



Habitat Regulations Assessment of the Purbeck Core Strategy

Public Consultation Draft



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Summary

This report is an assessment of Purbeck's Core Strategy Preferred Options (consultation draft, dated September 2009), in accordance with the Habitats Regulations.

Purbeck District supports one of the most special and heavily protected environments in the country. Even in the context of SW England it is exceptional. Some 21% of the area of the District is of international importance for nature conservation, including the whole of the Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC. The largest part by district of the Dorset Heath SAC/Dorset Heathlands SPA and Ramsar site and similarly the largest part of Poole Harbour SPA/Ramsar site, and the majority of the Isle of Portland to Studland Cliffs SAC fall within the District.

The aim of this assessment is to identify any areas where there are likely significant effects to the Natura 2000 sites and assess these in detail. This will influence the development of the submission draft of the Core Strategy, ensuring that any elements of the plan where there is a likelihood of a significant effect on any European site are assessed and that where necessary appropriate amendments are applied or alternative options pursued.

A full check for likely significant effects at preferred options stage is set out and we consider the following issues in detail within the appropriate assessment part of this report:

- Impacts of new housing and recreational pressure on the Dorset Heaths (the Dorset Heaths SAC, Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, Dorset Heathlands SPA, Dorset Heathlands Ramsar).
- Increased recreational pressure on Poole Harbour SPA/Ramsar from shore-based and water based activities likely to increase as a result of new housing.
- Increased recreational pressure to coastal sites as a result of enhanced transport links and housing (Isle of Portland to Studland Cliffs SAC, St Alban's to Durlston Head SAC).
- Increased recreational pressure to the New Forest (New Forest SPA/SAC/Ramsar) as a result of increased population and enhanced transport links within Purbeck.
- Water issues, including abstraction and water quality, affecting Poole Harbour SPA/Ramsar and Dorset Heaths SAC, Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, Dorset Heathlands SPA, Dorset Heathlands Ramsar).
- Fragmentation and pressure on heathland sites (Dorset Heaths SAC, Dorset Heathlands SPA/Ramsar) as a result of employment allocation (Holton Heath).
- Air quality issues as a result of increased traffic (Dorset Heaths SAC, Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, Dorset Heathlands SPA/Ramsar and Poole Harbour SPA/Ramsar).

Our assessment of the development proposals considered at preferred options stage showed that, without mitigation measures, adverse effects would be likely as a result of the Core Strategy alone, either as single elements or as a combination of elements within the plan for each of these issues (see Table 1). However, mitigation measures, which would eliminate these effects, are largely feasible (in some cases some further work is required to check that the mitigation can be implemented) and can be built into the Core Strategy before submission. If

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included in the submitted Core Strategy, as recommended, these avoidance measures would eliminate the likelihood of significant effects.

There are obligations on Member States to avoid deterioration of habitats and significant disturbance of species on European sites. It seems clear that some measures under the Directives will be needed to tackle existing pressures and problems, including deterioration of water quality and habitat deterioration and disturbance on the designated sites. The next phase of the Habitats Regulations Assessment will need to attempt to identify what the measures may be, how effective they may be, and when they may take effect. It will then be necessary to consider whether those measures may be sufficient to also counter the effects of increased development, as a result of the plan; or would different measures, or more of the same measures be required? Provision for any additional or different measures will need to be incorporated into the proposals of the Core Strategy.

Table 1: Summary table highlighting issues and Natura 2000 sites for which adverse effects on integrity are identified within the assessment

Issue	Relevant policies	Natura 2000 sites within and around Purbeck District											Mitigation / Notes	
		Dorset Heaths ¹	Poole Harbour	St Albans Head to Durlston Head	Isle of Portland to Studland Cliffs	Chesil and the Fleet	Crookhill Brick Pit	Cerne and Sydling Downs	Holnest	Rooksmoor	Fontmell and Melbury Downs	River Avon / Avon Valley		New Forest
SAC SPA Ramsar		✓ ✓ ✓	✓ ✓	✓	✓	✓ ✓	✓	✓	✓	✓	✓	✓ ✓ ✓	✓ ✓ ✓	
Increased recreational pressure ²	HS, TA	✓	✓	✓	✓								✓	Each development option will put pressure on different locations. Option A potentially most damaging and difficult to mitigate. Mitigation includes alternative sites and range of access management measures.
Water abstraction	HS	✓												Strategic management of water supplies potentially resolves issue in long term. Further assurances and information required.
Water quality	HS	✓	✓											Option B least damaging. Mitigation includes development of sewage treatment works. Further information needed on sewer capacity.
Fragmentation	ELS, TA	✓												Employment land at Holton Heath and Winfrith has potential to impact nearby heaths. Detailed assessment required of each site to ensure level of development can go ahead.
Air quality	HS, ELS, TA, IAT	✓												Development in Swanage will have particular impacts for traffic (Stoborough Heath and Corfe Common SSSIs). Further information on traffic levels required. Further clarification of some elements of the Purbeck Transportation Strategy required.

¹ By Dorset Heaths we mean the Dorset Heaths SAC, The Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC, the Dorset Heathlands SPA and the Dorset Heathlands Ramsar

² We include other urban issues with recreational pressure, especially for the heaths (see assessment text for further information)

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1 Introduction

1.1 Overview of process to date

- 1.1.1 Purbeck District Council commenced work on its Core Strategy in 2005. The strategy has undergone a number of iterations and consultations, primarily influenced by the progression of the South West Regional Spatial Strategy (SWRSS). The Core Strategy is now in a more complete form, incorporating the most recent housing figures from the emerging SWRSS at its current stage, with the consultation period for the Proposed Changes now closed, and the publication of the final SWRSS awaited. In addition to the overarching Core Strategy, the document now also incorporates development options and development policies.
- 1.1.2 The current Core Strategy, setting out issues and options and incorporating some recent elements of the SWRSS and expanding to include development options and policies, is now out for consultation as a further 'Issues and Options' consultation. In order to ensure that the Core Strategy is compliant with the requirements of the Conservation (Natural Habitats &c.) Regulations 1994, Purbeck District Council appointed Footprint Ecology & David Tyldesley and Associates to carry out an assessment of the strategy's implications for European wildlife sites, i.e. a Habitats Regulations Assessment of the plan.
- 1.1.3 Work on the Habitats Regulations Assessment to date has been in the form of evidence gathering, site visits, continued discussions between the consultants and the Council, along with informal communication with Natural England. However, now that the Core Strategy is proceeding through the official stages towards Submission for Examination in 2010, it is at this consultation stage that a formal Habitats Regulations Assessment document, recording assessment progress thus far, has been produced. This is not the final record of assessment, but rather represents the current stage of the assessment, and will continue to be updated as the Core Strategy progresses to Submission stage in 2010.
- 1.1.4 Purbeck District Council, along with other authorities within the region, has raised a legal challenge to the SWRSS, specifically in relation to the inclusion of 'Area of Search 7b' as a proposed Western Sector of growth within the Purbeck District, amounting to 2,750 additional houses, over and above the recent increases incorporated into the current Purbeck Core Strategy document. A separate assessment of this proposal was commissioned by Purbeck District Council, and it was concluded that the Council would be unlikely to be able to conclude that the Core Strategy would not adversely affect European sites if the Western Sector was incorporated. This separate and ongoing work and legal challenge are not considered further within this document. The assessment presented here purely relates to the content of the Core Strategy as currently out for public consultation.

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

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Directive 1992 into UK law³. 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 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 It should be noted that SPAs and SACs include European Marine Sites, which are designated sites below Highest Astronomical Tide. In addition, European Offshore Marine Sites (**EOMS**) are also part of the suite of internationally protected sites. Although outside the direct jurisdiction of local planning authorities, there is the potential for indirect effects upon European Offshore Marine Sites as a result of plans or projects under local planning authority control.
- 1.2.6 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

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)

7

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.

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.

- 1.2.7 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 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).

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

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*".

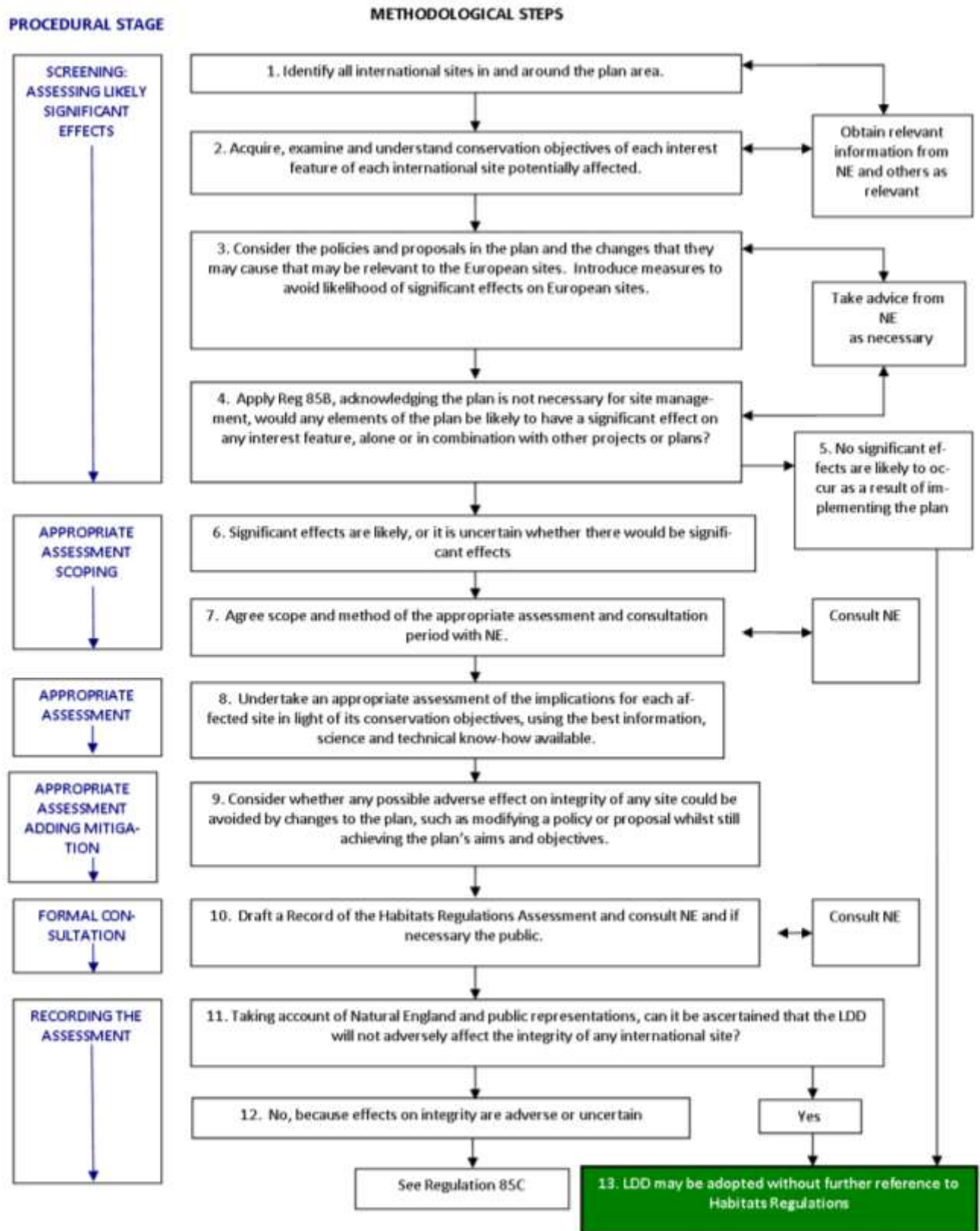


Figure 1: Methodological steps for conducting an HRA

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- 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 evidence gathering, checking for the likelihood of significant effects, and then the 'Appropriate Assessment' of elements of the plan where a likelihood of significant effects cannot be ruled out, followed by the introduction of mitigation measures, the final consultation and recording the assessment upon completion.
- 1.3.4 This Habitats Regulations Assessment has taken account of published guidance and good practice:
- Department for Communities and Local Government, 2006, Planning for the Protection of European Sites: Appropriate Assessment under The Conservation (Natural Habitats &c) (Amendment) (England and Wales) Regulations 2006: Guidance for Regional Spatial Strategies and Local Development Documents;
 - 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*.

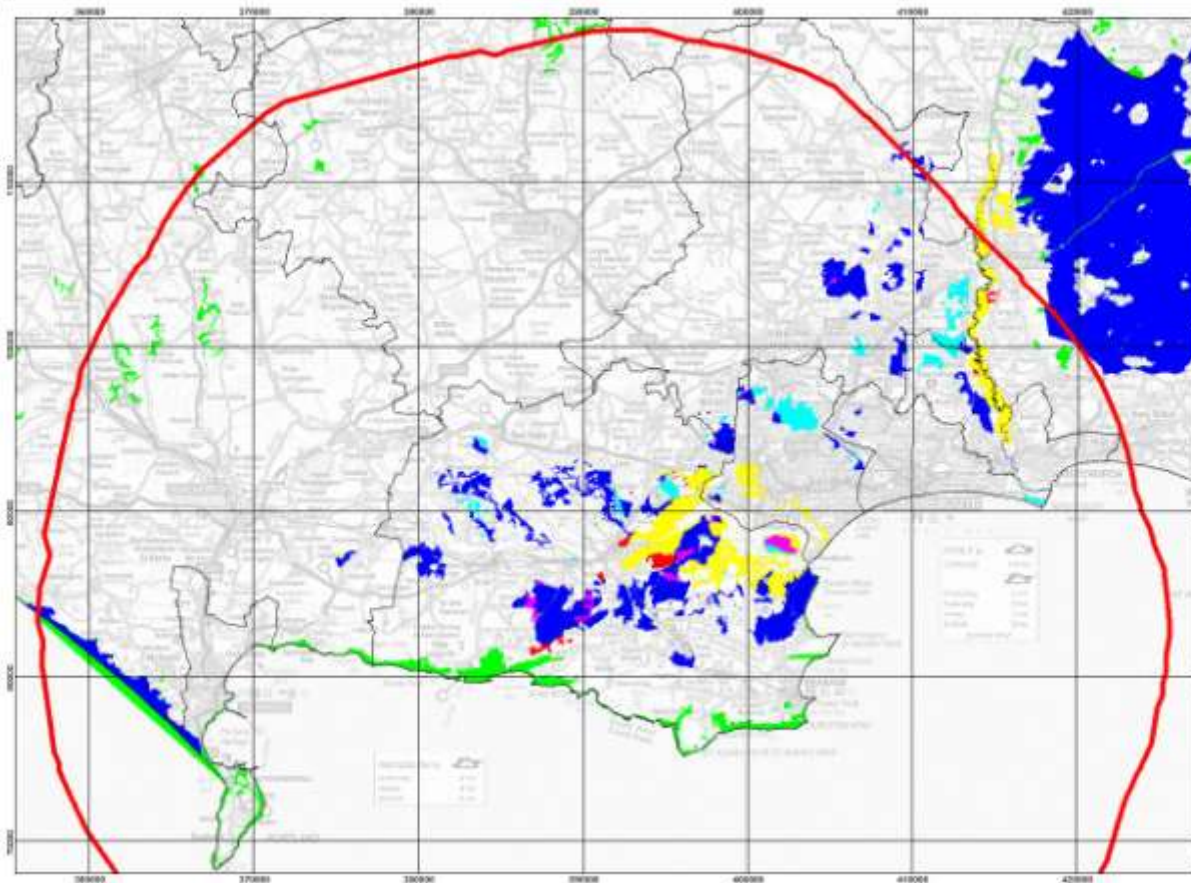
2 European Sites Potentially Affected by the Core Strategy

2.1.1 European sites both inside and outside of the District are considered because impacts such as water abstraction, waste water discharge and increased recreation could have effects well beyond the District boundary, and it is necessary to identify all functional links between with Purbeck District and the different European sites. Work in Dorset and Hampshire (Liley et al., 2008, Sharp et al., 2008b) has shown that coastal sites or large tracts of semi-natural habitat (such as the New Forest) will attract a relatively high proportion of residents from up to 20km away from the site, so we have used a 20km radius as our initial area of search, at least in terms of recreational use. This buffer is shown in Map 1 and all European Sites that fall entirely or in part within it are summarised in Table 2.

Table 2: European Sites in and around Purbeck District, entirely or partly within 20km of the District Boundary.

SAC	SPA	Ramsar	Within Purbeck District Boundary	Within 20km of Purbeck District Boundary
Dorset Heaths, Dorset heaths (Purbeck and Wareham) and Studland Dunes	Dorset Heaths	Dorset Heathlands	✓	✓
	Poole Harbour	Poole Harbour	✓	✓
St Albans Head to Durlston Head			✓	
Isle of Portland to Studland Cliffs			✓	✓
Chesil and the Fleet	Chesil Beach and the Fleet	Chesil Beach and the Fleet		✓
Crookhill Brick Pit				✓
Cerne and Sydling Downs				✓
Holnest				✓
Rooksmoor				✓
Fontmell and Melbury Downs				✓
River Avon	Avon Valley	Avon Valley		✓
The New Forest	New Forest	New Forest		✓

Map 1: European designations of sites within and surrounding, up to 20 km, Purbeck District
 Habitat Regulations Assessment for Purbeck's Core Strategy



11 August 2009

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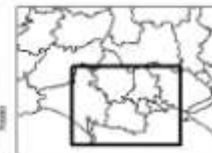
European designations

- SPA
- SAC
- Ramsar
- SPA & SAC
- SPA & Ramsar
- SPA, SAC & Ramsar

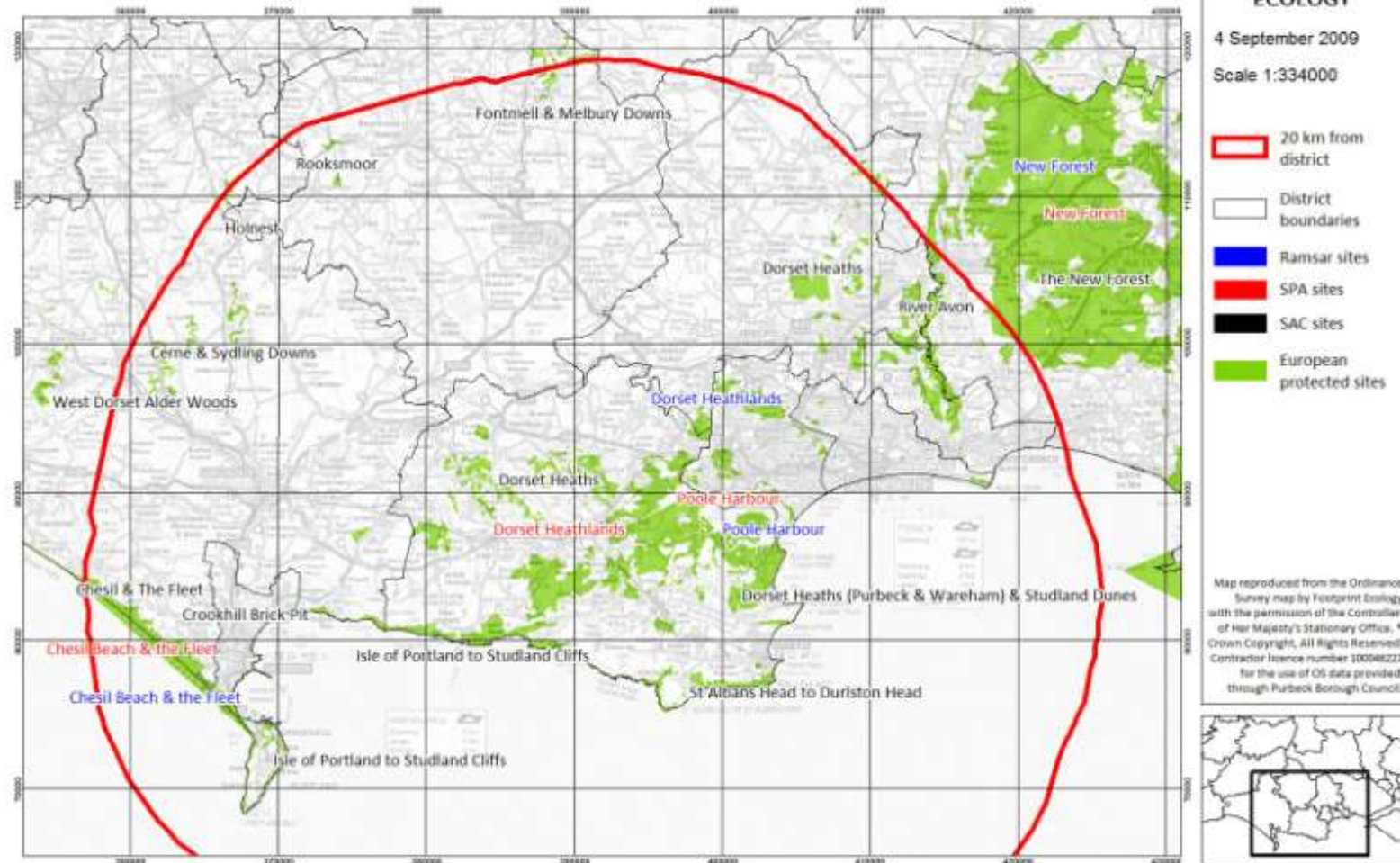
20 km from district

District boundaries

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Map 2: European protected sites within and surrounding, up to 20 km, Purbeck District
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- 2.1.2 The Purbeck District lies in an area of considerable importance for nature conservation. Eight European sites are located completely or partially within the District (see Map 1 and Map 2 for designations and site names) with a further 13 at least partially within 20km of the District boundary. The range of sites, habitats and designations is complex. Some of the European Sites are composite sites comprising a large number of component SSSIs over a wide area (such as the Dorset Heathlands SPA), others such as the St Alban's Head to Durlston Head SAC comprise a single area. The largest designated area extends to 8,169ha while the smallest is just 4.7ha. For some sites SPA, SAC and Ramsar designations all apply, while other sites or parts of sites are simply covered by one designation.
- 2.1.3 Of the 21 designated sites, seven reach beyond the 20km buffer but are largely contained within it. The majority of the New Forest designated sites fall outside the 20km buffer and Holnest and Fontmell and Melbury Downs SACs straddle the boundary.
- 2.1.4 Each European site is further described below. Sites with overlapping designations are grouped together to avoid repetition. Appendix 1
- 2.1.5 Table 13 (Appendix 1) summarises the reasons for the designation of each European site.

2.2 Dorset Heaths

Ecology and conservation objectives

- 2.2.1 The Dorset Heaths SAC covers a complex of heathland sites centred around Poole Harbour. It encompasses 5,730 ha of heathland reaching from Warmwell in the west to Cranborne in the north east and Hengistbury Head in the south east and includes all or part of 37 SSSIs. Virtually all of the SAC falls within Purbeck District and the 20km buffer. The SPA and Ramsar designations largely cover the same area as the SAC but also include the Dorset Heaths (Wareham and Purbeck) and Studland Dunes SAC, and cover 8169ha and 6730ha respectively.
- 2.2.2 Within the Dorset Heaths European sites a full range of heathland communities is represented with transitions from dry heaths to wet lowland heathland and mires; all habitats restricted to the Atlantic Fringe of Europe and among the best of their type in the UK. There are also transitions to coastal wetlands and floodplain fen habitats, plus woodland, grassland, and pools. The whole complex has an outstanding fauna in a European context, covering many different taxa. Many species have a specialist ecology, strongly associated with, or restricted to, heathland. The site lies in one of the most biologically-rich wetland areas of lowland Britain, being continuous with three other European sites: Poole Harbour, Avon Valley and The New Forest.
- 2.2.3 The heaths lie on infertile soils derived from the sands and clays of the Bagshot Beds and include shallow peat in wetter areas. Wet heath and mires support a diverse range of rare species including include Dorset heath *Erica ciliaris*, brown beak-sedge *Rhynchospora fusca*, marsh gentian *Gentiana pneumonanthe*, marsh clubmoss *Lycopodiella inundata*, great sundew *Drosera anglica* and bog orchid *Hammarbya paludosa* and the moss *Sphagnum pulchrum*. They are a stronghold for

invertebrates, particularly dragonflies, damselflies, butterflies and spiders, including Southern damselfly *Coenagrion mercuriale*. Within the UK, some of these invertebrates are restricted to the Dorset heaths.

- 2.2.4 The dry heath occurs on very infertile soils and is not very diverse botanically, but locally some nationally scarce plants occur, such as mossy stonecrop *Crassula tillaea* and yellow centaury *Cicendia filiformis*. In places, where heather *Calluna vulgaris* occurs in mature stands, lichens of the genus *Cladonia* are very abundant. The dry heaths support populations of European importance of several species, including rare butterflies (e.g. silver-studded blue *Plebejus argus*), grasshoppers and spiders. Among birds, the dry heath is very important for woodlark *Lullula arborea*, European nightjar *Caprimulgus europaeus*, Dartford warbler *Sylvia undata* and some migrants such as hen harrier *Circus cyaneus* and merlin *Falco columbarius* (see Table 3). All six species of native British reptiles, including the Annex IV species sand lizard *Lacerta agilis* and smooth snake *Coronella austriaca*, occur within the Dorset Heaths.

Table 3 Estimated populations of species listed in Annex I of the Habitats Directive (79/409/EEC) used for SPA designation (from counts undertaken in 1991/2).

Annex I species	Estimated population	% GB total
Dartford warbler <i>Sylvia undata</i>	418-606 pairs	26.1%
Nightjar <i>Caprimulgus europaeus</i>	436+ pairs	12.8%
Woodlark <i>Lullula arborea</i>	41-56 pairs	6.8%
Hen harrier <i>Circus cyaneus</i>	20, wintering	2.7%
Merlin <i>Falco columbarius</i>	15, wintering	1.2%

- 2.2.5 The Dorset heaths represent some of the biggest and finest remaining areas of lowland heathland in the UK. However, the area of heathland has been reduced and fragmented, with about 86% lost since the mid-18th century to agriculture, forestry and urban development. In recent years these land use changes have been almost halted through changes in national and local policy, but the scale of previous fragmentation and development has left a number of adverse pressures, including those relating to recreational use of heaths. The decline in use for traditional agriculture has resulted in a successional trend to scrub and woodland together with invasion by conifer and introduced scrub species, especially *Rhododendron*. Financial support schemes and management initiatives which aid the removal of scrub and encourage the re-establishment of traditional management in the form of extensive grazing now cover much of the heath area.
- 2.2.6 The heaths have been the focus of many detailed, long term, ecological studies, mainly led by the ITE/CEH research station, which for many years was located locally at Furzebrook, in Purbeck. Of particular note are the successive heathland surveys that have documented the changes in extent, fragmentation and area of different heathland habitats within Dorset (Rose et al., 2000, Webb, 1990)

2.2.7 The conservation objectives for the sites are complex as they are developed separately for each SSSI. In general terms they are to maintain the designated habitats and species (see Table 13 for European designations) in favourable condition (subject to natural change), including restoration of habitats where necessary. Those for the SPA are to maintain, in favourable condition, the habitats for the populations of Annex 1 bird species (nightjar, woodlark, Dartford warbler, hen harrier and merlin) of European importance, with particular reference to their lowland heathland habitat. Sites are considered to be in favourable condition when they are being managed in a way which maintains or enhances their nature conservation value.

Recreation and other pressures

2.2.8 Recreational use of the heaths has become a key issue in recent years. There has been a number of visitor studies addressing visitor behaviour, access patterns and use of lowland heathland sites (Atlantic Consultants, 2003, Atlantic Consultants, 2005, Clarke et al., 2006, W.S.P. Environmental, 2004, Liley et al., 2006c, Liley et al., 2006d, Tourism South East Research Services and Geoff Broom Associates, 2005, Underhill-Day and Liley, 2007). These studies have been targeted at sites of nature conservation importance and in some cases the visitor data subsequently used to explore nature conservation impacts (Clarke et al., 2008, Liley et al., 2006a, Sharp et al., 2008). The study by Clarke et al. 2006 focused on the Dorset Heaths SPA.

2.2.9 These visitor studies typically show high levels of recreational use, involving a wide range of different activities, with dog walking typically the most common reason for visiting. In the Dorset Heaths SPA study 80% of visitors were dog walkers, and other reasons for visiting included walking, jogging, cycling and horse riding (Table 4).

Table 4: Percentage of visitors undertaking different activities on the Dorset Heaths SPA. Data are from 632 interview carried out at 20 different access points in a SPA wide visitor survey conducted in 2004 (Clarke et al., 2006).

Type of activity	Percentage of visitors
Dog walking	80
Walking	10
Jogging	2
Cycling	2
Horse riding	1
Other	5

2.2.10 'Urban effects' such as fly tipping, increased fire incidence, use of heaths for motor biking and off-road vehicles etc. tend to be particularly focused around the conurbation of Poole and Bournemouth.

- 2.2.11 The majority of the heaths are mapped as open access land under the Countryside and Rights of Way (CRoW) Act, 2001 and have a long history of access by local people.

Dorset Heaths (Wareham and Purbeck) and Studland Dunes SAC

- 2.2.12 This SAC encompasses most of the remaining area of heathland within the eastern half of the Isle of Purbeck (south of the river Frome, plus Morden Bog and part of Sandford Heath) with the addition of the beach and dunes at Studland. It covers a further 2,222ha. (Note that the Dorset Heathlands Ramsar site covers this SAC, while the Dorset Heathlands SPA also covers this SAC with the exclusion of the Studland lakes, which are included within the Poole Harbour SPA).

Ecology and conservation

- 2.2.13 For a general description of the heathland within this SAC, please refer to the Dorset Heaths above. Note that the greatest concentration of Dorset heather in the UK is found within this SAC. The Dorset Heaths contain small pockets of wet woodland within valley mires but most of these appear to be of recent origin. However, at Morden Bog a bog woodland stand is of ancient origin, as shown by its pollen record and old maps. The woodland is dominated by downy birch *Betula pubescens* with a ground flora consisting of greater tussock sedge *Carex paniculata* and purple moor-grass *Molinia caerulea*. There is a rich epiphytic lichen assemblage, again indicating the persistence of this area of bog woodland.
- 2.2.14 The heaths around Wareham and to the west of the Dorset Heaths tend to have a more rural feel. Many of the sites are particularly large and are well known visitor sites, attracting both local people and tourists. There are tourist facilities such as visitor centres at both Arne (RSPB) and Studland (National Trust).
- 2.2.15 Studland dunes form part of the South Haven Peninsula, a complex spit feature located on the south side of the entrance to Poole Harbour comprising a series of shallow lakes and acidic dunes. The surface features have developed partly on the site of a former shallow sea since the seventeenth century (Diver, 1933), although some dune ridges may have been present at least as far back as the Domesday Book (May, 2003). The structure and function of the dunes are well-represented with dune-building processes still active. The site supports a number of vegetation communities which are rare in this part of the UK (partly owing to intensive recreational use of the coast) and comprises the only large dune heath site in the south and south-west of Britain.
- 2.2.16 The coastal elements of the Studland heath and dune site comprise "embryonic shifting dunes" with sand couch *Elytrigia juncea* and lyme grass *Leymus arenarius* as the key pioneer species. In some seasons good populations of sea rocket *Cakile maritima* and saltwort *Salsola kali* also occur in this restricted community, along the toe of the fore dunes. This embryonic dune feature is rare in southern England, due in part to recreational pressures. It is continuous with and grades into "shifting dunes along the foreshore", with marram grass *Ammophila arenaria* as the dominant species, along with other local dune flora. At Studland, these classic fore-

dune communities grade into "Atlantic decalcified dune heath" which is a priority feature and confined in south and south-west UK to the Studland site. This community is dominated by heather *Calluna vulgaris* with sand sedge *Carex arenaria* and bell heather *Erica cinerea* and occupies a series of dune ridges, which have developed over a period of several hundred years and represent successive eastwards growth of the dunes. The occurrence in this community of rare and protected reptiles eg sand lizard *Lacerta agilis* is especially noted for this SAC. The Studland dunes and heath are the most important single locality for this species in UK. There is no dune grassland at this site, with the fore-dunes merging directly into dune heath and then other heath communities and this has a direct relevance to vulnerability of the SAC to impacts from human pressure. The dry open heath is an important habitat for rare reptiles such as sand lizard. At the western margin of the dune ridges the dry dune heath grades into wet heath in which cross-leaved heath is prominent, while at the northern end it grades into the southern heathland types of inland Dorset.

- 2.2.17 Acidic humid dune slack communities with a high water table lie in the parallel hollows between the dune ridges. In these slacks, acidic fen and reedbeds have developed with some areas of scrub. The dune slacks are linked to an area of open fresh water known as the Little Sea on the western edge of the dune ridges. This is of recent origin (<500 years old), formed as a large body of seawater became landlocked by the growing sand dunes. This water is now fresh and is replenished by acidic, nutrient-poor water draining off the adjacent heathland, which then flows through the dune slacks and into the sea. The submerged vegetation is characterised by alternate water-milfoil *Myriophyllum alterniflorum*, shoreweed *Littorella uniflora* and spring quillwort *Isoetes echinospora*, together with bladderwort *Utricularia australis* and less frequently six-stamened waterwort *Elatine hexandra*.
- 2.2.18 Little Sea also supports an internationally important assemblage of wintering wildfowl, including Gadwall, *Anas strepera*, Goldeneye *Bucephala clangula*, Pochard *Aythya merina*, Scaup, *Aythya marila*. Numbers have declined significantly since designation under the Poole Harbour SPA.
- 2.2.19 Conservation objectives for the site include maintaining the designated habitats and species in favourable condition (see Appendix 1), including restoration where necessary and subject to natural change.

Recreation and other pressures

- 2.2.20 Studland dunes and beach are used extensively by tourists and also by students studying the ecology and coastal geomorphology of the site. Three car parks totalling over a thousand car park spaces are provided by the National Trust, with Beach Road used extensively for further parking. Part of the beach is a designated nudist beach. Overall this easily accessed, sandy, and relatively sheltered site receives over a million visitors per year (Dickinson, 2006). Holiday visitors tend to be concentrated around the cafes and car parks at Middle and Knoll beaches and the car park at Shell Bay. The one access route through the dunes and slacks from ferry Road also has a concentration of visitors where it reaches the beach, midway

along the dunes. The site is popular with dog walkers throughout the year. Just offshore, the sea is used extensively by pleasure craft including jet skis. In the past, visitor pressures have caused serious damage to the dunes, especially in the Knoll Beach car park area. In recent years several areas have been 'restored' for conservation purposes, however, visitor pressure is seen in the absence of embryo dunes in the southern area of the bay and incipient blowout development in the foredune ridge. At the extreme southern end of the bay, near Knoll Beach car park, the frontal dunes have experienced significant erosion in recent decades (Pye et al., 2007).

2.2.21 Studland Dunes are vulnerable to sea-level rise related to climate change. Erosion at the Knoll and Middle Beaches began to threaten infrastructure in the early 1990's. Research commissioned by the National Trust from Bournemouth University in 1996 showed that the annual rate of erosion had significantly increased in recent years. The main causes of erosion were identified as an increase in easterly winds, an increase in stormy weather and a rise in sea level. Other factors included reduced local sediment supply to the system due to cliff protection measures at the southern end of the Bay, and interruption of littoral drift by the construction of groynes.

2.2.22 The National Trust's long-term policy for the dune system is to permit natural processes to operate. At the present time, beach erosion is not a sufficiently widespread problem to require large-scale relocation of visitor facilities or other infrastructure, but this may be required in the future. It is unlikely that the frontal dunes in this area will roll back and maintain their present size, especially in the face of sea level rise. Ultimately washover and breakthrough is likely on a timescale of 50 to 100 years.

2.3 Poole Harbour SPA and Ramsar Ecology and conservation

2.3.1 Poole Harbour is a bar-built estuary of nearly 4,000ha occupying a shallow depression towards the south-western extremity of the Hampshire Basin which has flooded over the last 5,000 years as a result of rising sea levels. The unusual micro-tidal regime means that a significant body of water is retained throughout the tidal cycle and the Harbour therefore exhibits many of the characteristics of a lagoon. There are extensive intertidal mud-flats and, away from the north shore that has become urbanised through the growth of Poole, there are fringes of saltmarsh and reedbed. Parts of the Harbour, especially along the western and southern shores, adjoin the Dorset Heathlands SPA. Where the two areas meet, there are rare transitions from saltmarsh and reedbed to valley mire and heath habitats. The Harbour is separated from Poole Bay by the Studland Dunes (part of the Dorset Heaths [Purbeck and Wareham] and Studland Dunes SAC) and the SPA includes Littlesea, a large oligotrophic dune-slack lake of importance for wintering wildfowl.

2.3.2 As a whole, the Harbour supports important numbers of waterbirds in winter and is also an important breeding site for terns and gulls, whilst significant numbers of

little egret *Egretta garzetta* and aquatic warbler *Acrocephalus paludicola* occur on passage (see Table 5). Several river valleys converge on the Harbour, notably the Frome and the Piddle, and these support grazing marshes that contribute to the importance of the area for wintering waterbirds.

- 2.3.3 There is a considerable amount of data on the birds of Poole Harbour. Work funded by BP Ltd. and conducted by the RSPB in the mid 1980s provides useful context (Collins, 1985, 1986). The Harbour is surveyed annually as part of the national Wetland Bird Survey (WeBS). These data have been collated and analysed to provide comparative assessments of the important bird species within Poole Harbour (Pickess and Underhill-day, 2002, Pickess, 2007). Dedicated surveys of roost sites within the Harbour were conducted by Morrison (2004), and detailed mapping and surveying of the invertebrates that are the main prey of the key bird species was conducted by CEH (Thomas et al., 2004), the latter work to provide a baseline against which future verification of favourable condition could be established. A condition assessment of the Harbour was conducted by Footprint Ecology in 2006 (Underhill-Day, 2006).
- 2.3.4 The bird data is summarised in Underhill-Day (2006), which shows that populations of those bird species for which the harbour was designated as an SPA are mostly stable or increasing. Breeding numbers of common terns and Mediterranean gulls have been rising and the wintering populations of black-tailed godwits and avocets have also been increasing. Shelduck numbers have declined but at a lower rate than those nationally. The size of the overall assemblage of wintering waterfowl has declined, but wader numbers excluding lapwings (which have fallen considerably) have risen and wildfowl numbers show no clear trend. Some wader roosts are threatened by saltmarsh erosion and disturbance from people and boats. The fact that overall wader numbers are rising can mask impacts that prevent numbers increasing to their full potential within the protected site.
- 2.3.5 The site includes examples of natural habitat types of European interest (see Table 2Table 13) and the transitions from saltmarsh through to peatland mires are of exceptional conservation importance as few such examples remain in Britain. The site supports nationally important plant species including Viper's grass *Scorzonera humilis*, sharp-leaved pondweed *Potamogeton acutifolius*, bulbous foxtail *Alopecurus bulbosus*, narrow-leaved water-dropwort *Oenanthe silaifolia*, mousetail *Myosurus minimus*, shrubby seablite *Sueda vera*, spring quillwort *Isoetes echinospora* and six-stamened waterwort *Elatine hexandra*, and the marine flowering plants narrow-leaved eelgrass *Zostera angustifolia* and dwarf eelgrass *Zostera noltei*. There are also at least three British Red data book invertebrate species.
- 2.3.6 The conservation objectives for Poole Harbour include the maintenance in favourable condition of the shallow inshore waters, intertidal sediment communities, saltmarsh and reedbed for the internationally important populations of regularly occurring Annex I and migratory bird species and the internationally important assemblage of waterfowl.

Table 5 Rare or vulnerable species and regularly occurring migratory species in Poole Harbour listed in Annex I (Article 4.1, Article 4.2) of the Habitats Directive (79/409/EEC). For full details of the relevance to the SPA / Ramsar designations, see Appendix 1.

Species	Number	Proportion of population	Count details
During the breeding season:			
Common Tern <i>Sterna hirundo</i>	155 pairs	at least 1.3% of the breeding population in Great Britain	5 year mean 1993-1997
Mediterranean Gull <i>Larus melanocephalus</i>	5 pairs	at least 50.0% of the breeding population in Great Britain	5 year mean 1993-1997
On passage:			
Aquatic Warbler <i>Acrocephalus paludicola</i>	11 individuals	at least 16.4% of the population in Great Britain	Count as at 1997
Little Egret <i>Egretta garzetta</i>	107 individuals	representing at least 13.4% of the population in Great Britain	Count as at 1998
Over winter:			
Avocet <i>Recurvirostra avosetta</i>	459 individuals	at least 36.1% of the wintering population in Great Britain	5 year peak mean 1992/3-1996/7
Little Egret	83 individuals	at least 16.6% of the wintering population in Great Britain	Count as at 1998
Migratory species over winter:			
Black-tailed Godwit <i>Limosa limosa islandica</i>	1,576 individuals	At least 2.3% of the wintering Iceland - breeding population	5 year peak mean 1992/3-1996/7
Shelduck <i>Tadorna tadorna</i>	3,569 individuals	1.2% of the wintering Northwestern Europe population	4 year peak mean 1993/4-1996/
Overwintering waterfowl:			
including redshank <i>Tringa totanus</i> , curlew <i>Numenius arquata</i> , dunlin <i>Calidris alpina alpina</i> , lapwing <i>Vanellus vanellus</i> , red-breasted Merganser <i>Mergus serrator</i> , goldeneye <i>Bucephala clangula</i> , pochard <i>Aythya ferina</i> , shoveler <i>Anas clypeata</i> , dark-bellied brent goose <i>Branta bernicla bernicla</i> , cormorant <i>Phalacrocorax carbo</i> , black-tailed Godwit, shelduck, avocet, little egret.	28,426 individuals		5 year peak mean 1991/2 - 1995/6

2.3.7 **Recreation and other pressures**

- 2.3.8 There are a number of marinas and boat havens along the northern shore of the Harbour, and some 2000 swinging moorings within the site. Poole Harbour is heavily used for water sports recreation, mainly boating but water skiing, jet skiing, wind surfing, canoeing and angling also occur, particularly during the summer. Most of the north shore of the site is urbanised and there is a caravan site adjacent to the Harbour at Rockley Sands. The site is not heavily used for bathing and beach recreation, although there are numerous accesses for bird watching along the northern shore. Public access on the quiet southern shore is largely limited to Studland National Nature Reserve and a controlled access at Arne RSPB Reserve. There is also easy public access along the River Frome at Wareham allowing good viewing of birds on the grazing marsh.
- 2.3.9 At a few places along the shoreline where there is good access the site is well used for bait-digging and angling. The eastern part of the site is a bass nursery area. All wildfowling on the intertidal areas is under the control of the Dorset Wildfowling Association. Private estates also shoot on their own land i.e. on saltmarsh above high water but much of the shoreline above MHW is controlled by conservation organisations.
- 2.3.10 Poole Harbour has been impacted by the growth of a conurbation along its north shore, together with associated infrastructure, and by development of a commercial port, marinas and moorings. In recent years, further encroachment by development has been almost halted by changes in national and local policy. Most of Poole Harbour falls under the authority of Poole Harbour Commissioners and management policies have been in place since 1987. Recreation pressures on the site are being addressed by an Aquatic Management Plan which has directed certain uses to areas where impacts on nature conservation are thought to be minimal. The plan is supported by a steering group of almost wholly statutory bodies, and consists of Borough of Poole, Dorset County Council, Natural England, Environment Agency, Poole Harbour Commissioners, Purbeck District Council, Southern Sea Fisheries District Committee and Wessex Water Services Ltd. A 'Navigate with nature' project, funded by the Department of the Environment, promoted best practice amongst Harbour users to reduce water pollution and disturbance to wildlife. Dredging to provide navigation may impact on intertidal habitat and will be addressed through national policy requirements on sustainable coastal management. There is recent evidence that Manilla clam is becoming naturalised within the Harbour following small scale commercial introduction and any potential problems will be examined by the steering group. Die back of common cord-grass *Spartina anglica* is also affecting the site and has been monitored by the Centre for Ecology and Hydrology.
- 2.3.11 Footprint Ecology produced a monitoring strategy for Poole Harbour in 2009 (Liley and Underhill-Day, 2009), which sets out the monitoring measures needed to address increases in access and quantify potential impacts to the SPA.
- 2.3.12 Several sewage treatment plants discharge into the Harbour and the effect of these on water quality is monitored by the Environment Agency. Wytch Farm oilfield has facilities within the site; their maintenance and any risks from oil spills are dealt

with according to agreed method statements and oil spill contingency plans. Recent studies have addressed the effects of bait digging in the Harbour which has local impacts. Most of the wildfowling is regulated by a management plan that identifies non shooting areas. The impact of drainage on grazing marshes is being addressed through Water level Management Plans.

2.4 St Albans to Durlston Head SAC

Ecology and conservation

- 2.4.1 St Albans Head to Durlston Head SAC comprises a single unit of cliffed coastline stretching some 10km between St Albans Head and Durlston, plus associated patches of calcareous grassland just inland. The SAC is located entirely within Purbeck District. It also falls within the Dorset Area of Outstanding Natural Beauty and some parts are within the Dorset and East Devon Coast World Heritage Site.
- 2.4.2 The cliffs are formed of hard limestones and support the Annex 1 habitat "vegetated sea cliffs of the Atlantic and Baltic regions" for which they are one of the best localities in the UK. They are also designated for semi-natural dry grasslands and scrub on calcareous substrates, supporting species that are rare in the UK, such as wild cabbage *Brassica oleracea* var. *oleracea* and the UK's largest population of early spider-orchid *Ophrys sphegodes*.
- 2.4.3 Together with Isle of Portland to Studland Cliffs SAC, this SAC also supports important long-standing populations of the endemic early gentian *Gentianella anglica* numbering several thousands of plants in floristically-rich calcareous grassland. St Alban's Head to Durlston SAC also supports a wintering population of greater horseshoe bat *Rhinolophus ferrumequinum*.
- 2.4.4 Conservation objectives for the site are focussed around maintaining a suitable sward. The condition of the site varies between favourable and unfavourable declining, attaining and maintaining appropriate grazing levels being a key issue. This is especially challenging on these coastal limestone grasslands as the turf is dominated by tor grass *Brachypodium pinnatum* which is not preferentially grazed by some stock.

Recreation and other pressures

- 2.4.5 The South West Coast Path runs through the site, and is well used. Much of the area is also popular with climbers (see Isle of Portland to Studland Cliffs SAC). In addition to boat tours along the coast from Swanage, many independent leisure craft use this stretch of coast, however it is not possible to land. Visitor pressure is focused at Durlston Country Park where there are car parks and a café, and to a lesser extent at St Alban's Head and Winspit, where there are car parks about one km inland and local amenities at Worth Matravers.

2.5 Isle of Portland to Studland Cliffs SAC

Ecology and conservation

- 2.5.1 Isle of Portland to Studland Cliffs, together with St Albans Head to Durlston Head (see above), forms a discontinuous unit of cliffed coastline and associated calcareous grassland stretching some 40km. The Isle of Portland to Studland Cliffs SAC (1447.5ha) includes the cliffed coast of the Portland peninsula, a stretch of coastline from just north-east of Weymouth to St Alban's Head, from Durlston to Peveril Point south of Swanage, and Ballard Down and Cliff. Most of the SAC is located within Purbeck District, with the section west of Ringstead within 20km of the district. Some parts of the SAC also fall within the Dorset and East Devon Coast World Heritage Site.
- 2.5.2 The great range of rock types has given rise to a varied coastline of vertical cliffs, undercliffs and landslips which support an outstanding array of local and maritime species. Some of the cliffs are formed of hard limestones, with chalk at the eastern end and central section, interspersed with slumped sections of soft cliff of sand and clays. The cliffs support "vegetated sea cliffs of the Atlantic and Baltic regions" for which it is also one of the best localities in the UK. The Portland peninsula, extending eight kilometres south of the mainland, demonstrates very clearly the contrast between the exposed western and southern coasts, with sheer rock faces and sparse maritime vegetation, and the sheltered eastern side, with sloping cliffs supporting scrub communities, where wood spurge *Euphorbia amygdaloides* grows in grassland.
- 2.5.3 Semi-natural dry grasslands and scrub on calcareous substrates, among the best examples in the country, occur at this site in both inland and coastal situations on both chalk and Jurassic limestone. The site contains extensive species-rich examples of tor grass *Brachypodium pinnatum* grassland in the southern part of its UK range. Smaller areas of the typical chalk grassland type sheep's fescue *Festuca ovina* – meadow oat-grass *Avenula pratensis* grassland occur on shallow soils on steeper slopes. Transitions from calcareous grassland to both chalk heath and acid grassland are also present. The site has well-developed terricolous (ground dwelling) and saxicolous (rock dwelling) lichen and bryophyte communities associated with open turf, chalk rock and pebbles, and flinty soils. Among the many scarce and localised plants and animals of the chalk and limestone are the largest national populations of two rare species – early spider orchid and Lulworth skipper butterfly *Thymelicus acteon*.
- 2.5.4 The site also supports annual vegetation of drift lines, here associated with the intermittent occurrence of shingle beaches beneath the cliffs which are subject to periodic displacement or overtopping by high tides and storms. The distinctive vegetation, which may form only sparse cover, is therefore ephemeral and composed of annual or short-lived perennial species such sea mayweed *Matricaria maritima*, oraches *Atriplex* species, and sea beet *Beta vulgaris* ssp. *maritima*. Level or gently-sloping, high-level mobile beaches, with limited human disturbance, support the best examples of this vegetation.

- 2.5.5 Together with St Albans Head to Durlston Head, Isle of Portland to Studland Cliffs SAC, supports important long-standing populations of early gentian numbering several thousands of plants in floristically-rich calcareous grassland.
- 2.5.6 Conservation objectives for the site include those for the separate SSSI, and are in general terms to maintain the designated habitats and species (see Table 13) in favourable condition. The main forces active here are natural processes, so that erosion/deposition and cliff slumping occur widely (in the absence of any significant coast protection works) and grazing, where the same difficulties arise with tor grass turf as in the St Alban's to Durlston SAC.

Recreation and other pressures

- 2.5.7 The south-west coast path runs the length of this site. Over 1 million people walk some of the South West Coast Path between Poole and Lyme Regis each year. Visitor numbers for individual locations are not generally available, although it is estimated that 500,000 people visit Lulworth Cove annually. Erosion is a key concern in some areas, particularly where it is not clear who should shoulder the burden of repair and maintenance costs.
- 2.5.8 The hard limestone cliffs of Purbeck and Portland are also increasingly popular for climbing⁹. Season and route restrictions are in place in Purbeck to help avoid conflict with nesting birds – the scheme appears to be accepted by the majority of climbers, and is monitored through an annual climbing forum. Portland is experiencing rapid growth in sports climbing, following national publication of new climbing guides: over 300 routes with fixed bolts have been put in place in the last few years, and this is set to increase further. Issues include impacts on cliff vegetation (particularly the nationally important Portland sea-lavender *Limonium recurvum*).
- 2.5.9 Hang-gliding has been a localised minority activity on the coast for over 10 years, and has been joined recently by paragliding (gliding using a parachute). The main clubs use sites in Portland, Kimmeridge, St Aldhelm's and Ballard Down when weather conditions are suitable. Erosion at launch sites and disturbance to cliff-nesting birds is a concern on Portland, and a zoning scheme has been agreed with the main association who use the Island.

2.6 Chesil Beach and the Fleet SAC, SPA, Ramsar Ecology and conservation

- 2.6.1 The SAC includes Chesil beach, the Fleet and the shore of Portland Harbour, and extends to some 1630 hectares. Portland Harbour and all but the north-westernmost tip of the Fleet fall within 20km of Purbeck District, although Chesil Beach extends several kilometres beyond this area. The Chesil Beach and the Fleet Ramsar site covers a smaller area than the SAC (748ha), including Chesil Bank, but not the entire beach.

⁹ www.dorsetforyou.com/index.jsp?articleid=21650

- 2.6.2 Chesil Beach is a large (28 km-long), relatively undisturbed shingle bar, one of the three major shingle structures in the UK. It encloses the Fleet, by far the largest saline lagoon in the country. The salinity gradient, peculiar hydrographic regime and varied substrates, together with associated reedbed and intertidal habitats and the relative lack of pollution in comparison to most other lagoons, have resulted in the Fleet being extraordinarily rich in wildlife. It contains outstanding communities of aquatic plants and invertebrates, and supports large numbers of wintering waterbirds, including Dark-bellied Brent Goose *Branta bernicla bernicla*. In spring and summer, Chesil Bank is an important breeding site for Little Terns *Sterna albifrons* which feed in the shallow waters of the lagoon, as well as adjacent waters outside the SPA. The plant life includes 150 species of algae and the lagoon is best known for the most extensive mixed populations of eelgrass *Zostera* and tasselweeds *Ruppia* in Britain including two species of eelgrass and three species of tasselweed, one of which is the rare spiral tasselweed *R. cirrhosa*. The Fleet also supports distinct and highly unusual mollusc associations and other notable invertebrates. It is an important breeding area for fish and is a bass nursery. In all, 23 species of fish have been recorded.
- 2.6.3 On the landward, more stable side of Chesil Bank, large, internationally and nationally important populations of shingle plants occur (perennial vegetation of stony banks), mostly relatively undisturbed by human activities. Much of the shingle bar is subject to wash-over and percolation in storm conditions and is therefore sparsely vegetated. It supports the most extensive occurrences of the nationally scarce sea-kale *Crambe maritima* and sea pea *Lathyrus japonicus* in the UK, together with other grassland and lichen-rich shingle plant communities typical of more stable conditions, especially towards the eastern end of the site.
- 2.6.4 An almost continuous belt of shrubby seablite and sea-purslane *Atriplex portulacoides* (Mediterranean and thermo-Atlantic halophilous scrubs [*Sarcocornetea fruticosi*]) forms a clear zone between the Fleet and the shingle vegetation of Chesil Bank. It appears to exist in a dynamic equilibrium with annual vegetation of drift lines dominated by sea beet and oraches which replaces the scrub in areas subject to disturbance, and is in turn displaced by the scrub after disturbance ceases.
- 2.6.5 Conservation objectives for the site include the maintenance of designated habitats and species.

Recreation and other pressures

- 2.6.6 The Fleet and much of Chesil bank are privately owned and managed as a nature reserve. Part of Chesil is Crown Common land. Whilst the majority of the site is largely inaccessible to casual visitors, the south western part of the site known variously as Ferrybridge or Ham beach is subject to considerable visitor recreational pressure, and receives an estimated 100,000-150,000 visitors per annum¹⁰. The purpose of visits to the area is wide ranging from local people dog walking, to those engaged in specialist sports or activities. The Coast Path runs

¹⁰ www.rtpi.org.uk/download/1973/Chesil-Beach-and-Fleet-Potland.pdf

alongside the inland boundary of part of the site, which is used year round for walking. Large numbers of migrating birds pass through the area in spring and autumn, attracting bird watchers. The beach is used for swimming and sunbathing in the summer. There are moorings within part of the site and windsurfing, kite surfing and sailing occur adjacent to the site year round (including international competitions). The height restriction of Ferrybridge itself mean that only canoes and other small craft can use the Fleet, and numbers are monitored. Diving occurs both within and adjacent to the site - all year but mainly April to October. Bait-digging is carried out by recreational fisherman on the intertidal mudflats of the Fleet. Angling is popular off Chesil Beach, which hosts national competitions and litter and discarded and lost tackle remains an issue.

- 2.6.7 The adjacent Portland Harbour through which much of the water exchange for the Fleet takes place is the site of a new commercial port, following departure of MOD several years ago. Routine or accidental discharges arising from activities within the Harbour could affect water quality in the Fleet and there is potential for recreational uses to 'spill over' into the Fleet. The land use of the Fleet hinterland is largely intensive agriculture and agricultural run-off is a potential source of eutrophication within the Fleet itself. There are also small domestic sewage discharges into the Fleet. There is a shellfish farm within the Fleet which cultivates oysters and cleanses mussels and other species. Introduction of non-native species remains a potential concern. Japanese seaweed is cut on an annual basis. The site is close to one of the world's busiest shipping lanes and consequently there is a risk of accidental oil pollution. Contingency plans exist for dealing with oil spills.

2.7 Crookhill Brick Pit SAC

- 2.7.1 Crookhill Brickpit is a disused brickpit near Weymouth which has important geological features (exposure of Lower and Middle Oxford Clay). The site contains several ponds that support great crested newts *Triturus cristatus*, including one pond which has been recorded to have one of the highest counts of the species in Dorset. The site also contains a variety of other habitats used by the great crested newt, including grassland, scrub and quarry spoil. The newer ponds were created as part of a mitigation project for the construction of a waste transfer station. A public footpath between the village of Chickerell and the Fleet runs through the north of the site.

2.8 Cerne & Sydling Downs SAC

- 2.8.1 This 370ha site on the west Dorset chalk consists of a large area of semi-natural dry grassland. Dry valley slopes with a variety of aspects support extensive examples of CG2 sheeps festuce *Festuca ovina* – meadow oat grass *Avenula pratensis* grassland in the south-west of its UK range. A particular feature of this site is the presence of the devil's bit scabious *Succisa pratensis* – ox-eye daisy *Leucanthemum vulgare* sub-community, especially on south- and west-facing slopes. This type of calcareous grassland is almost entirely restricted to parts of Wiltshire and Dorset..

- 2.8.2 Cerne & Sydling Downs is also designated for the presence of the marsh fritillary butterfly *Euphydryas aurinia*, an Annex 2 species. The larger sub-populations regularly expand into other nearby areas in favourable years. These calcareous downland colonies complement the wet grassland habitats of the other Dorset strongholds for the butterfly.
- 2.8.3 Cerne & Sydling Downs is a composite site comprising a number of steep downland scarps around Cerne Abbas, including Sydling Valley Downs, Black Hill Down; Court Farm, Sydling, Giant Hill and Hog Cliff. Conservation objectives are developed separately for each of the component SSSIs and in general seek to maintain the designated habitats and species in favourable condition, subject to natural change (see Appendix 1). Condition of the site is largely favourable, with some areas unfavourable, generally due to locally unsatisfactory grazing regime and scrub control.

Recreation and other pressures

- 2.8.4 Public rights of way run through the sites, but visitor pressure is focussed around the Cerne Abbas giant, a 55m high figure into the chalk of the hillside which attracts a large number of visitors. However the giant is best viewed from the opposite side of the valley where a car park is provided. Some areas of the site are designated as open access land under the CRoW Act (2000). There is also a paragliding site within the SAC just east of Sydling St Nicholas, although it is used infrequently (N. Bourn, pers. comm.).

2.9 Holnest SAC

- 2.9.1 This 55ha site is designated solely for great crested newts *Triturus cristatus*. The site encompasses around 20 ponds set in a matrix of terrestrial habitats, comprising areas of semi-improved grassland, scrub, associated semi-natural habitats and woodland bounded by fences and hedgerows. The ponds exhibit a range of sizes, profiles and origins, and include some recently-created ornamental ponds as well as traditional farm ponds. A large population of great crested newts is present, with over 200 individuals having been recorded at one pond in spring 2003. The woodland areas provide ideal hibernation habitat. The site is located 20km north-west of Purbeck District.

2.10 Rooksmoor SAC

- 2.10.1 Rooksmoor SAC includes two separate SSSIs: Rooksmoor, and Lydlinch Common and Stock Wood. The SAC designation applies to all of Rooksmoor SSSI and the units at Lydlinch that include the common rather than Stock Wood. The reason for the international designation is the presence of *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) and also for the presence of the marsh fritillary for which this is considered to be one of the best areas in the United Kingdom.

- 2.10.2 There is a problem with achieving sustainable grassland management on both parts of the site. Traditional light grazing with cattle is difficult on Lydlinch Common because it is bisected by two very busy roads and is registered common land. The legal complexities to be overcome and the infrastructure needed to reinstate grazing on Lydlinch Common are being addressed and an application has been made to fence the common. At Rooksmoor, the land is isolated from the rest of the farm holding which is now an intensive dairy unit.
- 2.10.3 At Lydlinch, the SSSI condition assessment records the grassland units as currently unfavourable recovering, due a large amount of recent scrub clearance. The condition of Rooksmoor SSSI is considered to be unfavourable (no change), due to undergrazing and tree/scrub management.
- 2.10.4 Public rights of way run through parts of both sites. Lydlinch also has open access as a registered common under the 2001 CRoW Act. Use of the sites is likely to be mainly local. The site is located to the north-west of Purbeck District, close to the 20km boundary.

2.11 Fontmell and Melbury Downs SAC

- 2.11.1 This site is designated for its calcareous grassland and the presence of large populations of early gentian *Gentianella anglica*, numbering many thousands of plants. The SAC covers 261ha, while the SSSI is slightly larger, covering 287.9 ha. The site is part owned by the National Trust and part managed as a nature reserve by the Dorset Wildlife Trust. The grassland shows wide variety related to variation in soil type, aspect and grazing pressure.
- 2.11.2 SSSI condition assessment information for the site indicates that c.70% of the site is in favourable condition, 20% unfavourable recovering and 10% unfavourable declining. The reasons for unfavourable declining condition relate to past management (part of the site was ploughed) and inappropriate grazing levels.
- 2.11.3 The site is located to the north-west of Purbeck District, close to the 20km boundary. A public right of way crosses the site which is designated as open access land under the CRoW Act (2000).

2.12 River Avon/Avon Valley

- 2.12.1 The Avon is a large, lowland river system running through chalk and clay, with transitions between the two. It displays wide fluctuations in water level and parts of the valley are regularly flooded in winter. The Avon valley has a greater range of habitats and a more diverse flora and fauna than any other chalk river in Britain. The valley includes one of the largest expanses of unimproved floodplain grassland in Britain, including extensive areas managed as hay meadow. The SAC covers almost 500ha in Wiltshire, Hampshire and Dorset, and includes the tributary rivers Wylde and Bourne. The SPA and Ramsar site encompass 20km of the lower reaches of the River Avon and its floodplain between Bickton and Christchurch. The section of the River Avon/Avon Valley between Blashford and Christchurch is located within 20km of Purbeck District.

- 2.12.2 The River Avon is particularly important for its water-crowfoot species, which may modify water flow, promote fine sediment deposition, and provide shelter and food for fish and invertebrate animals. Five such species occur within this habitat, but stream water-crowfoot *Ranunculus penicillatus* ssp. *pseudofluitans* and river water-crowfoot *R. fluitans* are the main dominants, with *R. peltatus* dominant in some winterbourne reaches. The Avon has an excellent mosaic of aquatic habitats, which include extensive areas of gravel, sand and silt essential for spawning and growth of juvenile fry. The site is also important for Desmoulin's whorled snail *Vertigo moulinsiana* in addition to several fish species (see Table 13). There has been limited modification of the river course by comparison with many other southern lowland rivers in England.
- 2.12.3 The extensive floodplain grasslands support wintering Bewick's Swans *Cygnus columbianus bewickii* in numbers of European importance (though this winter flock has declined markedly in recent years), and Blashford Lakes Gravel Pits within the SPA are particularly important for wintering Gadwall *Anas strepera*.
- 2.12.4 The Avon valley is used for informal walking and birdwatching, and access by people and dogs both on and off public rights of way is a significant cause of disturbance in some areas. Coarse-fish and game-fish angling and wildfowling and game shooting and associated activities also take place, but the extent and intensity are unknown although thought to be considerable. Localised sailing and watersports are carried out at Blashford Lakes. Most land is private with no public access apart from a very few public footpaths.
- 2.12.5 There are issues arising from the decline in traditional pastoral agriculture and lack of maintenance of ditch network. Management of water levels driven partly by agriculture but also urban flood risk management continues to have adverse effect on habitats. High levels of silt in the river continue to degrade its interest, especially aquatic species but also contribute to silting-up ditches and deterioration of grasslands after flood events. The invasive introduced species *Crassula helmsii* is an increasing problem in Blashford Lakes following restoration of the gravel pits.

2.13 The New Forest

- 2.13.1 The New Forest is a composite site covering some 29,626ha, almost entirely within Hampshire but with 1% in Wiltshire. The Ramsar and SPA sites cover a similar area. The vast majority of the site lies beyond 20km of Purbeck District, but about 285ha lies within this boundary near Bransgore.
- 2.13.2 It comprises a complex mosaic of habitats overlying mainly nutrient-poor soils over plateau gravels. The major components are the extensive wet and dry heaths with their rich valley mires and associated wet and dry grasslands, the ancient pasture woodlands and inclosure woodlands, the network of clean rivers and streams, and frequent permanent and temporary ponds.
- 2.13.3 The area supports a diverse assemblage of wetland plants and animals including (at the time of designation at least) 29 nationally important plant species, including small fleabane *Pulicaria vulgaris*, slender cottongrass *Eriophorum gracile* and pennyroyal *Mentha pulegium*. Invertebrates include two species with

internationally important populations (southern damselfly *Coenagrion mercuriale* and stag beetle *Lucanus cervus*). 180 other species of invertebrate range from butterflies such as the high brown fritillary *Argynnis adippe* to ground bugs such as *Nysius helveticus*, freshwater invertebrates such as the tadpole shrimp *Triops canriformis* and insects such as the New Forest cicada *Cicadetta montana*, the latter two species only known from the New Forest in the UK. Other important species occurring include great crested newt and two fish, brook lamprey and bullhead. The area supports important populations of breeding birds, including nightjar, woodlark and Dartford warbler. Breeding honey buzzard *Pernis apivorus* and wintering hen harriers are also notable.

- 2.13.4 The site is subject to recreational pressure including informal walking, horse-riding, cycling, birdwatching and shooting, and steps are being taken to deal with recreational pressures. A recent decline in waders (which are not included in the SPA designation) such as redshank, lapwing, curlew and snipe may in part be due to the effects of walkers and particularly those with dogs, as well as low water levels affecting the wetland habitats. Most of the valley mires in the Forest have been damaged in the past by drainage which has caused drying out of the peat layers. Prevention of further erosion has already been tackled on some sites but a more extensive programme of infilling drainage ditches is currently being discussed with the landowners and commoners. The work to restore valley mires systems is expected to influence these bird populations in time.

3 Regional Issues - Habitats Regulations Assessment of the South West Regional Spatial Strategy

3.1.1 A comprehensive Habitats Regulations Assessment (HRA) of the South West RSS was undertaken in February 2007 and a further HRA was published in July 2008, assessing the proposed changes to the RSS. In this section we summarise the relevant findings of these HRAs which are then used as context for the assessment of Purbeck's Core Strategy Preferred Options. We highlight that the core Strategy document addressed in this report does not include the proposed Western Sector development of 2,750 dwellings. This is due to Purbeck District Council's outstanding representations of objection relating to the western sector. Further details are given in the core strategy document and in White (White et al., 2008).

3.1.2 The HRA of the proposed changes summarises various sites and issues relevant to Purbeck where it is uncertain whether adverse effects on integrity will occur. These are summarised in Table 6.

Table 6: Sites (relevant to Purbeck) and issues identified in the HRA of the proposed changes to the RSS where there is uncertainty relating to adverse effects on integrity.

Site	Issue(s)
Dorset Heaths SPA, Dorset Heathlands SAC and Ramsar	Water abstraction Air quality
Isle of Portland to Studland Cliffs SAC	Water abstraction Air quality
Poole Harbour SPA and Ramsar	Air quality

3.1.3 The following issues (relevant to Purbeck) are addressed in detail within the regional level HRAs:

- Water abstraction;
- Water quality;
- Tourism, recreation and other urban effects;
- Air quality;
- Coastal squeeze;
- Physical habitat loss and damage.

These details of the regional HRAs relevant to Purbeck are discussed below.

3.2 Water Abstraction

3.2.1 For the Dorset Heaths SPA, Dorset Heathlands SAC and Ramsar, and the Isle of Portland to Studland Cliffs SAC, the HRA of the proposed changes to the RSS (2008) indicates that correspondence from the Environment Agency has identified Public Water Supply (PWS) abstractions on or near the sites that could be considered to be hydrologically connected. The PWS abstractions have been determined as not having a significant effect on the interest features of the sites and have therefore been affirmed or are in the process of being affirmed through the Environment

Agency's Review of Consents process. The Environment Agency's judgements were based on the situation at the time, and did not take into account the proposed changes and increased housing allocations. Uncertainty therefore remains as to whether adverse effects on integrity will occur as a result of the proposed changes.

- 3.2.2 The HRA of the original RSS (2007) states that, for the Dorset Heaths SAC, Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, Dorset Heathlands SPA/Ramsar, and the Poole Harbour SPA/Ramsar, it was not possible to conclude that no adverse effects on integrity will occur. The assessment goes on to suggest that sufficient safeguards are available with both lower level plan making and the other regulatory mechanisms such as Catchment Area Management Plans coordinated by the Environment Agency. The assessment advises that further detailed assessment should be undertaken at the local or catchment level to ensure strong safeguards are in place.

3.3 Water Quality

- 3.3.1 Similar conclusions are drawn by the HRA (2007) with regard to water quality. The assessment states that it was not possible to conclude that no adverse effects would occur with regard to both Dorset Heathlands and Poole Harbour. In the HRA, Poole Harbour is specifically cited following correspondence with Natural England identifying particular issues with nutrient enrichment at this SPA/Ramsar; however, the HRA does then not list Poole Harbour among the sites for which any adverse effect (or uncertainty regarding adverse effect) remains.

3.4 Tourism, Recreation and Urban Effects

- 3.4.1 The HRA (2007) recommended changes to the policy wording of the RSS to make it clear that local plans must address any potentially adverse effects as a result of increased tourism, recreation and urbanisation. The HRA suggested a number of mitigation measures that could be taken forward at a local level, including the provision of alternative recreation spaces and the development of management plans for sensitive sites.
- 3.4.2 For the Dorset Heaths SAC, Dorset Heathlands SPA/Ramsar, and the Dorset Heaths (Wareham and Purbeck) and Studland Dunes SAC, the HRA (2007) identified a greater chance of an adverse effect. As mitigation, it proposes a joint Development Plan Document to guide local authorities in the achievement of development requirements whilst ensuring that the integrity of the Dorset heathland sites is not adversely affected. The DPD will include mitigation measures in the form of (i) the provision of alternative recreational greenspace, (ii) a focus on the use of land adjacent to development sites to accommodate local recreational needs, and (iii) consideration of the most appropriate management (including access management) of sensitive heathland sites to reduce disturbance and harm. These measures are also necessary to mitigate for the effects of direct habitats loss through trampling.
- 3.4.3 In order to allow development to proceed while the joint DPD is completed, an interim planning framework (IPF) has been established. This has used developer contributions, collected across the south-east Dorset sub-region, to fund a programme of wardening, education programmes, alternative sites, access management measures

3.4.4 Following advice from Natural England, the HRA of the proposed changes to the RSS (2008) identified the following sites as being vulnerable to recreational pressure:

- Isle of Portland to Studland Cliffs SAC
- Poole Harbour SPA and Ramsar
- Dorset Heaths SAC,
- Dorset Heathlands SPA and Ramsar
- Dorset Heaths and Studland Dunes SAC
- The New Forest SAC

3.4.5 The HRA recommended additional wording within the RSS as follows:

“The relevant authorities will need to work jointly and with Natural England to secure and implement appropriate and deliverable measures to avoid or mitigate adverse effects from recreation at these sites, such as the use of Section 106 funding to secure provision of alternative greenspace or improve habitat management. Providing new areas of appropriate greenspace (as set out in Policy GI1) is likely to mitigate potential adverse effects in many locations. However, management of activities and access on these sites may also be required. If following investigation of mitigation options by local authorities and partners, provision of appropriate greenspace and/or management measures is not possible, restrictions may need to be put in place on the type, scale and/or location of development (e.g. through implementation of ‘no development’ buffer zones) within LDDs in proximity to these sites. “

3.4.6 Following the adoption of this text the HRA and the development of the joint DPD in relation to the various Dorset heathland sites, the HRA then concluded that there would be no adverse effects from disturbance effects in relation to recreation. This conclusion is based on the assumption that mitigation measures are implemented successfully, an assumption that the HRA recognises will need to be thoroughly tested, regularly monitored and reviewed. Should the mitigation measures be shown not to be successful, the HRA states that development proposals and the mitigation measures will need to be reviewed to ensure that no adverse effect on site integrity occurs.

3.5 Air Quality

3.5.1 The HRA of the proposed changes to the RSS (2008) identifies the following sites where nitrogen deposition is already exceeding critical loads:

- Dorset Heaths SAC and Dorset Heathlands SPA and Ramsar (A31, A35, A350)
- Dorset Heaths (Purbeck & Wareham) & Studland Dunes SAC (A31, A35, A351, A350)
- The New Forest SAC, SPA and Ramsar (M27, A31 A36, and A35 and Bournemouth Airport)

3.5.2 In addition, the assessment also recognised uncertainty with relation to Poole Harbour SPA/Ramsar as to whether the critical load was currently being exceeded.

3.5.3 The HRA therefore recommends that the RSS amend policy wording to specifically include reference to the need to avoid/reduce the impacts of air quality on European sites, explaining that local development documents must take this requirement into account in plans and the determination of projects.

3.6 Coastal Squeeze

3.6.1 Following a response from the Environment Agency, coastal squeeze is recognised within the HRA of the proposed changes (2008) to the RSS. Poole Harbour SPA/Ramsar is identified as a site where flood defences could restrict natural coastal retreat, leading to habitat loss. The HRA proposes additional wording ensuring that coastal squeeze is fully considered in lower tier plans.

3.7 Physical Habitat Loss and Damage

3.7.1 For the Dorset Heaths SAC, Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, and Dorset Heathlands SPA/Ramsar, the RSS addresses the potential for physical loss and damage under the proposed DPD mitigation measure. In response to the recommendation in the HRA of the Draft RSS, the Proposed Changes to the RSS contains specific reference within Policy ENV1 to the need for protection of the Dorset heathland sites listed above. In addition, Policy HMA7 also includes reference to the vulnerability and need for particular protection of these Dorset heathland sites. The HRA of the proposed changes to the RSS considers that this should ensure that adverse effects of physical damage from development are avoided or mitigated for all the Dorset heathland sites.

3.8 Delivery of the RSS HRA expectations in the Assessment of the Purbeck Core Strategy DPD

3.8.1 This Habitats Regulations Assessment (HRA) takes full account of the conclusions of the Assessment of the RSS, as published for consultation. It carries out lower tier assessments where these were relied upon by the RSS HRA, as far as possible. However, this HRA is not limited to the assessments recommended by the RSS HRA. Rather, this HRA is undertaken independently and it screened the entire DPD for all potential effects, irrespective of whether they were identified by the RSS HRA. This HRA includes assessment of potential effects not covered in the RSS HRA and notably addresses the potential effects on water quality in Poole Harbour (see 3.3.1 above).

3.8.2 Again it is emphasised that this HRA of the Core Strategy Preferred Options as published at this time, excludes any provision for, and therefore any assessment of, the proposed modification to increase housing provision in the Western Sector development by an additional 2,750 dwellings.

4 Check for Likely Significant Effects at the Preferred Options Stage

- 4.1.1 The assessment of Purbeck's Core Strategy Preferred Options, in accordance with the Habitats Regulations, should influence the development of the submission draft of the Core Strategy in terms of ensuring that any elements of the plan where there is a likelihood of a significant effect on any European site are assessed, and where necessary appropriate amendments are applied or alternative options pursued.
- 4.1.2 The initial screening stage to determine whether an 'Appropriate Assessment' (see Figure 1) is necessary comprises a full check for likely significant effects at the Preferred Options stage. This is set out within Appendix 2, providing a policy-option-by-policy-option check for the likelihood of significant effects. The check also considers whether any preferred option likely to have a significant effect can be modified to avoid the potential effect.
- 4.1.3 Following the screening for Likely Significant Effects we identify the following issues for which further assessment is needed:
- Impacts of new housing and recreational pressure on the Dorset Heaths (the Dorset Heaths SAC, Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, Dorset Heathlands SPA, Dorset Heathlands Ramsar).
 - Increased recreational pressure on Poole Harbour SPA/Ramsar from shore-based and water-based activities likely to increase as a result of new housing.
 - Increased recreational pressure on coastal sites as a result of enhanced transport links and housing (Isle of Portland to Studland Cliffs SAC and St Alban's to Durlston Head SAC).
 - Increased recreational pressure to the New Forest (New Forest SPA/SAC/Ramsar) as a result of increased population and enhanced transport links within Purbeck.
 - Water Issues, including abstraction and water quality, affecting Poole Harbour SPA/Ramsar and Dorset Heaths SAC, Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, Dorset Heathlands SPA/Ramsar).
 - Fragmentation and pressure on heathland sites (Dorset Heaths SAC, Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, Dorset Heathlands SPA/Ramsar) as a result of employment allocation.
 - Air quality issues as a result of increased traffic (Dorset Heaths SAC, Dorset Heaths [Purbeck & Wareham] and Studland Dunes SAC and Poole Harbour SPA/Ramsar).
- 4.1.4 In Section 2 we identified all Natura 2000 sites that occur in and around Purbeck. Those sites that are not listed in the bullet points above are not considered in the following appropriate assessment as the screening stage did not identify any functional links between the sites and the various options within the core strategy. For these sites, mostly located well outside the District boundary, there are no

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foreseeable ways in which issues identified in the regional HRA and listed in Section 3 may be relevant.

5 Impacts of new housing and increased recreational access on the Dorset Heaths

- 5.1.1 New housing can result in an increase in the pressure on heathland sites through a wide range of impacts including: increased access, increased incidence of 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 Molinaar, 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 7 and further discussion below. We view these urban effects as potentially operating synergistically to influence the conservation interest of sites surrounded by high densities of housing.

Table 7: Summary of key negative impacts (besides disturbance to birds) of development close to European heathland sites. Table is adapted from Liley *et al.* (2006b)

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	
	Smaller site size increases edge effects from non-heathland species	Invertebrates and plants	Webb (1989); Webb & Vermaat (1990); Webb (1990); Webb & Thomas (1994)
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)
	Higher 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); Bignal <i>et al.</i> (2007)
Trampling	Soil compaction	Plant communities and species. Invertebrates	(Taylor <i>et al.</i> , 2006)
	Soil erosion from walkers, cyclists and horse riders	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	
Vandalism	Damage to signs, fences, gates		
Eutrophication	Enrichment of soils from dog excrement.	Plant communities and species, invertebrates	Bonner & Agnew (1983); Taylor <i>et al.</i> (Taylor <i>et al.</i> , 2005)

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Effect	Description and Impact	Examples of species / species group affected	Key references
	Dumping of household and garden rubbish.	Plant communities and species, invertebrates	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/injuring animals, inappropriate feeding or theft of stock		
	Objections to management e.g. 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	

5.2 Disturbance to Annex I birds

5.2.1 There is a strong evidence-base showing impacts of new housing and recreational access on the three Annex I breeding bird species associated with lowland heathland. This material has been rigorously tested at various public inquiries and underpins much of the recent policy and planning initiatives such as the Thames Basin Heaths Interim Strategic Delivery Plan now embedded in the South East Plan (SE RSS) and the Dorset Interim Planning Framework.

Nightjars *Caprimulgus europaeus*

5.2.2 Several recent studies have demonstrated clear links between human disturbance and both density and breeding success in European nightjars (Liley and Clarke, 2003, Langston et al., 2007b, Clarke et al., 2006, Clarke et al., 2008, Liley and Clarke, 2002b, Liley and Clarke, 2002a, Langston et al., 2007c, Murison, 2002).

5.2.3 Modelling using data from the last national survey (in 2004) suggests that the nightjar population on the combined Dorset Heaths and Thames Basin Heaths SPAs would be 14% higher were there no nearby housing or visitor pressure (Clarke et al., 2008). On the Thames Basin Heaths (where visitor pressure is higher than Dorset), nightjars demonstrate a general preference for areas away from access points and site edges. There is a clear trend for nightjar density to decline with increasing visitor pressure, with nightjars appearing to avoid highly disturbed areas within sites. This decline is gradual, and there is not a clear cut-off point at which a marked change in nightjar density occurs. The trend is similar but less clear on the Dorset Heaths (Liley et al., 2006a, Langston et al., 2007c). However, on the Dorset Heaths a negative correlation was shown for urban development or people density and nightjar density, regardless of the size of heathland studied (Liley and Clarke, 2002a, Liley and Clarke, 2002b); urban development density could be considered a rough proxy for recreational access levels.

5.2.4 Studies on 10 Dorset heaths revealed that nightjars had significantly higher breeding success at sites with no public access than those with open access. Nests had a greater chance of failure on open access sites with more surrounding urban development and increasing proximity to a greater density of footpaths (Murison, 2002). Nightjar nests that failed were significantly closer to paths (45 m compared to 150m for successful nests) and tended to be closer to the main access points. Nightjar territories had fewer paths within 100m than did random points. No significant differences in levels of path usage and nest failure were detected. Incubating nightjars sit tight unless disturbed; in 2,000 hours of camera observations of eight nests, nightjars never left the nest unattended during the day unless disturbed (Langston et al., 2007a).

5.2.5 Humans and dogs flush nightjars from their nest, the flushing rate being positively associated with height of the vegetation around the nest (presumably because nightjars cannot see the cause of the disturbance); and negatively correlated with the extent of nest cover (Murison, 2002, Langston et al., 2007a, Langston et al., 2007c). Flushing during daylight leaves nightjar eggs or chicks vulnerable to

predation, the proximate cause of nest failure (Murison, 2002). Use of remote cameras fixed on nests documented a single instance of predation: The predator was a carrion crow *Corvus corone* (Woodfield and Langston, 2004), but this species may be responsible for 60% of nest failures (Murison, 2002).

- 5.2.6 As most nightjar breeding failures happen during incubation (Murison, 2002, Woodfield and Langston, 2004), a single dog running off-path into the heather could disturb large areas of nightjar breeding habitat. Disturbance may be of greater significance during breeding seasons that, for other reasons (e.g. weather), are less favourable.

Woodlark *Lullula arborea*

- 5.2.7 Across 16 sites in southern England, including the Dorset Heaths, woodlark population density was found to be significantly lower at sites with higher disturbance levels (Mallord et al., 2006, Mallord et al., 2007a). This supported previous findings that density of woodlark territories is significantly reduced on sites with open access compared to those with restricted access (Liley and Clarke, 2002b). This pattern was thought to be due to birds not nesting (but nevertheless still foraging) in the most heavily visited areas.
- 5.2.8 At sites with recreational access, woodlarks were found to be less likely to colonise suitable habitat in areas with greater disturbance; eight disturbance events per hour reduced the probability of colonisation to below 50%. However, the lower woodlark density at more highly disturbed sites resulted in greater breeding success, in terms of more fledged chicks per pair, i.e. high disturbance levels produced a strong density-dependent increase in reproductive output (Mallord et al., 2006, Mallord et al., 2007a).
- 5.2.9 A model has been developed to predict the consequences for the woodlark population of a range of visitor access levels (Mallord et al., 2006). Recreational disturbance is thought to be having a major adverse effect on woodlark populations in Dorset already. Any further population impact is likely to depend on the spatial distribution of visitors as well as overall numbers. Under current access arrangements, a doubling of visitor numbers is predicted to reduce population size by 15%. If visitor levels doubled and visitors spread equally across sites, a 40% population decline is predicted (Mallord et al., 2006, Mallord et al., 2007b). If disturbance at 16 heathland sites were to be removed, it is predicted that the breeding population of woodlarks would increase by 13–48% (Mallord 2005).

Dartford warbler *Sylvia undata*

- 5.2.10 Initial analysis based on data from the Dorset heaths suggested no statistically significant difference in the number of Dartford warbler territories on sites with open access compared to those with restricted access (Liley and Clarke, 2002b). Subsequent studies, however, have refined this view. Clear impacts on breeding ecology have been demonstrated: Disturbance at territories was higher where these were located close to car parks (Murison, 2007, Murison et al., 2007). Dartford warblers are particularly susceptible to disturbance when nest-building, halting or even abandoning activities when interrupted (Murison, 2007, Murison et al., 2007). The nearer the centre of the warbler territory is to an access point (e.g.

car park), the later the first brood is likely to be raised. Disturbance appears to delay hatching dates and so prevent chick growth from coinciding with periods of optimal invertebrate prey density, and also to interrupt adult foraging and chick feeding (Murison, 2007, Murison et al., 2007). Dog-walkers accounted for 60–72% of all disturbance events, with dogs off-lead and off-path likely to have the greatest adverse impact on Dartford warbler breeding productivity (Murison, 2007, Murison et al., 2007). Moreover, for such a short-lived species in which there is also low over-winter survival of young birds, increased disturbance could limit population recovery by reducing annual breeding productivity and hence the numbers of potential recruits to new areas (Langston et al., 2007a).

- 5.2.11 Research in Dorset on Dartford warblers shows that disturbance impacts may vary to different extents in different habitats (Murison, 2007, Murison et al., 2007). Dartford warblers occupy territories dominated by heather *Calluna vulgaris*, heather territories with significant areas of European gorse *Ulex europaeus* and territories containing western gorse *Ulex gallii*. However, only in the first habitat type did Murison find that disturbance had a significant impact on breeding productivity, delaying breeding by up to six weeks which, in turn significantly reduced the number of broods raised and the average number of chicks raised per pair. In heather territories, an average of 13–16 people passing through per hour each day delayed pairs sufficiently to prevent them raising multiple broods; most heather territories fell below this threshold. The lower impact of disturbance in territories with gorse may be due to this impenetrable habitat offering some protection from disturbance, as it is known to provide from harsh weather and predators. Dogs were seen to move up to 45 m off-path in heather, but never into gorse-dominated vegetation (Murison, 2007, Murison et al., 2007).

5.3 Trampling and disturbance to other species

- 5.3.1 Bare ground and early successional habitats are a very important for a suite of plants, invertebrates and reptiles on heaths (Byfield and Pearman, 1996, Moulton and Corbett, 1999, Key, 2000, Kirby, 2001, Lake and Day, 1999). On the Dorset Heaths it is bare ground habitats, rather than heather-dominated ones, that support the most rare species (Key, 2000) and of the 90 Biodiversity Action Plan species associated with lowland heathland, 39% depend on bare ground and early successional habitats (Alonso pers. comm.). Many plants are only associated with such habitats (e.g. tiny annuals such as slender centaury *Cicendia filiformis*, which occurs alongside the B3075 and is associated with wetter hollows, including vehicle ruts and hoof prints (Lake et al., 2001).
- 5.3.2 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.

5.3.3 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 and Day, 2003) and sand lizards that need to lay their eggs in bare sand. 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.

5.3.4 Path surfacing to divert people along particular routes or contain access problems such as erosion can often be detrimental to invertebrates (S. Miles pers. comm.) and sand lizards. Surfacing with gravel, hoggins, chips or similar material can entomb invertebrates within their burrows and can render the path useless in the future as the invertebrates can no longer burrow through the capping.

5.4 Dog fouling

5.4.1 A number of reviews have addressed the impacts of dog fouling (Taylor et al., 2006, Taylor et al., 2005). 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) though this is not invariably the case. Similarly, dogs will typically urinate at the start of a walk, but they will also urinate at frequent 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. 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).

5.4.2 Nutrient levels in soil are important factors determining plant species composition and on heathland 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 and flowering (Taylor et al., 2006).

5.4.3 The interface between heather and open bare ground is important for many species, especially invertebrates. The rich grassy strips alongside paths result in a direct loss of an important micro-habitat and the effect is therefore often disproportionate to the amount of land affected.

5.5 Fire risk to heathland

5.5.1 The main source of information on fire on the Dorset heaths was a report commissioned by DETR (Kirby and Tantrum, 1999) which analysed 3333 separate fires and evaluated these in relation to built up areas. This report noted that of the

26 lowland heathland SSSIs in Dorset with the highest number of fires, 1990-1998, 70% were located in or adjacent to urban areas, including the top nine. Similar clustering around the urban fringe was noted by Liley based on earlier work by Hall on Yateley Common, one of the Thames Basin Heaths in Surrey (Liley, 2004). In a later study, Murison found that there was a strong causative relationship between measures of human recreational disturbance and the incidence of wildfires on heaths (Murison, 2007). Kirby & Tantrum also noted that fires were more likely to occur at weekends than weekdays, during school holidays than term time, and during the afternoon and early evening than at other times of day (at times when children have been let out of school but working parents may not have arrived home) (Kirby and Tantrum, 1999). They reported that there was a widespread belief amongst professional heathland managers that most fires were deliberate and that children were often responsible.

5.5.2 Heathland fires can kill mature heather plants, and, where it is hot enough to penetrate the top layers of the soil, can damage seed banks (Hobbs and Gimingham, 1987). On organic soils the soil itself can be damaged by fire delaying the re-establishment of vegetation, sometimes for many years, and causing soil erosion (Maltby et al., 1990, Legg et al., 1992).

5.5.3 The effects of wild fires on invertebrates is variable, with invertebrates with restricted niches, e.g. on old heather the most susceptible to uncontrolled burning (Bell et al., 2001). Old heather stands are also valuable for reptiles, in Dorset particularly rare sand lizards and smooth snakes, and wild fires not only kill many reptiles and leave survivors vulnerable to increased predation, but it can take between 5-25 years before the vegetation has recovered sufficiently to allow re-colonisation (Braithwaite, 1995, Nature Conservancy Council, 1983). No studies have been carried out on nightjars and woodlarks, but it has been found that on a number of wild fire sites on urban heaths in Dorset, after a year 20% of territories remained unoccupied (Murison, 2007).

5.6 Other urban effects

5.6.1 There is a range of other urban effects on heathland ecosystems including pollution, vandalism, fly tipping, littering, introduction of alien plants and animals, trampling and predation.

5.6.2 There is considerable evidence from the records of a number of heathland managers of a range of undesirable activities by members of the public including use of vehicles off paths and tracks, dumping of chemicals, setting fire to abandoned vehicles, collecting wildlife and indirect effects of barbecues and camping (De Molinaar, 1998, Haskins, 2000, Underhill-Day, 2005, Munns, 2001).

5.6.3 No systematic studies have been attempted on the introduction of alien plants and animals to heathland, but one study recorded over 40 non-native plants and another the introduction of alien plants and fish into heathland ponds (Liley, 2004, Munns, 2001).

5.6.4 A number of studies have estimated the number of cats in Britain and these suggest a figure of about 8 million domestic cats and over 800,000 feral cats (Harris et al.,

1995). An analysis of the Target Group Index survey of 25,000 adults from across GB in 2000, suggested that 13% of British households own one cat and 10% own two or more cats (Saul, 2000). Although cats differ widely in the amount of hunting they do and the distances they will travel to hunt, studies have shown that some cats will travel at least a kilometre from home; that they hunt both during the day and at night; and that they catch a wide range of mammals, birds and reptiles (Barratt, 1995, Barratt, 1997, Woods et al., 2003). Cats have been seen on most of the urban heaths in Dorset (Urban Heath Life Project pers comm.), and in 2004, Murison (2007) recorded that out of a marked population of young Dartford warblers, 16% had been predated by cats within 2-4 weeks of leaving the nest. No similar studies have been carried out on woodlarks or nightjars both of which are ground nesting.

- 5.6.5 Heathlands can be damaged by trampling, with heather dominated heath and communities with a high cover of lichens and mosses, and bog communities all being particularly susceptible (Harrison, 1981, Anderson and Radford, 1992). Wet and humid heathland are damaged by trampling with summer trampling generally being more harmful than winter trampling and repeated tramples causing more damage than single events (Gallet and Roze, 2001, Gallet and Roze, 2002, Gallet et al., 2004). These results show that most damage to heathland plant communities is likely to occur in summer when visitor numbers are greatest and that new paths can be rapidly created from desire lines by walkers on heathland.

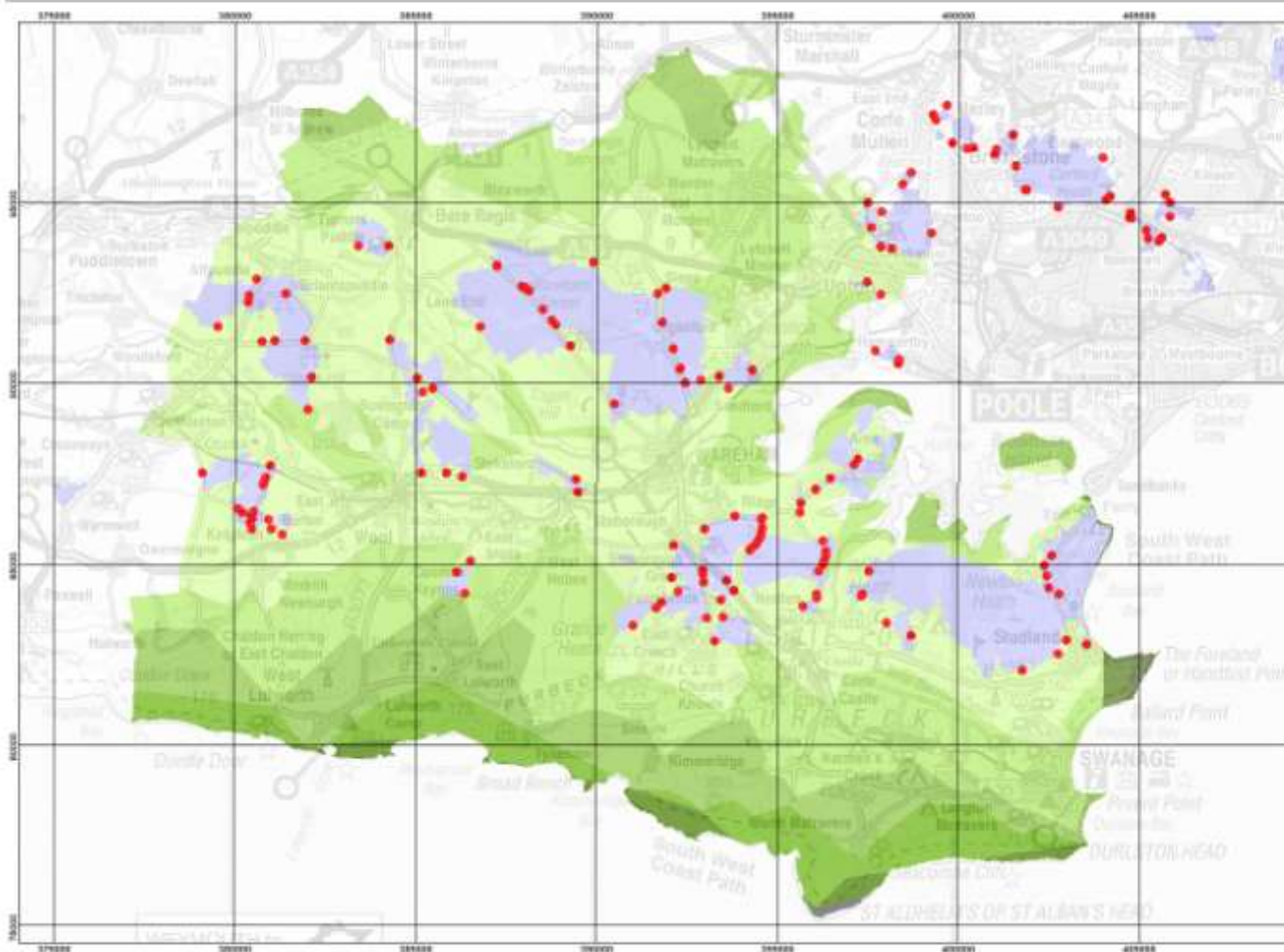
5.7 Predictions of increases in visitor rates

- 5.7.1 The level of access on sites is likely to be linked to disturbance to Annex I birds, dog fouling and a range of other impacts. It is therefore useful to estimate how visitor rates might change with new housing. Both within the Purbeck District and within a short travel distance of the District boundary there are numerous opportunities for access to the countryside for recreation, much lying within the Dorset Heaths.
- 5.7.2 We have plotted the drivetime isochrones from heath access points within Purbeck District. This map (Map 3) essentially divides the district into zones reflecting areas which are within 5 minutes drive of a heath access point, 10 minutes drive, 15 minutes etc. This highlights any locations where drive time means that it is difficult to access the heaths (for example due to the road infrastructure or geography). Map 3 shows that all of Purbeck District is within 25 minutes (or less) drive of an access point onto a heath. The proportion of houses currently within the bands and how these will change with each of the options detailed in Purbeck's Core Strategy Preferred Options are summarised in Table 8. For each option, all new development (i.e. 2400 houses) are within 15 minutes drive of a heath. There is little difference between the three options, if one solely considers the number of houses within the different drivetime bands. However, option A can be seen to involve the largest increase in housing within 5 minutes drive of a heath.

Table 8: Number of residential properties in Purbeck District that are within different drive times from heath access points. Drive times are calculated from heath access points only and only access points with parking are used. See map 3.

Drive time from heath (minutes)	Current number of residential properties	Number of residential properties (% increase)		
		Preferred Option	Option A	Option B
5	12333	13638 (10.6)	13881 (12.6)	13483 (9.3)
10	7837	8801 (12.3)	8559 (9.2)	8937 (14)
15	1082	1107 (2.3)	1107 (2.3)	1107 (2.3)
20	26	26 (0)	26 (0)	26 (0)
25	7	7 (0)	7 (0)	7 (0)

Map 3: Drivetime to heathland access points, with parking, from within Purbeck District
 Habitat Regulations Assessment for Purbeck's Core Strategy



footprint ECOLOGY

13 August 2009
 Scale 1:149856

Drivetime

- 0-5 mins
- 5-10 mins
- 10-15 mins
- 15-20 mins
- 20-25 mins
- Heath access point
- Heathland patch

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. Contractor license number 330046223 for the use of OS data provided through Purbeck Borough Council.

- 5.7.3 Any new housing typically results in a re-distribution of where people live and an increase in population. Taking an average occupancy rate of 2.36¹¹ people per dwelling, 2,400 new houses will result in an increase of some 5,664 additional residents to the area. The core strategy states that Purbeck District has a population of around 45,000 - the increase therefore equates to c.13% increase.
- 5.7.4 Approximately 20% of households in the UK have at least one dog (Mintel International Group Ltd., 2006), and therefore, with 2,400 houses, approximately 480 households could be expected to have at least one dog.
- 5.7.5 A household survey of Dorset residents, conducted in 2008, estimated that each household in south-east Dorset tends to make 166 recreational visits to the countryside, parks or other outdoor space per year (Liley et al., 2008a). Of these visits, 23% were to heathland sites. Applying these figures to the 2400 new houses proposed for the District suggests there would be 398,400 additional visits, per annum, to outdoor space, and 91,632 of these would be to heaths. As the household survey included households within the conurbation (for example central Bournemouth), it might be expected that these figures will be under-estimates given that there is so much heathland and other attractive sites to visit within Purbeck.
- 5.7.6 Visitor rates resulting from new housing can also be predicted using the visitor models developed specifically for local authorities in Dorset in 2006 (Liley et al., 2006b), applied to postcode data showing the distribution of houses. We used the "C5" model, which predicts the number of people visiting each access point onto heathland patches. These patches are areas of heath and adjacent land that have open access and are, at least in part, included within the Natura 2000 network. Each patch is essentially a discrete area with open access and where it is possible to walk from one end to the other. Where patches are split by busy roads or similar we have split them (Clarke et al., 2006). Some patches contain more than one SSSI and sometimes the same SSSI is split into different patches.
- 5.7.7 For each heathland patch access point we predict visitor numbers according to the number of houses surrounding the access point and, for access points where there are parking facilities, the number of car-park spaces. The equations used have been derived using actual visitor data from a sample of sites (collected in 2004, see Clarke et al., 2006 for details).
- 5.7.8 The predictions for each access point should be considered as a guide, indicating typical access levels and based on actual data. They should be interpreted with consideration of site-based factors and the local area. The predictions will be an underestimate where the access point is to a particularly attractive location (for example one with a beach or viewpoint), where the parking is particularly easy or good, where road access or travel time is easy and where access is encouraged. Conversely, locations where parking is perhaps particularly difficult, or where the site is not particularly attractive (near a main road, landfill or similar) may be overestimates. The equations use postcode data, and therefore mobile homes,

¹¹ The national average occupancy rate, derived from the 2001 census, see Office of National Statistics data: <http://www.statistics.gov.uk/StatBase/>

campsites etc. will not be included; where these are present, the site may receive more visitors than estimated. It is important to highlight that the predictions are also based on housing levels within and to a maximum distance of 10km. High profile sites that attract day visitors and tourists (for example Studland) will receive more visitors than predicted.

5.7.9 Travel distance is important context as sites like Arne are at the end of a peninsula: The Arne heaths are therefore geographically close to housing at Upton, for example but the travel distance is considerable.

5.7.10 The estimates are summarised in Table 9, which gives the predicted current number of visitors (per 16 hours in August) and the predictions generated for the preferred option, option A and option B. For each of the three options we have mapped new housing very simply and in an indicative fashion, as shown in Map 4. Each option includes a countryside element of 106 houses – these are not included as it is impossible to predict where they may be located. Table 9 lists the sites in order of the number of new visitors to each site that would be expected under the preferred option. Only those sites that are predicted to see any change in visitor numbers are listed, the shading indicates those with a change of at least 5% (and that are predicted to receive at least 5 visitors per 16 hours).

5.7.11 The predictions (when considered in context with the sites themselves) suggest that:

- Studland will see the largest change in visitor numbers, but the percentage change is relatively low due to the huge numbers of visitors this site already receive. Option B (Swanage focus), not surprisingly, results in the highest predicted increase at Studland/Rempstone. At sites such as Studland, local people are likely to develop access patterns that avoid the tourist hotspots and this may well mean increased recreational pressure away from the beach car-parks, for example at Godlingston or at Greenlands.
- Wareham Forest will see a marked increase under all three scenarios, but particularly with Option A, where greenfield growth is concentrated at Wareham. Wareham Forest covers a very large area, much of which is not included within the European designations, although a large number of Annex I birds are present throughout. It is easily accessed from Lytchett Matravers, Wareham, Bere Regis and Sandford. Due to the large size of the site and the widely promoted cycle trails etc., visitor data has shown that the site draws people from a wide area, and the model may underpredict use.
- The heaths to the east of Wareham, towards Poole Harbour are all predicted to see an increase in visitor numbers, with Hartland/Stoborough (which includes Sunnyside) and Stoborough RSPB particularly affected, and option A resulting in the most marked increase. These sites will see the largest change in visitor numbers under Option A with the focus on Wareham. Arne (Arne, Coombe, Grip and Shipstal are considered as a single patch) is predicted to see a relatively small increase but the model predictions are unlikely to be particularly accurate for Arne. This is because the site is at the end of a peninsula and there are parking charges (to non RSPB members). There is access to the Harbour shoreline and many people visit to access the shore,

hence access here is atypical compared to other heaths. Much of Arne is open access and in the long term it is possible that the extent of open access may increase (parts of the RSPB reserve that are heath were not included in the original mapping of open countryside). There are particular access issues with this site as the shoreline will attract people but holds important wader roosts.

- The block of heathland that encompasses Winfrith, Tadnoll and Knighton heaths is predicted to see a relatively small increase in recreational use. The exact level of use of these sites will depend on the precise location of housing at Wool and the predictions may underestimate use. Winfrith Heath is easily accessed by car from the west of Wool and the number of alternative options for residents in Wool is fairly limited in comparison with other parts of Purbeck. Development outside Purbeck, such as at Crossways and at Dorchester may also impact this area.
- Blackhill (Bere Regis) is just to the south-west of Bere Regis village and is predicted to see an increase in access levels under each of the options. However the preferred option has a larger allocation to Bere Regis and as a consequence the predictions for this option are much higher.

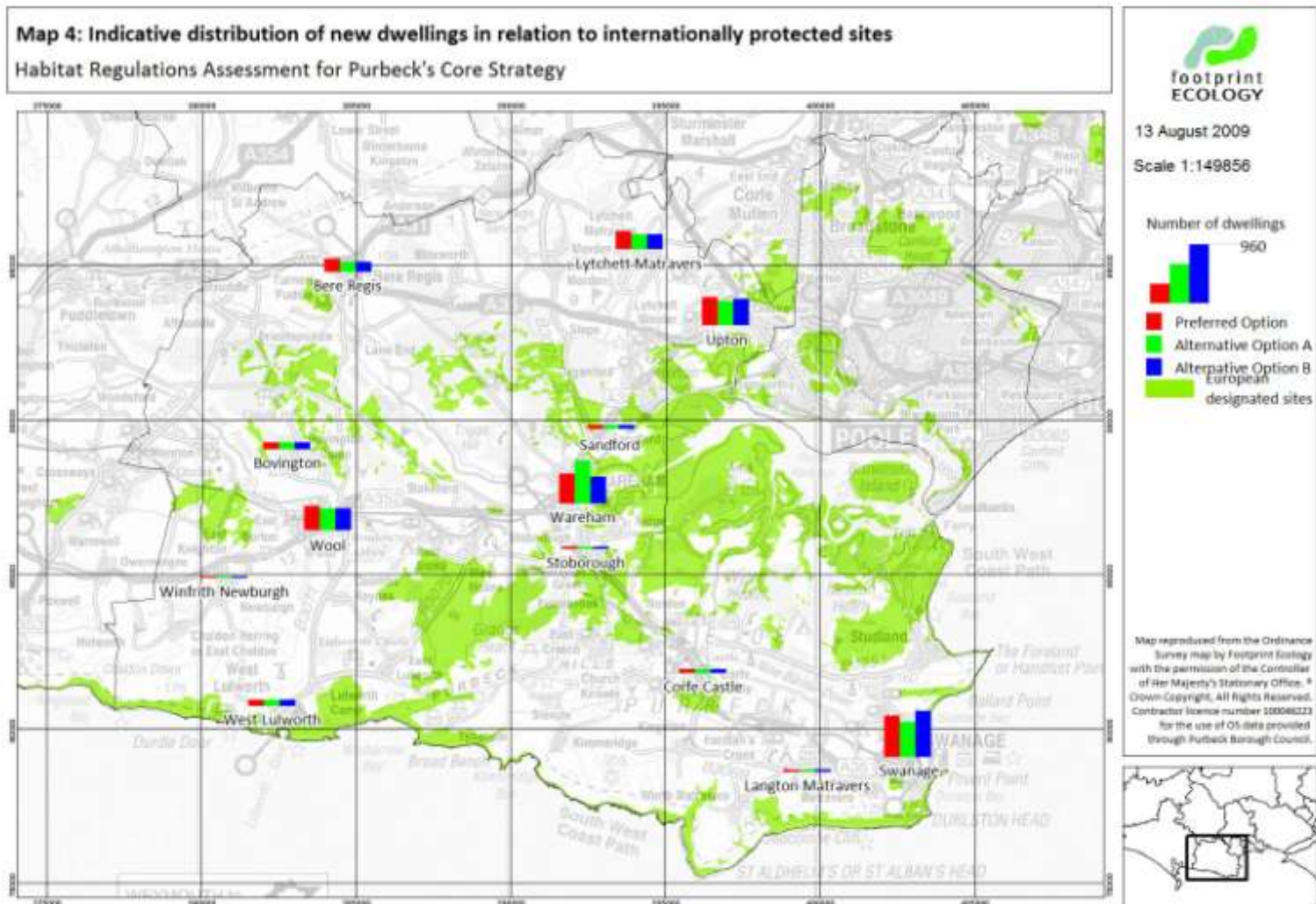
5.7.12 Visitor rates may also increase due to Policy TA allowing an increase in tourist accommodation and attractions within settlement boundaries. It is not possible to predict what effect these might have on visitor numbers to the heaths. In general, most heathland sites are unlikely to attract tourists, however, within Purbeck, Arne, Hartland, Wareham Forest and Godlingston will all potentially attract some tourists.

Table 9: Predictions of changes in visitor rates for different heathland blocks. Predictions derived using "C5" model (see text above for details). Shading indicates increases in visitor rates of at least 5 people and at least 5%. Red shading indicates an increase of at least 10%, yellow an increase of at least 5%. Sites are ranked such that the sites with highest actual increase (in numbers of visits) for the preferred option are at the top. Only blocks that will see any change in visitor rates are listed.

Site	Area (ha)	No. Access Points	No. CP Spaces	Predicted visitor numbers (per 16 hours)			
				Current use	Preferred Option	Option A	Option B
Studland and Rempstone	1502	29	1732	917	26.1	20.0	32.1
Wareham Forest	1808	32	130	292	23	38.4	20.1
Upton Heath and Beacon Hill	249	17	61	2035	22.4	18.3	22
Lytchett adjacent to sewage station	7	2	10	220	16.0	13.2	15.9
Ham Common	25	9	152	900	9.6	8.7	9.3
Stoborough (RSPB)	221	18	20	167	8.6	14.9	7.8
Stoborough and Hartland	461	21	92	178	7.5	12.9	6.8
BlackHill, Bere Regis	71	7	2	52	5.6	3.1	3.0
Lytchett	4	1	4	137	4.4	3.6	4.4
Hethfelton Plantation	171	3	7	24	4.3	3.9	3.6
Tadnoll, Winfrith and Knighton	226	15	54	90	3.9	3.4	3.4
Sandford Heath	65	4	12	112	3.6	5.3	3.3
Worgret Heath	35	2	2	15	2.8	5.3	2.5
Moreton Plantation and Bryants Puddle Heath	541	25	81	108	2.4	1.8	1.8
Arne: Combe, Grip and Shipstal	122	6	75	96	2.2	2.9	2.1
Higher Hyde and Gallows Hill	129	3	14	13	1.4	1.4	1.2
Combe Heath	41	3	3	7	1.4	1.3	1.1
Blue Pool	73	7	52	33	1.2	2.1	1.1

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Site	Area (ha)	No. Access Points	No. CP Spaces	Predicted visitor numbers (per 16 hours)			
				Current use	Preferred Option	Option A	Option B
edge of Lulworth Ranges, nr East holme firing range	4	2	0	8	1	1.8	0.9
Canford Heath	381	24	22	2822	0.9	0.7	0.9
Grange Heath	60	3	8	11	0.8	1.5	0.8
nr Dorey's Farm, edge of Lulworth Ranges	8	1	0	5	0.8	1.6	0.7
Corfe Hills Golf Course	43	7	8	595	0.7	0.6	0.7
Mount Pleasant	13	5	8	453	0.6	0.5	0.6
Corfe Hills School	6	5	0	467	0.4	0.3	0.4
Stoke Heath	24	1	1	4	0.4	0.4	0.4
Scotland	16	3	4	9	0.3	0.4	0.3
Dunyeats	31	5	5	397	0.3	0.3	0.3
Arne: Bank Gate	3	2	2	8	0.3	0.5	0.3
Arne: Arne Heath	52	2	0	10	0.2	0.3	0.2
Bourne Valley	38	16	33	3983	0.2	0.1	0.2
Arne: Crichton's Heath	29	1	0	6	0.1	0.1	0.1
Arne: Bank Gate Cottages, north of triangle	7	1	0	3	0.1	0.2	0.1
Turbary Common	40	24	16	5263	0.1	0.1	0.1
Bourne Valley / Talbot Heath	36	13	21	3190	0.1	<0.05	0.1
Alder Hills	5	1	24	504	<0.05	<0.05	<0.05
Warmwell	31	3	8	25	<0.05	<0.05	<0.05



5.8 Mitigation

5.8.1 A strategic approach to mitigation has been established for the south-east Dorset sub-region through the IPF and the subsequent DPD, as stated within the Core Strategy (Policy DH). Mitigation measures will be different for each of the three development options and will need to specifically be tailored to the development locations. Mitigation measures should ensure no net increase in visitor pressure on the adjacent heathland sites and ensure that access onto the heaths is responsible and impacts are minimised. A package of measures will be necessary, including measures on-site to control or deter access and measures off-site to draw people to less sensitive locations. We outline measures below, and these will need to be agreed and set out within the Core Strategy or the Heathland DPD prior to development commencing. Some of the measures may be difficult to secure and potentially beyond the control of Purbeck District Council. The Council will therefore need to meet with relevant parties and seek the necessary solutions prior to finalising the core strategy, and the ability to secure the mitigation measures set out may therefore influence the potential for the different development options to be achieved without adverse affect on integrity of the different heathland sites.

Works on sites

5.8.2 A long term vision for the management of the heaths to the east of Wareham (Arne, Stoborough NNR, Hartland NNR) is for extensive grazing and effective links between the sites. It may also be possible in the long term to link these through Rempstone to Godlingston and Studland. Within the general area and particularly within the Arne/Hartland/Stoborough block it is important to ensure that increases in traffic and access do not inhibit the implementation of future management, in particular the ability to install cattle grids, fell conifer blocks and change fencing locations.

5.8.3 Many of the roadsides are currently used for informal parking, resulting in diffuse visitor pressure which is difficult to manage. Existing fencing is preventing this in some locations (such as along the Arne road), but should the distribution of fencing change then visitor numbers to different areas may also change. The Arne RSPB car-park is currently often full and it is not known how visitors respond when the car-park is full. There is therefore some uncertainty about how visitor levels may change in the future and where exactly the pressures may occur. There are solutions that include:

- The use of signs, bollards, banks or ditches alongside the roads (such as the Slepe road that runs across Hartland) to deter roadside parking and remove all diffuse parking. Natural England are already considering such works (A. Nicholson, *pers. comm.*) and further clarification is therefore required from Natural England to ascertain whether additional works are possible.
- Speed restrictions (e.g. 20 mph) and other traffic calming measures along the Arne road through to Nutcrack Lane to increase travel time and potentially reduce visitor numbers. These measures will require liason with the Highways Agency, and may be difficult to secure.

- Enhanced parking at locations such as the Sunnyside car park at Stoborough NNR. Here the car-park is not clearly signposted from the road and is hidden from view and appears underused.
- Enhanced on-site wardening presence at key locations to control off-road parking, use of barbeques, enforce dogs on leads policies etc.
- Provision of additional visitor parking (i.e. a new car-park) at a location set back from the heaths, so that access can be focused away from sensitive locations. It may be difficult to secure such a location, but possibilities may exist on National Trust land.

5.8.4 Measures such as the control of roadside parking and on-site wardening presence may result in local opposition and would change the general character of the area. Careful instigation is therefore required. The need for such measures in these areas will be most critical with Option A. In order to get the level of visitor mitigation measures right a review of access across Arne, Stoborough, Hartland and potentially including Rempstone and Studland should be conducted, prior to large scale additional development in Wareham. Such a review would involve interviews with visitors and should address where people park and how they use the area. The review should consider changes in management that may happen in the future (such as conifer removal and creation of more extensive grazing) and predict visitor use as a result of likely new development. Appropriate targeted measures should then be possible.

5.8.5 Ferry Road (between the Studland Ferry and Studland village) is another location where access is diffuse and difficult to control. The Road is owned and managed by the Bournemouth-Swanage Ferry company, and therefore mitigation measures will be difficult to secure. Currently parking occurs all along the road, providing access to the Poole Harbour shoreline, to the heath and to the beach. Such locations are likely to be popular with Swanage residents, as the roadside parking allows people to avoid charges at the National Trust car-parks and also provides access to some areas away from the tourist hotspots. Mitigation measures here should therefore reduce diffuse visitor pressure by limiting roadside parking (e.g. through the application of parking restrictions and policing). The need to ban parking along this road is set out in the Purbeck Transport Strategy.

5.8.6 At Winfrith Heath additional access may occur as a result of development in Wool. Bollards, ditches or banks could be instigated along the roads crossing the heath to ensure parking is limited to the south-east corner of the site (the main parking location) rather than diffuse parking along the roadsides.

Alternative sites

5.8.7 The concept of alternative sites is logical but as yet largely untested. Both in the Thames Basin area (Surrey, Berks, N Hants) and in SE Dorset, where in both cases the close proximity of SAC/SPA heathland to high numbers of existing and proposed housing is a characteristic, there will be a heavy reliance on SANGs being provided and being effective. Using a number of visitor surveys in both areas to determine the reasons for visiting outdoor sites, and the characteristics of the existing used

locations, Guidelines for SANGs in Thames Basin Heaths area have been produced (Liley et al, 2009. Research Report for Natural England, unpublished). Whilst these specifically address the local situation, in particular the nature of the heathland sites currently under heavy pressure, many of the principles are generic and the requirements for SANGs provision should be widely applicable.

- 5.8.8 SANGs may be created from existing open space available to local authorities, but at present with no or limited public access; from sites with some access but where visit levels could be increased; and from newly established open space. In all cases the SANGs need to be a long-term provision if they are to genuinely offer mitigation for internationally designated sites and satisfy the requirements of the Habitats Regulations.
- 5.8.9 If SANGs are to draw visitors away from the designated sites they have to be of sufficient size, character and quality. In other areas (e.g. Thames Basin Heaths) 8ha per 1000 people is the guideline for site size. The characteristics of the heaths and spatial distribution of development in Purbeck, indicate that this needs to be delivered by a small number of well located, large sites, each with a critical mass and characteristics sufficient to compete with the heaths. This may, therefore, mean that the minimum has to be exceeded in Purbeck. The core strategy may not be able to cite particular candidate SANGs owing to the possibility of ransom demands for private land. However, the next phase of the HRA of the core strategy and, indeed, the CS itself, will need to conclude on the basis of reasonable evidence that sufficient appropriate land will be likely to be available
- 5.8.10 There is clear evidence that people preferentially visit heaths compared to other types of (non-coastal) habitat (Clarke et al., 2006, Liley et al., 2008b), which suggests that new sites must be carefully tailored and designed to attract people that otherwise would visit the heaths. Without knowledge of the exact locations it is impossible to accurately state where SANGs should be implemented, nor indeed how successful they might be, but the following broad areas may be suitable:
- In the north of the district, between Lytchett Matravers and Bere Regis or to the north of Bere Regis, suitably located to provide opportunities for dog walking and other recreational activities for residents of Lytchett and Bere Regis. Such a site would be particularly critical for Option A.
 - Near Wareham, to the west or north-west of the town, drawing new residents away from sensitive locations within Wareham Forest and Hartland/Stoborough/Arne. Again, this would be particularly important for Option A. Given the attractiveness and scale of Wareham Forest and the heaths to the east of Wareham this will need to be sufficiently large and attractive site to be at all effective, and there is more uncertainty for this scale of development that SANGs may be successful. There may be potential to enhance Binnegar Common and some of the areas within the Piddle Valley, but further work is necessary to assess the potential of these sites, particularly in comparison to Wareham Forest and Hartland.
 - To the north of Swanage. Here a SANG would attract people who would otherwise visit Godlingston, Rempstone and Studland.

- Alternative access sites must be ready and available when new housing is first occupied so that patterns of visitor use to sensitive sites do not become established.

5.8.11 For each of the above potential SANGS, it will be necessary to identify what works might be possible on the site, how large the SANGs might be and what parking facilities it may have. Detailed assessments of each should then be conducted to predict their potential use. These predictions should then be used to determine levels of development that the SANGs would secure without increasing visitors on the heathland sites.

Promoting responsible access, education and awareness

5.8.12 The Urban Heaths Partnership funded through the IPF is already providing on-site wardening, awareness and education programmes that include many Purbeck sites. Such measures are important, and in particular should:

- Promote locations, for different activities, where there are no nature conservation implications
- Promote responsible access (such as only cycling on bridleways, dogs on leads, no litter, no barbeques) through education programmes, promotional material, on site presence etc.
- Provide clear information as to why the heaths are important and the need for conservation management
- Provide face-to-face contact with local residents and visitors

5.8.13 Key sites where such measures will be needed (depending on the development option chosen) are:

- Arne & Stoborough RSPB reserves
- Hartland & Stoborough NNRs
- Sandford Heath
- Blackhill Bere Regis
- Winfrith Heath
- Godlingston & Studland Heaths
- Worgret Heath

5.9 Conclusions

5.9.1 The research and analysis undertaken for the Appropriate Assessment above indicates that if the development and tourist elements of the Core Strategy are implemented without mitigation measures, an adverse effect upon the integrity of the Dorset Heaths SAC, the Dorset Heathlands SAC/SPA/Ramsar and the Dorset Heaths (Purbeck & Wareham) and Studland dunes SAC cannot be ruled out. The Preferred Option and Option A (which propose that greatest housing numbers be

accommodated at Wareham or Upton) pose the most intractable problems for designated heathlands. Option B which focuses more growth at Swanage, appear to present fewer such difficulties. Nonetheless, growth at Swanage is not without potentially serious impacts for heathlands to the north; Studland and Godlingston in particular.

- 5.9.2 This assessment of the development proposals considered at preferred options stage showed that, without mitigation measures, adverse effects would be likely as a result of the Core Strategy alone, either as single elements or as a combination of elements within the plan. However, mitigation measures, which would eliminate these effects, are feasible and can be built into the Core Strategy before submission. Mitigation measures, particularly for Option A, will need to be considerable and further work may be necessary to ensure they can be delivered. If included in the submitted Core Strategy, as recommended, these avoidance measures would eliminate the likelihood of significant effects alone. Because there would be no effects on the sites, there could be no contribution to combined effects. The HRA of the Core Strategy will, in these circumstances, be able to record no likelihood of a significant effect alone or in combination with other plans or projects.

6 Recreational Access to Poole Harbour

6.1.1 While heathland sites provide the majority of nearby access to tracts of semi-natural habitat, other sites in the vicinity include the shores of Poole Harbour. We assume that additional housing will result in an increase in the number of people living close to Poole Harbour. As a result there is likely to be an increase in recreational activities in and around the harbour. These are summarised in Table 10.

Table 10: Principal types of access within the Harbour

Type of Access	Notes
Shore based activities	
Dog walking	Dogs loose on mud or chasing birds are particular issue
Cycling	
Fishing	
Collecting shellfish, Bait digging	
Shore-based commercial activity	Marina staff, building work, laying out/repairing moorings etc
Wildfowling	
Other shore-based activities	Encompassing a range of activities such as birdwatching, walking, jogging, mending boats, kite flying, kids playing etc.
Water-based activities	
Kite surfing	Separated from other types of activity as unique and birds could respond differently
Small non-motorised craft	Windsurfers, dinghies, canoes/kayaks - able to use shallow water areas
Large sailing craft	Tend to stick to main channels
MOD/RNLI	Fast boats, some testing of equipment, hovercraft etc
Pump scoop dredging	Shellfish dredgers stay in one area, often for several hours
Commercial craft	Freight, channel ferries, fishing boats etc.
Jet skis and small motor boats	Fast recreational craft – can use shallow water
Dredging	Specific craft associated with channel deepening etc.
Tourist boats/tour boats	Boats providing tours of the harbour, trips to Brownsea etc.

6.1.2 The Harbour is designated as an SPA for breeding passage and wintering birds (see Section 2.3) and significant effects relating to disturbance from shore-based and water-based activities are likely. In this section we consider these issues in more detail.

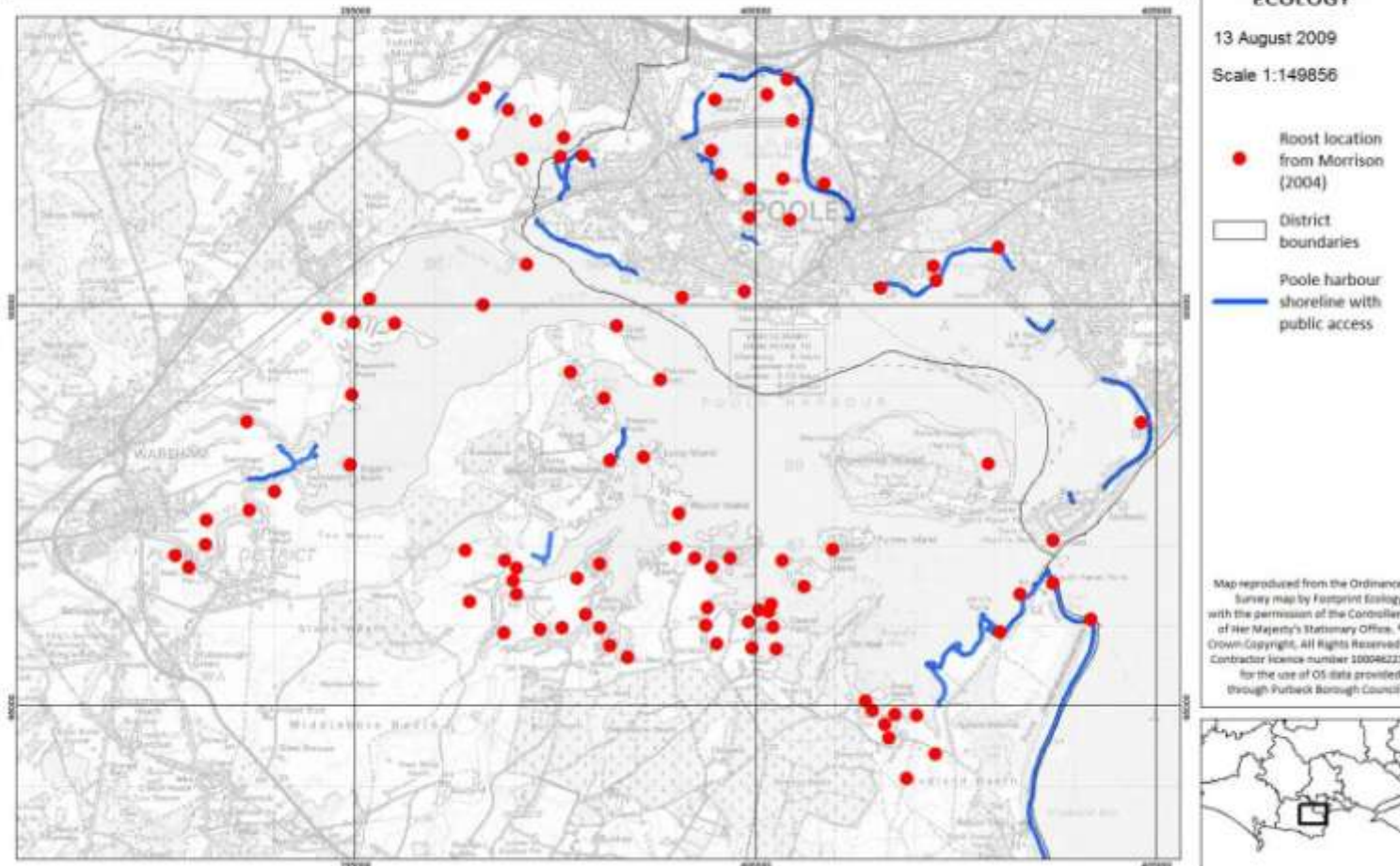
6.2 Access along the shoreline

6.2.1 The Harbour shoreline is used for a variety of land-based recreational activities. The shoreline paths are popular with families, dog walkers, cyclists, joggers, walkers and fishermen. There is currently little information on levels of recreational use of the Harbour frontage, but (particularly around Poole) these areas are very well used. Areas of shoreline with public access are shown in Map 5. The only studies looking specifically at Poole Harbour and access/disturbance involve work on bait

diggers (Dyrynda & Lewis, 1994; Morrisson, 2006), work at Studland (Liley, Pickess & Underhill-day, 2006c) and a study comparing night time and diurnal use of the northern shore by birds during the winter (Liley et al., 2008 in press).

- 6.2.2 The southern shore is rural in character and access opportunities directly to the shore within Purbeck District are limited. However visitor levels are relatively high at key sites. At Arne there is an RSPB car-park and bridleway and the Shipstal area, which has sandy beaches and fine views is popular with walkers, families, birdwatchers and others. Similarly at Studland the Poole Harbour shoreline is sandy in places and is used by walkers, dog walkers, fishermen and others. At Studland the area of heath adjacent to the shore is open access land and therefore there is limited potential to limit or redirect access. At both locations there are important bird roosts and feeding areas (Collins, 1985, Liley, 2007, Liley and Underhill-Day, 2007, Liley et al., 2007, Morrison, 2004, Thomas et al., 2004, Underhill-Day, 2006). There is also foot access to the shoreline at Swineham Point near Wareham via a circular route that encompasses Bestwall. Here the route is set back from the mud flats although there is an informal path across the saltmarsh. Access levels here are probably quite low.
- 6.2.3 Outside Purbeck District boundary, but potentially still used by Purbeck residents, is Upton Country Park, a large site containing a mix of habitats, including mature woodland and gardens. The shoreline here is quite wooded and there is a bird hide over-looking Holes Bay. A path runs along the shoreline around Holes Bay and another from Lilliput round to Sandbanks. There are parks at Hamworthy (Ham Park) and in the centre of Poole (Poole Park, Baiter and Whitecliff). Ham Park is relatively close to Upton and contains beach huts and a children's play area in addition to an expanse of mown grass. A tarmac path runs along the shore. Recent visitor survey data from the park (Footprint Ecology, unpublished data) shows that residents from Upton visit the site: 180 visitors were interviewed over five days. Eleven of these visitors were residents of Upton (within Purbeck District) and one was from Swanage, suggesting that around seven percent of visitors were from Purbeck District.

Map 5: Public access and location of wader roost sites along the Poole harbour coastline
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6.3 Water-based activities

- 6.3.1 Levels of existing recreational boating activity are high (see Underhill-Day, 2006 for counts). There are currently c.2,500 swinging moorings and c.2,300 pontoon and marina berths within the Harbour. There are seven marinas with dry storage for c.2,000 craft. With approximately eight yacht clubs (combined membership c.7,500 members), some 5,000 yachts visit the harbour each year (Underhill-Day, 2006). There are two public slipways. Other waterborne activities include windsurfing, kite-surfing, water-skiing, jet-skiing, motor-boating, canoeing and wildfowling.
- 6.3.2 There are designated zones for water-skiing and personal watercraft within the Harbour, both of which require permits. An area off Whitley Lake is set aside for windsurfers but they are not confined to this. The area to the south of the harbour is designated as a quiet area, although this is only enforced in relation to activities taking place outside permitted areas or violations of the speed limits. Generally speed limits are 10 knots, but with six knots in some enclosed parts of the Harbour.
- 6.3.3 The number of wet moorings provided by pontoons and marinas has increased in recent years, but the policy of the Harbour Commissioners has been to reduce swinging mooring numbers as other wet berths become available. This policy has resulted in a small reduction in wet berths in the Harbour since 1994 (Underhill-Day, 2006). Based on a questionnaire survey, Southgate (2006) estimated the popularity of various waterborne activities within the Harbour. The mean figures of daily use suggest some increase in harbour usage from 1994, and although the number of wet berths has declined slightly, there is an increasing trend in the number of visiting boats being launched from the public slipway at Baiter (Underhill-Day, 2006).
- 6.3.4 During the summer months many of the farms along the southern shore host camps for large groups such as cadets and scouts. Cleaval Point in particular is well used. Such groups are unlikely to change in light of the measures in the core strategy, but add to the general pressure from access, especially as these groups access the water (for canoeing, windsurfing, swimming etc.) from the southern shore, which is the least disturbed.
- 6.3.5 Water-based recreation also spreads out from Poole Harbour into Poole Bay, particularly in the area just outside the harbour mouth, around Shell Bay and Studland. These areas are also very important for birds and many species move freely between the harbour and this part of the bay. Water-based activities in these areas could therefore also have an impact.

6.4 Impacts of Disturbance

- 6.4.1 There are existing concerns about recreational disturbance to the northern shoreline and its impacts upon the SPA (Underhill-Day, 2006). There is the potential for disturbance to result in birds avoiding using certain feeding areas and birds being repeatedly flushed, resulting in increased energy expenditure. Such effects can have consequences at the population level (see Stillman & Goss-Custard, 2002; Stillman et al., 2001; Stillman et al., 2007; West et al., 2002). Water-based and shore-based activities can result in similar impacts and compound the issues. It is likely that the main effect of boating in the Harbour on the SPA interest

features is to cause disturbance to birds on the adjoining flats, saltmarshes, shingle and other habitats, particularly during the winter months (see 6.4.4). The boats can provide access to parts of the Harbour shoreline that are otherwise inaccessible.

6.4.2 An audit of wader roost sites around the Harbour documents the principal wader roost locations, species present and principal threats (Morrison, 2004). The roost locations for the entire harbour are summarised in Map 5. It can be seen that many are away from areas with shoreline access and therefore recreational disturbance to these is likely to be mainly from boat traffic and people landing. Morrison expresses concern that some of the other roosts are also disturbed by boat traffic.

6.4.3 The main tern colonies are on protected areas on Brownsea Island, but the gull colony in Wareham Channel is easily accessible to small boats and landing is possible. There is no information on landings here.

6.4.4 It is during the winter that disturbance is likely to have the greatest effect as there are more birds present within the harbour and the weather conditions can mean additional stress (Clark et al., 1993). Although boat traffic is likely to be reduced in winter (but note there is no available data on boat use in the most important areas of the Harbour on the south shore throughout the year), other activities increase. Wildfowling is a winter activity, legally permissible from September 1st to February 20th on foreshore below mean high water, while the licensed clam fishery runs from October to January. Some fishermen collect cockles in winter both from dredging and hand raking, and bait digging takes place all the year round. While individually each of these activities may engender acceptable levels of disturbance under normal tidal and weather conditions when birds can move to undisturbed areas to feed, taken in combination they could have a profound effect, particularly during hard weather.

6.4.5 Disturbance at particular times of the tidal cycle or in freezing weather could be particularly hard on avocet and grey plover which have a limited distribution linked to the patchy occurrence of their main prey species. Birds such as oystercatcher and curlew may also be vulnerable as in some places the abundance of their prey species is too low to meet their winter energy requirements. There are no data on the in-combination disturbance from various activities for the Harbour, or on the likely effects. In the medium to longer term, milder winters could encourage greater year-round recreational activities with consequent disturbance both alone and in-combination with other activities. Increases in the abundance of a number of wintering species in the Harbour have recently been recorded, but these may reflect changes in distribution due to factors elsewhere. These increases may mask effects of changing distribution and intensities of activities within the Harbour about which little is known. Moreover, any effects may take some time to influence population trends, and further time may elapse before causes can be identified.

6.5 Mitigation

6.5.1 Measures relating to shore-line and water-based activities should be implemented in partnership with other bodies, including Poole Borough Council. Some measures will be necessary outside the District.

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- 6.5.2 The following measures would reduce the levels and impacts of shore-line access:
- Control of parking along Ferry Road (see Section 5.8 on mitigation for heaths)
 - Measures (such as wardening and signs) to help ensure dogs are kept on leads along the shoreline around Jerry's Point
 - Working with the National Trust to instigate sensitive management of access along the Harbour shoreline at Studland, for example developing a way-marked route set back from the shoreline. This will of course potentially increase access on the heath.
 - Provision of viewpoints over the Harbour at Swineham whilst ensuring access across the saltmarsh and onto the shore is limited.
 - Measures (such as signs, information and wardening) to help prevent dogs from roaming on the mudflats and salt marsh at Upton County Park, Holes Bay, Ham Common, and Poole Park.
 - Along the northern shoreline, footpaths should be relocated back from the shore at the most sensitive locations, such as at Baiter. Screening should be used to separate walkers from the shore and provide quiet feeding areas at Baiter and in parts along the shoreline path round to Sandbanks and around Holes Bay. Dog walking zones and a 'dogs on leads' policy for selected sensitive path lengths where dog walking is still allowed should be implemented. Sensitive locations should be identified as part of a monitoring package (see Section 6.6.5).
- 6.5.3 The following measures should reduce the impacts of water-based activities:
- Close-working with landowners along the southern shore to allow measures to be put in place to promote responsible access, working with the different groups camping and using the southern shore for canoeing etc. Leaflets and other suitable promotional material should be developed with codes of conduct and to direct people away from key areas for birds.
 - Reviews of the measures in the Aquatic Management Plan and further implementation of zoning as necessary.
 - Landing/launching of small craft (windsurfers, canoes etc.) should be limited to specific locations only. Where the nature or location of activities is outside the jurisdiction of Purbeck's Local Development Framework or other Council functions, the Council should continue to work with relevant partners to improve regulation of such activities, including the police.
- 6.5.4 The increases in access to the harbour will be gradual and there remains uncertainty about the levels of use and the exact impacts. A programme of monitoring, recording water-based and shore-based activities should therefore put in place. A suitable programme of monitoring is set out for the Harbour in (Liley and Underhill-Day, 2009).

6.6 Conclusions

- 6.6.1 The options within the Core Strategy include housing allocations at Wareham and Swanage. New residents in both towns are likely to visit the Harbour shore to walk and to participate in water-based activities within the Harbour. It is currently not possible to predict the extent to which this will happen, as there is no existing visitor data available. However, given the attractiveness of the sites, their proximity and the lack of alternatives, it would seem likely that recreational pressure on Poole Harbour will increase as a consequence of new homes in Purbeck. Considered alone, the impacts of this potential increase may not be significant; however, in combination with increases in housing in other adjacent areas, the impacts may be significant.
- 6.6.2 The key issue is the potential for a gradual increase in all the water-based and shore-based activities identified to interact and in synergy reduce the ability of the site to maintain its internationally important bird populations.
- 6.6.3 Climate change increases the uncertainty surrounding the extent and nature of the impacts, as this may change the distribution of the birds and the species present within Poole Harbour (Norris, Atkinson & Gill, 2004; Rehfish et al., 2005), the distribution and availability of soft sediments (birds may be pushed closer to the shoreline by coastal squeeze) and the timing and levels of recreational access.
- 6.6.4 The implementation of the mitigation measures set out in Section 6.5 should reduce the levels and impacts of access. In order to be effective these should be instigated strategically, in a similar fashion to the mitigation measures for the heaths.
- 6.6.5 It is also important to understand in more detail how disturbance currently affects Poole Harbour, and the links between housing and access around the Harbour. Monitoring of use is therefore necessary to help to inform the mitigation and ensure that it is effective and successful.

7 Increased recreational pressure to coastal sites

7.1 Introduction

7.1.1 The Purbeck Core Strategy Options will have implications for the European designated coastal sites west from Durlston and the coastal elements of the Studland site (impacts on the heathland component of the Studland site are discussed in Section 5 and on Poole Harbour in Section 6). Other coastal sites, such as Chesil and the Fleet, we consider too far from Purbeck to be affected by an increase in housing within Purbeck District. The availability of coastal sites within the District will mean that most access remains within or very close to Purbeck.

7.1.2 Map 6 shows the location of car-parks providing access to coastal sites and drivetime isochrones relating to these car-parks. As with the heaths it can be seen that all of the District is within a short drive of the coast.

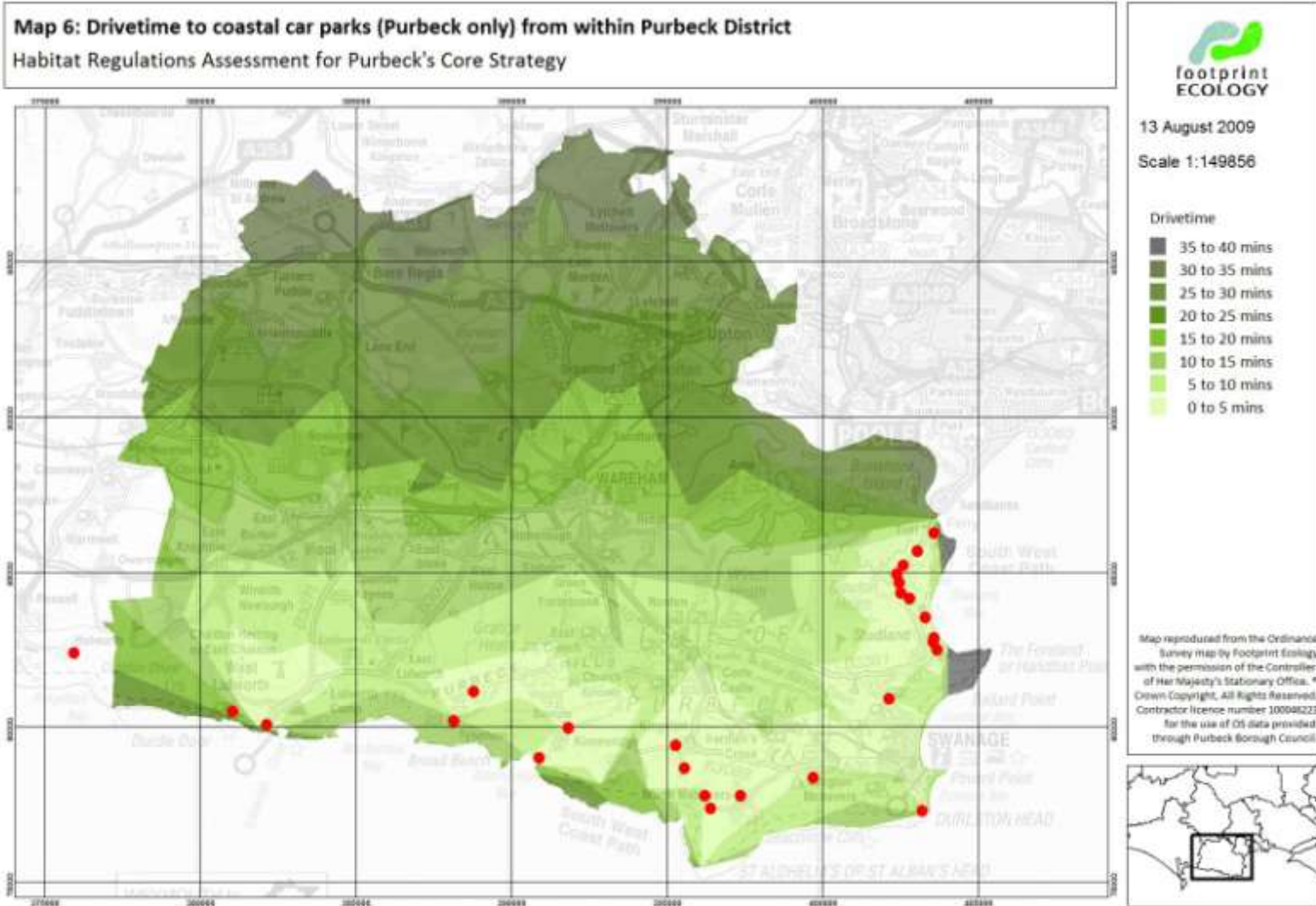
7.2 Impacts

7.2.1 The coastal cliff and grassland SACs likely to be impacted by proposals in the Core Strategy are Isle of Portland to Studland Cliffs and St Alban's Head to Durlston Head. These are considered here together with the coastal dunes of the Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC. Impacts are mainly from the effects of trampling and possibly erosion caused by walking or cycling, and the addition of nutrients. In the latter case, atmospheric deposition from traffic emissions is covered in Section 11, but eutrophication from dog faeces is also a real if localised threat, especially to habitats that are necessarily naturally low in nutrients, such as limestone grassland and dune heath.

7.3 Effects of trampling

7.3.1 Most of the SAC habitats are highly vulnerable to the impacts from the passage of walkers or cyclists. Those that are narrow or linear, such as vegetated sea cliffs, and the embryonic and fore-dune communities are of very limited extent and in some cases only a few metres in width. These plant communities are fragile and already under high environmental stress, from among other factors, drought, thin soils and natural sub-aerial erosion.

7.3.2 Because of their location generally on steep slopes or dangerous cliff edges, the vegetated sea cliff features, though highly susceptible to such wear, are by their position relatively safe. However, rock climbing is popular on the cliffs of Purbeck and Portland. Although it is reasonably controlled, especially at Durlston, in order to avoid conflicts with wildlife, rock climbing does have the potential to cause serious damage locally. There are some localities where the sea cliff plant community is adjacent to or even on the inland side of the coast path, such as in the vicinity of the lighthouse at Durlston, but here there is a well-established and rock-hardened path that for the most part directs and confines walkers to the route. However it is apparent there is a need to close off or divert sections where.



the path is less defined, and where erosion is a real threat, e.g. the steep slope down to the Tilly Whim ledge

- 7.3.3 The embryonic and fore-dune communities at Studland are also vulnerable to trampling damage. The sparse vegetation of the upper strand line, with scattered fleshy plants like sea rocket, is especially susceptible to foot traffic and beach users, including the increasing amount of vehicle patrols. In addition to this zone being the often-preferred location for sunbathing, the daily passage of ATVs for litter collection and beach patrols several times a day during the summer makes this very localised and scarce vegetation highly susceptible to damage. A single traverse of two ATVs travelling side by side along the upper strand line at the toe of the dunes was observed to flatten and crush several sea rocket plants (J. White *pers. obs*). Earlier in the season, the establishment of seedlings of these annual plants would be equally vulnerable to such damage. Moreover, the gradual trend of sea level rise is exerting a "squeeze" on this vegetation community.
- 7.3.4 The shifting (fore) dunes, though appearing tough with apparently resilient grasses like marram, are also very vulnerable to trampling damage. Much of the published research on the effects of trampling on dunes relates to fixed or stable dune grassland but it seems that the earlier stages in the succession – the fore and shifting dunes – are disproportionately adversely affected, with even small levels of trampling having a marked effect (Coombes, 2007). The review by Bonte and Hoffman (2005), records that restricting recreation had a positive impact on species diversity within such dune vegetation in every case reported.
- 7.3.5 The dune heath, with marram, sand sedge and heathers is also vulnerable to trampling. Here the dwarf shrubs can be damaged and broken; and the diverse lichen and bryophyte turf is also easily dislodged and fragmented. The Studland dunes support a significant proportion of the UK's sand lizard population and their feeding and sheltering habitat is vulnerable to damage as is the bare sand used for egg laying. Sand which is trampled and loosened by excessive foot traffic is unsuitable and any eggs laid here are more likely to be lost. Sand lizards are mentioned as a component of this SAC.
- 7.3.6 The dry calcareous grasslands of the SACs in close proximity to Swanage comprise the chalk grassland of the Purbeck ridge from Studland Bay to Ballard down; and the extensive limestone grasslands west from Durlston, including the small separate fragment (30 ha) immediately south of the town at Townsend. The chalk and limestone downland is open to public access and the long distance coastal path around the SW peninsula passes through the SAC, at the cliff top; and there are also many other footpaths, some linking back to Swanage. There is thus heavy and sustained walking pressure, especially along the coast path, but also across the downland slopes. At Ballard this is especially obvious along the ridge top and in the vicinity of Old Harry rocks; and at Durlston the slopes on either side of the lighthouse and the ridge top westwards to Belle Vue are well trodden. Townsend (a Dorset Wildlife Trust reserve) has the closest proximity to housing and the several footpaths attract daily walkers with dogs while the hummocks and slopes can be a draw for mountain bikers.

7.3.7 Many studies on the effects of trampling, by feet, cycles and vehicles, and on the impacts of soil enrichment including from dog fouling are cited in the literature. A useful and recent compendium of this varied research is given in the English Nature / Natural England commissioned reports relating to the implementation of CRoW (Lowen et al., 2008, Penny Anderson Associates, 2001). Findings from a variety of experiments and research, and in various localities, support the view that low productivity turf (e.g. calcareous grassland) is more prone to trampling and enrichment damage than more productive grassland and that recovery from such damage is slower. Even quite modest pressure can result in changes in plant composition, reduction in biodiversity, reduction in soil invertebrates, and in soil compaction. Even where diversity appears to be maintained, there can be a shift to more resilient and generalised species rather than the characteristic species of calcareous grassland. There is some evidence however that already grazed sites are less prone to dramatic change since to some extent the grassland communities have already adapted to the effects of grazing animals, which are comparable in some respects.

7.4 Effects of nutrient input

7.4.1 Low nutrient sites, typical of many semi-natural habitats including chalk and limestone grassland, are especially susceptible to the addition of fertiliser, whether from atmospheric deposition (mainly nitrogen) or dog faeces and urine (phosphorus and nitrogen). There are many studies and reports of the observed effects of dog fouling on vegetation and also on the volume of faeces and urine deposited (see Section 5.4).

7.4.2 The number of dogs in UK is estimated to be some 2.1 – 2.3 million; and there may be 1 dog for every 2 to 4 walkers (25-50%) on sites close to residential areas. In some cases, the ratio of dogs to people was more than 1 dog per walker on average. A study in a semi-rural community in Cheshire (Westgarth et al., 2008) found that 24% of households own at least one dog and that the average rate was 1.3 dogs per household. Similar levels are found in Dorset with 19% of a random sample of houses within south-east Dorset responding that they owned at least one dog (Liley et al., 2008b). For Purbeck alone, rates were even higher, with 29.3% of households owning one or more dogs.

7.4.3 It is obvious from any casual observation of the car parks at Studland and Durlston and the paths leading into Townsend, that these locations are already regularly used for dog walking. Dog walking is a daily discipline and in many cases may mean one or more walks with the dog every day. Thus the impact of dog walkers is comparatively much more frequent than for other walking. This effect is thus likely to be much more linked to the impacts from housing, with a decidedly local focus.

7.4.4 The 2008 SE Dorset Access Study (Liley et al., 2008b) found that the most frequently visited type of outdoor site by a considerable margin was the coast with 46% of respondents (from Purbeck, Poole, Bournemouth, East Dorset and Christchurch) saying they had visited within the last week (The next most frequently visited type of site was "parks" with 30% visiting within the last week). The proportion of those owning a dog and visiting any outdoor site within the last year was higher than for non-dog owning households (96% cf 89%); and the proportion of dog owners that

said they had visited a particular kind of site was higher for all types of site, though the difference for the coast, though the most visited, was less marked than for other outdoor sites.

- 7.4.5 Both Studland and Durlston (and the more extensive coast from this access point) are very heavily visited sites, with many people coming to the beach in the case of Studland; or the various historic and natural features at Durlston. In both cases the long distance coast path passes through the site, though at Studland most passing walkers will use the foreshore or to a lesser extent the N/S track through the heathland. Relatively few passing walkers would use the foredunes as a through route, whereas beach users may target this zone preferentially.
- 7.4.6 Given the high numbers of visitors to Studland beach and the coast path sections north and south of Swanage, including Durlston, it is difficult to see that the Core Strategy proposals solely in relation to recreation would have any detectable additional impact. The housing proposals however may present a different outcome.
- 7.4.7 The Core Strategy gives the population of Swanage as 10,010 and if an occupancy rate of 2.36 is assumed this equates to some 4,241 households currently. However the Carrying Capacity Evaluation Report for the Purbeck section of the WHS, Bournemouth University 2007, gives the number of households in Swanage parish as 5500. Using this latter figure, the increases proposed in Swanage as a result of the preferred Option (774), and Option A (582) and Option B (980) indicate proportional increases of 14.1%, 10.6% and 17.9% of households. It is reasonable to assume that a similar level of increase in the dog population would also occur. Whilst it is not possible to determine, without specific visitor surveys, how many of the current dog owning population of Swanage use either or both of the Studland or Durlston/Townsend SACs for daily dog walking, it is obvious that many do. Some degree of increase in this activity is thus likely to result from each of the various Options and that could be of the order of the household increase – i.e. 11 – 18%.
- 7.4.8 Using the Cheshire ratios of dog ownership per household (Westgarth 2007) as a guide, the number of dogs in Swanage at present may be in the order of 1320 and the proportional increases under the Core Strategy growth scenarios could result in an extra 242, 186 and 306 dogs respectively. The same analysis using the conservative SE Dorset 19% figure from Liley et al, would give the current number of dogs in Swanage as 1045 and the extra numbers for the three growth levels would be 191, 144 and 242. Even if only some of these dogs are taken for their daily exercise to Studland or Durlston, that is a marked increase in the number of dogs exercised on sites that are sensitive to trampling and/or nutrient addition.
- 7.4.9 Both Studland beach (but not the dunes) and Swanage beach have restrictions on the use of the foreshore for dog walking during the summer months and it is at this time that the heath and dunes at Studland and the grasslands at Durlston and Townsend may be additionally impacted, at least for longer walks.
- 7.4.10 Durlston receives in the order of 250,000 people visiting each year, with peaks at holiday times – Easter and the summer holidays. It is likely that a significant number of such visitors are passing through, along the coast path or maybe just visiting the more tourist-based features such as the Globe. But some 120,000 visits annually

are made to the Visitor Centre which suggests a higher degree of commitment and interest that may be part of a wider exploration of the site. Regular daily visits, for dog walking for instance, are most unlikely to be via the Visitor Centre and so would not be captured in this total. A survey in 2000 revealed that of the sample interviewed, 32% were day visitors and thus of relatively local origin (Durlston Management Plan, 2005-10 Dorset County Council). This Plan highlights the conflicts inherent in managing a popular visitor destination on the coast with the outstanding biodiversity and sensitivity of its habitats ("Increased visitor numbers and recreational activity at Durlston must be reconciled with the protection of Durlston's special qualities and the conservation of its key habitats, landscapes and biodiversity"). This suggests that there is already experience and awareness of adverse pressures, ahead of any new impacts arising from the Core Strategy proposals.

- 7.4.11 The impacts of additional pressures on the dune and calcareous grassland SACs arising purely from recreational increase in the Core Strategy proposals may be slight or undetectable, in the context of considerable existing pressure. The potential for adverse impacts on these habitats as a result of the housing figures cannot be ruled out however, especially those from the effects of additional frequent and even daily dog walking. This particular impact is likely to be greater on the grassland sites with relatively easy access such as Durlston. Trampling and especially increased enrichment from dog fouling on essentially low-nutrient habitat are the main impacts.

7.5 Mitigation

- 7.5.1 Specific targeted monitoring of the condition of limestone grassland, including the presence of indicators of decline in quality due to trampling and/or enrichment will be required, and this should focus on vulnerable locations such as steep slopes or desire lines leading out from main access points. Though the main additional impacts from trampling and increased nutrient input are felt to be on the coastal grassland SACs, they cannot be ruled out as impacts on the Studland dune communities. A similar suite of mitigation measures should apply here to watch for adverse impacts and deal with them if they start to be apparent.
- 7.5.2 The features to be monitored need to be agreed with Natural England and to be sufficiently sensitive that early warning of adverse effect can be recognised. If signs of deterioration start to appear then actions will need to follow to contain or divert such pressure before long-term damage is sustained. This could include amongst other initiatives:
- path diversions, accompanied by on-site interpretation and rationale to explain the reasons
 - further patrolling by rangers/wardens, again with explanation for actions
 - enforcement of the need to pick up dog mess, accompanied perhaps by the provision of sacrificial areas not within the SAC where such a policy need not apply

- the provision of alternative sites (SANGs) to attract some pressures away from the SACs

- 7.5.3 The concept of alternative sites is logical but as yet largely untested. See Section 5.8.7 for further discussion about SANGs. In order to draw people away from coastal sites the alternatives will need to be large and attractive. Assuming a provision of a minimum of 8ha per 1000 new population, the three Core Strategy growth scenarios as they affect Swanage would require SANGs specifically for this element of the development proposals of at least 15ha, 11.2ha and 19ha respectively. A variety of sizes and types of site may be more effective than provision of a single location.
- 7.5.4 It would be unrealistic to attempt to provide SANGs that offered a genuine replacement for the extensive coastal cliff and limestone grasslands at Durlston, or the Studland dunes and beach, but there will be some more routine or very frequent activities for which the special features, landscapes and habitats of those locations are not essential. Thus one or more convenient and suitable dog walking areas, with easy access and parking (free), and where additionally it was not a requirement to pick up mess and where dogs could be let off the lead, could be expected to draw some elements of the current and future pressures away from the SACs. The objective would be to reduce overall impact on the SACs so that no net increase follows the Core Strategy proposals.
- 7.5.5 Such alternative sites will also need to be monitored, by use of visitor surveys, counts of numbers visiting and purpose of visit, to test to what degree the SANGs are successful; and correspondingly the SACs need to be monitored to check that adequate diversions to SANGs are functioning with the desired reduction in pressure on the SACs.
- 7.5.6 The cost of the mitigation measures, including the essential elements of monitoring and long-term management, need to be provided by a realistic tariff applied to all new development within a close zone of influence to the coastal (and heathland) SACs. This must be additional to any other provisions for other green space or community benefits. Further work is needed to identify to what distance such a zone might extend.
- 7.5.7 If this mitigation is adopted and put in place ahead of or at least at the same time as new development, the potential for adverse impacts in relation to the coastal SACs arising from the new housing proposals in the Core Strategy should be avoided.

7.6 Conclusions

- 7.6.1 The research and analysis undertaken above indicates that the new housing and potential for new tourist accommodation within the Core Strategy, if implemented without mitigation measures, could result in an adverse effect upon the integrity of the Dorset Heaths (Purbeck & Wareham) and Studland Dunes SAC, the Isle of Portland to Studland Cliffs SAC and the St Alban's Head to Durlston Head SAC. Option B, with the focus of development in Swanage, is likely to have the greatest impact.

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- 7.6.2 The impacts from increased housing are potentially 'diluted' in that the coastal sites are heavily visited by tourists, and receive many more visitors than, for example, the heaths. Given that some of the impacts (such as trampling and eutrophication) are similar for coastal habitats and heathland ones, the impact of new housing on coastal sites is potentially less than that on the heaths.
- 7.6.3 This assessment of the development proposals considered at preferred options stage showed that, without mitigation measures, adverse effects would be likely as a result of the Core Strategy alone, either as single elements or as a combination of elements within the plan. However, mitigation measures, which would eliminate these effects, are feasible and can be built into the Core Strategy before submission. If included in the submitted Core Strategy, as recommended, these avoidance measures would eliminate the likelihood of significant effects alone. Because there would be no effects on the sites, there could be no contribution to combined effects. The HRA of the Core Strategy will, in these circumstances, be able to record no likelihood of a significant effect alone or in combination with other plans or projects.

8 Increased recreational pressure to the New Forest

- 8.1.1 Southern England's extensive motorway and trunk road system puts more than 15 million people within 90 minutes drivetime of the New Forest. Good rail links further improve ease of accessibility. This, coupled with the unique mosaic of extensive, high quality habitats, is probably the main reason for the appeal of the New Forest as a tourist destination.
- 8.1.2 Various studies highlight the high levels of recreational use currently taking place within the New Forest (Tourism South East Research Services and Geoff Broom Associates, 2005, Gallagher et al., 2007, University of Portsmouth, 1996). Total visitor volumes within the New Forest are estimated at over 13 million visitor days (Tourism South East Research Services and Geoff Broom Associates, 2005). This total includes holidaymakers staying within the National Park (12% of visitor days), day trips from home by New Forest residents (14% of visitor days) and people living outside the Park and visiting for the day from home (64% of day visits).
- 8.1.3 Visitor data from the New Forest is drawn largely from the work conducted as part of the PROGRESS Project (Tourism South East Research Services and Geoff Broom Associates, 2005). The New Forest appears to be the third most frequently visited National Park in England. However, the large size of the New Forest means that visitor densities are equivalent to those experienced on the Dorset Heaths. Visitor distribution within the New Forest may be largely governed by the distribution of car parks since this is the primary mode of transport for visitors. The New Forest has a far larger catchment area than the Dorset Heaths and, accordingly, attracts a far higher proportion of tourists (40%). Dorset forms the second largest visitor origin, contributing 29% of the 'other day-visitor' total. Of the visitors from Dorset to New Forest, Purbeck residents accounted for just two percent (i.e. of the people interviewed within the PROGRESS work that gave exact postcodes and were resident in Dorset two percent came from Purbeck). Most of the visitors from Dorset were from Bournemouth and Poole.
- 8.1.4 In contrast to the Dorset Heaths, where there appears little seasonal variation in visitor numbers, the New Forest exhibits a clear peak during summer. This peak is due in large part due to the arrival of holidaymakers. Visitor pressure is thus greatest during the most ecologically vulnerable period of the year (i.e. during the vertebrate and invertebrate breeding season). New Forest visitors spend more time and travel further on site than visitors to the Dorset Heaths. Dog-walking is a far less and walking a far more important activity in the New Forest than in the Dorset Heaths. Local day visitors to the New Forest are more likely to walk dogs than non-locals, but the proportion is still comparatively low.
- 8.1.5 It has been estimated that housing development as outlined in the southeast and southwest Regional Spatial Strategies within 50km of the New Forest National Park may result in an additional 1.05 million visits to the National Park per year (Sharp et al., 2008). However, 73 % of these additional visits will be made by visitors living within 20 km. As the crow flies, Purbeck District is approximately 18 - 40 km away from the New Forest National Park, however, by road, the district is considerably further. Visitors are attracted to the New Forest due to its scenery, tranquillity,

suitability for outdoor activities, and wildlife, characteristics that are similar to other greenspaces within and closer to Purbeck than the New Forest.

- 8.1.6 Impacts from recreation within the National Park are similar in many ways to those already described above for the Dorset Heaths (see Section 5). Access can result in disturbance to Annex I breeding birds, trampling, and eutrophication. Impacts of access to the New Forest are discussed in more detail in (Sharp et al., 2008).
- 8.1.7 Considering the distance to the New Forest and the availability of high quality greenspace within and close to Purbeck, it is unlikely that the proposed housing developments and tourism policies within the Purbeck District's Core Strategy alone will result in significant increases to the number of visitors to the New Forest National Park. However, the in-combination effects of the housing development and tourism policies within the core strategies of all other districts surrounding and close to the New Forest National Park may result in significant increases in the number of visits made to the Park, especially where new development is within 20km of the National Park (Sharp et al., 2008). Such an increase is likely to have an adverse effect on the integrity of the New Forest SPA and SAC. Development within Upton does fall within the 20km radius and it is therefore not possible to conclude, in the absence of mitigating measures, no adverse effect on the integrity of the New Forest European sites, in combination with all other developments in other Districts proceeding without mitigation..

8.2 Mitigation

- 8.2.1 The in-combination effects identified can only be resolved through a strategic approach, either through the Interim Planning Framework (IPF) and subsequent DPD, or through some extended partnership that includes the New Forest National Park. Purbeck's contribution to such a strategic approach is relatively minor compared to other adjacent districts as the existing visitor data does suggest a relatively small proportion of visits originating from Purbeck. The implementation of any mitigation is potentially complex as one of the fundamental purposes of the National Park is to promote opportunities for understanding and enjoying it's opportunities. The National Park therefore has both a duty to encourage and facilitate access as well as to manage access to ensure the protection of the Park. Much of the potential mitigation measures (such as codes of conduct, wardening, interpretation etc.) are already in place.
- 8.2.2 Visitors are attracted to the New Forest, rather than alternative areas, by dint of its scenery, peace and quiet, ease of accessibility, suitability for walking, and wildlife. As such the site has a wide appeal and draws people from a wide area. These factors need to be taken into consideration when identifying potential mitigation measures.
- 8.2.3 Potential mitigation measures include:
- Green infrastructure and alternative sites. These may be successful in attracting some visitors (such as regular dog-walkers living close or within the National Park) but are unlikely to attract someone from Purbeck. The alternative sites may well reduce total visitor numbers and therefore work as part of a package of measures to ensure a no net increase in visitor pressure.

- Promotion of rail transport and measures to reduce car-use when visiting the National Park, thereby ensuring access is focused through main 'gateways' and reducing impacts from cars (pollution, parking on verges etc.).
- Access management within the New Forest as part of a long-term, carefully planned programme to ensure promotion, the spatial distribution of access infrastructure, visitor welcome and contact with visitors is such that the interest features of the European designations are protected and enhanced.

8.3 Conclusions

8.3.1 The New Forest National Park is a nationally promoted visitor attraction that draws day visitors and holiday makers from a wide radius. Visitor levels to the National Park are already high and additional development, especially within a 20km radius, is likely to result in increased visitor pressure. Part of Purbeck District just falls within such a radius. Mitigation measures, implemented strategically in conjunction with other local authorities, will eliminate any of the impacts.

9 Water Issues

9.1 Introduction

9.1.1 Water issues relating to European Protected Sites in or near Purbeck District are abstraction and discharge. Abstraction can potentially draw water away from the European Protected Sites, resulting in impacts to wetland habitats and species. Discharge can result in nutrient inputs and therefore impacts to water quality and impacts to vegetation communities.

9.2 Water Abstraction

9.2.1 Water throughout the Purbeck District Council area is supplied by Wessex Water (WW) who also supply parts of Somerset, Wiltshire and Avon across four water Resource Zones (RZ). These zones are defined as "the largest possible zone in which all resources, including external transfers, can be shared and hence the zone in which all customers experience the same risk of supply failure from a resource shortfall". Purbeck falls within the south RZ stretching from the Avon Valley in the east to Lyme Regis in the west and to the north and west of Blandford Forum. The following European Sites (with wetland interest features) are therefore potentially affected: the Dorset Heaths SAC, The Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC, the Dorset Heathlands SPA, the Dorset Heathlands Ramsar, Avon Valley SAC, Avon Valley SPA/Ramsar.

9.2.2 WW have estimated the future household demand for water in each resource zone by examining each use of water by households and forecasting future use based on changing attitudes and behaviours and expected changes to domestic equipment; by allowing for projected increases in population and from a forecast of the increase in the use of meters. They have also made an estimate of the future changes in non-household demand. These estimates have been converted into forecasts of demand in a dry year and for the peak week in a dry year when demand would be expected to be at its highest (Wessex Water, 2008c).

9.2.3 The company has then adjusted these figures to allow for the promotion of water efficiency measures to customers, a reduction in leakage and the effect of climate change on demand, to forecast the total demand for water until 2035.

9.2.4 Currently some 75% of supply comes from groundwater sources, of which two thirds comes from groundwater sources which are limited in a drought, and with four sources identified where abstraction is believed to have a significant effect on groundwater levels (none in Purbeck). The company has also calculated surface water yields, and allowed for the import of water from adjoining suppliers. Calculations have then been made on the effect of climate change on supply using three scenarios, dry, mid and wet (in the south zone wetter winters are expected to slightly increase future average and peak groundwater yields).

9.2.5 These figures have then been adjusted to allow for outage (a temporary reduction in the achievable output from water treatment works due to unforeseen circumstances i.e. a breakdown in equipment, or a foreseen event such as

maintenance) and headroom, an allowance for the uncertainties of demand and supply.

9.2.6 The balance between demand and supply has then been calculated as:

Balance = Yields – Outage – Target headroom – Demand + imports – Exports.

Without low flow reductions (see below), the southern resource zone has a surplus of resources to meet foreseeable demand.

9.2.7 In the early 1990s there were concerns about the effects of abstraction during low flows on three rivers, including the River Piddle (on the upper reaches outside Purbeck). WW proposed a major project to address these concerns but this was not approved by the water regulator OFWAT on the grounds of cost. An agreement between WW, EA, OFWAT and NE was then put in place to minimise the use of water sources which affected the three rivers, and formalised in a statement of Intent in 2002 which was renewed in 2007 for a further three years. However, these measures have not been confirmed as a long term solution, water might still need to be extracted up to typical current abstraction rates in dry years, when the streams would be most vulnerable, and further investigations and monitoring are necessary.

9.2.8 For the current Abstraction Management Plan (AMP5) period, 2005-2010, another fourteen low flow sites have been identified as at risk from abstraction. Tadholl Brook discharging into the River Frome in Purbeck is one of these, as a result of abstraction at Empool. Tadholl Brook is provided with water added from groundwater sources to maintain acceptable flows (stream support) as a condition of the groundwater abstraction licence, and at times this constitutes the entire flow of the stream.

9.2.9 WW embarked on an option study and appraisal to identify options that could help to meet a growth in peak demand across the region and allowing for a potential reduction in licenced abstraction to address low flows. They began by listing an unconstrained list of options and undertaking an assessment of, and consultation on, each one. The schemes were then ranked according to their social, environmental, economic and carbon costs and categorised into those that reduced demand for water; those that increased average and peak water availability, those that catered for peak demands only and those that were only applicable with low flow licence reductions. The optimal schemes identified were all in the East and north RZs and none affect the south RZ directly. Although no figures have yet been agreed, a deficit of 20MI/d¹² has been identified in the north resource zone and 12MI/d in the east resource zone by 2035. These are due to a growth in demand in the north and sustainability reductions in both zones likely to be imposed by EA as a result of the low flows studies (Wessex Water, 2008a).

9.2.10 WW have opted for a strategy that integrates their water supplies such that customers will be able to receive their water from more than one source. This would provide more security of supply, allow the movement of water around the region in the event that some supplies became unsuitable (for example due to high levels of nitrate), give greater robustness of supply against the effects of climate

¹² MI/d = million litres per day

change and improve the connections between areas in deficit and those in surplus. However this also means that supply shortages in one area could impact on other areas as water is moved around the region to ease the deficits. They anticipate that the measures they take will remove the supply/demand balance deficits in the north and east resource zones until 2034. However, the achievement of this will also depend on the construction of additional pipelines, pumping stations and reservoirs, increasing the proportion of metered customers, continuing to reduce wastage from leaks and continued wise use of water by customers.

- 9.2.11 Groundwater quality is an important issue for the Company with elevated levels of nitrates found in some locations, coming largely from agricultural sources. In many areas groundwater quality is getting worse, and between 2010 and 2015 it is expected that abstracted raw water will exceed the drinking water standard for nitrate at eight water supply sources. Where the nitrate level exceeds this standard of 11.3mg/l the law requires that the water is not put into the public supply. Using a modelling approach, based on historic rates of nitrate fertiliser application, variations in groundwater levels and intense groundwater recharge events, the company has extrapolated nitrate levels into the future for sources at risk, including four in Purbeck. This has shown that for most sources, nitrate levels will continue to rise for a few years and then decline. If nitrate concentrations exceed permitted levels, the company can close the source of supply or install treatment processes to remove nitrates as has been done recently for two sources near Salisbury.
- 9.2.12 Abstraction, whether from reservoirs, rivers or groundwater sources has to be licenced by the Environment Agency (EA), and these licences set a limit to the amount of water that can be abstracted from any given source per annum or per day in order to protect the environment. In some places there is stream support, in others, the level of abstraction from groundwater sources can depress river flows.
- 9.2.13 The Environment Agency is required to produce Catchment Management Strategies for river catchments setting out the availability of water and their strategy for managing this resource now and in the future. The Frome, Piddle and Purbeck Catchment Abstraction Management Strategy (CAMS) covers an area of approximately 900km² and takes in the whole of the Purbeck District Council area as well as the headwaters of the Frome and Piddle to the west (Environment Agency, 2005). There are 381 abstraction licences within the CAMS and 80% of the water abstracted is used for public water supply.
- 9.2.14 Approximately 90% of the CAMS area has been designated a Nitrate Vulnerable Zone (NVZ) due to high or rising levels of nitrates and action programme measures must therefore be implemented in the CAMS area to reduce nitrate pollution. Both surface and groundwaters have enhanced levels of nitrates mostly due to the historic application of fertilisers. If public water supply sources are polluted by nitrates, alternative sources may have to be used that effectively reduce the available supplies.
- 9.2.15 The CAMS has assessed the availability of supplies used for consumptive purposes in terms of availability status, as described in Table 11.

Table 11: Definitions of water availability status

Indicative resource availability status	Definition
Water available	Water likely to be available at all flows including low flows. Restrictions may apply
No water available	No water available for further licensing at low flows, although water may be available at higher flows with appropriate restrictions
Over-licensed	Current actual abstraction is resulting in no water available at low flows. If existing licences were used to their full allocation they would have the potential to cause unacceptable environmental impact at low flows. Water may be available at high flows with appropriate restrictions.
Over-abstracted	Existing abstraction is causing unacceptable environmental impact at low flows. Water may still be available at high flows with appropriate restrictions

- 9.2.16 The CAMS area has been subdivided into smaller Water Resource management Units for the purposes of assessment and the relevant management units are:
- 9.2.17 Unit 1 Frome (groundwater and surface water). This unit includes the whole River Frome catchment including the river and its tributaries together with the Lower Frome Groundwater Management Unit (GWMU No 9). The surface water unit includes a substantial area of Purbeck DC but excludes the catchments of the rivers Piddle, Corfe and Sherford and those parts of the Frome subject to tidal influence. WW provides stream support to the Tadnoll Brook and the South Winterborne. The River Frome has been assessed as "water available". The lower Frome groundwater unit which supplies the Tadnoll Brook and the River Frome are currently believed to be abstracted up to sustainable levels and have been assessed as "no water available". The major consumptive use of both sources is for public water supply
- 9.2.18 Unit 2 River Piddle (Surface and groundwater). This unit includes the entire River Piddle and its tributaries down as far as the tidal limit at Wareham, and the chalk aquifer underlying the upper Piddle and Bere stream. WW supplies steam support for the Piddle and Devils Brook. Sustainable levels of licensed abstraction (most of which by volume is for public water supply) have been reached from this unit and are on the boundary of over licensed. The CAMS states that further unconstrained abstractions would give cause for concern and that the unit has been classified as "no water available"
- 9.2.19 Unit 3 River Sherford (surface water). This unit covers the River Sherford and its tributaries down to the tidal limit together with GWMU 10. The underlying confined chalk aquifer has not been assessed. There are no abstractions for public water supply. The river has been assessed as "water available".

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- 9.2.20 Unit 4 River Corfe (surface water). The unit covers the river Corfe and its tributaries. The underlying confined chalk aquifer has not been assessed. There is one large public water supply licence which is not currently utilised, but the CAMS has assessed the unit as reaching sustainable levels of licensed abstraction and as "no water available".
- 9.2.21 GWM Unit 11 Sherford (groundwater). Most of this groundwater catchment lies in the North Winterborne catchment. There is no abstraction for public water supply. The CAMS has assessed this unit as "water available"
- 9.2.22 The CAMS indicates that most groundwater abstractions do not have restrictive conditions during the summer months due to the difficulty of assessing the relationship between the abstraction and the nearest stretch of river. There are concerns about the depletion of chalk springs due to chalk public water supply abstraction. The normal renewal period for abstraction licenses in the Frome, piddle and Purbeck CAMS is twelve years with any new licences having a common end date of 31st March 2017 although shorter time periods can be imposed. Since the CAMS was published there have been two published reviews and no changes have been made in the water availability status of either surface or groundwater management units (Environment Agency, 2006, Environment Agency, 2007).
- 9.2.23 WW have opted for a strategy over the next 25 years of developing a more integrated water supply grid. This involves a network of pipelines to supplement the existing system which inter alia, connects Poole, Wareham and Dorchester. Modelling by WW has identified a number of additional network connections or improvements to the existing pipeline system to allow for increased flows or to allow water to flow in the opposite direction. In Purbeck this will require an additional pipeline connection between Ringwood and Wareham.
- 9.2.24 The proposed scheme will connect all major areas so that deficits in one area can be accommodated from surpluses elsewhere by moving water around. Such deficits may arise from water shortages in some years, the need to maintain flows in streams and rivers by reducing abstractions and stream support and the possibility of cutting supplies from sources with high nitrate levels or high pathogen levels (Wessex Water, 2008b).
- 9.2.25 For Purbeck, this means that that in terms of water supply, there is no need to separate the three options for assessment in the longer term, as the combined total increase in housing will be the same (although with different distributions depending on which option is chosen), and all areas will be on the extended network of water mains. It will, however, take WW some time to put a fully operative network in place and there could therefore be some short term issues of supply if further development places additional burdens on surface or groundwater sources which have no water available during dry years or at dry peaks, and if some local sources are closed due to high nitrate levels. The various Dorset Heath sites are therefore potentially at risk.
- 9.2.26 The Environment Agency's abstraction licensing system and Review of Consents should serve to protect the European sites from the negative effects of over-abstraction. However there are concerns that abstraction could be affecting chalkwater springs and the links between extraction and river flows are uncertain.

There is no assessment in the CAMS of the effects of water abstraction on wetland sites such as the fens and mires associated with the Dorset Heaths SAC/SPA/Ramsar Sites. A decline in the area of wet habitats, peatland and wet heath on the Dorset heaths has been noted (Rose *et al.*, 2000), but no cause has been ascribed to this.

- 9.2.27 The CAMS does not cover river discharges into the Poole Harbour SPA/RAMSAR site, and therefore it does not assess the effects of reduced flows or increases in nitrates in the rivers feeding the Harbour.
- 9.2.28 Although in the longer term it will be possible to address these issues by using alternative sources of supply, through the enhanced network proposed by WW, in the short term, Purbeck District Council will need to be satisfied that that WW can guarantee a supply of water of sufficient quantity and quality will be available to meet the needs of new housing and industrial/commercial development without detriment to the European sites, before publishing their final development proposals in the core strategy.
- 9.2.29 Whilst it cannot be relied upon as a measure to counteract potential effects upon European sites, it would be sensible for Purbeck District Council to consider the encouragement or imposition of water saving measures in 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 or demonstrate that a plan will not adversely affect any European site.

9.3 Sewage discharges

- 9.3.1 A total of approximately 17.1Ml/d of treated effluent discharges into the Frome, Piddle and Purbeck CAMS area, with 98% of all discharges from Sewage Treatment Works (STWs) operated by WW. The largest of these STWs are at Dorchester, Wool and Blackheath.
- 9.3.2 There are ten STWs entering the River Frome and operated by WW, with the largest at Dorchester. A scheme to install phosphate reduction equipment in the Dorchester, Wool and Bradford Peverell Waste Water Treatment Works which all discharge into the Frome, has been approved.
- 9.3.3 On the River Piddle there are three STWs operated by WW with the largest at Milborne St Andrew. On the Sherford there is one STW at Blackheath, although this also takes piped sewage from Bere Regis in the Piddle catchment for treatment and discharge. The volume of discharge from the STW is a major constituent of the Sherford river flow below Blackheath.
- 9.3.4 The single STW below Corfe Village on the Corfe River contributes a major proportion of the river flow below the STW.
- 9.3.5 Altogether then, there are twenty-one STWs discharging into rivers which flow into Poole Harbour or discharging directly into the Harbour.
- 9.3.6 Targets for river water quality objectives are set for all rivers by EA on the basis of a River Ecosystem (RE) Classification Scheme. Over 97% of the Frome, Piddle and

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Corfe catchments reached level RE1 (very good quality suitable for all fish species) or RE2 (good quality suitable for all fish species) in 2000-2003. However the status of the rivers under a General Quality Assessment is less favourable with elevated phosphate levels in the Rivers Corfe and Frome and some of their tributaries and elevated nitrate levels in the Piddle, its major tributaries and the Tadnoll Brook.

- 9.3.7 In June 2002 Poole Harbour and Holes Bay were designated as a eutrophic sensitive area by DEFRA.
- 9.3.8 Where a water body has been identified as sensitive on the grounds that it has been found to be eutrophic, more stringent tertiary treatment of sewage discharges is required from sewage works serving populations of more than 10,000. Such additional treatment involves reducing levels of nitrogen and/or phosphorus in discharges to reach standards set in the Urban Waste Water Treatment Directive, within seven years of the identification of the sensitive areas (DEFRA, 2009).
- 9.3.9 Raised nitrate levels in Poole Harbour have recently indicated hyper-nutrication with the highest levels of nutrient concentrations entering the Harbour from the Frome, Sherford and Piddle and with highest inorganic nitrogen in the Frome (Underhill-Day, 2006, Langston, 2003, Murdoch and Randall, 2001). The highest levels of nutrients recorded in the Harbour were in Holes Bay and the Wareham Channel (Murdoch and Randall, 2001)
- 9.3.10 One effect of higher nutrient levels in the Harbour is the growth of macro-algal mats (mostly *Ulva* and *Enteromorpha* sp.) covering the intertidal flats. These can cause changes in invertebrate species richness and abundance which could impact on the SPA waterfowl populations of the area (Jones, 2003, Pinn and Jones, 2005)
- 9.3.11 All the proposed development sites with the exception of Swanage, will discharge their wastewater into STWs that either discharge into rivers entering Poole Harbour or directly into the Harbour itself.
- 9.3.12 Therefore without mitigation, option B would be less damaging than the preferred option or option A in relation to increased nutrient inputs from wastewater into the Poole Harbour SPA/RAMSAR site, as option B directs more dwellings to Swanage where sewage discharges go directly out to sea.
- 9.3.13 It is not clear at present what population size would be served by each of the main STWs under each of the three options, as STWs serve a range of scattered settlements as well as the main town, and in some cases sewage is pumped considerable distances from other settlements (e.g. Bere Regis to Blackheath). However, WW have advised that the treatment works at the locations in Table 12 will be subject to additional flow from new development during the proposed plan period. The table also lists receiving water courses for each STW.

Table 12: Treatment works that will be subject to additional flow from new development.

Treatment Works	Receiving effluent discharge
Swanage	Swanage Bay
Wareham	River Frome (Dorset) - then Poole Harbour
Blackheath	River Sherford - then Poole Harbour

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Wool	River Frome (Dorset) - then Poole Harbour
Corfe Castle	River Corfe (Poole Harbour)
Lytchett Minster	Lytchett Bay(Poole Harbour)
Poole	Holes Bay (Poole Harbour)

- 9.3.14 A preliminary assessment of the development options and the predicted capacity of each of the works has been completed.
- 9.3.15 The SWTs at Wareham and Blackheath will require planned improvement works to provide adequate capacity to serve the new developments. These capacity improvements may be delivered as either phased improvements to match the rate of development or a single scheme with a suitable design horizon.
- 9.3.16 The remaining SWTs have sufficient capacity to serve the proposed developments within the plan period 2026. This assumes that no consent reviews will be required during the plan period.
- 9.3.17 Asset planning is reviewed on a periodic basis to assist funding requirements through the 5 year business plan agreed with regulator OFWAT. Cumulative windfall growth within the catchment is also accounted for in this process. Ongoing maintenance works for mechanical/electrical plant will be required when asset replacement is necessary.
- 9.3.18 WW are planning several investigations relating to existing phosphorus discharges from STW effluent and nitrogen discharges into Poole Harbour. Both of these investigations will advise on the influence of the discharges upon the level of eutrophication relative to other sources and predicting the impacts of future development.
- 9.3.19 Both investigations will involve the Environment Agency and are due to commence during April 2010 and report in March 2012 subject to funding agreement with OFWAT.
- 9.3.20 It is understood that the EA are currently completing a study of nutrient issues in Poole Harbour but this is still in draft and under consultation and is not yet available. It is understood, however that STWs contribute some 30% of the total annual nitrate load entering the Harbour. When this report becomes available additional information and recommendations may need to be added to this section of the AA.
- 9.3.21 It is unclear at present whether the existing network of sewers is adequate to accommodate the additional dwellings under the three options. It is known that sewer bursts in the area are a problem (WWs environmental programme contains 68 actions to reduce the volume of sewage that overflows from sewers during periods of heavy rainfall), but it is not known where these are or whether such overflows threaten any European designated sites. However it is reasonable to assume that any sewer bursts within the river catchments will find their way into the catchment drainage system and eventually into the main rivers and down the Poole Harbour, howbeit perhaps much filtered and diluted. Purbeck District Council will need to be satisfied that WW can demonstrate that any additional development will not result in increased risk of bursts in overloaded sewers.

- 9.3.22 There are no known water quality issues in relation to urban run-off in the District (Environment Agency, 2005), and it is not considered that any of the heathland mires or Poole Harbour is at risk from natural flooding events.

9.4 Mitigation

- 9.4.1 Purbeck District Council will need to be satisfied before publishing their final development proposals in the core strategy that WW can demonstrate (and that EA will consent) that:

- A supply of water of sufficient quantity and quality will be available to meet the needs of new housing and industrial/commercial development without detriment to the European sites prior to the occupation of each phase of all new developments,
- No new developments should be sited in areas which put at risk the quality or quantity of surface or groundwater sources
- That the sewer capacity is sufficient or will be made so, to accommodate the increased effluent resulting from all new developments under any of the three options without risk of bursts
- That measures will be put in place at Wareham and Blackheath STWs to increase capacities so that the STWs have sufficient additional capacity to accommodate any of the three options before occupation of the new developments which they will serve. That any other shortfalls in STW capacities identified by consent reviews will be addressed prior to the occupation of any new developments they will serve
- That additional STW discharges arising from new developments under any of the three options will not have an adverse effect on the Poole Harbour RAMSAR/SPA European site through increases in the total inputs of nutrients. This could be achieved through the installation of nutrient stripping at one or more STWs or by measures to reduce nutrient inputs to the Harbour from other point or diffuse sources such that the effect of new developments was nutrient neutral.
- That a timetable of actions is agreed with EA and WW to ensure that the necessary actions are taken with regard to STW capacities and discharges and sewer capacities to avoid any adverse effect on the designated features of the Poole Harbour RAMSAR/SPA site as a result of new development

9.5 Conclusions

- 9.5.1 At this current point in time therefore, it cannot be concluded that adverse effects upon European designated heathland sites arising from water abstraction can be prevented.
- 9.5.2 However, in relation to housing growth within Purbeck District, Guarantees from WW in the short term and the implementation of an extended water supply network in the medium term by WW should allow development of any of the alternative options to proceed with regard to water abstraction.

- 9.5.3 Given the current eutrophic nature of Poole Harbour and in the absence of a consent review, the precautionary approach suggests that current STW discharges could already be having an adverse effect on the integrity of the Poole harbour RAMSAR?SPA site. There are also uncertainties in relation to existing trends in Nitrate concentrations in the Harbour, the effects of further nutrient discharges from STWs and as a result of sewer bursts on the Poole Harbour SPA/RAMSAR site and the extent and timing of the measures needed to address these. It is not possible to conclude that the wastewater discharges from the proposed developments will not have an adverse effect on the Poole harbour European site. However, with if the mitigation measures (outlined above are put in place prior to occupation this should allow development of any of the three options to proceed without an adverse effect on the Poole Harbour SPA/RAMSAR site.

10 Fragmentation and pressure on heathland sites as a result of employment allocation.

- 10.1.1 There is abundant literature accumulated over decades on the effects of habitat fragmentation, with the majority citing negative effects on biodiversity. This includes work on the Dorset Heaths (Webb, 1989, Webb and Vermaat, 1990). In general, development as proposed in the Core Strategy is sufficiently far from or peripheral to internationally protected sites to be unlikely to contribute to fragmentation of the sites, but there is one area of particular concern - Holton and Sandford Heaths - which could be affected by employment land allocations. In addition the Winfrith Technology Park, near Wool, is adjacent to part of the Dorset Heaths.
- 10.1.2 The Core Strategy Preferred Option for development, and Options A and B, all rely for employment land on the allocation of eight hectares at Holton Heath and five hectares at Admiralty Park.
- 10.1.3 The proposed employment land allocations at Holton lie between the Holton Heath and Sandford Heath parts of the SSSI/SAC/SPA. The smaller fragment of heathland at Blackhill, also within this international designation, is itself between the two larger heath blocks and could be very much encircled by the land uses associated with the employment allocation.
- 10.1.4 The Inspector's Report of the Inquiry into the NE Purbeck Local Plan in 2002 raised some very relevant issues in relation to development at Holton. In particular the Inspector was concerned about the direct loss or compromising of further land of nature conservation interest (SNCI and pSNCI); and by the effects of development causing further fragmentation of heathland habitat with the consequence of isolating and making more vulnerable, populations of certain key heathland species. These include sand lizards that are a particular SAC feature in Dorset and the Annex 1 bird species that are the Dorset Heaths SPA core interest feature.
- 10.1.5 The above issues were highlighted in the context of the proposed development for a substantial amount of residential development then before the Inspector. However, many of the concerns apply also to employment uses. There would probably not be the additional impacts caused by the keeping of pets, or from recreational access, and fire. However the separation and fragmentation of habitat and species, the loss of ability to restore heathland on land currently covered by trees, either as additional habitat or for the provision of links, and the risk to habitats of conservation importance such as acid grassland are all just as relevant to the employment uses now proposed in the Core Strategy.
- 10.1.6 Land adjacent to heaths is often important to sustaining the nature conservation interest of the heaths. For example radio-tracking of nightjars breeding on the heaths has shown that they will fly up to 8km from the heaths to feed at night (Alexander and Cresswell, 1990, Cresswell, 1996). The nightjars have been shown to use a range of habitats such as grassland, orchards and wet meadow. Any loss of

such habitats (potentially rich in invertebrates) outside the heaths could therefore have a knock-on consequence for the Annex 1 bird species present on the site.

- 10.1.7 The Core Strategy also proposes (para 8.10.5) that employment land is provided with recreational space for walking and cycling. This is a worthy intention and is probably intended to ensure that sufficient land is allocated to allow for the built infrastructure plus additional green space. In the context of Holton however, it could perversely reduce the area available as habitat linkage, or cause a reduction in the quality of existing habitat if this is used for recreation, making the effect of the employment use more similar to the generally more damaging impacts that are associated with residential use.
- 10.1.8 The precise distribution of buildings, infrastructure and green space is not clear at this stage. Although it may be possible to accommodate all of these and not adversely affect the Dorset Heaths SAC/ Dorset Heathlands SPA and Ramsar sites, this is not certain. Therefore it is not possible to rule out that the European sites could be negatively impacted by the employment land proposal.

10.2 Mitigation

- 10.2.1 It may be possible to mitigate the effects of employment use at Holton. A full ecological survey carried out before any land is allocated for development or green space will be necessary to inform a nature conservation master plan, whereby land with the most important potential for habitat restoration and linkage provision is safeguarded and managed, along with all areas with existing high nature conservation interest. It may be that the total 13ha of land for employment use can be found, without adverse impacts being likely, or the allocation area may need to be amended in the light of the detailed site assessment.
- 10.2.2 The costs of these mitigation provisions need to be part of the development brief for the Holton employment land, given its highly sensitive and vulnerable location, in the same way that they would apply for residential use.
- 10.2.3 The most obvious risk of habitat fragmentation is at Holton. There is also a potential threat from the employment land proposals at Winfrith. Although there is more space available, and the distribution of designated sites is concentrated towards the western side of Winfrith, employment provision here could adversely affect the internationally designated heathland. A precautionary approach would require that a similar ecological survey and conservation master plan is drawn up here to avoid any risk of fragmentation.

10.3 Conclusions

- 10.3.1 The Core Strategy should therefore refrain from promoting any specific levels of employment provision at Holton Heath and Winfrith until the necessary studies have been undertaken.

11 Air quality

- 11.1.1 Local Authorities are required under Part IV of the 1995 Environment Act to review air quality in their areas, and to periodically report to DEFRA whether they have met the standards set by the Air Quality Regulations. Where the standards are not being, or are not likely to be met, the LA is required to set up an Air Quality Management Area (AQMA) with an action plan to take steps to reduce the levels of the offending pollutants.
- 11.1.2 Most AQMAs are in urbanised areas where pollutant levels are highest from industry and traffic.
- 11.1.3 Purbeck District Council carried out a screening exercise in 2003 to check on the levels of benzene, 1,3 butadiene, carbon monoxide (CO), nitrogen dioxide (NO₂), PM10 (fine particles), lead and sulphur dioxide (SO₂) (Purbeck District Council, 2003). This study found that none of the pollutants measured were at concentrations which exceeded the nationally set air quality objectives and that in no case were these objectives likely to be exceeded in the future.
- 11.1.4 Purbeck District Council has since carried out an annual assessment and has found no factors likely to change the original assessment and that the levels of NO₂ (which is the only pollutant regularly measured in the District) are still below the set levels (Purbeck District Council, 2008).
- 11.1.5 There are two national objectives for NO₂: an hourly mean of 200ug/m³ not to be exceeded more than 18 times pa, and an annual mean of 40ug/ m³ or less by 31st December 2005. In Purbeck, the Council have installed monitoring points in 10 locations to represent a range of situations, mostly close to roads, and including Wareham, Swanage, Upton, Bere Regis and Wool. These showed that for the period 2003-2007, average levels for Wareham, Bere Regis, Wool and parts of Swanage (Queens Road and Gilbert Road) was below 20ug/m³, at the railway station Swanage it was between 20-30ug/m³, and at Sandford Road, Sandford and Blandford Road, Upton, the levels are at about 30ug/m³.
- 11.1.6 However, the standards set by the Air Quality Regulations relate to human health and are not directly relevant to critical levels of deposition on heathland. Further, the Air Quality Standards are expressed in terms of the ratio of pollutant to a cubic metre of air, whereas the standards for habitats such as heathland are expressed in terms of kilograms deposited per hectare per annum.
- 11.1.7 Purbeck District has a substantial proportion of the internationally important Dorset Heaths SAC/Dorset Heathlands SPA and Ramsar sites. Heathlands are acid, low nutrient systems with poor buffering capability against inputs of nutrients (mostly airborne nitrogen) or increases in acidity (mostly a side effect of nitrogen or from airborne sulphur).
- 11.1.8 Airborne nitrogen (mostly as ammonia and nitrous oxides) from burning fossil fuels by industry, traffic, shipping and agriculture, now poses one of the greatest threats to heathland in Europe. Heathland systems are generally poor in nutrients and many of the plant species can only survive and compete successfully on soils with low nitrogen availability (Bobbink *et al.*, 2002). Nitrogen compounds also increase

acidification in soils. The addition of nitrogen in rain or dust particles, results in an increase in the nitrogen in the vegetation, litter and upper soil layers, and this builds up over time.

- 11.1.9 In one study on a lowland heath in southern England, about 18% of the nitrogen build-up was in the vegetation, 14% in the litter and 60% in the top 10cm of soil (Power pers. comm.). Heather growth can initially benefit from inputs of nitrogen, but where the heather is then 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.
- 11.1.10 Where there is no sudden event such as fire, the enhanced nutrient levels in the heather plants can speed up the growth cycle so that aging occurs more rapidly, the plants become more vulnerable to cold weather effects or drought and higher nutrient levels can encourage more frequent attacks by insects, particularly heather beetle (Lee and Caporn, 1998, Lee et al., 2000, Kristensen, 1999, Power et al., 1998, Carroll et al., 1999). All these factors can lead to a weakening of the heather, and, as the light penetration increases through weakened or dead heather canopies and levels of nitrogen in the soil from a build-up of airborne nitrogen deposition increase, both these factors encourage the growth of grasses.
- 11.1.11 A range of grass species can be involved in this process, and one of these, purple moor-grass (henceforth referred to as *Molinia*) has displaced heathland vegetation on many heaths across North-west Europe. On wet heaths, *Molinia* can oust the typical heathland dwarf shrubs under high nitrogen conditions (Aerts and Berendse, 1988, Berendse and Aerts, 1984, Milligan et al., 2004, Uren et al., 1997).
- 11.1.12 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.
- 11.1.13 In a review of the evidence, Bobbink et al. (2002) concluded that the critical load¹³ for nitrogen in dry heathland should be 10-20 kg/ ha/ yr and in wet heathland it should be 10-25 kg/ ha/ yr with the lower end of this range applied to sites with low intensity management.
- 11.1.14 A number of studies have shown a decline in heather and an increase in the dominance of *Molinia* on a range of heaths, mires and moors in Norway, Denmark, Holland, Belgium and the UK (e.g. Chambers et al., 1999, Tybirk et al., 1995). In the UK, there is also evidence of grass invasion of some dry heaths. These changes can involve a variety of heathland grasses including *Molinia*, bristle bent grass *Agrostis*

¹³ Critical loads are defined as the rate of pollutant deposition below which adverse effects do not appear in the ecosystem Cunha, A., Power, S. A., Ashmore, M. R., Green, P. R. S., Haworth, B. J. & Bobbink, R. (2002) Whole ecosystem nitrogen manipulation: An updated review. JNCC Report No. 331., Peterborough.

curtissii, sheep's fescue *Festuca ovina* and wavy hair grass *Deschampsia flexuosa* (Marrs, 1993, Todd et al., 2000).

- 11.1.15 In the Dorset Heath area, the level of nitrogen deposition has been estimated as 13.2 kg/ha/yr which is slightly above the minimum for both dry and wet heath but well below the maximum for both. The level of acid deposition is 1.12 keq¹⁴/ha/yr which is well above the critical load level of 0.1keq/ha/yr¹⁵. The very acid heaths of Dorset give little buffering protection from this increased acidity.
- 11.1.16 The deposition of nitrogen has fallen in Europe since 1990, and levels are expected to fall further (NEGTA., 2001) although world levels are predicted to go on rising for some time. However, past depositions remain in the vegetation, litter and upper soil layers and modelling suggests that it may take between 20 and 50 years to restore heather dominance in some grass heaths depending on the intensity of management (Terry et al., 2004).
- 11.1.17 The results for Purbeck suggest that the current levels of nitrogen are not directly damaging to the European heathland sites, but that the situation requires further continued monitoring. It is not known what has led to the high levels of acid deposition. This normally takes the form of sulphur dioxide but the only source of SO₂ which has given cause for concern was the Swanage railway, and measurement taken at Swanage where the trains waited at the station and SO₂ levels might have been expected to be high, found that these did not breach air quality objectives.
- 11.1.18 The Regional Spatial Strategy for the South West 2006-2026 proposes that measures be put in place to reduce traffic by all local authorities, and at a district level there are a limited range of measures LAs can pursue. Whilst it cannot be relied upon as a measure to counteract potential effects upon European sites, Purbeck District Council could encourage (as part of, or in addition to Policy IAT):
- Park and ride systems.
 - Bus priority routes.
 - Green transport plans for companies.
 - Encourage use of 'greener' vehicles.
 - Information and education activities.
 - Vehicle emission testing.
 - Encourage more home/remote working initiatives.
 - Encourage companies to reduce their environmental impact.
 - Reduce the council's own environmental impact.
 - Low emission zones for use with greener vehicles.
 - Encouraging people to use more public transport.
 - Improvements to public transport.
 - Considering air quality impacts from major developments

¹⁴ A keq is a kilo equivalent of inputs of 14 kg/ha⁻¹yr⁻¹ of nitrogen or 16kg/ha⁻¹yr⁻¹ of sulphur

¹⁵ See <http://www.apis.ac.uk/>

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- 11.1.19 Research has shown that effects on heathland vegetation from local traffic can extend up to 200m from the road edge (Angold, 1997). Proposed development which results in an increase in traffic on roads crossing European heathland sites should be discouraged.
- 11.1.20 With respect to the core strategy the following in particular may have consequences for air quality:
- Increased levels of housing, leading to increased traffic along the B3075, the A351, the A352, Ferry Road (Studland).
 - Employment land allocations resulting in increased traffic. The great majority of the employment land allocations are distant from Swanage. In this respect there is no difference between the Options. For the Preferred Option and Option B, with a focus for extra housing allocation at Swanage, there would be an increased threat to the international sites between Swanage and Holton, from the effects of increased traffic, caused by vehicles used for driving to work. The heathland sites likely to be impacted are Stoborough Heath and Corfe Common. The southern part of Morden Bog is also vulnerable, as is Sandford Heath, though these would be affected by all Options since they lie between Wareham and Holton.
 - Emissions from employment sites themselves (at Winfrith and Holton Heath).
- 11.1.21 The Purbeck Transportation Strategy includes reference to the Wool by-pass and Bere Regis by-pass. All of these have the potential to result in traffic increases within or close to 200m of heaths.
- 11.2 Mitigation**
- 11.2.1 Traffic emissions are difficult to address and the focus of development at Swanage in each of the options will result in increased traffic close to heathland sites. The Core Strategy already contains measures relating to reducing car-use. These could be further strengthened by reference to the Habitat Regulations in the text supporting policies TA and IAT. Without more detailed transport modelling it is not possible to identify the scale of impact and exact mitigation required.
- 11.2.2 To ensure no adverse effect it will be necessary to ensure no net decrease in air quality occurs on the European Sites as a result of the measures within the Core Strategy. When the Council formalise a transport infrastructure strategy for Purbeck as a Supplementary Planning Document, this will be an opportunity to mitigate for direct effects on the European site from adjoining road traffic.
- 11.2.3 The Purbeck Transport Strategy does propose various measures that reduce car use in the District, such as the rail link between Holton and Swanage (changing at Wareham) and the promotion of cycle routes and cycle facilities for tourists and residents. It is not possible to ascertain whether these will be sufficient to ensure no adverse effect on integrity of the European Sites.
- 11.2.4 Atmospheric inputs from further afield can only be mitigated at a regional level through the policies in the RSS.

11.3 Conclusions

- 11.3.1 The general level of nitrogen deposition in Dorset exceeds the minimum critical load for dry heath and wet heath but is well below the maximum. The level of acid deposition exceeds critical levels but the causes are unknown. The main source of nitrogen is from traffic and additional development (both housing and employment) in the areas close to the heathland SACs will generate additional traffic. It can be anticipated that further residential development in the area will increase direct effects on the heathland from emissions. Only a careful consideration of the traffic implications of each of the three options would establish whether any one is likely to lead to lower emissions than the others, and this is not available. 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 the Dorset Heaths SACs. Further information on traffic levels and emissions is required before it is possible to be confident that mitigation measures will be sufficient to remove the adverse effect. We understand that a new traffic model is scheduled for 2010. Given that the proposed housing developments are phased over a 15 year time span, interim estimates (based on housing numbers and assumptions about average trip rates) should suffice until this is available.

12 Summary of mitigation measures

12.1.1 This assessment of the development proposals considered at preferred options stage showed that, without mitigation measures, adverse effects would be likely as a result of the Core Strategy alone, either as single elements or as a combination of elements within the plan. However, mitigation measures, which would eliminate these effects, are feasible and can be built into the Core Strategy before submission. Throughout the report a number of different mitigation measures have been proposed and for convenience we summarise them here. These measures must be in place and agreed with Natural England before submission.

12.1.2 There are also obligations on Member States to avoid deterioration of habitats and significant disturbance of species on European sites. It seems clear that some measures under the Directives will be needed to tackle existing pressures and problems, including deterioration of water quality and habitat deterioration and disturbance on the designated sites. The next phase of the Habitats Regulations Assessment will need to attempt to identify what the measures may be, how effective they may be, and when they may take effect. It will then be necessary to consider whether those measures may be sufficient to also counter the effects of increased development, as a result of the plan; or would different measures, or more of the same measures be required? Provision for any additional or different measures will need to be incorporated into the proposals of the Core Strategy.

12.2 Section 5: Dorset Heaths

12.2.1 Option B presents fewer difficulties, but is not without potentially serious impacts for heathlands (notably Studland and Godlingston). Mitigation measures are probably possible for all options, but will need to be considerable, especially with large development in Wareham. Mitigation measures should ensure no net increase in visitor pressure on the adjacent heathland sites and ensure that access onto the heaths is responsible and impacts are minimised. Measures will be different for each of the three development options and will need to specifically be tailored to the development locations and include:

- Measures to ensure that the long-term vision of extensive grazing on connected heathland sites is not affected by increased traffic and access pressure.
- Measures to manage roadside, off-road and diffuse car parking at relevant sites.
- A review of access across key heaths to inform targeting of measures.
- Provision of carefully designed SANGS to draw visitors away from heaths. Careful assessment of SANG sites will be necessary to ensure their effectiveness.
- Promotion of responsible access.

12.3 Section 6: Recreational Access to Poole Harbour

12.3.1 Measures will need to be implemented in partnership with other bodies and to potentially include:

- Management of parking e.g. Ferry Road

- Provision of signs, wardening, a viewpoint, relocation and screening of shoreline footpaths in recommended locations
- Measures to reduce the impact of water-based activities including a review of the Aquatic Management Plan and limits on small craft to specific locations

12.3.2 A programme of monitoring, recording water-based and shore-based activities is required to help inform the mitigation. Such monitoring is set out in Liley & Underhill-Day (2009).

12.4 Section 7: Increased recreational pressure to coastal sites

- The preferred option is likely to have the greatest impact on coastal sites. Mitigation measures will need to include long-term management and monitoring, including:
 - Monitoring of condition of limestone grassland as agreed with Natural England. Early warning of adverse effects must inform further measures to include among other initiatives:
 - Path diversions
 - Patrolling by rangers/wardens
 - Enforcement of need to pick up dog mess
- Provision of SANGs and monitoring to assess how effective they are in reducing pressure on coastal SACs

12.5 Section 8: Increased recreation pressure to the New Forest

12.5.1 Mitigation measures will need to be implemented strategically in conjunction with other local authorities, and will include:

- Provisions of green infrastructure and alternative sites
- Promotion of rail transport and measures to reduce car-use when visiting the National Park
- Access management within the New Forest as part of a long-term, carefully planned programme interest features of the European designations are protected and enhanced.

12.6 Section 9: Water Issues

12.6.1 Assurances from the Environment Agency in the short term and the implementation of an extended water supply network in the medium term by Wessex Water should allow development of any of the alternative options to proceed.

12.6.2 Assurance will be required from EA and WW that there is:

- Sufficient water quality and quantity for all new developments
- Sufficient sewer capacity without risk of burst for all new developments

- That measures will be put in place at Wareham and Blackheath SWTs to increase capacities
- That additional discharge levels will not have a significant adverse effect on the nutrient status of the Poole Harbour European site

In addition:

- No new developments should be sited in areas which put at risk the quality or quantity of surface or groundwater sources.

12.7 Section 10: Fragmentation and pressure on heathland sites as a result of employment allocation

12.7.1 It may be that the required area of land for employment use can be found without adverse impacts, or the allocation area may need to be amended in the light of a detailed site assessment. Detailed site assessments for Holton Heath and Winfrith Technology Park are therefore required prior to submission of the core strategy. These assessments must include:

- Ecological survey (before any land is allocated) to inform planning for habitat restoration, linkage and protection of areas of nature conservation interest
- Mitigation provisions that will be included within the development proposals.

12.8 Section 11: Air quality

12.8.1 It will be necessary to ensure no net decrease in air quality as a result of increases in traffic close to heathland sites. Without more detailed transport modelling it is not possible to identify the scale of impact and exact mitigation required. The formalisation of a transport infrastructure for Purbeck as a Supplementary Planning Document will provide an opportunity to mitigate for direct effects on the European site from adjoining road traffic. Atmospheric inputs from further afield can only be mitigated at a regional level through the policies in the RSS.

- Further information on traffic levels and emissions required
- Strengthen car-reduction measures in Core Strategy by reference to the Habitat Regulations in the text supporting policies TA and IAT.

Appendix 1

Table 13 Reasons for designation of European sites within Purbeck District and 20km of the District boundary. + indicates a primary reason for designation as SAC, * indicate a priority SAC feature.

Site	Reason for designation : SAC	SPA	Ramsar
Dorset Heaths SAC, Dorset Heathlands SPA and Ramsar	Northern Atlantic wet heaths with <i>Erica tetralix</i> ⁺ , temperate Atlantic wet heaths with <i>Erica ciliaris</i> and <i>Erica tetralix</i> ⁺ , European dry heaths ⁺ , depressions on peat substrates of the <i>Rhynchosporion</i> ⁺ , <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils, Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [*] , Alkaline fens, Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains Southern damselfly ⁺ ; great crested newt.	Breeding nightjar, Dartford warbler, woodlark. Wintering hen harrier, merlin (see Table 3).	Ramsar criterion 1: Contains particularly good examples of (i) northern Atlantic wet heaths with cross-leaved heath <i>Erica tetralix</i> and (ii) acid mire with <i>Rhynchosporion</i> , largest example in Britain of southern Atlantic wet heaths with Dorset heath <i>Erica ciliaris</i> and cross-leaved heath <i>Erica tetralix</i> . Ramsar criterion 2: Supports 1 nationally rare and 13 nationally scarce wetland plant species, and at least 28 nationally rare wetland invertebrate species. Ramsar criterion 3: high species richness and ecological diversity of wetland habitat types and transitions; lies in one of the most biologically-rich wetland areas of lowland Britain. See above
Dorset Heaths (Purbeck and Wareham) and Studland dunes SAC	Embryonic shifting dunes ⁺ , shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes") ⁺ , Atlantic decalcified fixed dunes [*] , humid dunes slacks ⁺ , oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) ⁺ , Northern Atlantic wet heaths with <i>Erica tetralix</i> ⁺ , temperate Atlantic wet heaths with <i>Erica ciliaris</i> and <i>Erica tetralix</i> [*] ,	See above. Little Sea and Eastern Lake located within this SAC fall within Poole Harbour SPA.	

Site	Reason for designation : SAC	SPA	Ramsar
Poole Harbour SPA and Ramsar	<p>European dry heaths⁺, depressions on peat substrates of the <i>Rhynchosporion</i>⁺, bog woodland*, <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils, Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>*, Alkaline fens, Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains.</p> <p>Southern damselfly⁺; great crested newt.</p>	<p>Breeding common tern, and Mediterranean gull. Passage aquatic warbler and little egret. Wintering avocet, little egret.</p> <p>Internationally important wintering populations of Icelandic population of black-tailed godwit and the North-western European population of wintering shelduck.</p> <p>A wetland of international importance by regularly supporting at least 20,000 waterfowl.</p>	<p>Ramsar criterion 1: best and largest example of a bar-built estuary with lagoonal characteristics in Britain.</p> <p>Ramsar criterion 2: 2 species of nationally rare plant, 1 nationally rare alga, at least 3 British Red data book invertebrate species.</p> <p>Ramsar criterion 3: Mediterranean and thermo Atlantic halophilous scrubs, dominated by shrubby seablite <i>Suaeda vera</i>; calcareous fens with great fen sedge <i>Cladium mariscus</i>; transitions from saltmarsh through to peatland mires. Nationally important populations of breeding waterfowl including common tern, and Mediterranean gull, and of wintering. avocet.</p> <p>Ramsar criterion 5: internationally important assemblages of waterfowl.</p> <p>Ramsar criterion 6: Internationally important populations of common shelduck, black-tailed godwit..</p>
St Alban's Head to	Vegetated sea cliffs of the Atlantic and Baltic	N/A	N/A

Site	Reason for designation : SAC	SPA	Ramsar
Durlston SAC	coasts, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) (important orchid sites)*. Early gentian <i>Gentianella anglica</i> ⁺ , Greater horseshoe bat <i>Rhinolophus ferrumequinum</i>		
Portland to Studland Cliffs SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts ⁺ , Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia ⁺ , annual vegetation of drift lines. Early gentian <i>Gentianella anglica</i> ⁺	N/A	N/A
Chesil Beach and The Fleet	Coastal lagoons*, Annual vegetation of drift lines, perennial vegetation of stony banks ⁺ , Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>) ⁺ , Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>).	Internationally important overwintering population of dark-bellied Brent goose (Western Siberia/Western Europe) 1.1% of the GB population (5 year peak mean 1991/92-1995/96)	<p>Ramsar criterion 1: outstanding example of rare lagoon habitat, largest of its kind in the UK. The site also supports rare saltmarsh habitats.</p> <p>Ramsar criterion 2: Supports 15 specialist lagoonal species – more than any other UK site – and five nationally scarce wetland plants, ten nationally scarce wetland animals. Chesil Bank is one of the most important UK sites for shingle habitats and species.</p> <p>Ramsar criterion 3: The site is the largest barrier-built saline lagoon in the UK, and has the greatest diversity of habitats and of biota.</p> <p>Ramsar criterion 4: important for a number of species at a critical stage in their life cycle including post-larval and juvenile bass <i>Dicentrarchus</i></p>

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Site	Reason for designation : SAC	SPA	Ramsar
			<i>labrax</i> . Ramsar criterion 6: 2 species/ populations occurring at levels of international importance. Ramsar criterion 8: nursery for bass <i>Dicentrarchus labrax</i> .
Crookhill Brick Pit Cerne and Sydling Downs	Great crested newt <i>Triturus cristatus</i> ⁺ Semi-natural dry grasslands and scrubland facies: on calcareous substrates (<i>Festuco- Brometalia</i>) ⁺ Marsh fritillary butterfly <i>Euphydryas</i> (<i>Eurodryas</i> , <i>Hypodryas</i>) <i>aurinia</i> ⁺	N/A N/A	N/A N/A
Holnest Rooksmoor	Great crested newt <i>Triturus cristatus</i> ⁺ <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) Marsh fritillary butterfly <i>Euphydryas</i> (<i>Eurodryas</i> , <i>Hypodryas</i>) <i>aurinia</i> ⁺	N/A N/A	N/A N/A
Fontmell and Melbury Downs	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (<i>Festuco- Brometalia</i>) Early gentian <i>Gentianella anglica</i> ⁺	N/A	N/A
River Avon/Avon Valley	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho- Batrachion</i> vegetation ⁺ Desmoulin's whorl snail <i>Vertigo moulinsiana</i> ⁺ , Sea lamprey <i>Petromyzon marinus</i> ⁺ , Brook lamprey <i>Lampetra planeri</i> ⁺ , Atlantic salmon <i>Salmo salar</i> ⁺ , Bullhead <i>Cottus gobi</i> ⁺ .	Internationally important over-wintering populations of Bewick's Swan (135 individuals, at least 1.9% of the wintering population in Great Britain [5 year peak mean 1991/2 - 1995/6]) Overwintering populations of European importance of Gadwall (135 individuals representing at least 1.9% of the wintering population in Great Britain [5 year peak mean 1991/2 - 1995/6])	Ramsar criterion 1: The site shows a greater range of habitats than any other chalk river in Britain, including fen, mire, lowland wet grassland and small areas of woodland. Ramsar criterion 2: The site supports a diverse assemblage of wetland flora and fauna including several nationally-rare species. Ramsar criterion 6: Internationally important populations of wintering Gadwall , <i>Anas strepera strepera</i> , 537

Site	Reason for designation : SAC	SPA	Ramsar
The New Forest	<p>Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)⁺, Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>⁺, Northern Atlantic wet heaths with <i>Erica tetralix</i>⁺, European dry heaths⁺, <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)⁺, Depressions on peat substrates of the <i>Rhynchosporion</i>⁺, Atlantic acidophilous beech forests with <i>Ilex</i> and sometimes also <i>Taxus</i> in the shrub layer (<i>Quercion robori-petraeae</i> or <i>Ilici-Fagenion</i>)⁺, <i>Asperulo-Fagetum</i> beech forests⁺, Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains⁺, Bog woodland⁺, Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)⁺, Transition mires, quaking bogs and Alkaline fens.</p> <p>Southern damselfly <i>Coenagrion mercuriale</i>⁺, Stag beetle <i>Lucanus cervus</i>⁺, Great crested newt <i>Triturus cristatus</i>.</p>	<p>Breeding Dartford warbler, nightjar, woodlark, honey buzzard, wood warbler <i>Phylloscopus sibilatrix</i>, hobby.</p> <p>Wintering hen harrier</p>	<p>individuals, average of 3.1% of the GB population (5 year peak mean 1998/9-2002/3)</p> <p>Ramsar Criterion 1: Valley mires and wet heaths of outstanding scientific interest. The largest concentration of intact valley mires of their type in GB.</p> <p>Ramsar Criterion 2: Supports a diverse assemblage of wetland plants and animals.</p> <p>Ramsar Criterion 3: Mire habitats of high ecological quality and diversity. Invertebrate fauna important due to the concentration of rare and scarce wetland species. Whole site complex is essential to the genetic and ecological diversity of southern England.</p>

Appendix 2

Screening of the Core Strategy and Development Options (September 2009) for the likelihood of significant effects

Colours: no colour indicates no likely significant effect; pale red indicates where there is a likely significant effect; highlighted text in yellow indicates potential amendments to text.

Plan section/policy reference	Summary of relevant section/policy content	Likely Significant Effect	Explanation of assessment made	Counteracting measures, or proceed to AA
Overarching Vision	Explains that the Vision is guided by the Purbeck Community Plan, reflecting its Priority Areas. The environment features as one of the seven Priority Areas, with all other elements being very strategic and in accordance with sustainability principles.	No LSE	The environment features as one of the seven Priority Areas, with all other elements being very strategic and in accordance with sustainability principles. The Vision does not include any location or quantum of development for the District.	No further action required.
North East Vision	Describes the vision for Upton and Lytchett.	LSE Particularly Dorset Heaths SAC and SPA.	Potential for additional development at Upton to add to effects on surrounding heaths. Also references to managed realignment of Poole Harbour.	Impact of increased development generally across the district to be assessed within AA as part of overall housing figures and locations proposed within the plan.
Central Vision	Describes the vision for Wareham, North Wareham and Sandford.	LSE	Potential for additional development to add to effects to sites in terms of increase urbanisation and disturbance	Impact of increased development generally across the district to be considered in AA as part of overall housing figures and locations proposed within the plan. Wording could be strengthened to include other measures besides green space to reduce visitor pressure on adjacent heathland.
South East Vision	Describes the vision for Swanage, Corfe Castle and Langton, supporting a focus of development at Swanage.	LSE	Potential for additional development to add to effects to sites in terms of increase urbanisation and disturbance	Impact of increased development generally across the district to be considered in AA as part of overall housing figures and locations proposed within the plan. Promotion of Swanage needs to be considered in relation to visitor

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Plan section/policy reference	Summary of relevant section/policy content	Likely Significant Effect	Explanation of assessment made	Counteracting measures, or proceed to AA
				pressure on coastal sites.
South West Vision	Describes the vision for Wool, Bovington Winfrith Newburgh and West Lulworth. Winfrith Technology Centre is also promoted.	LSE	Potential for additional development to add to effects to sites in terms of increase urbanisation and disturbance	Impact of increased development generally across the district to be considered in AA as part of overall housing figures and locations proposed within the plan. Also need to specifically check Winfrith Technology Centre proposal.
North West Vision	Describes the vision for Bere Regis.	LSE Particularly Dorset Heaths SAC and SPA.	Potential for additional development at Bere Regis to add to effects on adjacent heaths.	Impact of increased development generally across the district to be assessed within AA as part of overall housing figures and locations proposed within the plan.
Vision for A351 Corridor	Describes the vision for the road corridor to the east of Wareham.	LSE	Enhanced transport infrastructure and employment allocation could increase pressures on adjacent heaths.	AA needs to consider issues at Holton Heath, such as fragmentation of heaths.
Spatial Objectives	The 10 spatial objectives set out social, economic and environmental objectives to improve the sustainability of the District.	No LSE	Objectives are overarching and very strategic in nature. The objectives do not promote development, or particular development locations.	No further action required.
Policy LD	The policy sets out the locations for development, following the settlement hierarchy pattern. The key towns, along with a number of key service villages will be the focus of development.	LSE	The effects of development in towns with close proximity to European sites cannot be ruled out without further consideration. Effects arising from close proximity include water resources and quality, pollution, direct land take, disturbance, erosion, recreational pressure and urbanisation effects.	Impact of increased development generally across the district to be assessed within AA, and this will also include consideration of the focus of development in the main towns and service villages, taking into account proximity to European sites.
Policy HS	Sets out the quantum of new housing for the District for the plan period, being 2,400 houses	LSE	Potential for effects upon all European sites as a result of the quantum of new housing for the district, in terms of water resources and quality,	Impact of the quantum of housing proposed to be assessed within AA.

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Plan section/policy reference	Summary of relevant section/policy content	Likely Significant Effect	Explanation of assessment made	Counteracting measures, or proceed to AA
			pollution, direct land take, disturbance, erosion, recreational pressure and urbanisation effects	
Policy ELS	Policy lists key locations for employment land, totalling some 37ha.	LSE	Possible locations for employment land are close to European sites, which could increase recreational pressure.	Further investigation of employment land locations required. To discuss with Council.
Policy RFS	Sets out retail floor space allocations in square metres, for towns within the District.	No LSE	This type of development is unlikely to result in effects upon European sites.	No further action required.
Preferred Option for Development	Three options for the proportions and distribution of development are proposed. The preferred option presented includes Swanage as the main focus of new housing, with Upton and Wareham also absorbing significant proportions of the overall quantum. With the preferred option there is also a slightly increased focus of development in the key service villages in comparison with the other two options.	LSE	At the broad filter stage of checking for LSE, it appears that the preferred option would be the most preferable of the three in terms of potential effects upon European sites. However, all three options are likely to have significant effects that need to be assessed further.	Impact of increased development generally across the district to be assessed within AA, and this will also include consideration of the focus of development in the main towns and service villages, taking into account proximity to European sites.
Alternative Option A	This option places the focus of development at Wareham, with lesser allocations for housing at Swanage, Upton and the key service villages.	LSE	Whilst all three options are likely to have a significant effect upon European sites, alternative option A appears to be the most damaging, and potentially the most difficult to mitigate for, with growth concentrated in close proximity to heathland sites.	Whilst this is not the preferred option, some consideration will be given within the AA to proposals for alternative options, in order to inform the next stage of the plan, and contribute to decisions made over options pursued.
Alternative Option B	This option places the focus of development at Swanage, with lesser allocations for housing at Wareham, Upton and the key service villages.	LSE	The extent and type of effects that may occur from this option are unclear at this stage. A focus of development at Swanage may have implications for coastal European sites, which would require further investigation. All three options are likely to have a significant effect upon European sites, and this option would also still require consideration of development at Upton and Wareham, even though the quantum of development proposed in these locations is smaller.	Whilst this is not the preferred option, some consideration will be given within the AA to proposals for alternative options, in order to inform the next stage of the plan, and contribute to decisions made over options pursued.
Policy CO	Describes the criteria by which development in	No LSE	The policy itself will not lead to development,	The text on equestrian

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Plan section/policy reference	Summary of relevant section/policy content	Likely Significant Effect	Explanation of assessment made	Counteracting measures, or proceed to AA
	the countryside will be assessed, including the re-use or replacement of buildings.		rather it describes criteria by which development in the countryside will be judged. The policy is qualitative, and does not include locations or a quantum of development.	development could be strengthened to ensure developments adjacent or with direct access to any European Protected Site will not be permitted.
Policy GB	Sets out modifications to the greenbelt.	No LSE	The greenbelt itself is not designated to protect European sites. Its alteration therefore does not result in effects upon European sites. The policy does not include locations or a quantum of development.	No further action required.
Policy AHT	Sets out the mix of affordable housing types within the district.	No LSE	The type of affordable housing will not influence effects upon European sites.	No further action required.
Policy AH	Describes the proposals for affordable housing .	No LSE	The policy is overarching, setting out requirements for affordable housing to ensure mixed and sustainable communities. It does not refer to locations or types of development	No further action required.
Policy RE	Sets out exceptions to rural housing policy.	No LSE	A qualitative policy, which does not include locations or a quantum of development.	No further action required.
Policy GT	Sets out criteria for considering gypsy, traveller and travelling show people sites.	No LSE	A qualitative policy, which does not include locations or a quantum of development. The policy includes wording that protects the natural environment from harm.	No further action required.
Policy WHN	Explains the focus of supported housing	No LSE	A qualitative policy, which does refer to locations for development, but includes all key service villages and main settlements. This therefore provides for a wide range of locations and is very general in nature.	No further action required.
Policy RP	Explains the hierarchy of retail provision within the District, focusing on the importance of town centres.	No LSE	The location for this type of development is unlikely to result in effects upon European sites, and by focusing upon existing retail centres, the development is drawn away from European sites.	No further action required.
Policy CF	Sets out criteria for considering community facilities and services.	No LSE	There is a focus upon the provision of facilities within towns and villages, following sustainable principles for the proximity of facilities. This	No further action required.

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Plan section/policy reference	Summary of relevant section/policy content	Likely Significant Effect	Explanation of assessment made	Counteracting measures, or proceed to AA
			therefore means that development is drawn away from European sites.	
Policy GI	Sets out objectives for green infrastructure, sports and recreation facilities	Cannot rule out no LSE	There is a possibility that the promotion, enhancement and expansion of green infrastructure could include accessible areas of European sites, which in turn could bring greater recreational pressure to sensitive sites	Consider expansion of paragraph 8.10.3 of supporting text to emphasise the need to ensure the protection of the ecological integrity of European sites as part of green infrastructure enhancement and expansion.
Policy FR	Promotes the principles of PPS25 in relation to flood management.	No LSE	A general policy incorporating sustainable principles of PPS25. Also prevents development exacerbating coastal erosion. Policy does not support any development.	No further action required.
Policy GP	Policy protects groundwater source protection areas from damaging development.	No LSE	A general policy protecting groundwater. No reference to development.	No further action required.
Policy CE	Policy creates a buffer zone to protect coastal cliffs from erosion.	No LSE	A general policy protecting coastal cliffs from erosion with a protection buffer. A positive protection policy without any reference to development.	No further action required.
Policy DSB	Promotes sustainable design and construction in built development	No LSE	A qualitative and environmentally positive policy, which does not promote development.	No further action required.
Policy LR	Promotes renewable energy development.	No LSE	Whilst promoting a development type, the policy does not refer to any locations or quantum of development. The policy also includes caveats to specifically ensure the protection of European sites and wider biodiversity.	No further action required.
Policy HLH	Policy protects the landscape and built heritage	No LSE	A qualitative and environmentally positive policy, which does not promote development.	No further action required.
Policy BIO	Policy protects the natural heritage of the District	No LSE	A wholly positive policy protecting the natural environment.	No further action required.
Policy DH	Sets in policy the agreed interim planning framework, developed by a partnership of Dorset authorities, to protect the Dorset Heathlands from the impact of development.	No LSE	A wholly positive policy protecting European sites.	Policy may require further amendment to incorporate any counteracting measures. Policy should be revisited at each HRA stage to determine whether

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Plan section/policy reference	Summary of relevant section/policy content	Likely Significant Effect	Explanation of assessment made	Counteracting measures, or proceed to AA
				amendments or additions are required.
Policy EE	Sets out general criteria for employment development, adhering to sustainability principles. Includes a focus on town and village centres.	No LSE	A general policy that does not refer to any quantum of employment development. Promotes urban centres, which generally detracts from locations in the vicinity of European sites.	No further action required.
Policy TA	Sets out criteria for tourism related development in the District.	Cannot rule out no LSE	There is a possibility that the tourism related development could be in close proximity to, or bring greater recreational pressure to sensitive sites.	Consider the expansion of paragraph 8.19.1, or the addition of a new paragraph to refer to the protection of biodiversity and in particular the need to ensure the protection of the ecological integrity of European sites.
Policy IAT	Promotes sustainable travel.	No LSE	A general and environmentally positive policy promoting sustainable travel. The policy does not in itself promote development.	No further action required.
Policy AP	Promotes the production and implementation of the Purbeck Transportation Strategy	LSE	There is the possibility that targeted road improvements could lead to effects upon European sites.	Further discussions and investigations required regarding the Purbeck Transportation Strategy and options for road improvements.
Monitoring	Yet to be added to the plan	N/A	N/A	N/A
Implementation	Yet to be added to the plan	N/A	N/A	N/A

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