Report

footprint ECOLOGY

Cannock Chase Options Appraisal

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This report has been produced by Footprint Ecology who were commissioned by Staffordshire County Council to undertake a preliminary study of broad options for managing habitats on Cannock Chase Country Park.

The report is focused on the County Council's landholding and does not specifically cover the RSPB site, though many of the management measures described could apply to both areas.

Views expressed in the report are those of Footprint Ecology staff, based on their technical knowledge and experience from other sites. The vision and objectives outlined in the report are draft ideas; final versions will be developed by the working group which includes stakeholder representation, and will reflect the views expressed through the workshop, drop-in event and online survey.

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Contents

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1. Introduction and background Summary

Introduction

1.1 The following brief description of the Cannock Chase Country Park (the CP) and its history, features and legislative background is intended to give an introduction to the site. A more detailed description of all the matters summarised here is included in Appendix I.

Physical description

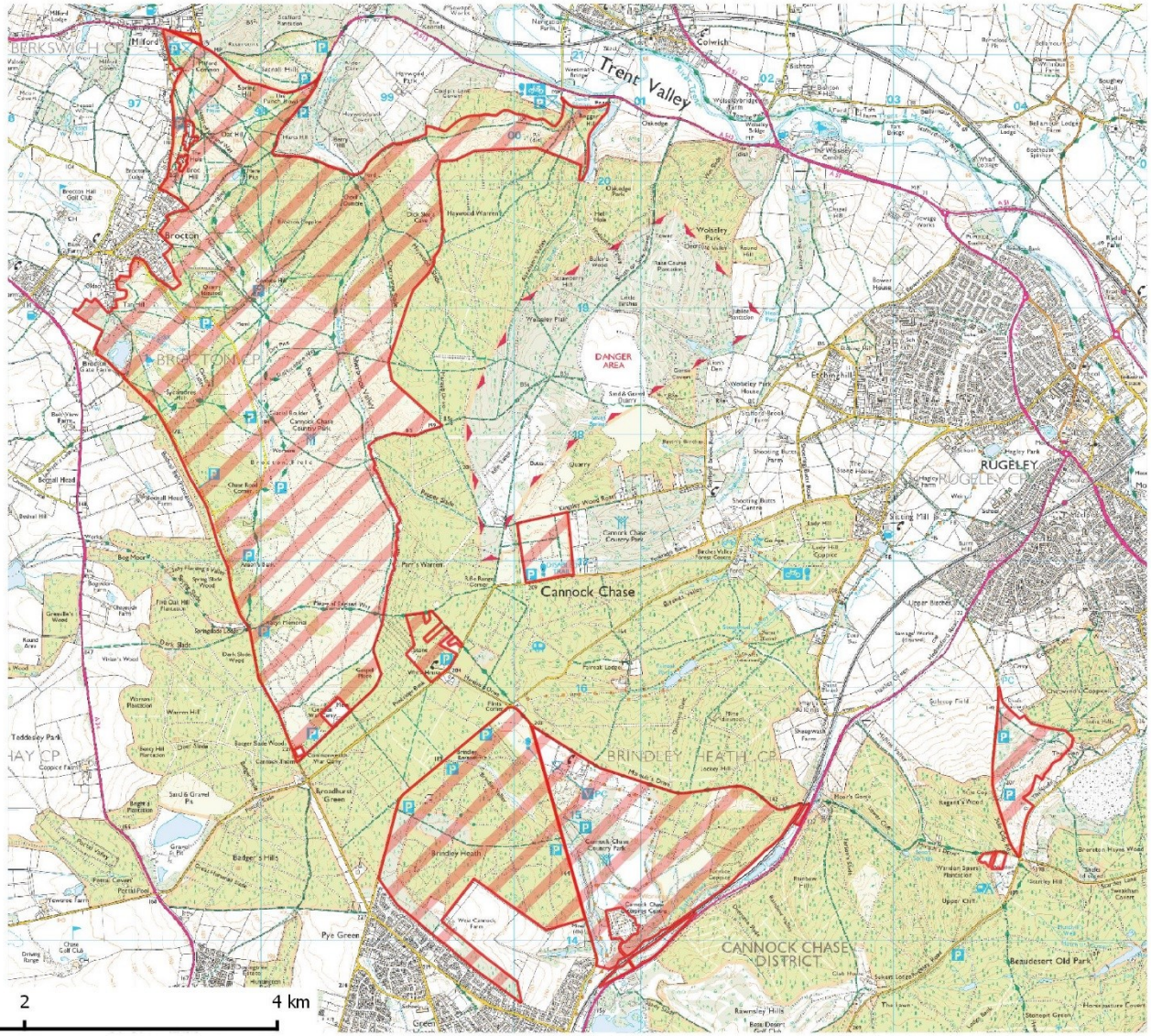
1.2 Cannock Chase Country Park (the CP) is situated between Cannock, Stafford and Rugeley in Staffordshire (see Map 1) and covers around 1335ha. The CP is fragmented, with two main areas separated by a road and forestry compartments, and several smaller outlying parcels and the CP is owned and managed by Staffordshire County Council. Cannock Chase sits on an elevated Triassic sandstone plateau dissected by small incised valleys with well-drained, acidic, stony soils low in nutrients and typical of heathland and acid grassland habitats. The open landscape of the plateau is characterised by unenclosed heathland, with native oak wood to the north containing an important population of veteran oaks. Two stream valleys include important mire habitats and alder woodland.

History and Archaeology

1.3 While its prehistoric past is only poorly understood, there is evidence for human activity within the CP since the Bronze Age; a circular burial mound recorded at Spring Hill is designated as a Scheduled Monument. Much of the CP lay within the bounds of William I's Royal Forest following the Conquest (1066); this Norman royal control may reflect a similar status prior to the Conquest. Land use during the medieval period is likely to have been dominated by access to hunting rights; however, the Forest provided other benefits both to its owners and to those living close by. Local residents maintained several rights within the Forest including pannage (the right to turn pigs out in the autumn) and estovers (the right to collect timber, gorse and heather) likely up until the 17th century. Access to a wider range of raw materials such as coppiced woodland, ironstone, sand and coal allowed large landowners (and tenants) to promote industrial endeavours activities such as coal mining, iron working and glass making. This mainly occurred in the southern area of the Chase during the 15th-17th centuries although coal mining continued beneath the Chase into the 19th century. Throughout this period much of the CP continued to be used for hunting and other 'leisure activities'.

1.4 The open nature, ownership status and central location within the country of the Chase led to its use for military training from the late 19th century onwards. This included the construction of two Great War training camps (which trained over half a million men), a Second World War RAF technical school, a tank testing area and an RAF bombing range; it was also used for training exercises by the Home Guard during this period.

Map 1: Cannock Chase Country Park Boundary.



Status and wildlife interest

1.5 The CP is registered common land and lies within the Cannock Chase Area of Natural Beauty (AONB) (see Map 2). It was first designated as a Site of Special Scientific Interest (SSSI) in 1951 (reflecting its national importance for wildlife), and was notified as a Special Area of Conservation (SAC) in 2005 (reflecting its European importance for wildlife). It forms the largest area of heathland in the Midlands, and is intermediate in character between the northern or upland heaths and those of the southern counties.

1.6 The 6800 ha AONB was designated in 1958 and its main primary purpose is to conserve and enhance the natural beauty of the area for everyone to enjoy, and to develop a successful partnership to manage the AONB. The objectives of the AONB Plan include:

- Developing a special, peaceful and tranquil place of enjoyment for everyone whilst conserving and enhancing the nationally important landscape and the locally, nationally and internationally important biodiversity and geodiversity.
- Maintaining and developing a successful partnership to manage the AONB as a place valued and understood by everyone so that they can contribute to the shaping of its future.

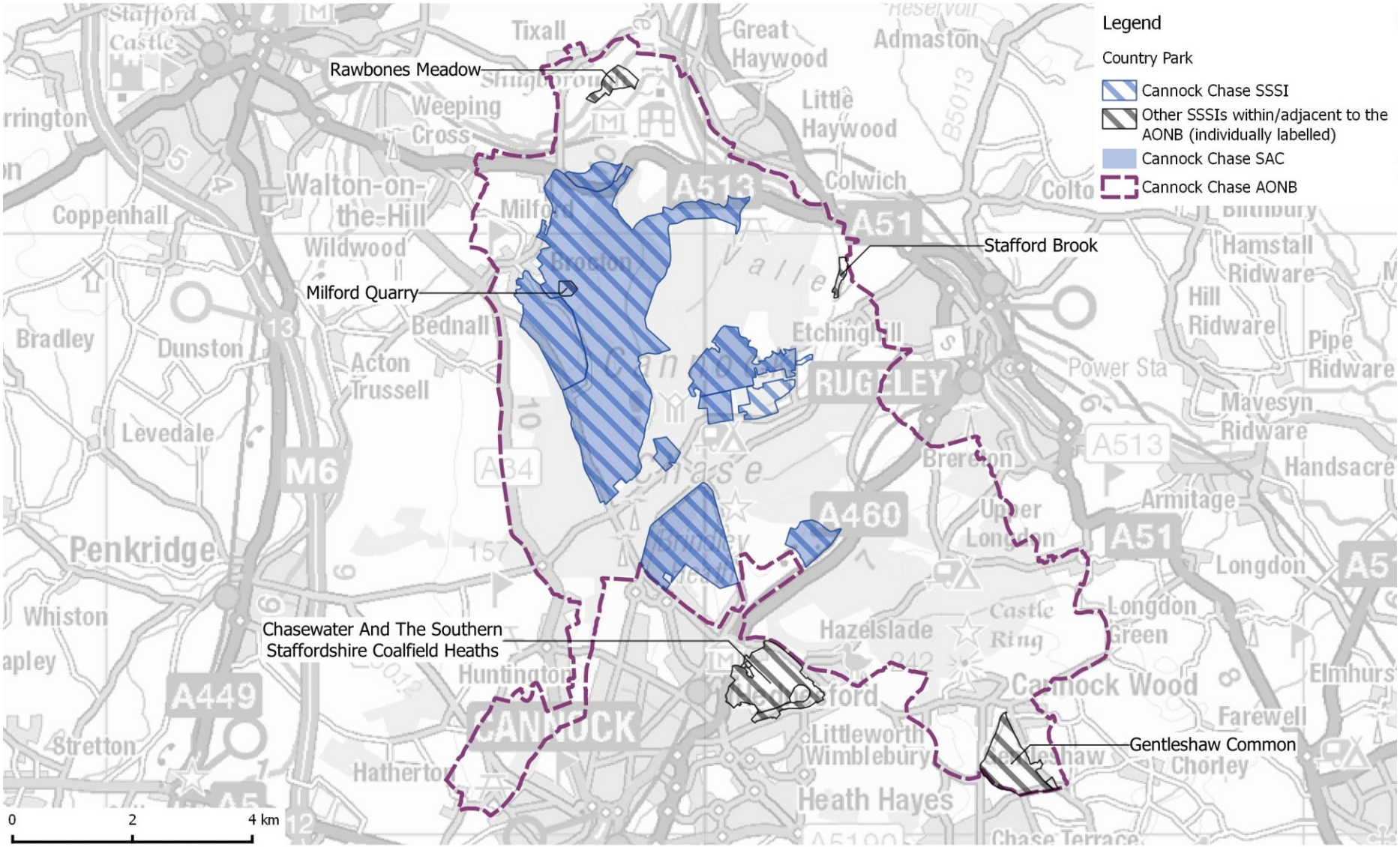
1.7 The SSSI was designated for its dry and wet heathland, valley bog/fen, wet alder woods and oak wood pasture, together with their associated invertebrate assemblages. Most of the SSSI is in unfavourable-recovering condition with the valley mires described as unfavourable-no change.

1.8 The site's SAC status brings international obligations that need to be met in terms of the site's maintenance and protection from potentially damaging activities. The Habitats Directive, and its transposition into the Conservation of Habitats and Species Regulations 2010, as amended, includes provisions that relate to both the individual site, in terms of protecting its integrity, and also the wider favourable conservation status of habitats and species across their bio-geographical range. Each designated area should contribute to achieving favourable conservation status for habitats and species of European importance, as listed within the Directive. The site's status as a SSSI brings legislative requirements at a national level through the Wildlife and Countryside Act 1981, as amended. There are often additional site features described in the SSSI citation for the site to those listed for the SAC designation, and all SSSI features should be protected in accordance with the legislation, from damage or neglect.

1.9 Both the European and national level legislation refer to conservation and enhancement as well as protection from harm, and the appropriate steps must be taken on the SAC and SSSI to avoid deterioration of natural habitats as well as disturbance of the species for which the SAC/SSSI has been designated. Natural England has given guidance on the main objectives for areas of the CP that are SSSI and SAC which include maintaining the area of heathland and its associated habitats and improving their management, conserving archaeological deposits and features and securing better management of those heritage assets which represent key landscape features.

1.10 Most of the CP area is dry dwarf shrub heath dominated by heather *Calluna vulgaris* and bilberry *Vaccinium myrtillus* and acid grassland dominated by wavy hair-grass *Deschampsia flexuosa* (see Maps 2 and 3), with purple moor-grass *Molinia caerulea* on

Map 2: Designated features within the Cannock Chase AONB.



1.11 the plateau tops and shallower slopes. The hybrid bilberry *Vaccinium intermedium* has its main UK stronghold at Cannock Chase. There is also scrub and bracken either in dense communities or more scattered across the CP, including areas of bramble *Rubus* spp. There are smaller areas of humid heath and valley mire in the Oldacre Valley in the north-west and the Sherbrook Valley, running north-south along the western boundary. A small area of open water is found at Mere Pits (Mere Pool) and Womere in the Brocton Field area and there are two small ponds in the northern section. Brocton Coppice, towards the north, is an area of old wood pasture with veteran oak trees up to 600 years old and more recent birch regeneration.

1.12 Cannock Chase supports a unique assemblage of species, with many species that are at either the southern or the northern extent of their range. Important plant species include marsh fern *Thelypteris thelypteroides*, round-leaved sundew *Drosera rotundifolia*, few-flowered spike-rush *Eleocharis quinqueflora* and bog asphodel *Narthecium ossifragum*. Locally, where nutrient enriched springwater gives rise to flushed ground rich in sedges and flowering plants, uncommon species include dioecious sedge *Carex dioica*, long-stalked yellow-sedge, *C. lepidocarpa*, common butterwort *Pinguicula vulgaris* and grass of Parnassus *Parnassia palustris*.

1.13 The area also supports the Annex I breeding birds, woodlark and nightjar, and more recently Dartford warblers have been recorded, together with other characteristic heathland birds. There are important populations of butterflies and moths (including small pearl-bordered fritillary *Boloria selene* and Welsh clearwing *Synanthedon scoliaeformis*), beetles (in Brocton Coppice), solitary bees and wasps and bog bush cricket *Metrioptera brachyptera*. Five species of bat use the area, which also supports several reptile and amphibian species. Cannock Chase also supports a major breeding concentration of fallow deer *Dama dama*.

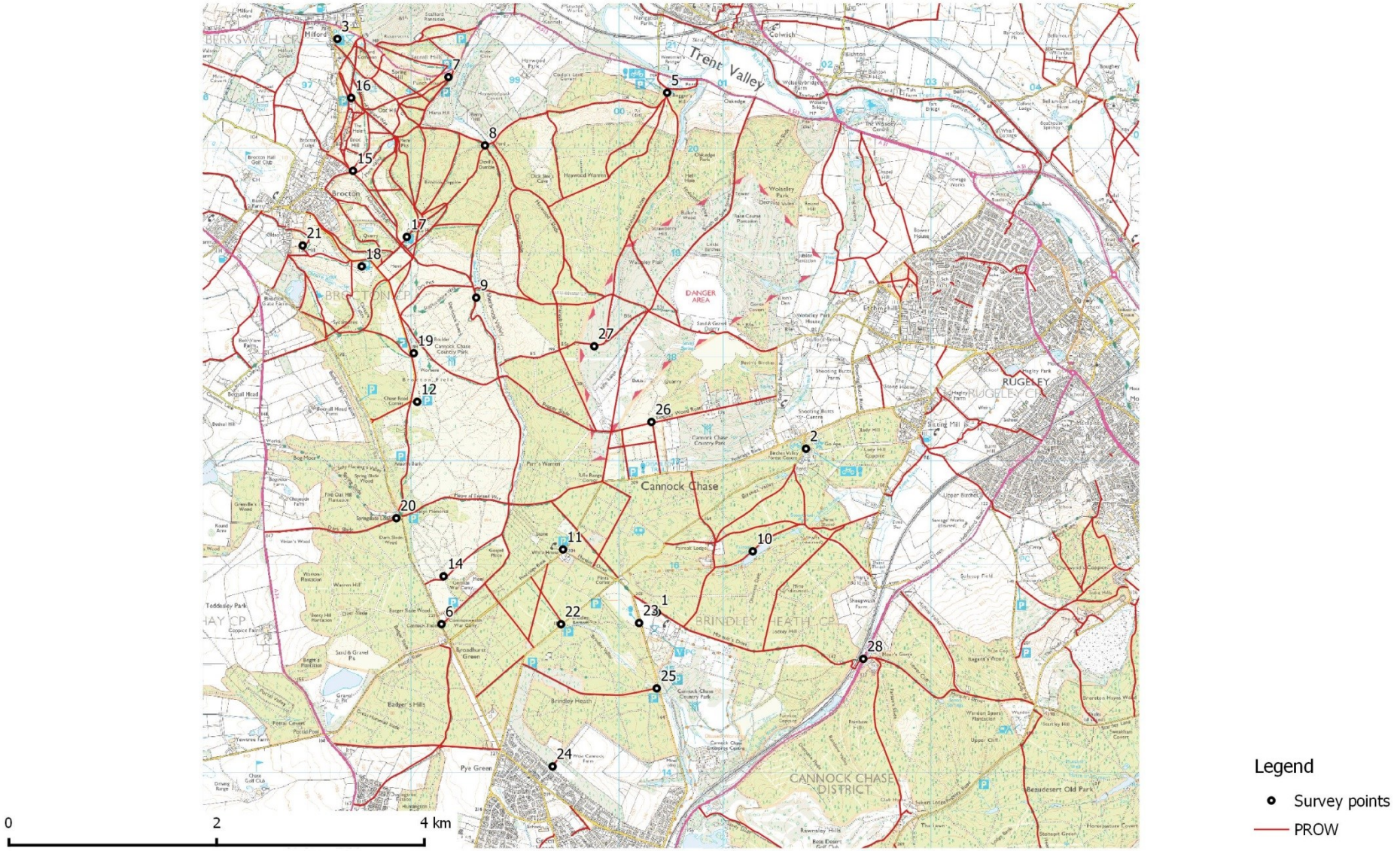
Visitor Patterns

1.14 Cannock Chase is a popular site, providing important green space in a highly populated area. Based on a survey of visitors during 2010-2011, it was estimated that about 1.7 million visits are made to the main access points on Cannock Chase CP each year (see Map 3) and that most visitors came to walk with or without a dog, or to cycle. Most visitors arrived by car; about a third of those questioned visited every week with a higher proportion of dog walkers and horse riders visiting daily; and most came because it is good for walking and dog walking, close to home with easy parking and with attractive scenery.

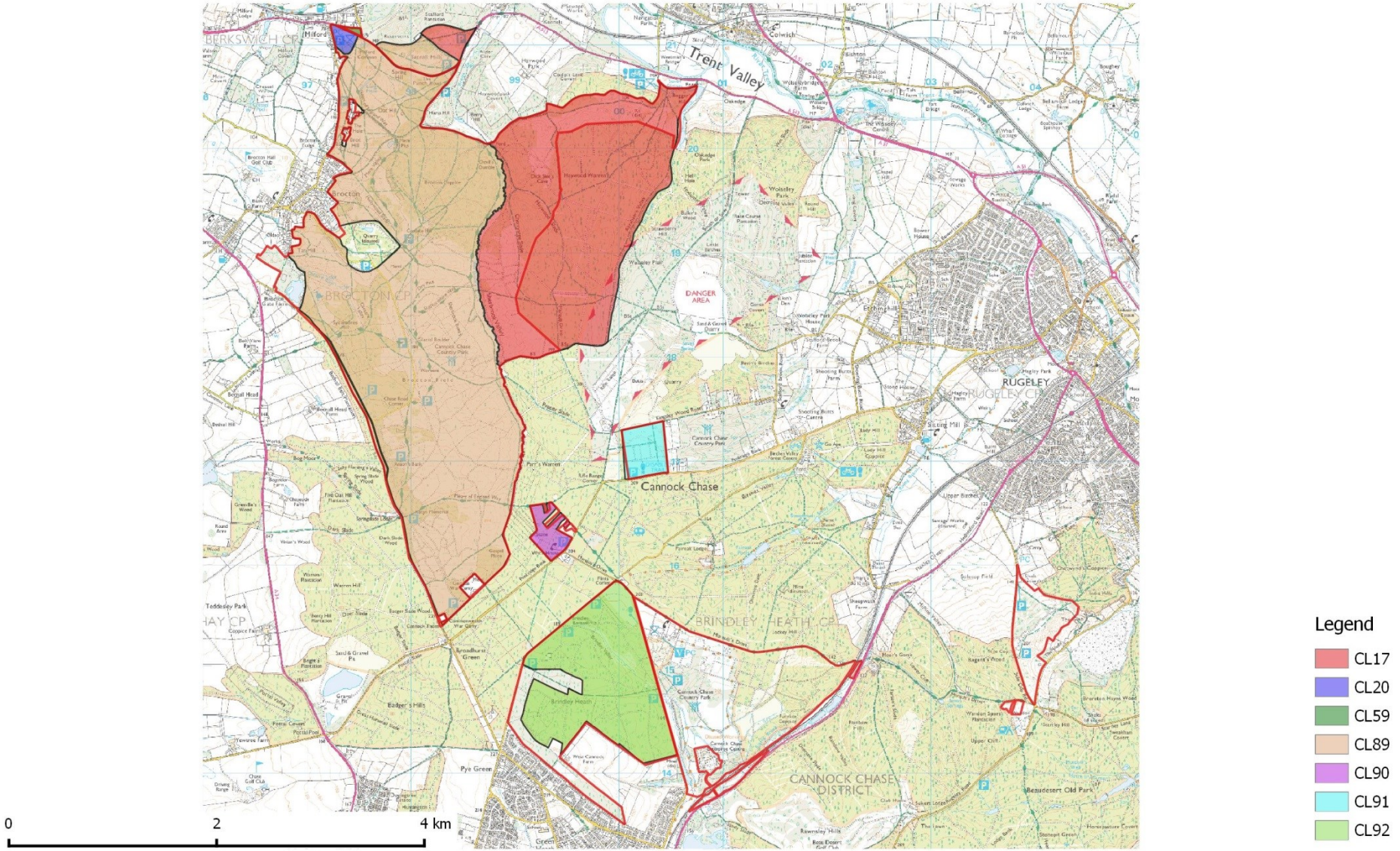
1.15 About half of visitors lived within a radius of about 6 km of the point at which they were interviewed on the Chase, and 75% lived within a radius of 15km. Mountain bikers travelled furthest. Visitor numbers were highest along the main access routes and long distance paths and the proportions of different types of users differed from place to place, possibly due to the provision of particular facilities or to restrictions at some places. Dog walking was the most frequent activity (44% of groups) followed by cycling (24%) and walking (22%).

1.16 Local staff involved with Cannock Chase (see White, McGibbon and Underhill-Day 2012 and Appendix 1) noted that there had been some increases in the numbers of walkers, dog walkers and commercial dog walkers, a slight increase in horse riders and a marked increase in cyclists in the last ten years. Roadside parking also increased. Experience

Map 3: Location of survey points as used in the 2010/2011 visitor survey (Liley 2012) and Public Rights of Way.



Map 4: Areas of Conclusive Registered Common Land (CRoW Act 2000 - S4).



1.17 suggested that visitor patterns are difficult to change using signage, interpretation, press coverage, patrols and offers of alternative areas, but major new facilities and trails are more successful.

Relevant legislation

1.18 The Country Park is registered common land with rights on part (CL17 see Map 4) of the areas for grazing, taking heath, turf, fern, peat mould, firewood and sand, marl and gravel. No grazing is exercised and for the most part, no other rights have been exercised.

1.19 Access to the common by the public was contained in an access agreement under Part V the National Parks and Countryside Act 1949, and the area was declared a Country Park under part VII of the Countryside Act 1968.

1.20 The Commons Act 2006 requires consent to be obtained from the Planning Inspectorate (PINS) for any works on a common including fencing or surfacing and sets out procedures for seeking consent and the factors to be taken into account by PINS when making a decision. There are some exceptions to these requirements set out in an accompanying Statutory Order. There are also guidance documents on how to involve local communities in commons management and how to conduct consultations with the public and organisations before submitting an application for works on a common. Consent for cattle grids on roads crossing a common is covered by separate legislation.

1.21 The CP is situated above substantial underground mine workings and this has led to surface fissures which can be deep and dangerous. There are also a number of surface quarries. Public safety has to be considered by the site managers under legislation and common law relating to a general duty of care.

1.22 The CP therefore supports a range of important assets including landscape, archaeological and cultural features and biodiversity in the form of habitats and species which are much valued by the large numbers of people who visit the area each year. The restoration, maintenance and enhancement of these features as required by national and international legislation is the basis for the management of the CP and is the subject of the option appraisal which follows.

2. Management issues

2.1 Favourable condition for Cannock Chase has been defined by Natural England, and is summarised in Appendix II. The main issues affecting the maintenance or achievement of favourable condition on the habitat and species for which Cannock Chase has been designated are discussed below (see also the Site Improvement Plan, Natural England 2014b) together with other issues affecting the SSSI. These issues will lead to the need for increased management and may be given greater emphasis by the effects of climate change and increased recreational activity.

Drainage and hydrological changes

2.2 The wet heath and mire habitats in both the Sherbrook and Oldacre valleys have changed as water sources have reduced in volume. In the Oldacre valley this is exacerbated by drainage works mostly associated with military activities during the First World War (Great War). The situation is complicated by the complex geology and by past mining activities which could lead to the release of polluted water from underground workings.

2.3 A substantial report prepared by Halcrow (2002) considered the hydrology of the areas particularly as it might affect the flows of the Sher Brook and Oldacre Brook. The effects of groundwater abstraction for public water supply, ground water flows and leakage of ground water into the underlying coal measures were all investigated. It was concluded that the water for both Brooks comes from groundwater base flows and that all water abstraction takes place outside the catchments feeding base flow to the two Brooks. However, some abstraction intercepts a proportion of base flows in the lower reaches of the two Brooks, but the effects of groundwater abstraction are difficult to quantify. No other source affects the base flow in either Brook. The tentative conclusion was that there was no measurable effect of ground water abstraction, but the results were constrained by lack of data and further work was recommended. Further work was carried out by the Water Company and was overseen by the Environment Agency. Effects of abstractions on the Oldacre Brook were ruled out but effects on the Sher Brook were still possible so these were investigated further. Following in-depth investigations over several years, the abstractions were not found to be having an effect within the SAC. Therefore public water abstractions have been discounted as the cause of drying of wetland habitats in the Sherbrook Valley.

2.4 An investigation by Shaw (2010) into the Oldacre Valley suggested that the headwaters here may have migrated downstream with resulting losses to the botanical interest from drying out of seepages, although the mire areas do not appear to have dried out to any extent. There was no evidence of the drying out being associated with water abstraction or seepage into the underlying coal measures. Evidence suggests that species loss may be influenced by lack of grazing management, shading and nutrient enrichment.

2.5 Following further investigation the current state of knowledge with respect to the Sher Brook was summarised in a report by Eades *et al.* (2016). This study concluded that there was no evidence that the Brook source had moved downstream but plenty of evidence that there had been a general drying out of wetlands along the valley and that the wetland vegetation was now mostly confined to the valley floor. The study found no

evidence of a decrease in groundwater levels between 1983 and 2012 and no effects of abstraction from the main pumping stations at Stepping Stones, although increases in pumping could affect water flows in the Brook north of the SAC at Satnall Hills.

Site Improvement Plan

2.6 The Site Improvement Plan (SIP) prepared by Natural England for Cannock Chase Special Area of Conservation recognises a need for conservation grazing by appropriate animals to build on the restoration of the dry and wet heathland habitats and address the lack of structure and insufficient diversity across the SAC. This will also benefit the special fauna at Cannock Chase. Some of the area that has been cleared of trees, scrub, and/or bracken is currently dominated by grasses, particularly Purple Moor-grass and Wavy Hair-grass. Grasses also re-establish in areas where over-mature or senescing heather is cut. If not prevented from doing so, grasses are likely to expand at the expense of ericaceous species on dry heath and herbaceous species, mosses and ferns in the valley mires.

2.7 The SIP also recognises the need to investigate the possible impacts of the Great War drainage system on the hydrology of the Oldacre Valley, the need to restore the hydrology of the Sherbrook Valley and the effects of Phytophthora disease on the dry heaths and atmospheric nutrient inputs on the wet heath. It recommends that the fire plan be updated and that invasive species continue to be monitored and controlled.

2.8 The presence of the plant fungal disease *Phytophthora pseudosyringae* (see Disease below) on Bilberry stalled progress towards commencing a consultation on future site management that could include a reintroduction of grazing to the main body of the Chase, partly through concerns that grazing could spread the disease around the SAC. Any conservation grazing plan for the CP would need to take into consideration biosecurity requirements due to the presence of *Phytophthora,* in addition to consultation with users and stakeholders in line with *A Common Purpose* (Natural England 2012).

Disease

2.9 In 2009 a fungal pathogen *Phytophthora pseudosyringae* was identified on Bilberry *Vaccinium myrtillus* in Brocton Coppice (Grout *et al.* 2010). Despite rapid action to prevent its spread, by cutting and burning infected material, the pathogen spread onto the open heather areas of Cannock Chase and is now widespread. Experimental research was undertaken to investigate control methods including fungicides, herbicides, burning *in situ* and cutting and removal of infected material. The trial concluded that destroying infected plants through herbicide spot treatment was the most effective method of slowing disease progression. Evidence suggests that the disease is being spread through access but vectors may also include wild mammals and birds within the area.

2.10 A second and notifiable pathogen *Phytophthora ramorum* has also been identified in Rhododendron in the adjacent Shugborough woodlands and measures have been put in place to eliminate it here. There continue, however, to be concerns that this more virulent pathogen may find its way onto the CP since it produces long-lived, resistant spores and is more easily aerially dispersed.

2.11 Native white-clawed crayfish *Austropotamobius pallipes* is present in some of the Country Park streams and there is an ongoing a risk of infection by *Aphanomyces astaci*, a water mould that infects native crayfish, which die within a few weeks of being infected. They are now seriously endangered in the UK. The mould is carried by Signal crayfish *Pacifastacus leniusculus* from North America which have been recorded in the River Sow in Stafford and the Trent and Mersey Canal to the north. In 2011 the Sherbrook population was wiped out by crayfish plague though no Signal crayfish were found. The disease must therefore have been brought to the stream by another means. Signal crayfish have been found in a fishing pool fed by the Rising Brook, which is within the CP though not part of the SAC. The pools are however, upstream of a population of the native crayfish so the latter is at significant risk. Efforts to address this are being put in place but the chances of successful elimination of the Signal crayfish are slim without significant resourcing.

2.12 There are other pathogens which could affect wildlife species in the Country Park such as tree diseases, (e.g. acute oak decline and *Phytophthora alni* in alder trees), amphibian *Chytridiomycosis*, and heather beetle attack.

Atmospheric nutrient inputs

2.13 Atmospheric nitrogen inputs affecting Cannock Chase currently reach or exceed the maximum critical load (the level at which adverse effects can appear in the ecosystem) for lowland heaths. The minimum critical load for nitrogen on lowland dry and wet heath is 10-20 kg ha/yr [1]. Estimated levels for Cannock Chase are 20.7 kg ha/yr. A recent investigation found that at 30cms depth on the heathland soils at Cannock Chase, sulphates had reduced over three years (i.e. acidity had decreased) but ammonia had increased at depths of 15 and 30cms over the same period (indicating an increase in nitrogen) (Monteith *et al.* 2015a). A further report on the vegetation suggests that bracken probably still poses a potential threat to the vegetation, while the lichen, *Cladonia* sp., was recorded in around 0.25% of cells only, again consistent with measured ammonia concentrations in excess of the Critical Level for this pollutant and target organism. Furthermore, Ellenberg N scores (indicative of soil fertility) for the Cannock Chase vegetation plots were high relative to most UK Countryside Survey heaths and considerably higher than the two other Habitats Monitoring Network (HMN)heath sites, providing additional evidence that nitrogen deposition is having a significant impact on the ecology of this site (Monteith *et al.* 2015b).

2.14 Atmospheric nutrient inputs (which may also have associated acidification effects) can drive the conversion of heathland to grassland. They can cause heather to age more rapidly and induce greater vulnerability to drought, poor heather seed germination, frosts and insect attack, resulting in canopy deterioration - the increased nutrients and light levels can lead to dominance by grasses. Increased nutrients also encourage the spread of bracken and bramble at the expense of other heathland species and ammonia deposition can affect lichens and bryophytes. At Cannock Chase soil suitability scores were highest for bracken, purple moor-grass and wavy-hair grass and lowest for heather, bilberry and cowberry. The species most likely to decrease under current soil chemistry conditions was considered to be cowberry (Monteith *et al.* 2013).

[1] http://www.apis.ac.uk/

2.15 Annual increments of nutrients, particularly nitrogen, generally build up in the vegetation, litter and the top 10 cm of soil. Around 20% of this accumulated nitrogen is in the vegetation, with the remaining 80% in the soil and litter.

Visitor impacts

2.16 Cannock Chase CP is a publicly owned site with a long history of enjoyment by local people and visitors. While visitors and wildlife are not incompatible, some activities and pressure from high numbers of people may impact on the natural habitats and wildlife of the site. These can include summer fires, erosion and trampling and habitat fragmentation, eutrophication, species disturbance, littering and vandalism.

2.17 Summer fires (either accidental or deliberate), general disturbance and habitat deterioration arising from heavy recreational pressure can work individually and in combination to impact on biodiversity. Fire and some other visitor impacts can also be detrimental to sensitive and potentially significant archaeology. Summer fires often start near access points and paths. The impacts on vegetation depend on the severity of the fire; heaths can take years to recover from a large, hot summer fire, and there can be long term effects on vegetation communities. Frequently repeated small fires however, may reduce the suitable habitat for many heathland species, but can encourage early successional populations of plants and invertebrates.

2.18 Historically, accidental and deliberate summer fires have caused extensive damage to Cannock Chase heathland and to associated wildlife. Ensuring that a comprehensive Fire Plan is in place with restoration plans post-fire will help areas recover more quickly.

2.19 There are also other effects of recreational activities on Cannock Chase. Visitor impacts were assessed in August 2011 (White, McGibbon & Underhill-Day 2012). A selection of paths and routes within each compartment of the SSSI/SAC were walked and all observed impacts noted; a questionnaire was sent to knowledgeable local staff and others to seek their views of the main problems and trends in visitor impacts. Impacts noted included:

- **Path widening** (often due to avoidance of difficult surfaces, including eroded paths and tracks where stone has been imported to check erosion that in some cases has been exacerbated by vehicles) leading to loss of habitat.
- **Damage to path surfaces** (ranging from modest effects on vegetation through to serious erosion of surfaces). Trampling effects are widespread around honeypot areas and cobbly or wet track edges.
- **New paths** often initially created by deer and then becoming established through further use by visitors; these further fragment the remaining heathland blocks, eroding track edge vegetation and increasing the risk of disturbance to wildlife within the reduced habitat areas. In Brocton Coppice, tracks being made and used by mountain bikers may result in soil compaction, potentially affecting veteran trees. New paths can result from corner cutting, finding short-cuts or more adventurous routes (such as steep slopes) or by seeking a quieter place to walk. Heavy access on areas of vegetation cut short to form firebreaks can also lead to a loss of vegetation cover. Soil erosion/compaction issues were particularly associated with Oldacre and Sherbrook Valleys and with Brocton Coppice. Regular path maintenance is needed across the CP, particularly on areas on soft, wet or sloping ground to reduce the creation of new paths or footpath spread.

- **Fragmentation -** The creation of a dense network of paths effectively fragments the remaining heathland, resulting in smaller blocks of undisturbed habitat in which birds can nest, feed or roost. The largest block of heathland without a track or path through it is about 8ha.
- **Eutrophication** - heathland soils are naturally nutrient-poor and support vegetation adapted to these conditions. Local increase in nutrients through animal faeces on track edges is resulting in strips of coarse grasses, thistles and brambles alongside many of the paths, supplanting the more typical heathland vegetation.
- **Litter and dumping** - although noted in a number of locations, this did not appear to be a widespread problem. Roadside dumping as well as burnt out cars and garden waste dumping is a problem mostly in specific locations, including over roadside barriers and in some smaller car parks. There are locally problems from the introduction of invasive alien plants.
- **Vandalism** - some damage to car barriers and signage was noted, and egg and fungi/mushroom collectors were also mentioned.
- **Fire** - with the exception of a couple of larger wild fires that had affected several hectares, evidence of recent wild fires was restricted to small areas associated with picnic or barbeque sites. Most are arson, happen during spring/summer and school holidays and are small and quickly put out. Fire frequencies have not changed in recent years.
- **Disturbance/damage** -regularly used but non-definitive routes across and within the heath can result in disturbance to breeding birds, especially Nightjar and Woodlark, and to deer. Heathland, humid heath, streams and mires were felt to be particularly vulnerable to off-track access.

Invasive species

2.20 Several invasive non-native species are present on the CP and adjacent land. These include the highly invasive aquatic New Zealand pygmy weed *Crassula helmsii* in Mere and Milford Quarry Pools and parrot's feather (*Myriophyllum aquaticum*) in the Brindley Heath pool, Himalayan balsam *Impatiens glandulifera* and Japanese knotweed *Fallopia japonica* invading from adjoining land at Seven Springs, with knotweed also recorded from other locations. *Gaultheria shallon* has been recorded but was rapidly treated. *Rhododendron ponticum* and laurel *Prunus laurocerasus* are present mainly on Brindley and on the RAF camp at Marquis Drive, and there are a number of alien and non-typical broadleaved trees (including larch *Larix* spp and sweet chestnut *Castanea sativa*) on Brindley Heath. The spread of non-native species may impact negatively on the characteristic aquatic flora and fauna and dry and wet heath communities.

Scrub and woodland regeneration

2.21 Cannock Chase Country Park is bordered by forestry plantations and areas of woodland on many boundaries, and these provide effective seed sources. Inevitably, succession of heathland to scrub and woodland will occur unless prevented by ongoing management. Encroachment by trees and scrub is a continuing threat to the survival of open heathland and mire. Where heathland reverts to tree cover, most of the characteristic species associated with lowland heath are eventually lost, although the retention of some trees and scrub on the heaths is desirable for wildlife diversity and visual amenity.

2.22 However, in some areas of woodland, including Brocton Coppice and the streamside alder woodlands, there is also concern over the lack of recent regeneration.

Climate change

Heathland

2.23 The effects of climate change are anticipated to be hotter summers leading to a longer growing season, increased evapotranspiration and the possibility of drought. Changes in climatic conditions are also likely to impact on visitor use, with the potential for increased visitor numbers. It is also expected to lead to wetter winters with increased surface run-off and nitrogen deposition. The effects of this on various habitats has been assessed (Natural England 2014b).

2.24 On lowland heath, climate change is expected to lead to a decline in dwarf shrubs, with increased nutrient cycling and insect herbivory (e.g. heather beetle) and greater dominance of grasses. Summer drought could lead to altered community composition, a drying out and loss of wet heath and mire and consequent changes in dependant invertebrate communities, as well as to more summer fires. Warmer, wetter winters could lead to an increase in the incidence and range expansion of *Phytophthora* and other pathogens. However, some heathland species such as Dartford warbler may benefit and spread further north.

2.25 A longer summer and shorter winter season may reduce the window of opportunity for management usually undertaken in winter, (e.g. managed heather burning in early spring), leading to greater fire risk in summer and to greater growth of other species such as bracken. Longer, warmer summers may increase visitor use, soil compaction/erosion, a greater risk of wildfires and increased disturbance to birds and other wildlife.

2.26 Responses to these changes could include more intensive vegetation management more flexible management in terms of treatments and timing, and greater visitor management.

Mires

2.27 The effects of climate change on mires could include higher nutrient loading and faster decomposition, higher water temperatures in summer, moving them out of the tolerance range of some characteristic species, an increased dominance by ruderal plant species, lowering of water tables in summer, reduced water quality due to increased release of organic carbon during autumn/winter rainfall, increased scour in springs, prolonged low flows during drought with temporary reductions in habitat and increased competition and predation, higher peak flows in winter with possible downstream shift in species, greater erosion and increased sediment loads and nutrients causing siltation and eutrophication.

2.28 Adaptations could include maintaining natural vegetation through the restoration of natural ecosystem processes (e.g. by blocking any former drainage channels/structures and leaving natural woody debris in situ) and by reducing trampling and erosion through heavy visitor use.

Woodland

2.29 Within the woodland of Brocton Coppice with its veteran trees, climate change could result in greater winter survival and reduced generation time of insect pests and greater

survival of grey squirrels and deer. Important mycorrhizal fungi needed to support healthy tree growth could be at risk from waterlogging, drought and changes in soil temperature. Loss rates of veteran trees could increase and there could be losses of associated invertebrates of dead and decaying wood, lichens and fungi. Tree loss may result in changes to ground flora and wetter ground in winter could exacerbate wind-throw.

2.30 Responses to these changes could include the prevention of over or under-grazing, regeneration and planting replacements, reducing crown growth and pollarding, leaving dead wood and fallen trees and reducing fire risk.

Recent management

2.31 Current management focuses on maintaining appropriate balances of tree and bracken cover in heathland and grasslands, improving heather age structure by cutting and burning in patches and light thinning of key woodland areas. Some planting of acorns of local provenance is also undertaken in Brocton Coppice where natural regeneration is poor. Further details of recent management are included as Appendix III.

3. Conservation management – rationale and techniques

3.1 Humans have had profound impacts on natural habitats in the UK since adopting a settled agricultural existence in the Neolithic period. Woodland clearance started around 5000 years ago, and by the 21st Century had significantly reduced woodland cover in the UK. In the intervening millennia, open, semi-natural habitats came to dominate the landscape as a consequence of agricultural and associated practices. When these practices began to change radically in the second half of the 20th Century, substantial amounts were lost to development and changing land uses, and the surviving open features began to be valued for their wildlife, landscape, cultural heritage and amenity features. These semi-natural habitats, including the heathland and associated habitats and the wood pasture that characterise Cannock Chase, developed under human management, and require similar management to persist.

3.2 On areas with poor sandy or gravelly soils, tree clearance and subsequent grazing by domestic livestock reduced soil nutrients and caused an increase in acidity in the soil. This created conditions that particularly suited heathland plants such as gorse and heather and the ensuing heathland habitat provided homes for specialist plants. In the absence of management such as grazing, mowing or burning, the natural process of succession causes heathland to revert to woodland (mostly birch on drier areas and willow or alder on wetter areas) and the plants and animals associated with the earlier successional heathland phases become scarce or are lost. Where atmospheric nitrogen inputs are high, heather is replaced by grasses and bracken and bramble can invade. Acid grassland associated with heathland supports a greater number of flower species when it is grazed or mown as this prevents domination by coarse grasses and the build-up of a litter layer which suppresses the smaller flower and grass species.

3.3 Wood pasture may be derived from post-glacial wildwoods, where fluctuations in the woodland canopy and the actions of wild herbivores created open areas. It subsequently developed and was maintained through the interactions between domestic livestock grazing, collecting leaf fodder and leaf-hay, firewood, timber and bark, and also hunting. Over the centuries, fluctuations in grazing allowed sporadic

recruitment of younger trees, but in general grazing suppressed vigorous tree regeneration, and this combined with practices such as pollarding allowed the persistence of existing trees to great ages. The resulting semi-shade together with the long-term presence of ancient trees promoted a rich epiphytic flora and an invertebrate fauna of deadwood specialists (mainly beetles).

3.4 Both over-grazing and in some cases the cessation of grazing eventually result in the loss of wood pasture, either to closed-canopy woodland or open heathland or grassland, with the loss of specialist species, so, as with heathland, ongoing human intervention is needed to allow the habitat to persist. A long-term view is needed for wood pasture management (such as the 500-year plan the Corporation of London has developed for Burnham Beeches in Buckinghamshire).

3.5 In the following sections we describe the types of management that are habitually used on heathlands and wood pasture. Techniques mainly suitable for heathland management are described first, followed by grazing, deer management and the control of alien invasives (needed in both habitats), and then techniques specific to wood pasture.

Tree and scrub clearance

- Favourable condition requires tree cover on lowland heath to be <15% by area
- Removal of woodland and scrub is straightforward using a variety of mechanical and manual techniques. Follow up management by stump treatment or grazing is required for broad-leaved trees and shrubs
- As part of the planning for woodland and scrub clearance programmes, the effects on landscapes and archaeology should be carefully assessed

3.6 Trees and scrub can be cleared by machine or by hand. Machine clearance is usually only viable for large areas of secondary woodland or scrub and in these circumstances can be cheaper than hand clearance. Dedicated machines are available to fell the trees and convert the timber to logs or wood chips. Hand clearance is usually carried out using chainsaws and the material either burnt or chipped. Any material left would normally be removed off-site to avoid adding nutrients to the soil. Seedlings can be hand pulled by work parties, including volunteers, or if conifers, cut off at ground level.

3.7 Cut stumps of broadleaved species are usually painted or drilled and injected with herbicide during winter or early spring to prevent re-growth. Where stumps are too small or too numerous for this treatment, targeted spot spraying in successive seasons can also control re-growth. The removal of the canopy of mature trees increases light levels and for species with light demanding seeds such as silver birch *Betula pendula,* this can lead to an eruption of seedlings which poses a further management issue. Hand pulling of seedlings or saplings on open heath can help control regeneration but can also open up the soil surface and encourage the regeneration of further seedlings. It may also be impractical over larger areas.

3.8 Consideration should be given to the landscape impact of felling and planting programmes on sites within the AONB. Where it is proposed to remove large areas of woodland, an environmental impact assessment may be needed under the Environmental Impact Assessment (Forestry) (England and Wales) Regulations 1999.

Bramble control

- Control of bramble where desirable can be achieved by uprooting (where there is no underlying archaeology), cutting or spraying.
- Uprooting is only an option where stands are very extensive and warrant the use of machinery and where this cannot impact on archaeology, or in very small stands in sensitive locations where removal can be carried out by hand. In most circumstances neither of these is viable.
- Cutting will remove the above-ground material but leave the roots which are capable of rapid regeneration, necessitating regular further cutting. This may be a viable management where cutting for other purposes is a regular occurrence such as annual cutting of grassland or regular path clearance.
- To kill the root systems, chemical treatment is required usually with follow up treatment once or twice to eliminate any regrowth. Cutting, followed by spot treatment, can however, limit the amount of herbicide that needs to be used.

3.9 The presence of bramble *Rubus spp*. on heathland is usually an indication of disturbance and some degree of locally elevated soil nutrients, including nitrogen from atmospheric inputs. Bramble is now widespread and spreading on Cannock Chase and although no previous estimates of its occurrence exist, it is noteworthy that bramble is not mentioned in the previous survey of habitats and management recommendations (Land Use Consultants 1993).

3.10 Any approach where uprooting of bramble is considered on the CP runs the risk of having significant impact upon surviving below ground archaeological remains and potentially on the longer term survival of earthworks. Any proposals should be carried out after consultation with the County Archaeologist and reference would need to be made to the Historic Environment Record (HER) as to whether remains are recorded in affected areas.

3.11 Treatment of woody species such as bramble has traditionally involved the use of glyphosate (e.g. in products such as Round-up). Whilst glyphosate is still authorised for use in the EU and UK, there are new concerns about its use that need further investigation. An alternative is triclopyr (e.g.in commercial products such as Garlon) which is a systematic herbicide. It is not toxic to humans, birds or insects but should not be used in the vicinity of water as it may affect aquatic invertebrates and fish.

Bracken control

- Favourable condition requires dense bracken cover on lowland heath to be <10% by area
- Bracken can be controlled by cutting, bruising or spraying. Twice yearly cutting is more effective than a single cut and a single application of Asulam. There are no published results from bracken bruising, but results may be better than cutting where it is feasible to use. Asulam can affect other fern species.
- No treatments are 100% effective but once-only treatments without follow up are least effective.
- The extent and pace of regeneration to grassland or heathland after bracken control will mainly depend on the seedbank, the depth of dead bracken litter remaining and any historic soil disturbance that may result in coarser species returning.
- Establishing heather from the seed bank (if already present, or introduced if absent) in former bracken beds has had variable results depending on site, but is better where bracken litter is disturbed.
- Cutting and bruising will not be appropriate where ground nesting birds are present or where bracken is co-dominant with other ericaceous species. Heavy machinery can also damage heather communities. These methods may also not be feasible on rough terrain or steep ground.
- Livestock may help limit regeneration after physical or chemical bracken control has been carried out by trampling the young fronds.

3.12 There are some areas where broken ground or archaeological sites prevent the use of surface scraping, mechanical cutting or bruising of bracken, so spraying by hand or by helicopter for larger areas is the only option. Treatment of bracken on very steep ground can cause soil erosion. The presence of ground nesting birds on heathland also prevents cutting/bruising (when it is most likely to be effective) during the bird breeding season, which for woodlark and nightjar can extend from March into August.

3.13 Bracken can be cut, rolled or crushed or sprayed. Each has advantages and disadvantages. Cutting needs to be carried out during the summer when birds may be nesting and two cuts are required for the best results. If nesting bird territories can be located then areas of bracken can be left uncut and follow-up work carried out the following year. The main problem could be disturbance to nesting birds rather than destruction of nests. Rolling or crushing however, can destroy nest and eggs or young and is best carried out towards the end of the bird breeding season when it is necessarily less effective. Spraying needs to be undertaken when the fronds reach their full size in summer but some report it to be less effective than two cuts.

3.14 Whichever method is chosen 100% kill is usually unlikely and the bracken will return after a period of years requiring re-treatment. Follow-up treatment the following year will usually extend the period before further treatment is necessary, but much depends on the weather conditions when treatment is undertaken, the character of the soils, the topography and other local factors and these are best assessed by the local site manager in the light of experience.

3.15 On some sites there is a dense layer of dead bracken under the living plants which smother regeneration and will need to be removed to expose the heathland seed bank. This needs to be done with care to prevent the removal of the seed bank itself and can

also lead to dense regeneration of birch which will need follow-up treatment. Spot spraying with Asulam or weed wiping is also effective but both this and cutting needs follow up to maintain control.

3.16 Pesticide use is regularly reviewed and safety standards revisited. During a recent review Asulam was removed from the list of approved herbicides within the EU until further testing was completed. The Bracken Control Group was set up in the UK in 2011 to advise landowners and managers and with the Pesticides safety Directorate, secured exemptions to allow Asulam use to continue in the UK for the control of bracken for subsequent years. To date, there is no evidence that when used correctly, Asulam poses a risk to human or animal health.

3.17 Bracken control may also be carried out in wood pasture, where one of the aims may be to reduce fire risk and encourage ground flora or recruitment of young trees to take place.

Gorse management

- Favourable condition requires common gorse (*Ulex europaeus*) cover on lowland heath to be <25% by area
- Gorse is a valuable breeding habitat and year round foraging habitat for invertebrates and a number of birds, including stonechat and linnet. Stands of gorse scattered across the heath will provide maximum territorial opportunities for these birds.
- Roadside gorse however, can be used by birds and result in bird casualties from traffic.
- To provide thick gorse for birds foraging and shelter in hard winter weather, a 12-15 year coppice cycle is best.
- Managed gorse near footpaths allows passers to get good views of birds whilst deterring them from straying off paths.

3.18 Common gorse *Ulex europaeus* often marks the site of previously disturbed ground, old trackways etc. but can extend to cover considerable areas at the expense of open heathland. Common gorse also provides nesting sites and a variety of invertebrate prey for heathland birds. However, gorse bushes become open and straggly after 10-15 years and, to retain their value for wildlife, they are usually managed by cutting or burning, from which the bushes rapidly recover.

3.19 Grazing can prevent gorse regeneration where it covers large areas and it is desirable to reduce its extent, but conversely may need to be protected from grazing by, e.g. rabbits or deer where it is to be retained. Old gorse may not regenerate after cutting but can do so from the seed bank which is relatively long-lived.

Surface scraping

- For favourable condition, bare ground should be between 1-10% by area of lowland heathland sites.
- Surface scraping removes the vegetation mat but leaves the soil largely undisturbed
- This removes more nutrients than mowing or a light burn
- Surface scraping can leave the seed bank more or less intact and exposes bare ground which encourages regeneration from seed and is temporarily of benefit to invertebrates. The material removed is mostly organic and can be piled and left to rot down on areas off the heathland, where available.
- Scraping must be avoided in areas where there is sensitive archaeology.

3.20 Bare ground is used by a number of specialist invertebrate species, many of which have particular requirements. These can include bare ground in soft sand, in sand with small pebbles, in pebble beds and in ground waterlogged in winter. Some invertebrates require large flat areas of bare ground, others will burrow into vertical sand faces or into the detritus at the base. Any plan for the creation of bare ground should therefore seek the greatest variety of substrates and topography available on the site.

3.21 However, there can also be landscape considerations and these should be carefully assessed before bare ground areas are created. Since such features are usually of very limited extent it is often possible to create bare ground areas which are largely concealed by surrounding heathland vegetation.

3.22 Scraping is a skilled operation and requires an experienced machine operator who can remove the vegetation mat and leave soil profiles intact. Surface scraping creates a bare ground environment which can also be of benefit to ephemeral heathland plants. The creation of new areas of bare ground, scrapes, pools and ponds as part of the cycle of management will benefit and maintain biodiversity. Generally, surface scrapes will regenerate rapidly but the temporary bare ground created can be incorporated into firebreak systems where they will provide some resistance to fire for a few years. Full consultation will be required prior to surface scraping to avoid damage to archaeology or other surface features, since on the CP, much of the archaeology survives at or close to the surface. Consultation should include reference to the HER.

3.23 The material generated by scraping can be almost wholly organic and can be burnt or left to rot down. The latter can provide suitable conditions for breeding grass snake and will be used by slow worm, small mammals and invertebrates. However, it may add nutrients to the land on which it is deposited causing a shift away from heathland vegetation, so ideally would be removed. Mineral materials such as sand or gravels can be used to create banks or mound on site which can add to the diversity of the bare ground creation.

3.24 Where there is surface archaeology on site, an archaeological audit is necessary before any scraping occurs. Any larger piles of material left on site will need to be contoured and kept low to allow continued access.

Turf stripping

- Turf stripping can remove the seed bank and exposes bare ground which can take some time to re-vegetate and is of benefit to invertebrates.
- Turf stripping is the most effective way to remove accumulated nutrients
- Removing the turf and surface soil layer down to about 10cms can damage archaeology and will always require consultation
- Turf stripping removes large amounts of material. Any plan to dispose of this off-site needs to satisfy complex regulations and can be very expensive.
- This management is normally reserved for small areas of special interest.
- Turf stripping must be avoided in areas of sensitive archaeology

3.25 Turf stripping will remove most nutrients from the stripped area. If a seed bank is present, restoration of dwarf shrub heath may follow if the top soil remains. However, it can also result in restoration of species -poor heathland, due to depletion of seed banks from the stripping process, acidification of groundwater and increases in soil ammonium concentrations that can inhibit seed germination and reduce seedling survival. In the absence of a seed bank, heathland litter may need to be spread over the stripped area.

3.26 On dry heath turf stripping will create temporary open areas of value to invertebrates, such as hunting spiders and beetles or for providing sites for the nests of ants and their commensals and parasites. Such areas can also be used by nesting and foraging birds. On wet heath turf digging or stripping will restart the succession and may benefit plants and animals of early successional phases, including those of seasonally flooded or waterlogged ground.

3.27 Where turf stripping has been carried out, recovery of the dwarf shrub cover can be slow, but can provide a pioneer heath/bare ground habitat for several years. Turf stripping can be carried out on dry, humid and wet heath but not usually in mires (where it would constitute peat digging). Turf stripping can damage the archaeological interest and would require approval from Natural England and consultation with the County Archaeologist. It cannot be carried out mechanically on broken ground or on steep slopes. Areas stripped can be unsightly until the vegetation recovers, although this depends on how sensitively it is done and on the size and shape of stripped areas. Turf stripping generates large quantities of material which can create a difficult and potentially very expensive disposal problem.

3.28 The expense, disposal problems and temporary landscape impacts make turf stripping an option only in exceptional circumstances. These could arise if no other options for heathland restoration were available and large scale turf stripping was a last resort, as has happened in The Netherlands where nutrient levels have been generally much higher than in the UK. On a smaller scale, circumstances can arise where turf stripping is a practical option on small areas of rare habitat or where species are threatened by nutrient-driven spread of grasses.

Controlled burning

- Controlled burning usually results in pioneer heather which should be within 10-40% of the heathland area for favourable condition.
- Controlled burning should be infrequent on any one area (±15year intervals).
- Controlled burning on dry heathland, if carried out at the right temperature and where heather is at the right age, will initiate regeneration from rootstock and seed and will not usually need follow up management.
- Where a fire moves into a bracken bed (which should not be deliberately burned) then follow up treatment by cutting, bruising or spraying of bracken may be necessary.
- Purple moor-grass and wavy hair-grass can be encouraged by burning (especially of older heather) unless there is follow up management, usually grazing.
- On mires, burning is not a suitable form of ecological management as it can damage bog plants and Sphagnum mosses.
- Burning also needs to be considered carefully in areas where there are surface archaeological remains.

3.29 Controlled burning is permitted by law only in the winter in the uplands between 1st October and 15th April and elsewhere (which presumably includes Cannock Chase) between November 1st- March 31st; in practice, most controlled burning is done in February-March. At this time, most heathland invertebrates and reptiles are hibernating. Ideally, small areas of dry heath (<5ha) should be burned. An ideal burn will move across the ground reasonably slowly, removing the above ground vegetation and litter, but leaving the base of existing heather plants undamaged and the seed bank intact. Depending on the fire temperature, a well-managed burn will remove nutrients and encourage heather regeneration. Burning, even in combination with herbicides or mowing however, does not effectively control wavy hair-grass or purple moor-grass.

3.30 Traditionally burning was undertaken to provide a flush of fresh growth for grazing animals in spring. In some cases, burning without subsequent grazing may encourage grasses and reduce heather cover, and even with grazing, too frequent burning will give the same result. Generally the best regime for lowland heaths that involves burning management is occasional controlled burns to add structural diversity to the vegetation, remove litter and reduce nutrient build-up, combined with an annual grazing regime.

3.31 Controlled burns need to be carefully planned and managed by experienced operators to minimise the risk of losing control and burning large and unintended areas. A fire-break would normally be mown around the proposed fire site in the autumn (when, if needed, the mown material can be collected for use in heathland restoration elsewhere,) and the controlled fires completed within the statutory deadline of March 31st[2]. Burning can cause problems if it takes place close to power lines, roads and houses, and wind direction needs to be carefully monitored. Care is also needed in areas where early nesting bird species are known to be present. Consultation should be made with the County Archaeologist where burning is planned on sites with important archaeological features below or at the ground surface.

[2] The heather and Grass etc. Burning (England) regulations 2007.

Mowing

- Mowing heather at the right age, especially where cuttings are removed, results in the regeneration of pioneer heather, which should be within 10-40% of the heathland area for favourable condition.
- Overly frequent mowing can change heather communities to grassland.
- Occasional mowing can reduce nutrients (through the removal of cut material) and stimulate regeneration of pioneer heath. Finding suitable sites for disposal of cut material can be problematic and costly.
- Mowing can suppress purple moor-grass temporarily but only if repeated, preferably three or more times during the season. In many areas this would not be possible due to ground nesting birds and wet conditions.
- Mowing wavy hair-grass or other grasses can be used for heathland or acid grassland restoration but needs follow up management to be effective. It is not suitable for maintenance of grass/heather mosaics or in breeding bird territories.

3.32 Frequent repeated mowing can convert dwarf shrub heath to grassland, especially in humid or damp conditions. Regular mowing of tall grass may simply convert it to short grass. The action of mowing several times in a short period and removing the cut material can cause soil compaction, especially on wet organic soils, and mowing is not possible on broken ground or very steep slopes. Issues with mowing are that it is temporarily disruptive in restricted areas, relies on fossil fuels and needs to be used with care in areas containing features of historic interest. It may not be sustainable in the longer term.

3.33 However, mowing on dry heath can be very effective in returning the mown areas to pioneer heather with a bare ground mosaic where cut litter is removed, and can break up areas of even-aged and homogeneously structured heath. It is also a valuable technique for maintaining fire breaks. As mowing removes only the standing vegetation and leaves the lower layers of vegetation and the litter layer intact, the effect on the accumulated nutrient stores is modest; one study showed that with cutting every 10-15 years, the removal of the equivalent of 5 years of accumulated nitrogen may be possible. This assumes that some 24-33% of the nitrogen is stored in the above ground biomass, including litter, so that some 10-20% % of the total nutrients are removed depending on the height and efficiency of the cuts (Power, Ashmore & Cousins 1998; Hardtle *et al.* 2006). Mown material should ideally be removed off site to reduce nutrients. Some litter will remain, however. Removal of cut material can raise problems of disposal, although if cut in autumn when the heather seed is ripe, the cut litter can be used for heathland restoration elsewhere.

3.34 Mowing can be effective in achieving control of purple moor-grass but this will depend on the frequency, severity and timing of mowing. In a study which looked at the effect of different treatments on purple moor- grass, one study found that mowing once had little measurable effect, whereas mowing three times (December, June and July) significantly reduced the grass cover for up to four years after treatment.

3.35 Where vegetative litter is deep, then litter removal may be necessary by raking or burning (provided this will not impact on surface archaeology). If the seed bank is poor then seed may need to be provided using cut heather from a suitable heathland source.

In the longer term to maintain the balance in favour of dwarf shrub heath on damp or wet heathland habitats, grazing at the right intensity is more likely to achieve this. Mowing is therefore a restoration not a maintenance technique on lowland heaths except where the objective is to maintain acid grassland areas.

Control of alien and other native invasive plants

- The native species (apart from bramble and bracken discussed above) that is subject to occasional control is ragwort *Senecio jacobea*, which is hand pulled in sensitive areas.
- Invasive alien species can have a major impact on biodiversity and can be extremely costly to control.
- Regular site inspections concentrating on high risk areas help identify new colonies - early identification saves time and money later. It is also important to be aware of infestation problems on nearby land.
- A common sense approach is needed to prevent the import of invasive aliens onto the CP (including on contractors machinery, through animal movements and vehicles, etc.)
- Where the risk is high, full and appropriate precautions should be taken, including setting aside a suitable wash-down area and disposal facilities.
- When carrying out control operations, precautions to prevent cut or excavated material contaminating other areas both on and off the CP are needed.

3.36 Ragwort is a native species poisonous to grazing animals and can be required to be controlled under the Weeds Act 1959 where it represents as nuisance to neighbouring landholdings. Limited control by hand pulling is exercised near bridleways.

3.37 Some species such as New Zealand pygmy weed and Gaultheria are extremely invasive and very difficult to control, while species such as sweet chestnut or larch pose no immediate threat and can be given lower priority, unless the larch is in an area where *Phytophthora ramorum* is prevalent. In some cases (including that of Himalayan balsam and Japanese knotweed) elimination, although not difficult, requires co-operation from adjoining landowners if re-infestation is to be avoided. A strategy for dealing with all alien invasives including locating, treating, follow-up and longer term monitoring is usually the best way forward.

3.38 A control strategy for each invasive species should take into account the threat posed, the chances of successful elimination, the likely public response and the expected results of an elimination programme (which could result in one invasive species being eliminated and being replaced by another).

Deer Management

- In the absence of natural predators, deer numbers can rapidly increase to the detriment of the habitat which supports them and to the deer themselves (e.g. winter starvation, disease problems)
- Usually deer management involves culling by expert marksmen to either reduce the number of deer (reduction cull) or to maintain numbers (maintenance cull). Culling will have the aim of establishing and maintaining a healthy and balanced population of deer with appropriate age and sex ratios
- Deer will browse as well as graze, so deer activity can restrict tree regeneration and steps may need to be taken to protect plantings or natural regeneration from deer damage
- Deer can also selectively graze certain plant species resulting in a loss of biodiversity
- Deer distribution and behaviour will be constrained by disturbance from visitor use so some areas favoured by deer e.g. deer 'lawns' for grazing in remote parts of the CP will benefit the deer
- Some mortality will be caused by road collisions, sometimes following pursuit by stray dogs, as well as through poaching (especially in winter).
- The public like to see deer but not everyone recognises the risks that stray dogs may pose to the wild deer herd.
- Feeding wild deer can involve giving them inappropriate foodstuff and encouraging them to venture closer to people, potentially increasing the risk of poaching.

3.39 At Cannock Chase there are Red and Fallow deer, the latter, possibly a genetic remnant of herds which were present in mediaeval times. Culling is carried out by Forestry Commission staff who have also co-ordinated regular deer counts carried out by their own staff and others, including County Council Rangers on the CP.

Livestock grazing

- The impacts of livestock vary according to stocking density, livestock type, grazing season, vegetation start point, site characteristics (including the presence of wild herbivores) and climate.
- On heathland, both low and high livestock densities can lead to an increase in grasses and a reduction in dwarf shrubs.
- Intermediate livestock density results in the maintenance or an increase in dwarf shrubs on heathland, restricting the expansion of invasive grasses and bracken and is likely to produce maximum species and structural diversity, including the creation of bare ground habitat.
- On heathland, livestock will not necessarily control existing scrub and tree species without additional management, but will significantly help to reduce further scrub establishment.
- In wood pasture, grazing can prevent the mass regeneration of trees and scrub, reducing competition for light and creating more varied tree growth forms and woodland structure.
- On heathland, grazing will not significantly reduce existing nutrient levels but can help to offset annual increments if animals move to adjacent woodland or are taken off the heathland at night, or when removed from site at the end of a grazing season.
- Grazing can be a sustainable form of management in the long term.
- Grazing needs to be properly planned and monitored to avoid impacting negatively on amenity use and archaeological remains, in particular, surviving earthworks.
- Grazing supplements other management techniques and may reduce the extent to which they are needed, but will not entirely replace them.

3.40 On heathlands, changes in heather cover and structure through grazing depend on grazing intensity. Heather cover, height and biomass decline with heavy livestock presence, but increase under lighter grazing. Structural diversity may be maximised by light grazing which may stimulate young growth while not adversely affecting mature or degenerate plants. In general, intermediate grazing is likely to favour these species in a mixed sward, while heavier grazing will decrease heather and other dwarf shrubs. While one-off management events (e.g. burning or cutting) do not prevent grass re-establishment, it can be delayed and perhaps more permanently prevented, by grazing, preferably by cattle. Grazing can have some benefits in controlling encroaching trees and scrub, but in most situations other management will also be needed. Trampling and resting up by livestock can create patches of bare ground and lead to greater plant and animal diversity.

3.41 In wood pasture, grazing plays a similar role and was historically an essential part of the system under which veteran trees and their associated flora and fauna flourished. Light grazing maintains a largely open ground flora, preventing the development and dominance of scrub and tree saplings and creating structural diversity. A balance is needed whereby sporadic tree recruitment is allowed and recruitment of palatable tree species within the protection of thorny species is known from grazed sites such as the

New Forest and Hatfield Forest. Where deer are already present, the likely combined effect from grazing by deer and domestic livestock should be assessed. Grazing can also damage trees and over-grazing may result in livestock stripping bark from trees. Any grazing is likely to create a browse line. Livestock should not be fed or watered close to trees as this will cause trampling and nutrient enrichment of the ground around the tree, which may damage the tree. Vehicles used to check stock coming too close to trees may also be damaging. These issues can be addressed through following good practice.

Stock management

- Generally grazing systems on lowland heath consist of cattle grazing in summer with or without ponies all year round, or year-round grazing by sheep.
- In wood pasture, grazing by cattle or sheep is usually carried out in summer (to avoid bark stripping in winter)
- Stocking rates can vary enormously depending on type of animal, site and management objectives, but are usually relatively low in extensive grazing schemes compared to commercial schemes. However, they can be locally high on grass-dominated heath after fire or after mowing to open up swards
- Winter feeding should not take place on lowland heath or wood pasture and the need for this should in any event, be minimised by using appropriate stock if grazing continues in winter.
- All grazing schemes need some off-site layback land for emergency use, and for overwintering cattle and lambing sheep (if relevant).
- Sheep will readily graze heather and can damage pioneer heather swards by pulling up young plants. Sheep grazing is generally less effective than cattle or pony grazing on purple moor-grass and on wet ground. Fencing (including netting) or shepherding is usually needed to manage sheep, and are both expensive.
- Ponies will graze rough herbage and will go into wet and bracken dominated areas to forage. They have a large throughput of vegetation and can be effective year round grazers. However, ponies can become a nuisance if fed by the public, and can be disliked by horse-riders.
- Cattle preferentially graze grass-dominated areas and can be turned out onto young heather. Heather regeneration is improved by localised ground disturbance from stock, and trampling by cattle and ponies is considered more effective than by sheep. Cattle will also trample bracken.
- Choice of breed is important, but not more so than background, age, gender and experience.
- Dog worrying is a major consideration on public access sites where stray dogs are present, particularly for sheep.
- For any type of livestock, some form of containment is likely to be necessary to keep them from straying onto roads or into neighbouring landholdings.

3.42 The following sections are not an exhaustive description of the options for stock grazing but provide a summary of some main considerations.

Livestock type

3.43 Sheep, cattle and ponies are all used for conservation grazing on heathland, and each have particular advantages and other considerations depending on the management objectives and characteristics of the site in question. On many sites, a combination of livestock is used at any one time. Different livestock species are discussed below. Livestock 'type' also includes breed, gender, age and background.

Sheep

3.44 Sheep tend to graze short swards and will crop the vegetation closely. They avoid wet, grassy habitats, especially coarse vegetation and prefer short grass turf. They avoid purple moor-grass straw (i.e. the dead leaves which collect as litter and smother smaller plants). They have a more limited impact on tall grass swards. On drier ground, sheep grazing can help to maintain a balance between dwarf shrubs and grasses. However, sheep are selective grazers, and breeding ewes in particular are likely to graze the green shoots of heather in preference to the older blades of grass, particularly in late summer and autumn. They can also damage young heather by pulling up the seedlings as they graze, but with their relatively light weight are less likely to cause damage by trampling than cattle and ponies. However their small hooves do not create the same range of hoof print regeneration niches as the larger hooves of cattle and ponies.

3.45 Sheep grazing is less likely to control purple moor-grass and more likely to cause heather damage from grazing than other stock types. They also preferentially graze other flowering plants. On public access land with dog walkers or where stray dogs are present, sheep are very vulnerable to worrying or attack.

Ponies

3.46 Ponies have a different digestive morphology to ruminants such as cattle and sheep and are less efficient at digesting plant matter. This means they require a larger throughput of vegetation. Ponies preferentially select grassy areas on heathland and will travel further into mire communities than other stock. They will also eat more poor-quality forage including dead leaves and stems. The diet of ponies has been found to be 50% grasses throughout the year with up to 80% in summer. A study of pony grazing on a valley mire in Dorset over 10 years showed an increase in small species such as sundews and bog asphodels as well as bog moss species and a general reduction in vegetation height. Ponies are considered highly suitable for grazing purple moor-grass in wet heath and mires, but will also browse gorse (in both summer and winter) and regeneration from cut downy birch in summer.

3.47 Ponies will congregate around areas such as car parks if visitors feed them and can become a nuisance or even a danger if aggressively seeking food. Stallions can also pose a problem for horse riders, and are not usually kept on amenity sites.

Cattle

3.48 Cattle are less selective grazers than sheep but preferentially select grassy habitats to forage in. In summer they are likely to concentrate on grassland and wet heath and will reduce rank vegetation such as tussocky purple moor-grass, which they are particularly

attracted to in early summer. They will also eat dead purple moor-grass 'straw', reducing the smothering effects of deep litter on smaller plant species, some of which are scarce or rare in wet heathland. A reduction in litter build up also lowers fire risk.

Breeds and Types

3.49 The breed, age, gender and background of livestock also need to be considered. Although different traits are often attributed to particular breeds (e.g. the willingness of Hebridean sheep to browse), the background of the animals, particularly their previous experience of semi-natural sites, can be just as important, as can their age, gender, breeding status, the make-up of the herd and temperament of individual animals. More information can be found in the Breed Profiles Handbook (Tolhurst & Oates 2001).

3.50 Traditional, hardy breeds are generally used on heathland and wood pasture as they are better adapted to grazing rougher vegetation, are hardy and docile and may be more tolerant of dogs. Further information on different breeds can be found in the Breed Profiles Handbook. Stock should be used which are used to being handled and led by a stock manager, but warier with strangers so they do not create problems for picnickers or others, or permit cattle rustlers to remove them.

3.51 Most sheep are susceptible to dog worrying and attack although Jacob's sheep may defend themselves better. Hebridean and Welsh Mountain sheep both do well on poor vegetation and will browse developing scrub, but both are vulnerable to stray dogs.

3.52 There are several cattle breeds that do well on rough vegetation, including English Whites, North Devons (known locally as Ruby Reds), Long-horned or Sussex both which are all very docile and able to cope with poor forage. Horned cattle are more likely to cause concern to the public, however. Other possibilities are Aberdeen Angus, Belted Galloway and Highland cattle, the latter which do well over winter on poor forage, but may look threatening with their shaggy coats and large horns, despite being very docile. All will generally ignore people and their pets.

3.53 Suitable pony breeds for heathland grazing include Exmoor ponies, which can live on rough vegetation, take very little heather and ignore people and their dogs, New Forest ponies (although they can be troublesome if they become familiarised with people by feeding) and Dartmoor Ponies.

3.54 Suckler herds (cows with attendant calves) will soon get to know their territories, the best places to graze, drink, lie up and avoid human disturbance, and cows will pass on their experience to calves. Cows will need to come off heaths for bulling and calving, and may need to be kept off until calves are a few months old, as they can be aggressive when calves are small. If exclusion of cows and young calves is necessary, then a very early spring or autumn calving herd would be best to allow purple moor-grass grazing from April to September. Suckler cows would need to be over-wintered off the heaths. These problems could be avoided by using older barren cows, which could be bought in spring and sold in autumn, but supply may be unreliable in sufficient numbers in spring, they would not establish a legacy of experience to be passed on to their offspring and each spring the new cows would need to learn how to use the area. A herd of young cattle can be curious and playful so could be a nuisance or perceived threat by visitors and especially for those with dogs. They could also be more accident prone or susceptible to disease and more likely to escape.

3.55 Pony herds of mares, possibly with geldings, are a good option, but may need to be removed from the heath if breeding is required. Stallions are best avoided if the area is used by horse-riders and if a breeding herd is not required.

Seasonality

3.56 Normal practice on grazed lowland heaths is to remove the cattle for the winter (between late Oct/Nov-April/May depending on weather) but to leave ponies on the heaths unless the weather is very severe (e.g. on the Dorset Heaths and in the New Forest). In continental Europe sheep are grazed all year round, except during lambing, but where heather is being supplanted by grass, particularly purple moor-grass, this can lead to heather damage and sheep should be off-wintered in this situation.

3.57 Sheep grazing takes place all year round (except during lambing) in continental systems, and where grasses such as wavy hair-grass or sheep's fescue are the major grass competitors to dwarf shrubs, this system works well. However, where purple moor-grass is dominant and there are few alternative grasses available, then ponies or sheep left on over winter will concentrate on heather, which can damage the sub-shrub community.

3.58 On wood pasture, grazing animals may be removed in winter to prevent bark stripping, which may result in trees becoming ring-barked and dying. This can particularly affect certain tree species including Ash and Holly.

Stocking rates

3.59 Reference to historic stocking rates is often of limited value to the modern site manager, as the effects of nitrogen deposition and, in some areas, mineralization of peat soils, has resulted in greater vegetation growth and more rapid successional processes than would have taken place in the past. Thus, reliance on past measures of stocking density can lead to under-grazing.

3.60 Further problems in setting stocking rates are that different definitions of livestock units have been used in different schemes, and even where consistent, the definition may not be helpful, as grazing impact by animals classified in the same way may differ according to livestock type and site characteristics. The impacts of a particular grazing level will also differ depending on when grazing takes place, even if the length of the season is the same, e.g. three months in May-July or three months in Aug-Oct. Furthermore, every site is different and a stocking rate on one site may be inappropriate on another that is superficially similar.

3.61 On some sites quite small changes in stocking rate can result in different impacts; for example, a lower rate can stimulate growth of purple moor-grass while a slightly higher rate can suppress it. Generally, the stocking rates recorded on lowland heathland have been roughly the equivalent of 1 cow or pony to 5-10ha per year. This compares with commercial grazing on improved grass fields of 1-2 animals per hectare. In practice, most heathland managers err on the side of caution and use low stocking rates to start with, slowly building up numbers in the light of experience and impacts on the vegetation.

Winter feeding

3.62 Where livestock are left on site for all or part of the winter, supplementary feeding may be necessary. Regular winter feeding encourages the animals to hang around feeding sites before and after feeding times, resulting in serious damage to vegetation and trampling which can lead to soil erosion and compaction. In addition, if winter feeding is carried out using hay, then this can introduce different plant species. It is normally therefore recommended that supplementary feeding is avoided on heathland or wood pasture but may be carried out on grassland, ideally on adjoining land, if necessary. Feeding should be kept to a minimum (i.e. only for welfare reasons during hard weather) and should not be carried out either for commercial reasons or to maintain the condition of animals that are intrinsically unsuited for grazing the habitat in winter. On heathlands, a substantial feeding programme for animals fed off the heath but still having access to it can reverse the process of nutrient removal and lead to nutrients being imported onto the heathland.

Livestock ownership

3.63 Livestock used for conservation grazing may be owned by the organisation managing the land, or may belong to a grazier. Graziers may be farmers or a conservation grazing service. There are of course advantages and disadvantages to both. Stock ownership offers more flexibility in terms of the type of livestock, stocking rate and duration and other aspects of livestock management. However, it requires experienced staff and investment in both livestock and infrastructure (see below). Using a grazier, whereby a third party grazes their own stock on a site under license, avoids the need to employ a stock person and to purchase livestock. It also means there is likely to be a farm base and layback land already available (see below). However, farmers willing to grazing unfertile land such as heathland can be hard to find, particularly in places where the tradition of heathland grazing has ceased, and in some cases (particularly in the south of England) it is necessary to pay graziers to take on heathland sites. It may also be difficult to find graziers with suitable stock, and there may be conflicts of interest where the focus of graziers is on the economic viability of the grazing project rather than the conservation outcomes for the site. Graziers may also be reluctant to graze land also used for amenity purposes.

3.64 Conservation graziers can be an effective alternative, but are not widely available. They have the skills, experience and resources of other graziers, but with a good understanding of conservation objectives and how to achieve them. However, they will require payment (which could include Environmental Stewardship payments). In some cases compromises are found; for example, stock used by the Morecambe Bay Conservation Grazing Company to graze upland heath and limestone grassland on Ingleborough NNR were purchased by the site managers (then English Nature), but managed by the grazier with subsequent offspring then owned by the grazier.

3.65 On common land there may be commoners who wish to exercise their grazing rights. Where this is the case, it offers an excellent way to achieve grazing, building community relations, and continuing a long-standing tradition. In some cases, it may be possible to encourage commoners to graze their livestock by offering a ‘lookering’ (stock checking) or shepherding service. However, there are sometimes difficulties if commoners are wary of conservation livestock also brought onto the land, and potential issues with disease transference (e.g. all commoners being affecting by livestock movement constraints if a positive bTB reactor is found among one commoner’s animals).

Lay-back land

3.66 Any grazing system on lowland heathland will operate more efficiently if it has some associated layback land and possibly farm buildings. A farm base is not essential, but can help greatly with housing sick animals, machinery and other equipment. Where it is intended to keep animals on the heath throughout the year, as might be the case with ponies for example, then a small area of fenced land can still be useful (e.g. to keep mothers and new-borns, to separate sick or injured animals from the herd, to train or acclimatise animals to the presence of dogs and for other purposes, such as publicity and community awareness events).

3.67 A larger area of lay-back land is essential if sheep are to be lambed close to the heath, and perhaps returned to the heath in batches, depending on the tupping programme and avoiding the costs and stress of taking them a longer distance back to the farm for lambing. Cattle will probably go back to the farm, but small numbers may be out-wintered on nearby fields where this is not too labour-intensive, and some grazing schemes out-winter cattle on site. Layback land should preferably be grassland of no special conservation value, have a reliable water supply and be free from public access. Permanent stock handling and loading/unloading facilities will be useful both on and off site, and direct access from lay-back onto the nearby grazed site would be an advantage, but is not essential.

Other infrastructure

3.68 A grazing scheme will require the provision of water (unless natural sources are available and reliable) and handling facilities. The latter generally include some means of penning animals (which can be permanent pens or mobile units constructed of hurdles), and for cattle, a permanent or mobile cattle crush. More information on suitable handling facilities can be found on the GAP website. Fixed pens or other structures will require consent under the Commons Act 2006, but water troughs are excluded from the need for consent. Surface piping or piping which is moled into the ground surface in a single operation probably does not need consent but the digging of trenches to install water pipes does. The need for facilities will, to some extent, depend on whether there is a farm base associated with the scheme, and its location in relation to the grazed area. Care is needed to ensure suitable ground checks are undertaken before installing any grazing infrastructure. Fence instalment and placing of cattle troughs can all impact on archaeological remains, the latter also potentially causing poaching of the soil surface.

Animal Welfare

3.69 Heathland grazing schemes should work within the guidelines given in A Guide to Animal Welfare in Nature Conservation Grazing (Tolhurst 2001). These are based around the "5 Freedoms", a concept developed by the Farm Animal Welfare Council which forms the basis for Welfare Codes produced by DEFRA and are also the principles behind the RSPCA-led "Freedom Foods Scheme". The 5 Freedoms are:

1. Freedom from hunger and thirst;
2. Freedom from discomfort;
3. Freedom from pain, injury or disease;
4. Freedom to express normal behaviour;
5. Freedom from fear and distress.

3.70 A livestock risk assessment should be carried out as part of the planning stage for a grazing scheme (see Tolhurst 2001), and an Animal Health Plan should be developed to help optimise welfare (useful guidance can be found on the GAP website. Animals need to be checked daily by the stock manager or staff or, as is the case on several heaths, using volunteer 'lookers'. If the majority of the checks are carried out by volunteers the stock manager should always check the livestock at least once a week. When livestock are moved onto a site, notice should be given to the public via websites and notices on gates to tell them that stock are present and who to contact in case of emergency. Welfare considerations related to grazing sites crossed by roads are discussed below under cattle grids.

3.71 On large sites where animals are free to wander considerable distances, they can be difficult to find by conventional means. In this situation GPS collars can be invaluable for locating herds. An example of where they have been used successfully is the Wild Ennerdale project, in which Galloway cattle used in a naturalistic grazing project were fitted with GPS collars, allowing staff to both locate the animals and monitoring their use of the extensive site. GPS collars are also used with animals grazing within invisible fencing, allowing any animals crossing the fence line to be rapidly relocated.

3.72 Layback land is needed to accommodate sick or injured animals. Some areas of mire may need stock fencing to prevent animals getting stuck. TB testing for cattle requires periodic rounding up, so pens and a mobile crush are also required. The provision of water needs consideration where this is not naturally available.

Management systems for grazing

Shepherding

3.73 Shepherding systems have been used historically on heathlands, and are currently used on lowland heaths in Holland and Germany (e.g. in the Veluwe National Park in Holland and the Lüneburger Heide in Germany). The continental sites grazed by shepherds tend to be large (over 4000 ha) and to consist of a mixture of heathland, grassland and arable. Each shepherd looks after a flock of approximately 400 ewes, with some 50 wethers (castrated males), 6-8 rams and around 350 lambs. The sheep are taken onto the heaths by a shepherd, who stays with them all day and controls them with trained dogs. These may be large Turkish or Caucasian shepherd dogs, used in their native lands to guard against wolves and bears and able to guard against other dogs chasing sheep. In the late afternoon, the sheep are taken off the heath and folded for the night into a barn. This system operates all year round, except during lambing in early spring. At this time, the sheep are kept on lay-back land off the heath from the first lamb through to about three weeks after the last lamb, when they return to the heaths. The shepherds and their flock are considered an attraction to both the local people and tourists, but tend to operate in areas where the numbers of other users are low, where dog walkers have to keep their dogs on leads by law, and where there are very large open spaces. Shepherded sheep may not be suitable where there are stray dogs as sheep can be worried or, if protected by guard dogs, there can be dog/dog interactions.

3.74 A scheme was introduced onto Ashdown Forest in Sussex to explore the feasibility of using close-shepherded grazing so that grazing could be carried out without the need to install fencing (Amos 2010). Between 2007 and 2010, the conservators employed a full time shepherd and a relief shepherd for a flock of up to 300 Hebridean sheep. The system of management was found to be flexible, to educate the public and to publicize

conservation management on the Ashdown Forest. Challenges included recruiting and retaining suitably experienced staff and sourcing overnight and winter grazing. It also proved challenging for the shepherd to spend sufficient time out with the flock, given the requirements for public liaison work, reporting etc. (C. Fitzgerald, pers. comm.). Although in receipt of HLS funding, the project was found to be loss-making and was not continued.

3.75 The feasibility of a shepherded grazing system on Cannock Chase was explored by Swanson, Silcock & Kiernel (2008). They suggested that a shepherding scheme would be practically feasibly and would contribute to the achievement of conservation objectives for the CP. They provide an action plan and detailed recommendations (e.g. a shepherd mounted on a pony, starting with around 30 hardy-breed ewes grazing at about 0.07LU/ha, with grazing carried out at quieter times of the week) and note the requirements (watering points, traffic calming/reduction, layback land - ideally a farm base but at least pens for containing stock at night). Exploration of the finances indicated that a shepherding system would be more expensive than a free-ranging system, but that both would require support funding. They also note the importance of recruiting a shepherd with particular qualities and interest beyond those expected of a farm shepherd.

3.76 Herding generally relates to sheep. However, cattle are herding on the Veluwe in Holland, and Swanson et al (2008) recommended that a few goats and cattle should be run with the sheep on Cannock Chase. A cattle herding project was trialled at Studland Heath in Dorset, but was not found to be successful.

3.77 Shepherded flocks allow targeted grazing, providing structural diversity at a range of levels while leaving ungrazed refuges. They can be a good advertisement for heathland conservation and have plenty of potential for local community liaison and involvement. The capital costs of setting up a shepherded scheme can be low compared with a regime involving fencing, but the running costs can be high, as a full time and relief shepherd are generally both required, together with equipment for transport and handling livestock. The challenges of finding suitable shepherds should not be underestimated. Unfenced roads can still be an issues, as the primitive breeds best for conservation grazing, such as Hebrideans, tend to scatter at the approach of danger (e.g. a stray dog), rather than bunch up as more domesticated breeds do. Sheep worrying is a problem regardless of breed, and where sheep dogs are used to protect the flock, there is the danger of injury to other dogs. Lay-back land adjoining the heath is necessary on which the animals can be rested at night (this also reduces nutrient levels on the heath, as they will dung here), and lambing fields will also be necessary. Generally shepherding works best on large sites where dogs are required to be on leads and where there are no busy roads, or the roads are fenced.

Temporary enclosures

3.78 Temporary enclosures which do not require consent from PINS are possible. These are, however, limited to 10ha or 10% by area of a common land unit by law and may only be in place for six months in any twelve. These restrictions mean that grazing would be limited, and might not achieve conservation aims. In addition, as stock are confined in small areas, they are more vulnerable to attacks by stray dogs, rustling or to wildfire. Enclosures are best placed some distance from roads in case of escapes, particularly when using sheep. If electric fencing is used, enclosures require regular attention to prevent shorting out by tall vegetation, or have to be placed on a pre-mown strip every

time they are installed. When fences are moved, the mown strip is left and becomes, temporarily at least, an incongruous landscape feature. Such strips may encourage additional public access but also create further structural variety in the vegetation and act as temporary firebreaks. They are, however, often felt to be inappropriate on public amenity land and use of temporary enclosures is also likely to be very labour intensive. In combination with other management, however, enclosures could provide targeted, more intensive grazing or for the exclusion of grazing from small sensitive areas, for example wet heath and mire or vulnerable archaeological features.

3.79 If temporary enclosures over 10ha or 10% of the common land unit (see above) were required, then under Section 38 of the Commons Act, consent would need to be sought for any structures on the common. This could result in objections, possibly to some enclosures and not others, and would still result in areas only being grazed every two or three years depending on the size of the enclosures. It would also require considerable resources to clear fence lines and to put up and take down and move fences and the provision of water in each enclosure. However, consent has been obtained from PINS for larger temporary enclosures, put up for the grazing season in summer and removed for the rest of the year. Such a scheme was submitted for Woodbury and Colaton Raleigh Commons in Devon consisting of five enclosures covering 70ha, which was approved by PINS. Consent was also received at Chobham Common for trial enclosures, to monitor the impact of grazing on various heathland communities.

Permanent perimeter fencing

3.80 Perimeter fencing facilitates extensive grazing and more natural behaviour by grazing animals. In recent years, perimeter fencing on commons and the subsequent introduction of grazing has, among many others, included Chailey Common, Stedham Common and Grafham Common in Sussex, Wisley Common in Surrey, Lydlinch Common in Dorset, Hartlebury Common in Worstershire and parts of the Pebblebed Commons in Devon. Such natural behaviour (e.g. the preferential use of particular habitat patches due to vegetation type, proximity to water and shelter, or the distribution of preferred habitat patches) is desirable on welfare grounds (animals are free to make choices e.g. about where to feed, lie up etc. and to express normal behaviour). It also means that the impact of grazing is heterogeneous across a site, thus maximising diversity. However, it does not facilitate more controlled grazing of particular areas for species or habitat conservation, unless used in combination with other means, such as temporary enclosures or invisible fencing (see below).

3.81 Permanent perimeter fencing is expensive and requires a major capital input at the start. To install a permanent fence, a vegetation strip would have to be cleared, cattle grids installed on open access points for vehicles, and a considerable number of gates installed. Once in place, little maintenance would be required and the fence should last for some 20 years, and the gates and grids rather longer.

3.82 In most places permanent fencing can be concealed by vegetation and be consistent with existing fenced fields in the landscape, but in some places such as along roadsides may be conspicuous. It can be possible to hide stretches of fencing in a ditch or by a bank, but construction of such features is be an additional cost.

3.83 If cattle fences are used then deer can get through between the wires, whereas sheep netting can be more problematic and fence design has to avoid the risk of deer getting caught up. If there are particular places where deer tend to cross roads, then rails can

be used instead of wire to facilitate this. However, netting can prevent dogs and children from running onto roads more effectively than wire strands. Special arrangements are required for horse riders at entrances. Permanent fences can engender more public opposition than other solutions and will require the approval of PINS.

Temporary electric perimeter fencing

3.84 Compared with permanent fencing, temporary electric fencing is relatively cheap initially, but annual replacement and repair costs tend to be much higher.

3.85 Temporary electric fencing around the currently unfenced boundaries of Cannock Chase would require batteries or solar panels and would need to be installed and regularly changed or checked. Grazing by sheep would need flexi-netting, which is unsightly but would have to be kept clear of vegetation and therefore remain in view in the open. It can cause problems for animals (both sheep and wild animals such as deer) which can get caught up in it and repeatedly shocked. This would need regular (for sheep, twice daily) checking. Health and safety notices at regular intervals along the fence would be required for the visiting public. Special arrangements for access would have to be made at each entrance and path, and the system could easily be damaged, turned off, vandalised, broken or stolen. By its very nature, electric fencing, though easily repairable, is temporary and would be likely to have only a short life. Extensive internal electric fencing could pose more problems for users of a site than perimeter fencing. Any fencing, whether permanent or temporary, would require the approval of the Planning Inspectorate other than temporary fenced enclosures less than 10% of the area of the Common (see above).

Invisible fencing

3.86 This type of fencing entails the installation of an underground cable carrying a radio signal. Cattle are fitted with collars holding a unit that emits first a warning buzz and then a deterrent shock (slightly weaker to that delivered by conventional electric fencing) when the underground cable is approached. This has been used on cattle, but would be very expensive to use on sheep, as each individual needs to be fitted with a collar and has not been reported as being successfully used on ponies as yet, although trials are underway.

3.87 Invisible fencing has the advantage of making no visible change to the common and no requirement for gates to be opened/closed on entering/leaving the common. Other wild or domestic animals, people with heart pacemakers, hearing aids etc. are unaffected by the underground cable which emits a radio frequency. Invisible fences can be taken under minor roads. Animals must however, be trained beforehand (usually in an enclosed field off the common) to recognise the warning sound or shock. This is usually done by using visible fencing in combination with the invisible fencing, and progressively lowering the visible fencing until it can be removed.

3.88 Invisible fences are not fool-proof and animals can still cross them, for example if being chased. Once on the other side, they cannot get back without a further shock unless the cable is interrupted (taken over a gate for example) or fence is turned off. The installation of an invisible fence does not require consent under the Commons Act. On the side of busy roads, permanent fencing is likely to be required but invisible fencing can be used alongside and across minor roads.

3.89 Training livestock to invisible fencing can be very time consuming if the same livestock are not used regularly. Cattle being chased may not be stopped by an invisible fence, so placement of the wire also needs careful consideration. Both the collars and the electric cable can fail, potentially leaving the cattle with access to busy roads which would be very dangerous. Cannock Chase is heavily used by visitors with dogs and there are also on occasions loose dogs on the site. There are also limitations on the length of cable that can be used to maintain the necessary voltage. Invisible fencing of up to about 2000 m for each loop can be used and the cable is relatively inexpensive. The collar units on each animal are the major expense and the collars themselves need to be replaced annually.

3.90 Invisible fencing is currently being used successfully in Epping Forest and Burnham Beeches to contain cattle within loops (behind permanent fencing along roads). It is also being trialled on heathland in Ashdown Forest, where the two existing systems, Bovi-guard and the newer Dog Guard, are being compared. Invisible fencing is still new to conservation grazing, and staff would need to be willing to experiment and improvise. A reference manual for invisible fencing, similar to that available for electric fencing, is currently being developed, and will be of considerable interest when available. Defra are also reviewing how invisible fencing might be funded within continuing Environmental Stewardship schemes. The outcome of this review will be pivotal in any decision to use invisible fencing at Cannock Chase if funding through Stewardship is available.

Combinations of different fencing types

3.91 There is little advantage in a perimeter fence that is partly permanent and partly temporary (electric), but there may be circumstances where this might be desirable, for example, where it is necessary to take down part of the fence for access to a regular local event. If such an arrangement merited further consideration, consent from the Planning Inspectorate would be needed. Temporary enclosures using electric fencing also offer the potential to graze small areas more intensively but are less likely to be popular on public access sites.

3.92 A combination of permanent and invisible fencing could be a solution to stock containment where there is a need for a permanent fence alongside a busy road, but other boundaries are away from roads and open to adjoining land. It could possibly also be used to exclude livestock from specific areas or features within the CP.

3.93 Shepherding or herding would remain an option within the security of an overall perimeter fence to move the livestock around the site, however the cost of such a combined approach would be significant.

Cattle grids

3.94 Where extensive grazing schemes are instituted, it is usually desirable to have as large an area of continuous grazing as possible. Roadside fencing can be obtrusive particularly where the roadside abuts open habitat such as grassland or heathland and cattle grids can obviate the need for long lengths of fence, especially alongside roads. Decisions on cattle grids are made by the County Council Highways Department, usually after carrying out traffic censuses and a health and safety inspection. If there are objections, the proposals have to be referred to the Minister for a decision so installation of cattle

grids on roads requires the navigation of what can be a lengthy consent procedure with no guarantee of success.

3.95 Proposals for the installation of grids are open to challenge and the installation of grids can be accompanied by proposals for speed restrictions and traffic calming measures. Grids are extremely expensive to install, by-pass arrangements need to be made at each grid location for horse riders, and there are associated maintenance costs over the long term. Horse riders do not like cattle grids due to concerns about risks to inexperienced or frightened horses.

3.96 It is worth noting in this context that at grazed lowland heathland sites crossed by roads such as Ashdown Forest and the New Forest where there is no roadside fencing, a number of stock animals are killed on the roads each year. Steps need to be taken to reduce the possibility of accidents, for example by pressing for speed limits and clearing vegetation back 20-30m from the road edge, by considering stocking with light-coloured animals (e.g. British White or White Park cattle), by careful siting of watering or winter feeding sites, by the use of reflective collars or leg bands and by signage. There is a useful information leaflet on reducing stock casualties on sites with vehicular access available from the GAP website. This publication also contains useful information about the process required in installing cattle grids.

Marketing

3.97 Increasing the return from livestock can increased the feasibility of undertaking conservation grazing, particularly on nutrient-poor sites such as heathland, where slower-growing breeds are generally preferred due to their ability to do well on poor grazing, and where growth rates are likely to be slower in any case. Adding value to products through appropriate marketing, including branding, is a good approach. Branding allows customers to make the choice to pay a little more for a produce that, for example, supports wildlife or the environment. Quality marks (e.g. Freedom Foods, LEAF) and certification (e.g. organic, Pasture for Life) may also increase returns. The GAP marketing guide provides useful information, although now rather dated. There are now a number of conservation grazing and sustainable food initiatives, such as that promoted by Kent Wildlife Trust, Dartmoor Conservation Meat or Knepp Wildlife Beef.

Visitors and stock management

- Visitors' concerns are very real and should be treated seriously. Many concerns can be allayed by meaningful consultation, education and good design, and reference to existing successful schemes.
- Visitors may be concerned about the presence of livestock (e.g. because of restrictions on access with dogs off leads or because they are frightened of livestock), or by fencing required to contain stock.
- Visitors concerns about fencing usually revolve around landscape issues, restriction of access and 'enclosure' of common land.
- Visitors and their pets may inadvertently cause harm to livestock e.g. through worrying, chasing or disturbing livestock.

3.98 Experience elsewhere (both sites with a continuous history of grazing, such as the New Forest, and sites where grazing has been more recently reintroduced) suggests that many visitors are unconcerned at the presence of stock and some visitors see grazing animals as an additional feature of interest and historical relevance on lowland heaths. There are a number of measures that can be taken both before grazing starts and once it is underway to allay concerns, for example good consultation and liaison work with local communities, avoiding "difficult" stock (sheep, cattle with calves, bulls, stallions). Further information can be found in the GAP information leaflet *Grazing on Sites with Public Access*. Public access can be an asset on grazed sites, as regular visitors may become involved with a grazing scheme as regular lookers or in keeping an informal eye on stock and talking to other visitors.

3.99 Those who are often most concerned are dog walkers and horse riders. Dog walkers have a particular concern about sheep, either because they are worried that their own dog will chase them or because they are concerned about uncontrolled dogs owned by others and the risk these may pose. These concerns are not ill-founded – sheep-worrying by dogs can cause injury and death to sheep and statistics collected by the National Sheep Association suggest that the average number of sheep killed or injured per dog attack is just over seven animals. Several hundred such attacks were recorded in the last year (2012) in which statistics were collected[3] but many attacks go unrecorded. Dog-walkers may also be concerned about walking near cattle with dogs, as cattle may chase their dogs. Horse riders are also often concerned about grazing stock, most often ponies, and particularly stallions (although this latter concern can be avoided by undertaking not to put stallions onto a site).

3.100 Another concern is about zoonoses (diseases that can pass between animals and humans, such as E. coli and also Lyme disease, which is carried by ticks); public awareness has a key role to play in averting problems.

[3] Investigation by the Farmer's Guardian of police records. Not all police forces responded.

3.101 Concerns about fencing and grazing tend to fall into three categories:

- Landscape - the worry that the sense of openness and informality will be reduced and that fencing will be a blot on the landscape;
- Access - concerns that the presence of stock will in effect deny access to the areas where the stock are grazing; concerns about restrictions to access due to fencing, concerns about fencing affecting long-term access rights
- 'Enclosure' - the perception that fencing is akin to enclosure, which has historical connotations on common land.

3.102 Shepherding seems to be of least concern to the general public as a method of stock management, although, as it involves sheep, dog owners may have some concerns. Mention has already been made of the concerns horse riders can have about cattle grids, but they are also unpopular with cyclists and runners.

3.103 Whether or not these concerns are always justified, they are often genuinely held by people who have a real concern for the future of the area and they should be treated with respect and consideration. Some concerns can be allayed, for example right to roam and access rights are not affected by fencing on a common. Boundary fences are often already present around commons, so roadside fencing is often the biggest issue, and here it can quite quickly be hidden by vegetation. With care, structures such a fences can be designed to be inconspicuous and on some fenced commons, the only point at which the fence is intrusive is at the point of entry. Some visitors welcome a perimeter fence as it prevents children and their dogs from running onto roads and can also stop runaway horses. Some of these concerns can also be addressed by using invisible fencing where this is practical.

Veteran tree management

- Veteran trees thrive best in settled and stable conditions. Rapid change can be harmful so any management of the tree itself or its surroundings should be done in stages.
- Expert help should be sought for any cutting work on the trees themselves.
- Populations of veteran trees should ideally consist of a large number of trees in close proximity with a good range of ages including future veterans.
- Large spaces between populations of veteran trees should be given priority for establishing future veterans and reducing fragmentation.
- There needs to be continuity of veterans and both standing and fallen dead wood and decay features in living trees.
- Open grown trees provide more and better biodiversity features than closely grown trees
- Manage populations of veteran trees for the long term.

3.104 Managing veteran trees is a specialist skill. A full assessment is usually a first step with each tree assessed photographed and numbered. Deciding on tree surgery, pollarding etc. to veteran trees requires expert advice. Other work such as halo thinning, clearance of secondary woodland or thinning surrounding trees should be done in stages so that changes to the environment of the veterans are slow and allow time to adapt. Management will depend on objectives, for example management for lichens might be different from management for invertebrates associated with veteran trees. Any

machinery used in the vicinity of ancient trees should be carefully planned and executed to avoid damage to the trees or their root systems either directly or through soil compaction. Application of fertilisers, lime or chemicals should be avoided in the vicinity of veteran trees. Replacement veteran trees can be planted (using provenance from the veterans themselves) or naturally regenerating seedlings can be protected from grazing animals. Densities of 5-10 trees /ha are appropriate. Good guidance on the management of veteran trees is available (e. g. Read 2000; Lonsdale 2013)

Connecting sites

3.105 The reconnection of areas of habitat is needed to increase the viability of habitats and enhance conditions for wildlife (e.g. Lawton 2010). If a site is fragmented, it will be beneficial to reconnect isolated blocks of habitat. This can be achieved through habitat restoration in corridors linking key areas. This process has already begun at Cannock Chase, where some key areas of former plantation within the Forestry Commission estate have been identified for heathland restoration to link historically fragmented blocks of heath within the CP (SWT & SBAP 2014). Through a partnership b including the Forestry Commission, initial restoration work was carried out on around 10ha of former plantation, including grazing in one area (Noake 2014). Where extensive, large-scale grazing is preferred, such corridors can connect grazing units, allowing livestock to move between them. Partnership working is generally required to achieve this, as projects need to include landowners of different habitat parcels and the adjacent areas with potential for restoration.

Monitoring

3.106 Monitoring is essential to assess the effects of conservation management and to allow techniques to be refined or if necessary, changed according to the outcome. Monitoring is particularly important during and after the introduction of new management measures, such as grazing. Some new management practices might be undertaken on an experimental basis and monitored before more widespread introduction. Unfortunately, monitoring is often seen as an additional extra, and may often be omitted if resources are tight. However, gradual changes are often missed by those with regular and frequent involvement in sites and in any case changes (for example in difficult taxonomic groups) may not be immediately obvious. Ongoing monitoring should therefore be an integral part of management. It may be relatively low key, for example a programme of fixed-point photography undertaken every few years, or may involve detailed data collection by experts, for example repeated surveys of vegetation or animals. In either case, the methodology is best designed by those undertaking the subsequent data analysis (to ensure the data are fit for purpose), and should be recorded to ensure subsequent surveys are compatible. The data should be carefully stored and the storage format kept up to date.

Considerations for management

3.107 There are a number of considerations for management of different types at Cannock Chase. These are listed and summarised in Table 1.

Table 1: Considerations for management at Cannock Chase

Considerations	Issue
Structural and background factors	
Historic environment	Management may be of benefit where structures are revealed through removal of trees, scrub or bracken, but may also harm features through vehicle damage, erosion or from excessive trampling by livestock, if present. The full extent of archaeological features (particularly prehistoric) is not currently known for Cannock Chase, and any features not yet discovered may be vulnerable. Features dating from the First World War are widespread in some areas; much of the camp architecture is known, although a recent LIDAR survey (assessment ongoing) points to the survival of further areas of the camps previously thought lost. A key area is the training landscape between the camps - the locations of trench systems were not typically recorded and more systems are being recorded from the current LIDAR survey. This should produce a more complete understanding of the survival of earthworks associated with the camps, but less so of the ground archaeology.
Landscape	Management may complement landscape objectives (e.g. in maintaining open vistas), but also needs to take landscape requirements into account (e.g. concealing fencing if grazing scheme implemented, maintaining copses of landscape interest, ensuring intimacy of valley and woodland landscapes is maintained etc.). Guidance on overall objectives in relation to landscape issues is available from the current Cannock Chase AONB Management Plan
Climate change	It is important that natural processes are restored as far as possible in order to allow habitat to adapt to climate change. Warmer, dryer summers and warmer, wetter winters are predicted and may drive a trend towards less dominance by ericaceous shrubs and greater dominance by grasses. It is likely that greater management input will be needed to offset this.
Atmospheric nutrient inputs	Nitrogen deposition currently exceeds the critical load for the heathland habitats, and will make the restoration and ongoing management of dry and wet heath communities more difficult, particularly the control of competitive species such as purple moor-grass and wavy hair-grass and prevention of bracken, bramble and scrub encroachment.
Visitor-related factors	
Impacts of management on recreation	Habitat management may impact on recreational use of the site. Techniques such as burning, cutting, turf-

Considerations	Issue
use	stripping etc. require people to be temporarily excluded from work areas for health and safety reasons. Management, particularly if mechanical, may also impinge on visitors' enjoyment of the site when being carried out, and the immediate results may be unattractive. Grazing could deter some visitors and potentially alters visitors' choice of routes. Positive management of visitor routes, sign posting and information measures can help to mitigate such effects and can enhance the visitor experience.
Recreational pressure and impacts of visitor use	Recreational pressures can impact on the CP and its wildlife through the effects of heavy footfall and resulting soil erosion; littering; raised nutrient levels from animal waste, disturbance to wildlife (e.g. deer or breeding birds), disturbance to livestock (e.g. dog worrying). These could affect spatial management for wildlife species (e.g. nightjar breeding sites), livestock management, vegetation management and management of paths and firebreaks.
Anti-social behaviour (vandalism of gates etc.)	Vandalism is currently an issue on the CP, for example, barriers across tracks are destroyed to allow vehicles to access the CP. Continuing vandalism could increase unauthorised access and damage (e.g. from vehicles) on the CP. If extended to gates or other infrastructure, these activities could endanger livestock and road users.
Wild fires	Wildfire, whether accidental e.g. from barbeques, or deliberate, damages the flora and fauna and could endanger any livestock present. If wildfires occur, spatial planning of management will change.
Commoners' rights	There are a number of existing common rights holders. Although are not currently practiced, management techniques such as grazing, if implemented could need adapting should commoners wish to exercise their grazing rights.
Concerns of adjacent landowners	Adjacent landowners may be concerned about management practices on Cannock Chase that could impact on their own land management/business. Cattle farmers in particular may be concerned about the possibility of bovine TB spreading from a herd on Cannock Chase into their own where there are contiguous boundaries or badger populations. SCC would need to practice excellent biosecurity, ideally above and beyond the testing regime currently required, and source livestock carefully.
Health and safety issues	
Surface fissuring from former mining	There are potential risks from surface fissuring to the safety of both people and livestock. Only limited hazard warning is in place as it is not possible to identify future risk areas. Known high risk areas may need to be excluded from livestock grazing to reduce the risk of animal injuries or fatalities.

Considerations	Issue
Other hazards	There are additional features such as drainage inspection hatches dating from WW 1 which no longer have covers and present a risk to both people and livestock. Unexploded munitions remain a risk as does the presence of (white) asbestos sheets from when the military encampments were dismantled.
Management hazards	Management with machinery, controlled burning, grazing livestock and the use of herbicides can all pose a hazard to the operators, the public, livestock and wildlife. These issues can largely be mitigated by training, the use or risk assessments, following manufacturers recommendations and health and safety guidelines and other measures to avoid danger to people and livestock
Zoonoses	Zoonoses (diseases carried by animals that can also infect humans) are potentially an issue as livestock have been absent from Cannock Chase for a significant period, and visitors are not necessarily accustomed to visiting sites with livestock. Visitors may not be aware of sensible precautions, or may be concerned about the risks. Best practice from other sites can be promoted and adopted.
Management issues	
Protected species	A number of protected species are present on site. Inappropriate management, or management in the wrong place or at the wrong time, could negatively impact protected species. Ongoing monitoring will be needed as species distributions are not necessarily constant.
Introduction of grazing	There will be some visitors, including dog walkers and horse riders, who will be wary of encountering grazing livestock. These real fears need to be recognised and mitigated for in any grazing scheme. Timing of grazing, prior notification, livestock location and containment and type of livestock will all be important considerations in any grazing scheme to be brought forward. Risks to livestock from public access also need consideration, including the activities of dogs. Organising training and familiarisation events involving both livestock and dog walkers can be a valuable first step, but continued monitoring and appropriate follow-up actions will also be needed. Siting of facilities for the public and the presence of livestock will require careful thought.
Introduction of fencing and gates	Sufficient access for people will be required in any fencing scheme covering both official and appropriate unofficial access points. Fence design will need to recognise and avoid problems for deer and other wildlife crossing the area. Gated access can cause problems for horse riders and disabled visitors and care needs to be taken to provide the right access facilities.

Considerations	Issue
Introduction of cattle grids and levels of road traffic	The A 518 Lichfield road is busy with some 800 vehicles/hour at peak times in June and August, most of which are motorcycles, car and light vans. There is also some heavy traffic including HGVs and buses, but these are less than 40/hour at peak. Peak traffic on the other roads is less at just over 1000/hour in June on the A460 Cannock Chase Road, nearly 300/hour June/August eastbound on the Penkridge Bank Road, Rugeley, about 300/hour June/August on the C320 Camp Road, Brocton, and about 150/hour June/August on the unclassified Brindley Heath Road Cannock. On Chase Road, Brocton, June/August, the peak count was just over 40/hour. On the busier roads there were clear peaks between 00.6-00.9 and 17.00-18.00 reflecting commuter traffic. On the minor road peaks were less clear but also showed peaks between about 00.9-0.10 and at 0.14 presumably reflecting the pattern of visitors, including local dog walkers. If cattle grids were proposed there would need to be early discussions with the Highways Authority and Police on which roads they would be considered acceptable

4. Vision and conservation objectives for the management of the habitats and species of Cannock Chase Country Park & SAC

Vision

The characteristic wide open spaces of Cannock Chase Country Park and SAC are appreciated and cherished by visitors who carry out a range of appropriate outdoor activities. Visitors to Cannock Chase have a sense of involvement in and ownership of the area and consequently act in ways that conserve its unique character. The Country Park is sustainably managed through a range of appropriate techniques, maintaining its cultural heritage, aided by suitable innovative approaches. The heathland is in excellent condition, it has a diverse structure supporting robust populations of key species such as nightjar, woodlark, common lizard and green tiger beetle. Interspersed with the heathland, areas of acid grassland, bracken and gorse support additional wildlife. In the valley mires of the Oldacre and Sherbrook Valleys, small pools of water are visible between tussocks of vegetation; populations of characteristic species such as small pearl-bordered fritillary butterfly and bog bush cricket are flourishing. Opportunities to extend and link heathland blocks are taken up and effectively connect these areas. Within Brocton Coppice, careful management is supporting the existing veteran trees and their specialist flora and fauna and ensuring continuity through a regeneration programme. Archaeological and historic features are conserved and where possible, enhanced and many are visible in the landscape.

Objectives

4.1 Habitat management objectives to enable Staffordshire County Council to realise the vision for Cannock Chase are listed below. In general these objectives fall within one or more of the high level objectives (HLOs) of the Cannock Chase AONB Management Plan (Cannock Chase AONB Partnership 2014). HLOs particularly relevant to habitat management objectives for Cannock Chase CP are :

HLO1: *Develop Cannock Chase AONB as a special, peaceful and tranquil place for everyone who lives in, works within or visits the area*

HLO2: *Conserve and enhance the distinctive and nationally important landscape of Cannock Chase AONB and the locally, nationally and internationally important biodiversity and geodiversity it supports, ensuring links between habitats within the AONB and surrounding landscape*

HLO3: *Develop a place valued and understood by everyone who comes into contact with Cannock Chase AONB, so that they can contribute positively to the shaping of its future.*

HLO4: *Ensure a safe, clean and tranquil environment that can contribute to a high and sustainable quality of life.*

HLO5: *Support a balance between a working landscape where prosperity and opportunity increase, biodiversity flourishes and pressure upon natural resources is diminished.*

HLO6: *Create a place of enjoyment for everyone, providing opportunities for quiet recreation and maintaining ecosystems that contribute positively to physical and mental well-being.*

4.2 Lastly, although the management objectives to do not specifically fall within the HLO7, this is still very relevant:

HLO7: *Maintain and develop a successful partnership, working together to manage Cannock Chase AONB effectively*.

Objective 1: Enhancing visitors' understanding of and engagement with the land and habitat management of the Country Park and SSSIO/SAC areas within.

Rationale

4.3 Visitors to Cannock Chase Country Park SAC need information as to where they can go, what activities they can carry out, what to see and how they can help conserve the area, its landscape, wildlife and archaeology by following good practice. However some visitors may not understand either the need for management of the human-made landscapes of the open heaths and mires and the perpetuation of the woodlands, nor of the available methodologies available to the site managers. This includes an understanding of how any scheme for grazing on the Chase may have a role to play in its future management. A concerted effort will be needed to raise awareness of the management issues and the ways in which these can be addressed.

Objective 2: Managing public access

Rationale

4.4 There is considerable public access across the CP, both as of right on foot at any time and along definitive routes and bridleways that can be used by horse riders and cyclists. Heavy use of this access can give rise to soil erosion and deposition, and lead to trampling of sensitive plant communities and breeding invertebrate and bird habitat, disturbance to wildlife and conflicts between users. The introduction of grazing is likely to present further challenges and would need careful thought in relation to access points and routes and to consider alternative options for those wishing to avoid contact with livestock.

Objective 3: Achieving and maintaining favourable condition of the heathland, valley mire, and wood pasture habitats

Rationale

4.5 Natural England have issued definitions of favourable condition for the habitats within the SSSI including dry and wet heath, valley mire and broadleaved woodland. These require that defined targets are maintained for the characteristic features of each habitat (these are set out in detail in Appendix II). These objectives will be similar to the European Site Conservation Objectives for maintaining the site integrity of the SAC and are enforceable under national and European law.

Objective 4: Increasing connectivity between heathland areas

Rationale

4.6 Favourable condition for Cannock Chase SSSI requires that there is no unconsented decline in the area of heathland or notable woodland habitats. Working in partnership with other bodies, there is a move towards identifying opportunities to extend and link existing heathland blocks, for example, such as through the heathland corridors created on former forestry land by the Connecting Cannock Chase partnership project.

Objective 5: Sustainable management of heathland

Rationale

4.7 The management of heathland by cutting, scraping or other use of machinery alone is unsustainable in the long term, as it requires the use of fossil fuels and can be associated with damaging soil compaction and erosion. Traditional management of heathland involved burning and grazing, with other small scale management by hand, such as tree clearance and turf cutting. In the long term, a return to more sustainable management techniques is desirable.

Objective 6: Maintain and perpetuate the stock of veteran trees

Rationale

4.8 The c. 600 veteran trees in Brocton Coppice are a feature of the SSSI and are of at least regional importance in their own right as well as being a valuable resource for a number of rare and scarce invertebrates. Inevitably the stock of trees will decline over time through age and accident. Natural England has determined that there should not be any decline of more than 5% in the stock of trees over any 7 year period and any decline over any 20 year period in order to meet favourable condition targets. Tree planting is permitted provided locally native stock (preferably from seed collected in Brocton coppice) is used and the objective will be to establish a new cohort of trees in the next 50 years.

Objective 7: Protect and enhance the cultural landscape of Cannock Chase

Rationale

4.9 The landscape and character of Cannock Chase Country Park has been heavily influenced over the centuries by human activities. Grazing, cutting, burning and other activities have kept the heathlands open over the centuries; the area has also been affected by mining, quarrying and military use, particularly during both World Wars. Other works have been carried out to provide infrastructure for recreation or to benefit wildlife and have left their mark on the CP, e.g. the creation of ponds in the stream valleys. Key features should be protected in order to allow people to understand the evolution of the current landscape and for future research. This accords with the policies within the Cannock Chase AONB Management Plan (Cannock Chase AONB Partnership 2014) to ensure protection and where feasible, enhancement of all landscape and heritage features and to conserve the distinctive landscape character.

Objective 8: Protect soils and geology

Rationale

4.10 The character of the landscape is the result not only of human land use but also of the underlying geology and soils. Heathland soils are particularly important in this respect as they have usually retained soil profiles that have remained undisturbed for centuries. No effects of management are anticipated on the geology of the area, but any geological exposures will be conserved.

Objective 9: Protect and enhance archaeological and historic environment features

Rationale

4.11 Known archaeological features will be protected and where possible enhanced, as well as historic features such as the Katyn Memorial. Though not under the management of the County Council, the nearby Commonwealth Cemetery and the German War Grave Cemetery (a Grade II Registered Park & Garden site), should not be impacted negatively from any management undertaken on the CP. In any projects which might disturb the soil surface, the guidelines set out by Natural England will be followed (Alonso, 2009) and archaeological advice sought. Guidance from the appropriate authorities will be sought before any maintenance or restoration is carried out on historic environment features.

Objective 10: Minimise disturbance impacts on sensitive species and habitats

Rationale

4.12 A number of animal species (including breeding birds, deer and some invertebrates) are vulnerable to disturbance from visitors, their pets and land management work. Several habitats are at risk from heavy footfall, vandalism and/or fire, including the dry heaths, valley mires and veteran trees. Steps to monitor these threats and to put in place measures to minimise the risks and mitigate the effects are an essential part of the management of the CP.

Objective 11: Control of alien invasives

Rationale

4.13 The eventual aim will be to remove all alien invasive species. In some cases this will be straightforward; in others, the cooperation of the public or adjoining landowners will be needed. For a few species, no effective methodologies currently exist to eliminate them and a strategy of containment is currently the only way forward pending the development of effective control measures.

Objective 12: Resolve hydrological issues in the stream valleys

Rationale

4.14 Hydrological issues are of most concern in the Sherbrook and Oldacre Valleys. Here, the mire habitats have been notified as being in unfavourable-no change condition by NE due to the drying up of wetland habitat. While the causes are still obscure, the effects have been well researched. It seems uncertain whether further research will shed more light on the reasons behind the drying out of the wetland habitats in the Sherbrook Valley and there are no feasible

restoration works that could be undertaken to restore what has been lost. The situation in the Oldacre Valley is yet to be fully investigated but restoration works are thought to be feasible here.

Summary of critical success factors

4.15 The critical success factors for management of the Country Park, SSSI and SAC are:

1. Open, cultural and wooded landscapes maintained and protected, retaining the intrinsic qualities and character of the area.
2. Main heathland block joined by viable heathland corridors
3. Heathland a complex mosaic of different ages and structure of ericaceous shrubs, acid grassland, bare ground and scattered trees and shrubs which meet favourable condition targets
4. Wet heath and mire in sustainable favourable hydrological and biological condition
5. Key heathland species populations self-sustaining and stable or increasing
6. Management of the dry and wet heath and mire effective and sustainable in the long term
7. Existing veteran trees under appropriate management to maximise their longevity and support their associated flora and fauna
8. Rate of veteran tree replacement matches losses from existing population in the long term
9. Archaeological and cultural features of the CP maintained, protected and where appropriate, enhanced.
10. People are able to enjoy peace and tranquillity of the site, as well as engage in active and healthy recreational activities.
11. Habitat management techniques and practices widely understood and supported by stakeholders
12. People feel a sense of ownership and involvement in the safeguarding and management of the CP

5. Options Appraisal

5.1 The following options appraisal focuses on habitat management on Cannock Chase Country Park. It does not include visitor management per se, except where this relates to or is affected by habitat management, nor actions for engaging with visitors or communities. The main mechanisms for managing the habitats of Cannock Chase CP have been described in section 3 above. Most of the activities listed already take place on the CP. Rangers, contractors and volunteers all carry out management work, some of which is repeat work on rotation in areas previously managed in the past. Many of the activities undertaken involve choosing priorities and making choices about the levels of activity necessary to achieve the objectives.

5.2 The heathland and associated habitats on Cannock Chase CP are designated as of European and national importance; it is Government policy that they must be managed to restore and maintain favourable condition. Without appropriate management, the heathland habitats and wildlife interest would deteriorate, visitor access would become more difficult, archaeology and historic features and landscape would be damaged or changed triggering greater involvement by bodies such as Natural England and Historic England to safeguard the future of the CP. For the County Council, as owner and manager of the site, all these considerations lead to the need for continued management of the CP.

5.3 That said, the limits of the targets are sufficient to enable some flexibility on how these targets are achieved and the extent to which one management technique may be used rather than another, or which activities can be prioritised. For each technique there are a whole range of considerations involving practicalities, the extent of the use of human and financial resources available, the views of other stakeholders, the biological consequences and the effects on archaeology, historic features and the landscape. Not least among these are the views of those who visit and value the CP for its amenities, wildlife, views and other benefits.

5.4 In practice, most site managers use a variety of techniques to suit the nature and expected response of the vegetation. For example, after tree felling, it is often necessary to carry out follow up management to control bracken or scrub regeneration, or after mowing, grazing may help to control grasses and return the site to heather dominance.

5.5 The needs of visitors must also be considered in all management regimes to ensure visitors can safely access the site, in order to support enjoyment and understanding about the site, and to address any concerns visitors may have.

5.6 Several management techniques have the potential to damage historic environment features. Before using particular techniques, it will be essential to consult the County Council Principal Archaeologist and to refer to the Historic Environment Record (HER) held at the County Council, as is current practice.

5.7 In the tabulated appraisal below, the management options and a range of pros and cons for each have been set out. These are not comprehensive and it is expected that consultees will add to these from their own experience and views. In several cases, the options for management are not mutually exclusive and different managements may be

put in place at the same time or separated by their applicability to different parts of the CP or at different times.

Table 2a. Options appraisal for the management of Cannock Chase Country Park, SSSI and SAC: Trees and scrub.

Activity	Impacts	Pros	Cons
Trees and scrub including bramble, bracken and gorse on heaths			
Summary favourable condition targets for trees, scrub, gorse and bracken are: Overall gorse <50%, European gorse <25%, bracken 1-10% trees and scrub 10-15%			
Critical success factors: • *Heathland a complex mosaic of different ages and structure of ericaceous shrubs, acid grassland, bare ground and scattered trees and shrubs which meet favourable condition targets* • *Open and wooded cultural landscapes maintained and protected Open, cultural and wooded landscapes maintained and protected, retaining the intrinsic qualities and character of the area.* • *Archaeological and cultural features of the CP maintained, protected and where appropriate, enhanced.*			
1. No management	Gradual loss of open habitats together with their associated species through colonisation and spread of scrub and trees	• Financial support not required. • In short/medium term inaccessible areas subject to less disturbance, trampling, etc. • In short term, bramble is good for wildlife providing nectar for invertebrates and nesting and feeding sites for birds and small mammals.	• County Council fails to meet legal requirements for management of SSSI/SAC • Vulnerable habitats and species associated with heathland, mire and bare ground restricted or lost • SSSI/SAC condition becomes unfavourable • Characteristic open habitats lost from AONB • Areas invaded by bramble, bracken and gorse become inaccessible to visitors
2. Current management programme of tree/scrub clearance, bracken spraying, bramble control and gorse management continued	Open habitats retained and encroachment delayed.	• County Council meets legal requirements for management of SSSI/SAC • SSSI/SAC continues in recovering favourable condition with regard to tree/scrub and bracken presence • Management supported by existing funding mechanism • Open habitats and their characteristic species maintained in the medium term over the open heath • Existing levels of management generally accepted by public • Bracken control can reduce number of ticks harboured.	• Current management insufficient to meet NE Site Improvement Plan recommendations • Current management uses high levels of human and financial input • Current programmes may not be sufficient to prevent all expansion of trees, scrub and bramble, leading to potential loss of open heathland/grassland/bare ground and other SAC/SSSI habitats and species • Spread of scrub/bracken/bramble may compromise existing levels of public access over time. • Loss of characteristic open habitats with the AONB. • Current management programmes must be continued and repeated over time

Activity	Impacts	Pros	Cons
			• Opportunities for heathland restoration not fully exploited • Reliance on machinery and chemicals has environmental impacts and is unsustainable in the long term • Bracken spraying requires the use of specific chemicals which might be discontinued by manufacturers • Cutting and rolling bracken can damage other vegetation and destroy nests of breeding birds and is ineffective where bracken and heather are co-dominant. It may also impact negatively on surface archaeology. • Potential damage to archaeological and historic features from tree and scrub roots • An increase in scrub and bracken litter would increase fire risk.
3. **Alternative management of trees and scrub - intensive and extended programmes of tree/scrub clearance, bracken spraying, cutting and bruising.**	Woodland and scrub cover reduced, encroachment reduced, more open habitat retained.	• SSSI/SAC moves into favourable condition • County Council meets legal requirements for management of SSSI/SAC • Management uses medium levels of human and financial input • Could exploit opportunities for more heathland restoration including additional heathland corridors • Could enhance historic environment features • Increased gorse management could benefit invertebrates and Dartford warblers • Increased gorse management could lower fire risk • Bracken cutting and bruising may be more environmentally acceptable than use of chemicals • Bracken mowing or bruising can open up swards for grazing (if used)	• Could be some unfavourable landscape changes • Increased management would use high levels of human and financial input • Reliance on machinery and chemicals can have environmental impacts and may be unsustainable in long term • More intensive management may have diminishing returns • Bracken spraying requires the use of specific chemicals which may be discontinued by manufacturers • Bracken bruising can damage heather communities • Bracken cutting and bruising limited by bird breeding season and ineffective in co-dominant Heather and Bracken stands. May also impact negatively on surface archaeology.

Activity	Impacts	Pros	Cons
		• Further reduction in bracken could reduce tick numbers and likelihood of tick infestation of domestic stock and pets • Could improve access for visitors.	
4. **Introduction of livestock**	Introduction of livestock slows expansion of trees, scrub and bracken	• Management meets NE Site Improvement Plan recommendations • Perpetuates a cultural activity (grazing has been traditional way of managing heathland and wood pasture) • Grazing is an environmentally sustainable management practice • Grazing reduces need for frequency and intensity of other management • Visitors like to see livestock in a natural environment and take an interest in their behaviour and welfare.	• Significant commitment in terms of infrastructure, possibly also back up land • Stock will need daily checking and a qualified stock person on call. • Finding and checking animals can be labour intensive (although this can be helped by tracking technology) • Grazing livestock would require containment through some form of fencing • Livestock could potentially accelerate spread of Phytophthora (although number of animals would be relatively low, therefore impact may not be great) • Extensive public consultation and liaison work required • Some visitors would be concerned by the presence of livestock • Measures to address risk of zoonoses required • Livestock could interact negatively with dogs • Introduction of grazing could influence deer distribution and behaviour though numbers will be generally low • Heavy trampling may damage historic environment features • In wet weather livestock trampling may damage visitor access routes where livestock gather • Grazing could prevent tree regeneration in woodland and wood pasture.

Table 2b. Options appraisal for the management of Cannock Chase Country Park, SSSI and SAC: Heathland, mire, grassland and bare ground.

Activity	Impacts	Pros	Cons
B. Dry and wet heathland, mire, grassland and bare ground			
Summary favourable condition targets for heathland, grassland and bare ground are: Bare ground 1-10%, dwarf shrub cover 25-90%, pioneer heather 10-40%, building-mature heather 20-80%, degenerate heather <30%, dead heather <10% Bryophytes and lichens 5+% cover			
Critical success factors: • *Heathland a complex mosaic of different ages and structure of ericaceous shrubs, acid grassland, bare ground and scattered trees and shrubs which meet favourable condition targets* • *Open and wooded cultural landscapes maintained and protected* • *Main heathland blocks joined by viable heathland corridors* • *Key heathland species populations self-sustaining and stable or increasing* • *Management of the dry and wet heathland and mire effective and sustainable in the long term* • *Remedial measures for addressing hydrological issues in stream valleys investigated and viable schemes implemented* • *Wet Heath and mire in sustainable favourable hydrological and biological condition* • *Archaeological and historic features of the CP maintained, protected and where appropriate, enhanced* • *The surviving cultural features of the CP maintained and protected*			
1. No management		• Financial support not required • Heather may layer and regenerate naturally in suitable conditions (low nutrients, humid, undisturbed); however this is more typical of the uplands and has not been observed at Cannock Chase.	• County Council fails to meet legal requirements for management of SSSI/SAC • Heathers stands likely to become degenerate and heather cover will reduce • Homogenous heather stands will provide fewer opportunities for characteristic heathland species • Failure to reduce nutrient loads by cutting/burning etc. leads to shorter heather life, greater damage by drought/frost, greater susceptibility to heather beetle attack and conversion of heath to grass dominance • Larger, older stands of heath more vulnerable to wildfire • Loss of younger pioneer and building/mature heather stands and their associated flora and fauna • Overgrowing of bare ground other than trampled paths leads to reduction/loss of specialist invertebrates and birds

Activity	Impacts	Pros	Cons
			• Degeneration of limited areas of wet heath and mire continues • Favourable condition targets unlikely to be met.
2. Heath management by mowing and baling	Creates uneven age and structural mosaic in dwarf shrub community which benefits biodiversity and reduces nutrient loading	• Removes nutrients from system, helping to maintain vegetation communities and associated wildlife • Mowing helps create uneven aged and structurally diverse heathland habitats • Easy to carry out using standard machinery • Can be carried out at any time during autumn/winter • Could improve condition of grassland in the absence of, or as a precursor to, grazing. • No risk to visitors when undertaken carefully • Heather regeneration can be good for livestock (if relevant) • Cut areas can act as temporary fire breaks • Can cut mixed bracken/heather areas (unlike some other bracken management techniques) • Mowing widely accepted as a normal habitat management technique by public. • Mowing an alternative to burning in some places and in some years	• Reliance on machinery can have environmental impacts and be unsustainable in long term • Machinery cannot be used on broken, rough or wet ground or among tree stumps. • Use of heavy machinery can cause soil compaction and increase waterlogging • Machinery could damage surface archaeology • Cut material needs removal to reduce nutrient levels, which is costly • Cost of removal increased due to Phytophthora presence, as bales cannot be sold and must be treated as waste • Removal of cut material by machine can cause track erosion • Leaves relatively large even-aged areas of heather with structural homogeneity • Leaves some litter layer • Regeneration from seed can be poor if cut material not removed or where grass is prevalent • Use of machinery can be noisy and obtrusive for visitors • Can result in opening up sensitive areas to access and create new path networks. • This type of management is not suitable for wet heath and mire.

Activity	Impacts	Pros	Cons
3. Heath management by controlled burning	Creates uneven age and structural mosaic in dwarf shrub community which benefits biodiversity and reduces nutrient loading	• Controlled burning helps create uneven aged and structurally diverse heathland habitats • Removes nutrients more efficiently than mowing • Heather regeneration can be good from stock and seed • Helps to remove developing scrub and maintain dominance of heathland species. • Burnt areas my act as temporary firebreaks • Burning reduces biomass of older heather communities which can represent a fire risk for the future. • Burning an effective alternative to mowing where conditions allow • Burning can benefit wet heath communities (although the limited area of wet heath on Cannock means this may not be suitable).	• Heathland burning requires special expertise, possibly specialist training and volunteer help • Precautions against spread of fire increases costs and human resources • Sustainability issues - releases CO_2 into atmosphere • Despite precautions, fires can get out of control • Controlled burning can concern members of public and adjoining householders • Burning is limited to specific weather conditions usually in early spring, resulting in a wide variation in extent burned each year • Burning not a suitable management for mire communities • Leaves unsightly areas in the short term • Burning is controlled by regulations • Controlled burning might encourage others to set fires on heaths • Leaves larger, even-aged areas of heather with structural homogeneity • Visitors can use burnt areas as new access routes • H&S precautions may affect visitor use locally • Burning is not possible on very steep slopes or near houses, power lines etc. • Burnt areas can encourage erosion and may affect surface archaeology • Will encourage bracken spread if burning includes bracken beds or nearby stands
4. Turf stripping	Small areas of turf removed to reveal bare ground, removing nutrients and creating bare ground habitat for annual plants, lower plants, and invertebrates	• Will enable NE criteria for bare ground to be met • Most effective way of reducing built up soil nutrients • May expose seed bank if not too deep, facilitating good regeneration • Bare ground areas can be hidden in topography if considered unsightly	• Can leave unsightly strips/squares of bare earth in the short term • Can damage surface archaeology or cultural features, so needs prior survey • Disposing of spoil can be a problem • Difficult to acquire suitable machinery and trained staff to carry out turf stripping - manual stripping is only practical on very small scale.

Activity	Impacts	Pros	Cons
		• Surface scraping leaves lower archaeological record intact • Can remove substantial parts of surface bracken rhizome systems • Small areas can be stripped using hand tools and volunteers.	• Turf stripping not possible in mire communities • Turf stripping is not an alternative to mowing or burning.
5. Grazing and trampling	Over time, appropriate grazing will favour heather species over grasses, reduce tree, scrub and bracken encroachment, and possibly reduce nutrients, supporting heathland biodiversity.	• See pros listed in Table 2a • Grazing animals favour grasses over heather so encourage a shift to the latter when at suitable densities • Suitable grazing encourages structural diversity in vegetation and higher biodiversity • Grazing can maintain glades in wood pasture • Light trampling provides niches for specialised flora and fauna, particularly in wet heath and mire edges • If cattle can move to woodland at night they transfer nutrients from heath to woods, benefitting both habitats • Cowpats provide habitat for many invertebrates and specialist fungi • Grazing can slow (but not necessarily stop) tree and scrub regeneration • Grazing following burning or mowing can discourage initial grass dominance and encourage greater structural diversity • Grazing bare ground plots will extend their life and value for invertebrates • Grazing coarse vegetation around mires will benefit specialist mire species • If extensively grazing large areas, livestock have opportunities to avoid dogs and fires • Reduction in rank vegetation may reveal historic environment features	• See cons listed in Table 2a • Grazing complements but does not replace burning, mowing and turf stripping • Animals choose their own grazing areas so impacts are not targeted. • Mire vegetation can be damaged by excessive livestock trampling • Wet mire on deep peat can be a safety hazard for livestock • Overgrazing could favour grass cover on heathland.

Activity	Impacts	Pros	Cons
		• Establishment of grazing compartments can allow animal-free areas to be present at all times.	
6. New hydrological management of wet heath and mire	Could maintain wet heath and mire communities and extend them	• Could bring mire communities currently in unfavourable condition due to hydrological conditions into favourable condition • Oldacre mires are affected by WWI drainage systems which could potentially be remedied by drain blocking.	• In Sherbrook Valley reasons for drying out of mires from has been exhaustively investigated and no obvious cause established, making management challenging • Limited works may be possible in Sherbrook Valley but would affect the current interest of the site and not restore previous features.
7. Heathland management using a combination of techniques including grazing	Will maintain open heathland with scattered trees and scrub, areas of bare ground and maintain heather dominance but with a mosaic of grassland	• Burning can clear the ground prior to turf-stripping and assist archaeological examination. • Mowing provides a shorter sward for subsequent grazing by stock, and may be used to attract stock to particular areas • Burning and mowing offer alternative managements depending on topography, weather and available expertise • Turf stripping can reduce bracken growth prior to spraying • Grazing after burning or mowing can help to restore heather dominance • A mix of different management is desirable if site is to be adequately managed e.g. tree and scrub clearance still required in presence of grazing.	• Grazing by sheep after burning or mowing can encourage grasses at the expense of heather • A well thought out strategy for providing information to public on management requirement would be needed, including location of livestock/timing of grazing, if used • Staff training needs and requirement for external inputs may be increased • A range of resources that may include use of contractors, back up land, in-house facilities and equipment required.

Table 2c: Options appraisal for the management of Cannock Chase Country Park, SSSI and SAC: Control of alien invasive species.

Activity	Impacts	Pros	Cons
C. Control of alien invasive species			
Critical success factor: *Invasive and potentially invasive species eliminated or contained*			
1. No management	Alien invasive species increase at the expense of characteristic native species	• No financial support required • Some colourful species e.g. Rhododendron can be popular with some members of public.	• County Council fails to meet legal requirements for management of SSSI/SAC • Favourable condition targets unlikely to be met • Probable loss of native White-clawed Crayfish • Rhododendron susceptible to Phytophthora fungal disease and can produce many infectious spores that can affect native plants like bilberry • Increase in invasive plants to detriment of characteristic species • Reduction/loss of characteristic invertebrate species from limited habitats, e.g. ponds.
2. Invasive alien plants	Management measures will prevent the spread of alien plants that can outcompete native species and communities and affect the associated invertebrate species	• Elimination of invasive Gaultheria, Japanese knotweed and parrot's feather removes threat • Containment of Himalayan balsam, New Zealand pygmy weed restricts threat • Tolerance of some areas of Rhododendron, laurel, sweet chestnut and larch maintains public amenity • Some species are seen by the public as attractive additions to the landscape • Allows continued presence of alien species with least invasive habit.	• Elimination of alien invasives expensive and can require long term commitment • Some aliens are accepted part of cultural landscape • Some aliens can contribute to biodiversity • Current knowledge and techniques do not always allow elimination so containment may be the only option for some species (e.g. New Zealand pygmy weed) • Elimination requires cooperation of other landowners (e.g. Himalayan balsam) • Tolerance of existing aliens either dependant on no current spread or no current association with Phytophthora • Delay in elimination can incur possibly substantial additional costs, and lead to additional damage to native habitats and species.

Activity	Impacts	Pros	Cons
			• Requires continual monitoring to detect unacceptable spread or increase.
3. **Phytophthora** Continue measures to control using spot spraying	Management measures will help prevent fungal pathogen killing all native bilberry and potentially spreading to other plant species (including garden plants on neighbouring land)	• Measures to slow but not stop spread appear to have been successful • No known spread to another species may be partly due to control measures.	• Control incurs an ongoing cost and may not be effective in the long term • No known method of elimination • Likely to be spread by human and animal vectors and to some degree, by wind • Burning not effective as doesn't sufficiently penetrate soil surface where spores can persist.
4. Crayfish Plague (Reintroduction of native white-clawed crayfish attempted but success unknown)	Management measure may help prevent the elimination of native crayfish from streams in the CP	• White-clawed Crayfish population strengthened.	• If introduction attempt unsuccessful further attempts may have similar results.

Table 2d: Options appraisal for the management of Cannock Chase Country Park, SSSI and SAC: Heathland, mire, grassland and bare ground.

Activity	Impacts	Pros	Cons
D. Veteran tree and woodland management			
Summary favourable condition targets for broad-leaved woodland, relatively open woodland with heathy glades, 30-70% canopy, 5-40% understorey, sapling number 200% and middle-aged trees 125% times number of veterans, minimum quantities of fallen deadwood and snags, veteran deaths <1% pa, no declines over 20 years			
Critical success factors*:* *Existing veteran trees under appropriate management to maximise their longevity and support their associated flora and fauna* *Rate of veteran tree replacement matches losses from existing population in the long term* *Open and wooded cultural landscapes maintained and protected* *The surviving cultural features of the CP maintained and protected*			
1. No management	Gradual decline and loss of veteran trees, with a lack of regeneration and replacements	• Natural processes allowed to dictate development of woodland • No financial support required • In short/medium term, no apparent change in extent of woodland.	• County Council fails to meet legal requirements for management of SSSI/SAC • Favourable condition targets unlikely to be met • Loss of veteran trees • Lack of replacement of veteran oak trees • Eventual Loss of veteran trees leads to loss of cultural, historical, landscape and amenity benefits • Reduction/loss of nationally important invertebrate populations and other flora and fauna associated with veteran trees.
2. Perpetuate veteran woodland by planting	Scattered tree tubes visible in woodland in short term and scattered saplings in longer term.	• Perpetuates oak woodland with new cohorts of trees • Using native provenance from existing sessile oak veterans perpetuates gene pool • Young trees protected in nursery conditions during youngest vulnerable stage • Planting can concentrate on areas with fewest trees to establish canopy continuity • Planting can be done in additional areas outside existing woodland.	• Pattern of tree planting determined by planter and not naturally occurring • Transplanting leads to a check in growth, so trees do not establish more quickly than by natural regeneration • Planted trees may need more aftercare than naturally regenerating trees, especially in dry summers. • Use of nursery soils does not exactly replicate soil flora and fauna of original woodland • Tubes needed to protect against deer and rabbit grazing unsightly • Tubes will need regular checking • Planting within the Coppice needs to consider potential impacts on surface archaeology

Activity	Impacts	Pros	Cons
3. Perpetuate veteran woodland by tube protection of natural regeneration	Scattered tree tubes in woodland in short term and scattered saplings in longer term	• Perpetuates woodland with new cohorts of trees • Using seedlings from existing veterans perpetuates gene pool • Results in more natural distribution of next cohort of trees • Naturally regenerated seedlings tend to catch up with planted trees • New trees inherit soil flora and fauna of existing woodland	• Pattern of regeneration determined by which seedlings are chosen for protection. • Tubes unsightly and will need regular checking • Natural regeneration in the Coppice has historically been poor so there may no natural regeneration to protect.
4. Perpetuate veteran trees by fenced exclosures to protect natural regeneration from grazers	Fenced enclosures within woodland with regenerating trees, thickets and ungrazed ground vegetation	• Same advantages as protecting natural regeneration by tubes • Allows regeneration to follow natural patterns in fenced areas • Allows regeneration of all trees species in a natural way • Creates areas of understorey in woodland, which benefits biodiversity.	• Creation of understorey can be seen as undesirable in a wood pasture landscape • Limited scope for shrub species as not currently present (mainly dwarf shrub) • When fences are removed, understorey and other species may need thinning or clearing • Without grazing and trampling bracken may spread in exclosures and restrict tree regeneration • Results in unnatural rectangular shapes with potentially dense regeneration in short term • Fences vulnerable to vandalism, fallen trees etc. and will need regular checking • Could impact on surface archaeology • Brocton Coppice lies within common land unit.
5. Perpetuate veteran trees by light management (e.g. selective thinning)	Minor changes in appearance of wood, protection of existing veteran trees	• Requires only limited resources • Could include encouraging path use away from trees to reduce soil compaction and nutrient addition • Unlikely to be controversial and will retain current appearance of woodland.	• Not likely to enhance regeneration.

Activity	Impacts	Pros	Cons
6. Perpetuate veteran trees by more substantial management (remove much of the birch secondary woodland leaving only scattered trees to create a more open and traditional wood pasture	Results in far more open woodland with improved lichen and bryophyte communities and more vigorous ground layer	• Could result in more interesting and biodiverse ground flora including re-colonisation of former wood pasture species.	• More resource intensive in terms of planning and execution • Would require expert input to protect veteran trees • Would be likely to require work to be done in stage over several years • Could provoke a strong response from bracken and other understorey species which will require follow-on management • In the long term would require grazing to maintain as wood pasture • Could impact on surface archaeology.

Table 2e. Options appraisal for the management of Cannock Chase Country Park, SSSI and SAC: Further appraisal of different grazing systems.

Activity	Impacts	Pros	Cons
E. Alder woodland management			
Wet woodland 30-90% canopy cover, understory over at least 5% of area, frequent fallen and standing deadwood, no regeneration by planting			
Critical Success factors: *Open and wooded cultural landscapes maintained and protected*			
1. No management	No alder regeneration	• No financial support required	• Limited or no alder regeneration • Loss of landscape and amenity • Loss of flora and fauna associated with alder • Potential soil erosion as trees lost.
2. Alder woodland - coppicing	Alder stumps regenerating within fences or tree guards	• Longevity of individual stream-side Alders increased.	• Coppice regrowth will need protection from graziers for a few years. • Could be unsightly and generate objections from public.
3. Alder woodland - planting	Alder saplings within tree guards along streams	• Perpetuate streamside alders by planting new individuals from local provenance. • Follow up management in dry years unlikely to be needed • Natural patterns of regeneration less important in linear feature associated with stream.	• New plantings not recommended by NE • New trees will need protection from grazers for some years.

Table 2f. Options appraisal for the management of Cannock Chase Country Park, SSSI and SAC: Further appraisal of different grazing systems.

Activity	Impacts	Pros	Cons
1. Stock management-sheep	Sheep will create short "lawns" with fine grasses but have less impact on regenerating trees and scrub	• Sheep grazing reduces grass dominance in favour of heather • Sheep maintain short swards with benefits for some plants and animals on heaths • Sheep are relatively easy to handle • Sheep are generally very safe with people • Sheep trampling is unlikely to damage historic environment features • Shepherded animals can be targeted at areas which will benefit most from grazing. • Shepherd can be good advocate for grazing • Public generally enjoy seeing shepherded grazing • Sheep grazing was the traditional management of Cannock Chase • Will not pester public for food.	• Sheep grazing on tall, tussocky, uncut vegetation is not effective • Free range sheep are particularly vulnerable to dog attacks to the point where un-shepherded sheep grazing may not be viable • Sheep cannot be used with invisible fencing schemes • As free range sheep spread out they are difficult to locate on large sites even with modern technology • On a large site like the CP with high dog numbers sheep likely to need a full time shepherd • Full time shepherding generally only practical on very large and well-resourced sites • Shepherded flock is costly to manage, with a relief shepherd required • Despite shepherd and guard dogs, livestock can be chased onto roads and there can be interactions between guard dogs and other dogs • Sheep could compete with deer on limited deer lawn areas • Back-up land for lambing and wintering is needed. • Sheep do not move into fringing woodland at night so nutrient reductions are small. • Sheep trampling has limited benefits for plants. • Sheep can get caught up in prickly vegetation particularly brambles and need daily checks. • Sheep are less able to graze tall herbaceous vegetation than larger stock and are less effective at containing species like purple moor grass • Grazing by sheep after burning or mowing can encourage grasses at the expense of heather • Sheep trampling of bracken has limited impact.

Activity	Impacts	Pros	Cons
2. Stock management - cattle	Grazing reduces grass dominance in favour of heath, delays tree and scrub encroachment, can reduce nutrient loading which favours grass and bramble and creates bare ground from trampling	• Cattle grazing reduces grass dominance in favour of heather • Cattle will graze tall coarse vegetation. • Cattle will move into wet areas to graze • Trampling by cattle can benefit plant and animal communities and reduce bracken • Grazing by cattle following burning or mowing can encourage dwarf shrubs • Cattle can be used with invisible fencing schemes • As herding animals cattle can be located using modern technology • Some traditional breeds are very docile and ignore public and dogs. • Will not pester public for food • If woodland available cattle will move at night off heath and transfer nutrients • Cowpats good for biodiversity.	• Young stock can be boisterous and can alarm visitors • Bulls can cause concern to visitors and should not be used • Cows with young calves can be aggressive, particularly to dogs • Can be out-wintered but need feeding and this requires back-up land. Land also needed for calving and bulling for breeding herds • Potential to damage historic environment features through trampling • Cattle require more handling facilities than sheep • Cattle need regular checking • Visitors can be nervous of cattle and some will avoid cattle grazed areas • Careful choice of breeds and individuals is necessary on public access land, and cattle free areas should be available for the public at all times • Cattle require TB testing and passports so their maintenance can be expensive and bureaucratic
3. **Stock management- ponies**	Grazing reduces grass dominance in favour of heath, delays tree and scrub encroachment and can create bare ground from trampling	• Ponies will graze tall coarse vegetation. • Ponies will move into wet areas to graze. • Ponies have a large throughput of vegetation and are very effective grazers. • Trampling by ponies can benefit plant and animal communities. • Grazing by ponies following burning or mowing can encourage dwarf shrubs • Ponies can be out-wintered on heathlands. • Ponies are not vulnerable to dog worrying.	• Ponies can graze selectively and create 'lawns' • Ponies can be a nuisance around entrances and car parks if fed by the public • Ponies can cause problems for horse riders, especially stallions, which should not be used. • In hard weather ponies may need feeding for which back-up land is required • Ponies require more handling facilities than sheep • As with all stock, ponies would need regular checking • Ponies are likely to have similar impacts on archaeology to cattle.

Activity	Impacts	Pros	Cons
4. **Stock management- contain stock in enclosures**	Grazing limited to discrete areas on Country Park	• Small enclosures allow targeting of specific areas and control of stocking densities • Experience shows that adequate stocking densities control grasses, suppress encroaching scrub and encourage plants and invertebrates • Can be managed daily with limited resources.	• Enclosing livestock in smaller areas increases risk of negative impacts on vulnerable species • Grazing in enclosures minimises nutrient removal • Enclosures will need to comply with size criteria in Commons Act (effectively 10ha at any one time), or if larger, need scheme approval • Increased risk to stock in enclosures from dog worrying and fires • Moving fences and stock and provision of temporary water supplies is labour intensive • Temporary fencing vulnerable to damage, vandalism and theft • Landscape implications from fenced enclosures (with obtrusive notices if electrified) on common and grazed down shapes afterwards • Fences need to be installed so that they do not impact negatively on surface archaeology.
5. **Permanent perimeter fencing for extensive grazing- without cattle grids**	Minimal impact within site, impacts on site edge	• Animals contained and kept off roads • Fences also assist in keeping children, dogs and stray horses off roads • Permanent fences less vulnerable to damage and theft than electric fences • Extensive grazing promotes animal welfare by allowing animals to behave naturally in environment • Animals have more opportunities to avoid dogs and fires than if in enclosures. • Fence lines can be sites and concealed where there is perimeter scrub/bracken • Access retained by suitable gates at all existing access points.	• Large capital cost initially • Fence can be visible on boundaries where scrub is absent • Fences require approval from planning Inspectorate and possibly planning consent • Fence life limited to c. 25 years if kept in repair • Visitors have to access site via gates, which is unpopular with horse riders and some others • Can be objections to fencing on landscape grounds • Fence cutting/vandalism causing safety risks • Fences need to be installed so that they do not impact negatively on surface archaeology • Cannot target grazing at undesirable species.
6. **Permanent perimeter fencing for extensive grazing**	Minimal impact within site, impact reduced on site edges abutting roads	• Cattle grids can reduce need for fencing, and allow joining up of commons for more extensive grazing	• Cattle grids unpopular with some road users particularly horse riders • Livestock on roads leads to RTAs

Activity	Impacts	Pros	Cons
with cattle grids		• Usually traffic calming/speed restrictions needed for traffic which local residents often favour.	• Cattle grids can be noisy and should be sited away from houses and on straight road stretches • Preparatory work for grid proposals includes traffic censuses and H&S assessments • Cattle grids need approvals and are costly to install and maintain • With animals on roads, grids usually require speed limits and traffic calming measures which may be unpopular with motorists and require police agreement • Approvals for cattle grids follow a different procedure for fencing on commons and can be time consuming. • Cattle gridding requires clearance of roadside vegetation on long road stretches with implications for landscape • Fences need to be installed so that they do not impact negatively on surface archaeology.
7. Invisible fencing	Minimal impacts within site and on site edges	• Invisible fences, once installed are buried and the only visible signs are small control boxes • There is no effect on humans or other animals such as dogs, horses or wild animals • No effects on heart pacemaker or other equipment • Once buried there is minimal maintenance on cable • Cable can be buried under minor roads • Can be an ideal solution away from roads.	• Each animal needs a unit attached to a collar and the system has only been shown to work on cattle • There can be difficulties burying cable in woodland without damage to tree roots • The cattle need to be trained to recognise the warning and stop before receiving a shock • The shock is similar to an electric fence but there are still some welfare concerns • Collars (but not units) have to be replaced annually • Initial cost of units can be high if large number of animals • System is not 100% effective and both cable and collars can fail • Cattle could be driven over cable if chased by dogs.

Activity	Impacts	Pros	Cons
			• These uncertainties mean that invisible fencing has generally be considered unsuitable for main or busy roads • Cattle crossing the live cable are stranded on the far side until cable is turned off • Fences need to be installed so that they do not impact negatively on surface archaeology.

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7. Appendix I. Introduction and background

Physical description

7.1 Cannock Chase Country Park (the CP) coincides with the hills and heaths at the domed heart of Cannock Chase Area of Outstanding Natural Beauty (AONB). It is situated between Cannock, Stafford and Rugeley in Staffordshire (see Map 1) and covers around 1335ha. The CP is fragmented, with two main areas separated by a road and forestry compartment, and several smaller outlying parcels. A minor road (Camp Road) runs just inside the western boundary of the CP, and a private road which carries a bridleway (Chase Road) branching from this runs north-south in the western part of the CP. A visitor centre and café are located at Marquis Drive near Brindley Heath in the south.

Legal background and ownership

7.2 The CP is owned and managed by Staffordshire County Council. Adjacent landowners include the National Trust (Shugborough Estate) and the Forestry Commission. Most of the CP is also registered common land (see section on Commons status below), which also extended into some of the adjacent forestry. The common land boundary generally coincides with that of the Country Park, although it becomes more complicated around White House, south of the main Chase area, and not all of Brindley Heath is common land.

Topography & Landscape character

7.3 Cannock Chase comprises an elevated sandstone plateau dissected by small incised valleys, known locally as slades. The remote, open landscape of the plateau is characterised by unenclosed heathland, bordered by coniferous forestry plantations. Native oak wood is more restricted but is important as a reminder of the forest that was once widespread in the area. The large expanses of open land with sweeping views give a sense of spaciousness, while the valley bottoms and groves of regenerating birch and pine woodland create a more intimate feel. This contrast between large and small scale, together with the feeling of wildness engendered by the open, remote landscape without significant settlement is a key characteristic of the Cannock Chase landscape. The landscape character of Cannock Chase is explored more fully in the AONB Management Plan 2014-19 (Cannock Chase AONB Partnership 2014).

Geology and soils

7.4 The underlying geology of Cannock Chase is Triassic Sherwood sandstone (layers of red sandstone and sand-cemented pebbles, or pebble beds) with some marl deposits. The overlying soils are derived from the sandstone and consist primarily of humo-ferric podsols – well-drained, acidic, stony soils low in nutrients and typical of heathland and acid grassland habitats.

Short history

7.5 Cannock Chase was used as a hunting forest in Norman times but much of the timber was felled in the C16th to provide charcoal for the local iron industry. OS maps from late C19th show Cannock Chase was used for localised coal mining and that there were scattered gravel pits. The common land was used for grazing cattle and sheep, and for

the collection of wood, peat, bracken and probably gorse for fires, thatching, brooms, animal bedding and other uses such as soap making, all of which would have contributed to keeping the heathland areas open. Maps also indicate the keeping of rabbit warrens and the development of fish ponds. The heathland is estimated to have extended to around 7000ha at one time. However, in the C20th, substantial areas were lost to agriculture, urban development, mining and afforestation, so that only around 1000ha of open heathland remains.

7.6 During the early C20th, the remaining heathland in the CP was managed as a grouse moor, but much of the area began to scrub up as commoning practices were abandoned pre First World War. Cannock Chase was used for military training and encampment during the First and Second World Wars, and there are many associated structures remaining and unexploded ordnance is still occasionally found.

7.7 Cannock Chase was listed in the Report of the National Parks Committee in 1947 on account of its high landscape quality, scientific interest and recreational value. The importance of Cannock Chase for nature conservation and landscape was recognised in 1951 with the designation of part of the CP as a Site of Special Scientific Interest (SSSI) and in 1958 with its designation as an Area of Outstanding Natural Beauty. The central area was designated as a Country Park, and a smaller area, including Brocton Quarry and a part of Oldacre Valley, was designated a Local Nature Reserve in 1971. The Country Park was designated as a Special Area of Conservation in 2005 (see section below on Conservation status

7.8 The history of Cannock Chase is described more fully in a report by Penny Anderson Associates (2005).

Archaeology

7.9 A Bronze Age circular burial mound on Spring Hill is a Scheduled Ancient Monument. It is likely that there is other evidence of both prehistoric and also late medieval activity on Cannock Chase that has not yet been found. The potential extent of such features is not currently known because the area has been relatively undisturbed (compared to urban or arable areas) and so there has been little opportunity to find earthworks and artefacts. In the past, earthworks have been revealed when burns have removed the vegetation. A Lidar survey has been undertaken and results are due at the time of writing.

7.10 Cannock Chase was the location of two of the largest army camps constructed for the First World War, and so there are a number of remaining structures relating to this military use. Some are considered by Historic England to be of national, possibly international, heritage value, such as the Messines Terrain Model. This is a model covering around 35 square metres constructed at the Brocton Camp following the capture of the village of Messines in Belgium in June 1917 and used for training purposes. There are also very numerous trenches across parts of Cannock Chase. There is a German War Cemetery and a Commonwealth War Cemetery located within the CP (but excluded from the Country Park area).

Broad description of flora and fauna

Vegetation

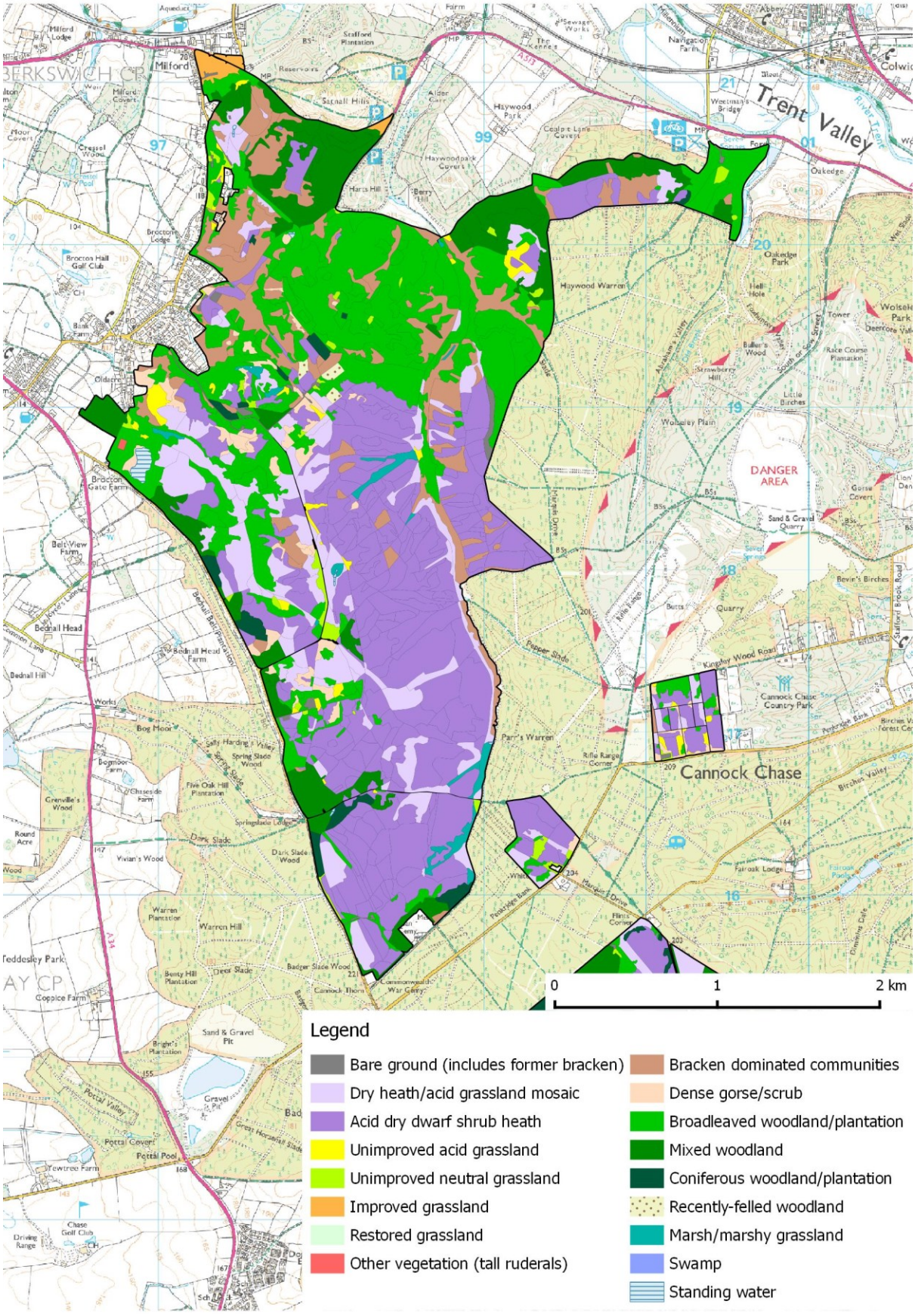
7.11 Cannock Chase forms the largest area of heathland in the Midlands, and is intermediate in character between the northern or upland heaths and those of the southern counties. A significant area of Cannock Chase comprises dry dwarf shrub heath dominated by heather *Calluna vulgaris* and bilberry *Vaccinium myrtillus* with typically northern species such as cowberry *Vaccinium vitis-idaea* and crowberry *Empetrum nigrum*. These species are often mixed with acid grassland dominated by wavy hair-grass *Deschampsia flexuosa* (see Maps 5 and 6) with purple moor-grass *Molinia caerulea* on the plateau tops and shallower slopes. The hybrid bilberry *Vaccinium intermedium*, a plant with a restricted national distribution, has its main stronghold at Cannock Chase. The heathland generally conforms to the National Vegetation Classification (NVC) type H9 Wavy hair-grass heath (*Calluna vulgaris-Deschampsia flexuosa* heath and H8 Western gorse dry heath (*Calluna vulgaris-Ulex gallii* heath).

7.12 There are smaller areas of humid heath and valley mire in the Oldacre Valley in the north-west and the Sherbrook Valley, running north-south along the western boundary of the central area. Water from springs in both valleys is of variable pH; the Sherbrook springs contain higher levels of phosphates. There is an additional pocket of less species-rich valley mire at Womere, found on a pocket of glacial silt in the Brocton Field area. The central section here supports a M2 Bog moss (*Sphagnum cuspidatum/recurvum*) bog pool community.

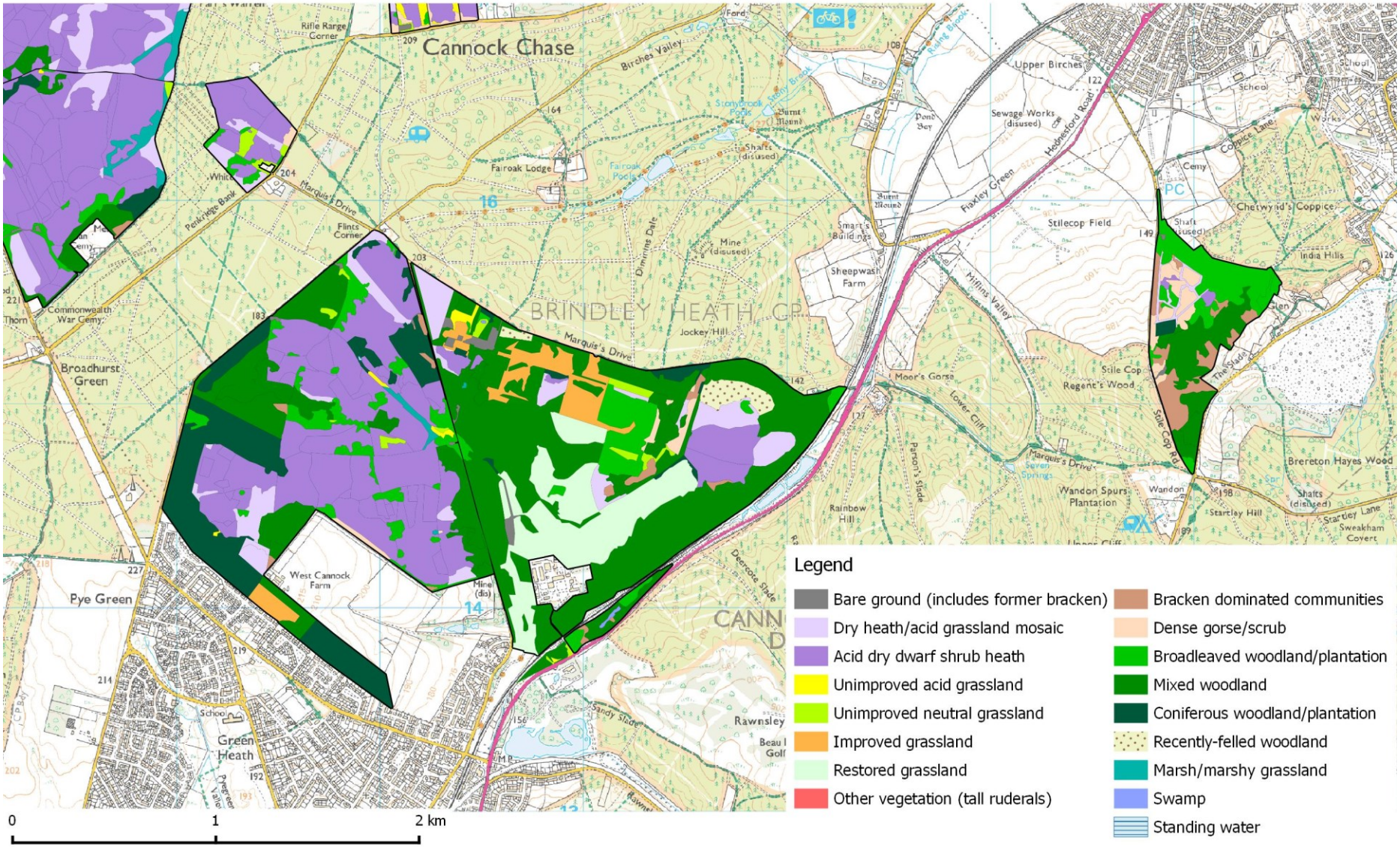
7.13 Much of the mire conforms to the National Vegetation Classification type M25 Purple Moor-grass-Tormentil (*Molinia caerulea- Potentilla erect)* mire; a recent survey in the Sherbrook Valley (Eades *et al.* 2016) found areas of S3 Tussock sedge (*C. paniculata*) swamp and it also supports M23 Sharp-flowered-Common marsh-bedstraw (*Juncus acutiflorus-Galium palustre)* and MG10 Yorkshire fog-Soft rush (*Holcus lanatus-Juncus effusus*) rush-pasture communities and a number of springs and flushes with affinities to M6 Star sedge-Bog moss (*Carex echinata-Sphagnum recurvum)* mire and M9 Marsh St. John's-wort-Bog pondweed (*Hypericum elodes-Potamogeton poligonyfolius)* soakway.

7.14 To the south of the brook species-rich rushy vegetation has affinities with M25, M24 Purple moor-grass-Meadow thistle (*M. caerulea-Cirsium dissectum)* fen-meadow and M22 Blunt-flowered rush-Marsh thistle (*Juncus subnodulosus-Cirsium palustre)* fen meadow. There are also examples of M27 Meadow sweet- Angelica (*Filipendula ulmaria-Angelica syvestris*) and M4 Bottle sedge-Bog moss (*Carex rostrate –S. recurvum*) mire and mire communities with affinities to M21 Bog asphodel-Bog moss (*Narthecium ossifragum-S. papillosum*) valley mire and M15 Deer grass-Cross-leaved heath (*Scirpus cespitosa-Erica tetralix*) and M16 Cross-leaved heath-Bog moss (*E. tetralix –S. compactum*) wet heath.
Species include Marsh Fern *Thelypteris thelypteroides*, Round-leaved Sundew *Drosera rotundifolia*, Few-flowered Spike-rush *Eleocharis quinqueflora* and Bog Asphodel *Narthecium ossifragum*. Locally, where nutrient enriched springwater gives rise to flushed ground rich in sedges and flowering plants, uncommon species include Dioecious Sedge *Carex dioica*, Long-stalked Yellow-sedge, *C. lepidocarpa*, Common Butterwort *Pinguicula vulgaris* and Grass of Parnassus *Parnassia palustris.*

Map 5: Habitat types in the north-west area of the site.



Map 6: Habitat types in the south-east area of the site.



7.15 A small area of open water is found at Mere Pits (Mere Pool) and Womere in the Brocton Field area and there are two small ponds in the northern section, one near Long Mere, itself now dry and one just east of Milford Common and two within the Sherbrook Valley. There is a damp hollow (with sufficient water for deer to drink from) and a small lined pool on Brindley Heath. Areas of standing water are important for amphibians, dragonflies and damselflies.

7.16 Brocton Coppice, towards the north, is an area of old wood pasture with veteran oak trees up to 600 years old and more recent birch regeneration. The oaks support rare and specialist beetles. There are patches of willow and alder carr - W1 Sallow marsh woodland (*Salix cinerea-Galium palustre* woodland) and W5 Alder-sedge swamp woodland (*Alnus glutinosa-Carex paniculata* woodland) - along the Sherbrook and Oldacre Valleys. There are also small areas of conifer plantation, such as on the west side of Brindley Heath, and some peripheral areas of mixed coniferous/broadleaved woodland.

7.17 There is also scrub and bracken either in dense communities or more scattered across the CP including areas of bramble *Rubus* spp. Some areas, for example in areas disturbed by former military use, support neutral grassland dominated by rank grasses such as false oat-grass *Arrhenatherum elatius* and cock's-foot *Dactylis glomerata*. There are also areas of semi-improved grassland near car parks and in amenity areas.

Protected species

7.18 Cannock Chase supports a unique assemblage of species, with many species that are at either the southern or the northern extent of their range. Important plant species are mentioned under Vegetation above. Characteristic bird species include breeding nightjar *Caprimulgus europaeus* and woodlark *Lullula arborea,* and more recently Dartford warbler *Sylvia undata* has been recorded. Stonechat *Saxicola torquata,* grasshopper warbler *Locustella naevia,* reed bunting *Emberiza schoeniclus* and skylark *Alauda arvensis* also breed on site. There are important populations of butterflies and moths (including small pearl-bordered fritillary *Boloria selene* and Welsh clearwing *Synanthedon scoliaeformis*), beetles (in Brocton Coppice), solitary bees and wasps and bog bush cricket *Metrioptera brachyptera*. Five species of bat use the area, which also supports adder *Vipera berus*, grass snake *Natrix natrix*, common lizard *Lacerta vivipara*, slow worm *Anguis fragilis* and great crested newt *Triturus cristatus*. The requirements and vulnerability of these species are discussed by Red Kite Countryside Training Partnership (2010) and Penny Anderson Associates (2005). Red squirrel *Sciurus vulgaris* was present at the time of SSSI notification, but is now extinct in the region.

7.19 Cannock Chase also supports a major breeding concentration of fallow deer *Dama dama*, thought to contain the genetic residue of late mediaeval herds.

Visitor interest and use

7.20 Cannock Chase is very accessible to people, with easy access via highways, car parking, public rights of way and open access, and high numbers of people visit the area. A rough estimate of the number of annual visitors to 30 interview locations in the AONB is 2 million, with 1.7 million visiting the interview locations on the SAC (Liley 2012).

Visitor patterns

7.21 The most comprehensive and recent visitor survey took place during autumn 2010 to late summer 2011 and was analysed by Liley (2012). Counts of people entering/passing locations on the edge of or within Cannock Chase, gave an average visitor rate of 19 people/hour at all locations. The busiest sites overall were the Birches Valley car park (Point 2 on Map 3) with 75 people/hour, Point 1, Marquis Drive (56) and Point 28, Moors Gorse (37) but in Autumn/winter, Birches Valley recorded 120 people/hour on week days and Point 14, Aspens car park 117 people/hour at weekends. There were higher numbers of visitors on weekend days compared to weekdays, but no significant differences in visitors between spring/summer and autumn/winter.

7.22 Counts of cars parked in 105 car parks and lay-bys around the Chase ranged from 166 (midweek in June) to 1095 (Sunday in July). Birches Valley was the busiest location (1599 vehicles from all counts and with the highest number of cars with cycle racks) with Marquis Drive also busy. Cars with cycle racks were recorded from 27 locations.

7.23 Of 4,809 face-to-face interviews with visitors at 30 locations most were within the SAC, but some well outside although still within the AONB. These found that the most frequent activities were walking (62%), dog walking (45%), mountain biking (18%) and cycling (17%), but with some overlap between activities.

7.24 Walkers accounted for a particularly high percentage of visitors at Marquis Drive, Commonwealth Cemetery (Point 6 on Map 3), Punchbowl Car-park (7), Stepping Stones (8), Spring Slade Lodge (20) and Gentleshaw Common (29). Dog walkers accounted for a particularly high percentage of visitors at Duffields (25) and Gentleshaw Common, while Mountain Bikers accounted for a particularly high percentage (90% of interviewees) at Moors Gorse.

7.25 About a third of those questioned visited every week with a higher proportion of dog walkers and horse riders visiting daily. About 75% of visitors had been visiting the Chase for at least five years, but a much higher proportion of mountain bikers than those undertaking other activities have been visiting only within the previous five years suggesting that this is a rapidly increasing activity, confirmed by the high proportion of mountain bikers who report that they visited more regularly at the time of the survey than in previous years.

7.26 About 84% of visits lasted less than 3 hours with 32% of visits of 1-2 hours and only 3% staying a full day and 1% staying overnight. About half of visitors visited with their family (at least sometimes). The majority of visitors (85%) arrived by car with most of the rest walking or arriving by bike. Most visitors to Brook Lane Corner and West Cannock Farm arrived on foot.

7.27 The most frequently cited reasons for visiting were:

- Attractive scenery
- Good for walking
- Close to home
- Good for dogs
- Good/easy parking.

7.28 Nearly half of respondents did not visit other sites, and of those that did, most visited elsewhere on the Chase. About half of visitors lived within a radius of about 6 km of the

point at which they were interviewed on the Chase, and 75% lived within a radius of 15km. Mountain bikers travelled furthest (median distance from postcode to survey point (11.2km) compared to cyclists (6.7km) and dog walkers (4.3km). Visitors tended to travel from further away at weekends than during the week, and the most frequent visitors live more locally and include about half of walkers.

Visitor Patterns

7.29 During August 2011 a total of 1291 groups of visitors to the SAC were observed and mapped (Liley & Lake 2012). Visitor numbers were highest along the main access routes and long distance paths including Sherbrook Valley and along the Heart of England Trail. Dog walkers dispersed more widely than other groups. Cyclists were also widespread but with the highest numbers along the Sherbrook Valley. Cyclists did not always use marked cycle routes or bridleways. Highest numbers of horse riders were on the Heart of England Way but were also seen on paths other than bridleways.

7.30 The proportions of different types of users differed from place to place, possibly due to the provision of particular facilities or to restrictions at some places. Dog walking was the most frequent activity (44% of groups) followed by cycling (24%) and walking (22%). In most cases dogs were off-lead (90%). 8% of groups did not pick up after their dogs and 51% of dogs strayed at least 15m from their owner. In 9% of groups one or more people strayed off the paths, and 6% of groups were seen to drop litter.

Visitor trends

7.31 In the view of local site staff questioned in a study by White, McGibbon and Underhill-Day (2012), there had been some increase in the numbers of walkers, dog walkers and commercial dog walkers in the last ten years, particularly around honey pots and key visitor destinations. A slight increase the number of horse riders was also identified, possibly associated with trekking centres. All local site staff and key stakeholders consulted considered there had been a marked increase in the number of cyclists during the same period and night riding with bright lights had increased. However, just under half felt that there was scope to increase visitor numbers without detriment.

7.32 Local staff considered that, over the last ten years, roadside parking had increased, although where steps had been taken to reduce spaces it was generally successful where enforced. There was strong support from the experts for charges in particular car parks, recognition that this could lead to more roadside parking, and that its effectiveness would depend on the charge and types of ticket available (e.g. seasonal).

7.33 A number of methods to manage public access have been employed over the years but have not all been successful. In particular, it was felt that visitors tend to ignore signs, to go to favourite areas regardless of other options, to choose routes convenient to their home or easy parking, and to walk where they wanted to go, rather than where they were being encouraged to go. Extensive signage, interpretation, press coverage, patrols and promotion of alternative areas to persuade visitors to stay away from the *Phytophthora* infected areas (see para. 2.8) were nearly all unsuccessful after a relatively short period of time although major new facilities and trails have changed visitor patterns. However, there appear to be no systematic studies of the effect of various initiatives on visitor patterns.

Commons status

Commons Act 1899

The Law of Property Act 1925

7.34 Under section 193 of the Law of Property Act 1925, the Lord of the Manor or other person entitled to the soil of any land subject to rights of common (e.g. the landowner) could declare that this section of the act should apply to the land, effectively giving rights of access to the public for air and exercise to the land. Certain Commons in Urban District Council areas were also subject to public access. Neither of these apply to Cannock Chase as far as is known.

The Commons Registration Act 1965

7.35 Under this act it was open to anyone to register land as common land and to register rights over this land. The registrations were initially provisional, but if unchallenged (or not successfully challenged) they became final and became conclusive evidence of the matters registered. The land and rights over it were then included on a public register, kept by the registration authority, usually the County Council. This act has now been repealed.

7.36 On the Commons Register, details for Cannock Chase indicate that there are commons rights registered only on Common Land unit 17 (CL17), the area to the east of the Sherbrook Valley and a small area to the north of the A513 adjoining Shugborough Park (see Map 4). These are part owned by Staffordshire County Council and part owned by the Forestry Commission. Over these areas, 29 properties have registered commons right, collectively for grazing 298 sheep together with 20 animals for herbage or pannage (which could be a further 20 sheep, cattle or pigs). In addition 22 of these properties have registered rights for taking heath, ridging turf, fern, peat, leaf mould, firewood (up to 6” in diameter and fallen), clay, sand, marl and gravel, with six properties registering the same rights except firewood. The National Coal Board has registered ownership of all coal under CL 17, together with that under CL 59, 89, 90, 91 and 92, all of which are owned by Staffordshire County Council, as well as CL 20 on which there are no other rights or ownerships registered. No rights of grazing are exercised.

National Parks and Access to the Countryside Act 1949

7.37 The right of public access to the common at Cannock Chase was granted by an Access agreement under section 5 of the National Parks and Access to the Countryside Act 1949. Under the Countryside and Rights of Way Act (2000), any land which is registered common land is access land on which any person is entitled to enter and remain for the purpose of open air recreation. The right of access under this act and the restrictions to that right contained in Schedule 2 do not necessarily apply to land where access is available under another enactment, e.g. National Parks and Access to the Countryside Act 1949. Further advice is being legal advice is being sought about the situation at Cannock Chase CP.

The Countryside Act 1968

7.38 Under this act the council declared the area of the common as a Country Park, which allowed the authority to appoint wardens, make bylaws and carry out certain works.

The Commons Act 2006

7.39 Under the Commons Act 2006, there is a prohibition on carrying out any works including the erection of fences, buildings or other structures or the digging of ditches and trenches, or the building of embankments or works for the resurfacing of land consisting of the laying of concrete, tarmacadam, coated road stone or similar on the land, without the consent of the appropriate National Authority, which for these purposes is now the Planning Inspectorate (PINS). There are a number of exemptions and minor works including temporary fencing around limited areas for a defined purpose, a limited line of bollards or similar, signs, benches, repairs to surfaced areas, etc.

7.40 Apart from these exemptions and minor works, other works require consent from the Planning Inspectorate (PINS) and an application needs to be made and will be determined with regard to:

- The interests of persons having rights to, or occupying the land (particularly those exercising rights of common)
- The interests of the neighbourhood
- The public interest which shall include:
    - nature conservation
    - the conservation of the landscape
    - the protection of public rights of access
    - the protection of archaeological remains and historic interest features.

7.41 PINS may decide the application with or without a public hearing or inquiry. The Inspector has powers to change the scheme applied for and limited powers to give consent retrospectively for any work already completed.

Commons Act 2006 provisions for enclosures

7.42 Under the provisions of the Commons Act 2006 (The Works on Common Land (Exemptions) (England) Order 2007), temporary enclosures can be installed without the consent of the Secretary of State for a period not exceeding six months in the interests of nature conservation. A maximum of 10ha or 10% of the register unit, whichever is the less, can be enclosed, and part of the land to be enclosed cannot be enclosed again for six months after a previous enclosure of the same land.

A Common Purpose

7.43 *A common purpose; a guide to agreeing management on common land* (Short, Hayes et al. 2005) provides a mechanism whereby everyone with an interest in common land can contribute in deciding its future, through a structured and inclusive framework; it was revised in 2012. It embodies three principles:

1. Many people have a stake in common land but it is valued for different reasons. What people value may differ but they are united by the strength of their concern
2. All interests in common land are legitimate and deserve recognition. The starting point should be an attempt to embrace all interests within a single management framework (but without weakening statutory requirements). Progress is least likely when one interest in a common attempts to side-line the others, or forces change upon them
3. Decisions affecting the future of commons should be determined through an inclusive decision-making process. People with a significant interest in commons can contribute to decisions on the future of those commons, and not simply be consulted after decisions have been made by others.

7.44 The guidance gives the stages that most consultations will follow, tailored to local circumstances. These are:

- Gathering background information
- Engaging with stakeholders
- Harnessing the views of stakeholders
- Examining management options
- Selecting the most appropriate options
- Implementation

Finding Common Ground

7.45 This report was commissioned by Natural England from the Open Spaces Society (Ashbrook & Hodgson 2013) and gives guidance through a wealth of case studies on how to identify the people who care about a particular common, and how to involve them in plans for its future. It makes it clear that you should not undertake works on a common lightly and should take time to understand why the community values its common and how to accommodate everyone's wishes. The guidance includes sections on the value of commons to communities, the principles of engaging with communities and reconciling national and local interests. It covers such issues as proposals for fencing, alternatives to fencing and tree felling, give numerous examples from case studies and references with quotations, Planning Inspector's decisions from public inquiries on commons issues and examples of good and bad practice.

Other legislation

The Highways Act 1980

7.46 With respect to cattle grids on the highway, consent is required under the provisions of the Highways Act 1980. The provision of such grids and their maintenance will normally be carried out by the Highways Authority, but if there are objections the proposal will be passed to the Secretary of State for a decision to be implemented by the Highways Authority.

Mines and Quarries Act 1954 and Environment Protection Act 1990

7.47 Under the Mines and Quarries Act, owners of abandoned mines or quarries are obliged to make them safe by providing and maintaining barriers to shafts and outlets and fencing quarries such that any person is prevented from falling down a shaft or into a quarry or entering an outlet. Failure to do so will constitute a statutory nuisance, and the Local Authority can serve a notice on the owner requiring the execution of works to abate the nuisance. These provisions do not cover surface fissures resulting from mine subsidence, but are probably covered by a land owner's general duty of care. More specific duties and responsibilities of the landowner should be subject to legal opinion.

Conservation status

Special Area of Conservation

7.48 Part of Cannock Chase (1244.2 ha) is a Special Area of Conservation under the European Habitats Directive[4] (see Map 2). This requires the necessary conservation measures to be applied on the SAC for the maintenance or restoration of the natural habitats and species for which it has been designated, to a favourable conservation status.

7.49 The objectives for the conservation of the SAC have been laid out (Natural England 2014c) as follows (note that no supplementary guidance is currently available):

7.50 With regard to the SAC and the natural habitats and/or species for which it has been designated ('Qualifying features' listed below), and subject to natural change;
Ensure that the integrity of the SAC is maintained or restored as appropriate, and ensure SAC that the SAC contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats
- The structure and function (including typical species) of qualifying natural habitats, and,
- The supporting processes on which the qualifying natural habitats rely

7.51 At Cannock chase these habitats and species are:

- H4030 European dry heaths
- H4010 Northern Atlantic wet heaths with *Erica tetralix*

7.52 On the SAC the appropriate steps must be taken to avoid deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the SAC has been designated in so far as such disturbance could be significant.

[4] Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, as amended.

Site of Special Scientific Interest (SSSI)

7.53 An area of 1264.3 ha of Cannock Chase has been designated as an SSSI. The notified interest features of the SSSI include the habitats notified under the SAC above together with:

- Valley bog/fen with a mosaic of various mire types featuring sedges *Carex spp*., Sphagnum spp., common butterwort *Pinguicula vulgaris*, bog asphodel *Narthecium ossifragum*, purple moor-grass *Molinia caerulea* and tormentil *Potentilla erecta* together with fen meadow communities with rush *Juncus* ssp., marsh thistle *Cirsium palustris* and rush pasture with marsh bedstraw *Galium palustre* and, in the wettest areas, tussock Sedge *Carex paniculata* swamp.
- The featured woodland habitats are wet alder *Alnus glutinosa*-tussock sedge woodland and oak-*Quercus* spp. birch *Betula* spp. - wavy-hair grass wood pasture.
  The important invertebrate assemblages of wet and dry heathland and woodland habitats are characteristic of wood decay, fungal and fruiting bodies and bare sand and chalk

7.54 Natural England assesses the conservation status of SSSIs. Most Cannock Chase SSSI units were last assessed in 2011, with a small number assessed in 2013. Nearly 92% of the SSSI was in "unfavourable recovering condition", with the remainder split between "favourable" and "unfavourable no change" (note that some of the SSSI falls outside of the Country Park boundary and is on land leased and managed by RSPB). The units classified as unfavourable no change are those supporting valley mire communities.

The National Character Area Profile

7.55 The area profile for Cannock Chase and Cank Wood (Natural England 2015) provides a statement of environmental opportunity including:

- Maintaining the current extent of heathland and improving its management, for example by grazing, to increase biodiversity value.
- Planning the restoration of areas of former heathland and expanding the extent of heathland to improve filtration of clean water to the underlying aquifer, and improving habitat connectivity to increase resilience to climate change.
- Conserving and increasing the extent of habitats associated with heathland, such as acid grassland, to enhance the biodiversity value
- Protecting below-ground archaeological deposits and upstanding features such as bronze-age barrows, iron-age hill forts, ridge and furrow and the military camps on Cannock Chase.
- Investigating ways of securing better management of designated heritage assets, which contribute to landscape character – particularly those that have been identified as 'heritage at risk'.

Area of Outstanding Natural Beauty

7.56 The Cannock Chase Area of Outstanding Natural Beauty (AONB) was designated in 1958 and covers some 6800 ha. The current Management Plan for the AONB runs from 2014-2019 (Cannock Chase AONB Partnership 2014).

7.57 Key issues identified include the need to maintain heathlands in favourable condition; to manage the woodland areas to support nature conservation; to maintain the links to the heritage of military history; to balance recreation with the need to maintain and enhance the AONB; to recognise that greater impacts on the SAC implies greater need to manage visitors, and to maintain views and maintain water quality and flows. The plan also recognises the impacts of climate change, invasive species and plant diseases on the AONB.

SAC Partnership

7.58 Under the EU Habitats Directive any plan or project which may have a significant effect on a European site alone or in combination has to be subject to a Habitats Regulations Assessment (HRA). A partnership of local authorities whose HRAs ascertained that planned growth as identified in their respective Local Plans would have an impact on Cannock Chase SAC has been formed in line with DEFRA guidance to take a joined up approach in order to mitigate for this growth. A Memorandum of Understanding (MOU) provides a framework for coordination between these statutory bodies who have land use planning responsibilities in relation to Cannock Chase SAC. Members are Staffordshire CC, Stafford Borough Council, Lichfield District Council Cannock Chase Council, South Staffordshire Council, East Staffordshire Borough Council, Walsall Council and Wolverhampton City Council. Advisory members are Natural England, the Forestry Commission and the AONB.

7.59 Evidence commissioned by the Partnership, including a large-scale visitor survey and an impact assessment, suggests that the planned cumulative level of planned housing growth within a 15 kilometre radius of the Cannock Chase SAC would contribute an additional 15% of visits and is likely to have result in a significant effect on the important habitats of this designated site. Key impacts relate to loss, deterioration and fragmentation of habitats due to recreational activities. Given the locally unique features of the SAC provision of alternative greenspace is not considered an appropriate mitigation technique as it cannot replicate the features of Cannock Chase that attract most visitors. A programme of Strategic Access Management and Monitoring Measures (SAMMM) has been agreed as has a means of funding this through developer contributions. A Joint strategic Board meets for the first time in October 2016 and it is intended that this will approve Project Officer and Visitor Engagement Officer posts. These posts will further develop, implement and monitor the SAMMM.

8. Appendix II - Favourable condition objectives for designated features of SAC and SSSI

Introduction and criteria

8.1 Guidance on the definition of Favourable condition for the designated features of Cannock Chase SAC and SSSI have been produced (Natural England 2014d). There are general criteria concerned with maintaining (or restoring) the area of each habitat type including supporting habitat and the population of each designated species or assemblage. This includes 830ha of dry heath, 20ha of wet heath, mire, fen meadow, rush pasture and swamp, and 150 ha of wood-pasture with c. 600 veteran trees and 27ha of alder woodland. It also includes the invertebrate assemblage associated with wood decay and those associated with bare sand and chalk. Natural England carry out

regular assessments of each unit of land within each SSSI and assign these into the categories: favourable, unfavourable-recovering, unfavourable-no change, unfavourable-declining, part destroyed or destroyed. The following main generic criteria key components apply in determining favourable condition:

Dry heath

- Bracken cover 1%- 10%, gorse cover <50%, of which European gorse cover <25%, tree and scrub cover 5%- 15% by area
- Bare ground to be present in 20% of survey points with different surface profiles
- Dwarf shrub cover of at least two species of 25-90% by area
- On lowland dry heath a mixture of 10-40% cover of pioneer, 20-80% cover of building/mature and <30% cover of degenerate phase dwarf shrubs and <10% of dead ericaceous cover
- Bryophytes and lichens to be present in 20% of survey points
- Requirement for a mix of dwarf shrubs (heather and its allies), graminoids (grass-like plants) and other forbs (herbs and flowers), with maximum cover of exotic species <1% and weeds such as nettles *Urtica* spp. and thistles *Cirsium* spp <1%.
- Maximum cover of purple moor grass and wavy-hair grass each to be 33%

Wet heath

- Presence of ericaceous species in all stages of growth
- Cover of muddy bare ground to be 1-10% by area
- If naturally present >10% cover of *Sphagnum* spp, and >5% cover of lichens
- Purple moor grass to be no more than frequent and <66% cover
- European gorse cover <10%, bracken <5% cover, tree and scrub cover <10% by area
- Dwarf shrub cover of at least two species of 25-90% by area
- Requirement for a mix of dwarf shrub, graminoids and other forbs, with maximum cover of exotic species <1% and weeds such as rushes *Juncus* spp. and thistles *Cirsium* spp <1%.
- Trampling/paths <1%, and no silt or leachate or functioning artificial drains

Fen, marsh and swamp

- No loss in area of small plant communities of mires and no frequency decrease in positive indicators specific to any community >20%. Presence, frequency and cover targets for main species set for each mire type
- Vegetation with mix of named species with <80% cover, and no single species >50% cover
- Limits to cover of named species (e.g. reed, Molinia) in named mire communities and alien species absent or rare
- Cover of woody species <10% and absent from flushes and springs, tree species <5% cover, exposed substrate <10%, litter <25%, seedlings/saplings rare
- Maintain or expend stand of marsh fern *Thelypteris thelypteroides*

Woodland

In Oak-Birch woodland

- Open woodland with frequent heathy glades with little canopy competition or tall herbage and scrub around veteran trees
- Understory present in 5%-40%, open space 5%-40% and canopy cover 30%-70% of stand area
- At least twice as many saplings/ young trees as veteran trees and 25% more middle aged trees of which at least 20% oak.

- Succession of age classes present –a cohort every 100 years and at least one in last 50 years
- No more than 20% regeneration by planting and only on sites previously planted in last 15 years and using only native stock from Brocton Coppice or Shugborough
- Seedlings/saplings/young trees (at least 10% oak) at sufficient density to maintain canopy over 10 years and regeneration not limited by deer browsing
- Some old growth stands or scatter of large trees over 10% by area or 5-10 trees/ha
- At least 40m³/ha fallen deadwood and >50 deadwood snags/ha
- Five fallen lying trees >20cm dia. and seven trees allowed to die standing per ha
- One-two large (>50cms dia.) fallen trees with plenty of fallen dead wood visible at each sample point
- Short term decline in veteran trees limited to 1% p.a and 5% between inspections with no decline over 20 years
- At least 80% of ground flora cover referable to relevant native community and with nectar sources at least occasional
- Damage from introduced fauna or other unnatural factors <10% by number/area in five year period
- Woodland structure suitable for breeding Pied Flycatchers

In wet Alder woodland

- Canopy cover 30%-90% with understory present in at least 5% of total stand area,
- Some old growth stands or scatter of large trees over 10% by area or 5-10 trees/ha
- Five fallen lying trees and seven trees allowed to die standing per ha
- Bare ground with different surface profiles to be present in 20%, coarse grasses and tussock in 10% and scrub and young trees in 10% of survey points
- No regeneration by planting
- Seedlings/saplings/young trees at sufficient density to maintain canopy over 10 years and regeneration not limited by deer browsing
- At least 80% of ground flora cover referable to relevant native community
- Minimum levels and cover of native trees and limits on damage from introduced fauna
- Woodland structure suitable for breeding Pied Flycatchers

9. Appendix III – Summary of recent management

9.1 A five year restoration programme *Saving Cannock Chase* was carried out from 1999-2004, funded by Heritage Lottery. This comprised bracken spraying, cutting and/or litter removal, tree clearance, selective felling/thinning, heather cutting and heathland recreation. Ongoing management has included bracken spraying, heather cutting on a 10-12 year cycle and the planting of oaks grown from local trees in Brocton Coppice. Under the *Connecting Cannock Chase* project, an area known as Foden's corridor, which connects the two main areas of the Cannock Chase SSSI/SAC, has been restored to heathland from forestry and grazed with cattle (the first instance of livestock grazing on the heath for over 100 years) (Noake 2014). Heathland restoration has also been carried out at two other similar corridors within Cannock Forest.

9.2 Cannock Chase was badly affected by a wildlife fire in 1976 and several subsequent fires in that decade, which is thought to have contributed to the spread of Bracken. More

recently, heather cutting, bracken control and the creation of fire breaks have helped prevent a repeat of this. An operational fire plan has been in existence for some time but recently work has commenced to upgrade this so that it also includes fire appliance routes, access points and guidance/information on fire protection of critical site features.

9.3 Higher Level Stewardship (HLS) primarily provides financial help to support land managers in carrying out management for wildlife in high priority situations. The higher tier schemes deliver these benefits in areas of high wildlife interest, including designated sites such as Sites of Scientific Importance and Natura 2000 sites. Following an eight month planning period, including preparation of a detailed Farm Environment Plan, Cannock Chase Country Park was entered into the higher tier of the Environmental Stewardship Scheme in 2008.

9.4 Within the ten-year Higher Level Scheme for Cannock Chase a number of land management options were selected to enable the restoration and improvement of key habitats and safeguard of target species, including;

- **HO2 Restoration of lowland heathland on neglected sites** – involves the restoration of valuable plant communities and associated wildlife by appropriate active management including cutting, burning and/or grazing along with bare ground creation to create a mosaic of heathland vegetation and creation of a range of age classes of dwarf shrubs; also involves bracken and scrub and tree management to arrive at the appropriate balance of vegetation in accordance with favourable condition targets for this habitat. For Cannock Chase Country Park, around 645 hectares were included in this option and a range of management operations have been involved, including bramble and scrub removal (including spot treatment of scrub regrowth), gorse coppicing, heather cutting and removal of baled material, heather burning, bracken spraying and maintenance of mown firebreaks.

- **HO3 Restoration of forestry to lowland heathland** – involves the creation of heathland mosaics through clear felling of trees and removal of vegetative litter, where required; follow up maintenance is usually required as per HO2 options (scrub and bracken control) in order to allow regeneration of heathland vegetation and in some cases, re-seeding with locally sourced heather brash is also required. On Cannock Chase Country Park, some 23 hectares of woodland (mainly conifer plantation/self-set trees) has been cleared, and restoration work included follow-up treatment of bramble, scrub and bracken and in some cases, re-seeding with heather brash.

- **HQ7 Restoration of fen** – involves the restoration of fen/mire and wet heath habitat for associated wildlife species (plant and animals) though measures such as scrub removal and prevention of pollution and maintenance of water control structures, where appropriate. For Cannock Chase Country Park, just over 12 hectares were included under this option and work has involved bramble and scrub control, bracken control on bank sides and specific management to enhance conditions for marsh violets, the food plant of the small pearl-bordered fritillary. Key areas occupy the Sherbrook and Oldacre Valleys.

- **HC7 Maintenance of woodland** – this involves the maintenance of woodland of high wildlife or landscape value through appropriate measures, including thinning , maintaining, and where necessary creating, open areas such as rides and glades, retention of deadwood in the woodland, control of invasive species, tree planting, etc. On Cannock Chase Country Park, only the ancient semi-natural woodland (former wood pasture) known as Brocton Coppice and the alder carr in the Sherbrook were included under this option, the total land area comprising 30 hectares. Halo thinning around veteran sessile oaks and selective birch thinning has been undertaken to create small glades, whilst acorns have been collected and grown on for replanting in small plantations to act as replacement oaks as the veterans die. These plantations are thinned out periodically, as appropriate.

- **HK15 Maintenance of semi-improved or rough grassland for target species** – involves maintaining moderately species-rich grassland areas by grazing or cutting to support target species. On Cannock Chase Country Park a small enclosure of semi-improved grassland with a variety of grasses and forbs, together with some dry heath at site edges, falls into this option. The small field lies on the southern edge of the land parcel known as Brindley Heath and has been used by species like brown hare *Lepus europaeus*, skylark *Alauda arvensis* and meadow pipit *Anthus pratensis*. Management currently includes occasional mowing to maintain the current species diversity.

- **HD4 Management of scrub on archaeological sites** – on the Country Park, this has involved surveying key features of historic interest and monitoring levels of scrub encroachment on these, so that any scrub encroachment can be addressed as needed. Some of the features lie within heathland so these are covered under HO2 where scrub clearance is targeted to achieve both feature protection and habitat improvement. HD4 areas include those that fall outside of the other appropriate management options and covers around 20 hectares of land in total, though the features themselves are generally widely scattered across the Country Park.

9.5 Over the last 7 ½ years of this scheme, significant improvements have been made.

9.6 The current management of the habitats in the Country Park has achieved much in recent years but there are concerns about sustainability, cost and ability to meet all the favourable condition targets. Throughout the duration of these management operations, consideration has been given to the requirements of key wildlife species, historic environment interests and the landscape impacts of works. Having access to specialist officers within the Environmental Specialists team has facilitated good management practice and ensured the safeguard of the intrinsic qualities of this much valued area.

9.7 The current management can be summed as:

- Tree clearance on the open heaths is moving towards achieving favourable condition targets but in some areas woodland cover still exceed the targets. Tree clearance has facilitated the recovery of mosaics of acidic grassland and dwarf shrub heathland, and small-scale turf removal has been undertaken to provide

niches for invertebrates and nightjar nesting areas within dense dwarf shrub heath. Limited additional woodland clearance is still needed, together with some thinning of retained trees to favour broadleaves in plantations within the CP. Tree removal in the Sherbrook Valley has resulted in a reduction of up to 40% pine encroachment to between 5 – 10%, though there is some scope for smaller areas of successional scrub to be permitted to develop and then be managed in a rotational pattern across this area. A higher proportion of trees and scrub is found in parts of Oldacre Valley, reflecting greater ground disturbance from past military activities in that area.

- Scrub control, bracken control and mowing of patches of coarser grassland in and around the mire and fen habitats in both Oldacre and Sherbrook valleys has been undertaken to reduce their dominance there.
- Attempts to regenerate the streamside alder woodland by small-scale coppicing of alder has been undertaken to determine the benefit of this work both in terms of rejuvenating the woodland itself and opening up glades to encourage the spread of marsh violets. This has had limited success, in part, due to poor coppice regrowth, and potentially grazing by deer, but further work is needed to establish the best way to conserve this important landscape and biological feature in the long term.
- Some work has been done to free veteran oaks in Brocton Coppice from competition from birch secondary growth but this needs to be done carefully and slowly to prevent sudden changes in conditions affecting the veterans. Longer term plans include a reversion of this area to wood pasture but this will have to be done in such a way as to avoid risking loss of existing veteran oaks. The high degree of Phytophthora disease affecting the bilberry understorey does, however, pose a question over including this area in any grazing programme. There may also need to be further consideration of the best means of regenerating the veteran trees so that in the long term, replacements are in place as the old trees die off. A further concern is the paucity of standing and fallen dead wood which is such an important component of the woods for associated invertebrates and fungi.
- There has been considerable success in controlling bracken in recent years, and bracken cover in heathland has fallen from an estimated 70% to between 10 and 30%, the higher percentage cover being largely in localised areas that are either steep slopes or in close proximity to residential areas and a hospice, therefore more difficult to tackle. It is recognised that no method is completely successful in removing all the bracken and that after a period of years it will spread again and need further treatment. A particular concern is the possibility that the main chemical for spraying bracken, widely used over many years without long term environmental damage, could be withdrawn for use by the manufacturers due to other commercial considerations. Alternative control methods can be as effective as spraying but could also conflict with breeding birds or cause mechanical damage to other plant species and are not effective in co-dominant heather and bracken stands. These methods are also impractical on rough terrain and steep slopes.
- Bramble is a valuable resource for invertebrates and birds, especially in lightly wooded areas and on woodland fringes. It is however, considered as a negative indicator in terms of the condition of heathland. It has spread in recent years and is

now a serious threat to the open habitats on the CP as well as restricting access for visitors. Spraying has had some success in controlling this plant, but there are concerns about the use of chemicals for scrub control and repeat management is usually necessary to completely control. Cutting removes the above ground plant but it rapidly recovers. Better solutions to the control of bramble need to be found.

- There are limited amounts of gorse on the CP and management has concentrated on its removal only where archaeological or historic features are affected. Elsewhere this is a valuable biological feature for invertebrates and birds (not least as it is favoured by Dartford warblers) but needs management by coppicing every 15 years or so to retain its value for wildlife. This is a part of the current regime.
- Alien invasive plants have the potential for creating serious problems for habitats and species particularly where all known control measures are ineffective at eliminating them. There are a number of such species in the CP and the strategy is to eliminate those which pose the greatest threat to native species and communities or, where this is not possible to contain the threat. In some instances where such species pose a lower threat level and have amenity value or historic associations the strategy is to retain and monitor them.
- A serious plant pathogen *Phytophthora pseudosyringae* was discovered within Cannock Chase Country Park in 2009. This is considered to be the worst outbreak in England. Phytophthora is a fungal pathogen which has seriously affected the bilberry on the CP and has killed large stands of this plant. Carefully monitored treatment has consisted of removing and destroying affected material but the pathogen is still spreading although perhaps more slowly than it would have done in the absence of control measures. It is considered unlikely that the disease will, in the long term, be eradicated. There may be limited spread of spores by wind for this Phytophthora species, but animals and humans are likely to be the main vectors. There are also concerns that other more virulent and wind-dispersed Phytophthora species might arrive on site and infect additional tree and scrub species on the CP, such as *Phytophthora ramorum*. The most serious outbreaks of *Phytophthora pseudosyringae* on the CP are in the woodland and dense bracken areas. Though grazing could increase the risk of disease spread, opening up the woodland will also make it less suitable for the pathogen, and other animals are already using the area. The presence of the pathogen also makes disposal of cut material from the heaths more difficult and expensive.
- The presence of crayfish plague, a disease of introduced American crayfish which is not fatal to them but rapidly kills our native white-clawed crayfish has eliminated native crayfish in one stream on the CP. It is not known whether a re-introduction attempt has been successful.
- Native species (apart from bracken and bramble) on the CP but some ragwort control is currently undertaken, particularly near bridleways, and deer are controlled over the whole of the Chase by the Forestry Commission.
- On the heather areas the management is aimed at providing a mosaic of different aged stands of heather for age and structural diversity and at the same time reducing the soil nutrients (as heathland is a low nutrient system but is threatened by atmospheric inputs). Heather cutting plus baling to remove material from site

has progressed at an average of 8 hectares a year, with burning of around 1-2 hectares each year also being undertaken for the first 4 years of the HLS scheme (staff resources limiting more recent heather burning). Despite this programme of heather cutting, this has been insufficient to achieve a suitable matrix over the whole SSSI/SAC and there is not enough young (pioneer) heather, locally too much degenerate heather and the amount of building/mature heather is at the top end of the range for favourable condition in many parts of the site. A disadvantage of cutting over burning here is the need to dispose of the cut material which has to be baled and removed for disposal due to the potential presence of Phytophthora spores, which adds considerably to the cost. Both cutting and burning leave relatively large, even-aged areas of heather.

- There is not enough bare ground in the CP (a valuable habitat for many rare and scarce heathland invertebrates) as well as regeneration niches for the heathland seed bank and current management has been aimed at only at creating small bare areas for nesting nightjar. A programme of bare ground creation is needed over the next few years. Grazing would also help to create and such habitat.
- There have been problems with drying up of the mire systems in the Oldacre and Sherbrook valleys, and despite several in-depth studies the causes have not been identified. These mires are particularly important as they constitute some of the last such features in the English Midlands. Some mitigation is believed to be possible in the Oldacre Valley by investigating the feasibility of blocking drainage systems installed by the military during WWI and II, and in both valleys by removal of trees to reduce shading. However these actions have not yet been taken and further experimental work to improve the hydrology of the mires needs to be investigated. Currently these mires are “unfavourable” due to their hydrological condition.