Woodland creation guide

Site assessment handbook

A technical guide for practitioners

WOODLAND TRUST

Contents

For further information contact conservation@woodlandtrust.org.uk.

Hotchkiss, A., Burton, V., Herbert, S. and Reid, C. (2022) Site assessment handbook, The Woodland Trust.

1: Introduction

A thorough understanding of your site is essential to inform the creation of new woods and trees. This handbook accompanies the ***Woodland creation guide*** and aims to help you gather information on the **landscape context, characteristics, features** and **constraints** of your site. For each of these aspects, the handbook includes basic and introductory information on completing all four assessment stages: **scoping, desk survey, site survey** and **specialist survey**. It also provides links to other useful resources and includes a summary of how the results of each stage should influence the design, initiation and establishment of new woods and trees. It is intended to be used alongside the design principles and other chapters in the ***Woodland creation guide***, as well as the ***Tree species handbook***.

Scoping

Collate information from easily accessible, generally national scale, data sources

Desk survey

Conduct more detailed investigations using local data

Site survey

Build site-level understanding of the landscape context, features and constraints

Specialist survey(s)

Site survey may trigger this where there are high value or complex features

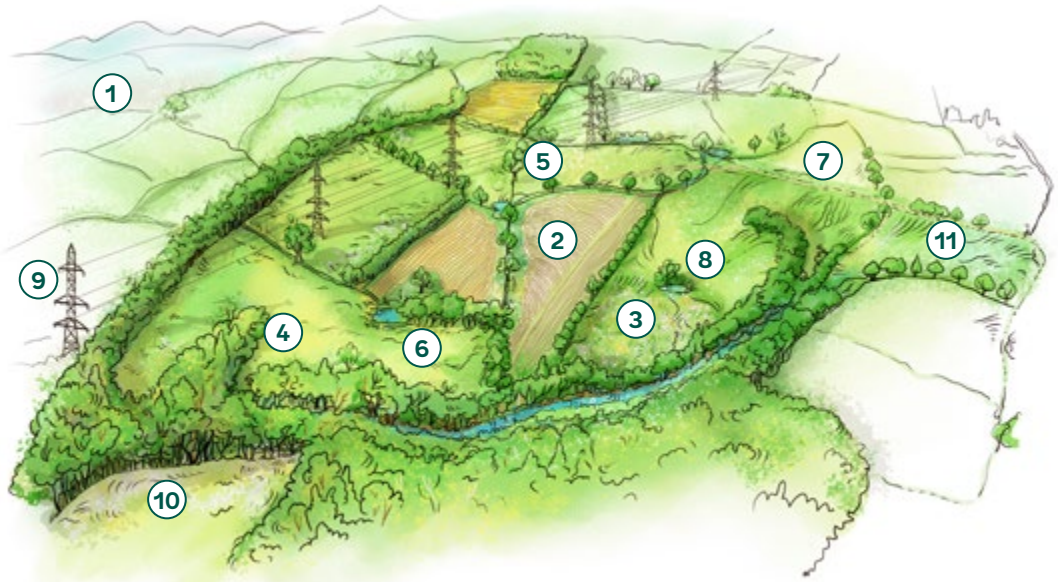
An annotated **assessment map** (or maps) should be produced to bring together all spatial information on site characteristics, features and constraints. Reference codes listed in this handbook can be used to annotate maps and link to reference tables with more information. Maps should be accompanied by a written **site assessment summary**, providing a brief site description and overview.

Information gathered in the site assessment should be presented separately to design maps, although for small and less complex projects, it may be possible to represent the site assessment and design phases on a single annotated map. There is no field survey form to systematically

go through, and the process is intended to give assessors freedom to gather and display information in ways that suit them best. A **checklist** is provided at the end of the handbook, as a prompt when required. Overall, the choice of which features to thoroughly assess and survey will depend on your site (what's there) and your vision and objectives.

From the start, the site assessment process should set out the intended approach towards **site survey(s)**. This could be planned in a number of ways; for example, either by splitting a larger site into compartments or zones to be consistently surveyed via transects or randomised points, or alternatively by setting up a survey by feature. The choice of survey method and design should be informed by a combined understanding of the site's topography, soils and key features. The better this stage is planned and made reproducible (i.e. by recording GPS locations of survey points or transects), the better it will support both site assessment and long-term monitoring.

1.1: SITE ASSESSMENT OVERVIEW



1 **Landscape context** – based on the landscape character assessment, surrounding land use, pattern of enclosure and topography, as well as views into and out from the site.

2 **Site characteristics** – including altitude, aspect and exposure and how these relate to geology and soils.

3 **Features** – priority open habitats, such as grassland, heathland and wetland, are equally important features. Even the smallest remnants can shape the design of new woods and trees and may offer opportunities for restoration and enhancement.

4 **Features** – species records and surveys add important detail to the site assessment, and presence of open habitat species may indicate the need to retain or restore extensive areas that are more open.

5 **Features** – historic environment features will need to be recorded and some may require careful consideration to protect archaeology.

6 **Site characteristics** - rivers, streams and ponds may be important features of the site.

7 **Features** – existing public access may be represented by access points, rights of way and other paths, or more informal use.

8 **Features** – existing and adjacent woods and trees, especially ancient woodland & veteran trees, provide a starting point for building woodland communities and structure.

Constraints – infrastructure and services, such as overhead powerlines, may place specific constraints on where new woods and trees are acceptable.

10 **Constraints** – the impact of herbivores, especially deer, can place a significant constraint on the establishment of new woods and trees.

11 **Constraints** – competing vegetation, such as dense grass swards or bracken, may impact tree establishment. Invasive non-native plants, such as rhododendron or Himalayan balsam, may also pose a threat to creation projects.

2: Assessing landscape context

Scoping: Research landscape character descriptions for your location and any protected landscape designations (AONB, National Park, Historic Landscape Area, National Scenic Areas in Scotland). Begin scoping all site characteristics, features and constraints in the wider landscape.

Desk survey: Familiarise yourself with the relevant Landscape Character Assessment before visiting the site. In some cases, visual impact assessments could begin as a desk survey. Consider how new woods and trees can make a positive contribution to the landscape – enhancing or restoring the landscape character while delivering against a range of other objectives for people and wildlife. This includes the role of woods and trees in how people experience and value the landscape. Desk surveys of all site characteristics, features and constraints should include the wider landscape.

Site survey: Conduct a visual appraisal of the landscape as part of your site survey, considering key aspects of the landscape character assessment. Map landscape and visual features of the site and surrounding area along with location and direction-referenced photographs of landscape features and views (both from and into the site). Assess the visual sensitivity of your site, based on the landscape value, scale, topography and visual prominence of your project, and seek to gauge people's perceptions of the visual impact your project will have. Record and, where necessary, map important viewpoints, the size of the local population (number of 'viewers') and how the landscape is used by people (including the number and types of visitors). A summary of the landscape context, drawing on each stage of the assessment, should be presented as a landscape appraisal.

Specialist survey: Large and significant projects, especially in protected landscapes, may be required to complete a Landscape and Visual Impact Assessment (LVIA) to a defined methodology. It may be necessary to commission a chartered landscape professional to carry out a specialist landscape character appraisal and/or a landscape and visual impact assessment.

Design/initiate/establish: The landscape assessment should ensure that the design, initiation and establishment of new trees and woods reflects an appreciation of the geographical and cultural context. It is important that all site characteristics, features and constraints are looked at in the wider landscape.

Useful resources

- England's 159 National Character Areas (NCAs) and guidance on carrying out landscape and seascape character assessments (gov.uk/guidance)
- Landscape Character Assessment (www.nature.scot) – Scotland's 390 Landscape Character Types (LCTs)
- Natural Resources Wales National Landscape Character Areas (NLCA) (www.naturalresources.wales) – Wales's 48 Area Plans. Many local authorities have also published their own Local Landscape Character Area descriptions.
- Landscape Character of Northern Ireland (www.daera-ni.gov.uk) – Ireland has two levels of assessment, with 26 Regional Landscape Character Assessments (NIRLCAs) and 130 Landscape Character Areas (LCAs)

Smithills Estate

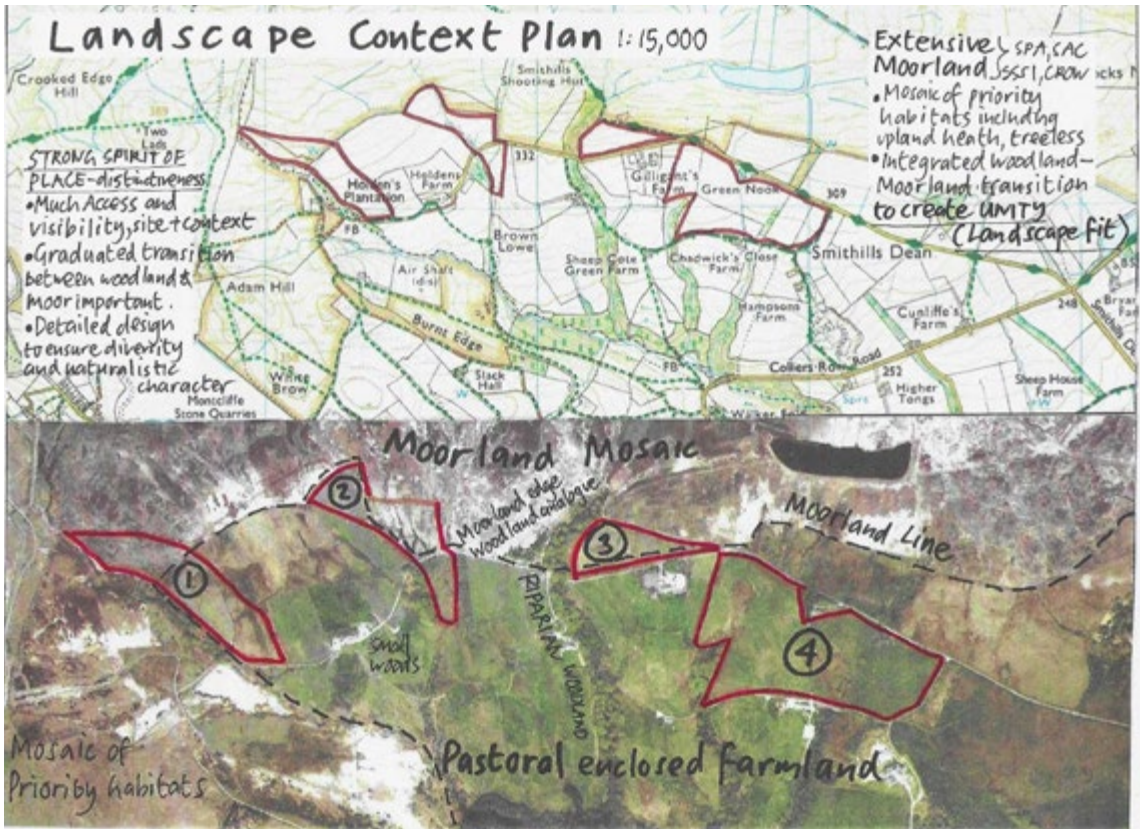


Fig. 3.3. Smithills Estate, landscape context and appraisal

1. **Extensive moorland.** A mosaic of open habitats, including upland heath and grassland, largely treeless. A range of designations, including SAC, SSSI, SPA and CROW open access land.

2. **Creating unity.** Harsh boundary between moorland and enclosed farmland. There is a big opportunity to create wildlife-rich moorland and open woodland transition that will create a sense of unity and ensure a good landscape fit for new woods and trees.

3. **Spirit of place.** The distinctive landscape, with high levels of public access and high visibility, has a spirit of place. A detailed design needs to create a gradual transition between the moorland and woodland, to ensure diversity and maintain the natural character of the landscape.

4. **South-facing bowl** with views across Bolton. An extensive and well-used rights of way network through enclosed pastoral farmland, with beech-dominated ghyll woodland and small conifer plantations.

3: Assessing site characteristics

3.1: Location and topography

LAURIE CAMPBELL/WTML

Geology, soils and water, along with climate, elevation and aspect, combine to influence site characteristics and will inform tree and shrub species choice.

Scoping: Check existing mapping for details on altitude and assess contours for slope steepness and aspect. Producing a basic location map with site boundaries and size (where known at this stage) is a useful first step in any site assessment.

Desk survey: Alongside a basic location map, produce a simple description of the location with relevant information on aspect, slope, elevation and exposure. Aerial images may also begin to reveal whether location or topography correspond to other potential features (e.g. possible grassland or heathland habitat features on steep slopes and how the location and topography might relate to public access), characteristics (hydrology and/or soil differences with topography), or constraints (e.g. is the location in known areas of high deer populations and herbivore impacts?). It is important to begin to consider the scale of a project and practicalities around access (i.e. vehicular, on-foot, remoteness).

Site survey: Record and map areas with particularly strong aspects and significant slopes. Record and map any significant differences in elevation or exposure in different parts of a site. Consider how this relates to the landscape assessment and assessment of other characteristics, features and constraints. Strong gradients in elevation, aspect, or soil type should guide survey design for other features. Record details on vehicular and on-foot access and any particular hazards that are identified (including terrain, remoteness, scale) which may influence other assessments (e.g. assessing constraints like herbivore impact assessments).

Specialist survey: Although location and topography itself is unlikely to require a specialist survey, particular aspects of it will influence other specialist surveys; for example, where differences correspond to other features or characteristics. Locational factors may also influence other specialist assessments.

Design/initiate/establish: The location and topography will strongly influence the other site characteristics, features and constraints, as well as the landscape context. They will also affect decisions about tree and shrub species choice (see the *Tree species handbook*), including which species are most appropriate for a given location, differences in climate (areas of high or low rainfall, severity of frosts, etc.) and exposure. Location may also influence the significance of other features. For example, features may be more significant as conservation or restoration priorities in some areas and less so in others, which may influence the design and initiation.

Useful resources

- OS Maps (explore.osmaps.com) – online mapping and walking, running and cycling routes
- Magic Map Application (magic.defra.gov.uk) – authoritative geographic information about the natural environment from across government
- Forestry Commission Map Browser (www.forestergis.com) – view data layers published by the Forestry Commission in England
- Scotland's Environment Web Map (map.environment.gov.scot) – search and discover spatial data published by Scottish Environment partner organisations
- OSNI Spatial NI Map Viewer (maps.spatialni.gov.uk) – interrogate mapping and other Northern Irish geospatial information from multiple sources

3.2 Geology and soils - peat (S1)

SHAWN WILLIAMS/ALAMY STOCK PHOTO

Areas of deep peat should be carefully mapped in order to quantify opportunities for restoration and to consider sensitive woodland establishment if appropriate.

Scoping: During the scoping for geology and soils, check for potential presence of peat at your location (including deeper peats and peaty organo-mineral soils; for example, shallower peaty podzols and gleys) using broad-scale mapping such as Soilscapes, as well as other available spatial data and aerial imagery. Peat should be recorded as a soil feature (S1), distinct from other mineral soils and geological features (S2).

Desk survey: Using available data, begin to map areas of potential peaty soils. Aerial photography can reveal information on existing vegetation and management that may also be helpful in identifying potential issues to look out for on the site survey. For example, heavily grazed or burnt upland areas (usually obvious from the aerial imagery) may indicate damaged peat soils and vegetation. Similarly, arable land use on peat (e.g. East Anglian fens) may indicate eroding or compacted peat soils. It is also important to record and map any artificial drains, as this will inform management for restoring natural hydrology. These should be differentiated from the natural watercourses on your assessment maps. It may be possible to identify drains on aerial photography and OS mapping.

Site survey: Record and map all areas of deep peat and peaty organo-mineral soils. Deeper peats may be most readily identified as areas of often waterlogged soils, where sphagnum bog mosses are present. Existing vegetation can be an important indicator, but some highly degraded sites on peat may have very modified vegetation and lack indicators like sphagnum. A site survey should record variation with some sample peat depths using an appropriate probe (for this purpose, a simple marked bamboo cane of one-metre length can work fine), as well as other basic aspects of condition and impacts (erosion, gullying, burning, drainage, overgrazing, etc.).

Specialist survey: Where deep peat is potentially present, then a more focused and structured peat-depth assessment across the site will be required. Mark a 50-metre x 50-metre grid on a map and aerial photograph (for the smallest or more complex sites, a smaller grid may be needed). Systematically measure depth at each intersection of the grid. As well as georeferenced maps of samples, it is important to record information on peatland condition (near natural, modified, drained, actively eroding) using the Peatland Condition Assessment guide. Record detail about peatland water-supply mechanisms (e.g. rain-fed, groundwater/spring-fed, topographical mires, etc.) to inform better hydrological understanding of implications of new trees in or near peat. For some organo-mineral soils (peaty podzols, ironpans, peaty gleys), completing a more detailed soil survey with additional soil pits or deeper cores is informative. These areas may also be subject to a more specialist survey of vegetation and habitat features. Where very detailed information on soil properties is required, the survey should aim for a randomised sampling of soil cores of at least 20cm depth in the area of interest. Aiming for a minimum of five replicate sampling points at each location of interest is good practice. If carbon sequestration is a key objective of the site, these cores can be analysed at relatively low cost for measures such as: soil organic carbon, total carbon, pH, total nitrogen and more. Peatland restoration projects are likely to require specialist input to produce management plans and specifications for restoration work. Surveys should map and quantify restoration management priorities while considering practicalities; for example, access routes for contractors. Restoration methods for creating dams to prevent drainage can vary, depending on size. Using vegetative material from the site may suit for smaller dams, whereas plastic piling or wooden structures may be needed for larger and flowing drains. For eroded peats, it may be

possible to support edges using revegetation. For blocking drains, it may be necessary to consult relevant authorities and seek permissions where required. Ordinary watercourse consent may be required from the local authority under the Flood and Water Management Act 2010, and other legislation such as the Land Drainage Act 1991 may apply.

Design/initiate/establish: The aim for all peat and peaty soils is to restore natural hydrological functioning, high water saturation, and never to artificially create conditions that enable trees to grow. This will protect both peatland carbon stores and associated biodiversity. The priority is to restore peatland functioning first and address other impacts on peatland vegetation (e.g. high herbivore impacts, burning) before or concurrently with considering whether or not increasing native tree cover is an appropriate objective. It is not acceptable to establish new woodlands on deep peat (> 50cm) and latest guidance suggests peat deeper than 30cm should also be avoided in order to provide a buffer of protection for deeper peats. Please defer to your relevant country agency guidance on this issue. For shallower peats and peaty soils, including peaty podzols and gleys, you must consider a range of other characteristics, features and constraints to determine whether, and at what scale, establishment of native trees becomes appropriate for nature recovery. The hydrological integrity of the site must not be degraded and new trees must have limited impact on hydrological relationships to any adjacent or intricately mixed deeper peats. It is vital that trees do not significantly alter existing high-value biodiversity such as wetland vegetation/habitats (section 5.2), or impact species of conservation importance (section 6). Woodland creation may be more appropriate where existing or historic native wooded habitats could be expanded or restored (section 4.1), especially where there are opportunities for natural colonisation of native trees (section 4.3) and constraints like herbivore pressure can be addressed (section 10). Where these are feasible, then it remains important to limit the impacts of initiating woodland creation on soil carbon stores. This will typically involve initiation methods with limited ground preparation and utilising natural colonisation wherever possible.

Useful resources

- The UK Soil Observatory (www.ukso.org) – access the British Geological Survey peat coverage map layers (surface body layer) under 'soil type' table
- Soilscapes Soil Types Viewer (www.landis.org.uk/soilscapes) – from the National Soil Resources Institute
- Forestry Commission Natural Environment Survey and Assessment instructions (gov.uk/goverment/publications)
- Peatland Condition Assessment Guide (www.nature.scot) – guidance from Nature Scot
- Woodland management: assessing deep peat – (naturalresources.wales) guidance from Natural Resources Wales
- Forestry Commission Map Browser (www.forestergis.com) – includes a Peat Map for England
- Look out for an upcoming Woodland Trust position statement (www.woodlandtrust.org.uk) and guidance note on peat and woodland creation

3.3 Geology and soils – other geological or soil features (S2)

NIGEL SAWYER/ALAMY STOCK PHOTO

Careful consideration of soil type across the site will inform design, species choice and initiation method

Scoping: Begin gathering information on underlying geology and soils from available datasets. Basic broad-scale soil characteristics can be checked using resources such as Soilscapes and bedrock geology mapping from British Geological Survey. As well as being characteristics of the site, some soils or geological exposures (e.g. Geological Conservation Review sites) may need to be considered as site features and mapped accordingly.

Desk survey: For sites with likely variation in soils or underlying geology, begin mapping these site characteristics using available data. Aerial photography can reveal information on existing vegetation and land management that may be helpful in identifying soil issues to look out for on the site survey. For example, arable management on clay soils may have led to compaction issues. Some areas in the uplands with bracken cover can indicate deeper, former-woodland soils.

Site survey: Consider exploratory soil surveys on site, ensuring representative samples are taken of the soil horizon using augers or soil pits. Some soil conditions (nutrient status, depth, structural properties, water table height, mycorrhizal associations, etc.) can be inferred from

vegetation and could be mapped as such from a walkover survey (e.g. sandy, acidic, infertile, base-rich clays). This may be sufficient for many sites. Some vegetation patterns may also relate to vegetation and habitat features. In most situations, digging soil pits is informative (see video in resources below). For some waterlogged mineral soils, a sample of soil pits might reveal if ground is naturally waterlogged or if it is compacted. Problematic soils should also be identified and mapped, including erosion pathways (e.g. wind direction, water runoff), toxic soils, mineral workings and compacted layers.

Specialist survey: Larger sites with complex patterns of differing soils might trigger a more detailed soil survey, including additional soils pits and finer-scale soil mapping. Where carbon sequestration is a key objective, aim for a randomised sampling of soil cores of at least 20cm depth, with a minimum of five replicates per area of interest. For further guidance, see 'Useful resources'. Specialist soil surveys may record and map details on soil characteristics, depth, pH and fertility. Soil analysis of nitrates and phosphates may be important, enabling competitive weedy-vegetation growth to be planned for.

Design/initiate/establish: It is vital to relate information on soils to the identification and selection of suitable wooded habitat communities and tree and shrub species (see the *Tree species handbook*). Consider how the design and initiation of trees and woods may be used to improve or protect soil structure (e.g. by reducing compaction), soil biodiversity and soil stabilisation (preventing erosion and loss). Some soils may also support existing important habitat, vegetation and species features, and may be part of designs as open habitat or glades or open wooded habitats. In agroforestry, trees with deeper roots than conventional crops or grassland can access otherwise unreachable soil nutrients, which can increase productivity, as well as protect soils from loss. For brownfield sites with toxic soils, species selection needs to be carefully researched, based on what will survive and how it will impact stabilisation of toxic materials in the environment. Significant soil structure issues (compaction, plough pans, buried drainage systems, etc.) may need remedial cultivation prior to woodland initiation.

Useful resources

- Soilscapes soil type viewer (www.landis.org.uk/soilscapes) – from the National Soil Resources Institute
- Geology of Britain Viewer (www.bgs.ac.uk) – a tool to explore geology from the British Geological Survey
- Geological Survey of Northern Ireland (www2.bgs.ac.uk) – access to data through Open Data NI (www.opendatani.gov.uk), Spatial NI (www.spatialni.gov.uk) and a number of web applications
- Ecological Site Classification tool (www.forestresearch.gov.uk/tools-and-resources) – a Forest Research guide to soil types, indicator plants, moisture and nutrient regimes. Largely designed for commercial forestry, but a useful basis for all woods and trees
- Recent Forestry Commission publication on soils assessment (gov.uk/government/publications) to determine pros and cons of cultivation prior to tree establishment
- Older guidance on collecting soil data for a woodland creation proposal can be found in Bulletin 119 (www.forestresearch.gov.uk) alongside online videos on digging soil pits (vimeo.com/channels/esctutorials)
- Tree species handbook – The Woodland Trust (www.woodlandtrust.org.uk/publications)

3.4 Water – waterbodies and watercourses (W3) and springs and flushes (W4)

AERIAL CLOSE-UP PHOTOGRAPHY/WTML

Assessing and mapping any water features on or near the site will inform design, whether this be establishing riparian woodland habitats or exploring opportunities for natural flood management.

Scoping: Interpret aerial imagery, maps and other land-use information, and begin to map all permanent or seasonal waterbodies (ponds, lakes, etc.) and watercourses (streams, rivers), ensuring that artificial drainage and ditches are differentiated where this is clear. Investigate available data on main rivers and catchment condition.

Desk survey: Use available data to identify waterbodies in the catchment that are either designated for nature conservation or discharge into a drinking watercourse; or are within the catchment of a river which periodically floods, with this affecting people or property. Identify the status attributed to the waterbodies in the catchment. Catchment Management Plans record the current status of waterbodies and watercourses, indicating the priority that intervention should take. This includes evidence about runoff pathways and rates, soil erosion and pollutant sources (diffuse or point source), as well as where trees and shrubs could help most.

Site survey: Build on the desk assessment by identifying and mapping runoff pathways and drains. Record and map obvious water quality issues (brown or silty water, any point-source pollution). Consider how historic land management has affected the hydrology of the site and how the restoration of natural hydrological processes would influence and complement the creation of new woods and trees and affect the wider catchment. Record and map drainage ditches and any known pipework. Artificial features should be differentiated on maps from any natural watercourses. Also consider how watercourses may be related to any invasive non-native plants (section 11.2).

Specialist survey: For some sites and projects, it may be necessary to engage with a professional hydrologist for advice. Where water quality and natural flood management are objectives, then specialist involvement may be important in ensuring data is collected to understand and evidence success. The presence or scale of some of the hydrological characteristics may vary seasonally or with extreme weather events, and local knowledge and/or repeat site survey may be required to build a sound understanding of the role of water in characterising and shaping the site.

Design/initiate/establish: Develop designs that support establishing riparian woodland habitats (groves, open wooded habitats and glades). Consider species selection by watercourses and waterbodies using the *Tree species handbook*. Depending on the objective, ensure that design features either reduce the rate of water flow within catchments – helping to reduce flooding downstream – or regulate water supply for crops in agroforestry. Take opportunities to restore natural hydrology prior to, or alongside, woodland creation activity; for example, by blocking artificial drains, de-canalising rivers and creating woody-debris dams. Consider how other vegetation as part of open wooded habitats and glades might also increase landscape texture and 'roughness', increasing infiltration and reducing surface flows of water. For sites with no open waterbodies, consider the potential to create ponds. Trees can also contribute to Sustainable Urban Drainage systems (SUDs), to ameliorate the impact of rainfall on large areas of hard surfaces (paving, car parks, roofing, etc).

Useful resources

- Catchment Data Explorer (environment.data.gov.uk) – for England, from the Environment Agency
- Map Gallery (waterwatchwales.naturalresourceswales.gov.uk) – a collection of web maps related to the Water Framework Directive in Wales
- River Basin Management Plans 2015 – 2021 (naturalresources.wales) – approved river basin management plans from Natural Resources Wales
- NEIA Water Management Units (www.daera-ni.gov.uk) – digital datasets for Northern Ireland, from DAERA
- NIEA Catchment Data Map Viewer (gis.daera-ni.gov.uk) – explore and download information about the water environment for Northern Ireland, from DAERA
- Water Environment Hub (www.sepa.org.uk) – the story of Scotland's water environment covering Scotland's 2015 river basin management plan
- Opportunity mapping (www.forestresearch.gov.uk) – targeting woodland creation for water objectives – a collection of publications and research from Forest Research

4: Assessing features – trees and woodland

4.1 Woodland (TW1)

DAVID WHITE/WTML

It is vital to consider the condition of existing woodland and the potential to enhance this through new trees and wooded habitats outside their existing boundaries.

Scoping: Use maps and aerials to consider where existing woodland is located within, adjacent to or in the wider landscape surrounding your site. Use available data to check for protected sites and ancient woodland. Other priority habitat inventories (e.g. wood pasture and parkland) may also be useful.

Desk survey: Map all patches of existing woodland within and adjacent to the immediate landscape around your site. Where possible from aerials, it may be useful to distinguish between denser areas (>70% canopy cover) as groves using the reference TW1gr, open wooded habitats (20–70% canopy) as TW1owh, and any glades (<20% canopy) within existing wooded habitats as TW1gl. This will help, when considering the design, to reflect the key design principle of structural complexity.

Site survey: Ground truth and refine any mapping of existing woodland boundaries. With access permission, survey woodland both within and adjacent to the site and note presence of woodland ground flora – mapping hotspots of notable species. Note the tree and shrub species which are present in adjacent woodland and include some basic information about condition, including any issues with high herbivore impacts (section 10) or invasive non-native plants (section 11.2).

Specialist survey: Consider potential restoration priorities for any existing ancient woodland, including carrying out an ancient woodland restoration (AWR) assessment for plantations on ancient woodland sites (PAWS) and other ancient woodlands subject to significant impacts or showing poor condition. A specialist survey may also be useful for assessing any tree or shrub species for propagation projects. If the existing trees and woodland are a significant feature of your site, you may need to decide whether the project is better considered as a restoration, rather than a creation project. For example, a remnant wood pasture with scattered mature or veteran trees may be better viewed as a restoration project informed by a condition assessment of the habitat.

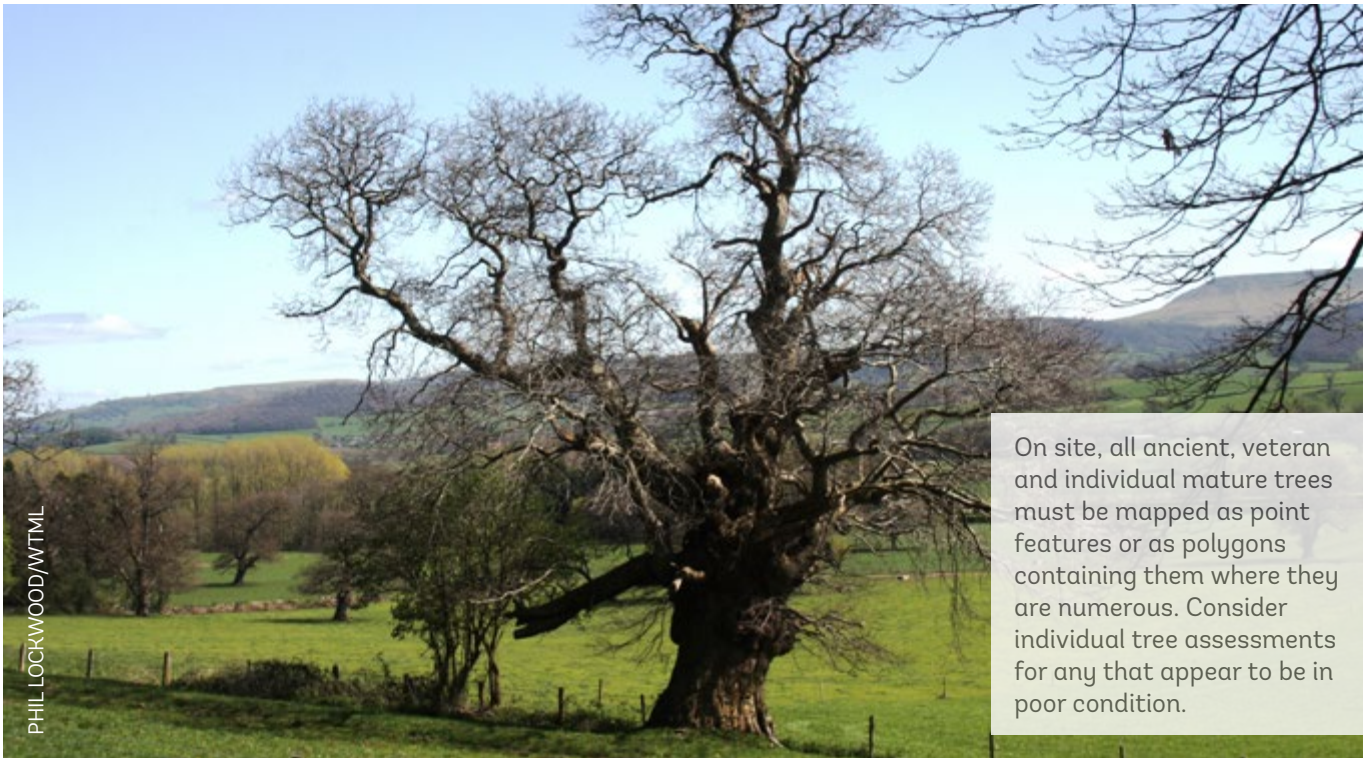
Design/initiate/establish: To create better connected and ecologically functioning woodland habitats, it is vital to consider the condition of existing woodland and the potential to enhance this through new trees and wooded habitats outside their existing boundaries. This will help species to colonise new areas and develop structures which may be lacking in the existing woodland. Existing woodland is an important seed source for natural colonisation (and/or propagation) and can inform decisions on the most appropriate initiation methods to be used. It is important to reflect the key design principle for nature recovery – structural complexity – by enhancing and building on the existing woodland habitats and the relative proportions of the different woodland mosaic components of groves, open wooded habitats and glades. Where one or more of these components are scarce within a landscape, then consider including higher proportions in a project design. Designs must enhance and accommodate all existing open wooded habitats (e.g. wood pasture, ffridd and scattered trees, including mature and veteran trees – section 4.2) and glades. If most existing woodland is predominately denser mature groves (>70% canopy), then consider designs that promote greater representation of open wooded

habitats and glades. The adjacency of ancient woodland will influence initiation methods, as in most instances their expansion through natural colonisation will be both possible and most appropriate. Consider the *Tree species handbook* for further information on the colonisation characteristics for each species.

Useful resources

- Magic Map (magic.defra.gov.uk) – this hosts spatial data on woodlands, including the National Forest Inventory and Ancient Woodlands
- DataMapWales (datamap.gov.wales) – source for public sector data in Wales
- Scotland's Environment Web (map.environment.gov.scot) – information and data for Scotland
- Northern Ireland Ancient Woodland Inventory (www.woodlandtrust.org.uk/publications) – location and extent of ancient woodland in NI, hosted by the Woodland Trust
- Restoring ancient woods: an introduction (www.woodlandtrust.org.uk/publications) – Woodland Trust guidance
- Ancient woodland restoration: survey and assessment (www.woodlandtrust.org.uk/publications) – Woodland Trust guidance
- Tree species handbook (www.woodlandtrust.org.uk/publications) – Woodland Trust guidance
- Ancient and veteran trees: A Assessment Guide (www.woodlandtrust.org.uk/publications) – Woodland Trust guidance

4.2 Mature and veteran trees (TW2)



PHIL LOCKWOOD/WTML

On site, all ancient, veteran and individual mature trees must be mapped as point features or as polygons containing them where they are numerous. Consider individual tree assessments for any that appear to be in poor condition.

Scoping: Interpret recent aerial imagery and available spatial data (e.g. the Ancient Tree Inventory) to check for presence of existing individual mature and veteran trees in fields, hedgerows and other wayside locations. It is important to consider and record mature and veteran trees within existing woodland.

Desk survey: Where aerial imagery and other available data suggest the presence of existing mature trees, then these can begin to be mapped as points to visit during a site survey. It may be possible to begin to consider their likely condition based on aerial imagery and land uses (e.g. ploughed arable), and to use Google Street View for some sites close to public highways.

Site survey: On site, all ancient, veteran, and individual mature trees must be mapped as point features or as polygons containing them where they are numerous. Any ancient or veteran trees identified during the site survey should be recorded and added to the Ancient Tree Inventory (where not already recorded), with the landowners' consent. Record species, stage (mature, veteran, ancient), features (e.g. hollowing or other decay features, epiphytes) and basic information about condition. For some sites (e.g. some upland locations with sparse tree cover), other individual mature

trees in the area beyond the boundaries of the site should be recorded and considered in terms of seed sources for natural colonisation. The *tree species handbook* has more information on colonisation characteristics for each species.

Specialist survey: For ancient and veteran trees that appear to be in poor condition, complete individual tree assessments to assess this and help ensure that future activity results in improved condition. This may benefit from the opinion of a specialist arboricultural professional with experience of managing veteran and ancient trees for conservation.

Design/initiate/establish: Ensure that designs enhance and improve the condition of existing mature and veteran trees. This will often mean maintaining considerable space around individual trees to avoid adding significant crown or root competition. Existing mature and veteran trees give new wooded habitats a considerable head start in developing old-growth characteristics and associated richness in terms of biodiversity. Design can incorporate mature and veteran tree features into glades or open wooded habitats. Ensure that no crown-competing trees are established within five times the girth or two and a half times the canopy of the feature tree (whichever is greatest). Consider planting complementary shrub species such as hawthorn closer to these features, but also ensure suitable areas for developing successor trees of the same species. For example, for an existing open grown veteran oak, designs should look to develop more open grown oaks. Ensure that future management maintains sufficient space around these individual legacy trees through grazing animals in silvopastoral agroforestry land uses. Use ongoing individual tree assessments to monitor the condition of ancient and veteran trees.

Useful resources

- Ancient Tree Inventory (ati.woodlandtrust.org.uk) – A Woodland Trust portal for ancient and veteran trees
- Ancient and veteran trees: caring for special trees on farms (www.woodlandtrust.org.uk/publications) – Woodland Trust guidance

4.3 Trees and shrubs, including younger regeneration (TW3)

NIALL BENVIE©/WTML

Record and map existing younger trees and shrubs, with notes on tree species and seed production. Consider soils and conditions favourable or unfavourable to regeneration and relate this to site surveys of constraints.

Scoping: Begin scoping the presence of younger trees and shrubs already present within a site and in the surrounding landscape, through interpreting aerial imagery. The potential for natural colonisation for different species, at a site or in specific parts of a site, will also link to scoping other features such as existing woodland, mature and veteran trees, scrub and hedgerows.

Desk survey: Interpreting aerial imagery and spatial data can reveal presence of existing younger trees. This will help to guide the site survey and show where elements of mapping can begin. Map all areas of existing younger trees as well as where there are potential sources of colonisation for different species of trees and shrubs. Using aerial imagery and information on current land uses will also help begin an assessment of the ground conditions and other factors favourable to natural colonisation potential. This includes relating it to constraints such as herbivore impacts (section 10) and competitive vegetation (section 11.1).

Site survey: Record and map existing younger trees and shrubs, with notes on species and seed production. Also record and map sources of all tree and shrub regeneration within and outside site boundaries, noting

different species separately. Refer to information in the *Tree species handbook* on dispersal and colonisation characteristics for each species, to ensure appropriate distances are considered. For many wind-dispersed species (including birch, willows, ash, elm, aspen, hornbeam, field maple, lime and pine), this needs to be considered up to and potentially beyond 200 metres from seed-producing trees. Consider vectors for seed dispersal too (e.g. where adjacent existing woodland and hedgerows may support mice, squirrels, jays). Record perching opportunities which may support regeneration of fleshy fruiting species (e.g. hawthorn, rowan). Existing shrubs and pioneering young trees will facilitate seed deposition of most other fleshy fruited trees and shrubs (e.g. hawthorn, dog rose, guelder rose, buckthorn, dogwood and privet). Consider colonisation from vegetative spread (e.g. from suckering species like blackthorn, wild cherry, bird cherry, aspen and hazel). Consider soils and conditions favourable or unfavourable to regeneration and relate this to site surveys of constraints, such as herbivore impacts and competitive vegetation or tight swards, as well as other open features where colonisation may not be desirable (e.g. grassland, wetland or heathland features - section 5) and which may need to be maintained.

Specialist survey: Consider completing a more thorough herbivore impact assessment where woodland creation will be carried out through natural regeneration processes. In some situations, this may need to include nearby woodland to understand pressures in the surrounding area.

Design/initiate/establish: Incorporate existing young tree regeneration as part of the design. Where possible, consider colonisation as an initiation method. Some existing trees and shrubs may already have relationships with mycorrhizal fungi that can assist trees in establishment, supporting their survival and longer-term growth. Some species of tree are best established alongside other trees that share associated fungi. The adjacency of ancient woodland will also influence initiation methods as, in most instances, their expansion through natural colonisation will be both possible and most appropriate. Explore whether any current constraints to natural colonisation can be managed; for example, through reducing heavy or prolonged herbivore impacts (such as livestock and deer). Complete absence of grazing is not always necessary. With enough seed source, trees can regenerate with the light presence of grazing animals. Ground conditions can be improved by lightly scarifying or

exposing soils to increase regeneration potential. Consider which species are most likely to naturally colonise and whether there are species that are very unlikely to colonise. Early on, denser tree establishment can occur closest to hedgerows or woodland edges rather than the innermost parts of existing fields. But, in the longer term, these treeless areas can develop into wooded habitats of diverse age and spatial structure through self-seeded colonisation.

Useful resources

- Tree species handbook (www.woodlandtrust.org.uk/publications) – Woodland Trust guidance
- Forestry Commission guidance on natural colonisation (www.gov.uk/government/publications)

4.4 Scrub (TW4)

NIGEL SAWYER/ALAMY STOCK PHOTO

Assessment and mapping of existing scrub and more open transitional habitats will help to ensure they are incorporated into site design, contributing to structural diversity and dynamism across the site.

Scoping: There are relatively few data or mapping sources for scrub. Interpreting aerial imagery may reveal potential patches of scrub, which may be in mosaic with other features. Depending on the time of year the aerial imagery was collected, certain species may be more apparent, such as the white flowering of hawthorn and blackthorn and the yellow flowering of gorse.

Desk survey: Begin to map potential scrub features based on aerial imagery and start to consider a desk survey for any associated species interests (section 6).

Site survey: Record scrub as areas on maps, including the presence of dense or patchy cover of gorse, broom, brambles, wild roses and patchy young woody scrub such as hawthorn, blackthorn or willow. Larger and more established areas might be best recorded as a woodland feature (section 4.1). Note where other young trees are colonising within scrub.

Specialist survey: Specialist surveys relating to scrub features are most likely to involve species-focused ecological surveys for wildlife associated with scrub, including some woodland specialists (section 6.5), and potentially birds or other wildlife associated with more open scrub.

Design/initiate/establish: Consider the potential for further colonisation from seed and vegetative spread. Existing shrubs like hawthorn, bramble and dog rose will facilitate seed deposition from other fleshy fruit trees and shrubs in particular, but they can also protect other tree colonisation from herbivory. Ensure that designs and future management represent these more open and transitional scrub habitats across a site, recognising that this is also likely to be dynamic through time and space. This should reflect the structural complexity design principle and ensure good representation of open wooded habitats and glades.

Useful resources

- Woodland Wildlife Toolkit (www.woodlandwildlifetoolkit.sylva.org.uk) – advice on managing woodlands for wildlife, including scrubby vegetation
- Natural England Scrub Management Handbook (publications.naturalengland.org.uk/publication)

4.5 Hedgerows (TW5)

PETER MOULTON/ALAMY STOCK PHOTO

Map hedgerow features, recording individual mature and veteran trees separately as points. If hedgerows are a significant feature, consider specialist survey via established hedgerow survey methodologies.

Scoping: There are currently relatively few data or mapping sources for hedgerows and their quality or condition, although research is increasingly trying to tackle this using remote sensing approaches (so keep an eye out for new resources). A UK dataset is available from the Centre of Ecology & Hydrology for a fee. Some local data may be accessible for surveys in counties or landscape projects. Interpreting aerial imagery will reveal hedgerows. Consider how landscape character assessments may also relate to hedgerows (section 2).

Desk survey: Begin to map hedgerow features based on aerial imagery, although sometimes it may be difficult to distinguish between low hedgerows and ditches. All mapping carried out at the desk can be checked on site.

Site survey: Note any species which may be present in adjacent hedgerows or adjacent woodland. Consider the potential for suckering and vegetative spread (e.g. from blackthorn, bird cherry, hazel, etc.) and note where hedgerows support other woodland specialist species (section 6.5), particularly woodland plants which might spread out. Record individual mature and veteran trees separately as points.

Specialist survey: It may be worth considering a more thorough assessment of existing hedgerows where they are a significant feature of a site, using existing hedgerow survey methodologies. Hedgerows may be a part of other specialist assessments; for example, landscape character assessments (section 2).

Design/initiate/establish: Consider the potential for species that are already present in hedgerows to colonise wider from seed and vegetative spread. If a key feature of the site and wider landscape, then consider buffering and extending hedgerows to enhance this characteristic and increase landscape connectivity.

Useful resources

- Hedgerow survey handbook (www.gov.uk/government/publications) – standard method for recording hedgerows
- Hedgelink (hedgelink.org.uk/guidance) advice and survey toolkit
- Hedgerow survey database (hedgelink.org.uk/guidance/surveys)
- Centre for Ecology & Hydrology Woody linear features framework (www.ceh.ac.uk) – this was developed using a combination of existing data and a predictive model

4.6 Decaying wood (TW6)

PRITZ/ALAMY STOCK PHOTO

Record decaying wood in all its forms, from standing decaying trees to fallen trees and branches on the ground. It can be an important head start for woodland creation in terms of developing the characteristics of older-growth woodland habitat.

Scoping: Existing data for scoping will be limited for this feature. However, consider the landscape context and a site's proximity to known or possible sites of importance for decaying wood features; for example, SSSIs or inventories of wood pasture and parkland sites.

Desk survey: Although some larger decaying wood might be seen on aerial imagery, it will be difficult to make much desk assessment of any deadwood. However, it may be worth considering using the Woodland Wildlife Toolkit or other biological data sources if priority species associated with decaying wood are known in the area.

Site survey: Record decaying wood in all its forms, from standing decaying trees (snags) to fallen trees and branches on the ground. This should include any significant decaying wood within or near watercourses. Record the environment within which decaying wood currently occurs (e.g. shaded, totally exposed to sun). Decaying wood on living trees (dead branches still attached, hollowing and cavities on ancient trees) is very important and is largely captured through feature TS1. You may be able to record some detail about species associated with decaying wood resources, such as whether it is supporting striking abundances of large fungi or an array of lichens, mosses or ferns. Exit holes and other signs may suggest associated

wood-decay invertebrates. Consider whether existing decaying wood has potential to facilitate natural colonisation of trees and shrubs. Decaying wood in the form of 'nurse logs' can facilitate seedling establishment by providing a substrate rich in organic matter, while also protecting seedlings from competing vegetation and acting as a refugium from browsers.

Specialist survey: Consider the need for specialist species surveys for protected species such as bats (section 6.1), other specialists like invertebrates (section 6.4) and lichens (section 6.3). Some of these may be associated with deadwood and wooded habitats, but still require being in well-lit situations. Sometimes, a rapid visual estimate of decaying wood volumes could be informative. As a rough guide, a log or snag of five metres in length and central diameter of 25cm is approximately 0.25m^3, while one of five metres length and diameter of 50cm is about 1m^3.

Design/initiate/establish: Where decaying wood already occurs, in any form, it is an important head start in developing the characteristics of older-growth wooded habitats. Typically, seek to maintain the current environment around decaying wood (e.g. if it is currently exposed to sun, ensure this is maintained). Consider where decaying wood occurs as a feature on living mature and veteran trees as well as how design can accelerate decaying wood resources in all forms and in different species. For example, consider managing glades with open grown trees as pollards and/or use other arboricultural interventions, such as veteranisation, that might accelerate wood-decay processes and growth into larger broadcrowned trees. Planning areas for future pollard creation can be particularly important, especially the provision of long-term access to enable continuity of management. Designs with denser groves can result in competitive exclusion with smaller standing and fallen decaying wood, but will be much slower to result in larger trees with snags or fallen material of larger volume.

Useful resources

- Dead good deadwood survey from TCV (www.tcv.org.uk/scotland)
- NFI survey manual section on deadwood (www.forestresearch.gov.uk)
- Ancient woodland restoration: module 5 (www.woodlandtrust.org.uk/publications) – The Woodland Trust

5: Assessing features – vegetation and other habitats

5.1 Grassland (OH1)

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Look for key indicator species which, on most 'neutral' soils, include common knapweed, bird's-foot trefoil, oxeye daisy and red clover. Even the occasional presence of key indicator species may signify an opportunity to restore or enhance grassland habitat within your woodland creation design.

Scoping: Check conservation designations and available inventories (SSSIs, SACs, Local Wildlife Sites, Local Nature Reserves, etc.) for priority grassland areas.

Desk survey: Check priority habitat inventories where available, Local Environment Records Centre data and any locally commissioned surveys. Information on recent land management may also be useful. Semi-natural and species-rich grassland will be less likely where there is evidence of recent ploughing, reseeding, fertilising, or slurry applications. Where grassland has not been ploughed/reseeded, or has had significant fertiliser or manure inputs in the past five years, there is likely to be a greater diversity of species. If grassland has not been grazed or mown for many

years, then it may be rank and tussocky. This can be restorable, but needs to be checked on site. Consider a desk survey of species' interests associated with grassland habitat (sections 6.2–6.4).

Site survey: Grassland habitat patches can be very small and may be found on marginal land which often includes the areas targeted for woodland creation. This makes it important to identify them on even the smallest of sites, and it is vital to survey all areas of larger sites with potential grassland features.

- Be aware of seasonal constraints (times of the year when important plants are not in flower or visible). If you are not comfortable evaluating what you are seeing, consider delaying your survey or commissioning a specialist survey.
- Stop and look closely at variation. Identify areas with relatively diverse swards of grasses and forbs/herbs (i.e. everything apart from 'grasses'), especially where the forbs make up more than 10% of the sward, with a variety of leaf shapes (e.g. 8 or more different types). Variation might be detected by various shades of green.
- Look for key indicator plants and distinguish between acid grassland, neutral grassland and calcareous grassland, especially on sites where there are different types.

ALASTAIR HOTCHKISS/WTML

On more alkaline/calcareous soils (particularly over chalk or limestone), look for the presence of bird's-foot trefoil, rock-rose, cowslip, lady's bedstraw, knapweed, thyme, scabious and salad burnet.

Grassland features may link to topography (section 3.1) and soils (sections 3.2 – 3.3). For example, grasslands might persist on steep banks or slopes, or very shallow, stony, or rocky soils. Some important grassland habitats may not be obviously very species rich, but instead can support important or rare grassland fungi. Other agriculturally-improved or amenity grassland might have conservation implications; for example, where it supports foraging birds or other species features. These grasslands may be of more significance where agricultural pasture itself is more limited (e.g. in mountainous or largely agriculturally-unimproved regions or in predominantly arable areas). Other features, such as ridge and furrow and other archaeological features (section 7.1) might indicate a lack of deep-ploughing history. Species-rich, semi-natural grassland is less likely to be present in very uniform sward dominated by few (<4) grass species (limited variation in shape and character of grass leaves) with very low (<10%) cover of forbs/herbs, or where ryegrass is abundant, with frequent white clover, docks or thistle. Some very rank and tussocky grassland (e.g. dense cock's-foot, or false oat grass and hogweed, with little diversity) may be less significant, often where a site is ungrazed or there has been limited cutting for 10 years or more. Although this may not be considered an important grassland feature, it may be worth developing into a scrub feature (section 4.4).

JOHN BRIDGES/WTML

On more acidic soils (e.g. over sands, hilly uplands) look out for key plants like tormentil, heath bedstraw, harebell, sheep's sorrel, betony, eyebrights, bitter vetch and pignut. These habitats may not always appear strikingly flowery. Some of these indicator species can also occur in open wooded habitats on similar soils.

Specialist survey: Seek assessment by a vegetation ecologist where you are not comfortable evaluating what you see (e.g. because of seasonality during winter months, a heavily grazed or mown site, or complex grassland vegetation patterns). A National Vegetation Classification (NVC) map of the site will provide a more detailed evaluation of grassland communities and subcommunities, and relative quality. This will map and describe communities and distinguish between acid (U), calcareous (CG) and mesotrophic or neutral grassland (MG). It is very important that other species are considered in grassland habitats, particularly where these are not strikingly species-rich botanically.

Design/initiate/establish: A key design principle is to restore and enhance existing habitat features as part of mosaic landscapes. All areas of high quality, semi-natural or species-rich grassland should be maintained in designs as areas characterised as open habitat. Consideration must be given to other important grassland habitats and the potential to restore habitats. Some might be accommodated as glades within more open wooded habitats, where sufficiently large and long-term management is ensured. Make sure these are not bound by dense groves, but by more transitional open wooded habitats and ecotones. Some features may be accommodated as part of the more open spectrum of open wooded habitats (20–70% canopy), although this is unlikely to be appropriate for the richest and most important grassland vegetation. It may be appropriate where grassland features are relatively widespread across landscapes, e.g. in some upland regions with extensive areas of acid grassland. However, the aim should still be to enhance these grassland features as part of a spectrum of open wooded habitats, where scattered trees establish without extensively and significantly altering the characteristics and composition of the field-layer vegetation or associated species. Crucially, sufficient grazing and cutting should be maintained throughout the establishment phase, and the design and long-term vision and planning must ensure their continued maintenance. It is important to design-in future management, including the management of grazing animals which are vital to maintaining many grassland habitats. Even if these habitats are mown annually, they may still become dominated by ranker grasses and not experience the disturbances required for seeds to germinate and establish. Consider whether species-poor rank grassland (ungrazed/uncut) may already be developing into scrub, with bramble,

thorns, roses, gorse, etc., and could be considered as a scrub feature (section 4.4), or whether these areas with flowering hogweed, etc. may develop well into open wooded habitats in designs.

Useful resources

- Information and guidance from Save our Magnificent Meadows, including guidance on identifying grassland types (www.magnificentmeadows.org.uk)
- Forestry Commission Operations Note 43 (www.gov.uk/government/publications) – principles for afforestation on or near priority habitats
- Natural Resources Wales guidance on identifying Priority Habitats (cdn.naturalresources.wales)
- The UK Habitat Classification (ukhab.org) – unified and comprehensive approach to classifying habitats, with links to training
- Magic Map (magic.defra.gov.uk) – spatial data, including priority grassland habitat inventory maps for England
- Forestry Commission Map Browser (www.forestergis.com) – shows priority habitat data for England
- DataMapWales (datamap.gov.wales/maps) – sensitivity layers for woodland creation based on priority habitats
- Scotland Environment Webmap (map.environment.gov.scot) – neutral and acid grassland spatial data for the central Scotland Green Network area
- NIEA Natural Environment Map Viewer (gis.daera-ni.gov.uk/arcgis) – priority habitat grassland inventory from DAERA

5.2 Wetland (OH2)

ALASTAIR HOTCHKISS/WTML

Record wetland vegetation features which are likely to occur where there are waterlogged soils, peaty soils, or seasonal inundation by watercourses. Look out for patches of rushes, purple moor grass, sedges and tall herbs like meadowsweet, sphagnum or other moss dominated areas.

Scoping: Wetland features include a varied range of vegetation and habitats, from blanket and raised bogs and fens on deep and shallower peat (section 3.2), wet heath, marshy rush and purple moor-grass pastures, to rich fen and swamp vegetation with reeds, sedges and tall herbs. Check all designations and other available inventories (SSSIs, SACs, SPAs, Ramsar, NNRs, Local Wildlife Sites, Local Nature Reserves, etc.).

Desk survey: Remnant patches of wetland habitat may be very small and may be found on marginal land which is often targeted for woodland creation. These patches may occur as extensive wet heath, bog, fen or marshy grassland habitats, or highly localised as small flushes, seepages, and soakaways among drier vegetation. It may be possible to begin to map some wetland features using aerial imagery; however, others will not be clear at this stage. This makes it important to identify these habitats on even the smallest of woodland creation sites, and it is vital to view all areas of larger sites with potential wetland features. Consider how wetland habitat features might relate to hydrological site characteristics and soils (section 3.4).

Site survey: Record wetland vegetation features as areas on maps. These are likely to occur on waterlogged soils, peaty soils, or with seasonal inundation from adjacent watercourses. Look for the presence of scattered or denser (>25%) patches of rushes, purple moor grass (deciduous – buff coloured in winter), taller sedges, sphagnum bog mosses, cross-leaved heath, deer grass, or other moss-dominated areas, in amongst varied vegetation. Plants like Devil's-bit scabious, meadowsweet, bog asphodel, marsh bedstraw and greater bird's-foot trefoil are also useful indicators of wetland habitats. It is also important to assess the condition of vegetation features, whether they are heavily overgrazed, burnt or drained. Agriculturally improved wet vegetation might occur on alluvial soils, frequently flooded land beside watercourses, or on other peaty and/or drained sites. These may support scattered soft rush, but usually occur in among bright green grasses (e.g. Yorkshire fog), dominated by a few grass species (<4, none of which are tussocky) and with a few forbs/herbs.

Specialist survey: Always consider a more detailed assessment by a specialist vegetation ecologist where you are not comfortable evaluating the significance of wetland vegetation and habitats. It is important to consider how this survey relates to other features and characteristics, such as hydrology (section 3.4), peat (section 3.2) and species (section 6). Specialist hydrological advice may also be informative when considering how increasing tree cover could influence existing wetland vegetation.

Design/initiate/establish: Evaluate the conservation significance of different wetland habitats at multiple scales (local, regional, UK and wider). In most situations, areas of high quality, semi-natural or species-rich wetland vegetation should be maintained in designs as areas characterised as largely open habitat, and consideration must be given to the potential to restore wetland habitats. If sufficiently large, some might be enhanced as glades within open wooded habitats, as long as long-term management is ensured. Make sure these are bounded by transitional open wooded habitats and not dense groves. In some regions, where native tree cover is now rare and severely reduced by historic land management, or where existing native woodland fragments (section 4.1) can be expanded and buffered, it can be more acceptable to increase the cover of native trees and shrubs onto some semi-natural wetland habitat. This may be where those habitats are relatively widespread across the landscape. For example, in parts of Scotland, heavily deer-impacted wet heaths may

benefit from the combined activity of reducing herbivore impacts (section 10.1) and establishment of more native trees and shrubs. In other upland regions (e.g. those dominated by dense purple moor-grass tussocks), activity supporting native wooded habitats might also benefit the recovery of richer wetland vegetation. These features can be part of a spectrum of open wooded habitats, where scattered trees establish without extensively and significantly altering the characteristics and composition of the field-layer vegetation or associated species. However, this is not appropriate for the richest and most important wetland vegetation. Caution is always required. In some areas, wetland vegetation may be higher priorities for biodiversity and nature recovery. This may be the case in parts of the UK (e.g. in some lowland regions) where they are scarcer. Consider specialist advice and always take into account species features (section 6). Appropriate grazing might be required through the establishment phase, and the design, long-term vision and planning must ensure that open wetland vegetation features are maintained. Irrespective of whether or not a wetland habitat feature is present, it is important to consider the carbon storage implications of establishing trees on wetland soils, particularly peaty soils (section 3.2).

Useful resources

- Priority open habitats and woodland creation: A field guide (www.gov.uk/government/publications) – guidance from the Forestry Commission
- Forestry Commission Map Browser (www.forestergis.com) – shows priority habitat data for England
- DataMapWales (datamap.gov.wales/maps) – sensitivity layers for woodland creation based on priority habitats
- NIEA Natural Environment Map Viewer (gis.daera-nis.gov.uk/arcgis) – priority habitat inventory from DAERA

5.3 Heathland (OH3)

ALASTAIR HOTCHKISS/WTML

Evaluate the conservation significance of the heathland habitat present, and consider opportunities for enhancing by accomodating as part of open wooded habitats, glades, or larger areas of open habitat depending on significance and extent.

Scoping: Heathland features include a range of relatively dry lowland and upland vegetation dominated by dwarf shrubs. Lowland heaths are those with presence of heather, dwarf gorses and cross-leaved heath, at lower altitudes, particularly in the drier central, eastern, southern or coastal parts of the UK. Upland heaths are generally those in hills and mountains, most typically of the north and west of the UK, and supporting dwarf shrubs, including heather, bilberry, bell heather, gorse and cowberry. Check all designations and other available inventories (SSSIs, SACs, SPAs, Ramsar, NNRs, Local Wildlife Sites, Local Nature Reserves etc.).

Desk survey: It may be possible to begin recording possible heathland vegetation features as areas on maps, particularly where heather or other heathland plants are clearly visible from imagery. Consider how heathland habitat features might relate to soils (sections 3.2–3.3).

Site survey: The site survey should confirm the presence of heathland vegetation features based on the presence of key species such as heather, cross-leaved heath, bilberry/blaeberry, gorses and fine-leaved grasses (e.g. wavy hair-grass, sheep's fescue), sometimes with obvious lichens and mosses. Some features may be on spectrum or as an intimate mosaic with other vegetation (e.g. acid grassland, typically with less than 25% ericoid

shrub cover). Grassland (section 5.1) and wetland (e.g. wet heath) features (section 5.2) may be considered part of a heathland vegetation mosaic, and it is important not to strictly compartmentalise habitat features. As with all habitat and vegetation surveys, it is important to consider the condition of those features – for example, from high herbivore impacts (section 10) – or other restoration needs in situations where artificial drainage, such as that of peaty soils (section 3.2) or other impacts, have resulted in drier heathland on what would naturally be a wetland habitat. Assessing the condition of heathland vegetation features is an important step in thinking about the role for increasing trees and wooded habitats.

Specialist survey: Consider a more detailed assessment by a vegetation ecologist, ensuring the design includes sufficient areas of open vegetation and that consideration is given to future management. It is important to assess whether supporting trees and woods through reducing high herbivore impacts might also support condition improvement for the heathland vegetation.

Design/initiate/establish: Evaluate the conservation significance of heathland habitats present, and consider the local, regional, UK and wider context. If sufficiently large, and where long-term management is ensured, some heathland vegetation may be incorporated as glades. Alternatively, it could be maintained as extensive habitat characterised as very open and without significant cover of trees and shrubs. Some heathland features may be accommodated as part of a more open spectrum of open wooded habitats (20–70% canopy), although this is unlikely to be appropriate for the richest and most important heathland vegetation. Such vegetation is part of many natural woodland communities, and where it is relatively widespread across landscapes, developing open wooded habitats with scattered trees may be appropriate where it does not extensively and significantly alter the characteristics and composition of the field-layer vegetation, or associated heathland species (section 6.2). The aim should still be to enhance the heathland vegetation feature alongside this, and reductions in grazing pressure to support tree regeneration or establishment may also enhance heathland vegetation and structures.

Useful resources

- Priority open habitats and woodland creation: a field guide (www.gov.uk/government/publications) – guidance from the Forestry Commission
- Forestry Commission Map Browser (www.forestergis.com) – shows priority habitat data for England
- DataMapWales (datamap.gov.wales/maps) – sensitivity layers for woodland creation based on priority habitats
- NIEA Natural Environment Map Viewer (gis.daera-ni.gov.uk/arcgis) – priority habitat inventory from DAERA
- Flora of Northern Ireland (www.habitas.org.uk/flora/index) – from National Museums NI
- Centre for Environmental Data and Recording NI (www.nmni.com/CEDaR) – information on the wildlife of Northern Ireland
- UK Habitat Classification (ukhab.org) – covers terrestrial and freshwater habitats

5.4 Other vegetation and habitats (OH4)

ALASTAIR HOTCHKISS/WTML

Some rock outcrops may host rare plants, mosses or lichens assoiated with sunny or dry situations. Ensuring these remain well lit as part of glades or open wooded habitats in woodland creation design will ensure these important small habitats can persist and thrive.

Scoping: There may be many other significant vegetation communities and habitats within or adjacent to a site which are not already defined as grassland, wetland, heathland, or trees and woodland features. These might include tall herb and fern-dominated vegetation (including bracken-dominated areas), rock outcrops and screes, or some artificial habitats, such as stone walls or those on urban brownfield sites or arable field margins. Often, the significance of these other features might relate to species interests (section 6). For example, it is important to consider species like pearl-bordered fritillary on bracken slopes, open habitat invertebrate assemblages for brownfield sites, or rare plants, mosses or lichens associated with arable margins or outcrops. Therefore, scoping may need to be closely linked to these potential species features.

Desk survey: Interpreting aerial imagery and spatial data can reveal the presence of some other potential vegetation and habitat features. Sometimes, the seasonality of aerial imagery might even reveal specific elements such as bracken cover.

Site survey: Record areas of tall herbs or ferns where dominated by rosebay willowherb, hogweed, nettles and dense bracken without any tree or shrub cover, and with little else growing within or beneath (seasonally/

weather dependent). For urban habitats, record and map bare ground/soil and broken-up concrete/stones/aggregate, particularly where these areas are combined with taller flowering vegetation, walls, ditches or old buildings. In many ways, these brownfield sites can be akin to an artificial limestone pavement and can be very rich in invertebrate life. Make a note if you see lots of insect activity, though this will be seasonal or weather dependent. On arable sites, look for diversity of plants in field margins, and consider specialist surveys in known areas of high arable plant diversity and conservation importance.

Specialist survey: Consider more detailed assessment and evaluation by specialist ecologists, often focused on associated birds (section 6.2), plants (section 6.3) and invertebrates (section 6.4).

Design/initiate/establish: Some bracken-dominated areas with spring bulb species, such as bluebells and wood anemone, may be located on sites of former ancient woodland and thus be well suited to woodland expansion. These could be suitable for both denser groves and more open wooded habitats where they do not impact any associated species interests. Other tall herb communities (like patches of hogweed and willowherb) might offer existing opportunities for developing transitional open wooded habitats. It is important to consider information from any specialist surveys, particularly with regard to any protected and priority species.

Useful resources

- Priority open habitats and woodland creation: a field guide (www.gov.uk/government/publications) – guidance from the Forestry Commission
- Forestry Commission Map Browser (www.forestergis.com) – shows priority habitat data for England
- DataMapWales (datamap.gov.wales/maps) – sensitivity layers for woodland creation based on priority habitats
- NIEA Natural Environment Map Viewer (gis.daera-ni.gov.uk/arcgis) – priority habitat inventory from DAERA
- Flora of Northern Ireland (www.habitas.org.uk/flora/index) – from National Museums NI
- Centre for Environmental Data and Recording NI (www.nmni.com/CEDaR) – information on the wildlife of Northern Ireland
- UK Habitat Classification (ukhab.org) – covers terrestrial and freshwater habitats

6: Assessing features – species

6.1 Protected species (SP1)

LAURIE CAMPBELL/WTML

Mapping available biodiversity data will help to explore the potential presence of protected species within or in proximity to the site. Identification and survey of many of these species will be a specialist skill that can be outsourced.

Scoping: Recording the extent of habitats present will give a good picture of the overall conservation value of your site. However, in order to fully understand the potential impact of new woods and trees and the opportunities for nature recovery, it is important to gather information on key species. Ensuring that the presence of legally protected species is accurately recorded will avoid disturbance or the loss of supporting habitats or features.

Desk survey: Desk assessment can begin to look at habitat features on aerial imagery – mapping other available biodiversity data to consider the potential presence of protected species within or in proximity to the site. For example, potential bat roosts within trees (section 6.5) or buildings within or close to the site, reptiles and amphibians, and badger setts. If the presence of protected species is possible, then consideration should be given to specialist surveys.

Site survey: The identification and survey of many of these species is a specialist skill, and although certain features might be identified on site (e.g. bat roost features or ponds with potential to support great crested newts), it is important that the specialist survey provides detailed and accurate information on which to base decisions.

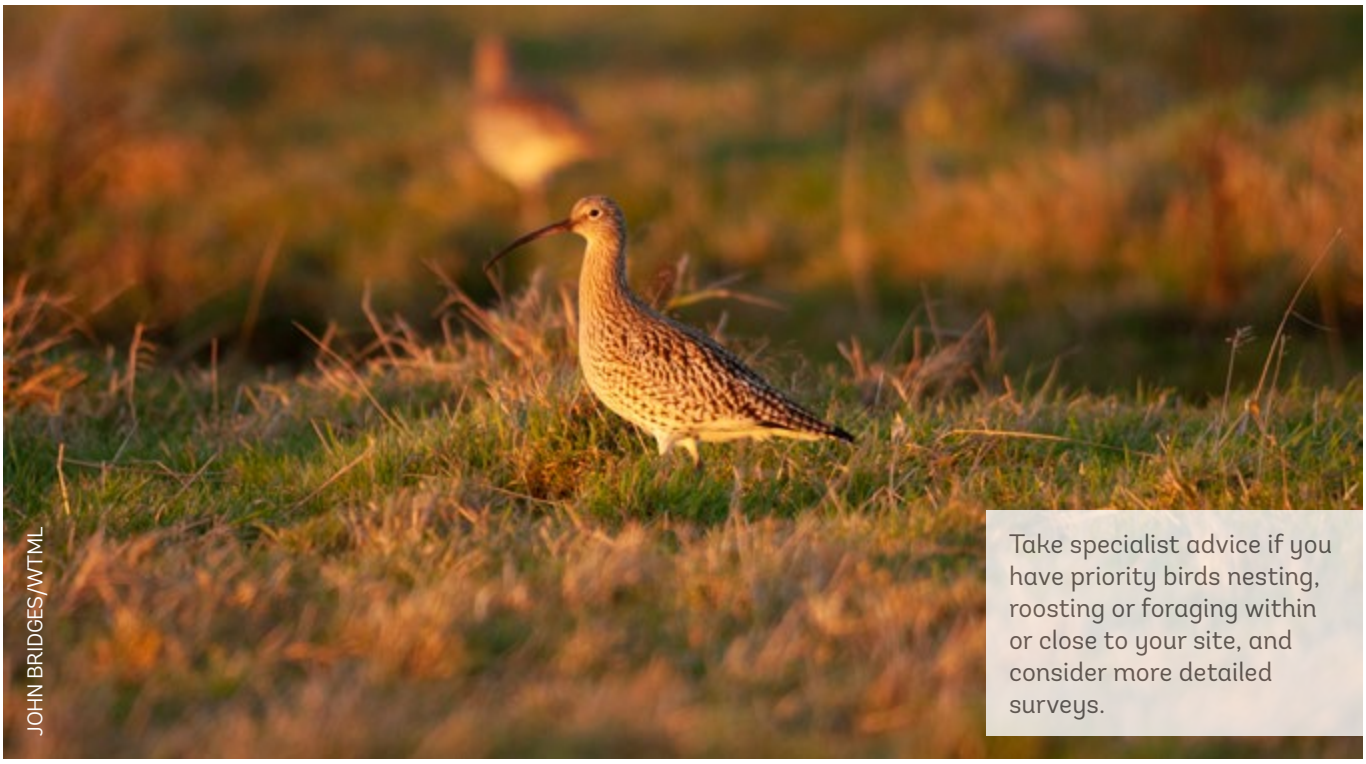
Specialist survey: Ecological consultants are available to conduct surveys and give advice for protected species. Where records are found during scoping or desk assessment, or particular features noted on site that might support protected species, then it is important to seek advice from professional ecological consultants.

Design/initiate/establish: It is vital that woodland creation not only avoids impacting on protected species (e.g. by not overly shading maternity bat roosts in old trees), but that it seeks to enhance these important features. For example, where the aim of the woodland creation is to increase connective tree cover from roosts to current or potential foraging areas of woodland. Follow species-specific guidance.

Useful resources

- NBN Atlas (nbnatlas.org) – the UK's largest collection of biodiversity information
- National Museums Northern Ireland NI Centre for Environmental Data and Recording (www.nmni.com/CEDaR) – species data and link to the NBN

6.2 Priority bird species of open habitats (SP2)



JOHN BRIDGES/WTML

Take specialist advice if you have priority birds nesting, roosting or foraging within or close to your site, and consider more detailed surveys.

Scoping: Bird species associated more with open habitats should be supported through appropriate woodland creation approaches. Scoping should include checking available mapping tools and data. It is important that this scoping is carried out across the wider landscape within at least a few kilometres of a site.

Desk survey: Desk assessment for vegetation and habitat features may reveal the potential for conservation-priority birds to use a site, but some birds (e.g. lapwing, chough and wintering geese such as brent, barnacle and white-fronted geese) will use agriculturally improved grassland and intensive arable fields which would not be considered habitat features.

Site survey: It is possible that the presence of some priority birds may not be noted during the site survey. It is important to consider habitat and vegetation features and how these might relate to priority bird species.

Specialist survey: Take specialist advice if you have priority birds nesting, roosting or foraging within or close to your site, and consider more detailed surveys of breeding and wintering birds to support decision making. Open habitats can be important throughout the year for priority birds, and the suitability of these habitats for such species could be reduced by some woodland establishment.

Design/initiate/establish: It is vital that the design of any new trees and woods enhances habitats for priority bird species. For ground nesting birds, such as lapwing and curlew, it is essential to consider potential increases in predation (from crows, badgers, foxes, etc.) as a result of new trees and wooded habitats nearby. Specialist advice from a bird ecologist is likely to be important, as well as ongoing monitoring throughout the establishment phase. The 'edge effect' of trees and wooded habitats for some wading birds (including golden plover, curlew, dunlin and lapwing) might extend beyond 400 metres and up to 700 metres from edges of some dense groves. Some species associated with scrub, hedgerow or other farmland also need to be considered and may be supported through good designs with significant areas of open wooded habitat and glade. Be aware of the significance of some more agriculturally improved grasslands (which are not recorded as habitat features) where they might have conservation implications for priority birds. This may be more significant in areas where agricultural pasture itself is more limited (e.g. in mountainous regions or those that are dominated by more semi-natural vegetation, or are predominantly arable).

Useful resources

- NBN Atlas (nbnatlas.org) – the UK's largest collection of biodiversity information
- MagicMap (magic.defra.gov.uk) – priority species data layers
- Centre for Environmental Data and Recording NI (www.nmni.com/CEDaR) – wildlife records data
- Forestry Commission (www.gov.uk/government/publications) – Natural environment survey and assessment instructions

6.3 Rare and scarce plants, lichens, and fungi of open habitats (SP3)

JOHN BRIDGES/WTML

The approach to site survey will depend on the species and habitats present - many of these rare features will require specialist advice from an ecologist.

Scoping: Consider the potential for a site to support rare and scarce plants, lichens and fungi associated with open habitats. These can include arable plant communities (plants associated with open, disturbed ground which have suffered dramatic declines), waxcaps and other colourful grassland fungi; or lichens, mosses and liverworts which may occur on small rock outcrops or areas of scree or other features, particularly where they are unshaded, such as on stone walls or on individual trees (section 4.2). Use available biodiversity data to begin to consider any existing records.

Desk survey: Continue to interpret biodiversity records, but also begin to consider the potential presence of habitat features that might support these species. Any information on historic land management may help to inform the likelihood of arable plant communities; for example, traditional, low-input systems, low herbicide use or organic arable land. Generally, these will occur on lighter soils (section 3.3), but do not rule out clays or deeper soils.

Site survey: The approach to site survey will depend on the species and habitats present. For arable margins, it may be possible to identify areas with a diverse range of flowering plants (identifying these will be seasonal/ weather dependent), although their identification is a botanical skill requiring specialist survey. For some lichens and mosses, it may be useful to record and map small rocky outcrops and stone walls. Individual mature and open grown trees are recorded elsewhere (section 4.2) and are best retained in more open glades and open wooded habitats anyway, which will both ensure the trees have space to thrive and that light levels for any associated epiphytes are maintained. Grassland fungi (such as waxcaps, earthtongue and coral fungi) need considering, especially where grassland habitat features may not necessarily be very species rich. These less species-rich grasslands may often be mossy or contain presence of small sedges or woodrushes (they look like grass, but with hairy leaves which are particularly noticeable in early spring). Identifying the potential for fungi may be dependent on season and weather, but management history (and desk-based biodiversity checks) can also help.

Specialist survey: For many of these features, identification and evaluation requires an ecologist who specialises in each group (e.g. arable plant communities, lichens, grassland fungi).

Design/initiate/establish: It is vital that the design of any new trees and woods enhances habitats for the rare and scarce plants, lichens, and fungi of more open habitats. Ensure that species-rich areas are incorporated within glades or open wooded habitats and that ongoing management (e.g. grazing) allows light and space.

Useful resources

- NBN Atlas (nbnatlas.org) – the UK's largest collection of biodiversity information
- Centre for Environmental Data and Recording NI (www.nmni.comCEDaR) – wildlife records data

6.4 Open habitat invertebrate assemblages (SP4)

PAUL CUMBERLAND/ALAMY STOCK PHOTO

Sunny, sandy banks with sparse vegetation often support solitary bees and wasps. Although some of these may feed on tree blossom (e.g. willows), it is important that existing nesting features are maintained in open sunny environments.

Scoping: The National Biodiversity Network Atlas and Local Environment Records Centres can provide detailed species records during the scoping and desktop assessments. Further information is likely to be available from local groups and naturalists.

Desk survey: Continue to evaluate existing data, and consider the potential habitat features likely to be present.

Site survey: Identification of many invertebrate species and evaluating conservation significance is an expert skill. A site survey may reveal features that could support important invertebrate assemblages. For example, record and map dry and drought-prone banks or exposed sandy/bare/rocky ground areas which may support solitary bees and wasps. Some species may be closely linked to particular habitat features; for example, moths and butterflies associated with plants and conditions in open grassland (section 5.4) or heathland (section 5.3) features.

Specialist survey: For many of these features, identification and evaluation requires an expert entomologist.

Design/initiate/establish: It is vital that the design of any new trees and woods enhances habitats for priority invertebrates of more open habitats. Many may also benefit from consideration of how new wooded habitats and trees can contribute to an available blossom sequence when selecting tree and shrub species (see the *Tree species handbook*). The combination of sunny nesting sites for species like solitary bees and wasps, along with available nectar and pollen from trees, can be important.

Useful resources

- NBN Atlas (nbnatlas.org) – the UK's largest collection of biodiversity information
- Centre for Environmental Data and Recording NI (www.nmni.comCEDaR) – wildlife records data

6.5 Woodland specialist species (SP5)

JOHN BRIDGES/WTML

Consider species present in nearby woodland using the Woodland Wildlife Toolkit, along with other sources of biodiversity data. Site surveys can add current observations or new records.

Scoping: It is useful to understand the presence of woodland specialist species in or around a site. These include species such as woodland indictor plants, woodland birds and bats, and invertebrates found in decaying wood. They may be present on the site; for example, in hedgerows (section 4.5) or existing wooded habitats (section 4.1) within or adjacent to a site. An assessment of woodland specialists is greatly enhanced by looking beyond the site boundaries to understand the potential for use and colonisation of the site by these species.

Desk survey: Although currently intended to inform management of existing woodland, the Woodland Wildlife Toolkit could help to inform the design and establishment of new wooded habitats. For example, nearby woodlands with specialist species such as the pearl-bordered fritillary, nightingale or purple emperor may inform decisions around the design, initiation and establishment of new wooded habitats. Other sources of biodiversity data may help reveal the potential presence of woodland specialist species.

Site survey: The site survey can add current observations and new records to the collated species lists. Record and map any woodland specialist species encountered on site and consider the potential to develop habitat to support more mobile woodland specialists.

Specialist survey: It may be useful to seek the advice of a specialist on particular woodland species that are known in an area, and use their expertise to inform the best possible design, initiation method and management in the establishment phase.

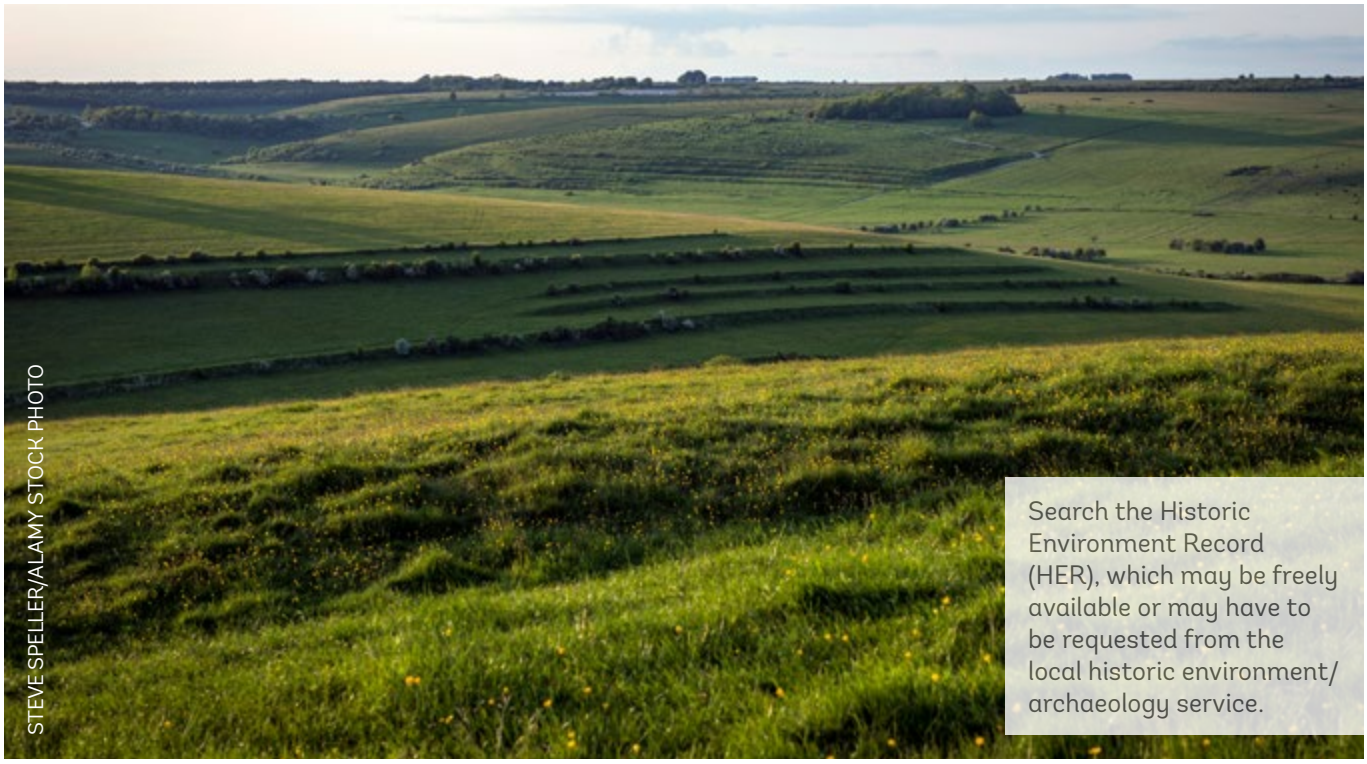
Design/initiate/establish: Designs should seek to support the recovery of important woodland species in the local area. Examples could include ensuring denser groves of young trees and scrub for species such as nightingale or willow tit, or designs that include more dynamic open wooded habitats and glades for species like tree pipit or pearl-bordered fritillary. Consider the establishment phase as well as the design and initiation phases. For example, if willow tit is known in an area, then dense groves of young trees that result in competitive exclusion (self-thinning) might contribute essential small-diameter decaying wood for their nesting. For willow tit and marsh tit, it is also important to think about connectivity of wooded habitats through a local landscape. While thinning in the establishment phase might be able to generate some nesting habitat (e.g. through creating high two to three-metre stumps), if all material is thinned, then standing decaying wood won't naturally develop.

Useful resources

- Woodland Wildlife Toolkit (sylva.org.uk)
- NBN Atlas (nbnatlas.org) – UK's largest collection of biodiversity information
- Centre for Environmental Data and Recording (www.nmni.com/CEDaR) – from the National Museum Northern Ireland
- Tree Species Handbook (www.woodlandtrust.org.uk/publications) – from the Woodland Trust. Includes guidance on specialist species associated with tree species and woodland communities

7: Assessing features – historic environment

7.1 Archaeology (HE1)



STEVE SPELLER/ALAMY STOCK PHOTO

Search the Historic Environment Record (HER), which may be freely available or may have to be requested from the local historic environment/ archaeology service.

Scoping: Include searches for non-designated historic features, scheduled monuments and previous archaeological surveys. Historic features can be crudely classified as prehistoric (standing stones, burial mounds, earthworks), historic (Roman, medieval, post-medieval – including the agricultural/industrial revolutions) or 20th century onwards (including recent military archaeology). Historic features are irreplaceable, although their rarity and/or value to society may vary significantly. Often, it is not the feature itself that is particularly remarkable, but its context in a landscape setting, and the stories it can reveal of past lives and livelihoods when taken together with its surroundings. All archaeological features, historic land use form and features, and other significant cultural features, should be identified and mapped as accurately as possible.

Desk survey: Search the Historic Environment Record (HER), which may be freely available or may have to be requested from the local historic environment/archaeology service. Check for scheduled monuments. The UKFS requires woodland creation proposals to seek local historic environment service advice. In many cases, local authorities charge for access to data and advice, so it may be worth asking for both at the same time to reduce the cost (one charge for advice and information, rather than two for information then advice). See 'Useful resources' for contact details. Online HERs are a useful indicative source, but some only give partial coverage of historic features to protect sensitive sites, and some may not be regularly updated. The presence of archaeological remains below ground may also appear on aerial photographs or satellite images (e.g. as differences in soil moisture content) and sometimes on historic maps, some of which are available online, while others can be viewed in local record offices. Where available, LiDAR data can show surviving above-ground features, like banks, ditches, ponds and ridge and furrow.

Site survey: Many inventories and registers are incomplete, and it is essential that the visual survey includes observations on any features or indications of historic land use. Map obvious features such as ridge and furrow, mounds, ledges or platforms, ditches and ponds. Look for any crop patterns (e.g. differences by ditches) and obvious surface scatter (e.g. pottery, coins). Be aware of the 'palimpsest' – layers in the landscape of different periods of archaeology through time – there may be more than one period represented in the features at your site. Consider the setting of any listed buildings in or close to the site. Protected Military Remains sites are not considered designated heritage assets, but they do have their own legal protection.

Specialist survey: If any of the desk and field assessments highlight significant features of interest, or if desk assessment data is not available, consider whether an archaeological contractor may be required. Services could include archaeological walkover/earthwork survey, geophysical survey, drone survey and fieldwalking, but not excavation. Excavation is not likely to be undertaken ahead of woodland creation as the level of funding needed is unlikely to be available. This means open space is probably the preferred approach, leaving potential for future excavation.

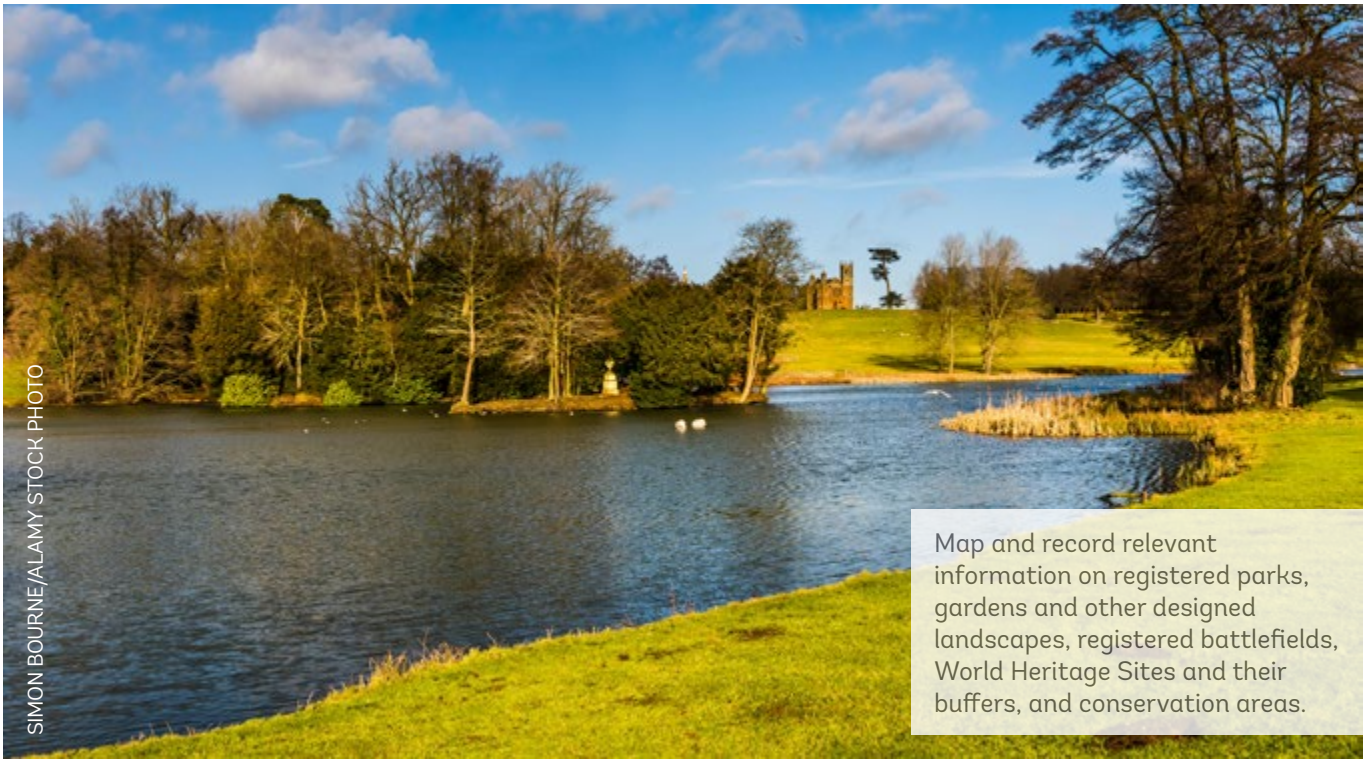
Design/initiate/establish: Well-designed new woods and trees can be used to enhance the landscape context of historic features, bolster boundary patterns and reveal and restore nuances within the landscape setting which may have been lost over time. There may also be strong links between historic features and wildlife value. For example, unploughed and unfertilised grassland which has protected ridge and furrow may be botanically rich, and woodbank features or burial chambers may hold ancient woodland or grassland indicator plants. Historic boundary trees (often pollards) may have become biodiversity-rich ancient trees over time, and stone walls, standing stones or other built features can support lichens, mosses and other species features. Following identification and mapping of archaeological features (or potential features) at your site, you will need to ensure that your woodland creation project avoids potential damage and protects and enhances identified features and the overall setting. Archaeological features, such as burial mounds, ridge and furrow field systems or hillforts, may indicate a long history of open land or vantage points which you will want to reflect in the design of new woods and trees. Consider whether sub-surface archaeology could be damaged by ground preparation or tree roots, and whether surface archaeology and landform may be damaged by the use of vehicles or machinery. There should be a minimum of 20 metres of open space around scheduled monuments, which may include burial mounds, hillforts, standing stones and rock art (although these features will not always be scheduled). The Forestry Commission advises leaving five metres of open space either side of boundary banks. A five-metre buffer could also apply to ridge and furrow and military features. For arable fields showing evidence of sub-surface remains, further advice should be taken as to whether any tree planting or natural regeneration is appropriate. It may be that establishment or restoration of other habitats, such as permanent semi-natural grassland, is better suited to these areas.

Useful resources

- The Forum on Information Standards in Heritage (FISH) (www.heritage-standards.org.uk) chronological guides to identify archaeological/ cultural periods

- Check for Scheduled Monuments in England via MagicMap (magic.defra.gov.uk) or Historic England (historicengland.org.uk), Northern Ireland via the Department for Communities Sites and Monuments Record (www.communities-ni.gov.uk), Scotland via the government data portal (data.gov.uk) or Historic Environment Scotland (www.historicenvironment.scot), and Wales via DataMap (datamap.gov.wales) or Archwilio (www.archwilio.org.uk)
- The Heritage Gateway (www.heritagegateway.org.uk), England only, provides a searchable database for historic sites and buildings
- Free access to online historic maps for Scotland, England and Wales from the National Library of Scotland (www.nls.uk/collections/maps)
- Historical maps for Northern Ireland are viewable via Spatial NI (www.spatialni.gov.uk)
- One-off historic maps can also be purchased from Promap (www.promap.co.uk), while comprehensive access to historic maps through all available dates can be purchased via Envirocheck (www.envirocheck.co.uk). These products have replaced the previously available Old Maps (www.landmark.co.uk) product.
- Association of Local Government Archaeological Officers (www.algao.org.uk) lists all UK HERs and provides contact details for local historic environment services across the UK
- Advice from Historic England on Historic Environment Records (HERs) and contact details (historicengland.org.uk/advice) for local authority and most national park authority HERs in England
- This Higher-Level Stewardship Farm Environment Plan Manual (adlib.everysite.co.uk) provides a list of historic environment features and a condition assessment methodology (pages 101–119)
- Historic England provides guidance on protected military remains such as aircraft crash sites (historicengland.org.uk). Information on the location of crash sites can be secured from HERs
- Advice on disused burial grounds (www.gov.uk/guidance), which are not designated heritage assets, but also have legal protection
- The High Weald AONB provides guidance on limiting damage to woodland archaeology (www.highweald.org)

7.2 Historic or designed landscapes (HE2)



SIMON BOURNE/ALAMY STOCK PHOTO

Map and record relevant information on registered parks, gardens and other designed landscapes, registered battlefields, World Heritage Sites and their buffers, and conservation areas.

Scoping: Map and record relevant information on registered parks, gardens and other designed landscapes, registered battlefields, World Heritage Sites and their buffers, and conservation areas. Existing trees and their configuration are likely to be an integral part of designed landscapes and should be mapped.

Desk survey: Information on conservation areas is not available through Magic or the National Heritage List. Instead, this should be sought from the relevant local planning authority or building conservation department.

Site survey: A visual survey should be carried out to look for indicators on the ground. Identify and map waterbodies and water features, designed views/vistas and built heritage such as follies, grottos and icehouses. The same applies for designed gardens: walled gardens, knot gardens, stumperies, arboretums, wooded clumps/roundels and avenues.

Specialist survey: Where identifiable features of historic designed landscapes occur, they should be an important consideration in the design of new woods and trees. Advice from a historic landscape specialist will provide information to ensure the design of new trees and woods is most appropriate in historic and designed landscapes. A Heritage Impact Assessment considering the impact on Outstanding Universal Value might be needed for some proposals in some World Heritage Sites.

Design/initiate/establish: Understanding the significance of the planting in your registered historic park or garden can help you to manage it and enhance its historic character. Ensure the design of new tree planting is sympathetic to the historic character of a registered park or garden in terms of location and species. Where possible, trees are best grown from existing estate stock as they will become the ancients and veterans of the future. In historic parkland, you should retain, and if necessary, aim to restore the historic configuration of open parkland pasture and wooded areas. Retaining areas of open parkland and avoiding inappropriate planting will help to conserve what is special about your historic park. Fragmentation of open parkland with new subdivisions, such as hedges, should also be avoided. Retain mature, ancient and veteran parkland trees, including dying trees or standing deadwood, because of their high historic, cultural and biodiversity value. Parkland pasture, which was grazed historically, is of great visual, historic and biodiversity value. Over time, however, agricultural practice may have converted the parkland to arable cultivation. If this has happened, you should consider reversion to grazed pasture in keeping with the historic use, character and setting, and to improve parkland habitats. For historic designed waterbodies or water features, it is important that they are not damaged by tree roots, and they may require restoration. Suitable fringing vegetation could be planted (e.g. native wetland shrubs) and invasive non-native species removed. Designed landscapes are an important part of the cultural heritage of many of our landscapes. Some will be listed on registers such as Historic Environment Scotland's Inventory of Gardens and Designed Landscapes, or Historic England's Register of Historic Parks and Gardens. However, these inventories are incomplete, although it may be possible to identify a fading design history in many landscapes. You may consider reflecting the distribution of woods and trees in the landscape, the size, shape and type of existing woodland and the nature of boundary features. Think particularly about what makes the landscape setting distinctive and how you might reflect this in your design.

Useful resources

- Search for gardens or landscapes in England (historicengland.org.uk), Northern Ireland (www.communities-ni.gov.uk), Scotland (www.historicenvironment.scot), Wales (cadw.gov.wales)
- In England, Historic England (historicengland.org.uk) should also be consulted on proposed changes to registered parks and gardens of Grade I and Grade II
- The Gardens Trust (thegardenstrust.org/conservation) is a statutory consultee on planning applications that affect designed historic landscapes and may be able to advise on gardens of all grades

7.3 Cultural features (HE3)

Record hedges and other field boundary patterns, considering how new woodland can restore and strengthen these, providing value for both landscape and wildlife.

Scoping: These features include distinctive land use characteristics, settlement patterns and living history. Consider hedges and other field boundary patterns, ancient trackways, abandoned settlements, ancient trees, pollard boundary trees, pollen records in soils, water features, ghost woods or wood pastures.

Desk survey: National level Historic Landscape Characterisations (HLCs, England), Assessments (HLA, Scotland), Historic Environment Features (HEF, Wales) and historic maps (Northern Ireland) are available via nationally relevant online portals. Aim to use these to help describe the historic development of your landscape – for example, the origins of land-use patterns – and think about how these can be mapped by areas of similar character to provide a basis for guiding future land use. Local level Historic Landscape Characterisation (HLC) is available on request from local historic environment or archaeological services (in many cases for a fee). Selected local HLC reports are available from the Archaeology Data Service. Some historic maps are available online, while others can be viewed in local record offices. Other guidance can be found in the UK Forestry Standard and from Forest Research.

Site survey: Conduct a visual survey to look for indicators on the ground. These indicators might include ancient trees, boundary features (banks, hedgerows, ditches), bracken-covered land (often former wooded land), wetland areas, wood pastures, trackways/double hedgelines, tree avenues, foundations of old buildings, and keeps.

Specialist survey: Patterns of settlement and land use have left a legacy of varied landscapes, rich in historical and cultural values. Understanding the historical interactions between people and nature that have shaped the landscape is important in shaping the design of new woods and trees. Specialist input and advice on this may provide useful information to influence the design and initiation phases.

Design/initiate/establish: Restoring woods and trees based on historical evidence may be appropriate and very appealing to stakeholders, especially where there is evidence of relatively recent loss of woods, trees, and woody boundary features. This may make it more appropriate to support more wooded habitats on some soils (e.g. peat), or some vegetation features, although the considerations for design and initiation under those features still need to be taken into account. New woodland can buffer or connect existing ancient woodland or strengthen boundary features, and this can be extremely valuable for wildlife and landscape. New trees outside woods, and those in glades and open wooded habitats, will help to – eventually – provide continuity of habitat conditions for species reliant on ancient and veteran trees. The use and management of woods and trees will have shaped the composition and structure of ancient woodland in the landscape. Ancient hunting forests and wood pasture systems which combined livestock grazing with the harvesting of firewood, fodder and timber may each have a legacy of distinct wooded habitats, or be discernible as remnant features or 'ghost woods'. Consideration also needs to be given to the cultural and historic associations which contribute to landscape value. Local distinctiveness is an underlying quality of a location – the thing that makes it unique and special and which people enjoy, remember and value.

Useful resources

- National data portals for England and Great Britain (magic.defra.gov.uk/magicmap.aspx), Wales (datamap.gov.wales and www.archwilio.org.uk/arch), Scotland (hlamap.org.uk), and Northern Ireland (apps.spatialni.gov.uk/PRONIApplication)
- The Archaeological Data Service (archaeologydataservice.ac.uk) provides selected local HLC reports
- Online sources for historic maps: National Library of Scotaland (maps.nls.uk)
- Section 6.3 of the UK Forestry Standard (www.gov.uk/government/publications)
- Forest Research (www.forestresearch.gov.uk) information and advice webpages on historic environment and archaeological preservation

8: Assessing features – public access

8.1 Public access (PA1)

KEITH MORRIS/WTML

Consider key access features of the site, including roads, parking, and existing public rights of way. You need to consider people as users in all ways - on foot, cycling, on horses - as appropriate.

Scoping: Use available maps and data to consider key features on the site, including roads, people and vehicular access, reservoirs, and parking. Explore any public rights of way or wayleaves on the site or in the surrounding area. It is important to understand the legal rights of people to access the site from the outset, including, for example, historical rights of common, as well as any patterns of established informal access. There may be third-party rights of access with neighbouring landowners or other interested parties, such as utilities. You need to consider people as users in all ways – on foot, cycling, on horses – as appropriate.

Desk survey: Scoping and desk surveys should include establishing the definitive routes of any public rights of way and any rights of access under the Countryside and Rights of Way Act 2000 (England and Wales), the Land Reform (Scotland) Act 2003 or the Access to the Countryside (Northern Ireland) Order 1983. These are free for anyone to edit, download

and use, and will therefore include routes used for walking, cycling and other recreational activities that may not be on some published maps. This should give a good indication of where recreational activities are taking place on the site. You could also contact the local authority or local Ramblers group to ascertain whether any historic rights of way have been applied for. Historical and archaeological surveys or recent LiDAR mapping may also highlight opportunities to reinstate historic trackways or drove roads. If this is a key objective, then in some cases it may be useful to consult pre-OS mapping, such as estate or tithe maps, where available.

Site survey: Public access should be recorded on maps. The site survey should additionally record any permissive access routes, *de facto* access to open land (especially in Northern Ireland) and any evidence of established informal access on the site (e.g. desire lines and ground compaction at viewpoints). This is also an opportunity to ground truth information gathered at desk survey stage. The significance and availability of other green space in the local area should be considered. Neighbouring landowners may be able to comment on site use, any current issues and footfall, to support a wider understanding of local land use by the public.

Specialist survey: Specialist advice on site design for public access may help to inform design where it is a key objective for your site, especially if your initial findings show current usage by multiple groups. Advice from local authority rights of way staff may be available. For some sites, a more detailed assessment and consultation with existing and potential user groups may be conducted. This is particularly likely to be the case where there are historic features or designations in place. Local community/ visitor surveys will help to highlight potential factors for consideration and ensure that designs incorporate the needs of people. Any access survey should be commissioned in line with other specialist surveys before the final design is developed for consultation.

Design/initiate/establish: It is important that public access features are enhanced through consultation, the design process and initiation of new trees and woods. Ensure that this considers the wider landscape and any visual sensitivity – usually around views – especially if the site has bordering neighbours or potential viewpoints. Public consultation is a key part of any new site. The sooner the immediate population are made aware of any new woodland creation site, the easier the creation will be longer

term. Consultation is not only a useful engagement tool, but can open you up to expert knowledge, local historians and potential volunteers. All the information gathered at consultation can inform the design, engagement opportunities and visitor experience stories, and help develop ideas for fundraising and communication campaigns. Explore opportunities to design open access routes to incorporate key features of the site. Consider opportunities for joining up local landscape-scale routes, particularly in significant landscape settings, such as reforesting areas of ancient, complex historic pilgrimage routes, archaeological features set over wider areas and AONBs.

Useful resources

- Open data on trails, roads, cafés, etc. is available from OpenStreetMap (www.openstreetmap.org), a spatial database which is populated by a community of mappers
- Rights of access are available from Ordnance Survey and through FootPathMap (footpathmap.co.uk)
- Existing agreed permissive access on sites for multiusers (e.g. horses, cyclists) may be found at Toll Rides Off-road Trust (tollrides.org.uk) or Accessing private land (gov.uk)
- Countryside For All Guide (www.pathsforall.org.uk) – focused on increasing access opportunities for a range of site users
- Local Path Networks – (www.nature.scot/enjoying-outdoors) spatial information from Nature Scot
- The UK's 46 AONBs (landscapesforlife.org.uk) – Landscapes for Life
- Most councils will also have interactive rights of way maps; for example, Kent County Council (webapps.kent.gov.uk)

9: Assessing constraints – Infrastructure

9.1 Infrastructure and services (IA1)

SHAUN DAVEY/ALAMY STOCK PHOTO

Map constraints such as overhead cables, underground services, buildings, roads and boundaries which may have legal wayleaves which will define areas to be kept free of shrubs and trees.

Scoping: Overhead cables, underground services, buildings, roads and boundaries with other land uses may be covered by legal wayleaves requiring defined areas to be kept free of trees and shrubs. In other areas, tree safety considerations may be important. Legal wayleaves and easements relating to the site and existing third-party access rights should be investigated as part of the scoping and desk assessment. Third-party rights may grant people other than the landowner rights of access across the land, the right to a private water supply, or fishing or shooting rights. It is important to be aware of the details of any such rights as they can significantly affect your design.

Desk survey: It is possible to record some constraints such as services or public highways at this stage.

Site survey: The constraints listed above should also be assessed and mapped during the site survey to provide a more detailed understanding of the practical issues. High risk zones along property boundaries, roads, etc. should be mapped to ensure that they are considered in the design.

Specialist survey: A specialist survey or advice may be required for constraints such as underground services, especially if these are close to access tracks, proposed fence lines or any part of the site where excavation may be required.

Design/initiate/establish: Avoid establishing dense groves of trees immediately adjacent to public highways, powerlines, gas pipelines and other services. Designing these adjacent areas into more open glades or some open wooded habitats is likely to be best.

Useful resources

- OS Open Data (www.ordnancesurvey.co.uk) – various open data products, including roads and built environment features
- National Grid Maps (www.nationalgrid.com) – approximate locations of the national electricity transmission network
- Mapping Greater Manchester (mappinggm.org.uk) – detailed utilities data for the Greater Manchester area, including national main gas and electricity lines for England, Wales and Scotland

10: Assessing constraints - herbivore impacts

10.1 Deer population and impacts (HI1)

JOHN BRIDGES/WTML

Some deer distribution data may be available from the NBN or British Deer Society maps, but where deer numbers are high a standardised impact assessment should be undertaken. Finding out if a Deer Management Group already operates in your area will be essential.

Scoping: National maps of deer species distribution may provide an initial indication of deer populations at the scoping stage.

Desk survey: During the desk survey, information on deer surveys should be sought. This may be at a local or landscape scale and could include count or census results, deer impact assessments and/or cull figures. National Biodiversity Network (NBN) data and British Deer Society maps can provide distribution of the six deer species present in the UK. Finding out which management prescriptions others are adopting on neighbouring land may offer opportunities to create a wider deer management plan or facilitate collaborative culling. Deer Management Groups (DMGs) operate in Scotland, England and Wales (although aren't found everywhere) and can act as forums for this wider collaboration, as well as being useful sources of information. Find out if there is a wider Deer Management Plan

(DMP) already in place, and if not, explore if one needs to be created. These practical frameworks can provide a basis for collecting and analysing necessary information to formulate good management decisions.

Site survey: Observations of deer activity, such as dung, scrapes or fraying, browse lines and selective grazing, should be recorded as part of the site survey. If appropriate, this should be recorded in a more structured deer impact assessment. There are standardised methods for monitoring activity and impact from the Deer Initiative (England and Wales) or Best Practice Guides (Scotland). For a full snapshot of deer impact within the woodland, a Herbivore Impact Assessment could be undertaken following the methodology set out within the Woodland Grazing Toolbox. The deer population in the surrounding landscape should be considered alongside evidence of activity on the site, as the suitability of the site for deer is likely to increase significantly as trees start to establish, and deer numbers and activity on the site may increase dramatically if large populations are already present in the area.

Specialist survey: Where knowledge of deer populations or evidence from the site survey indicates more negative impacts, detailed specialist surveys may be required. This could include impact assessments and/or an assessment of the population size through a count or thermal imaging survey and may involve engaging with an ecological consultant. Thermal imagery census can be undertaken using handheld devices on transects or vantage points, or, if the option is available, a drone thermal imaging survey can provide more accurate results. Thorough impact assessment will be especially important where woodland creation will involve natural colonisation processes.

Design/initiate /establish: Continued stakeholder and community engagement will be essential to manage deer impacts throughout these stages and beyond. This, together with partnership working, will help to put in place acceptable deer management plans and minimise the potential for conflicts with neighbouring landowners and the public. All woodland creation designs should consider deer management infrastructure that may be required to future-proof effective deer control as the woodland is being established. This can include deer glades, tracks, extraction routes

and larder facilities. Considerations around public access and signage are also important. Consider who will carry out the deer management, whether or not training is required and if there may be opportunities for recreational stalking.

Useful resources

- The Wildlife Management Dashboard (woodlandtrust.maps.arcgis.com) – information on deer counts and culls at Woodland Trust sites, for Woodland Trust internal use only
- The British Deer Society Deer Distribution Survey (www.bds.org.uk)
- Species records from the National Biodiversity Network (nbn.org.uk) gateway
- Scotland Best Practice Guides (www.bestpracticeguides.org.uk) – a collection of guides developed within Scotland's deer sector
- The Deer Initiative Best Practice guides (www.thedeerinitative.co.uk) for England and Wales, including record and survey methods and standardised methods for monitoring activity and impact
- NatureScot general advice on managing deer and guidance on deer counting (www.nature.scot/professional-advice)
- The Association of Deer Management Groups (www.deer-management.co.uk) Scotland, and information on England and Wales DMGs (www.thedeerinitiative.co.uk)
- Forestry Commission guidance (www.gov.uk/government/publications) on woodland creation and mitigating the impacts of deer
- Trees for Life advice on forest restoration and deer management (treesforlife.org.uk)

10.2 Other herbivore impacts (HI2)

JOHN BRIDGES/WTML

Record evidence of other herbivore impacts, including vole surface runways, browsings, bark damage, and racks and slots of rabbits and hares.

Scoping: There are limited opportunities for scoping other herbivore impacts, beyond simply determining if land is within or adjacent to existing pasture.

Desk survey: Consider any information available about current land use, including, for example, the type and numbers of stock present and existing fences and their condition. Also think about neighbouring land and whether there are opportunities for collaborative management of herbivores.

Site survey: Record evidence of other herbivore impacts, including vole surface runways, browsing, bark damage, and racks and slots of rabbits and hares. Existing vegetation cover may also be indicative – dense grass swards provide ideal cover for voles especially. Assessment of impacts can run alongside the habitat survey and condition assessment, as consideration of indicator species (good and bad), sward height and amount of litter may provide clues of herbivore impact alongside obvious signs of browsing pressure on trees and shrubs. Livestock ingress can provide huge challenges to woodland creation if not excluded during establishment. Relationships with neighbouring farmers and ensuring a secure stock/deer fence may be appropriate, depending on the site. Recording ingress of livestock is important to gauge exactly what may be having the overall impact on planted trees.

Specialist survey: Consider carrying out a thorough herbivore impact assessment where woodland creation will involve natural colonisation processes. This may need to include nearby existing wooded habitats to provide the best picture of herbivore impact levels.

Design/initiate/establish: Where herbivore pressure is high, tree protection methods may need to be considered during establishment. Existing domestic livestock does not need to be seen as a constraint to new woods and trees. Instead, it can offer potential for supporting the initiation and establishment of designs with open wooded habitats and glades. The Woodland Grazing Toolbox provides useful guidance on setting appropriate stocking densities.

Useful resources

- Scottish Forestry Woodland Grazing Toolbox (forestry.gov.scot) – a guide to developing a woodland grazing plan, using livestock as a management tool

10.3 Grey squirrel populations (HI3)

JOHN BRIDGES/WTML

If carbon sequestration or timber are key objectives for the site, record any evidence of squirrel impacts. This can be carried out via a variety of methods.

Scoping: Grey squirrels are present across most of England and Wales, with large areas of Scotland and Northern Ireland also having populations. Current maps of distribution can be found via the NBN Atlas. The extent to which grey squirrel assessment is an issue for your site will depend on your objectives. If carbon sequestration or timber production are priorities, then squirrel damage risk assessment is very important. There is limited evidence for negative impacts of squirrel damage on other objectives, such as biodiversity, recreation, or flood risk management, so detailed assessment may be less important where these benefits take priority.

Desk survey: Consider existing wooded habitats and trees, both within and connected to the site. Grey squirrels particularly favour broadleaved and mixed species woodlands. Assessment of both population distribution and habitat suitability in and around the site may together give an indication of the grey squirrel population and risk of bark-stripping damage. Consider the wider landscape too, as collaborative programmes with neighbouring landowners may increase the chance of successful grey squirrel management and reduce the risk of reinvasion. Proximity to good squirrel habitat is a key determinant of damage, and there is also some evidence that winter pheasant feeding may be beneficial to squirrels, so give special

attention to neighbouring woodland and landholdings that manage for pheasants.

Site survey: Record any evidence of squirrel impacts, including undertaking an impact assessment focusing particularly on trees 10–40 years old. Survey methods can include visual counts along line transects, use of hair tubes, counts of dreys, cone-line feeding transects, and feeding signs on whole-maize bait at feeding stations. Bark stripping in the crowns of broadleaves can be a particular issue in many places. It is also important to consider masting, where some species of trees and shrubs (in particular oak and beech) occasionally produce bumper crops of fruits or nuts. This tends to happen every 5–10 years. If a survey suggests that the previous year has been a mast year, then the likelihood of damage is much more severe. Assessment of current impact levels will aid decision making in terms of species and design of the woodland, in certain circumstances.

Specialist survey: Consider a specialist squirrel impact survey if populations are very high or impacts severe.

Design/initiate/establish: Consider how the design of new wooded habitats and trees can limit the significance of grey squirrel impacts. Some species and age structures may be more susceptible to impact. Thin-barked species, including beech, birch, sycamore and oak, and trees 10–40 years of age, have been found to be most at risk from bark stripping, and this is the case for both naturally regenerated and planted woodlands. This should not necessarily dissuade planting with these species in areas where grey squirrels are dominant, but management and control should be planned accordingly. Management practices intended to increase tree growth (e.g. thinning) are associated with increased risk of squirrel damage, so it is important to carefully consider whether these practices will take place and how damage can be controlled if it occurs. Broadly, control approaches can be split by whether they aim to limit damage to trees or protect red squirrel populations. Skill is involved in successfully and humanely using some methods (notably, shooting and use of spring traps) and inexperienced users are advised to seek training. Monitoring the effectiveness of control will be informative for both current and future operations.

Useful resources

- National Biodiversity Network (NBN) atlas data on current distribution (species.nbnatlas.org/species)
- Government guidance for England (assets.publishing.service.gov.uk) on the Public Forest Estate
- UK Squirrel Accord (squirrelaccord.uk) – a UK-wide partnership of 39 leading conservation and forestry organisations (including the Woodland Trust), with information and a resources library
- The European Squirrel Initiative (www.europeansquirrelinitiative.org)
- Forest Research (www.forestresearch.gov.uk/research) evidence and advice on grey squirrel management and a UK Forestry Standard technical note on controlling grey squirrels in forests and woodlands in the UK
- Training via the British Association for Shooting & Conservation (basc.org.uk)
- Local red squirrel conservation groups (www.forestresearch.gov.uk/publications) – in many areas there are coordinated groups dedicated to controlling grey squirrels to aid red squirrel conservation. If your woodland is within one of these areas, it is advisable to establish contact with the appropriate group.

11: Assessing constraints – competing vegetation

11.1 Competing vegetation (C1)

Nutrient levels will be strong determinants of the extent to which competing vegetation will be an issue - highlighting these areas will help to target management during initiation and establishment.

Scoping: It may be possible to gather some evidence during the scoping and desk assessment stages by looking at land-use maps or aerial photography. In most cases, an assessment of the challenges presented by competing vegetation can only be made through site surveys. The development of vegetation alongside establishing trees can be difficult to predict, and soil conditions and fertility may need to be considered as part of this assessment.

Desk survey: It is unlikely that there will be a great deal more information than found at scoping stage (land-use maps, aerial photography). Use these to target the site survey stage.

Site survey: Nutrient levels will be strong determinants of the extent of competing vegetation. On nutrient-poor sites, competing growth is likely to be weak compared to nutrient-rich sites, where ongoing control is probably going to be needed. Look out for areas of dense bracken cover and map the boundaries of these, along with other areas where dense vegetation looks like it might be an issue.

Specialist survey: Specialist survey is unlikely to be required unless information from any soil surveys can be used to highlight high-nutrient areas.

Design/initiate/establish: Depending on the establishment method you choose, targeted applications of herbicide may be appropriate, but these will need to be tailored to local circumstances. The use of chemical control should always be limited to the minimum intensity needed to deliver management objectives. Non-herbicide options for control include mulches, mats and trampling. Weeding (especially if direct seeding is used) may be needed for 1–2 years, until trees are established and dominating the site. Generally, this dominance will occur within 2–3 years, although again this is likely to be site dependent. If the aim is to establish by natural colonisation, then the development of scrub (bramble, wild rose, dogwood, blackthorn trees or protect pioneer tree species such as willow or birch) can be considered a natural pioneer phase. Thorny shrubs protect slower tree species colonisers (e.g. oak, beech) and thus can support establishment over longer timescales.

Useful resources

- Forestry Commission guides on natural colonisation (assets.publishing.service.gov.uk) and direct seeding (www.forestresearch.gov.uk/publications) contain guidance on assessing and managing competing vegetation
- Forest Research publications on vegetation management (www.forestresearch.gov.uk/research)

11.2 Invasive non-native vegetation (C2)

NIALL BENVIE/WTML

Site survey is the key step to identifying invasive non-native plants. Even if they occur infrequently, eradication will need to be included in plans for woodland creation.

Scoping: Invasive plants can compete directly with tree saplings and present a barrier to tree establishment. They can also seriously compromise the delivery of woodland creation objectives and present a lasting risk to the successful establishment of high-quality woodland habitat. Use existing resources to find out about both existing and potential future invasive species in the UK, and determine if any are a threat to your site.

Desk survey: Consider how invasive non-native plants (e.g. snowberry, rhododendron, Himalayan balsam) may relate to possible dispersal pathways and vectors, such as water, wind, tracks and roads, railway lines, and any vehicle/machinery access and use. Public rights of way and pedestrian access are also important to consider as they may offer another pathway and vector for spread. Aim to gather evidence of any previous spread of non-native vegetation, which may be recorded in old records, photographs or anecdotal evidence. Following rigorous risk assessment guidelines is vital to impartially assess the risk of species spreading further.

Site survey: Site survey is the key step to identifying invasive non-native plants, including rhododendron, laurel, Japanese knotweed and Himalayan balsam. Even if these plants occur infrequently, or over a small part of

the site, eradication will need to be included in the plans for woodland creation. Map the locations of species, recording proximity to designations, vulnerable habitats and dispersal corridors. Also consider the condition and age structure of the species, as this will inform management and control methods.

Specialist survey: A specialist survey to record locations and extent in detail may be required.

Design/initiate/establish: Long-term management is essential to tackle non-native species. There are likely to be stages, starting from control and working towards eradication. After surveying the site, there may be a need to prioritise areas to be cleared. An appropriate control method for your site will need to be chosen. Removal can be carried out by burying, burning, disposal off-site or targeted use of herbicide. Each of these methods may require certification, assessments or permission. Continued control should be set out as part of the management plan. Ensure control of non-native invasive plants is carried out before establishment, and maintain monitoring and follow-up control for a minimum of five years subsequently. Follow-up control treatments may be required.

Useful resources

- The GB Non-Native Invasive Species (www.nonnativespecies.org) secretariat offers online tools and information, including species risk assessments, risk analysis guidelines, species fact sheets and species management advice
- English government advice (www.gov.uk/guidance) for stopping the spread of invasive non-native plants
- Invasive non-native species in woodlands (naturalresources.wales/permits-and-permissions) – advice from Natural Resources Wales
- Invasive Species Ireland (invasivespeciesireland.com) – information on a range of species, policy relating to different species, and action plans to deal with species
- Managing invasive and non-native forestry species (forestry.gov.scot/publications) – guidance from Scottish Forestry for forest owners and managers. Contains a risk assessment at Appendix 5
- Specific guidance for rhododendron (assets.publishing.service.gov.uk) – including a staged framework for a control operation, from the Forestry Commission

11.3 SITE ASSESSMENT EXAMPLE

Pepper Wood

A project is currently underway to expand woodland northwards from Pepper Wood, an ancient woodland and Site of Special Scientific Interest on the outskirts of Bromsgrove. The Woodland Trust has owned and managed the existing 60ha Pepper Wood, with its important botanical features, since the 1980s.

This map provides an example of a site assessment map for the project, with features and constraints numbered and described using site assessment codes.

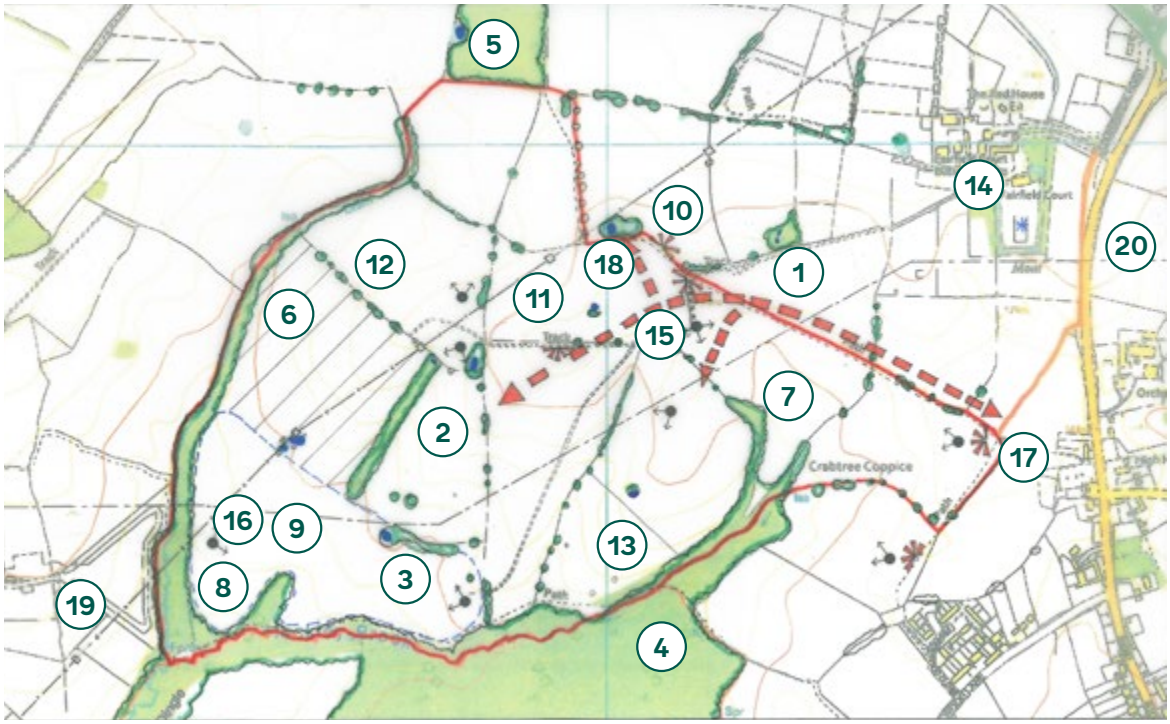


Fig. 1. Site assessment map for the Pepper Wood extension

1 Site Characteristics – Location and Topography: *Strong, prominent ridgeline. Allows great long views to the north, west and southwest.*

Site Characteristics – Soils and Geology (S1/S2): *Crumbly brown earths, especially in the first 10–20cm, with high clay content and heavy clay soils at depth across most of the site.*

2 Site Characteristics – Soils and Geology (S1/S2): *Presence of plough pan identified in arable fields.*

SITE ASSESSMENT EXAMPLE

3 Site Characteristics – Water (W1/W2): *The site has numerous ponds which provide interest and diversity – need to sensitively integrate these into the design.*

4 Features – Trees and Woodland – Woodland (TW1): *Adjacent ancient semi-natural woodland of Pepper Wood. The site offers an opportunity to significantly extend the core ancient woodland habitats.*

5 Features – Trees and Woodland – Woodland (TW1): *Small adjacent block of existing plantation woodland to the north.*

6 Features – Trees and Woodland – Woodland (TW1): *An area identified as having previously been woodland – Cross Coppice.*

7 Features – Trees and Woodland – Woodland (TW1): *Existing trees and woodland tend to follow the valleys.*

8 Features – Trees and Woodland – Woodland (TW1): *An area with good prospects for natural colonisation from adjacent ancient woodland (approx. 50 metres wide).*

9 Features – Trees and Woodland – Woodland (TW1): *A former woodland link that has been lost through field enlargement.*

10 Features – Trees and Woodland – Mature and Veteran Trees (TW2): *Mature and veteran trees in hedgerows.*

11 Features – Trees and Woodland – Hedgerows (TW5): *Ancient field pattern – rather more intact on the higher ground. Hedgerows are beginning to thin and gap in places.*

12 Features – Trees and Woodland – Hedgerows (TW5): *Western field hedgerow beginning to become gappy and fragmented, although some trees are still prominent.*

13 Features – Vegetation and Other Habitats – Grassland (OH1): *An area of semi-improved grassland. Already quite floristically rich. Retain and enhance.*

Features – Species – Protected Species (SP1): *Signs of badger recorded on the site survey, with a likelihood of several setts in the adjacent woodland. Two brown hares recorded on the site survey.*

Features – Species – Rare and scarce plants, lichens and fungi of open habitats (SP3): *No rare or scarce plants have been recorded on the site. No rare arable plants were recorded on the site survey.*

11.3: SITE ASSESSMENT EXAMPLE

14 Features – Historic Environment – Archaeology (HE1): *Scheduled Ancient Monument at Fairfield Court. Not visible from the site and does not appear to have a visual influence, but should be checked with Historic England.*

15 Features – Historic Environment – Cultural features: *Remains of trackway and buildings associated with Second World War decoy site. Should be retained as a feature of cultural interest.*

16 Features – Historic Environment – Cultural features: *Former site of Second World War star fish decoy. No remains left but an opportunity for interpretation.*

17 Features – Public Access (PA1): *Access point and public footpath*

18 Features – Public Access (PA1): *Viewpoints*

19 Constraints – Infrastructure and Services (IA1): *High-voltage overhead powerlines and pylons are prominent features and need to be kept free of trees. Need to ensure that the design does not emphasise this strong linear corridor.*

20 Constraints – Infrastructure and Services (IA1): *Underground gas pipeline. Not directly visible, but the route needs to be kept free of trees. Need to avoid creating an unnatural corridor effect with tree planting.*

Constraints – Herbivore Impacts – Deer population and impacts (HI1): *Roe, muntjac and fallow deer are known to be present in the local area and adjacent woodland. Population densities are likely to be too high for unprotected trees to establish. Carry out thermal imaging survey to establish the local deer population and inform management and tree protection.*

12: Site assessment checklist (☑ or n/a)

Landscape context and appraisal	Scoping	Desk survey	Site survey	Specialist survey	Reflected in the design	Influenced initiation	Ensured via longer-term management
Site characteristics: location and topography							
Site characteristics: soils and geology (S1/S2)							
Site characteristics: peat (S1)							
Site characteristics: water (W1/W2)							
Site characteristics – other							
Features: trees and woodland – woodland (TW1)							
Features: trees and woodland – mature and veteran trees (TW2)							
Features: trees and woodland – younger trees and shrubs, including natural colonisation potential (TW3)							
Features: trees and woodland – scrub (TW4)							
Features: trees and woodland – hedgerows (TW5)							
Features: trees and woodland – decaying wood (TW6)							
Features: vegetation and other habitats – grassland (OH1)							
Features: vegetation and other habitats – wetland (OH2)							
Features: vegetation and other habitats – heathland (OH3)							
Features: vegetation and other habitats – other (OH4)							
Features: species – protected species (SP1)							

Landscape context and appraisal	Scoping	Desk survey	Site survey	Specialist survey	Reflected in the design	Influenced initiation	Ensured via longer-term management
Features: species – priority bird species of open habitats (SP2)							
Features: species – rare and scarce plants, lichens and fungi of open habitats (SP3)							
Features: species – open habitat invertebrate assemblages (SP4)							
Features: species – woodland specialist species (SP5)							
Features: historic environment – archaeology (HE1)							
Features: historic environment – historic or designed landscapes (HE2)							
Features: historic environment – cultural features – land use, settlement patterns, living history							
Features: public access (PA1)							
Constraints: infrastructure and services (IA1)							
Constraints: herbivore impacts – deer population and impacts (HI1)							
Constraints: herbivore impacts – other herbivore impacts (HI2)							
Constraints: herbivore impacts – grey squirrel population (HI1)							
Constraints: competing vegetation (C1)							
Constraints: competing vegetation – invasive non-native vegetation (C2)							

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