



Evidence Base relating to Cannock Chase SAC and the Appropriate Assessment of Local Authority Core Strategies



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Summary

This report has been commissioned by a consortium of five authorities surrounding or adjacent to Cannock Chase Special Area of Conservation (SAC). The consortium includes four district authorities that are currently preparing individual core strategies as part of their Local Development Frameworks. This report focuses on Cannock Chase SAC, and provides the evidence base necessary for each local authority to complete a Habitat Regulations Assessment of their respective core strategies in relation to Cannock Chase.

We assess in detail the likely significant effects, of water abstraction, air quality, and increased recreation pressure on European wildlife sites, that may occur as a result of policies within the respective core strategies. In all three cases adverse effects on the integrity of the SAC are identified. The Habitats Regulations¹ stipulate that any plan or project that is unable to demonstrate that it will not have an adverse effect upon any European site cannot be given effect, unless strict and exceptional tests are met.

It is not possible from the data so far available to conclude that water abstraction from the boreholes at Milford and Shugborough are not having a significant adverse effect on the integrity of the SAC and that any effect will not be greater with increased abstraction at one or both boreholes. This means that Stafford Borough Council will need to obtain assurances from the Environment Agency that a supply of water of sufficient quantity and quality will be available to meet the needs of new housing and industrial/commercial development before publishing their final development proposals in the core strategy.

The general level of nitrogen deposition at Cannock Chase already exceeds the maximum critical load for dry heath and the minimum, critical load for wet heath. Any further increase in nitrogen deposition is therefore going to further contribute to an adverse effect upon the integrity of the interest features. The main source of nitrogen is from traffic and additional development in the areas surrounding the SAC is likely to generate additional traffic. The roads crossing the Chase are used by commuters and as 'rat-runs' between the various towns surrounding the Chase, and most visits to the SAC are by car. It can be anticipated that further development in the area will generate more visits to Cannock Chase, and increase direct effects on the heathland from emissions. About a third of the area of the SAC is within 200m of a road. Potential mitigation measures such as traffic calming and enhanced public transport may be successful in reducing traffic volumes around the SAC, however without accurate predictions of future vehicle flows and the extent to which these are linked to development it is not possible to be confident that mitigation measures will be successful to avoid adverse effects on integrity of the SAC.

¹ The Conservation (Natural Habitats &c.) Regulations 1994, normally referred to as the 'Habitats Regulations'

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We predict development in the respective core strategies will result in an increase of approximately 9% in visits to the SAC. Recreational access and associated visitor pressure is associated with various impacts that include trampling, increased fire risk, erosion, spread of disease and nutrient enrichment. It will not be possible to avoid these effects if development is within 400m of the SAC or for where large single developments occur within easy travel distance or travel time from the SAC. Otherwise mitigation measures should be successful in avoiding adverse effects arising from recreational pressure. Mitigation measures will be complex, difficult to implement and require a separate strategy, followed by a more detailed implementation plan; however precedents do exist in other areas, such as Dorset and the Thames Basin Heaths.

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Acknowledgements

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1 Introduction

1.1 Overview

1.1.1 This report has been commissioned by a consortium of five authorities² surrounding or adjacent to Cannock Chase Special Area of Conservation (SAC). The consortium includes four district authorities that are currently preparing individual core strategies as part of their Local Development Frameworks. In order to ensure that each core strategy is compliant with the requirements of the Conservation (Natural Habitats &c.) Regulations 1994, each authority must complete an assessment of the strategy's implications for European wildlife sites, i.e. a Habitats Regulations Assessment of the plan. This report focuses on Cannock Chase SAC and provides the material for each local authority's assessment, with respect to Cannock Chase. As the report focuses solely on a single site (i.e. it does not assess impacts on other European Sites in the area) and has been prepared jointly for different authorities in itself it is not the definitive assessment, rather it provides the evidence base and material relating to Cannock Chase SAC.

1.1.2 The report essentially follows on from a joint screening opinion produced by Stafford Borough Council and Cannock Chase District Council Local Development Frameworks (in respect of Cannock Chase SAC) that was undertaken in June 2007. This has since been updated to include Lichfield District and South Staffordshire District and also to reflect housing figures in the Regional Spatial Strategy Phase 2 revision.

1.2 Background to the Habitats Regulations Assessment

1.2.1 The Conservation (Natural Habitats &c.) Regulations 1994, normally referred to as the 'Habitats Regulations,' transpose the requirements of the European Habitats Directive 1992³ into UK law. The EC Habitats Directive and UK Habitats Regulations afford protection to plants, animals and habitats that are rare or vulnerable in a European context.

1.2.2 Earlier European legislation, known as the Birds Directive 1979⁴, protects rare and vulnerable birds and their habitats and includes the requirement for all Member States to classify 'Special Protection Areas' (SPA) for birds. This involves each State identifying the most suitable areas of land, water and sea for the protection of rare

² Cannock Chase District Council, Lichfield District Council, South Staffordshire District Council, Stafford Borough Council and Staffordshire County Council

³ Council Directive on the conservation of natural habitats and of wild fauna and flora of 21st May 1992 (92/43/EEC)

⁴ Council Directive on the conservation of wild birds of 2nd April 1979 (70/409/EEC)

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and vulnerable species listed in the Directive, and areas which are important for migratory species, such as large assemblages of waterfowl.

- 1.2.3 The Habitats Directive increased the protection afforded to plants, habitats and animals other than birds, through stricter protection of species and by the creation of 'Special Areas of Conservation' (SAC). This required each State, working in biogeographical regions, to designate the best areas for habitats and species listed in annexes to the Directive. Article 6(1) and (2) of the Habitats Directive impose duties on Member States to establish ecological conservation management measures for these areas, to avoid deterioration of their natural habitats and the habitats of species, and to avoid significant disturbance of the species in the areas
- 1.2.4 Importantly, by virtue of Article 7 of the Habitats Directive, the procedures relating to the protection of SAC equally apply to SPA. Article 7 of the Habitats Directive supersedes the previous requirements of the first sentence of Article 4(4) of the Birds Directive.
- 1.2.5 The UK is also a contracting party to the Ramsar Convention⁵. This is a global convention to protect wetlands of international importance, especially those wetlands utilised as waterfowl habitat. In order to ensure compliance with the requirements of the Convention, the UK Government expects all competent authorities to treat listed Ramsar sites as if they are part of the suite of designated European sites, as a matter of policy⁶. Most Ramsar sites are also a SPA or SAC, but the Ramsar features and boundary lines may vary from those for which the site is designated as a SPA or SAC. Collectively proposed and classified SPA, SAC and EOMS are referred to in this assessment as European sites. Article 6(3) and (4) of the Habitats Directive, and Regulations 48 and 85A - 85E of the Habitats Regulations, impose duties on all public bodies to follow strict regulatory procedures in order to protect the European sites from the effects of plans or projects.
- 1.2.6 Until recently, the assessment of the potential effects of a spatial or land use plan upon European sites was not considered a requirement of the Habitats Directive. A judgment of the European Court of Justice⁷ required the UK to extend the requirements of Article 6(3) and (4) of the Directive to include the assessment of

5 Convention on wetlands of international importance especially as waterfowl habitat, Ramsar, Iran, 2/2/71 as amended by the Paris protocol of 3/12/92 and the Regina amendments adopted at the extraordinary conference of contracting parties at Regina, Saskatchewan, Canada 28/5 – 3/6/87, most commonly referred to as the 'Ramsar Convention.'

6 Office of the Deputy Prime Minister, 2005, Planning Policy Statement 9, Biodiversity and Geological Conservation, paragraph 6.

⁷ ECJ case C-6/04, *Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland*, 20th October 2005.

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the potential effects of spatial and land use plans on European sites. The Habitats Regulations have been amended accordingly⁸.

1.3 Outline of the Habitats Regulations Assessment process

- 1.3.1 The Habitats Regulations Assessment procedure is outlined in Figure 1 below, which illustrates the method of assessment in accordance with Regulation 85B. The site(s) affected could be in or outside the relevant plan area. Depending on the outcome of the Habitats Regulations Assessment, the LPA may need to amend the plan to eliminate or reduce potentially damaging effects on the European site. If adverse effects on the integrity of sites cannot be ruled out, the plan can only be adopted in accordance with Regulations 85C to 85E, where there are no alternative solutions that would have a lesser effect and there are imperative reasons of overriding public interest sufficient to justify adopting the plan despite its effects on the European site(s).
- 1.3.2 The Government is likely to expect that a plan will only need to proceed by way of these later tests in the most exceptional circumstances because a LPA should, where necessary, adapt the plan as a result of the Habitats Regulations Assessment, to ensure that it will not adversely affect the integrity of any European site. The considerations of Regulations 85C to 85E are not applicable in this case.
- 1.3.3 It will be seen that the key stages are screening, scoping, the 'Appropriate Assessment', introducing mitigation measures, consultation and recording the assessment.
- 1.3.4 It is anticipated that this report, prepared for a group of different authorities, will provide the respective material necessary for an assessment of each Core Strategy. This document in itself is not the definitive record of the assessment as it is solely focused on a single SAC and each of the local authorities is at a different stage in the production of their plans. In order to produce a definitive record of the submission version of their core strategy, each authority will need to consider other relevant European Protected Sites and produce a single, stand-alone report. Such a document could contain much of the text within this report or cross-reference to this report.
- 1.3.5 This report has taken account of published guidance and good practice relating to appropriate assessment, including:
- Department for Communities and Local Government, 2006, Planning for the Protection of European Sites: Appropriate Assessment under The Conservation

⁸ The addition of Part IVA (Regulations 85A-85E) to the Habitats Regulations in 2007, under the title "Appropriate Assessments for Land Use Plans in England and Wales".

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(Natural Habitats &c) (Amendment) (England and Wales) Regulations 2006: Guidance for Regional Spatial Strategies and Local Development Documents⁹;

- Office of the Deputy Prime Minister (ODPM), Circular 6/2005, Department for Environment Food and Rural Affairs Circular 1/2005, Biodiversity and Geological Conservation: Statutory obligations and their impact within the planning system;
- Royal Society for the Protection of Birds, 2007, The Appropriate Assessment of Spatial Plans in England: A guide to why, when and how to do it.

⁹ The Department for Communities and Local Government guidance has remained in draft from since its production in 2006.

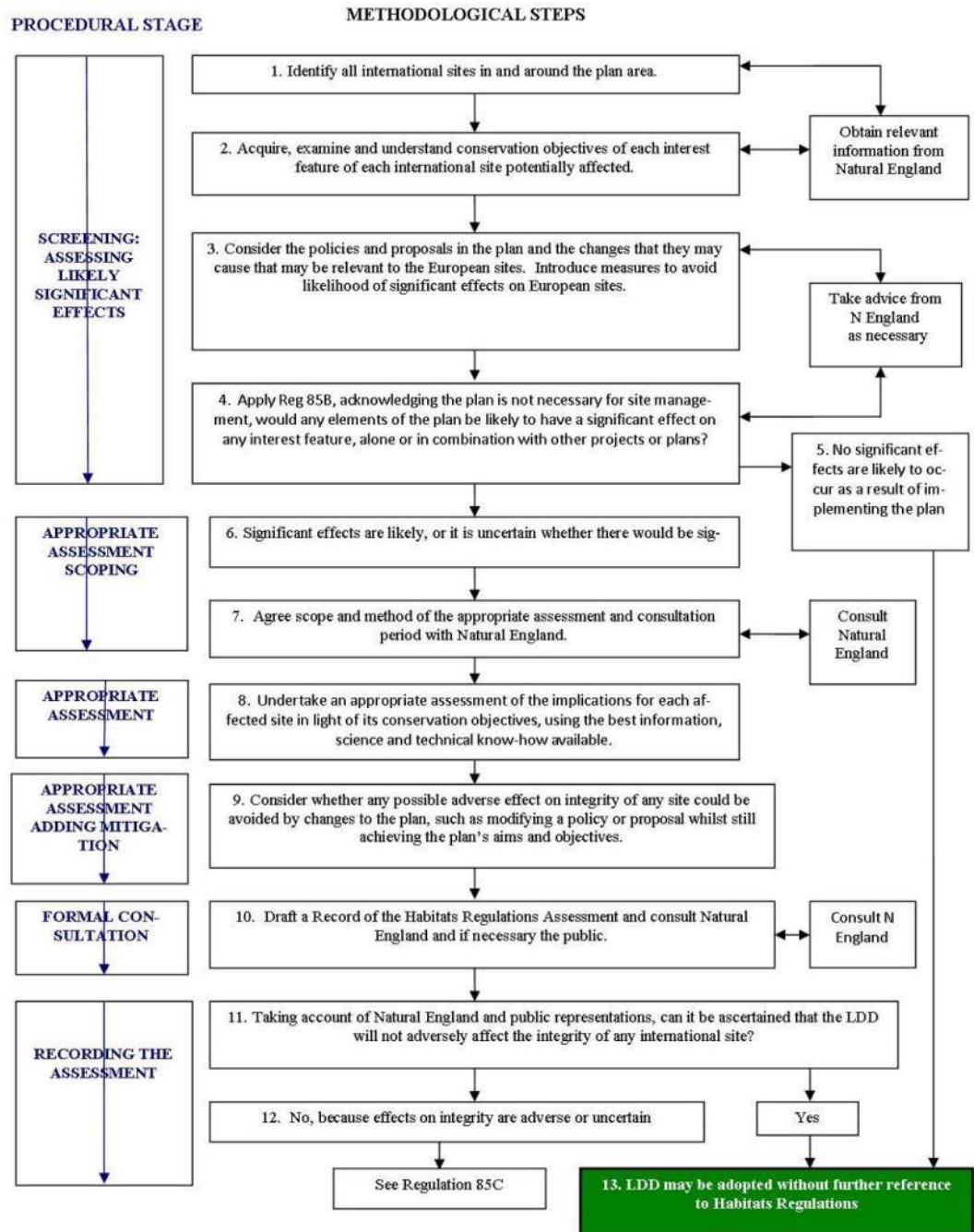


Figure 1: Flow chart showing the methodological steps for an appropriate assessment

2 Cannock Chase SAC

2.1 Description of Site

- 2.1.1 The Site of Special Scientific Interest (SSSI) at Cannock Chase was notified in 1987 and covers 1264.3 hectares. Almost all of this area (1236.93 ha) subsequently has been designated on 14 June 2005, as a Special Area of Conservation (SAC) under the provisions of the European Habitats Directive. Cannock Chase represents the largest area of heathland habitat surviving in the English Midlands and though much diminished in area from its original extent, as with all lowland heathland zones, the habitat and dependent species are of very high nature conservation importance. Map 1 shows the SAC in context with the AONB and surrounding area.
- 2.1.2 Cannock's well-drained, thin, acidic stony soils have formed over Triassic rocks of the Sherwood Sandstone Group. The more resistant rocks have resulted in a prominent, elevated range of hills (150m – 250m), deeply dissected by valleys and locally affected by subsidence following deep mining in the underlying coal deposits. Originally protected as a Norman hunting forest, later clearance of the sessile oak and silver birch woodland for fuel for the developing iron industry, especially since late Medieval times, led to ready depletion of soil nutrients and the formation of podsollic soils supporting extensive heathland. Common rights of grazing and fuel gathering helped to consolidate heathland vegetation but those activities have long lapsed and the reclamation of slightly better soils for agriculture, coupled with extensive afforestation with conifer plantations, has reduced the heath cover very significantly.
- 2.1.3 Without the traditional common uses actively pursued, especially grazing, and with the introduction of a huge source of pine seeds from the plantations, the open heath habitats are continuously threatened by scrub invasion and a shift away from heather-dominated communities to bracken and grass. Nonetheless, the open heathland that survives is a fine and rare example of heathland intermediate between the lowland heaths and mires of southern Britain and those of the uplands.
- 2.1.4 Dry heathland communities are the most widespread, with NVC H8 (Heather *Calluna vulgaris* – Western gorse *Ulex gallii*) and H9 (Heather – Wavy Hair-grass *Deschampsia flexuosa*) the main components. Much more limited areas of wet heath occur with Purple moor-grass *Molinia caerulea* and Cross-leaved heath *Erica tetralix*. Very locally there is mire with *Sphagnum* mosses, Sundew *Drosera rotundifolia*, Cottongrass *Eriophorum* spp and Bog Asphodel *Narthecium ossifragum*. The more upland character of the heath at Cannock Chase is reflected in the frequent occurrence of Bilberry *Vaccinium myrtillus*, Cowberry *V. vitis-idaea* and Crowberry *Empetrum nigrum*. A very scarce hybrid bilberry – *V. intermedium* - occurs at Cannock Chase, in its main location in Britain. Other very local mire flora includes Few-flowered Spike-rush *Eleocharis quinqueflora*, Cranberry *V. oxycoccus* and Marsh fern *Thelypteris palustris*. In a few places with more base-rich flushes, Grass of Parnassus *Parnassia palustris*, Common butterwort *Pinguicula vulgaris* and the sedges *Carex dioica* and *C. lepidocarpa* are recorded. Tall fen with Tussock

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sedge *C. paniculata* and Narrow buckler-fern *Dryopteris carthusiana* also occur in such places and in the valleys with wet woodland of Alder *Alnus glutinosa* and Grey willow *Salix cinerea*.

- 2.1.5 Most of the original oak/birch woodland cover was cleared for charcoal and timber but one area of veteran oaks *Quercus petraea* survives and these very old trees and the ancient woodland habitat are important for a number of nationally scarce and restricted beetles and moths. The mires support Small pearl-bordered fritillary butterfly *Boloni selene* and Bog bush-cricket *Metrioptera brachyptera*. The open dry heath and wood fringes also support a nationally significant population of European Nightjars *Caprimulgus europaeus*, and Woodlarks *Lullula arborea* also breed here. Dartford warblers *Sylvia undata* occur in small numbers. All of these are scarce and declining species in a European context, although the current populations are not such that the site would be classified as an SPA. (The RSPB advises that the 2006 national woodlark survey recorded 26 territories within the AONB, 16 of which were on the SAC. The national population recorded in that year was 1,741 so 1% of the UK population would be 18 territories or more. In 2006 Cannock Chase held c1.5% of the UK population.) The SSSI also has five species of bats present and there are small numbers of White-clawed crayfish *Austropotamobius pallipes* and Great crested newt *Triturus cristatus*.

2.2 Reason for Designation

- 2.2.1 Cannock Chase is designated as a SAC because of the extent of European Dry Heath habitat, for which it is regarded as one of the best areas in UK. The heathland is naturally relatively species-poor but here shows characteristics intermediate between the lowland heaths of southern England and the more montane heaths of upland Britain. The dry heath vegetation types, together with some areas restored recently from scrub invasion, occupy some 76% of the SAC. In addition to the important vegetation communities, Cannock Chase's dry heathland supports populations of several scarce invertebrates and is an important breeding site for the Annex I European nightjar.

- 2.2.2 In addition to the primary reason for SAC designation – the dry heathland – Cannock Chase is also designated for the further European Annex I habitat, North Atlantic Wet Heaths with *Erica tetralix*. There is only a small area of this habitat represented at Cannock Chase, so wet heath is not a primary reason for SAC designation. The small populations of European Annex II White-clawed crayfish and Great crested newts are also of interest, though not the reason for SAC designation.

2.3 Conservation Objectives

- 2.3.1 The conservation objectives for each European site within England are produced by Natural England. The conservation objectives set out what environmental conditions should be achieved in order for the ecological integrity of the European site to be maintained. The assessment of plans and projects as part of a Habitats Regulations Assessment should include consideration of whether the plan or project will affect the achievement of the conservation objectives for each

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European site. Natural England has produced the following set of conservation objectives for Cannock chase SAC, based upon the site's interest features:

- Maintain, in favourable condition, European dry heaths with particular reference to the H8 *Calluna vulgaris*-*Ulex gallii* and H9 *Calluna vulgaris* - *Deschampsia flexuosa* communities.
- Maintain, in favourable condition, North Atlantic wet heaths with *Erica tetralix*, with particular reference to the M10 *Carex dioica* - *Pinguicula vulgaris mire* and M16 *Erica tetralix* - *Sphagnum compactum* wet heath communities.

2.4 Condition

- 2.4.1 The 30 SSSI units of Cannock Chase have been assessed at different times between 2003 and 2009. Of the 21 units comprising lowland heathland, 20 are reported to be in “unfavourable recovering” condition and 1 “favourable”. Of the 7 units comprising lowland broadleaved and mixed woodland, 4 are reported as “favourable” and 3 as “unfavourable recovering”. Of the 2 units of lowland fen, marsh and swamp, 1 is reported as “unfavourable recovering” and 1 unit as “unfavourable no change”. The overall condition thus is that Cannock Chase SSSI is reported in 2009 as being 95.88% “unfavourable recovering” and 2.21% “favourable”. Together this means that 98.15% of the SSSI is assessed currently as meeting the target for SSSI condition, with only 1.85% being “unfavourable no change”.
- 2.4.2 No explanation of the condition assessment is given by Natural England as is sometimes the case. Given the lack of grazing or any imminent likelihood of grazing being re-established, the assessment of the heathland as “unfavourable recovering” could be misinterpreted, as it is primarily based on a management programme being in place through HLS, which then assumes that future improvements will follow, rather than seeing current improvements on the ground. However, other small scale or location specific initiatives have already been implemented over most recent years, which have had a locally positive effect. Clearly significant scrub and tree removal has taken place but the decline of heather dominated vegetation in favour of grass communities, and in some cases bracken, is apparent and this would seem likely to be an increasing feature in the absence of grazing. These do not provide a sustainable long-term solution. Without some additional vegetation management to address this into the medium to long term – ie grazing by appropriate livestock – the condition of the SSSI and thus SAC can be expected to revert to “unfavourable” as grasses eventually dominate once more.
- 2.4.3 An additional factor which may be affecting the vegetation dynamics of the SAC is the input of atmospheric nitrogen which is currently estimated to be above the critical level for dry heath and at the higher end of the critical load range for wet heath. The effect of nitrogen inputs on heathland ecosystems is to encourage a switch in dominance from ericaceous dominated vegetation to grass dominated communities, a process which heathland management including grazing can help to prevent or delay (see later section on air quality). Bramble also appears to be more widespread within the woodland and heathland areas of the SAC as a result of nitrogen input.

3 Overview of Relevant Plans

3.1 Relevant Core Strategies

3.1.1 In this report our focus is the following plan documents:

- Cannock Chase District Council: Preferred Options Consultation: April 2009
- Lichfield District Council: Core Strategy Preferred Options, December 2008.
- South Staffordshire District Council: Core Strategy Preferred Spatial Strategy Consultation Document, January 2009
- Stafford Borough Council: Delivering the plan for Stafford Borough: Issues & Options, February 2009

3.1.2 The SAC is shown in relation to the relevant district boundaries in Map 1. In Table 1 we summarise the levels of development and other key features within each strategy.

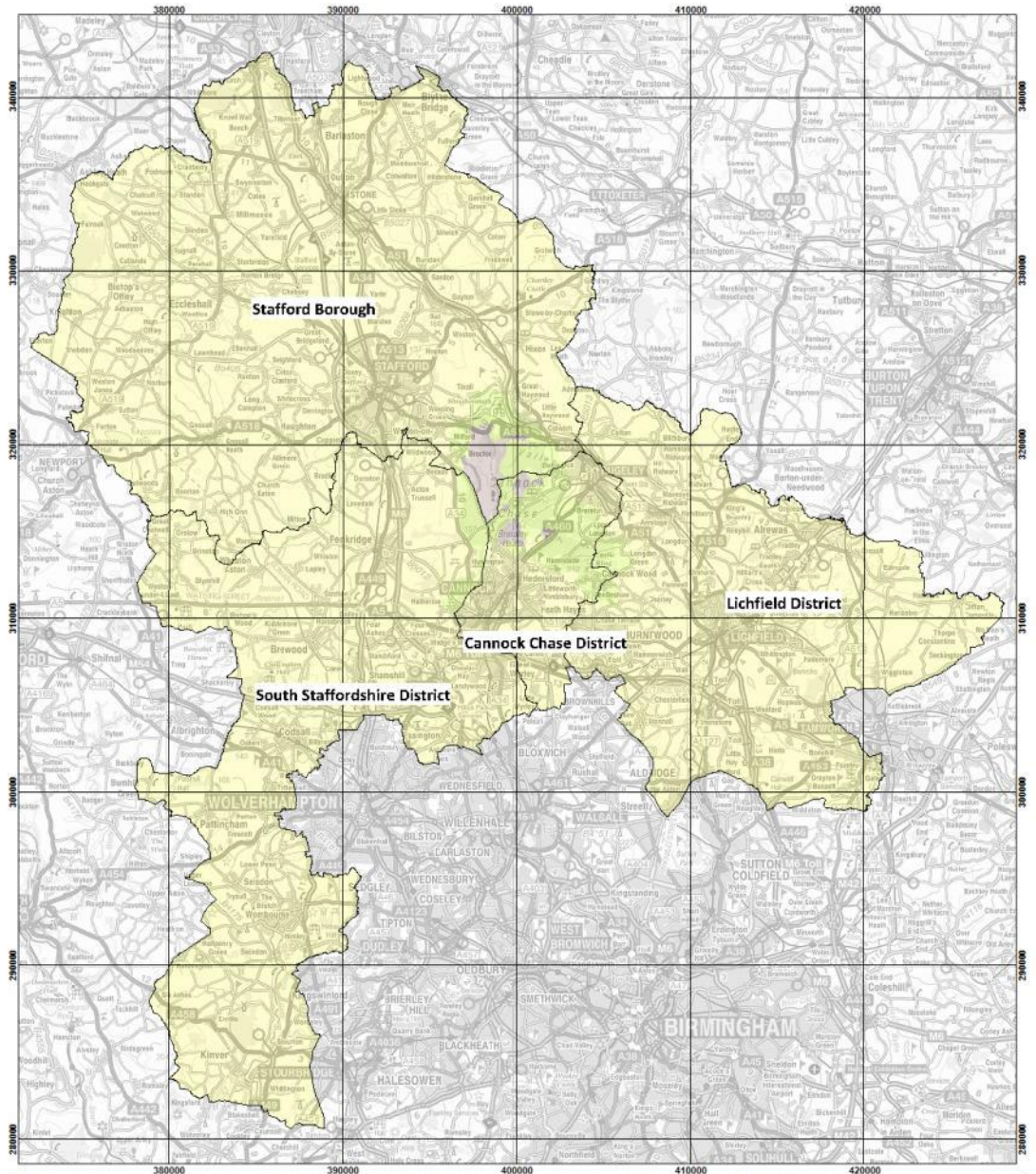
Table 1: Summary of the levels of development and other selected features of each core strategy, the numbers are not necessarily the allocation for each local authority but reflect current preferred options / working numbers.

	Housing (no. houses)	Employment (area of long term employment land)
Cannock Chase District Council	5,800	84ha
Lichfield District Council	8,000	99ha
Stafford Borough Council	10,100 (minimum growth scenario); 12,100 (higher growth scenario)	120ha
South Staffordshire District Council	3,500 (lower growth level); 4,375 (upper growth level)	24ha

3.1.3 The levels of development described in Table 1 are mapped in Map 2, which indicates the locations and scale of new housing around the SAC. The map provides a schematic overview of the strategic locations and likely levels of growth. For Stafford Borough the levels in the map are the mid-point (between minimum and higher growth strategies) taken for each settlement in the table on page 36 of issues and options report.

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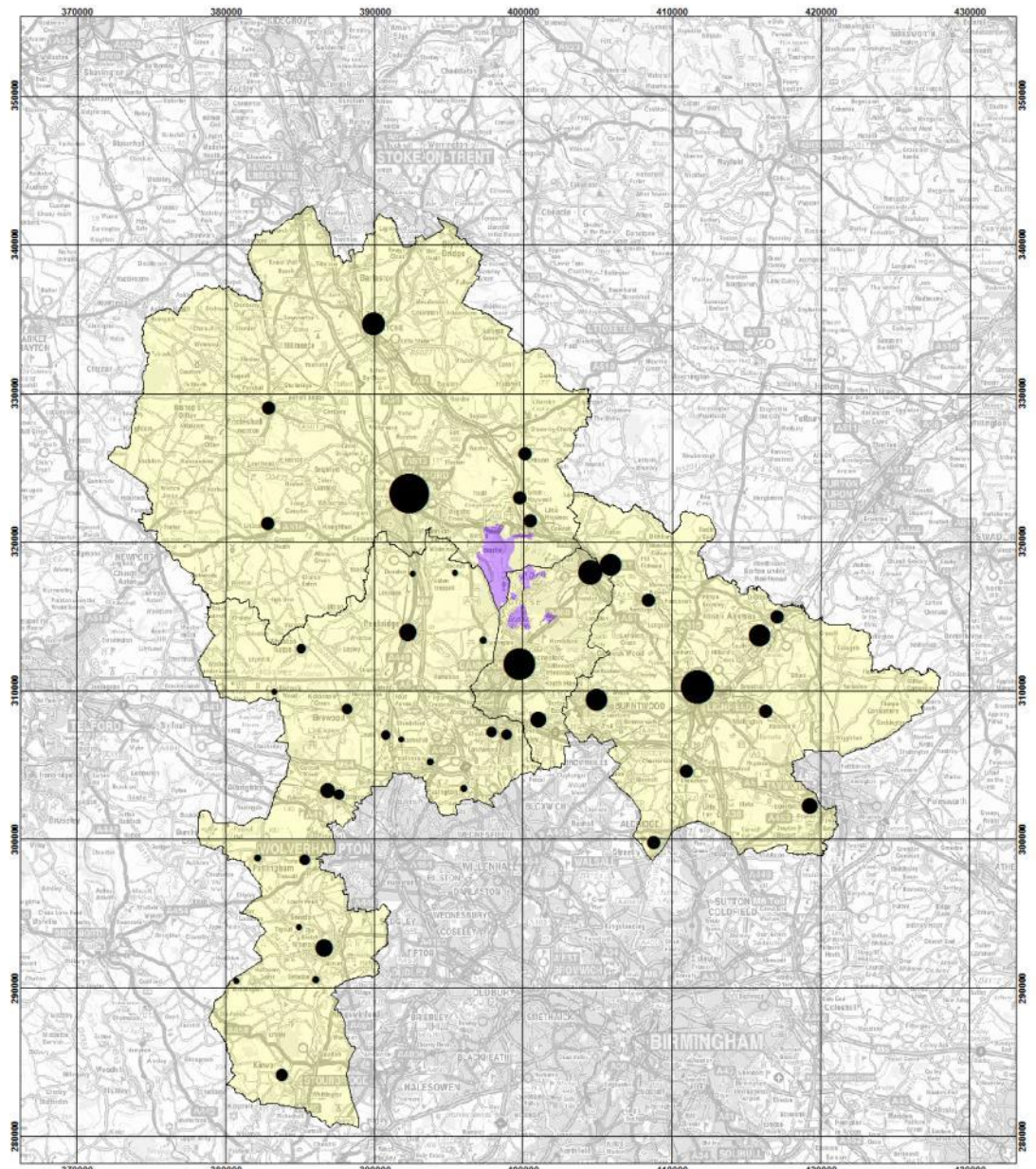


Map 1: Cannock Chase SAC and AONB in relation to the relevant districts
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of Cannock Chase SAC








 <p>footprint ECOLOGY</p> <p>20 May 2009 Scale 1:300,000</p>	<ul style="list-style-type: none">  District Boundaries  Cannock Chase SAC  Cannock Chase AONB 	<p>Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.</p>	
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Map 2: Cannock Chase SAC and schematic illustration of key growth areas in districts
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of Cannock Chase SAC

 footprint ECOLOGY 20 May 2009 Scale 1:350,000	 District Boundaries	Planned number of houses  8,000  4,000  800	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	
	 Cannock Chase SAC			

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3.1.4 The strategic approach for each District is summarised below:

3.2 Cannock Chase District

3.2.1 Cannock Chase District's Preferred Strategic approach is to focus development across the existing settlements of Cannock / Hednesford / Heath Hayes, Norton Canes and Rugeley / Brereton, with service provision developed to meet existing balances in housing across the District. The effect of this preferred approach is to broadly cater for development in the following proportions, Rugeley and Brereton 26%, Norton Canes 6% and Cannock, Hednesford and Heath Hayes 68%.

3.3 Lichfield District

3.3.1 The preferred development approach for Lichfield District focuses the majority of housing and employment growth on the larger settlements of Lichfield, Burntwood and to a lesser extent some development on the key sustainable rural settlements.

3.3.2 Lichfield, as the largest settlement in the District, will be the focus for housing and employment growth. Development for housing and employment will be on urban capacity sites and around Streethay and to the south of Lichfield. Development within Burntwood will be focused on developing the town centre to meet local needs. The plan also suggests some development within key rural sustainable settlements (Alrewas, Armitage with Handsacre, Fazeley, Little Aston, Shenstone and Whittington), with the amount of development that each settlement should contribute determined through the consideration of the individual characteristics of each settlement. Further significant development at Fradley will be focused on brownfield land and some of the housing needs of Tamworth will be met within the existing built up area of Fazeley; and some of the needs of Rugeley through urban extensions within Lichfield District. Limited development will occur in Lichfield District's smaller rural settlements through exception sites to meet local housing need only.

3.4 South Staffordshire District

3.4.1 The Preferred Spatial Strategy for South Staffordshire is to spread development geographically around the District on the basis of a clearly defined settlement hierarchy. The main service villages of Codsall, Bilbrook, Brewood, Cheslyn Hay, Great Wyrley, Kinver, Penkridge, Perton and Wombourne will be the main focus for development and service provision. These villages have the best range of facilities and services to support additional development. The villages of Coven, Essington, Featherstone, Huntington, Pattingham, Swindon and Wheaton Aston are defined as local service villages where limited development will be supported where it meets local needs. The local service villages have a smaller range of essential facilities and services but are capable of sustaining limited development. The focus for these villages will be on consolidating and improving existing services. Bednall, Bobbington, Bishops Wood, Dunston, Shareshill, and Trysull are small service villages where very limited development may be acceptable.

3.5 Stafford Borough

- 3.5.1 Stafford Borough's plan focuses on Stafford, where an additional 7,000 new houses will be provided by 2026 to create new communities, supported by district centres, with new health centres including GP surgeries and new primary schools in housing developments of more than 1,000 homes. In addition 90ha of employment land is anticipated.
- 3.5.2 The plan identifies the need for a new country park south of Stafford, provided as a sub-regional open space and recreational facility
- 3.5.3 Elsewhere within the district, additional housing development and employment land will be accommodated in Stone and selected rural settlements.

3.6 Other Plans and Projects

- 3.6.1 This report sets out an evidence base for the relevant local authorities to now use in the development of their individual HRAs of their Core Strategies. Depending on the outcomes of the HRAs for each of the core strategies, it may be necessary to consider the possible impacts of the four core strategies in combination with the following other plans and projects (largely taken from Treweek and Ursus Consulting Ltd. 2008):

- Staffordshire Local Transport Plan
- Staffordshire County Council Minerals and Waste Core Strategy
- Black Country Core Strategy
- Cannock Chase AONB Management Plan 2009 - 2014
- Rugeley Power Station Flue Gas Desulphurisation (FGD) plans
- Environment Agency consents for water extraction
- Severn Trent Water Water Resources Plan
- South Staffs Water Resources Plan
- Stoke -on-Trent and Newcastle Core Strategy
- East Staffordshire Core Strategy
- Regional Spatial Strategy and Phase II Revision
- Telford and Wrekin Core Strategy
- Outline Planning Application for housing development at Pye Green, Cannock Chase District
- Outline Planning Application for housing development at Curborough, Lichfield District
- RSS Phase 2 Revision*
- RSS Phase 3 Revision

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*It should be noted that at the same time as this evidence base report has been finalised, the Panel examining the Phase 2 of the RSS revision has published its recommendations¹⁰, which recommend a further 2,000 houses in Lichfield District, and a further 900 in Stafford Borough. It also recommends consideration of an additional 1000 in Stafford over and above its allocation, for the specific purpose of accommodating Defence Personnel related to Stafford, on their return from Germany. It is apparent from the Panel Report that it was understood by the Panel that the issues relating to Cannock Chase SAC arose from pressures in three surrounding districts, and the fourth, being Lichfield, is not referred to as being constrained by HRA issues. This is particularly apparent because the determined need for 1,000 houses in the Cannock Chase District is recommended by the Panel for inclusion in neighbouring Lichfield in order to avoid adverse effects upon Cannock Chase SAC. It may therefore be necessary for Lichfield Council to seek advice from the Government Office with regard to this issue, as it will have a bearing on how Lichfield District progresses with its Core Strategy, and how the Secretary of State is advised by the Panel Recommendations in the development of Proposed Changes to the RSS at Phase 2. With regard to Stafford Borough, the Panel report notes that the work to develop the necessary evidence base for local level HRA work is ongoing, and therefore acknowledges that the acceptability of the additional figures is yet to be established. Housing allocations for South Staffordshire and Cannock Chase Districts remain the same as those in the Preferred Options for the Phase 2 Revision. As the Panel Report has been published at the same time as finalising this evidence base, the extra figures have not been incorporated into this report.

¹⁰ West Midlands Regional Spatial Strategy Phase 2 Revision: Report of the Panel, September 2009

4 Likely Significant Effects

4.1 Defining Likely Significant Effects

- 4.1.1 A significant effect can be defined as “any effect that may reasonably be predicted...that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects”¹¹.
- 4.1.2 The term “likelihood” is equally important in the application of the check for a likelihood of significant effects. Critically, the check is for likelihood of effects rather than a certainty of effects¹².
- 4.1.3 It is important to note here that the significance of an actual effect is not necessarily, proportional to the scale of potential damage. The European Commission provides the following example in its guidance¹³, stating that “a loss of a hundred square metres of habitat may be significant in relation to a small rare orchid site, while a similar loss in a large steppic site may be insignificant.”
- 4.1.4 A large scale effect can be the result of seemingly very insignificant development where no direct habitat loss actually occurs. For example, a slight variation in water quality as a result of additional run off from a minor road some distance away from a European site may result in an adverse effect on a chalk stream where the interest features are reliant upon good water quality and particular water chemistry. A review of previous decisions by authoritative decision makers¹⁴ demonstrates that in many cases even the loss of less than 1% of a European site has been considered significant, and also likely to have an adverse effect on integrity of some of the sites. Decisions on whether there is a likely significant effect are therefore made with regard to ecological implications, rather than simply considering the scale of direct damage.
- 4.1.5 The legislation requires consideration of the effects of a plan or project either alone or in-combination with other plans or projects. It is important to note that the requirement is either alone OR in-combination. Where a plan or project is likely to have an effect alone, it is considered alone. Only where it has been determined that a plan or project will not have a significant effect alone, is it then considered whether a significant effect would occur if the effects of the plan or project were

¹¹ English Nature, 1999, Habitats Regulations Guidance Note 3: The determination of likely significant effect under The Conservation (Natural Habitats &c.) Regulations 1994. English Nature publication.

¹² EC, 2000, Managing Natura 2000 sites. Section 4.4.2.

¹³ EC, 2000, Managing Natura 2000 sites. Section 4.4.1

¹⁴ Hoskin, R. & Tyldesley, D. 2006, How the scale of internationally designated nature conservation sites in Britain has been considered in decision making: A review of authoritative decisions. English Nature Research Report No. 704.

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combined with other plans or projects. This may be the case for example where the recreational pressure of one net dwelling is not considered to significantly affect a European site, but the combined effect of hundreds of new houses would result in a significant recreational pressure.

4.2 Summary of Likely Significant Effects

4.2.1 The HRA of the West Midlands RSS Phase Two Revision (Trewick Environmental Consultants 2007) highlights the following likely significant effects to Cannock Chase SAC :

“Those parts of Cannock Chase SAC within 200 m of the A34, 513 or 460 may be exposed to increased levels of deposition of atmospheric pollutants, causing changes in the plant species composition of the vegetation communities for which the site is designated. Levels of traffic on these and more local roads could be further exacerbated by increased recreational use of the site associated with an expanding local population.”

“Recreational pressure and disturbance, particularly from dog-walking, horse-riding, mountain-biking and off-track activities (orienteering noted): all of these cause or contribute to erosion, creation of new tracks and damage to vegetation“

“Increasing recreational use could create a future need for additional supporting infrastructure or facilities, which could potentially require land-take within or near Cannock Chase SAC. Another possible consequence of increased recreational use could be impacts on water quality and localised eutrophication. All these effects could be further exacerbated by the in-combination effects of the Southern Staffordshire Economic Regeneration Strategy and Visitor Economy Strategy”.

“Water abstraction is an existing issue at the site which could potentially be exacerbated by housing development.”

4.2.2 The HRA (Trewick Environmental Consultants 2007) also recognises the particular issues with respect to Cannock Chase and makes particular recommendations:

“Due to the particular pressure at Cannock Chase SAC and likelihood that additional housing will increase local traffic and local air pollution, either housing numbers in the District should be reduced, or Policy CF3 should be amended as follows:

The delivery of additional housing in this district is dependant on further studies to confirm that the housing and associated traffic movements will not lead to an increase in local air pollution at the site”.

Following these studies, housing in the District should be implemented in tandem with measures to ensure that levels of traffic do not increase on roads around the site, whether through improved public transport schemes or other measures such as road pricing.”

4.2.3 At the time of writing this report, the West Midlands RSS Phase Two Revision has been going through the process of Examination in Public. Local planning authorities within the West Midlands Region must prepare their development plan

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documents in accordance with the RSS. It is necessary therefore for each authority to look to the emerging RSS revision to guide the development of local level planning documents.

4.2.4 At the current stage in the revision process, proposals have been tabled at the Examination in Public that incorporate the regional HRA recommendations and add measures into RSS policy wording that direct local planning authorities commencing their local level HRA work¹⁵. In relation to recreational pressure, water quality and air quality, the following proposals for RSS policy wording, which are relevant to Cannock Chase SAC, have been presented at the Examination in Public and are fully supported by Natural England; wider measures not relevant to Cannock Chase are not included:

- Ensure that additional development does not result in an increase in recreational pressure that would result in an adverse effect on the integrity of European sites. The relevant local authorities must, in undertaking HRAs of their LDDs, ensure that increases in visitor numbers can be accommodated before giving effect to any such plan, with the provision of appropriate counteracting measures where necessary;
- Engage in early consultation with water companies, the Environment Agency and the HRA statutory consultation bodies on site allocations to ensure development is located and appropriately phased in Water Resource Zones where a sustainable water supply is available and where water supply can be secured without adverse effects upon a European site;
- Ensure Water Cycle studies are undertaken for all areas where significant effects on a European site are possible, to inform the evidence base for LDDs;
- Secure the fullest possible use of sustainable transport choices (T1), reduce the need to travel (T2) and encourage the development of sustainable communities (SR2);
- Include policies to improve air quality and reduce the levels of emissions as set out in air quality strategies so as to take account of the risks to European sites;
- Ensure that both the diffuse and local air pollution effects of proposed development on European sites are considered;
- Ensure that development is only permitted where it is clearly demonstrated by the HRA that it will not significantly contribute to adverse effects caused by diffuse air pollution at European sites, alone or in combination with other plans and projects. Where development would result in such increases it should include measures to secure an equivalent improvement in air quality or reduction in emissions from other sources;

¹⁵ Paper tabled at the West Midlands RSs Phase Two Revision Examination in Public, April 2009, as 'Exam 16: Suggested wording for Policy SR4 from WMRA (in consultation with GOWM, Natural England, CCW and others) distributed to participants to Matters 1 & 2A'.

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- Avoid the siting of new sources of emissions or development that would increase traffic levels on roads near to sensitive European sites;
- Consider the local air pollution impacts of increased road traffic within 200 metres of a sensitive European site, including impacts from dust;
- Require a pollution-neutral strategy for major development based on the results of local air quality assessments, especially for potentially polluting development near to European sites;

4.2.5 This suggested policy wording has been accepted by the Examination Panel for the Phase 2 Revision, and included in the Panel Recommendations to the Secretary of State¹⁶ in their report of September 2009. It should be noted that at this current stage the West Midlands RSS Phase Two Revision is yet to be taken forward into the Secretary of State's Proposed Changes. However, it is wording that Natural England consider necessary (along with other measures regarding other issues not relevant to Cannock Chase SAC) to enable it to be concluded that the RSS Phase Two Revision will not have an adverse effect upon any European site. Whilst some editing may take place, it is assumed that the general direction of the suggested wording will be taken forward into the revised RSS.

4.2.6 Initial HRA screening at the local level of the relevant strategies for the four local authorities was conducted in 2008 (Anon 2008) and identified the following potential negative effects:

- Water abstraction
- Air quality
- Recreational pressure

4.2.7 Water Quality is also raised as an issue, but purely as an impact from recreation, and we therefore consider this as an impact relating to recreational pressure.

4.2.8 In this report we take these three issues forward to the appropriate assessment stage. This is in accordance with the proposed RSS wording and the direction given to local level HRA, as above. For recreational pressure we consider recreation as part of a suite of 'urban effects' associated with heathland sites that occur in or close to urban areas.

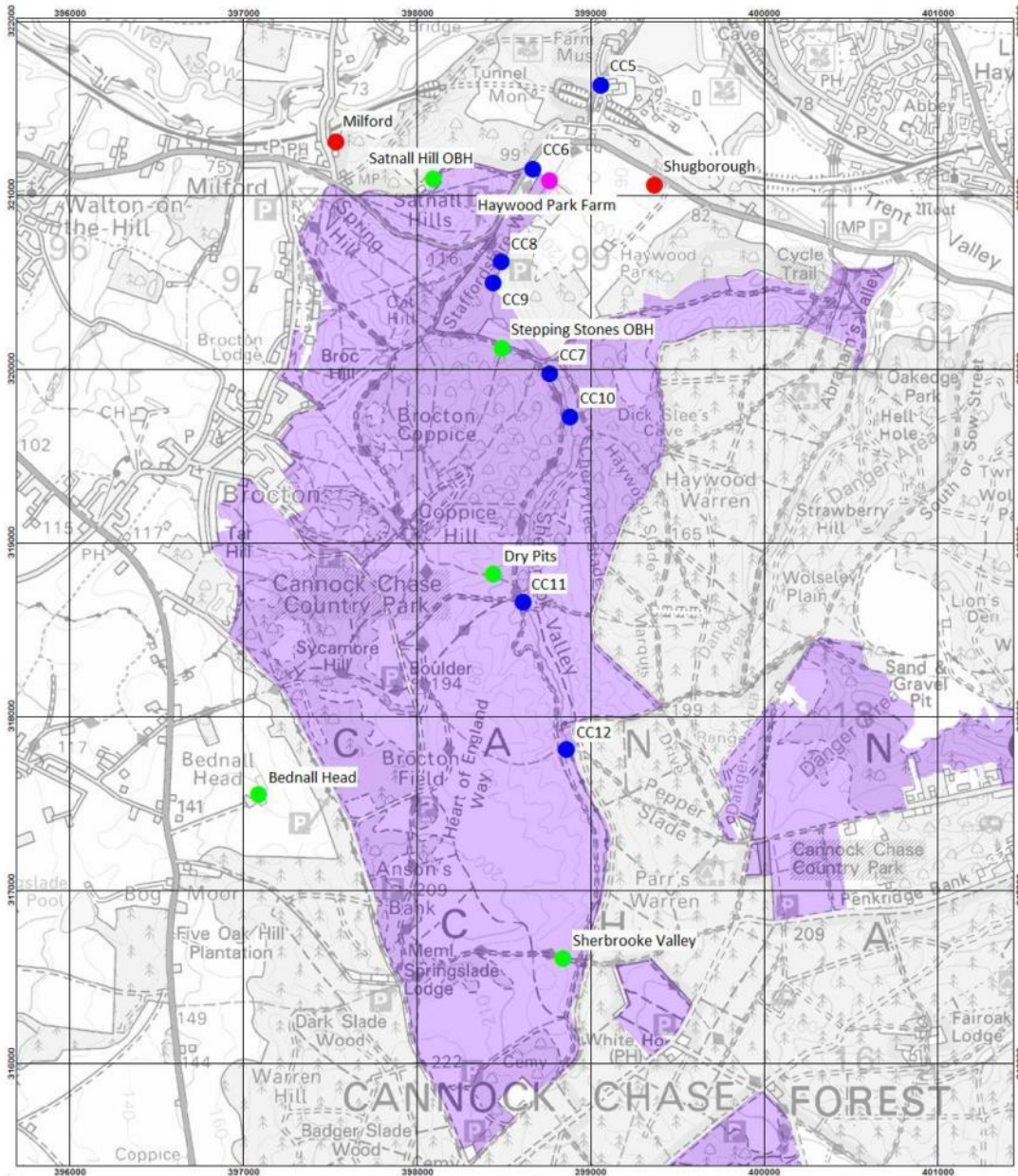
¹⁶ West Midlands Regional Spatial Strategy Phase 2 Revision: Report of the Panel, September 2009

5 Water Abstraction








- 5.1.1 A number of sources have been consulted during the preparation of this assessment. These include: (Smith, 1955;ESI, 2006; Severn Trent Water Company, 2006;ESI, 2008ab;ESI, 2008ba;Physalia, 2008;South Staffs Water, 2008;Severn Trent Water Company, 2009).
- 5.1.2 Water supply within the area is largely the responsibility of Severn Trent Water (STW), with water supplied by the South Staffs Water Company (SSWC) in the south, who also have an arrangement to transfer supply to STW at times of drought.
- 5.1.3 The water companies abstract some 2,300million litres of water per day (MI/d) for public supplies of which about three-quarters comes from surface water sources and about a quarter from aquifers. Both STW and SSWC have published their draft Water Resources Plans, but so far no Water Cycle Studies have been prepared by the LPAs.
- 5.1.4 In their Catchment Abstraction Management Strategy 4 (CAMS4), the Environment Agency identified four low flow sites within the Severn Trent Water operations area requiring investigation to identify whether groundwater abstractions were likely to be impacting on the surface water environment. The Sher Brook within the SAC is one of the four sites where they believe water abstraction by Severn Trent Water Ltd from their boreholes at Milford and Shugborough could be having an impact. Neither of these boreholes is currently operating at full licensed capacity and their output could be increased.
- 5.1.5 Natural England has also expressed concern about possible impacts of ground water abstraction for public water supply (PWS) on the middle and lower reaches of the Sher Brook and on groundwater levels in the valley, and the possibility that this has led to a reduction in the extent of wet heath in the stream valleys
- 5.1.6 EA's review of consents has identified a possible problem in relation to the Milford and Shugborough abstraction boreholes. Stage 3 of the review was not able to conclude that abstraction from these boreholes would not have an adverse effect on the SAC.
- 5.1.7 The boreholes operated by South Staffs Water at Moors Gorse, Brindley Bank and Slitting Mill are the closest to the SAC of the 25 boreholes the Company operates (see Map 3). The Company identified in their consideration of an unconstrained list of water resources options that there was currently 5 MI/d of spare annual and 10 MI/d of spare peak on the Slitting Mill/Moors Gorse/Brindley Bank licence. It was suggested that this could be transferred to a new confined raw water abstraction(s), north of the River Trent, (Nethertown) which could be used to support Blithfield Reservoir. Following comments from EA and NE on the unconstrained options this suggestion was taken no further, but the spare capacity at these boreholes remains, although the Company has no plans to increase abstraction levels.

Footprint Ecology

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Map 3: Boreholes, spot gauging and abstraction locations within the Sherbrooke Valley
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of Cannock Chase SAC

 footprint ECOLOGY 26 May 2009 Scale 1:30000	 Cannock Chase SAC	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	
	 Extraction borehole  Observation borehole  Spot gauging location  Surface water abstraction		

Footprint Ecology

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- 5.1.8 None of the abstractions by South Staffs Water have been identified by Natural England or the Environment Agency as being a risk to the SAC. Under the Review of Consents process, SSW have not been required to assess impacts on the SAC as the Environment Agency and Natural England do not believe it to be necessary and therefore their Draft Water Resources Plan makes no mention of any possible effect of their operations on the Cannock Chase SAC.
- 5.1.9 The Environment Agency considers that surface water abstraction at a number of locations around the SAC have no implications for the SAC status of the Sher or Oldacre Brooks.
- 5.1.10 There are concerns that the wet heath component of the Cannock Chase SAC which constitutes only 1.3% of the area of the SAC (c 16ha), and for which the area is considered to support a significant presence, has changed in both species diversity and extent. The main areas within the SAC containing wet heath or mire vegetation are in the valleys of the Oldacre and Sher Brooks, both flowing in a northerly direction, although separated by a ridge into two catchments, and both discharging into the River Sow.
- 5.1.11 Evidence for changes in these wet habitats is mainly anecdotal and is derived from the following sources:
- In his description of the H9 heath community (Rodwell, 1991) states “wholesale lowering of the water table, probably as a result of coal mining beneath the Chase, is drying out the mire systems there, eliminating the wetter elements or causing them to migrate downstream”. Unfortunately Rodwell does not give a reference for this statement.
 - In an NVC survey report on the mires and wet woodlands in the SAC, Godfrey & Hill (2006a) note that “Sphagnum lawns seem to have been much more prevalent in the past and such mire species as round-leaved sundew (and indeed oblong-leaved sundew *Drosera intermedia*) in the Oldacre Valley and bog asphodel *Narthecium ossifragum* in the mid Sherbrook valley were quite common. Also the change from Alder *Alnus* woodland to soft rush *Juncus effusus* pasture with increasing amounts of Bracken *Pteridium aquilinum* is indicative of drying”. Again, no references are given for these statements.
 - In an interim report Godfrey and Hill (2006b) suggest that the source of the Sher Brook has migrated downstream by 0.5 km-but give no evidence to support this.
- 5.1.12 Any consideration as to whether water abstraction is causing a lowering of ground water levels and consequent changes in the extent and character of wetland habitats on the SAC needs to take into account a number of factors:
- 5.1.13 Beneath the Triassic sandstone, which underlies much of the area, are Carboniferous coal measures which have been comprehensively worked in the past. The mining areas do not, as far as is known extend beneath the Sher and Oldacre valleys except in one area of the Sher valley in the south-east. In places the Triassic and Carboniferous aquifers are separated by an impermeable clay layer, but elsewhere there are permeable shales and sandstones which would allow leaking of

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water to lower levels. The distribution of impermeable and permeable strata is not known. Past mining activity could have lowered groundwater levels and caused stream headwater migration. Currently, water levels in the disused mines are rising. Past drainage and water diversion and supply works by the military could also still be having an effect on surface hydrology.

- 5.1.14 Current quarrying activity in the area is unlikely to be having any effect as this is above the water table and no de-watering is being carried out.
- 5.1.15 The effects on the water table as a result of changes to tree cover from former planting, successional increases in encroaching trees and scrub, and reductions in encroaching trees and scrub from recent heathland management, cannot easily be assessed.
- 5.1.16 The former extent and character of the wet heathland and mires is not known. Areas of presumed wetland may or may not have been linked to stream water levels, side streams or flushes or high groundwater levels. A vegetation map by Smith (1955) shows areas of bog alongside the Sher Brook, the Oldacre Brook, Mere Valley, and at Womere. However the details are not sufficient to assess the extent of bog areas against later maps.
- 5.1.17 It is not known whether there has been a change in the base status of the surface waters as a result of nitrogen or sulphur depositions (i.e. making the water more acid) nor whether increased recreational use (e.g. the nutrifying effects of dog waste) has affected water quality.
- 5.1.18 There is no evidence from historical maps that the headwaters have migrated downstream and more recent GPS surveys are of too short duration to draw conclusions.
- 5.1.19 The installation of observation boreholes (OBH) in the upper reaches of the Sher Valley (Sher Brook Valley and Dry Pits) show that groundwater levels correlate well with rainfall data and that substantial changes to abstraction rates at Milford PWS did not affect groundwater levels in these boreholes. Two new OBH at Stepping Stones and Satnall Hill, further down the valley and closer to the PWS boreholes at Milford and Shugborough have only been in operation since June 2008 (see Map 3). There have been technical problems with the OBH at Stepping Stones from August 2008 so subsequent data from this OBH is unreliable. However, it is suggested that neither of these OBH would detect substantial changes in daily abstraction rates at the PWS boreholes and that a longer duration change would be needed. Data from these new OBH suggests there is a good correlation between groundwater levels and rainfall.
- 5.1.20 Groundwater levels measured using shallow piezometers installed in June 2008 also show a correlation with rainfall. However, the changes in groundwater levels from the piezometers are difficult to allocate between recharge, evapo-transpiration and heterogeneity in alluvial deposits. Contact between the surface alluvials and the Triassic sandstone aquifer may vary spatially and in places clay deposits could lead to a perched water table.

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- 5.1.21 Eight flow gauges on the Sher Brook have collected data between Nov 2007 and Sept 2008, but only from the Brocton Coppice downstream, except in May and June 2008 when two gauges were recording in the mid valley area (see Map 3). There were no falls between gauges except between C6 and C5 (see Map 3) which are outside the SAC and probably not a real effect but due to measurement errors.
- 5.1.22 It is unclear whether areas of wet heath and mire are maintained by stream water or groundwater or both. However OBH data suggests that the upper and middle reaches of the Sher Brook and the upper reaches of the Oldacre Brook are groundwater fed.
- 5.1.23 Other historic activities could affect the general hydrology of the areas such as old sluices or bed management of the streams.
- 5.1.24 Changes in mire vegetation, especially the replacement of wet heath by vegetation dominated by Purple moor grass *Molinia caerulea*, may have taken place driven by increased atmospheric nitrogen inputs in recent decades and going unchecked following the cessation of grazing.

5.2 The Oldacre Brook

- 5.2.1 The steep hydraulic gradient makes it most unlikely that the PWS borehole at Bednall (see Map 3) which extracts from a deep regional aquifer will affect shallow groundwater levels in the upper groundwater system which supports the Oldacre Brook. Groundwater levels closer to the PWS show a good correlation with previous rainfall and no clear correlation with rates of abstraction. It seems that abstraction is not affecting the Oldacre brook and is unlikely to do so if abstraction rates are increased to licensed levels

5.3 The Sher Brook

- 5.3.1 The evidence for changes in the extent and character of the wet heaths is anecdotal and without measurements it is unclear whether the mire systems in the Sher Brook valley have contracted in area. However, evidence that certain mire plant species were previously present or present in greater numbers seems stronger. If, as seems probable, the mires have changed in character this could be due to nutrient inputs, changes in land management or lowering water table, or all of these. It is not possible on the evidence available to ascribe a cause to a probable change in the mires, but nor is it possible to rule out abstraction as a causative factor in the deterioration in mire quality which seem to have taken place.
- 5.3.2 Though there is no direct evidence that PWS boreholes at Milford and Shugborough are affecting the Sher Brook, in dry conditions a lack of accretion in the lower reaches of the Sher Brook due to abstraction is possible, and as both these PWS boreholes are operating at below their licensed capacity, any increases in abstraction rates could increase any impacts.

Footprint Ecology

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- 5.3.3 STW and the EA are reviewing the effects of the Milford and Shugborough boreholes and are proposing to carry out some pumping tests later in 2009 to try and establish the effect of abstraction on the Sher Brook. It is hoped that these tests will have been completed and the results analysed by March 2010.
- 5.3.4 STW has produced a draft Water Resources Management Plan but there are still considerable uncertainties over potential reductions in abstraction licence quantities and over water quality issues (Milford abstraction borehole has been out of use for some time due to high levels of manganese in the ground water).
- 5.3.5 The EA have produced a Staffordshire Trent Valley CAMS, which includes consideration of the Groundwater management Units of Rugeley and Teddesley (which covers the whole of the Cannock Chase area). This concludes that the groundwater resources are over licensed and will remain so until at least 2026, and that there will therefore be no water available for abstraction under new licences. No additional water will be granted under existing licences but there are no plans to reduce or cancel any existing licences.
- 5.3.6 Climate change may exacerbate any problems if groundwater abstraction is shown to affect the Sher Brook, as predictions indicate that while winters will be wetter, summers will be drier and this could affect the summer flows of this small stream.
- 5.3.7 It is understood that the outputs from the Milford and Shugborough extraction boreholes are fed into the supply system for Stafford Borough, and that when this source is not sufficient (as at present due to water quality problems) additional water is brought in from SSWC.
- 5.3.8 It is not possible, from the data so far available, to conclude that water abstractions from the boreholes at Milford and Shugborough are not having a significant adverse effect on the integrity of the SAC and that any effect will not be greater with increased abstraction at one or both boreholes.
- 5.3.9 Stafford LPA will therefore need to obtain assurances from the Environment Agency that a supply of water of sufficient quantity and quality will be available to meet the needs of new housing and industrial/commercial development before publishing their final development proposals in the core strategy.

6 Air Quality

- 6.1.1 In the preparation of this section reference has been made to a range of sources (Atkins 2002, Staffordshire County Council 2008, Cannock Chase Council 2007).
- 6.1.2 Airborne nitrogen arising from the burning of fossil fuels in industry, traffic, aviation and agriculture poses a considerable threat to heathland. Many heathland plant species can only survive and compete successfully on acid soils with low nitrogen availability. The addition of nutrients in rain or dust particles increases the nitrogen in the vegetation, litter and upper soil layers, and this builds up over time. Heather can initially benefit from inputs of nitrogen, but this also causes more rapid ageing of the plants and greater susceptibility to drought, frost and insect attack. Where the heather is weakened or removed, for example by fire, then grasses gain a competitive advantage both from the higher nutrient levels and from the increase in light; and this triggers a conversion from heather to grass-dominated communities with the loss of many specialist species associated with heather-dominated heaths. Grasses which can benefit from inputs of atmospheric nitrogen to the detriment of the heath vegetation include purple moor grass *Molinia caerulea* on wet heath and mire, and wavy hair grass *Deschampsia flexuosa* on dry heathland.
- 6.1.3 The most serious pollutant affecting heathland is nitrogen, due to nitrogen oxides (NOx) mostly from traffic and industry emissions, and ammonia (NH₃) mainly from agriculture.
- 6.1.4 Nitrogen compounds also increase acidification in heathland soils, which because of their low base status have poor buffering capacity, leading to dominance by the most acid resistant species and a reduction in biodiversity. High acid deposition can lead to direct damage to lower plants which receive their nutrients direct from the atmosphere. Acidification can also be caused by deposition of sulphur dioxide SO₂, mostly derived from electricity generation and industry.
- 6.1.5 A widely adopted international standard for setting acceptable levels of air pollutants is the use of critical loads and levels defined as: “quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge” (Nilsson and Grennfelt 1988). Critical levels identify acceptable levels of pollutants in the atmosphere while critical loads identify acceptable deposition levels on different habitats.
- 6.1.6 The critical loads/levels for deposition of a number of pollutants on wet heath and on dry heath and the estimated levels at Cannock Chase SAC are shown in Table 2. Only overall nitrogen deposition exceeds the lower range critical load for wet heath and the lower and higher range critical load for dry heath.
- 6.1.7 The screening opinion (Treweek and Ursus Consulting Ltd. 2008), also registered ozone levels as a potential cause for concern. It is known that high level plant communities such as alpine heaths are prone to the effects of ozone (which can

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alter the competitive ability of plants) but little is known of the effects of ozone on lowland heaths.

Table 2: Critical Loads / levels of deposition for a number of pollutants, for heathland habitats. Data are from apis¹⁷

Pollutant	Critical load/level on heathland*	Estimated for SAC
Nitrous oxides NO _x	30ug/m ³	13.1 ug/m ³
Ammonia NH ₃	1-3ug/m ³	1.2ug/m ³
Nitrogen N	Wet heath 10-25 Kg/ha/yr	21 Kg/ha/yr
Nitrogen N	Dry heath 10-20 Kg/ha/yr	21 Kg/ha/yr
Sulphur Dioxide SO ₂	20 ug/m ³	2.5ug/m ³
Acid deposition	4 keq/ha/yr	1.81 keq/ha/yr

*ug/m³: microgram per cubic metre of air

Kg/ha/yr: kilogram per hectare per annum

Keq/ha/yr: 1 keq equivalent to 14 Kg N /ha/yr

- 6.1.8 Apart from these estimates for loading levels on the SAC from nationally collected data, there are some local figures from Birches Valley, about 1.5 km from the SAC. These have been collected since 1994 up to Nov 2006 and are shown in Figure 2.
- 6.1.9 The figures show that there have at times been substantial deposition levels, up to 62.8 ug/m³ in November 1997 and over 25ug/m³ on 19 occasions during the period as a whole. However the trend line also shows a reducing trend in nitrogen deposition levels in line with national trends. This suggests that nitrogen deposition is a decreasing problem, but that past depositions could pose a problem for many years without management measures to reduce existing levels.

¹⁷ See <http://www.apis.ac.uk>

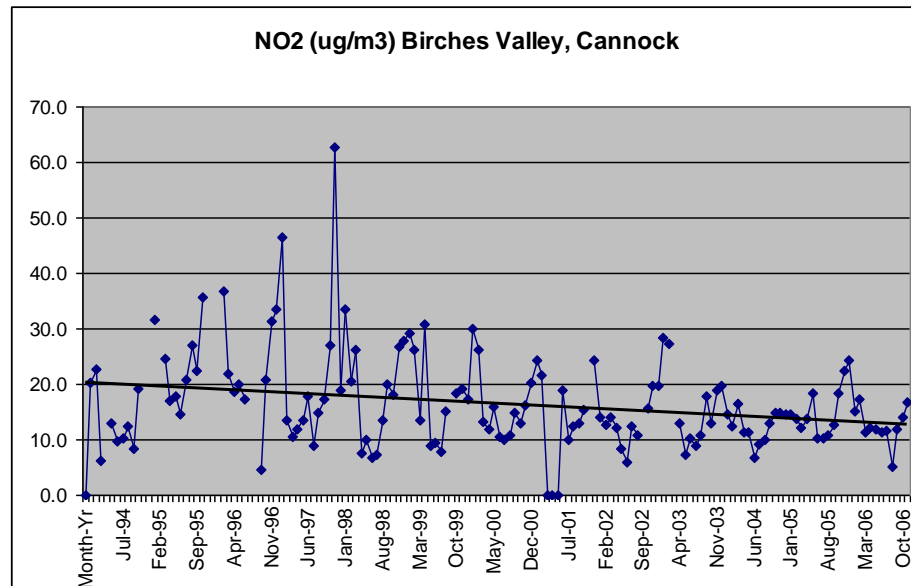


Figure 2: NO2 emissions at Birches Valley.

- 6.1.10 The main sources of pollutants at Cannock Chase SAC are likely to be the Power Station at Rugeley and traffic levels in the surrounding area. Rugeley Power Station has reduced its emissions of nitrogen oxides and is fitting flue gas desulphurisation to reduce emissions of sulphur dioxide.
- 6.1.11 The main ongoing concern is therefore from traffic emissions either as a result of the general increase in traffic levels as a result of new housing and employment developments within the region, or from localised effects from increased traffic on the roads crossing the Chase. The Habitats Regulations Assessment for the RSS considered that of those sites receiving nitrogen or acid deposition above critical loads in the West Midlands, Cannock Chase was most at threat due to its vicinity to three main roads and the expectation of a further 5800 houses in the area. It is not possible to make any assessment of the effects of any additional traffic generated as a result of the allocation of additional waste disposal or mineral working sites or increased capacity of existing sites, as neither the Joint Waste or Minerals Core Strategies have not yet reached the preferred options stage.
- 6.1.12 Another cause for concern would be any increase in traffic as a result of further congestion elsewhere, encouraging motorists to use roads across Cannock Chase as a 'rat run' to and from work or for the avoidance of congestion by heavy goods vehicles (already a problem on some areas in South Staffordshire). Congestion on the A34 could encourage such a change in traffic patterns.
- 6.1.13 Recent traffic data highlights the high levels of commuter traffic using the roads around the SAC (Figure 3). Comparison of weekend and weekday traffic flows shows a marked contrast. On weekdays there are clear peaks in the early morning and late afternoon, reflecting daily commuter use. At the weekend, use tends to be more even, peaking in the middle of the day, but relatively high between 10:00 and 16:00, reflecting recreational use. Interestingly there is also a small but noticeable

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peak in traffic levels in the early hours of Sunday morning, presumably attributable to people travelling home after a Saturday evening out. There is therefore a clear link between housing and traffic across the SAC.

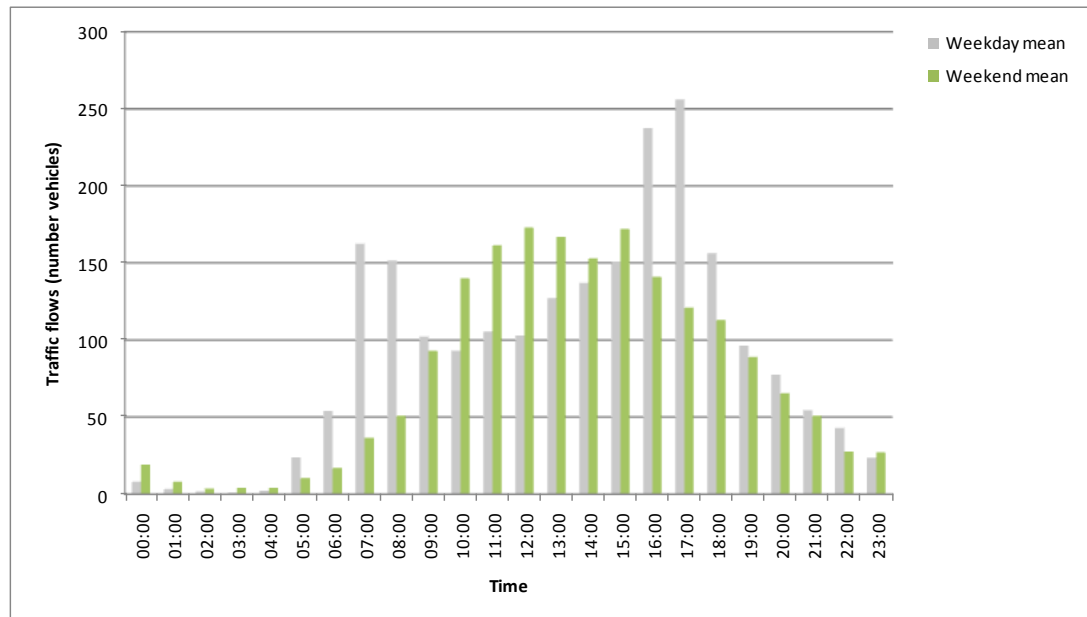


Figure 3: Hourly traffic flows for Penkridge Bank Road, Cannock Chase, for period 14/06/2004 – 23/06/2004. East bound traffic recorded at GR398958 315739. Data provided by Staffordshire County Council.

- 6.1.14 The Staffordshire County Council Local Transport Plan shows a full awareness of the issues of air quality and sensitive environments, and recognition that some areas, including Cannock Chase, are potentially sensitive to air quality changes. The plan proposes to review the County's road hierarchy with the intention "To reduce the impact of high traffic levels on air quality, and discourage the use of sensitive roads by inappropriate traffic". Most of the roads crossing Cannock Chase SSSI fall into the category of sensitive roads where they cross areas of heathland or potential heathland. Work elsewhere has shown an effect on heathland vegetation from local traffic can extend up to 200m from the road edge (Angold 1997).
- 6.1.15 Some attempt has previously been made to reduce car traffic to the SAC (almost all visitors arrive by car) by the provision of the Cannock Chase Hopper bus service, operating at weekends and bank holidays during the summer, and connecting Cannock Chase and Shugborough Hall with nearby residential areas and the local bus station. This service ceased to run c.2007.
- 6.1.16 A total of 414.37ha of the SAC is within 200m of a road (see Map 4), which constitutes 33.4% of the entire SAC area. This suggests that the vegetation, particularly the heathland communities, could be affected by traffic emissions over

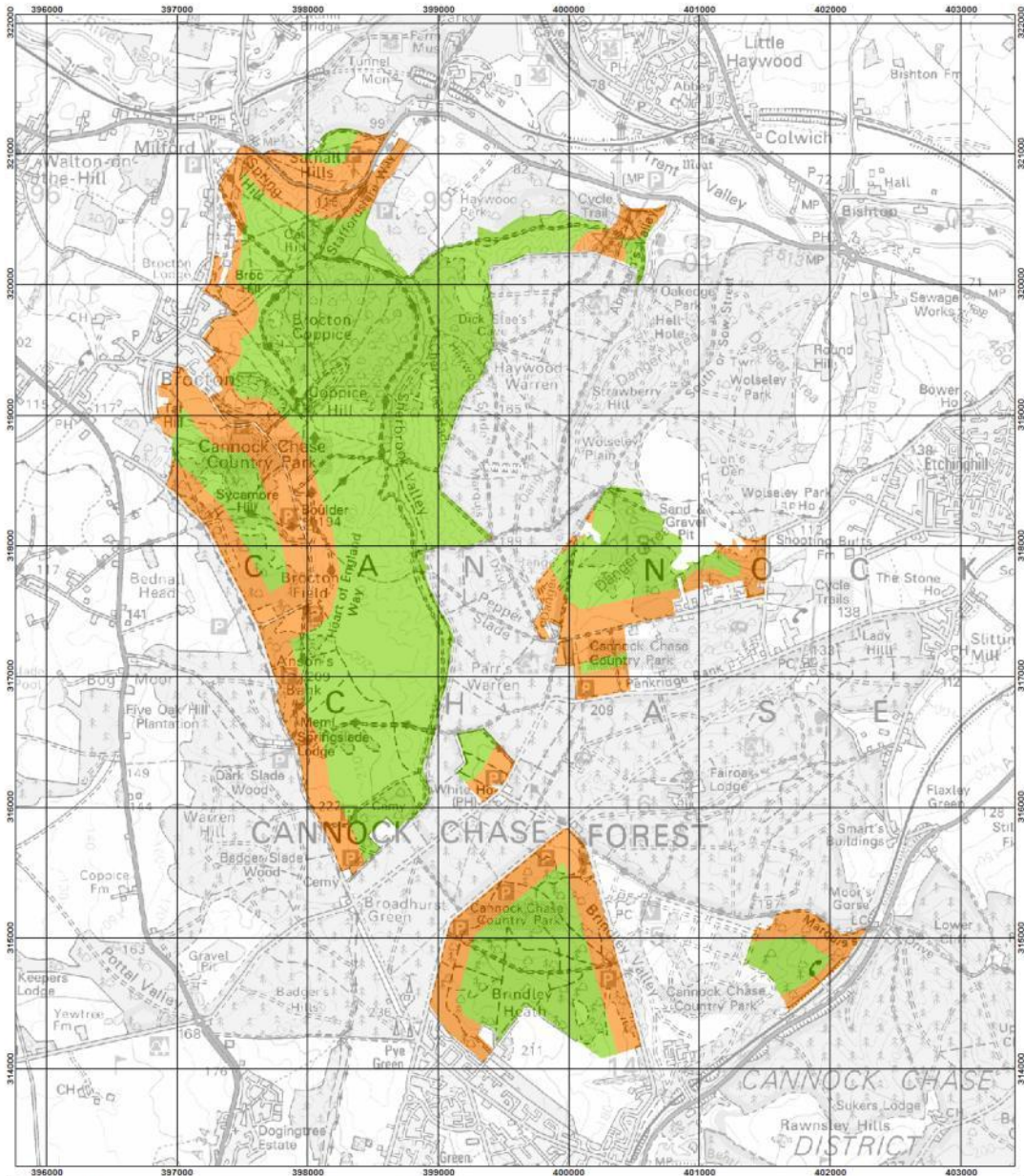
Evidence Base relating to Cannock Chase SAC and the Appropriate Assessment of Local Authority Core Strategies

a substantial part of the SAC, and that this could be at further risk from an increase in traffic levels.



- 6.1.17 The general level of nitrogen deposition at Cannock Chase already exceeds the maximum critical load for dry heath and the minimum, critical load for wet heath. Any further increase in nitrogen deposition is therefore going to further contribute to an adverse effect upon the integrity of the interest features. The main source of nitrogen is from traffic and additional development in the areas surrounding the SAC is likely to generate additional traffic. Most visits to the SAC are by car and it can be anticipated that further residential development in the area will generate more visits to Cannock Chase, and increase direct effects on the heathland from emissions. About a third of the area of the SAC is within 200m of a road. It is therefore not possible to conclude that the increased traffic levels both regionally and locally will not have a significant adverse effect on the integrity of Cannock Chase SAC.

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Map 4: Areas within Cannock Chase SAC within 200 m of a road
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 <p>footprint ECOLOGY</p> <p>2 September 2009 Scale 1:40000</p>	<ul style="list-style-type: none"> Cannock Chase SAC more than 200 m from a road Cannock Chase SAC less than 200 m from a road 	<p>Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.</p>	
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7 'Urban Effects' including Impacts from Recreation

7.1 Introduction

7.1.1 A wide variety of 'urban effects' are recognised from heathland sites surrounded by high levels of housing. These are largely related to access / recreation and include: deliberate and accidental fires, litter, predation from people and pets, eutrophication and dumping / fly tipping. Attention was formally drawn to these issues in a report on the Dorset heaths to the Council of Europe in 1998 (De Molenaar 1998), which prompted the UK Government to commission a study of heathland fires in the county (Kirby and Tantrum 1999). Various authors have since reviewed and summarised the various impacts (see Haskins 2000, Liley et al. 2006b, Underhill-Day 2005); we provide a summary in Table 3. We view these urban effects as potentially operating synergistically to influence the conservation interest of sites surrounded by high densities of housing.

Table 3: Summary of key negative impacts of development close to European heathland sites.

Effect	Description and Impact	Examples of species / species group affected	Key references
Fragmentation	Loss of supporting habitats	Nectar feeding invertebrates; nightjar, woodlark	Alexander & Cresswell (1990)
	Lack of connectivity between sites preventing movement / genetic exchange between sites	Invertebrates, plants, reptiles, birds and mammals	
	Link to disturbance as smaller sites less likely to have undisturbed areas	birds	
	Smaller site size increases edge effects from non-heathland species	Invertebrates and plants	Webb (1989); Webb & Vermaat (1990); Webb (1990); Webb & Thomas (1994)
Disturbance	Avoidance of otherwise suitable habitat by breeding birds	nightjar, woodlark	Liley & Clarke (2003); Mallord (2005, 2007a)
	Reduced breeding success due to disturbance	Nightjar, Dartford warbler	Murison (2002); Murison (Murison et al. 2007)
Predation and increased mortalities	Access by pet cats, some of which feed on the heath	Birds, invertebrates, reptiles and amphibians	Woods <i>et al.</i> (2003); Sims <i>et al.</i> (2008)
	Different densities of mammalian predators such as foxes present on more urban heaths	Birds, reptiles, mammals.	Taylor (2002)
	Increase in crows and magpies on sites with greater human activity	Birds, invertebrates, reptiles and amphibians	Marzluff & Neatherlin (2006)
Roads	Road kills from traffic	Birds, invertebrates, reptiles and amphibians	Erritzoe (2002)
	Increased levels of noise and light pollution	Birds, Invertebrates	Reijnen <i>et al.</i> (1997)
	Roads are barriers to species mobility	Invertebrates	Mader <i>et al.</i> (1990)
Pollution / Hydrology	Ground and surface water pollution from roads and hard surfaces, spills and dumping.	Vegetation communities, macroinvertebrates in watercourses	Armitage <i>et al.</i> (1994)
	Air pollution from industrial uses, fires and vehicles	Vegetation communities	Bobbink <i>et al.</i> (1998); Angold (1997); Signal <i>et al.</i> (2007)
Trampling	Soil compaction	Plant communities and	(Taylor et al. 2006)

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Effect	Description and Impact	Examples of species / species group affected	Key references
	Soil erosion from walkers, cyclists and horse riders	species. Invertebrates Plant communities and species, some invertebrates benefit	
	Damage to breeding and wintering sites	Invertebrates and reptiles	
	Creation of extensive path network increases spatial disturbance	Birds, reptiles	
	Creation of extensive path network results in fragmentation within the site	invertebrates	Lowen (2008)
Vandalism	Damage to signs, fences, gates		
Eutrophication	Enrichment of soils and water from dog excrement.	Plant communities and species, invertebrates	Bonner & Agnew (1983); Taylor <i>et al.</i> (Taylor et al. 2005)
Spread of aliens / pathogens	Recreational access can spread disease / pathogens within the site	Plant species	
	Access can provide a vector for seed dispersal, potentially brought in from outside the site	Plant species	
	Dumping of household and garden rubbish.		Liley (2004)
	Enrichment along road corridors, effects of dust, salt, run-off	Plant communities and species, invertebrates	Angold (1997)
Fires	High fire incidence on urban heaths. Direct mortality of fauna. Temporary removal of breeding and foraging habitat	Birds, invertebrates, reptiles and amphibians	Kirby & Tantrum (1999)
	Long term vegetation change from repeated fires	Vegetation communities	Bullock & Webb (1994)
Restrictions on management	Stock grazing, gates left open, dogs chasing animals, injury to stock		
	Objections to management eg. tree clearance		Woods (2002)
	Increased costs of wardening		
Negative public perception	Disregard of access and activity restrictions, hence trampling, dog fouling, fire lighting, illegal motorcycling etc	Vegetation communities, birds, invertebrates, reptiles and amphibians	

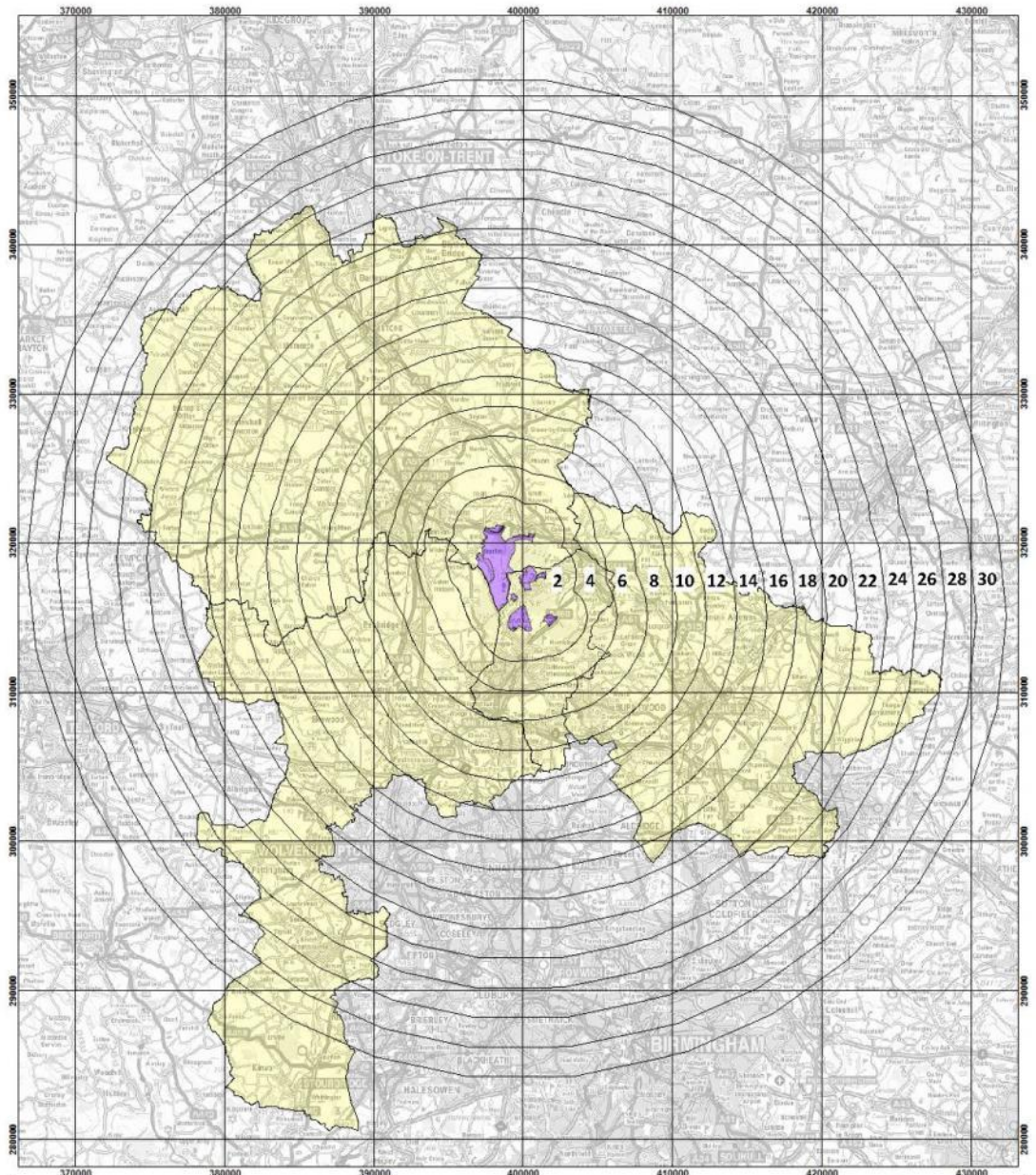
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- 7.1.2 Cannock Chase already has a high level of visitor use. The site is surrounded by a high density of settlement and has high visitor numbers. It is comparable in this respect to other heathland areas such as the heaths of SE Dorset, where much research has been carried out on the effects of human pressure on heathland habitat and species.
- 7.1.3 In order to assess the impacts in detail we consider the current levels of housing and levels of increase in the relevant districts. We attempt to relate housing to access using existing visitor data and we explore the existing access infrastructure and access provision. We make comparisons with other European Protected heathland sites in order to draw parallels with the scale of impacts (and mitigation measures) that have been determined elsewhere. We then explore the main issues specifically in relation to Cannock Chase SAC and its interest features.
- 7.2 Current distribution of housing in relation to the SAC**
- 7.2.1 There are currently over 1.1 million properties within a thirty mile radius of the SAC. Assuming average occupancy rates¹⁸ then this equates to some 2.7 million people living within 30km of the SAC boundary. Numbers of properties in successive distance bands increase away from the SAC due to the much larger area of the outer bands (Figure 4), with particularly high numbers of housing beyond 20km of the SAC boundary; these distance bands encompass West Bromwich and Birmingham (Map 5).
- 7.2.2 In the distance bands close to the SAC, it is Cannock, and to a lesser extent Stafford District, that have the largest volumes of existing housing adjacent to the SAC (Figure 5).



¹⁸ National average occupancy rates are 2.4 people per household.

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Evidence Base relating to Cannock Chase SAC and the Appropriate Assessment of Local Authority Core Strategies



Map 5: Cannock Chase SAC with 2 km buffers, up to 30km, and the relevant districts
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of Cannock Chase SAC

 footprint ECOLOGY 20 May 2009 Scale 1:350,000	 District Boundaries	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	
	 Cannock Chase SAC  2 km buffers around SAC to 30 km		

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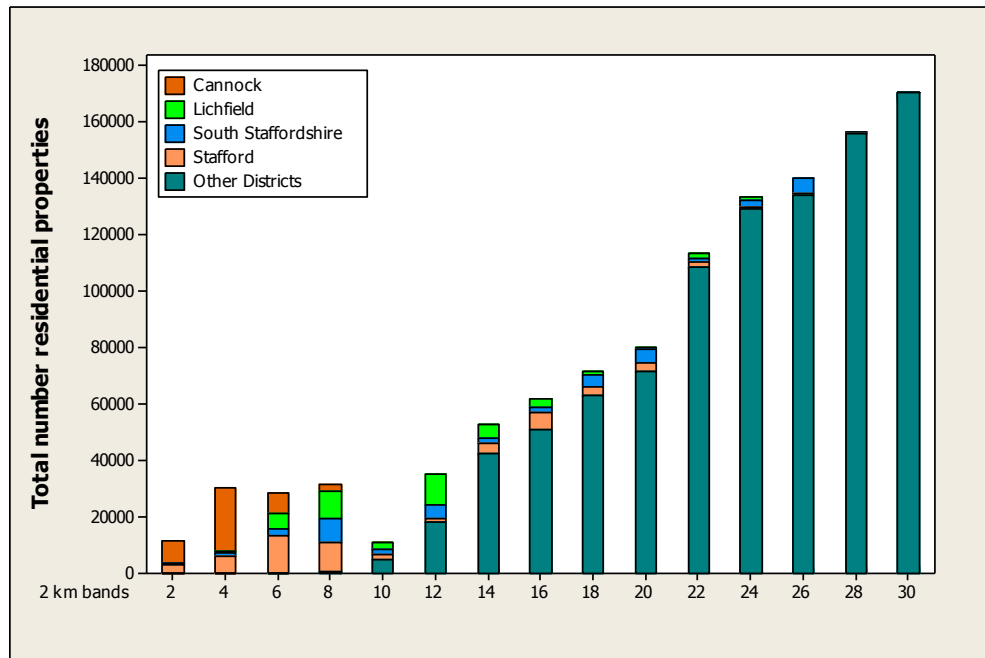


Figure 4: Number of residential properties at different distance bands (in 2 km intervals, from 0, i.e. 0-2, 2-4, 4-6 etc.) from the SAC boundary.

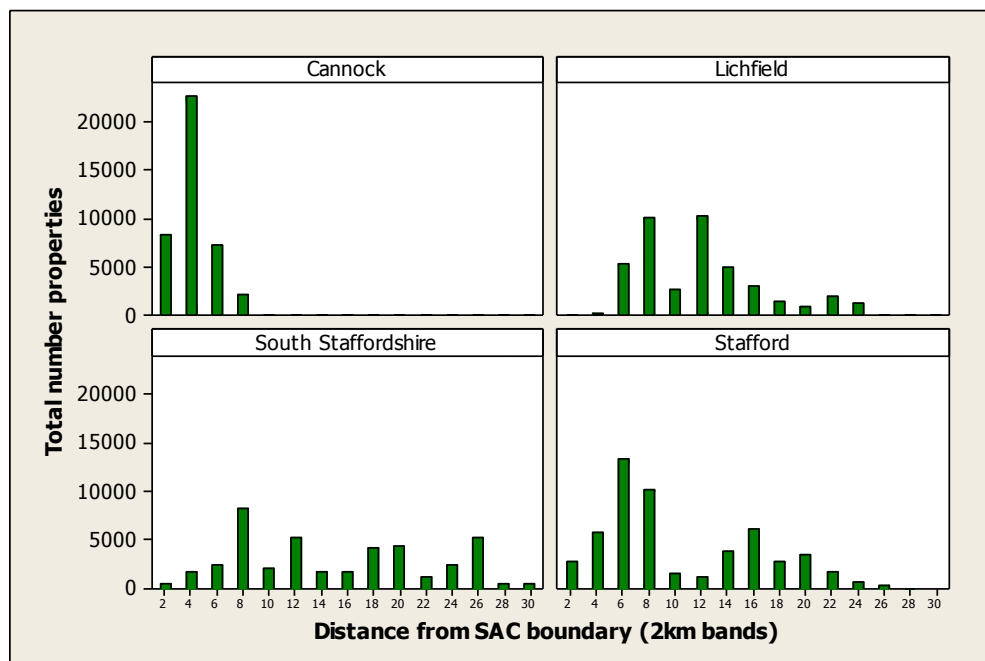


Figure 5: Number of residential properties within 20km distance bands for Cannock, Lichfield, South Staffordshire and Stafford Districts.

7.3 Current Access Levels and Access Infrastructure

- 7.3.1 The main information on visitor use of Cannock Chase comes from the visitor survey of the AONB, conducted in 2000 (Staffordshire University 2000). This survey involved on-site monitoring (eleven locations were sampled, nine of which were inside the SAC), door-to-door surveys with local residents and targeted work with local school children via the schools.
- 7.3.2 The visitor survey estimated total visitor volumes to the AONB to be 1.5 million. The people interviewed tended to visit frequently (60% stating that they visited at least fortnightly). Visits tend to be relatively short (i.e. less than two hours) and most people (81% of visitors) travel to the AONB by car. Walking (including walking with dogs) was the primary activity for 80% of visitors. Roughly a quarter (27%) of those walking had dogs with them. Mountain biking is also a key activity and the levels of mountain bike use are likely to have increased in more recent years since the development of the Birches Valley and provision of cycle hire, bicycle maintenance facilities and way-marked cycle routes. Staffordshire County Council also report an increase in night cycling with head torches in recent years.
- 7.3.3 The on-site element of the visitor survey included direct questions asking for home postcodes of visitors. Across all sites 70% of visitors came from within a 10 mile radius. There was however variation between the different interview locations and the distance people were travelling. Sites that had the highest incidence of use by local residents (living within 2 miles of the interview location) were Seven Springs and Castle Ring, followed by Birches Valley. At Castle Ring, the immediate proximity of the housing area of Cannock Wood meant there was a high proportion of local, regular use, especially by walkers and dog walkers. Although a little further removed from settlement areas, both Seven Springs and Birches Valley were found to draw visitors from Little Haywood and Colwich (at Seven Springs), and from Slitting Mill and Etching Hill (at Birches Valley). At these sites, 29% and 23% of visitors respectively, were resident within 2 miles of the sites. By contrast, the site which revealed the greatest proportion (17%) of visitors coming from beyond 20 miles was Marquis Drive.
- 7.3.4 The critical issue with respect to this assessment is how the spatial distribution of housing relates to the levels of recreational use. Data from all interview locations used in the AONB visitor survey are summarised in Table 4 and Figure 4. We have also extracted (from current postcode data in GIS) the number of residential properties in each band. It can be seen that, in relation to the number of houses, the visit rate appears to decline with distance, such that at the 10-20 mile band, the number of visits per property is in the region of 25 times less than the closest band (i.e. properties in the 10-20 distance band generate 1/25th the number of visits as closer properties). This approach is of course limited to the distance bands used in the original visitor survey, and visitor patterns in more recent years may well have changed, however it does provide an indication of the 'relative' draw of the Cannock Chase at different distances.

Evidence Base relating to Cannock Chase SAC and the Appropriate Assessment of Local Authority Core Strategies

Table 4: Distance travelled by visitors to Cannock Chase AONB. Distance categories and visitor data from the AONB visitor survey in 2000. Number of properties in each band extracted from current postcode data and is the number of residential properties. For the over 20 miles category the number of properties is for a band from 20 – 30 miles.

	Number of visitors	% of visitors	Number of properties in band	Number of visitors / number properties
0-2 miles	164	18	33,139	0.0049
2.1 – 5 miles	288	31	69,759	0.0041
5.1 – 10 miles	193	21	164,132	0.0011
10.1 – 20 miles	164	18	1,046,660	0.0002
Over 20 miles	116	12	893,115	0.0001
Total	925	100	2,206,805	

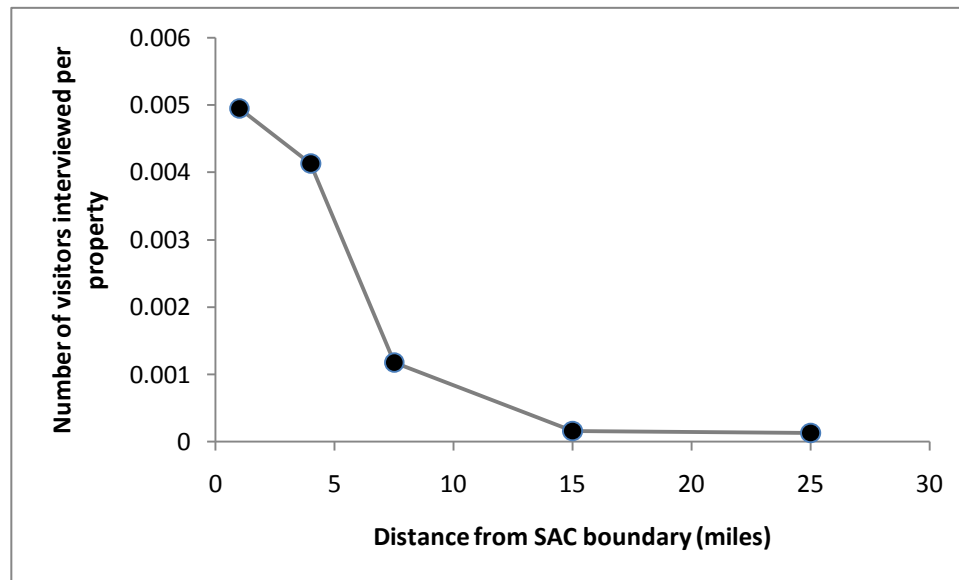


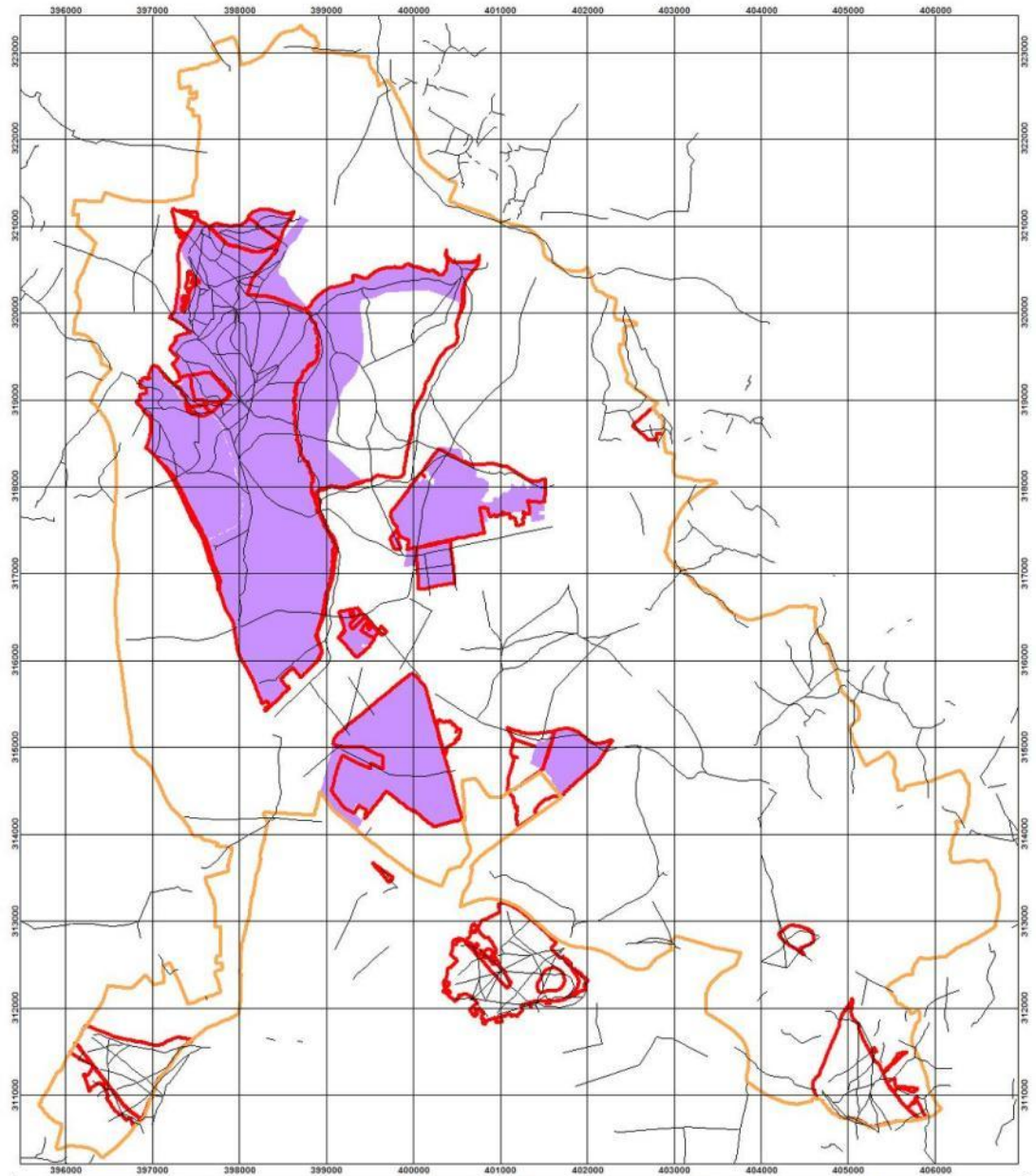
Figure 6: Number of visitors per property at different distances. Data are from Table 4.

Evidence Base relating to Cannock Chase SAC and the Appropriate Assessment of Local Authority Core Strategies

- 7.3.5 In Map 6 we show public rights of way (right of way data provided by Staffordshire County Council) for the Cannock Chase AONB and open access land (common land and open country only, and therefore excluding areas voluntarily dedicated by the Forestry Commission). The rights of way network is particularly focused within the SAC, particularly the north-western corner.
- 7.3.6 There are c.1086 car-park spaces around the SAC and a total of 85 different car-parks and lay-bys. These were mapped as part of this assessment and are shown on Map 7. It is striking that the distribution of car-parks is so focused around the SAC (rather than the forestry areas and other parts of the AONB). This skewed distribution in the distribution of access provision is also highlighted in the tranquillity study of the AONB (Land Use Consultants 2007), which used recreational impact as one measure of tranquillity. Various consultees (including parish councils, visitor centre staff, Natural England and tourism professionals) were asked to map areas where they believed recreational pressure was high or low. Their composite map shows that perceived recreational impact is highest in the areas around Marquis Drive and Birches Valley. While this is perhaps not surprising, the accompanying maps provide a clear visual pattern that much of the SAC is perceived to include relatively high levels of “recreational impact”, while many of the large conifer areas on the eastern and western slopes of the plateau are perceived to have little or no “recreational impact”.
- 7.3.7 This pattern is reinforced by Map 8, where the area of the SAC that has open access is divided up to reflect the distance from access points / car-parks. The coloured bands extend to a distance of 1km. Visitor monitoring from other heathland sites shows, for example, that the typical dog walk will ‘penetrate’ around 750m and that a relatively small proportion of walkers, dog walkers, families etc will stray further than a kilometre from an access point (see Clarke et al. 2006, Liley et al. 2006b, Liley, Jackson and Underhill-Day 2006c). The ‘access points’ shown on the map are either car-parks or foot access-points that are close to or adjacent to housing. This approach, while quite simplistic, does potentially map the areas where visitor levels might be expected to be concentrated. It can be seen that very little of the SAC is beyond a kilometre from an access point (pale green). Visitor impacts might therefore be expected across most of the site.

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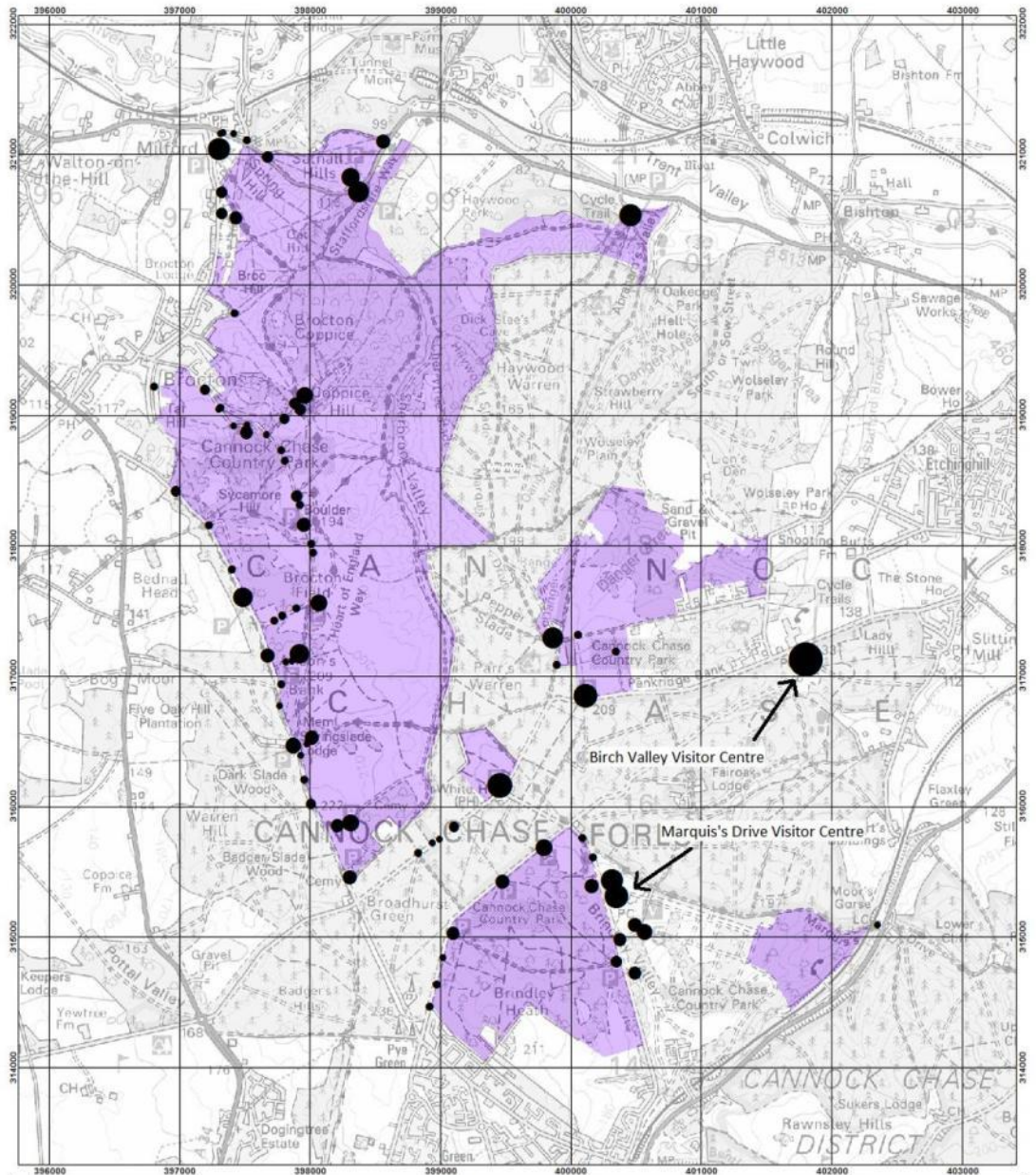
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Map 6: PROW and open access land within and around Cannock Chase SAC and AONB
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of Cannock Chase SAC

 footprint ECOLOGY 26 May 2009 Scale 1:60000	 Cannock Chase SAC	 Cannock Chase AONB	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	
	 PROW	 Open Access land		

Evidence Base relating to Cannock Chase SAC and the Appropriate Assessment of Local Authority Core Strategies

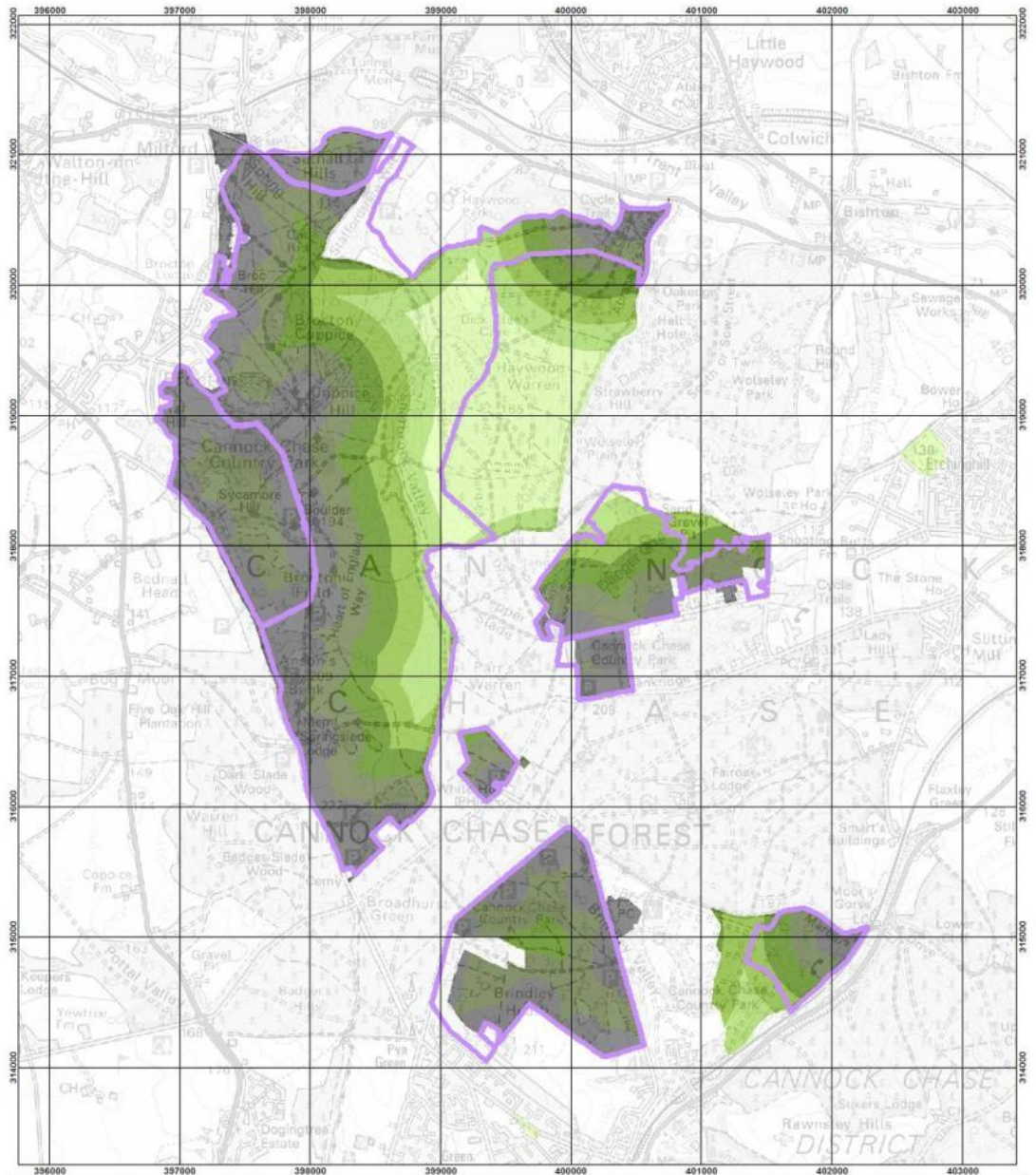


Map 7: Car parks, indicating capacity, within and around Cannock Chase SAC
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of Cannock Chase SAC




 footprint ECOLOGY 26 May 2009 Scale 1:40000	Car parking spaces  200  100  20	 Cannock Chase SAC	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	
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Evidence Base relating to Cannock Chase SAC and the Appropriate Assessment of Local Authority Core Strategies



Map 8: Distance within Cannock Chase SAC & open access land from a car park or access point
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of
 Cannock Chase SAC

 footprint ECOLOGY 2 September 2009 Scale 1:40000	 Cannock Chase SAC	Distance from car park or access point ■ 200 m ■ 400 m ■ 600 m ■ 800 m ■ 1000 m ■ > 1000 m	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	

7.4 Predictions of likely increases in access levels resulting from new housing

7.4.1 Map 2 shows, for the relevant core strategies, levels of growth in new housing and broadly outlines the locations for new development. The dots reflect the settlement where housing is proposed – the actual location of the housing could of course be in multiple locations and the map is intended as an indicative summary only. The levels of housing and locations have been extracted as follows:

- Cannock Chase District Council: Preferred Options Consultation: April 2009. Figures taken from the area implications and the maps in chapter 6. Housing in three broad locations (1: Cannock / Hednesford / Heath Haynes, 2: Rugeley, 3: Norton Canes) and the 3 dots on the map are therefore a simple representation of these broad locations.
- Lichfield District Council: Core Strategy Preferred Options, December 2008. Table 12.1, pg 58. The 1850 houses within other rural settlements have been distributed as follows: Fradley 1000; 170 at each of: Alrewas, Armitage with Handsacre, Little Aston, Shenstone and Whittington.
- South Staffordshire District Council: Core Strategy Preferred Spatial Strategy Consultation Document, January 2009. Mid-point taken for each settlement in Table 1, pgs 52 – 64. This table omits c.2000 houses that are already built (period 2006-2008), are under construction or have planning permission (see Appendix 4).
- Stafford Borough Council: Delivering the plan for Stafford Borough: Issues & Options, February 2009. Table on pg 36. Midpoint taken for the range given (i.e. midpoint between the lowest value in the minimum growth scenario and the maximum value in the higher growth scenario). Where multiple settlements named, then housing distributed evenly between them.

7.4.2 Using these indicative locations and levels of development we can determine how levels of housing might change at different distances away from the SAC boundary. This change is shown in Figure 7 and summarised in Table 6, which highlight that the levels of change are particularly high relatively close to the SAC, with the 4 and 6km distance bands potentially having an increase of 18 and 32% respectively.

7.4.3 The potential development locations are only loosely plotted and numbers are approximate, but the approach does allow us to highlight that substantial growth is proposed around Cannock Chase SAC, and particularly within the distance bands that Cannock Chase attracts a high proportion of residents.

7.4.4 Using the data in the 2000 Cannock Chase visitor survey it is possible to estimate the potential increase in visitor pressure as a result of new housing. A total of 1.27 million visits, per year, were estimated in the visitor survey. These data are shown (for the different distance bands used in the visitor survey) in column b of Table 5. For each of these (crude) bands we also know the approximate increase in housing (from Map 2). Applying this level of change to the 2000 visitor survey data would suggest that the numbers of visitors would rise to 1.38 million, an increase of 9%. This is a very simple estimate of change; it is useful to indicate the scale in the

Evidence Base relating to Cannock Chase SAC and the Appropriate Assessment of Local Authority Core Strategies

change in the level of access that might occur but we highlight the following caveats in the calculation:

- The 9% is solely from housing in the four districts relevant to this report. Development outside these will further increase visitor levels above this level of 9%.
- The calculation is based on the 2000 visitor survey, and we have little evidence to show how visitor numbers have changed in the intervening period
- The levels and distribution of new development are fairly crudely mapped and indicative only. It does not include 2000 properties in South Staffordshire (see bullet points above).
- The distance bands used in the 2000 visitor survey are relatively broad and within each band there is likely to be some variation in visit rates.

7.4.5

It is clear from Figure 6 that development close to the SAC will generate a disproportionate increase in visitor rates, compared to locations further away. People living close to the SAC are expected to visit more frequently, and are more likely to use the SAC for regular activities such as the daily dog walk. Such regular visitors are likely to become familiar with the site, relying on local knowledge and prior use of the site when choosing where to go. As such they are potentially harder to manage and influence through interpretation, signage, media etc. Development close to the SAC is therefore of particular concern. From Map 2 it can be seen that relevant locations close to the SAC are Stafford, Cannock / Hednesford / Heath Hayes and Rugeley.

Table 5: Predicted increase in visitor numbers as a result of additional residential development surrounding Cannock Chase, in the relevant districts only. Data in columns a) and b) is from the 2000 visitor survey, as are the choice of distance bands. Column c) is from current postcode data, extracted for each band within the GIS. New housing is that shown in Map 2.

	a	b	c	d	e	f
	% of visitors (from AONB visitor survey)	Number of visitors (from AONB visitor survey)	Current number of properties in distance band	Potential new housing within the band	% change in property numbers	% change in property applied to number of visitors
0-2 miles	18	270,000	33,139	5713	17	315,900
2.1 – 5 miles	31	465,000	69,759	11393	16	539,400
5.1 – 10 miles	21	315,000	164,132	7488	5	330,750
10.1 – 20 miles	18	270,000	1,046,660	1599	0	270,000
Over 20 miles	12	180,000	893,115	103	0	180,000
Total	100	1.5 million	2,206,805			1.6 million

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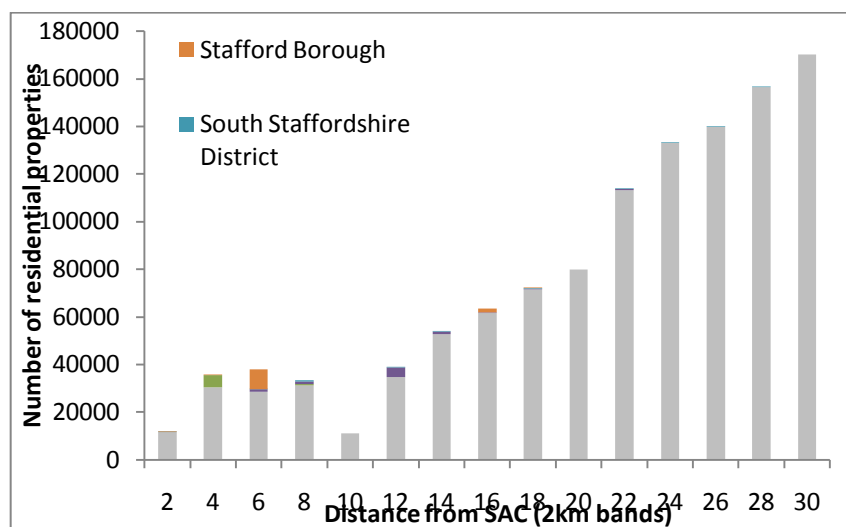


Figure 7: Current housing (grey) and approximate levels of new housing (coloured bands) at different distance bands from the SAC. New housing is for relevant districts only.

Table 6: Current properties and levels of new housing for relevant districts

Distance from SAC boundary (2 km bands)	Current Number Residential Properties	New Housing				Total new housing	% Change
		Cannock Chase District	Lichfield District	South Staffordshire District	Stafford Borough		
2	11,750			33	210	243	2
4	30,386	5260			210	5470	18
6	28,702		1000	8	8210	89218	32
8	31,334	390	1195	590		2175	7
10	11,061					0	0
12	34,817		4075	106		4181	12
14	52,801		1170	106		1276	2
16	61,586		340		1585	1925	3
18	71,617		170	366	210	746	1
20	80,025					0	0
22	113,265		400	68		468	0
24	133,152			25		25	0
26	139,721			433		433	0
28	156,420			25		25	0
30	170,335					0	0
Total	1126972	5650 ¹⁹	8350	1760	10425	26,185	

¹⁹ This total of 5650 is calculated with 3760 homes in Cannock, Hednesford and Heath Hayes, 390 in Norton Canes and 1500 in Rugeley. These figures are minimum values and are taken from Chapter 6 of the core strategy (preferred options). The actual total across the District will be 5,800 (see Table 1).

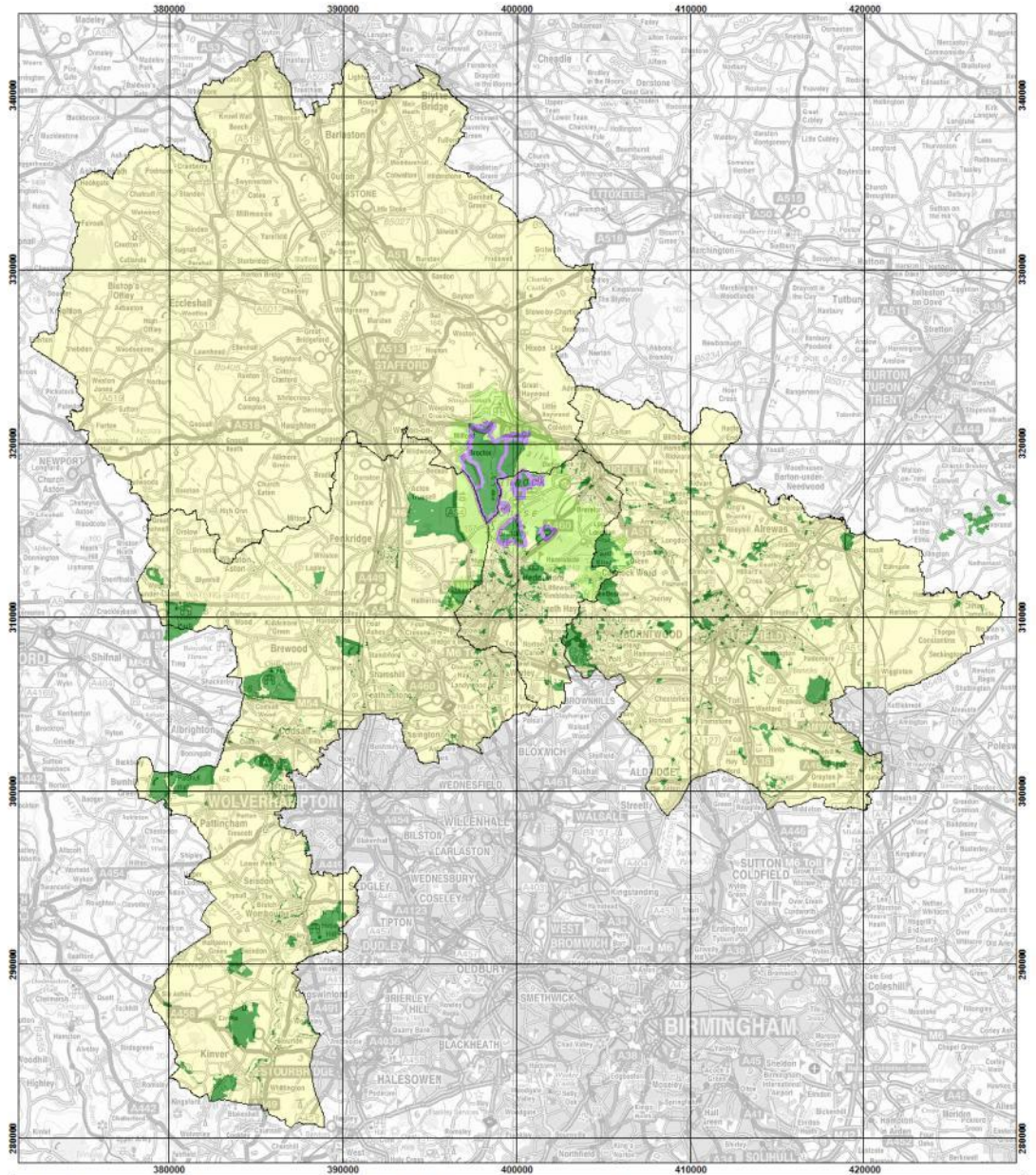
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- 7.4.6 In Map 9 we show the network of existing green space sites that surround Cannock Chase AONB. The data are patchy, based on green space audits provided by the local authorities. The audits are not directly comparable as slightly different methods are used by different local authorities and data are not available for Stafford Borough Council.
- 7.4.7 While there is no information to show how access patterns on these sites compare or relate to Cannock Chase, the map does highlight that Cannock Chase is unique within the general area, in providing a large, extensive site with semi-natural habitats.
- 7.4.8 In Map 10 we show drivetime isochrones drawn from the car-parks on or adjacent to the SAC. The map has been derived using the OS Mastermap road network and standard mapping software (Routeware™). In the calculations above we have relied on buffers that reflect the 'straight-line' (Euclidean) from the SAC boundary. By deriving drivetime isochrones we can also demonstrate that there are no physical barriers or particular areas with extended travel time to reach the SAC.

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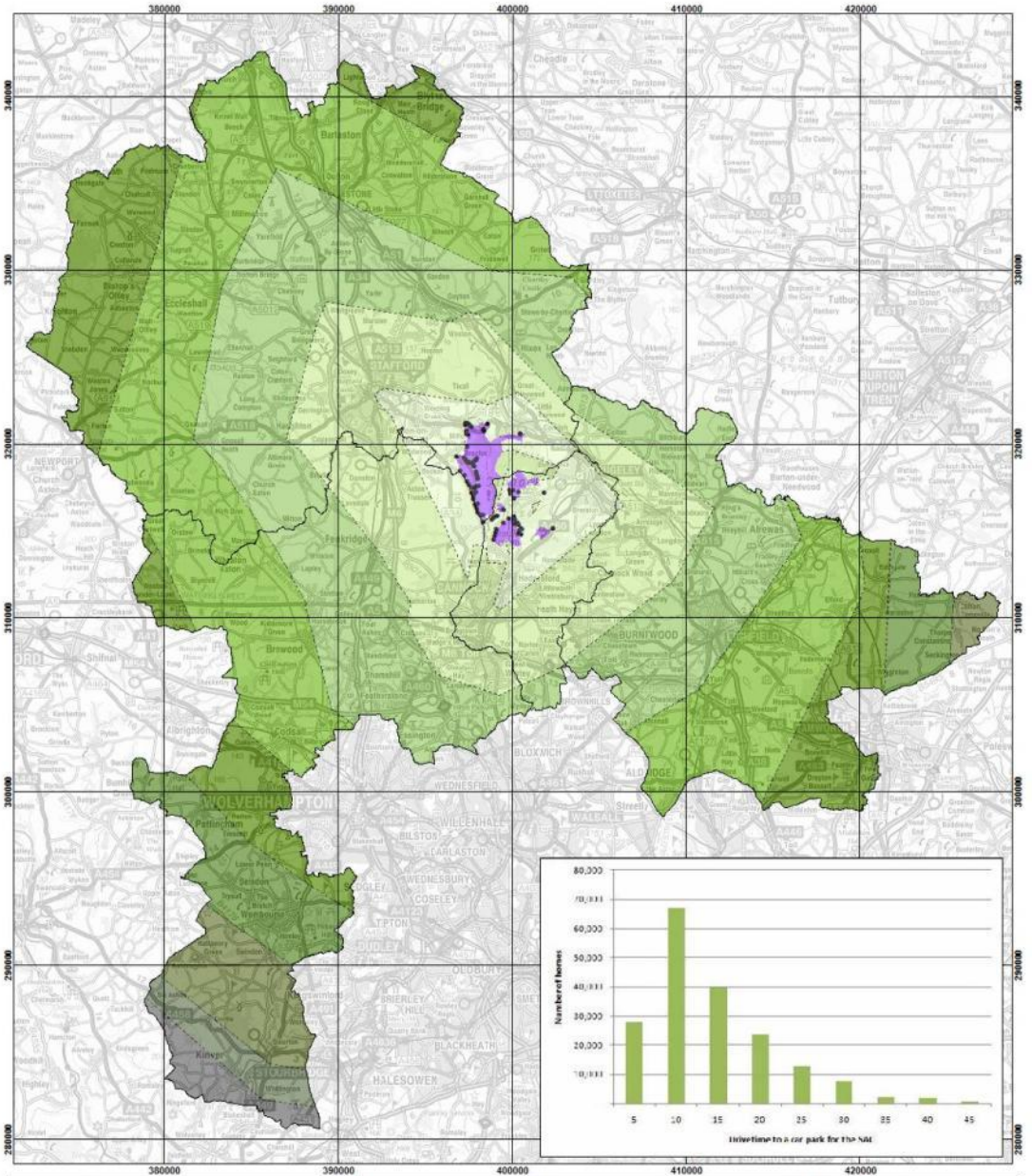


Map 9: Green infrastructure provision in the relevant districts
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of Cannock Chase SAC

 footprint ECOLOGY 2 September 2009 Scale 1:300,000	 District Boundaries	 Channock Chase SAC	 Cannock Chase AONB	 Green infrastructure	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	
	No data available from Stafford District Council					

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Map 10: Drivetime isochrones, for the relevant districts, around car parks for the SAC
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 footprint ECOLOGY 2 September 2009 Scale 1:300,000	District Boundaries	Drivetime to a car park 5 mins 10 mins 15 mins 20 mins 25 mins	SAC car park Channock Chase SAC	30 mins 35 mins 40 mins 45 mins	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	
	District Boundaries	SAC car park Channock Chase SAC	30 mins 35 mins 40 mins 45 mins			

7.5 Impacts in relation to Cannock Chase SAC, site integrity and conservation objectives

7.5.1 In this section we consider the 'urban effects' specifically addressing Cannock Chase SAC and in relation to the site's interest features and conservation objectives.

Soil erosion and compaction

7.5.2 The consequences of recreational activity on soil characteristics are complicated and the subject of a considerable volume of work (e.g. Cole, 1987, Growcock, 2005, Komatsu et al., 2007, Liddle, 1997). In general, trampling causes compaction and the maceration and physical removal of litter layers from the path surface as well as a reduction in the depth of the organic soil layers. This will also lead to a reduction of porosity, as does the direct force of compaction. The reduction in porosity means that there is less space for air and water, and a subsequent reduction in the suitability of the soil to support living processes. The physical action of feet or wheels may also loosen or displace some particles, and this together with the reduction in plant cover, leads to soil erosion. This can be accentuated by the fact that rainfall cannot easily penetrate the compacted soil and hence a greater proportion flows over the soil surface.

7.5.3 Erosion will also occur both during and after recreational activity (e.g. Kuss, 1983). The maximum impact force of a galloping horse's hoof is 8.89kN on hard soil (Frederick and Henderson, 1970, quoted in Liddle 1981) and the ground pressure of a horse's hoof when a rider is on its back may be as much as 27 times that of a walkers shoe and equivalent to a four-wheel drive vehicle with four passengers (Liddle, 1997).

7.5.4 The impacts to tracks caused by horse-riding may therefore far exceed other users such as cyclists or walkers (Wilson and Seney, 1994, Newsome et al., 2004, Dale and Weaver, 1974, Deluca et al., 1998). Tracks used by horses are likely to be wider, deeper and muddier (Newsome et al., 2004).

7.5.5 Horses' hooves dig into the surface, both pushing particles horizontally and, particularly on clay soils, causing compaction. Detached soil particles are then vulnerable to runoff, especially on slopes (Wilson and Seney, 1994, Siikamäki et al., 2006, Weaver and Dale, 1978) and where vegetation is not present (Liddle, 1997). On slopes, the direction of travel, (upslope or downslope) can be important, with damage greater when travelling downslope due to the 'halting action' used downhill (Weaver and Dale, 1978). Impacts are also likely to be most severe where horses are allowed to stray off trails and / or in environments prone to waterlogging (Landsberg et al., 2001).

7.5.6 Wheels exert compactive and shearing forces on surfaces and a downward pressure through the tyres. Bike tyres create linear channels that may promote runoff and erosion, and most studies focus on these physical impacts of mountain biking. A range of studies clearly demonstrates that bikes cause incisions (White et al., 2006, Goeft and Alder, 2001), soil compaction (Goeft and Alder, 2001, Bjorkman, 1996), erosion (Bjorkman, 1996, Marion, 2006, Wilson and Seney, 1994, Goeft and Alder,

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2001) and reduce vegetation cover (Goeft and Alder, 2001, Thurston and Reader, 2001).

- 7.5.7 Marion (2006) studied 47 segments of track, measuring soil loss along transects across the track to evaluate the influence of use-related, environmental, and management factors. Tracks that contoured around slopes were significantly less eroded than trails in valley bottom positions, in part due to the influence of periodic floods. Erosion rates on tracks with 0-6 percent and 7-15 percent slope angles were similar, while erosion on trails with gradients greater than 16 percent were significantly higher.
- 7.5.8 Bjorkman (1996) evaluated two new mountain biking trails before and for several years after they were opened to use. Vegetation cover within the tread declined with increasing use to negligible levels while trailside vegetation remained constant or increased in areas damaged by the initial construction of the trail. Similarly, soil compaction within the tread rose steadily while compaction of trailside soils remained constant. Vegetation and soil impacts occurred predominantly during the first year of use with minor changes thereafter.
- 7.5.9 Spatially, the impact of mountain bikes can be quite limited. For example one study showed that, after a maximum of 500 passes, visible impact from mountain bikes was concentrated within a narrow zone no greater than 30 cm from the track centreline (Thurston and Reader, 2001), suggesting that cyclists tend to steer a similar course. Where cyclists are in groups – such as families – this may of course not be the case as they may ride side by side.
- 7.5.10 The contact pressure (the mass divided by the contact area) of a bike is likely to be less than that of motorised vehicles, horses and heavily laden walkers (see Cessford, 1995). Comparative research on track impacts by Weaver and Dale (1978) found that motorbikes (the study did not include cyclists) had the greatest effects while going uphill, but that when going downhill, the effects of horses and walkers were greater.
- 7.5.11 There is clear evidence of a recent increase in the provision of mountain bike hire and the promotion of this recreation at Cannock Chase, and the linking of this activity with income generation as a financial benefit of the designated landscape (AONB). It is thus highly likely that outlets for bike hire and other cycle promotional ventures will capitalise on the new additional population brought to the near vicinity of the SAC with extra housing; and that this activity and any resulting pressure will further increase.
- 7.5.12 Similarly, there is a perception that the number of horse paddocks around Cannock has possibly increased, suggesting a growing trend for use of the routes within the Chase for horse riding. Neither activity is causing immediately obvious unacceptable harm to tracks at present, though that may be due to current wardening and remedial action, along with AONB team liaison with local horse riders and the British Horse Society, thus encouraging more responsible track use. The AONB Visitor Survey 2000 noted a clear perception from users that paths and tracks are suffering damage especially from mountain bikes and horse riding. However casual

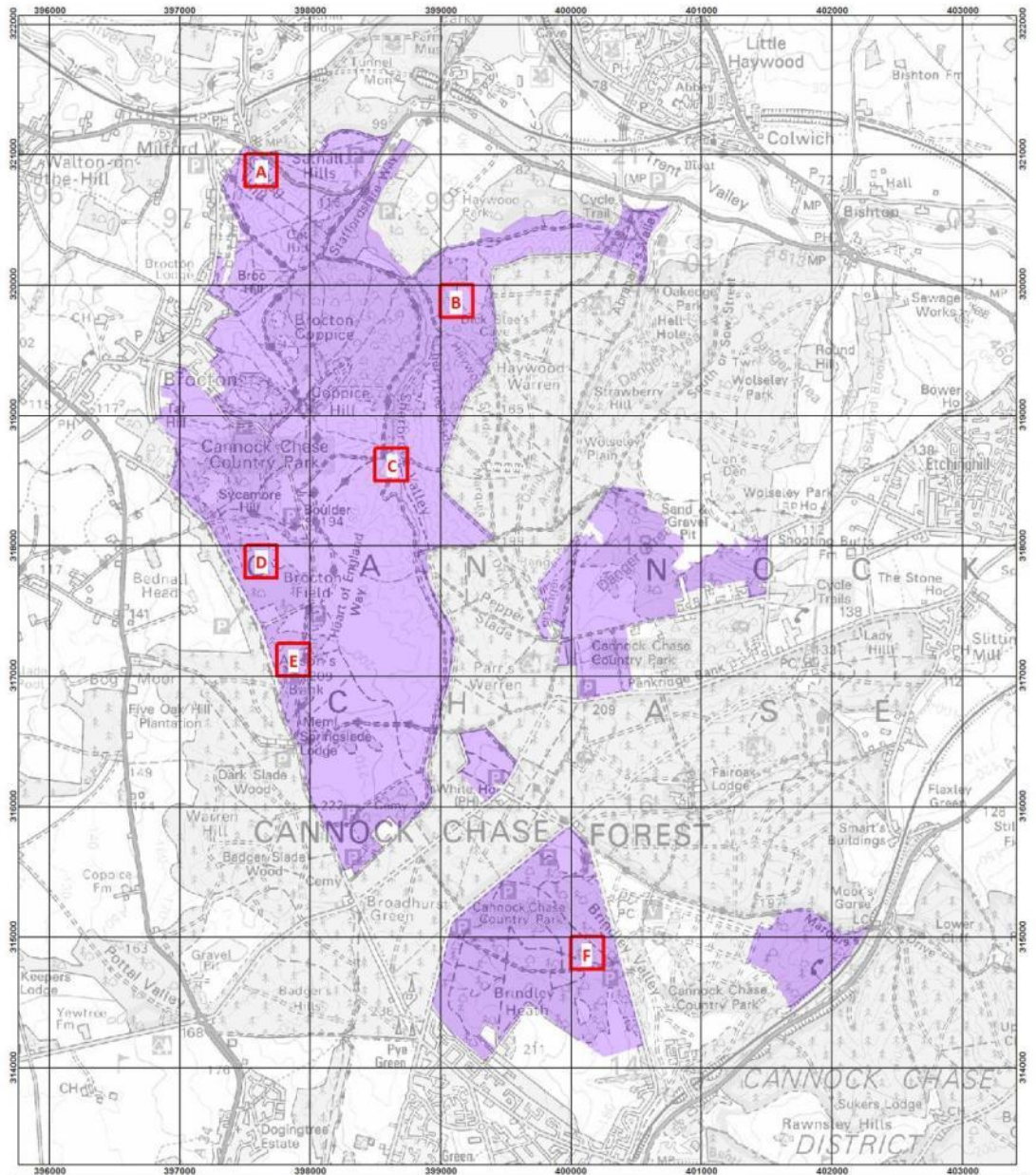
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paths and tracks appear to have decreased between 1981 and 2004, in several sample aerial photographs (selected at random to give an impression of change at different parts of the SAC), after an increase between 1963 and 1981 (see maps 10 – 13). The pattern reflected in the aerials is however complex and the locations chosen show slightly different patterns. For example in photograph C there is evidence that new paths have appeared in the period 1981 – 2004.

- 7.5.13 In the 1960's there was unrestricted access across the Chase and a lot of unofficial tracks. In the 1970s when the Country Park came into being, a visitor redistribution study was undertaken and various funding was made available by the Countryside Commission for a number of access management initiatives, implemented to control access and site damage. The first Country Park Management Plan included the development of measures to reduce damage from both people and vehicles. In the 1980s the site began to suffer extensive bracken and scrub invasion. This partly restricted access and began to block off smaller tracks (people wanted to avoid tall bracken areas) so the number of tracks is thought to have reduced (S. Sheppard, pers. comm.). Counter to this, from the 1970s onwards a number of firebreaks have been installed and a major bracken and scrub control programme initiated, all of which will have contributed to an opening up of much of the site again.
- 7.5.14 It is also not possible from aerial photographs to determine whether path restoration has occurred naturally or as the result of artificial strengthening. A degree of pressure can be beneficial to some invertebrates and plants, by reducing competition from more robust vegetation, but the hardening of paths with artificial surfaces or imported hardcore can be extremely damaging. The natural sandy substrate is lost and alien material (often limestone chippings in an otherwise naturally acidic environment), will fundamentally change the local characteristic flora and fauna. If paths or tracks become seriously worn or if this risk is apparent, the tendency would be to turn to such intervention and this would be especially harmful in heathland communities. Clearly it is imperative that access is maintained for emergency vehicles at key entrances, for site management, and also that health and safety issues are addressed where footpath erosion causes a hazard. A positive recent change is the acknowledgement of the need to use materials that will not significantly alter the acidity of the surrounding habitat, and this is now starting to be implemented by the County Council.

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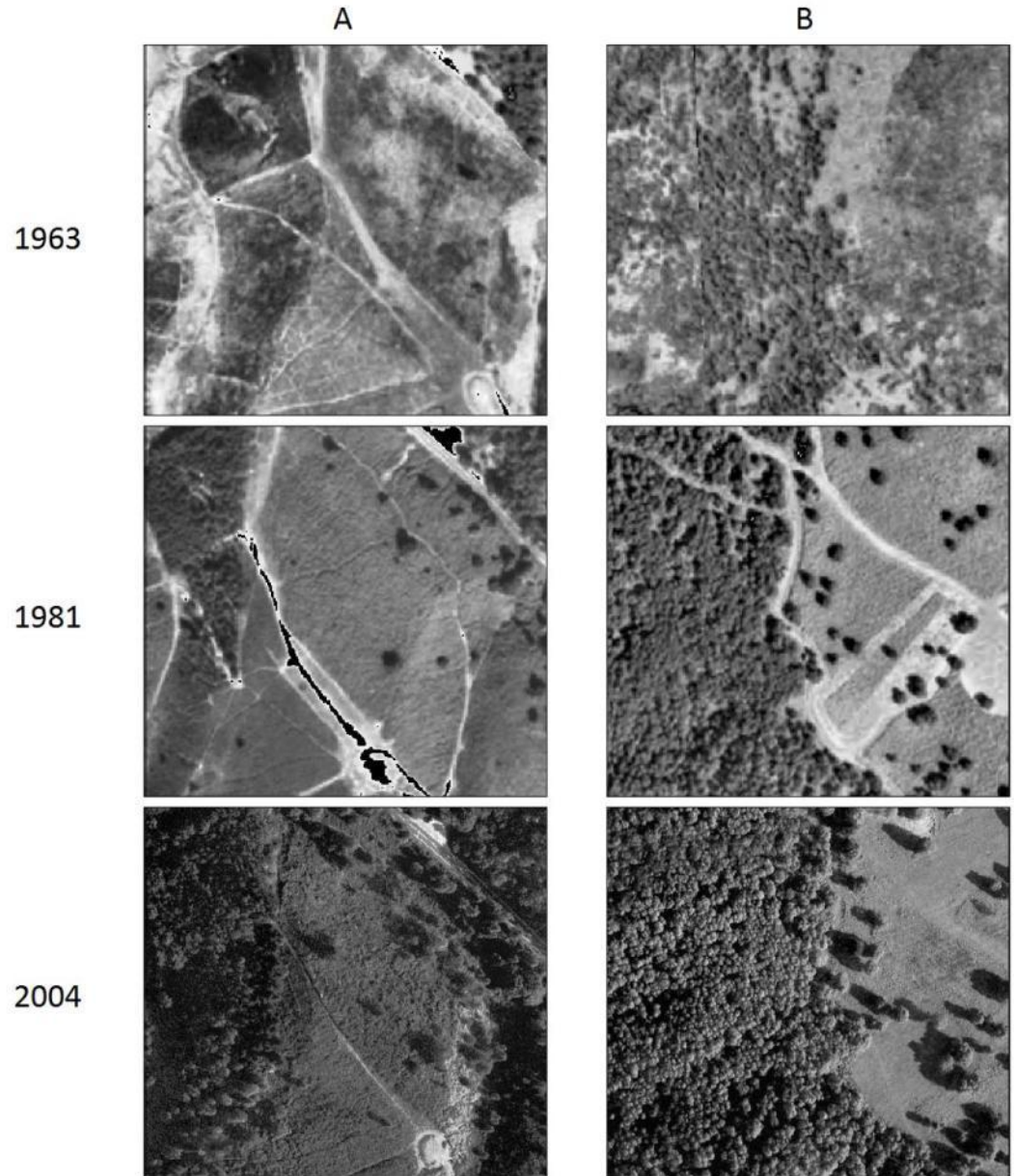


Map 11: Location of aerial photographs in maps 12, 13 and 14 within Cannock Chase SAC
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 <p>footprint ECOLOGY</p>	 <p>Cannock Chase SAC</p>	<p>Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.</p>	
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Map 12: Aerial photographs taken in 1963, 1981 and 2004 showing areas A and B
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2 September 2009

See Map 11 for location map

Each map equates to a 250m square

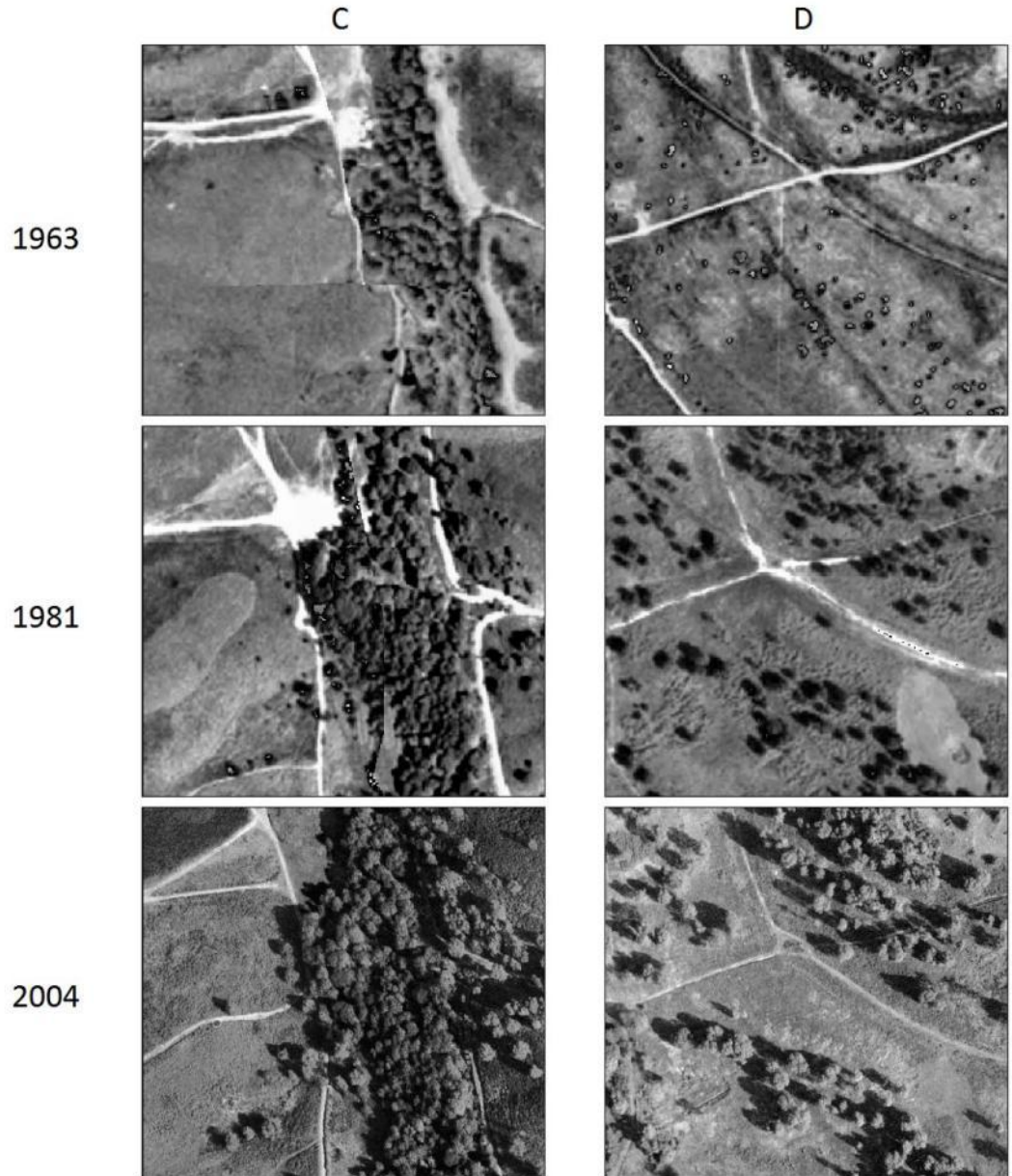
Aerial photographs supplied by
Staffordshire County Council

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Map 13: Aerial photographs taken in 1963, 1981 and 2004 showing areas C and D
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2 September 2009

See Map 11 for location map

Each map equates to a 250m square

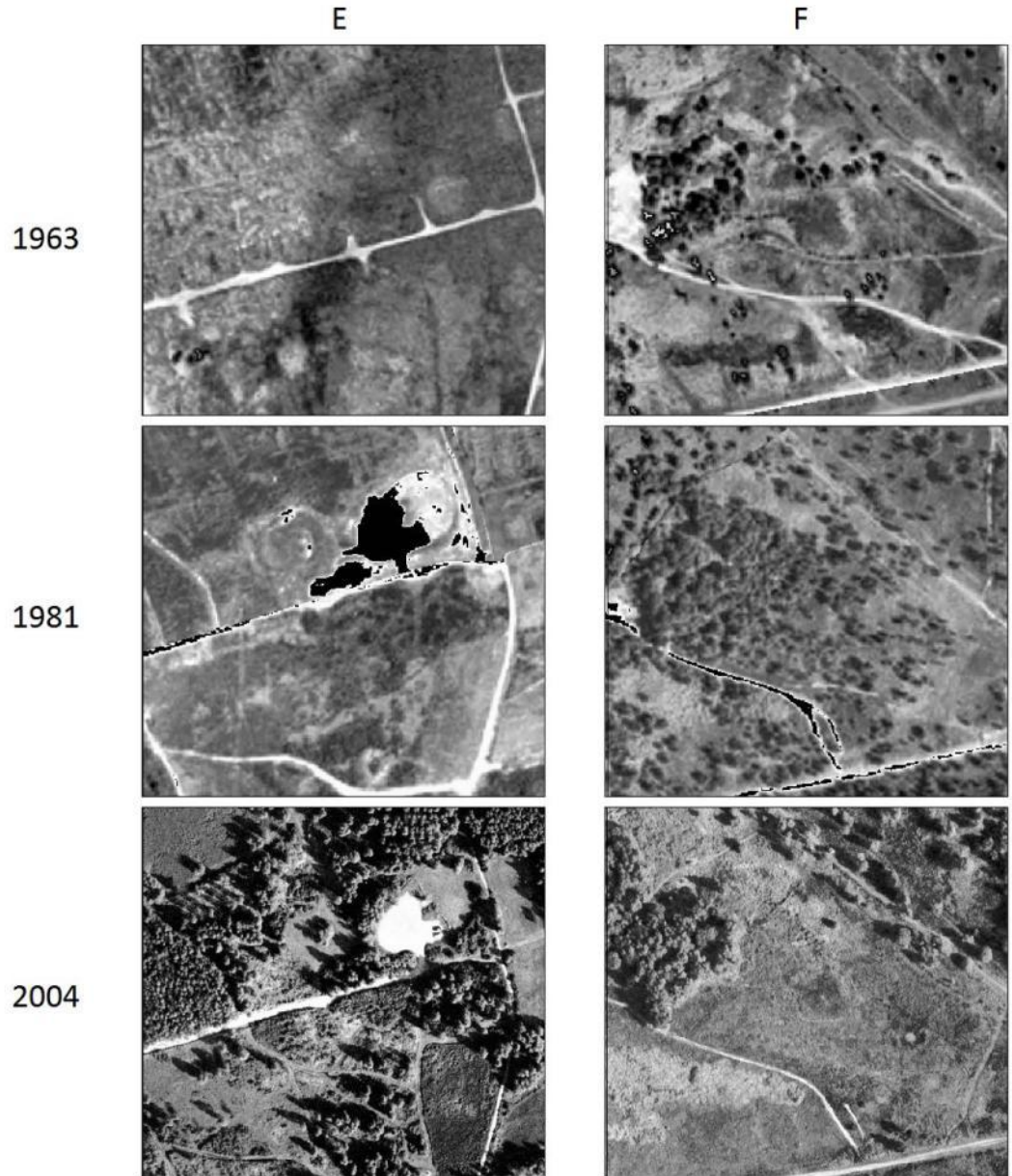
Aerial photographs supplied by
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Map 14: Aerial photographs taken in 1963, 1981 and 2004 showing areas E and F
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2 September 2009

See Map 11 for location map

Each map equates to a 250m square

Aerial photographs supplied by
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Disturbance to ground nesting birds

- 7.5.15 Woodlarks have been intensively studied in conifer plantations and heathland habitats in the Dorset Heaths (see Mallord 2005). Mallord's work has shown that otherwise suitable habitat with high levels of recreational access holds lower densities of woodlarks, but that breeding success in such areas is actually better, due to reduced competition between woodlarks (Mallord et al. 2007a, Mallord et al. 2006). The increase in breeding success is, however, not sufficient to compensate for the impact of disturbance and the net effect is a negative population impact (Mallord et al. 2006).
- 7.5.16 Correlative studies of nightjars (Clarke, Liley and Sharp 2008, Liley and Clarke 2003, Liley and Clarke 2002, Liley et al. 2006a) and woodlarks (Mallord 2005) have found lower densities of these Annex I species in areas close to housing or surrounded by high densities of housing. For nightjars, significant effects of housing surrounding sites have been detected where that housing occurs within 5km of sites (Liley et al. 2006a). The problem is that sites that have lots of housing close by also tend to have lots of houses further away, and it is therefore virtually impossible to state the distance to which housing has an effect.
- 7.5.17 The reasons for such avoidance by nightjars of sites close to housing are difficult to pin-point and could be due to a range of factors. Urban sites have higher levels of recreational access (e.g. Liley et al. 2006b) and therefore visitor pressure and disturbance may be an underlying cause. Nightjars and woodlarks have both been shown to avoid areas of high human disturbance (Liley et al. 2006a, Mallord et al. 2006, Mallord et al. 2007b), and for nightjars there is evidence that disturbance may impact on breeding success (Langston et al. 2007b, Murison 2002). Dogs have been filmed (by use of nest cameras) flushing incubating nightjars from the nest. Recreational disturbance, particularly from dogs, causes adults to be flushed from the nest, potentially betraying the presence of the nest to predators such as crows (Langston, Drewitt and Liley 2007a, Langston et al. 2007b, Murison 2002, Woodfield and Langston 2004).
- 7.5.18 Dartford warblers occur in small numbers at Cannock Chase. Disturbance impacts have also been shown for this species. Work in Dorset (Murison et al. 2007) has shown that birds nesting in heather-dominated territories (as opposed to gorse territories) breed later and raise fewer chicks in disturbed territories.
- 7.5.19 Woodlarks, nightjars and Dartford warblers are Annex 1 birds of European significance and all occur at Cannock Chase. Indeed nightjar is listed in the SSSI citation and on the SAC citation as being a notable and characteristic element of the heathland community here. Though the site is not a Special Protection Area for either species, the international scarcity of the birds and in particular the inclusion of nightjar in the descriptions of the SSSI/SAC heathland fauna, means that any adverse impact, such as through disturbance, that could affect their breeding success and conservation status must be avoided, or mitigation provided to offset any such effect.
- 7.5.20 Heathlands are particularly favoured by dog walkers (e.g. Dorset and Thames Basin Heaths), perhaps because they provide relatively large and unconstrained areas

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where the general perception is that dogs can safely be let off the lead and there is no requirement to pick up mess. The high numbers of visitors already to Cannock Chase and the significant proportion using the site for dog walking, and using it frequently, will be increased significantly by the provision of new dwellings within close proximity to the SAC. There is a real risk that disturbance to nightjars will also increase as a result. Though the population of nightjars is not large, compared with their strongholds on the southern and E Anglian heaths where they form an interest feature of SPAs, the use of Cannock Chase by nightjars is of high nature conservation significance; and a small population could be especially vulnerable to any increased adverse impact. It is also important to note the requirement of Article 4(4) of the Birds directive, whereby member states are required to 'strive to avoid pollution or deterioration of habitats' that fall outside SPAs but are of ecological importance to those species for which SPAs are classified.

Trampling / increased bare ground

- 7.5.21 The reduction in cover of grassland vegetation caused by mountain bikes is estimated to be twice that caused by walkers and approximately half that caused by horse riders. Compared to human access on foot, motor-bikes create between one and 16.6 times more bare ground (Liddle, 1997). Wilson and Seney (1994) identified a similar pattern, but showed that lighter and low-powered bikes had less track impact potential than motorbikes.
- 7.5.22 Trampling causes damage to and loss of plant parts, and the effects on and responses by individual plant species will differ, for example heather may be more damaged by trampling than purple moor-grass (Lake et al. 2001).
- 7.5.23 Different types of heathland (and different species) are susceptible to different levels of trampling. On English heaths, heather has been found to be more damaged by trampling than purple moor-grass *Molinia caerulea* (Lake et al., 2001). Assessments of the impact of heathland trampling in north-west France demonstrated that mesophilous heathlands (characterized by Dorset heath *Erica ciliaris*) tended to be more sensitive to trampling than dry heathlands. However, the resistance of these communities and their component species varied greatly in relation to season and weather conditions (Gallet and Rose, 2001). Dry and mesophilous heathlands are both more tolerant to trampling in winter than in summer. In the case of mesophilous heathland, this is linked to high plant resilience, especially of Dorset heath (Gallet and Roze, 2002). This species was more tolerant in wet conditions than dry (Gallet and Roze, 2002). In summer, bell heather *Erica cinerea* was more sensitive to trampling in wet weather than dry (Gallet and Rose, 2001). Heather species were more sensitive than the rest of the plant cover (Gallet and Rose, 2001).
- 7.5.24 An assessment of the impact of trampling on a heathland community in Belgium suggested that graminoid (purple moor-grass, wavy hair-grass) and dwarf-shrub species (bilberry, heather, cross-leaved heath *Erica tetralix*) were relatively resistant (Roovers et al. 2004).

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- 7.5.25 Repeated trampling affects the recovery rate of different heather species in different ways - for example, the impact on Dorset heath was the same at any trampling rate between one and five passes (Gallet et al., 2004), whereas for bell heather and western gorse *Ulex gallii*, trampling was slightly less damaging when applied once compared to five times. Dorset heath is thought to have a lower resistance and higher recovery capacity. Recalling the findings of Growcock (2005) on alpine and subalpine vegetation in Australia, a primary threshold for heather vegetation has been demonstrated at 20–40 passes, which increased sensitivity to disturbance. Another threshold was passed between 200–400 passes, leading to a new level of degradation (Gallet et al., 2004).
- 7.5.26 Bare ground and early successional habitats are a very important component of the heathland ecosystem, important for a suite of plants, invertebrates and reptiles (Byfield and Pearman, 1996, Moulton and Corbett, 1999, Key, 2000, Kirby, 2001, Lake and Day, 1999). Bare ground habitats, rather than heather-dominated ones, often support the most rare species (Key, 2000); of the 90 BAP species associated with lowland heathland, 39% depend on bare ground and early successional habitats (Alonso pers. comm.). Paths that are of high value to invertebrates (therefore those where there may be concern about access levels being too high) are unshaded, with a sunny aspect, open to the south, sloping and sheltered from the wind (see Symes et al., 2003). Many small annual and ruderal plants are only associated with such habitats, some species being associated with wetter hollows, even vehicle ruts and hoof prints (Lake et al., 2001). Such species depend on winter ground disturbance to create suitable habitat for germination.
- 7.5.27 Some kind of physical disturbance is usually required to create these bare ground habitats, and hence a certain level of physical disturbance can be beneficial. Localised erosion, the creation of new routes and ground disturbance may all contribute to the maintenance of habitat diversity within sites. However, the level of disturbance required is difficult to define and is likely to vary between sites (Lake et al., 2001). There are likely to be optimum levels of use that maintain the bare ground habitats but do not continually disturb the substrate. Unfortunately such levels of use have never been quantified, nor is it known whether sporadic use is likely to be better at maintaining bare ground habitats than low level, continuous use.
- 7.5.28 Heavy use of sandy tracks, particularly by horses or mountain bikes, causes the sand to be loose and continually disturbed, rendering the habitat of low value to many invertebrates (Symes et al., 2003). Species which burrow into flat surfaces (i.e. the centres of paths) are likely to be particularly vulnerable, as loose sand may not support their burrows and the churning may make it impossible for them to relocate their burrows once dug. The friable nature of heathland soils makes them particularly vulnerable to these impacts. Management to contain any erosion problems, such as path surfacing, may make the habitat useless for invertebrates.
- 7.5.29 The trends for path creation and the restoration of damage at Cannock Chase have been discussed in relation to erosion. As indicated here and in the research literature, a degree of trampling can be beneficial for less competitive plants and

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for a wider range of invertebrates, many of which are heathland specialists. The point at which desirable light trampling pressure becomes damaging and possibly provokes intervention in the form of path hardening is unknown and would be difficult if not impossible to specify. There is a risk that such a point could be reached on various paths with increased pressure from people and that the response may be damaging to some of the core interest features of the SAC, albeit unintentionally.

- 7.5.30 Even if intervention to surface worn paths is not taken, there may be the tendency for people to take their own steps to avoid trampled surfaces, especially if these become loose sand in dry conditions or waterlogged and muddy in the wet. This could result in the creation of new informal routes, avoiding the problem areas by striking out into presently undamaged vegetation. This could lead to penetration further into the site, which would not only threaten more of the limited resource of heathland vegetation but could also bring disturbance impacts for ground nesting birds like nightjar, into areas not currently experiencing such pressures.

7.6 Dogs and nutrient enrichment

- 7.6.1 Dogs may chase livestock, disturb aquatic wildlife, cause physical damage to water body structures, and possibly chemical pollution and enrich soil through fouling. The inevitably local enrichment (eutrophication) effects—caused by inputs of nitrogen, phosphates and potassium—may last up to three years in grassland communities, and may have a similar duration of effect in heathlands; the enrichment effect on nutrient-poor soils such as heaths is significant.
- 7.6.2 A number of reviews have addressed the impacts of dog fouling (Taylor et al., 2006, Taylor et al., 2005). The reviews give detail on the chemical composition of faeces, behaviour of dogs and impacts. Dogs will typically defecate within 10 minutes of a walk starting, and as a consequence most deposition tends to occur within 400m of a site entrance (Taylor et al., 2005). Similarly, dogs will typically urinate at the start of a walk, but they will also urinate at regular intervals during the walk too. The total volume deposited on sites may be surprisingly large. At Burnham Beeches NNR over one year, Barnard (Barnard, 2003) estimated the total amounts of urine as 30,000 litres and 60 tonnes of faeces from dogs. The limited information on the chemical composition of dog faeces indicates that they are particularly rich in nitrogen (see work cited in Taylor et al., 2006).
- 7.6.3 Nutrient levels in soil are important factors determining plant species composition and on grassland sites the typical effect will be equivalent to applying a high level of fertilizer, resulting in a reduction in species richness and the presence of species typically associated with more improved habitats. A lush green strip is often evident alongside paths as nutrient enrichment can also lead to more vigorous growth (Taylor et al., 2006).
- 7.6.4 Recent work addressing dog walking at Cannock Chase (Jenkinson 2009) recorded dogs off leads within the SAC, with explicit requests for “dogs on lead” in *Phytophthora* areas seen to be ignored by around 35% of dog-owning visitors (note however this is based on a small sample of 15 dog walkers observed during a single

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visit), and some dog fouling, along with filled poo bags being left on site. The most striking point raised by Jenkinson is the absence of information, guidance and facilities for dog walkers within Cannock Chase.

- 7.6.5 The presence of horses may also affect soils in other ways besides trampling. Liddle and Chitty (1981) compared soils from paths and areas away from paths at Chobham Common, a heathland site in Surrey. The paths were well used by horse riders. Path soils tended to have higher nutrient contents than untrampled soils and their fertility was higher in relation to adjacent areas. The authors suggest that this may be due to dung deposited from ridden horses, whose food is grown outside the heathland ecosystem.
- 7.6.6 In all the cases of dung deposition from dogs or horses, the effect is to add nutrients to the system since none of the original food production, even for horses, is likely to have come from the heath. Dog food is clearly not derived from the heath and horses for riding are not likely to be fed from grass or fodder harvested from the heath. (In contrast any grazing stock such as ponies or cattle would be feeding primarily or exclusively on heath production and themselves will be growing, so that their dung deposition is at least in balance with heathland productivity if not representing a modest depletion of nutrients). Given that heathland is naturally inherently poor in nitrogen and phosphates, and the distinctive plant community depends on this soil poverty to avoid change to other vegetation types, the addition of nutrients to heathland is a serious adverse impact.
- 7.6.7 The increase in population as a result of new housing within a short distance of the SAC will inevitably bring a significant increase in visitor numbers. An increase of some 9% can be anticipated, representing an extra 110,000 visits per year. If only a quarter of these additional visitors are accompanied by dogs – the present conservative estimate – that would bring a very significant extra addition of nutrient from dog faeces and urine.

Increased fire risk

- 7.6.8 Controlled fires have been part of beneficial heathland management for many years, however, wild (i.e. unmanaged) fires can be a serious issue. Kirkby & Tantrum (1999) analysed 3333 fire incidents in Dorset during 1990-1998. There was a clear peak during April-August, the period when potential damage to heathland fauna and flora is at its greatest. The authors found a clear link between fire frequency and urban areas, with heaths surrounded by more houses tending to be those with the most fires. Kirkby & Tantrum's survey of the causes of fires revealed 59% were arson, 17% were camp fires, 8% from management fires getting out of control, and 7% from spreading bonfires.
- 7.6.9 Fire has a serious impact on ecological integrity. The effect of individual fires depends on date, fire temperature and duration, and the type of habitat burnt. Fire destroys vegetation, which, depending on substrate and fire characteristics, can take 4-20 years to re-establish, most areas going through successional grassland stages, and some on better soils ending up in woodland rather than heathland. Particularly hot, slow-moving fires can destroy seedbanks and even the peat layer,

thus extending the time taken for heathland vegetation to re-establish. Invertebrates, reptiles, birds and other species will re-colonise once the vegetation has recovered and provided that the same area is not re-burnt.

- 7.6.10 Fires have been an issue at Cannock Chase in the past. Approximately three-quarters of the site was burnt in 1976, but large fires are now uncommon, though many small fires do occur. Fires occur sporadically all over the Country Park, especially where there is old bracken or gorse. Smaller fires tend to occur close to the more concealed car parks. Most deliberate fires and burnt-out cars tend to be at the southern edge of the SAC, close to the high-density housing (Sue Sheppard pers. comm.), such as at Brindley Heath or Penkridge Bank. The lack of large fires is believed to be due to the habitat management (reducing the amount of bracken litter), better reporting of fires (mobile phones), along with improvements in response time and fire tackling equipment. Better access for the fire services in some areas is countered with track deterioration in others.
- 7.6.11 Though efforts are being made, successfully, to reduce flammable material by better habitat management, the lack of traditional grazing inevitably increases the fire risk. Old heather and gorse and their accumulated litter, bracken and its deep litter layer, and the dry annual production of purple moor-grass in late winter, can be especially vulnerable to burning in early spring. Extensive grazing by appropriate stock would reduce the amount of material available to burn as well as benefitting the habitat for the great majority of heathland wildlife.

Spread of disease

- 7.6.12 A current issue of concern at Cannock Chase is the plant disease *Phytophthora pseudosyringae* which occurs within the SAC on bilberry. The disease can be spread by recreational users (as well as wildlife) and is therefore likely to be difficult to control / limit within the site. The disease causes stem die-back and death in bilberry plants. Various measures including surveys, testing, signage (asking people to keep to paths) are currently in place²⁰.

Restrictions on management

- 7.6.13 The feasibility of re-establishing grazing and the practical issues have been explored in two detailed studies focuses on Cannock Chase (Penny Anderson Associates Ltd. 2005, Swanson, Silcock and Kiernel 2008). Due to a number of factors, including the *Phytophthora* outbreak, a grazing scheme has not yet been developed. It is imperative that the issue of reinstating grazing is now revisited in order to enable the SAC/SSSI to make the necessary progress towards reaching favourable condition.

²⁰ Regular updates and information are provided on Defra and County Council websites: <http://www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/documents/phytophthoraPseudosyringae0609.pdf> and <http://www.staffordshire.gov.uk/environment/e-land/phytophthoraupdate.htm>

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- 7.6.14 The longer Cannock Chase SAC goes without grazing the worse the condition of the habitat will become or the more effort and cost will be needed to maintain the heathland communities. Equally, the more difficult it may be to persuade visitors to the site that a change of management to extensive stock grazing is needed and can be accommodated without disrupting established visiting patterns and activities. Where sites have been long managed by grazing, there appear to be few problems; indeed the presence of free-ranging animals can be an attraction in itself. The New Forest in Hampshire is perhaps the finest example of a very extensive traditional pastoral system uninterrupted for many centuries, yet attracting huge visitor numbers.
- 7.6.15 Paradoxically, where grazing has lapsed and proposals are put forward for re-establishing the practice, there is very often heavy opposition from people who believe that their regular uses – such as dog walking or horse riding – might be adversely affected. Such objections, to the concept or essential elements of the scheme such as fencing or cattle grids, can at best delay and all too often prevent the re-instatement of grazing on common land. There is a risk that the new population that will come to use Cannock Chase, from the proposed extra housing, will add to the difficulties in re-establishing grazing.
- 7.6.16 Increasingly, other conservation management practices are being challenged by residents and visitors to countryside sites generally, perhaps because the need for practices such as scrub and tree removal, to replicate former common rights that effectively maintained habitats, are not well understood. This can seriously impair the ability of conservation bodies and owners to manage sites to bring them into favourable condition and have an adverse impact on the nature conservation value of habitats. The significant increase in essentially urban-based population using Cannock Chase for recreation purposes, as a result of new housing in close proximity, is likely to compound any difficulties in achieving the necessary management for the SAC.
- 7.6.17 Firebreaks are essential to providing access for fire fighting machinery and providing areas with little or no combustible material, potentially slowing down or stopping the progress of fires. On sites with high levels of access however, firebreaks become used as paths, and this can result in high levels of visitors in areas where, previous to the firebreaks being in place, little or no access took place. Site management staff at Cannock Chase currently recognise the need to review the distribution and management of firebreaks.

7.7 Comparisons with other heathland sites

- 7.7.1 We consider it useful at this stage to draw comparisons with other heathland areas where there has been more research conducted relating to the scale of impact of new development and the relationship between new development and recreational impact. In both the Thames Basin Heaths and Dorset Heaths there has been extensive research over a number of years to explore visitor impacts and how these might be mitigated. Looking at other European Protected Sites and the approaches used to manage and protect them is a potentially useful exercise in guiding this assessment.

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- 7.7.2 In Table 7 we show comparative information for Cannock Chase, the Thames Basin Heaths and the Dorset Heaths. Compared to these two European Sites, Cannock Chase is not designated for its bird interest and is much smaller - roughly one sixth of the area. Both the Dorset Heaths and Thames Basin Heaths have large areas that have no public access, due to military use and other factors (such as land contaminated with asbestos). Cannock Chase lacks such areas (which have the potential of providing refuges and undisturbed areas for key species) and the smaller size of Cannock Chase means that visitor pressure is potentially more concentrated. Even after discounting the areas of the Dorset and Thames Basin Heaths that have no access provision, on the remaining land visitor densities are much lower than on Cannock Chase. The high levels of current access are reflected in the high number of car-parking spaces relevant to the size of Cannock Chase.
- 7.7.3 In both the Thames Basin Heaths and Dorset Heaths, concern about the levels of access and impacts of new development have led Natural England to propose a strategic approach to development and a package of mitigation measures. It would appear from the levels of access and the likely increases at Cannock Chase, that, were it equivalent (in terms of designated interest features) to the Thames Basin and Dorset Heaths, that similar measures would be necessary. Cannock Chase is different however in that it supports different heathland vegetation communities and is designated for different interest features. We therefore focus on the designated interest features and assess the likely impact that would be expected from the increase in visitor pressure outlined above.

Table 7: Comparison of visitor numbers and access levels with the Dorset Heaths and the Thames Basin Heaths. For detail of sources for the different figures, see footnotes beneath the table.

	Dorset Heaths	Thames Basin Heaths	Cannock Chase
Size of designated area (ha) ¹	8,169	8,294	1,240
Relevant European designations	SPA, SAC, Ramsar,	SPA, SAC,	SAC
No. car-park spaces ²	5,215	1,998	1,086
No. Houses within 500m ³	42,522	38,579	1,355
No. Houses within 5km ³	238,957	302,792	54,883
Estimated current total annual visitor numbers ⁴	5 million	7.5 million	1.27 million
Estimated current visitor density (per ha pa) ⁵	680	842	1024
Estimated change in visitor numbers as a result of new development in adjacent LDFs ⁶	13%	?	9%+

¹These areas are the total area designated – the Dorset Heaths SPA, the Thames Basin Heaths SPA and Cannock Chase SAC

²Estimates of car-park spaces for the Dorset Heaths and Thames Basin Heaths are taken from Liley (2006a). The Dorset sites include some very large car parks at Hengistbury and Studland, both coastal sites with the car-parks largely providing access to sandy beaches that are away from the designated heathland sites.

³The data on the number of houses are from postcode data and are the number of residential properties for all postcodes that fall within the given distance of the SPA/SAC boundary.

⁴For Dorset and the Thames Basin Heaths, these figures are derived from the spatial models (see Liley et al. 2006a). We have rounded the estimates and taken the mid value between the different models. These estimates are for the areas of the SPA / SAC with access and associated access land outside the European sites – a total area of 7348ha for Dorset and 8906ha for the Thames Basin Heaths.

⁵Estimated visitor density is the estimated total annual visitor numbers divided by the area figure (see point 3 above).

⁶The Dorset Figure is derived from Liley (2006b).

7.8 Summary and discussion

- 7.8.1 There are many similarities between Cannock Chase SAC and the SAC/SPA heaths of Dorset and the Thames Basin. All are heathland areas of high nature conservation significance with habitats and species that are specialised and often restricted in distribution both nationally and internationally. These include ground-nesting birds such as nightjars that are especially at risk from disturbance. All of the areas are closely surrounded by dense levels of development and all have correspondingly high visitor numbers. Many of the pressures and problems are common and thus many of the issues and possible solutions, and much of the research findings to support these, can be expected to be applicable to Cannock Chase.
- 7.8.2 The prevailing heathland habitat type at Cannock Chase is dry with very little wet heath and mire. There may be some more robustness in drier ground conditions and perhaps in the response of vegetation to pressures such as trampling, though the research evidence on this is mixed; and generally heather-dominated communities are vulnerable to trampling, whether wet or dry. The somewhat stonier soils at Cannock Chase may make paths and tracks slightly more robust and resistant to erosion but fire is likely to be just as much a risk at Cannock Chase since the drier heath communities are particularly vulnerable. Clearly however, there is a range of human induced factors, such as increased nitrogen, which are likely to be decreasing the robustness of Cannock Chase SAC overall.
- 7.8.3 Management issues are common and include the need for continuous scrub and tree control, exacerbated by the close proximity to extensive conifer plantations. The desire for landscape variation and visual amenity in this highly visited area is an added complication in the consideration of tree control. The absence of any stock grazing at present at Cannock Chase means that the long term future for heather-dominated vegetation is rather more doubtful here and the difficulties associated with re-establishing such grazing on common land with heavy public use may be severe. These problems are unlikely to be made simpler with an increase in visitor use arising from significant nearby housing development.
- 7.8.4 New housing in the relevant core strategies assessed within this report is estimated to generate an increase in visitor levels of at least 9% to the SAC. There will be additional increases as a result of new housing in the Districts not included within this assessment. Such a level of increase will potentially have an adverse effect on the integrity of the site, in particular relating to soil erosion, trampling of vegetation, increased fire risk, difficulties in instigating management and enrichment from dog fouling.
- 7.8.5 These impacts are cumulative and will result from the in-combination effects of housing at different distances from the SAC. It is impossible to consider individual development locations (involving small volumes of housing) in isolation; the impacts are strategic and relate to widespread growth at multiple locations over an extended time period. Potentially each new property will result in a tiny increase in the number of people living close to the SAC and a resulting tiny increase in recreational visits. Development close to the SAC is expected to generate more

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visits to the SAC than development further away, such that development within 2 miles of the boundary is associated with 25 times more visits than development 10-20 miles away. These figures are based on the 2000 AONB visitor survey and more detailed visitor studies are necessary to be confident of the impact of distance on the relationship between access and housing.

- 7.8.6 Development at Stafford, in the Cannock / Hednesford / Heath Hayes area and around Rugeley in particular are contributing to the increased level of access. Development to the south and east of Stafford, at Hednesford and western / central Rugeley will result in marked increases in access levels.
- 7.8.7 We have largely avoided focusing on individual locations within this assessment as the impacts are cumulative and can only sensibly be understood (and effectively mitigated) strategically, looking across local authority boundaries.

8 Mitigation

8.1 Water Abstraction

- 8.1.1 The Habitat Regulations Assessment of the phase II revision of the Regional Spatial Strategy for the West Midlands (2007) noted that current water abstraction may be affecting the site hydrology of Cannock Chase SAC and that further housing may create additional pressures on this resource. The report noted that the Water Resources Group were confident that there would be options available following the Review of Consents, to avoid any adverse effects on Cannock Chase SAC.
- 8.1.2 The present report recognises uncertainty over the effects that abstraction from the Milford and Shugborough abstraction boreholes. Current levels of abstraction (or higher licensed abstraction rates) could result in impacts on the designated features of the SAC. We take a precautionary approach as it is not possible to determine that there will be no adverse effect on the integrity of the SAC as a result of water abstraction. Ongoing investigations will, it is hoped, resolve this situation, and either show no effect or, if there is an effect or remaining uncertainty, then assurances will need to be obtained that alternative sources of supply can be guaranteed that will have no effect on the SAC. It is understood that only Stafford BC is affected by these provisions as the water abstracted from the two boreholes is used only in this Borough, but formal confirmation of this should be sought from STW.
- 8.1.3 The Environment Agency's abstraction licensing system should serve to protect the SAC from the negative effects of over-abstraction. However it is apparent from their CAMS that the groundwater resource for the Rugeley and Teddesley Groundwater management Unit is over licensed and is planned to remain so, at least until 2016
- 8.1.4 Before publishing their final development proposals in the core strategy, Stafford BC will therefore need to obtain assurances from the Environment Agency that a supply of water of sufficient quantity and quality will be available to meet the needs of new housing and industrial/commercial development. The findings of the Environment Agency review of consents process will form a critical part of the evidence base. It is likely that a water cycle study will need to be produced to draw together the evidence available and inform the Stafford Borough LDF documents.
- 8.1.5 If it proves to be the case that abstraction up to the full licensed levels from the Milford and Shugborough boreholes would have an adverse effect on the SAC, Stafford Borough Council will need to work closely with STW and the Environment Agency to determine whether any additional housing can be accommodated without adverse effects upon European sites. For the quantum of housing proposed that cannot be accommodated, STW will need to demonstrate what alternative sources will be utilised in order to enable the housing to be included in LDF documents. Whilst it cannot be relied upon as a measure to counteract potential effects upon European sites, it would sensible for Stafford Borough Council to consider the encouragement or imposition of water saving measures in

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all new developments as a matter of course, together with possible retro-fitting of existing housing stock. This may reduce overall water consumption, and therefore increase the numbers of new houses that can be accommodated within the Borough in the future. Until implemented and proven to be effective, this cannot however be relied upon to offset any new supply requirements in the context of HRA and demonstrating that a plan will not adversely affect any European site.

8.1.6 If the further investigations show an existing or potential adverse effect within current licensed limits, then the Environment Agency's review of consents will need to set out necessary mitigation measures to bring the consent to a level at which it can be concluded that European sites will not be adversely affected by the consent. Potential measures would include:

- Maintaining abstraction levels below the threshold at which they could have adverse effects
- The closure of one or both boreholes
- The installation of a water compensation scheme to pump water up to the headwaters of the Sher Brook to maintain an agreed minimum flow at times of drought.

8.1.7 It is advised that Stafford Borough Council may need to prepare a water cycle study, to inform emerging LDF documents, which should collate existing evidence and up to date information on the review of consents process. The study should include evidence from Severn Trent Water and the Environment Agency to inform housing levels that can proceed within the consent, and a timescale for any future improvements or use of alternative sources that would enable further housing to come forward at a future date. It is possible that the Council may need to include timescales and caveats within LDF documents, to ensure that levels of housing will only proceed once water supply is available. Without assurances of future improvements or alternative sources, the housing numbers may need to be revised. Given uncertainties at the regional level HRA, there are regional HRA recommendations, fully supported by Natural England, for RSS policy wording to enable a feedback mechanism for local authorities that are unable to demonstrate that their quantum of housing can proceed without adverse effects upon European sites. It is anticipated that this RSS policy wording will be included in the Secretary of State's Proposed Changes.

8.1.8 It is concluded that, at this current point in time, it cannot be ascertained that adverse effects upon the SAC arising from water abstraction can be prevented, in relation to housing growth within the Stafford Borough. Ongoing work by the Environment Agency and STW to review existing consents will inform Stafford Borough's HRA evidence base, and determine the quantum, timescale and possibly locations for housing development proposed.

8.2 Air Quality

8.2.1 At a local level, depositions from traffic are likely to be higher than depositions from more distant sources, but will also be more localised.

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- 8.2.2 A number of roads cross the SAC and three main roads, the A513, A460 and A34 run close by. While the current levels of traffic on these roads are known, there is no information as to how traffic levels may increase in the future, as a result of new housing developments. There are no road improvements planned for any of these roads. However, the highest levels of deposition are likely to occur within 200m of the road edge (Department of Transport 2005) and NE use this figure as the recommended distance from roadside for consideration within Core Strategies. Map 4 shows the 200m distance zone into the SAC for all roads. This zone constitutes a third of the area of the SAC.
- 8.2.3 The LPAs will need to take account of the recommendations tabled at the West Midlands RSS Phase Two Revision Examination in Public. In the absence of information at the regional level to demonstrate that increasing traffic in the vicinity of Cannock Chase SAC would not have an adverse effect upon the integrity of the site, the following measures were recommended:
- Avoid the siting of new sources of emissions or development that would increase traffic levels on roads near to sensitive European sites;
 - Consider the local air pollution impacts of increased road traffic within 200 metres of a sensitive European site, including impacts from dust;
 - Require a pollution-neutral strategy for major development based on the results of local air quality assessments, especially for potentially polluting development near to European sites;
- 8.2.4 In addition, the Habitats Regulations Assessment of the RSS recommended that local authorities:
- produce air quality strategies for their areas
 - for proposed new developments LPAs establish the implications for increased road traffic on identified routes passing near sensitive European sites
 - Undertake modelling for additional housing development at Cannock Chase to ensure this does not increase NO_x emissions close to the SAC
- 8.2.5 In summary therefore, the assessment of the effect of increased road traffic on any road within 200m of the SAC is likely to have a significant effect upon interest features. When considering the measures required to prevent adverse effects arising from air pollution on Cannock Chase SAC, it is necessary to take account of three factors; the need for a precautionary stance based upon the current absence of information; the need to take account of the fact that, due to the existing environmental condition of the site, any further increase in nitrogen deposition is going to further contribute to an adverse effect upon the integrity of the interest features; and the findings and recommendations of the regional HRA.
- 8.2.6 It is therefore recommended that the regional RSS recommendations are implemented when considering local level housing options. Each LPA will need to undertake modelling to determine the increased traffic use on affected roads that

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is likely to arise as a result of the range of options for new housing. Where it is determined that a housing option will not contribute any further effect, the housing can proceed without further assessment in terms of air quality. Where housing will add to the traffic use on roads within 200m of the SAC, the housing will adversely affect the SAC due to its current environmental condition whereby thresholds for nitrogen are currently being exceeded.

8.2.7 The LPA's will need to determine what measures are being undertaken to remove the current effects, and improve the status of SAC interest features. Article 6.1 and 6.2 of the Habitats Directive require each member state to avoid the deterioration of European sites. Natural England should be able to advise what measures are being implemented, or are proposed, to meet this member state requirement for Cannock Chase SAC. It is possible that the Article 6.1/6.2 measures will be enough to improve the condition of the SAC to the extent that the quantum of housing proposed can then be accommodated without adverse effects. However, it may be that the programme of Article 6.1/6.2 measures will require further bolstering with LPA input arising from developer contributions. Once the Article 6.1/6.2 measures are known, each LPA will be able to make informed decisions about their own quantum of housing that would otherwise adversely affect the SAC, and whether any additional measures will be required.

8.2.8 The following initiatives may contribute to the counteracting measures necessary to demonstrate that Cannock Chase SAC will not be adversely affected by air pollution. However, these cannot be guaranteed as counteracting measures unless modelling and research work is able to demonstrate road use reduction. The LPAs could make a contribution towards the reduction of air pollution regionally by:

- Requiring the construction of new dwellings and other buildings to be to the highest standards and to include measures for energy saving
- Siting new developments in locations which reduce travel to work and services and have good public transport links
- Promoting design which encourage pedestrians and cyclists, and which provides adequate recreational facilities and green space which offers an attractive alternative to the designated site
- The encouragement of walking and cycling and the use of public transport to and from, and within, the SAC. The reduction in car parking spaces combined with an examination of the feasibility of providing additional public transport within the Cannock Chase area should be carried out as part of a mitigation strategy to reduce vehicular traffic in and around the SAC.
- Traffic calming measures within the SAC to reduce speeds and therefore the amount of commuter traffic. These would be potentially effective and would also assist the establishment of extensive grazing across the SAC, with cattle grids and speed restrictions. (There are examples of successful extensive grazing schemes being instigated on other large heathland sites and crossed by busy roads, for example in Pembrokeshire, the New Forest and the Dorset Heaths.) Other possible traffic calming measures would include speed restrictions (enforced with speed cameras or equivalents) and changes to

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highway design, road markings etc. Such measures are set out in existing highway design guidance for the AONB (Arup and Latham Architects 2005).

- 8.2.9 It is concluded that, at this current point in time, it cannot be ascertained that adverse effects upon Cannock Chase SAC arising from air pollution can be prevented, in relation to housing growth within the administrative areas surrounding the SAC. Each LPA will need to undertake modelling to determine the quantum and location of housing that is likely to affect the SAC, and determine what Article 6.1/6.2 measures are being implemented or proposed, in order to inform what measures may be necessary at a local level, or whether contributions to add to Article 6.1/6.2 measures are required.

8.3 Recreation pressure

- 8.3.1 Disturbance and damage/erosion caused by recreational and amenity use have been identified as issues affecting the conservation objectives of Cannock Chase SAC. The issue is also identified in the HRA of the Phase 2 Revision of the RSS for W Midlands (Treweek and Ursus Consulting Ltd. 2008). These likely significant effects are explored further in the Updated HRA Report Vol 7 (Baker Sheperd Gillespie 2009).
- 8.3.2 These different analyses conclude that the impact of various growth scenarios on Cannock Chase will remain adverse, in combination with other proposals, for recreation pressures and disturbance; and the higher growth scenarios cannot be determined not to have an adverse impact for these factors, acting on their own. Similarly, the potential impacts of land use and habitat change, through the provision of infrastructure and recreation facilities and the implementation of a Visitor Economy Strategy that promotes increased use, may also adversely impact on Cannock Chase SAC.
- 8.3.3 The result of these predictions of further adverse effects on the SAC therefore requires that adequate provisions and strategies be in place to avoid further impacts on the site or to fully mitigate for the expected increase in recreation-related pressures. There are precedents for mitigation measures where large heathland blocks are at risk from development pressure in the surrounding Districts. In both the Thames Basin Heaths and the Dorset Heaths mitigation measures have been proposed by local authorities, supported by Natural England. In these areas new housing within 400m of the European Protected Sites requires an appropriate assessment and it is anticipated that development in such locations cannot avoid having an adverse effect on integrity. Beyond the 400m limit, in both areas, developer contributions are collected within a 'zone of influence' up to 5km from the European Protected Site boundary; and these are used to fund a series of different measures, including wardening, creation of alternative sites, support for fire services, on site management and a series of education and awareness raising initiatives. In both locations the measures are supported by detailed monitoring and recording of access and impacts, to ensure that the measures are working and to provide further feedback to ensure their success. These measures are accepted

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as being adequate to avoid adverse effects on the integrity of the European Sites arising from small-scale development within the 400m – 5km band. The need for appropriate assessment for such small development is therefore avoided.

- 8.3.4 These two examples provide tested examples of mitigation measures that have been accepted by Natural England and successfully implemented by local authorities. Cannock Chase is different in that Cannock Chase is not designated as an SPA and whilst the site does have the sensitive ground nesting bird interest, this is currently not at a level or extent that classifies it as of European importance. However Cannock Chase SAC is much smaller and has a particularly high visitor pressure (as set out in section 7.7). Mitigation measures must therefore reflect these differences and be tailored to Cannock Chase.
- 8.3.5 The impacts from recreation arise in-combination - the cumulative effects of development in many different locations, across different local authorities. All new housing in the vicinity of Cannock Chase SAC has the potential individually to result in a small amount of additional recreational access to the site. When considered in isolation, a single dwelling will have a tiny (almost un-measurable) effect on the number of visits made to the SAC. However, with thousands of new developments the increase will be significant and is likely to result in an adverse effect on the integrity of the site.
- 8.3.6 It is impossible to single out any but the largest development locations as having an adverse effect in isolation. This causes a particular issue when addressing mitigation. Most mitigation measures will need to happen simultaneously or well before new development and will need to be considered and resourced strategically, since the impacts will arise from several authority areas. Many of the measures will be complex to establish and will need to be co-ordinated between the various bodies involved in the management of the site – the SAC, AONB and the wider afforested zones. The Dorset and Thames Basin Heaths examples therefore provide a useful context of how such strategic issues can be addressed.
- 8.3.7 Development directly adjacent to the SAC will have the most impact and is the hardest to provide mitigation for, as it is unlikely to be possible to deflect people to other parts of the site (or alternative greenspace). Many particular issues, such as increased fire risk, are particularly associated with locations where housing is in very close proximity to the heath. This issue is particularly relevant to Cannock Chase District. It will be necessary within each local authority core strategy for each authority to map areas adjacent to the SAC where even small-scale development will have an adverse effect on integrity. Following the Dorset and Thames Basin Heaths example, we recommend this zone be set to at least 400m.
- 8.3.8 Beyond 400m, a Visitor Impact Strategy is required, which sets out a series of measures, as a package, that will remove the adverse effects associated with small-scale development. The Strategy will require adoption by all relevant parties and will need to be running prior to new development taking place.
- 8.3.9 The avoidance measures within the strategy should be applied within a 'Zone of Influence' defined as the area within 12 miles of the perimeter of the SAC

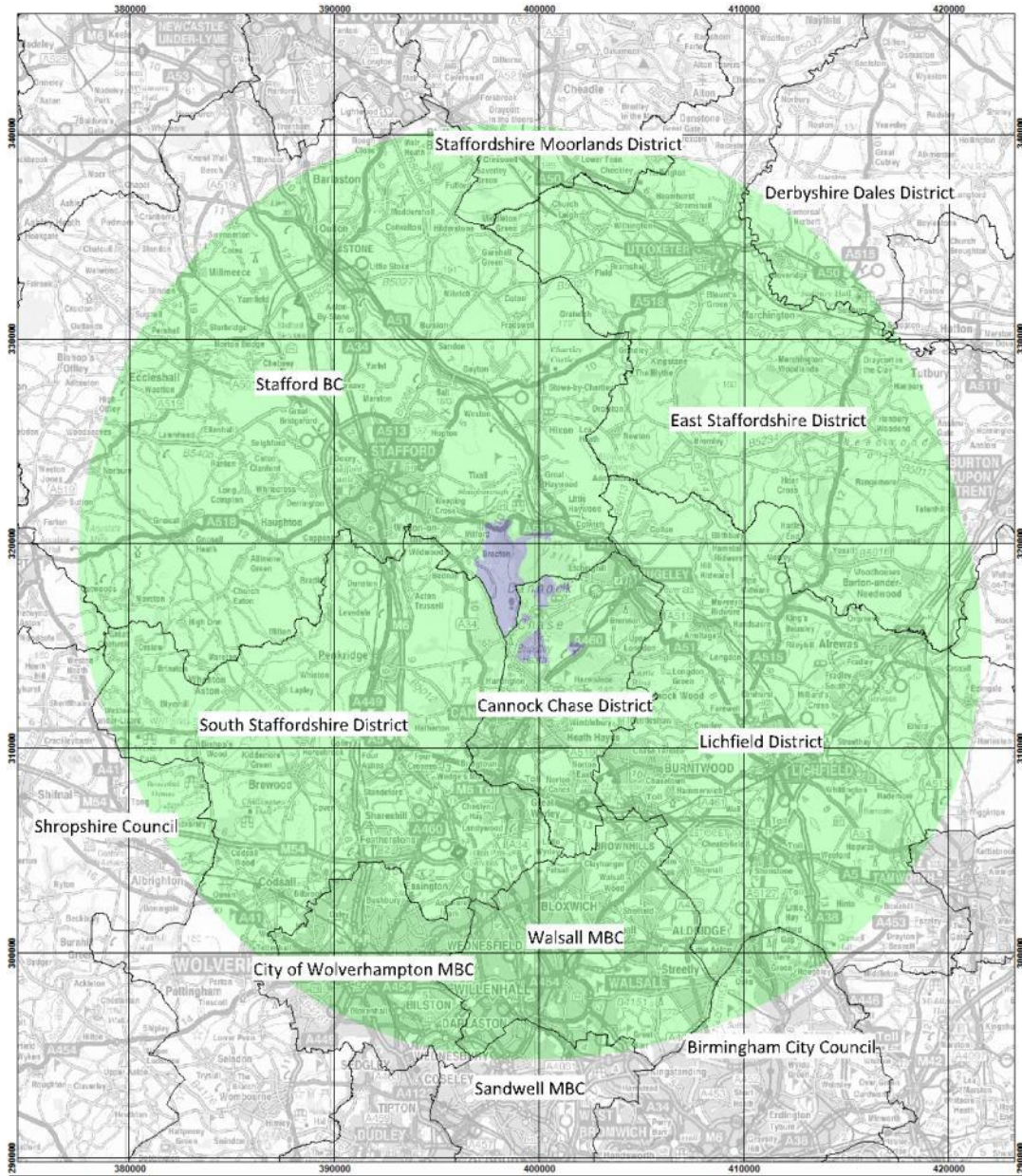
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(measured as the crow flies from the primary point of access to the curtilage of the dwelling). In the Thames Basin Heaths and Dorset Heaths, a 5km zone has been used. The selection of 5km has been based on visitor data (Clarke et al. 2006, Liley et al. 2006c), which shows that around 75% of visits originate from within this distance. The 5km zone therefore encompasses the origin of the majority of visitors. Visitor data from Cannock Chase reveals that Cannock Chase draws people from a much larger distance (see Staffordshire University 2000). Using the data shown in Figure 6 it would seem that a distance between 10 and 15 miles is appropriate. A total of 69% of visits to the AONB originate within a 10 mile radius and 87% of visits originate from within a 15mile radius. We therefore suggest that initially a 12 mile (19.3 km) zone of influence be used (Map 15).

- 8.3.10 Further monitoring of visitor use at Cannock Chase is necessary to ensure that this zone is correct and the distance should be reviewed when more robust visitor data are available. With better data it may be possible to define the zone of influence with more than one distance band. A more sophisticated approach involving different distance bands would allow different costs to be attributed to different zones, with the understanding that visitors travelling from further afield tend to visit less frequently and for different reasons than local people living directly adjacent to the Chase; and therefore different mitigation and avoidance measures are applicable.
- 8.3.11 The avoidance measures recommended in this strategy should be applied in relation to the following types of development:
- Proposals for 1 or more net new dwelling units falling within Use Class C3 (residential development).
 - Proposals for 1 or more net new units of staff residential accommodation falling within Use Class C1 and C2
- 8.3.12 Large residential development proposals are the exception, as due to their scale and potential impact and ability to offer their own alternative avoidance measures, these should be considered by local authorities on a case-by-case basis. The numerical definition of 'large development proposals', and the ability of large schemes to provide their own avoidance measures, will vary depending on the particular locality of the proposals and advice from Natural England will be required on each case. We suggest however that any development above fifty dwellings should normally be considered 'large' and such developments should contribute to the generic visitor impact mitigation set out within this document, and would also be expected to provide targeted alternative green space within or close to the development site. The design and suitability of such green space would normally need to be considered at plan level appropriate assessment, unless exceptionally the development is not part of a site allocation.

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Map 15: Twelve mile zone of influence around Cannock Chase SAC
 Evidence Base to Support the Appropriate Assessment of Local Authorities' Core Strategy in Respect of Cannock Chase SAC

 footprint ECOLOGY 25 March 2010 Scale 1:254,500	 Cannock Chase SAC	Map reproduced from the Ordnance Survey map by Footprint Ecology with the permission of the Controller of Her Majesty's Stationary Office. © Crown Copyright, All Rights Reserved. Licence numbers 100019422 and 10001968. Contractor licence for the use of OS data provided through Staffordshire County Council and South Staffordshire Council.	
	 12 mile (19 km) zone of influence		
	 District boundaries		

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- 8.3.13 It is difficult to envisage that locations that are close to the SAC, or relatively close with direct road access, can support large developments without adverse effect on the integrity of the SAC, even with substantial mitigation. Sites at Pye Green and south of Stafford fall into these categories.
- 8.3.14 Applications for large-scale development proposals (for example sites with more than 100 dwellings) beyond the zone of influence should be assessed on an individual basis, as it is not the case that development proposals beyond 12 miles can always be assumed to have no likely significant effect on Cannock Chase SAC. Such large scale allocations will be considered in the HRA of the relevant development plan document, but as above, exceptionally where this has not been the case, a full project level appropriate assessment may be required to ascertain whether such a proposal could have an adverse effect on the SAC. The need for project level HRA outside this boundary cannot easily be defined, but advice should be sought from Natural England, and key factors are likely to be the direct road connectivity between the development and the SAC, and the availability of existing or new areas of natural greenspace that meet recreational needs.
- 8.3.15 The Visitor Impact Mitigation Strategy will only apply to net new residential development. It is considered that one-for-one replacement dwellings will not generally lead to increased recreational pressure and therefore will have no likely significant effect on the SAC. All other applications for planning permission for developments in the vicinity of the SAC should be screened to assess whether they will have a likely significant effect (individually or in combination with other plans or projects) and where necessary a full Habitats Regulations Assessment should be undertaken. The recommendations in this strategy should be applied to applications for full or outline planning permission. Reserved matters, discharge of conditions or amendments to existing planning consents should be considered on an individual basis by local authorities.
- 8.3.16 The Visitor Impact Mitigation Strategy will set out the detailed provisions for mitigation, with the broad aim of ensuring no net increase in recreational pressure and enhancing the SAC. The strategy will need to include measures relating to:
- Habitat management, ensuring that the habitats are robust and managed appropriately to compensate for impacts from recreation such as additional nutrients
 - Access Management and Visitor Infrastructure, providing management measures to direct visitor pressure away from sensitive areas, ensure damage is minimised and attract visitors to locations that are less sensitive.
 - Publicity, Education and Awareness Raising, to engender support and appreciation of the nature conservation interest and management of the site.
 - Provision of alternative sites (“SANGs” – suitable alternative natural greenspace), away from the SAC, thereby increasing the space available for recreational activities and providing dedicated locations for particular activities.

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- 8.3.17 These will need to be supported by monitoring and further research, to ensure that the measures are successful, to provide further guidance on additional measures required and to identify any new issues (such as new activities taking place within the SAC).
- 8.3.18 A multitude of landowners, designations, partnerships, interests and aspirations exist within this one site. Their commitment to the strategy and what it needs to achieve is therefore fundamental to its success. The Visitor Impact Mitigation strategy will need to sit comfortably within and alongside a wider suite of plans and strategies for Cannock Chase, including the AONB Management Plan, Forest Design Plan and the Country Park Management Plan, whose purpose is to retain and enhance the landscape, non-designated biodiversity, historic and tranquillity values of the area and people's ability to enjoy those assets in a sustainable way. It is important to note that the Visitor Impact Mitigation Strategy cannot encompass these wider duties, as it must serve as a clear and accountable measure to ensure adherence to the Habitats Regulations. It is only with a partnership working approach that the full extent of strategies and duties can be taken forward. Mitigation must therefore build on the work already done and be targeted to address the problems associated with an increase in access. In order to ensure adequate mitigation, any strategy must provide tangible measures that are funded by developers.
- 8.3.19 Different measures that would form part of a strategy would include:
1. Assessment of potential to increase heathland extent
 2. Heathland re-creation in line with recommendations in 1
 3. Re-instatement of grazing
 4. Review of procedures and systems for fire prevention and fighting
 5. Continuation of existing programme of scrub management and bracken control
 6. New fire fighting equipment, enhanced fire breaks system (as recommended in 4.)
 7. Preparation and implementation of a car-parking strategy across the SAC and surrounding areas
 8. Enhanced parking provision and access in areas outside the SAC
 9. Enhancements to existing car-parks as necessary
 10. Consistent car-parking charges
 11. Provision of dog walking areas outside the SAC boundary
 12. Dog walkers encouraged to keep dogs on leads and pick-up after their dog
 13. Enforcement of requirements to keep dogs on leads and to pick-up
 14. Cycling encouraged on bridleways and designated cycle routes
 15. Encourage horse riders to use designated routes and provision of dedicated facilities for horse riders in areas well outside SAC.
 16. Redesign and enhancement at Marquis Drive to focus visitor routes and visitor numbers away from Brindley Heath.
 17. Review of events and activities scheduled and promoted within AONB.
 18. New bus route around Chase.
 19. Dedicated team of staff with a remit to cover access issues across the SAC and wider area

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20. Schools pack and enhanced programme of schools visits.
21. Enhanced web presence providing information on different activities.
22. Tailored leaflets with maps for the following user group/activities: dog walkers, cyclists, orienteering, walkers. Other groups to be included as necessary.
23. Material promoting bus routes to the Chase and how to use the bus to undertake different activities.
24. Leaflets, web presence etc. providing information on issues likely to be contentious – grazing and redistribution of parking in particular
25. Interpretation highlighting responsible use and nature conservation
26. Programme of guided walks and events promoting nature conservation
27. Enhanced community links with local residents / parish councils / community groups / volunteers etc through talks, guided walks etc.
28. Provision of leaflets/maps etc to promote alternative sites to visit / undertake activities.
29. System for the public to report undesirable activities such as a phone number at centres, on some displays and leaflets.
30. Audit of potential sites that could function as SANGs and potential measures needed to bring them forward and make them work.
31. Phased creation of c.800ha of alternative greenspace serving people living within 12km of the SAC.
32. Annual monitoring of Annex I birds.
33. Monitoring of road-verges within the SAC
34. Monitoring of vegetation alongside paths
35. Monitoring of vegetation communities within the Sherbrook Valley,
36. On-going monitoring of *Phytophthora* outbreak
37. Recording of all fire incidents
38. Monitoring of path structure and width

8.3.20 All of the above elements need to be considered in the Strategy. There will be cross-over with existing work and some elements come with caveats. For instance, the rationalising and promotion of alternative routes for some activities will need to be kept under review so that they tie in with forestry management programmes. Key ground nesting birds that are especially sensitive to disturbance may use newly felled forest areas for a few years before a new tree crop is well established and access routes may need to change over time to avoid such areas. Similarly, the promotion of alternative, apparently less sensitive areas for increased recreational use needs to take account of the potential for currently less disturbed areas outside the SAC to be supporting key species such as nightjar.

8.3.21 In the 1970s, when Cannock Chase was initially designated as a country park, the Countryside Commission funded a project officer and various pieces of work addressing access management measures and visitor research (Rodgers, Burton and Bostock 1978, Rodgers, Burton and Bostock 1981a, Rodgers, Burton and Bostock 1981b, Rodgers, Burton and Bostock 1982a, Rodgers, Burton and Shimwell 1978, Rodgers et al. 1982b). This work included developing a plan to reduce erosion caused through recreation and cars in key honey pot areas such as Milford

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Common, where a planting scheme and re-seeding with a tougher grass mix was undertaken, as well as cars being ‘bollarded’ off the hill and a tarmac car park provided. In some locations revetments were put in to stop erosion down this steep slope and improve access on foot. Since the end of this project resources and access management measures have been more piecemeal (S. Sheppard, pers. comm.). The earlier work provides useful, if dated, precedence to the current need.

- 8.3.22 The fact that some of the measures have been tried (and have failed) in the past should not mean that they are not implemented again in the future. For example there have been previous attempts to introduce a bus service for the Cannock Chase area (the ‘Chase Hopper’). There are major and important differences between these earlier attempts and the current situation:
- Local Planning Authorities are now working under a legal obligation to make sure that the Core Strategy housing allocations do not result in a significant adverse effect on the SAC
 - Local Planning Authorities have a clear rationale and mandate to secure significant financial contributions from developers to help fund these recommendations.
 - The different measures should interact and work together, for example a reduction in the number of car-parks and changes in parking costs may result in a better uptake in the use of public transport
 - Changes in people’s attitudes, brought about for example by an increasing awareness of the environmental costs of different activities (such as use of private cars) and increased fuel costs.
- 8.3.23 The strategy will need to be carefully produced and formally adopted by all the relevant parties and different organisations associated with Cannock Chase. It will be necessary to identify a suitable mechanism to ensure that adequate resources are in place and that all measures within the strategy are adopted before development can proceed. Such a mechanism could involve developer contributions generated for each new property, with the funds managed by a panel that includes Natural England and local authority staff. The level of funding would be determined from the total cost of measures set out in the visitor mitigation strategy, divided by the number of new properties.
- 8.3.24 The implementation of the different measures could be phased over time in step with increased housing development. Such phasing would provide the long lead in necessary to plan and implement some of the more complex measures.
- 8.3.25 The different organisations will have different roles, but will need to work in partnership and adopt common standards. The four local authorities will need to work with developers and levy developer contributions, whilst the County Council (managers of the SAC), and the Forestry Commission (managers of most of the surrounding land) will be core to delivering the strategy. Natural England will have a statutory role and Natural England, alongside other nature conservation bodies (RSPB, Wildlife Trusts), and key services such as Fire Service, will need to provide expertise, advice and support. The strategy falls within the wider remit of the

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AONB Committee, and there are clear links between some of the measures within the AONB management plan and Visitor Impact Mitigation measures. In fact the Habitat Regulations Assessment of the AONB Management Plan (Cannock Chase AONB 2009) directly refers to the forthcoming draft Visitor Impact Mitigation Strategy in relation to potential adverse effects associated with the AONB Management Plan.

- 8.3.26 It is concluded that, with a comprehensive Visitor Impact Mitigation Strategy, incorporating a wide range of counteracting measures and detailed monitoring, adverse effects upon the SAC arising from recreation pressure can be avoided and the SAC actually enhanced.

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