensation in relation to ancient woodland, with assessments made on a case-by-case basis.

A range of techniques would be employed to establish the Woodland Creation Area, including: preparation of the Woodland Creation Area (soil analysis and manipulation), the salvage/translocation of ancient woodland material (such as soil, saplings and ground flora), the establishment of a hay meadow ground flora and woodland tree planting.

Following establishment, suitable and long-term management would be undertaken within the Woodland Creation Area, tailored in accordance with ongoing monitoring, for a minimum period of 50 years.

This document provides an account of the proposed strategy to address impacts to ancient woodland as a result of the Scheme. The strategy has been developed in consultation and collaboration with Natural England. Finer details of the strategy shall be developed at the detailed design stage (identified within this document), with any deviation from the strategy to be further discussed and agreed with Natural England (and other appropriate statutory consultees).

1. INTRODUCTION

1.1. BACKGROUND

1.1.1. An Ancient Woodland Strategy has been prepared in response to impacts to ancient woodland habitat as a result of Part A of the proposed A1 in Northumberland: Morpeth to Ellingham scheme (the Scheme).

1.1.2. Part A aims to increase capacity along an approximately 12.6 km section of the existing A1 between Morpeth and Felton in Northumberland, by widening the single carriageway to a dual carriageway. It includes approximately 6.1 km online widening and approximately 6.5 km of new offline highway. The aim is to improve journey times and safety along the route.

1.1.3. In England, ancient woodland is defined as an area that has been wooded continuously since at least 1600 AD. The ancient semi-natural woodland present within the Scheme area is described within Standing Advice by Natural England and the Forestry Commission as woodland "*mainly made up of trees and shrubs native to the site, usually arising from natural regeneration*" (**Ref. 1.1**).

1.1.4. Ancient woodlands are complex ecosystems that take hundreds of years to establish. Because of this, they are considered to be an irreplaceable habitat.

1.1.5. As part of the Scheme, a new bridge over the River Coquet is proposed in parallel to the existing bridge (existing bridge crosses the river at Ordnance Survey grid reference NZ 17437 99798). The River Coquet and its southern embankment at the proposed location of the new bridge are located within the River Coquet and Coquet Valley Woodlands Site of Special Scientific Interest (SSSI). The woodland supported by the southern embankment, Duke's Bank Wood, is also designated as ancient semi-natural woodland.

1.1.6. The woodland slopes to the north of the River Coquet support semi-natural broadleaved woodland (Mill Banks) that is part of the non-statutory Coquet River Felton Park Local Wildlife Site (LWS). Whilst not designated as ancient woodland, Mill Banks exhibits ancient woodland character and supports Ancient Woodland Indicator (AWI) species.

1.1.7. This report is intended to document the strategy developed to address the potential impacts[1] upon ancient woodland arising as a result of the Scheme. While it is accepted that ancient woodland is an irreplaceable resource, the terms 'mitigation' and 'compensation' in the context of this strategy represent the following:

[1] Including both direct loss and indirect impacts (temporary or permanent).

a. Mitigation - the methods, processes and actions put in place to reduce and/or minimise the potential impacts of the Scheme on ancient woodland, which in turn would result in retention of ancient woodland where possible.
b. Compensation - those physical measures that would be carried out to address potential impacts associated with the direct loss of ancient woodland or temporary and permanent indirect impacts that would have a significant impact on ancient woodland.

1.1.8. Where potential impacts upon ancient woodland cannot reasonably be avoided (with mitigation), the Applicant is committed to provide compensation to address such impacts.

1.1.9. Compensation includes the establishment of new woodland ('Woodland Creation Area') within which there would be an area receiving material salvaged from the woodland that is lost to the Scheme ('Receptor Area'). Both areas are shown on **Figure 1**.

1.1.10. This strategy does not seek to define national policy regarding avoidance, mitigation and compensation for ancient woodlands; it represents a scheme specific approach based upon the predicted potential impacts of the Scheme which has been determined by the application of ecological expertise and appropriate professional judgement. This strategy addresses the potential impacts upon ancient woodland arising from the proposed new River Coquet Bridge only. The objective of the strategy is to identify potential impacts to the ancient woodland that may arise as a result of the Scheme and provide suitable avoidance, 'mitigation' and 'compensation' measures to address these impacts.

1.1.11. Impacts upon other ecological receptors are addressed within the Environmental Statement (**Chapter 9: Biodiversity** of Volume 1 of the ES (**Application Document Reference: TR010041/APP/6.1**)).

1.2. DESIGNATED SITES

1.2.1. The woodland on the southern side of the River Coquet within the Order Limits of the Scheme, as well as the river itself, falls within the River Coquet and Coquet Valley Woodlands SSSI[2]. The Scheme crosses two units of the SSSI – units 5 and 13. Unit 5 represents the Swarland Burn to Coquet Mouth section of the river and has been assessed by Natural England as being in unfavourable recovering condition. Unit 13 represents Duke's Bank Wood on the slopes to the south of the river, which has been assessed as being in favourable conservation condition through common standards monitoring[3].

[2] Natural England designated sites viewer (https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/2000052.pdf) accessed on 20/12/18.
[3] Natural England designated sites viewer (https://designatedsites.naturalengland.org.uk/sitedetail.aspx?SiteCode=S2000052&SiteName=coquet&countyCode=&responsiblePerson=&unitId=1027994&SeaArea=&IFCAArea=) accessed on 03/01/19.

1.2.2. The River Coquet flows for approximately 90 km (57 miles) within Northumberland, from its tributaries south of Cheviot summit to the sea below Warkworth. Along its length, the river vegetation shows a natural succession from mineral poor upland streams, through to vegetation that reflects the characteristics of gravel, sandstone, limestone and alluvial sediments of the middle and lower reaches. The river is one of the most important game fisheries in the north of England, with large runs of sea trout *Salmo trutta* and salmon *Salmo salar*. The fish are dependent on the rich insect life, of which the many species of mayfly are particularly significant. The reaches of the River Coquet are an important area for otters *Lutra lutra* and supports a high diversity of breeding birds that depend on riverine habitats. Many of the woodlands near the river are semi-natural and ancient woodland sites, representative of valley woodlands in Northumberland.

1.2.3. The area of SSSI woodland on the southern bank of the river, Duke's Bank Wood, is also identified as Ancient and Semi-Natural Woodland on the habitat inventory data layers held on the MAGIC website[4].

1.2.4. The Scheme also passes through Coquet River Felton Park LWS. This is a non-statutory wildlife site notified for the parkland contiguous with the River Coquet. The part of this site within the area of the Scheme supports broadleaved woodland with Ancient Woodland Indicator (AWI) species.

1.3. SUMMARY OF HABITAT AND TREE SURVEYS

1.3.1. The woodland of the River Coquet valley within the Order Limits of the Scheme (**Figure 1**) and adjacent woodland was subject to a National Vegetation Classification (NVC) survey in 2017 (**Ref. 1.2**). This survey identified the woodland as NVC type W9 *Fraxinus excelsior* - *Sorbus aucuparia* - *Mercurialis perennis* woodland, typical sub-community. This typical sub-community is commonly found by streams and flush lines in the uplands, where the climate is cool, wet and windy (**Ref. 1.3**).

1.3.2. The woodland was dominated by sycamore *Acer pseudoplatanus* closely followed by ash *Fraxinus excelsior* with frequent wych elm *Ulmus glabra*, occasional rowan *Sorbus aucuparia*, sessile oak *Quercus petraea* and less so pedunculate oak *Q. robur*. Localised silver birch *Betula pendula* and downy birch *Betula pubescens* also occur. The understorey, which was not densely vegetated, predominantly comprised hazel *Corylus avellana*, with smaller amounts of hawthorn *Crataegus monogyna* and English elm *Ulmus procera*, with saplings of the canopy trees and localised holly *Ilex aquifolium* (**Ref. 1.2**).

[4] MAGiC website (https://magic.defra.gov.uk/MagicMap.aspx) accessed 03/01/19.

1.3.3. The woodland includes the UK Habitat of Principal Importance (HPI) upland mixed ash woodland. This woodland type comprises mixed ash woods on base-rich soils in the north and west.

1.3.4. The arboriculture surveys (**Appendix 7.5** of Volume 3 of the Environmental Statement (ES) (**Application Document Reference: TR010041/APP/6.3**)) confirmed the presence of ash dieback, a disease of ash trees caused by the fungus *Hymenoscyphus fraxineus*. The disease is now endemic in this location.

1.4. SOILS AND GEOLOGY

1.4.1. The soils of the woodland anticipated to be impacted by the Scheme are freely draining slightly acid loamy soils[5]. The northern edge of the Woodland Creation Area is the same soil type. Soils in the southern half of the Woodland Creation Area transition to slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils with impeded drainage.

1.4.2. The bedrock geology beneath most of the wider area is comprised of Stainmore Formation – mudstone, siltstone and sandstone[6]. Sedimentary bedrock formed approximately 319 – 329 million years ago in the Carboniferous period and are fluvial, palustrine and shallow-marine in origin.

1.4.3. The Scheme would cut across a narrow band of Corbridge Limestone[7], a sedimentary bedrock formed approximately 324 – 328 million years also in the Carboniferous period in a local environment previously dominated by shallow carbonate seas.

1.4.4. Information regarding the superficial deposits is not available for the area of woodland that would be impacted by the Scheme. However, the Woodland Creation Area includes Till, Devensian – diamicton, superficial deposits formed up to 2 million years ago in the Quaternary period[8] formed during ice age conditions.

[5] British Geological Survey maps (http://mapapps2.bgs.ac.uk/ukso/home.html) accessed 03/01/19.
[6] British Geological Survey maps (http://mapapps.bgs.ac.uk/geologyofbritain/home.html) accessed 03/01/19.
[7] British Geological Survey maps (http://mapapps.bgs.ac.uk/geologyofbritain/home.html) accessed 03/01/19.
[8] British Geological Survey maps (http://mapapps.bgs.ac.uk/geologyofbritain/home.html) accessed 03/01/19.

2. POTENTIAL IMPACTS

2.1. DIRECT IMPACTS

HABITATS

2.1.1. Direct habitat loss would occur through the felling of trees and ground works to facilitate the construction of the new bridge.

2.1.2. The Scheme would result in the loss of approximately 0.68 ha (hereafter referred to as the 'ancient woodland') of closed canopy ancient woodland[9] (**Figure 1**) to facilitate the installation of the new bridge and an adjacent outfall pipe from a proposed detention basin to the south. Land take would occur on both the north and south sides of the river:

a. South of the river – approximately 0.27 ha of Ancient Semi-Natural Woodland within Duke's Bank Wood, part of the River Coquet and Coquet Valley Woodlands SSSI.

b. North of the river – approximately 0.41 ha of Mill Banks contained within the Coquet River Felton Park LWS. Whilst not designated as ancient woodland, the NVC survey identified ancient woodland characteristics. Through consultation with Northumberland County Council, this woodland is considered to be ancient in nature and therefore the impact assessment and mitigation strategy considers this area as if it were designated ancient woodland.

2.1.3. Habitat connectivity within the woodland along the river corridor would be severed.

2.1.4. The ecological structure and functionality that exists along the current woodland edge ('ecotone') would be affected[10]. However, new woodland edge vegetation is expected to develop over time, allowing the establishment of new species.

TREES

2.1.5. Use of construction plant within the Root Protection Areas (RPAs) of retained trees can result in root damage. This may arise as a result of soil compaction or direct forces that damage the root structure. Construction activities have the potential to damage trees outside of the construction footprint.

2.1.6. Aerial parts of retained trees may be damaged by movements of machinery and plant through physical impact.

SOIL

2.1.7. Soil compaction may occur as a result of vehicular movements, machinery positions (e.g. stationary cranes), storage of materials and increased pedestrian footfall. Compaction

[9] Habitat within the temporary boundary (red line boundary), which extends beyond the footprint of the bridge.
[10] A transitional area of vegetation between two different plant communities.

reduces soil pore size, which can restrict the availability of water and air to soil organisms and plant roots. The removal of soil voids also limits movement of soil-borne organisms. Soil compacted above certain densities can impede or halt root growth. This has repercussions upon organisms that rely on soil health for their own survival, and can lead to a permanent reduction in ecological function.

2.1.8. Soil compaction can occur instantaneously as a result of heavy traffic, particularly where the soil is wet. The recovery of the soil to a pre-compaction state by natural processes may never fully occur.

2.1.9. Impeded tree root growth caused by soil compaction and anaerobic soil conditions may lead to tree root death and destabilisation and can result in the death of the tree concerned.

2.2. INDIRECT IMPACTS

2.2.1. In addition to the direct loss of woodland, construction and operation of the Scheme may also result in the following indirect impacts:

SOIL COMPACTION AND DEGRADATION

2.2.2. Soil compaction may result in lower water infiltration rates and increased surface run off, potentially leading to localised erosion and loss of ground flora. Soil erosion is likely to adversely affect the aquatic environment of the River Coquet.

2.2.3. Native plants may not be able to establish within a degraded soil. Other more invasive species may outcompete established woodland plants, particularly where light and shade levels are altered.

WINDTHROW

2.2.4. Removing trees and shrubs from the existing margin of the woodland would increase the exposure of trees to wind. Exposed trees may be subject to windthrow or windsnap, which could lead to further changes to the woodland structure and composition beyond the area of tree clearance.

2.2.5. However, windthrow can produce valuable habitats by increasing the dead wood availability and upturned root plates can offer ecological niches for colonisation and utilisation.

NUTRIENT INPUTS

2.2.6. Felling of the woodland would create a new woodland edge and therefore vascular and lower plants previously receiving some degree of shelter from exposure to airborne nutrient input would receive higher levels of inputs. These nutrient inputs could result in a change in the botanical composition of at least the ground flora and epiphytes. Once the new woodland edge becomes established this would increase the effectiveness of buffering provided in the longer term.

2.2.7. Taking an area of arable land adjacent to retained SSSI ancient woodland out of crop production to create new woodland areas would reduce the input of nutrients (and other

agro-chemicals) entering the woodland, which would benefit plants and habitats adjacent to the Woodland Creation Area.

DUST

2.2.8. Dust can have both a physical and chemical impact on woodland. Physical impacts may arise from dust deposition onto leaves, smothering them and blocking light absorption, which reduces photosynthesis. This can result in stunted growth, reduction in plant health and even plant death. Chemical impacts of dust deposition may arise from direct contact with the plant's surface or changes to soil chemistry, affecting the balance of the floral community that the soil supports.

2.2.9. Dust deposition is a temporary impact that may arise during the construction phase.

SPREAD OF INVASIVE SPECIES

2.2.10. Opening of woodland canopies or soil disturbance could result in the spread of invasive species. Himalayan balsam *Impatiens glandulifera* is known to be present downstream in Felton and both Japanese knotweed *Reynoutria japonica*[11] and rhododendron *Rhododendron ponticum* have been recorded within the River Coquet corridor (highlighted by the Northumberland County Council ecologist). Japanese knotweed is known to be present in Felton village, in the carpark of the public house on the south bank of the river.

2.2.11. Ash dieback, also known as 'Chalara', has been identified as endemic within the area of ancient woodland impacted by the Scheme.

SHADING

2.2.12. Light levels within retained woodland may be altered by removal of trees and shrubs, whereas bridge construction may also reduce available light in the retained woodland areas. This may cause local changes in species distribution.

MICROCLIMATE

2.2.13. Microclimatic changes are likely to occur. Increased exposure may lead to soil drying during sunny conditions and increased exposure to frost and snow in winter. Reduced rain interception may lead to locally and/or seasonally wetter soil.

[11] Japanese knotweed has recently changed its name to *R. japonica* from *Fallopia japonica.*

3. STRATEGY

3.1. MITIGATION HIERARCHY

3.1.1. A sequential process has been adopted to avoid, mitigate and compensate for adverse ecological impacts and effects of the Scheme on ancient woodland; this is often referred to as the 'mitigation hierarchy' (**Ref. 1.4**). For most projects, avoidance, mitigation, compensation and enhancement measures are identified as part of the EcIA process.

3.1.2. **Avoidance** – seek options that avoid harm to ecological features (for example, by locating on an alternative site). Adverse effects should always be avoided where possible, for example by making a change to scheme design/layout to ensure no adverse effects.

3.1.3. **Mitigation** – Adverse effects should be avoided or minimised through mitigation measures, either through the design of the project or subsequent measures that can be guaranteed. This may include, for example, careful timing of an activity to prevent an impact occurring. Mitigation measures incorporated into a scheme design are often described as 'embedded mitigation' or 'mitigation by design'. Avoidance can also be part of mitigation.

3.1.4. **Compensation** – where there are significant residual adverse ecological effects despite the mitigation proposed, these should be offset by appropriate compensatory measures. For example, it may take the form of replacement habitat or improvements to existing habitats. Compensation should always be seen as a last resort, when all other mitigation options have been exhausted.

3.1.5. Any compensation area should be similar in terms of ecological features and ecological functions that have been lost or damaged, or with appropriate management have the ability to reproduce the functions and conditions of those ecological features. Compensation should be provided as close as possible to the location where effects have occurred and benefit the same habitats and species as those affected.

3.1.6. Replacement ratios of compensatory habitat greater than one-to-one are frequently appropriate because of the uncertainty inherent in compensation.

3.1.7. **Enhancement** – seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation. Enhancement is improved management of ecological features or provision of new ecological features, resulting in a net benefit to biodiversity. Enhancements are therefore considered 'over and above' that required to mitigate/compensate for a potential impact.

3.2. IMPLEMENTATION OF THE MITIGATION HIERARCHY

3.2.1. The mitigation hierarchy has been applied during the development and design of the Scheme, with the aim of minimising the potential impacts of the Scheme upon the ancient woodland.

AVOIDANCE

3.2.2. It has not been possible to completely avoid the ancient woodland within the Scheme design.

3.2.3. The Scheme design has carefully considered the siting of the Scheme alignment to minimise the extent of ancient woodland loss (embedded mitigation). Scheme design has also included reducing the extent of the Order Limits to retain woodland habitat; to constrain the extent of construction and infrastructure, including the drainage outflow location and diversion of the public right of way beneath the bridges (to be finalised at detailed design).

3.2.4. Temporary storage areas (as part of construction) would be located outside the area of ancient woodland to be retained, preventing where possible damage to the ground flora community.

3.2.5. Temporary fencing would be erected around the perimeter of areas of woodland to be retained, to act as a visual deterrent for plant/machine movement. The fencing would identify the extent of the working area and reduce the extent of excess woodland being cleared by mistake. The area would be pegged and confirmed by overseeing ecologist prior to vegetation clearance being carried out.

MITIGATION

3.2.6. The proposed bridge construction would be subject to the requirements set out in a Construction Environmental Management Plan (CEMP). An Outline CEMP has been produced in support of the DCO **[REP3-012 and 014]** and shall be further developed at detailed design.

3.2.7. Excavation protection zones of at least 15 m would be established around retained ancient woodland areas to avoid soil compaction and root damage. The haul road may encroach within the zone but would be designed to mitigate any impacts.

3.2.8. Due to the topography and nature of the site, it may not be possible to install protective fencing in accordance with British Standard 5837:2012 Trees in relation to Demolition Design and Construction – Recommendations at all locations. Temporary fencing (BS5837 compliant or otherwise) and Root Protection Areas would be made clearly visible and their locations included in site inductions to all staff. Any protective fencing would also be designed to be resilient to flooding as the lower sections of the fence may be subject to periodic flood events.

3.2.9. An appropriate arboriculture method statement to detail how the above and below ground elements of the retained trees would be protected would be developed prior to the start of works (to be developed at detailed design). The method statement would be developed in partnership with the detailed design of the Scheme at all stages, from initial site clearance through to completion and hand over.

3.2.10. Soil compaction within the ancient woodland would be kept to a minimum with minimal machine movements and the use of cranes and platforms outside the ancient woodland where possible.

3.2.11. Baseline surveys have not recorded invasive species within the Order Limits. However, precautionary working methods would be employed to ensure that Scheme construction does not result in the spread of invasive non-native species. This would include a pre-commencement walkover to confirm any changes from previous site knowledge and the implementation of suitable biosecurity controls (detailed in a Biosecurity Method Statement, to be developed at detailed design).

3.2.12. The Biosecurity Method Statement would also detail actions to be followed to prevent the spread of ash dieback, particularly during soil and material translocation from the ancient woodland and wider SSSI/ancient woodland.

3.2.13. Material from the ancient woodland would be salvaged, where possible, for use to enhance the creation of new broadleaved woodland (compensation, detailed below). This would include:

a. Translocation of ancient woodland soils from the area being felled.
b. Ground flora seed collection.
c. Translocation of saplings (including plants from within the wider woodland).
d. Translocation of ancient woodland indicator species.
e. Felled timber translocation (for deadwood habitat).

3.2.14. Material from the ancient woodland can also be salvaged as coppice stools, translocated for use to enhance the creation of new broadleaved woodland (Woodland Creation Area). However, the practicality and safety of this method, due to the steepness of embankments, would be determined at detailed design, as would any timing restrictions of the works.

3.2.15. The topography of the River Coquet valley, particularly the southern slope, presents a constraint to the collection of materials from the ancient woodland. The northern slope allows a greater degree of access, although the gradient may still reduce the quantity of attainable materials. The logistics and feasibility of material collection would be explored further at the detailed design stage. During the early stages of the works, mitigation measures (including seed collection and translocation of ancient woodland indicator species) would be carried out by hand, prior to the construction of the haul road, in order to reduce direct impacts occurring prior to mitigation. It is anticipated that any mitigation work carried out by hand may require the use of ropes and anchors on the grounds of health and safety.

COMPENSATION

3.2.16. A Woodland Creation Area of 8.16 ha has been identified to create new woodland habitat (and associated open rides and glades), directly adjacent to the retained SSSI and ancient woodland (**Figure 1**). This provides compensatory habitat at a ratio of approximately 12:1 of habitat creation compared to loss. The location and size of the Woodland Creation Area has

been agreed through consultation with Natural England. The identified area is immediately adjacent to Duke's Wood, which forms part of the SSSI and ancient woodland, and within 50m of the ancient woodland impacted by the Scheme. As a result, it would increase the extent of the local woodland resource resulting in larger and more resilient habitats within the local landscape.

3.2.17. Within the Woodland Creation Area, a smaller Receptor Area (**Figure 1**) is identified to receive the majority of the salvaged material being translocated. The Receptor Area is located immediately adjacent to the SSSI/ancient woodland.

3.2.18. It is proposed that the Woodland Creation Area would retain between 20 and 40% open habitats to maximise the potential edge ecotone extent, which would allow the creation of species-diverse neutral grassland. Establishment of these open habitats with a species-rich green hay, as well as the subsequent on-going management, would create a nectar rich grassland of high nature conservation value.

ENHANCEMENT OPPORTUNITIES

3.2.19. The Applicant has committed to develop a strategy of biodiversity enhancement, based on the opportunities identified below. The strategy will be developed in consultation with relevant stakeholders. This is identified in measure S-B20 of the updated **Outline CEMP**, issued at Deadline 4.

3.2.20. Principally, enhancement measures would involve the translocation of key ancient woodland indicator and other notable species (ground flora), from the ancient woodland to be lost to the Scheme, to within areas of retained SSSI woodland not directly affected by the Scheme.

3.2.21. To the west of the Woodland Creation Area, the boundary hedgerow has been identified as being defunct and species poor during surveys in 2016 (**Ref. 1.2**). It is proposed to stop-up gaps within the existing boundary hedgerow(s) as part of the mitigation strategy of the Scheme. Efforts to improve the ecological value and condition of the hedge above the mitigation strategy would be considered as enhancement. This in turn would provide greater connectivity between the Woodland Creation Area and the surrounding local landscape. Species selection would be in keeping with those currently found within the local area.

3.2.22. Whilst not included in the landscape mitigation masterplan (**Landscape Mitigation Masterplan Part A** [**REP3-008**]), the creation of a hedgerow boundary on the southern boundary of the Woodland Creation Area could also be considered at detailed design as an enhancement feature.

3.2.23. Subject to agreement with landowners, bird and bat boxes could be erected within adjacent areas of retained woodland to provide alternative nesting and roosting opportunities. Bat boxes are proposed as part of the mitigation strategy for Scheme to compensate for the temporary functional loss of pipistrelle *Pipistrellus* sp. roosts and therefore additional bat boxes would be considered as enhancement.

3.2.24. Retention of bankside and terrestrial habitat beneath the open-span bridge over the River Coquet would ensure continued connectivity of the woodland habitats throughout

construction and into operation. New scrub and tree planting beneath the bridge would reduce impacts relating to fragmentation and species dispersal.

3.2.25. The natural topography of the Woodland Creation Area may result in depressed areas that develop into wet woodland. The Woodland Creation Area would be managed to ensure that this does not impede the successful establishment of the woodland. Although, through long-term management, localised wet areas may offer a diversity to the woodland structure and condition, of greater ecological benefit. In addition, a pond(s) could be created during site preparation to increase the biodiversity value of the Woodland Creation Area. If incorporated (to be confirmed at detailed design), the pond(s) would be located in areas of open woodland structure to reduce the likelihood of over shading and eutrophication.

3.3. STRATEGY LIMITATIONS

3.3.1. The salvage of materials is constrained by the steep topography of the River Coquet Valley. This would be discussed further at detailed design. However, for the purpose of this report, it is assumed that the salvage of materials/resources from the area of ancient woodland being lost (the 'Donor Site', when referring to salvaged materials) is restricted and would, where possible, involve a combination of both hand digging (sapling, seed and ground flora collection/translocation) and machine operations (soil translocation). If soils are unable to be salvaged and translocated, the implementation of the remainder of the proposed actions is considered sufficient to address the impacts of the Scheme on ancient woodland and meet the aims and objectives of the strategy as a whole.

3.3.2. Ideally the Receptor Area should mimic the properties of the Donor Site as closely as possible in order to provide the most appropriate form of compensation. In doing so, this would provide an increased chance of successful plant, and soil translocation. However, in this location the ancient woodland runs along the steep sided slopes of the River Coquet valley. It was not possible to secure an area with similar aspect, slope and soil nutrient status in the local area, therefore an area as close as possible to the Donor Site was selected to minimise the damage caused by excessive transportation of materials. This area would reinforce the existing woodland, increasing the local woodland resource and create a larger, more ecologically robust, habitat area. Translocated materials are also offered a degree of shelter and shading by the existing adjacent woodland. As such, the Woodland Creation Area is considered appropriate.

3.3.3. A survey of the ancient woodland has identified the presence of ash dieback. The Plant Health (Forestry) (Amendment) Order 2012 prohibits all imports of ash seeds, plants and trees and all internal movement of ash seeds, plants and trees. In relation to this strategy, this would extend to the translocation of materials (including soils, saplings and ground flora) from the ancient woodland, which may be a carrier of ash dieback. However, given the proximity of the Receptor Area, adjacent to the area of infected woodland, it is believed there is a case for the translocation of materials. This would require a Statutory Plant Health Notice (SPHN) to be obtained. The translocation of materials from the ancient woodland to

the Receptor Area would be secured following further consultation with Plant Health England, Natural England and the Forestry Commission at detailed design.

4. MITIGATION AND COMPENSATION DELIVERY

4.1.1. The strategy includes a Woodland Creation Area of 8.16ha adjacent to the River Coquet and Coquet Valley Woodlands SSSI and ancient woodland. To supplement the woodland creation, salvage techniques would be undertaken where possible to take material from the Ancient Woodland Donor Site to the Receptor Area of the Woodland Creation Area. The proposed actions would inoculate at least the Receptor Area of the Woodland Creation Area with propagules (seed, bulbs and mycorrhiza), as well as local, native woody species that have grown in the immediate area.

4.1.2. Following consultation with Natural England, it has been agreed that woodland creation would be implemented in accordance with the following high-level steps (provided in chronological order):

a. **Soil analysis** – comparison of nutrient levels within the Donor Site/Woodland Creation Area.
b. **Soil manipulation** – manipulation of Woodland Creation Area, following outcome of soil analysis. This would include the initial removal of vegetation from the Woodland Creation Area, using a non-residual herbicide.
c. **Repeat analysis of soils** in the Woodland Creation Area to confirm soil manipulation has been successful (repeat Steps 2 and 3 until objective(s) successful).
d. **Translocation of ground flora** (key ancient woodland indicator species) from ancient woodland to wider retained SSSI/ancient woodland.
e. **Fell ancient woodland area** and retain material for use in Woodland Creation Area.
f. **Ground cultivation within Woodland Creation Area** to reduce soil to a fine tilth.
g. **Soil strip within ancient woodland** and directly spread within Receptor Area.
h. **Sow hay meadow seed mix/ green hay within Woodland Creation Area** (excluding area of translocated soil – to be left to colonise naturally).
i. **Plant nursery tree stock (this strategy assumes the use of transplants) within Woodland Creation Area.**
j. **Collect and transplant saplings (likely limited to 90 cm maximum) from the wider SSSI/ancient woodland** by hand into the Receptor Area.
k. **Commence establishment management following by long-term management and maintenance of the Woodland Creation Area** (minimum 50-year period).

4.1.3. Expansion on the above steps is presented below.

4.2. RECEPTOR SITE PREPARATION

SITE FERTILITY

4.2.1. Site-specific sampling to determine soil pH and nutrient status, as well as structural assessment of the soil, would be undertaken to inform detailed design.

4.2.2. Prior to tree planting and soil translocation taking place, the Woodland Creation Area would be analysed to determine its nutrient levels in comparison to that of the ancient

woodland/Donor Site, in particular for the Receptor Area. Where conditions are not comparable, soil manipulation would take place in the first instance. Soil sampling and analysis shall determine soil conditions and nutrient levels, including: pH and Total P, N, K and Mg. High nutrient levels promote excessive growth by competitive plant species that can compromise the ability of less competitive species from becoming established.

4.2.3. Soil sampling methodology would be adapted from Natural England guidance on soil sampling for habitat recreation and restoration (**Ref. 1.5**).

4.2.4. Soil compaction would be assessed at the same time as soil analysis for nutrient contents. The extent of soil compaction has particular significance for the process of tree establishment. As soil is compacted, physical resistance to roots is increased; soil aggregates break down and pore space is diminished. This reduces soil aeration, detrimentally affecting biological respiration of roots and soil biota, which in turn impacts nutrient cycling and availability. Modification of soil structure also changes hydraulic properties and significantly slows water movement through the soil presenting both water deficits and waterlogging as potential problems (**Ref. 1.6**).

SURFACE PREPARATION / VEGETATION CLEARANCE

4.2.5. Where undesirable vegetation cover exists, a non-residual and neonicotinoid-free herbicide approved for total weed control would be applied, in accordance with the manufacturer's instructions. Final herbicide application to be carried out no sooner than two weeks prior to ground cultivation.

SOIL PREPARATION

4.2.6. If nutrient levels are high in the Woodland Creation Area comparable to the Donor Site, as would be anticipated in a former arable field, then the nutrient levels would be reduced before the site is used for habitat creation. Two principal techniques are available to achieve this:

a. Topsoil stripping; or
b. Deep ploughing.

4.2.7. Soil preparation requirements would be informed by the sampling and analysis and would be developed further at detailed design.

4.2.8. The need for remediation works would be informed by a soil pit survey and taking into consideration the depth of soil stripping being undertaken to reduce fertility.

4.2.9. A second phase of soil analysis would follow ground manipulation in order to review how successfully the techniques have been in recreating those conditions found within the Donor Site. Further soil manipulation and analysis would be required to create as close a match as possible.

GROUND CULTIVATION

4.2.10. Immediately prior to planting or seeding, the ground would be cultivated during a period of dry weather, to provide a fine tilth. A fine seed bed shall be created by rotavating and harrowing. Prior to planting, any consolidated material shall be broken up to 300 mm depth and the top 50 mm of all soil reduced to a tilth suitable for final shaping with a grading blade (particle size 10 mm and below). All undesirable material brought to the surface including stones larger than 50 mm in any dimension, roots, tufts of grass and foreign matter is to be removed off site.

FENCING

4.2.11. Prior to habitat establishment being undertaken, the Woodland Creation Area would be fenced to exclude rabbits, deer and livestock to protect grassland creation and newly planted trees (fencing specification to be confirmed at detailed design). Fencing is proposed as an alternative to individual trees guards that would require more intensive maintenance to avoid suffocation of plant stock by more vigour's weeds. One-way deer gate(s) are recommended along the fence to allow a means of escape in the event that deer access the Woodland Creation Area.

4.3. ANCIENT WOODLAND COMPONENT SALVAGE

GROUND FLORA

4.3.1. Native woodland creation for ecological objectives requires more than just tree and shrub planting. Ground flora is an integral part of any woodland habitat but is of particular relevance within ancient woodlands. There are a number of key indicator species unique to ancient woodlands and the unique growing conditions that they create. As such not all species should be treated equally. It is proposed that specific key ancient woodland indicator species be translocated from the ancient woodland to be lost and replanted within areas of SSSI ancient woodland to be retained, where growing conditions are already established, capable of supporting those targeted species.

4.3.2. The species for collection would be informed by a detailed botanical assessment prior to the works commencing to allow for the targeting of the most appropriate woodland species.

4.3.3. Plants for translocation would be carefully marked, at an appropriate time of year to avoid misidentification, and dug by hand, ensuring that a sufficient root-system is retained. Notes would be made as to the location of the plant to be translocated in terms of woodland edge, open glade or under an enclosed canopy, so that it can be translocated within an area of woodland that exhibits similar characteristics in order to increase the likelihood of plant survival.

4.3.4. In addition to the above, seed of ground flora species would be collected from the wider SSSI/ancient woodland for the establishment of ground flora within the Woodland Creation Area at a later date. It is proposed that seed collected be propagated by a local nursery, for use as plug plants, following the establishment of an enclosed canopy within the Woodland

Creation Area. Grown on pot and plug plants should be planted in the spring after the threat of frosts have passed, and these should be established in clumps.

4.3.5. In this instance, it is not considered appropriate to directly sow ground flora seeds upon the newly cultivated soil of the Woodland Creation Area, as the trees themselves would be restricted in size and thus unable to mimic or recreate those growing conditions currently found within the ancient woodland. However, Anderson (1996) (**Ref. 1.7**) suggests that carefully selected ground flora can be introduced earlier where the soils and subsoils are infertile. If topsoils are stripped to remove nutrients these conditions may be met, although this would be determined by soil sampling to inform detailed design.

4.3.6. If soil conditions of the Woodland Creation Area are appropriate, seeding of woodland ground flora would be carried out in autumn or winter to ensure vernalisation can occur. Different types of plants require different planting rates. Quick growing species, such as those commonly found on woodland edges, include red campion *Silene dioica* and wood avens *Geum urbanum*, which can be seeded at lower rates (3kg/ha). Slower establishing shade-tolerant species, such as bluebell *Hyacinthoides non-scripta,* need planting at higher rates such as 10kg/ha (**Ref. 1.8**). Some plants that do not establish well from seed may need to be grown on as pot-grown plants and established as plugs, such as yellow archangel *Lamiastrum galeobdolon*. Bluebells introduced as seed may take up to six years to flower but seeding enables large areas to be inoculated through seed drilling prior to tree planting for future bluebell woodland (**Ref. 1.9**).

SAPLING TRANSLOCATION

4.3.7. Sapling removal from the ancient woodland lost to the Scheme has currently been discounted given that this would need to be carried out prior to soil stripping. This would result in either the sapling(s) being temporarily stored on site, within temporary trenches for approximately 6-9 months prior to planting (reducing likely success rate of establishment) or soil translocation being deferred to the winter months; outside the optimum/recommended season. The volume of material collected is also likely to be limited by the steep nature of the slopes. As such, sapling translocation from the ancient woodland is considered as an enhancement opportunity, if considered achievable at detailed design.

4.3.8. Following discussions with Natural England, it has been agreed that sapling translocation associated with the Scheme would be limited and restricted to selective sapling removal from within wider areas of retained ancient woodland. This activity would be undertaken sensitively that the natural regeneration of the woodland is not compromised. This action would require SSSI Assent from Natural England.

4.3.9. Sapling removal would be carried out during the winter months, outside the growing season when the trees are dormant. Translocation of saplings from the wider woodland would be completed after soil preparation of the Woodland Creation Area and stripping of soils in the ancient woodland and can therefore be translocated directly to the Receptor Area.

4.3.10. Translocation of saplings would be carried out by hand digging only, in order to reduce trampling and disturbance of the retained woodland. Therefore, saplings are likely to be restricted to a maximum of 90 cm in height for logistical reasons.

4.3.11. In comparison to nursery plant stock, translocated saplings would be pit planted, due to being translocated as a rootball, as opposed to bare root.

4.3.12. The Woodland Creation Area (including the Receptor Area) would predominantly be planted with plant stock of local provenance supplied by a local nursery. This strategy assumes that plant stock would be supplied as bare rooted transplants as agreed with Natural England during consultation. Should this change at detailed design, amendments would be discussed and agreed with Natural England.

4.3.13. Those areas of the Woodland Creation Area adjacent to the existing woodland may also be allowed to establish through natural regeneration. Trees that generate naturally from adjoining woodlands tend to be more vigorous and would be genetically suitable to the local area. Natural England have expressed an interest in exploring this further at detailed design stage.

4.3.14. The translocation of larger woody plant material of native trees and shrubs has been discounted due to the steep nature of the slopes, but this should be reviewed at detailed design in consultation with potential delivery contractors. Due to the timing of these works in relation to soil translocation, translocated stools would need to be moved into separate areas of the Woodland Creation Area to the soil Receptor Area. Holly would not survive by this method and would be translocated following judicious pruning to reduce drought stress; stumps to be translocated would be cut at approximately 150 mm above ground level (**Ref. 1.10**).

TIMBER COLLECTION

4.3.15. Donor dead-wood habitat would also be transferred to the Woodland Creation Area (in particular the Receptor Area) to provide standing as well as fallen micro-habitat of decomposing wood (**Ref. 1.10**). Dead wood logs and piles would be concentrated in sheltered, shady conditions, close the woodland edge. Placement would include, if possible, at least five single logs erected vertically, dug into the ground to provide standing dead wood; ten single logs laid on the ground and five in piles of 3-5 stacked on the ground.

4.3.16. To maximise the deadwood habitat value, the piles would be supplemented annually (for a period specified in the woodland management plan) with fresh timber that could be sourced from other felling works undertaken as part of the Scheme or other local highways maintenance work.

SOIL TRANSLOCATION

4.3.17. The topsoil from the ancient woodland/Donor Site would be translocated to the Receptor Area within the pre-prepared Woodland Creation Area with the aim to translocate the seed and bud bank. It is considered appropriate to concentrate the soil translocation to the Receptor Area (adjacent to the retained SSSI woodland) to improve the likelihood of

success, as opposed to spreading thinly across the larger Woodland Creation Area. Although translocation of ancient woodland soils cannot re-create an ancient woodland, research to date shows that it can be a valuable starting point for creating woodland of higher ecological value than can be achieved otherwise.

4.3.18. The benefits of using translocated material is that they are of local provenance and that translocation would retain the long-established soils, with their associated fungi, other microbes, soil invertebrates and plant propagules.

4.3.19. It is not anticipated that it would be possible to remove and translocate the soil as large turves due to the collection being made from steep slopes. If trees and shrubs can be coppiced back and translocated then some turf translocation may be achieved, although it is acknowledged that this would be limited. Instead soils would have to be collected, transported and spread in a loose form.

4.3.20. Very little is known about associations between soil microbial communities (bacteria and mycorrhizae) and plants, but the mixing up of soil is certainly likely to disrupt any associations that have formed. Any bacteria or mycorrhizae in the soil once mixed may not be compatible with vegetation that is transplanted, and this can cause plant growth to fail (**Ref. 1.11**, **Ref 1.12**).

4.3.21. Soil to be translocated from the Donor Site would be stripped during a period of dry weather and spread within the Receptor Area immediately adjacent to the area of retained ancient woodland.

4.3.22. The evidence for the optimal timing for soil translocation is restricted to a limited number of monitored examples but these show that the optimal time for the translocation of soils is in the autumn when the vegetation is closer to becoming dormant and soil moisture is low (**Ref. 1.13**). The soils also need to be handled sensitively. Wet winter periods should be avoided for soil translocation as it can depress seedling recruitment compared with autumn translocations when soils are drier (**Ref. 1.14**). As such, soil translocation shall be undertaken during the optimal time, if possible. Alternatively, timing of soil translocation shall be dictated by suitable environmental (weather) conditions.

4.3.23. The Donor Site would be worked in 6 m strips, the trees being felled and cleared before the removing 15 – 30 cm layers of topsoil. The depth of soil stripping must be sufficient to take the bud bank in addition to the seed bank (**Ref. 1.15**). It may be necessary to cut and remove the bramble on the woodland fringe to ease access to the soils for extraction.

4.3.24. It is anticipated that in total, no more then 1/12th of the Woodland Creation Area (the Receptor Area) would be surface dressed by soil translocated from the Donor Site but due to physical constraints the area is likely to be lower. The exact amount of soil to be translocated from the Donor Site would be confirmed at detailed design in consultation with potential delivery contractors.

4.3.25. Soil is typically spread to a depth of 20 – 30 cm (to allow for settlement) using reaching excavators rather than bulldozers to minimise the need to track the machinery over the area,

which would minimise the risk of creating soil compaction. The location and route of haulage routes would be marked to avoid additional vehicle movement and associated soil compaction (**Ref. 1.10**). Any bluebell bulbs left on the soil surface would be planted to a depth of approximately 100 mm.

4.3.26. There would be no storage of soils, except for short periods never exceeding 24 hours (**Ref. 1.15**) where practical and achievable. However, ideally soil would be spread in the Receptor Area immediately after removal from the Donor Site.

4.4. PROPOSED SPECIES-RICH GRASSLAND CREATION

4.4.1. Woodland creation for wildlife value should include between 20 and 40% open habitat in the form of rides and glades within the woodland. These features provide the richest wildlife interest for butterfly and bird species.

4.4.2. Following discussions with Natural England, the ground flora of the Woodland Creation Area shall initially be established as a hay meadow. This would be achieved through seeding with a suitable seed mix of local provenance or through spreading green hay (the latter being of preference). Suggested species for inclusion within the mix, provided by Natural England, are presented in **Appendix C.**

4.4.3. Green hay is a good means of ensuring that fresh seed from a local source is used and would usually offer a wider range of species than is available as seed. Green hay would be collected from a suitable local donor location and spread within a few hours. The availability of a local donor source is therefore essential for this technique to work.

4.4.4. If appropriate, a green hay donor site(s) shall be confirmed and agreed at detailed design. Consultation with Natural England has indicated the presence of suitable donor sites in the local area. Review of the information available on the MAGiC website[12] for grassland inventory data identifies one high value priority site that occurs with lowland meadow Habitat of Principal Importance to the east of the Scheme. A further seven sites with good quality semi-improved grassland occur locally, which may also have potential as a donor site. Details of the sites are provided in **Appendix B**. Successive hay spreading may be undertaken to achieve a species-rich meadow. Where the donor site is itself not species-rich, hay spreading would be repeated within areas of retained rides and glades.

4.4.5. Natural England (2010) (**Ref. 1.16**) has produced guidance on using green hay to produce species-rich grassland. To be successful, the technique of spreading green hay requires very careful organisation, with the Woodland Creation Area ready to receive the hay when the donor site is cut. Green hay cannot be stored for more than a few hours before it heats up, which in turn reduces the viability of the seeds. Once collected, the green hay must be

[12] MAGiC website (https://magic.defra.gov.uk/MagicMap.aspx) accessed on 03/01/19.

immediately transported to and spread on the Woodland Creation Area. As a guide, material cut from 1ha of a donor site should be sufficient to spread on to 3ha of the Woodland Creation Area.

4.4.6. Donor sites for green hay should ideally be grassland with the following characteristics:

a. Donor sites should be in the same locality as the Woodland Creation Area.
b. Site characteristics should be similar to the Woodland Creation Area (soil type, soil pH and hydrology, etc).
c. Donor sites must be free from invasive species, pernicious weeds (such as common ragwort *Senecio jacobaea*) and have limited amounts of highly competitive species (such as white clover *Trifolium repens* and creeping buttercup *Ranunculus repens*).

4.4.7. Hay meadow creation would occur following soil manipulation within the Woodland Creation Area and if a vegetation cover exists at the time of hay spreading, then at least 50% bare ground is required to facilitate establishment of seedlings.

4.4.8. The sward of the donor site must be left uncut and ungrazed for 8 to 12 weeks prior to collecting green hay to allow the plants to flower and set seed. Where the donor site is a traditionally managed, species-rich hay meadow; it shall be cut at the usual time for that site. Cut herbage shall not be wilted or turned and shall be collected as quickly as possible, certainly within 24 hours of cutting.

4.4.9. Once the cut material has been collected from the donor site, it must be transported to and spread on the Woodland Creation Area on the same day - ideally within an hour or two. The hay should be spread thinly and evenly so that it does not create a mulch that would inhibit seed germination. Seeds must land and then be pressed into the bare soil in the gaps, with sufficient moisture to germinate and sustain them.

4.4.10. The hay would be left for at least one week in dry weather, or three weeks in wet weather, to allow seed to fall. After this period, the site would be rolled lightly. If the hay is smothering the sward, it shall be removed. However, this is unlikely to occur if hay is spread in the recommended amounts.

4.4.11. In the first spring, it may be necessary to cut the sward to avoid seedlings being shaded out by the existing vegetation. A short period of cutting (with the cuttings removed) is recommended.

4.4.12. There would be no use of inorganic fertilisers or widespread application of herbicides. Herbicide weed control would be by spot treatment or weed wiping to avoid damaging non-target species.

4.4.13. Following establishment management, the grassland shall be managed, where possible, to create of a diverse grassland habitat. The grassland would be cut and collected in mid-August followed by light scarification using a harrow to create regeneration opportunities. A second cut and collect phase in late October would also be undertaken, if required, as a replacement for aftermath grazing (which is not appropriate for the woodland creation

objectives of the site). Following tree planting, grassland management would not be undertaken[13] except in areas where planting is not dense or where issues with weeds arise.

4.4.14. Green hay would be excluded from the area of soil translocation (Receptor Area), in order to retain as much of the original seed back as possible and avoid species being out competed by those more vigorous grassland species likely to be introduced, through the creation of the hay meadow.

4.5. PROPOSED WOODLAND ESTABLISHMENT

4.5.1. Tree planting is proposed following the successful establishment of the hay meadow (to commence in the following growing year). The majority of the new woodland would be established by planting trees and shrubs imported from local plant nurseries. All new ancient woodland compensation planting would be of native origin and of local provenance.

4.5.2. Following discussion with Natural England, it has been agreed that the planting composition should aim to replicate the species mix for the canopy and shrub layer of the ancient woodland and wider SSSI woodland, with the exceptions of ash (due to ash dieback), sweet chestnut and sycamore. It is accepted that these species may establish naturally in the future. The species list includes sessile oak, silver birch, wych elm *Ulmus glabra*, hazel, holly and rowan (refer to **Appendix A**). While ash is a key component of the ancient woodland type, it cannot currently be planted (due to ash dieback). However, if circumstances change prior to woodland establishment, then ash should be included in the species list. Sycamore is also a key component in the ancient woodland/SSSI woodland but would be expected to colonise naturally.

4.5.3. Planting of bare-rooted stock would be carried out during favourable weather and soil conditions, between the months of November and March. No planting or preparatory operations would take place when the ground is frost bound, covered by snow, excessively wet or waterlogged.

4.5.4. Grouping of planting material should be by species, as this reduces the impact of variable growth and establishment rates between species. For example, oak could be grouped in 25's, whereas faster growing species such as birch is 10's, but with some 'randomness' with species such as hazel grouped in anything between 5's and 25's (**Ref. 1.8**).

4.5.5. In areas immediately adjacent to existing woodland habitat, planting may not need to be undertaken initially. Instead, natural colonisation could provide a local method of establishment. However, the suitability of this method would be informed by further investigation of the local site conditions to inform the detailed design.

[13] As discussed with Natural England, it is not considered logistically efficient or effective to manage grassland within such a large area (8.16ha) where tree planting is dense.

4.5.6. Given thinning is recommended as part of the management plan to be conducted after the canopy closes (5-15 years), the planting pattern is less important, and rows can be used. However, if this cannot be guaranteed, then planting in groups and avoiding straight lines would be preferred.

4.5.7. Replacement of dead or dying specimens would be carried out annually during the initial 5 years following first planting, to maintain a minimum of 90% successful plant establishment rate – replacement planting to be carried out annual during the months of either November or March respectively.

4.5.8. If deemed appropriate, replacement plant stock could include plants purposely grown in a local nursery from seed collected from the ancient woodland and/or wider SSSI woodland in order to ensure local provenance. This is not deemed to be viable for the whole of the Woodland Creation Area, due to the time required in order to achieve the appropriate height of the plant material (3-5 years).

4.5.9. Following the initial five-year plant establishment period, areas of open ground would be formalised based on open areas retained during tree planting and those areas where tree and shrub establishment fails, and re-stocking is not considered appropriate. Within areas of new woodland glades, wide rides and unplanted margins can provide valuable habitat for mammals, birds and invertebrates. Unplanted areas can also allow for an element of natural regeneration within an otherwise planted woodland.

4.5.10. Plants shall be notch planted into t-shaped openings of sufficient size for the roots of bare-root plants to be fully spread out.

4.5.11. Biannual checks of boundary fencing, and replacement/maintenance where required.

4.5.12. A long-term management plan, for a minimum of 50 years following establishment, shall be prepared to guide the newly created woodland management during this period. The proposed Woodland Creation Area would also be retained as woodland in perpetuity.

5. MONITORING AND MANAGEMENT

5.1. OVERVIEW

5.1.1. The Woodland Creation Area would be subject to a long-term management plan with the success of the woodland creation strategy to be reviewed at 5-year intervals.

5.1.2. The absence of initial canopy cover allows competitive light-responsive species to persist for 10 years or more before planted trees can cast significant shade (**Ref. 1.13**). Following this, management shall aim to successfully introduce woodland (and ancient woodland) indicator species to emulate the composition of the ancient woodland impacted and the wider SSSI/ancient woodland. It is therefore recommended that the monitoring period should be at least 50 years.

5.1.3. An Ancient Woodland Management and Monitoring Plan (AWMMP) shall be developed at the detailed design stage to ensure the long-term viability and sustainability of the Woodland Creation Area and its integration with the surrounding landscape, notably the adjoining SSSI/ancient woodland. The AWMMP shall be informed by the pre-commencement soil analysis, an update botanical survey of the ancient woodland and wider SSSI woodland and the definitive species composition of the Woodland Creation Area (hay meadow, tree species list and subsequent woodland ground flora expectations).

5.1.4. Heads of terms of the management plan may include:

a. Site Details – particulars of site and spatial description.
b. Vision and Objectives – the long-term vision/aspiration for the woodland.
c. Management Objectives – what would be achieved; how sustainable forest management would be achieved.
d. Description of Woodland Creation Area – topography, climate and soil.
e. Description of Woodland Creation Area - designations, priority species and protected species.
f. Description of Woodland Creation Area – historic environment, landscape, access and water.
g. Woodland Creation Area Structure- proposed structure in line with establishment plan and site objectives.
h. Risks – Plant health, browsing, weeds and other damage. Threats to soil and water. Climate change.
i. Establishment Review – review of initial translocation and establishment.
j. Management Strategy – silviculture, site priorities, interventions.
k. Monitoring Strategy.
l. Stakeholder Engagement and Consultation.

5.2. INDICATIVE MANAGEMENT AND MONITORING

5.2.1. High level thoughts for the AWWMP management strategy are provided below and expanded as necessary:

YEARS 1 – 5 (INTENSIVE PERIOD)

a. Weed control – check for weeds and use herbicide spot treatment 3-4 times annually.
b. Undertake an annual hay cut of the grassland (where accessible in relation to tree density).
c. Annual visual inspection for dead or decaying specimens (replacement as necessary in accordance with the below).
d. Year 5 – remove boundary (rabbit and deer proof) fencing. The timing of this action may be delayed should natural regeneration be used as a tool for the establishment of areas of the Woodland Creation Area adjacent to the existing woodland.

YEARS 6– 10 (LESS INTENSIVE)

a. Weed control – check for weeds, spot treatment 2 times annually.
b. Annual hay cut, as required (cessation triggered by natural die off of grassland as habitat develops into established woodland).
c. Thinning and pruning.

YEARS 11+

a. Management actions every few years.

5.2.2. During the initial 5-year establishment period, annual monitoring of woodland establishment is recommended, reducing to 5 yearly intervals for the remainder of the management period. Monitoring would allow comparison of the Woodland Creation Area (in particular the Receptor Area) to the adjacent SSSI/ancient woodland.

5.2.3. The Woodland Creation Area would be managed in consultation with both national and local stakeholders. It is anticipated that the Applicant shall be responsible for the implementation of the AWMMP, although may appoint a third party to fulfil the management and monitoring requirements on their behalf.

5.3. PLANT STOCK

5.3.1. It is recommended that rabbit proof fencing is installed, in preference to individual tree guards, where large areas of woodland block planting is to be carried out. The integrity of protective fencing or stock proof fencing around planting areas would be assessed during aftercare visits. Any remedial action required would be undertaken immediately.

5.3.2. Plants stock would be inspected during each visit and any that have been subject to frost heave or wind rock shall be straightened to an upright position and the ground re-firmed.

5.3.3. General plant health would be monitored during each monitoring visit. Any signs of plant stress, disease or failure would be recorded at that time.

5.3.4. Herbicide treatment of invasive and noxious species would be carried out if required in order to maintain weed free circles around newly planted stock. Additional herbicide application would be required where noticeable clumps of weeds are recorded as being present. Herbicide would be used sparingly and only when it is deemed to be absolutely necessary.

A protocol for the use of herbicides would be developed and set out in the AWMMP, developed at detailed design.

5.4. WEED CONTROL

5.4.1. The Woodland Creation Area would be maintained free of weeds using a neonicotinoid and non-residual herbicide, applied in accordance with manufacturer's instruction via spot treatment or hand weeding, where required. This may include those noxious and invasive weeds noted within the Weeds Act 1959, Ragwort Control Act 2003 and listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) (the latter may require further considerations, detailed within the Biosecurity Method Statement). As detailed in **Section 5.3.4** above, herbicide would be used sparingly, only when it is deemed to be absolutely necessary and in accordance with the protocol to be detailed in the AWMMP.

5.4.2. Ragwort would be controlled on an annual basis through hand weeding. Hand weeding would consist of the removal of the entire weed, including roots, by digging, forking, hoeing or pulling. Weeds would be taken off-site prior to flowering.

5.4.3. During the initial 5-year maintenance period, herbicide application would be carried out 3-4 times annually, subject to the growing conditions. This would reduce to biannually following the establishment period.

5.4.4. Should any non-native invasive species become established, these would be managed following best practice guidance at the time.

5.5. PLANTING FAILURES

5.5.1. All plants which are missing, damaged, have died, or, in the opinion of the Applicant, are failing to make satisfactory extension growth, would be replaced in the next planting season. The only exception would be in cases of theft or malicious damage after completion. Plants would be replaced with equivalent plants to match size of adjacent or nearby plants of same species or match original specification, whichever is the greater.

5.5.2. Where 95% of the plant stock within the Woodland Creation Area or Receptor Area is still alive, no plant replacement would be carried out. This is to account for natural die off, which would create natural open areas of ecological benefit.

5.6. LONG TERM MAINTENANCE

5.6.1. At the end of the year 5 maintenance period, selective thinning would be carried out in order to ensure healthy plant establishment continues. At this time, approximately 10-30% of all plant stock within the Woodland Creation Area would be removed in accordance with good forestry and silvicultural practices to enable development of a diverse woodland canopy (assuming satisfactory establishment in the preliminary years). Larger specimens should be favoured over smaller plant stock that have signs of less vigorous growth.

5.6.2. Where natural glades have developed these would be maintained providing breaks within the woodland canopy adding additional variance in structure and light levels.

5.6.3. Once a tree canopy has started to form, resulting in the natural die back of the hay meadow grassland, woodland/ancient woodland ground flora would be introduced. Ground flora would be planted as plug plants, sourced from a local nursery (to ensure local provenance), translocated from the wider SSSI/ancient woodland (undertaken sensitively to prevent degeneration of the SSSI/ancient woodland) or grown from seeds collected from the SSSI/ancient woodland.

5.6.4. Additional selective thinning could be carried out at years 10 and 15, as required, ensuring healthy crown growth and the creation of open glades and rides.

5.6.5. The proposed Woodland Creation Area would be retained as woodland in perpetuity.

6. PROGRAMME

6.1.1. The precise programme of works shall be finalised at the detailed design stage, following approval of the Scheme at DCO. However, the following sets out the broad chronology of tasks to be undertaken.

6.1.2. Progress between stages and the implementation of further stages of the habitat creation works would be driven by the achievement of conditions that 'trigger' the next stage of the programme. For example, the transplantation of woodland indicator ground flora species may not occur until triggered by the development of a woodland canopy and natural die off of the hay meadow grassland.

PRE-TRANSLOCATION

a. Woodland Creation Area – test soil conditions/nutrient levels. Identify any soil compaction issues.
b. Woodland Creation Area – manipulate soils to reduce soil fertility and alleviate soil compaction (if necessary) and prepare seed-bed for receiving translocation material.
c. Woodland Creation Area – re-test soil condition/nutrient levels to confirm target levels achieved.

TRANSLOCATION

a. Ancient Woodland (Donor Site) – translocate ground flora to wider SSSI/AW. OPTIONAL - Salvage of saplings from within the Donor Site by hand (likely limited to 90 cm maximum) and temporary storage, ready for transplant into the Receptor Area.
b. Donor Site – fell woodland (retain material for use in Woodland Creation Area).
c. Woodland Creation Area – sow hay meadow seed mix/spread green hay (July – August).
d. Donor Site – soil strip.
e. Receptor Area – spread stripped soils.
f. Woodland Creation Area (including Receptor Area) – plant nursery transplants and collected/salvaged transplant saplings (November – March).

POST-TRANSLOCATION

a. Manage and maintain Woodland Creation Area – AWMMP to be prepared to guide the short- and long-term management of the newly created woodland and associated habitats.
b. Ground flora seed obtained during translocation phase grown on in a nursery, ready to be transplanted at suitable time as plug plants (trigger – when canopy of woodland has developed, and hay meadow grassland has started to die back/recede).

7. GLOSSARY

Woodland Creation Area – the 8.16ha area proposed for woodland planting.

Receptor Area – an area contained within the Woodland Creation Area designated to receive materials salvaged from the ancient woodland impacted by the Scheme.

Ride – a linear trackway designed for access.

Glades – open areas within a woodland habitat, which can either be coppiced or left as grassland and scrub.

Green hay – harvested grasses and wildflowers just as they are shedding seed and still 'green'.

Ancient Woodland (capitalised) – the 0.68ha of ancient woodland (both designated and adopted) within the Order Limits of the Scheme.

Windthrow or windsnap – Windthrow refers to trees uprooted or broken by wind. Breakage of the tree trunk instead of uprooting is sometimes called windsnap.

Donor Site – the Ancient Woodland within the Order Limits where salvaged materials would be obtained.

Tilth – soil that has been prepared for planting.

Turves – plural of turf. A layer of matted earth formed by grass and plant roots.

8. REFERENCES

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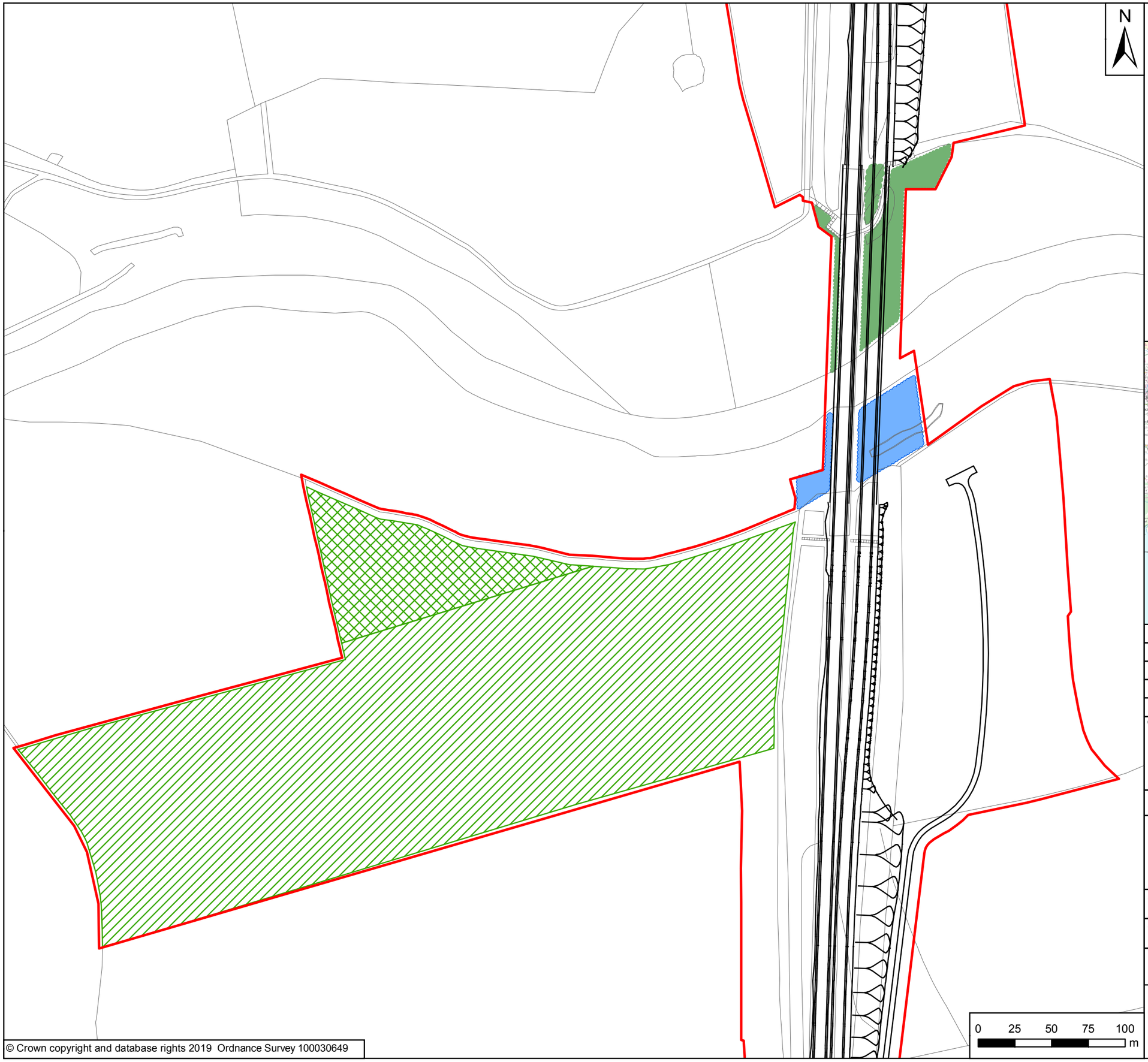
Figure 1 - Ancient Woodland Strategy Plan

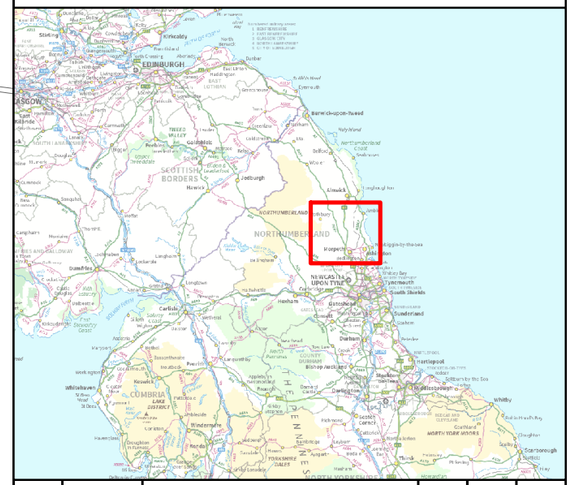


Key

- Order Limits
- General Arrangement
- Receptor Area
- Woodland Creation Area

Ancient Woodland Potentially Impacted by the Scheme

- Coquet River Felton Park LWS
- River Coquet and Coquet Valley Woodlands SSSI/Duke's Bank Wood



Rev	Date	Description	By	Chk'd	App'd
P02	12/07/19	Second Issue	GH	JF	NM
P01	01/04/19	First Issue	GH	JF	NM

Client: highways england

Project Title: A1 in Northumberland: Morpeth to Felton

Drawing Title: Figure 1 Ancient Woodland Strategy Plan

Scale	Drawn	Checked	Approved	Authorised
1:2,500	GH	JF	NM	DM
Original Size	**Date**	**Date**	**Date**	**Date**
A3	01/04/19	01/04/19	01/04/19	01/04/19

Drawing Status: For Information

Suitability: S1

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Appendix A

PROPOSED WOODLAND PLANTING MIXTURE

The woodland creation planting species mixture proposed (to be reviewed and agreed with Natural England during detailed design).

Botanical Name	Common Name	Size (cm)*	Type*
Quercus petraea	Sessile Oak	60-90	Transplant
Quercus robur	Common Oak	60-90	Transplant
Sorbus aucuparia	Rowan	60-90	Transplant
Betula pendula	Silver Birch	60-90	Transplant
Acer campestre	Field Maple	60-90	Transplant
Sambucus nigra	Elder	60-90	Transplant
Prunus avium	Gean Cherry	60-90	Transplant
Viburnum opulus	Guelder Rose	60-90	Transplant
Ilex aquifolium	Holly	60-90	5L
Corylus avellana	Hazel	60-90	Transplant
Aesculus hippocastanum	Horse Chestnut	60-90	Transplant
Fagus sylvatica	Beech	60-90	Transplant

* Size and Type have been assumed to inform this strategy document, although would be confirmed at detailed design. Any changes to the information presented within this strategy shall be agreed through consultation with Natural England.

Appendix B

POTENTIAL GREEN HAY DONOR SITES

Potential Green Hay Donor Sites identified from the grassland inventory data held on the MAGIC website[14]. Other potential sources may be available within the local area or a purchased meadow seed mixture could be considered (to be confirmed at detailed designed in discussion with Natural England). Sources for the hay meadow are to be confirmed at detailed design.

Site Name	Centre Point Grid Reference	Inventory habitat Type	Extent (approx..)	Distance from receptor	Comments
Druridge Bay Country Park	NZ2675 9988	Lowland meadow	7.6 ha	8.7 km (5.4 miles)	HLS agreement on holding
Druridge Bay Country Park	NU2671 0040	Good quality SI Grassland	11.8 ha	9.0 km (5.6 miles)	HLS agreement on holding
Paxton Dene	NZ1675 9485	Good quality SI Grassland	5.5 ha	4.6 km (2.9 miles)	ELS/HLS agreement on holding
Paxtondean Burn	NZ1635 9450	Good quality SI Grassland	6.7 ha	5.0 km (3.1 miles)	
Middleheugh	NZ1149 9862	Good quality SI Grassland	15.6 ha	5.5 km (3.4 miles)	ELS/HLS agreement on holding
Unknown	NZ1185 9762	Good quality SI Grassland	5.0 ha	5.5 km (3.4 miles)	ELS/HLS agreement on holding
Unknown	NZ11519725	Good quality SI Grassland	9.9 ha	5.9 km (3.7 miles)	ELS/HLS agreement on holding

[14] MAGiC website (https://magic.defra.gov.uk/MagicMap.aspx) accessed 03/01/19.

Site Name	Centre Point Grid Reference	Inventory habitat Type	Extent (approx..)	Distance from receptor	Comments
Earsdon East	NZ1964 9353	Good quality SI Grassland	10.2 ha	6.1 km (3.8 miles)	ELS/HLS agreement on holding

Appendix C

SUGGESTED SPECIES FROM NATURAL ENGLAND FOR GREEN HAY MIX

Suggested Plants:

Water avens *Geum rivale*

Devils bit scabious *Succisa pratensis*

Common knapweed *Centaurea nigra*

Betony[15] *Stachys officinalis*

Great burnet *Sanguisorba officinalis*

Tufted vetch *Vicia cracca*

Bush vetch *Vicia sepium*

Meadow vetchling *Lathyrus pratensis*

Pignut *Conopodium majus*

Red campion *Silene dioica*

Cuckoo flower *Cardamine pratensis*

Meadow buttercup *Ranunculus acris*

Autumn hawkbit *Scorzoneroides autumnalis*

Yarrow *Achillea millefolium*

Red clover *Trifolium pratense*

Selfheal *Prunella vulgaris*

Common sorrel *Rumes acetosa*

Ribwort plantain *Plantago lanceolata*

Common cats ear *Hypochaeris radicata*

Wild angelica *Angelica sylvestris*

Meadow cranesbill *Geranium pratense*

Bluebells *Hyacinthoides non-scripta*

Wood anemone *Anemone nemorosa*

Lesser celandine *Ficaria verna*

[15] This species wouldn't cope with fertile soils as it is very uncompetitive.

Grasses are likely to appear immediately, but robust types could potentially cause drought stress in the trees (such as false oat grasses *Arrenatherum* sp. and cocksfoot *Dactylis glomerata*).

Consideration would be given to less competitive species, for example sweet vernal grass *Anthoxanthum odoratum*, crested dog's-tail *Cynosurus cristatus* and sheep's fescue *Festuca ovina*.

This document is also available on our website at **www.gov.uk /highways**

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